Susitna-Watana Hydroelectric Project Document
ARLIS Uniform Cover Page

Title: Study of fish distribution and abundance in the upper Susitna River (9.5) : Initial study report. Appendices	**SuWa 207**
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Notes: Contents: appendix A. Distribution of fish radio-tagged in the upper Susitna River, 2013 -- appendix B. Fish distribution maps for the upper Susitna River, 2012 and 2013 -- appendix C. Seasonal fish distribution, upper Susitna River 2012 and 2013 -- appendix D. Upper river fish observations and relative abundance, 2013. The following parts of Section 9.5 appear in separate files: Main report ; Appendices.	

APPENDIX A: DISTRIBUTION OF FISH RADIO-TAGGED IN THE UPPER SUSITNA RIVER, 2013

APPENDIX B: FISH DISTRIBUTION MAPS FOR THE UPPER SUSITNA RIVER 2012 AND 2013

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(FERC No. 14241)

Study of Fish Distribution and Abundance in the Upper Susitna River (9.5)

Appendix A
Distribution of Fish Radio-Tagged in the Upper Susitna River, 2013

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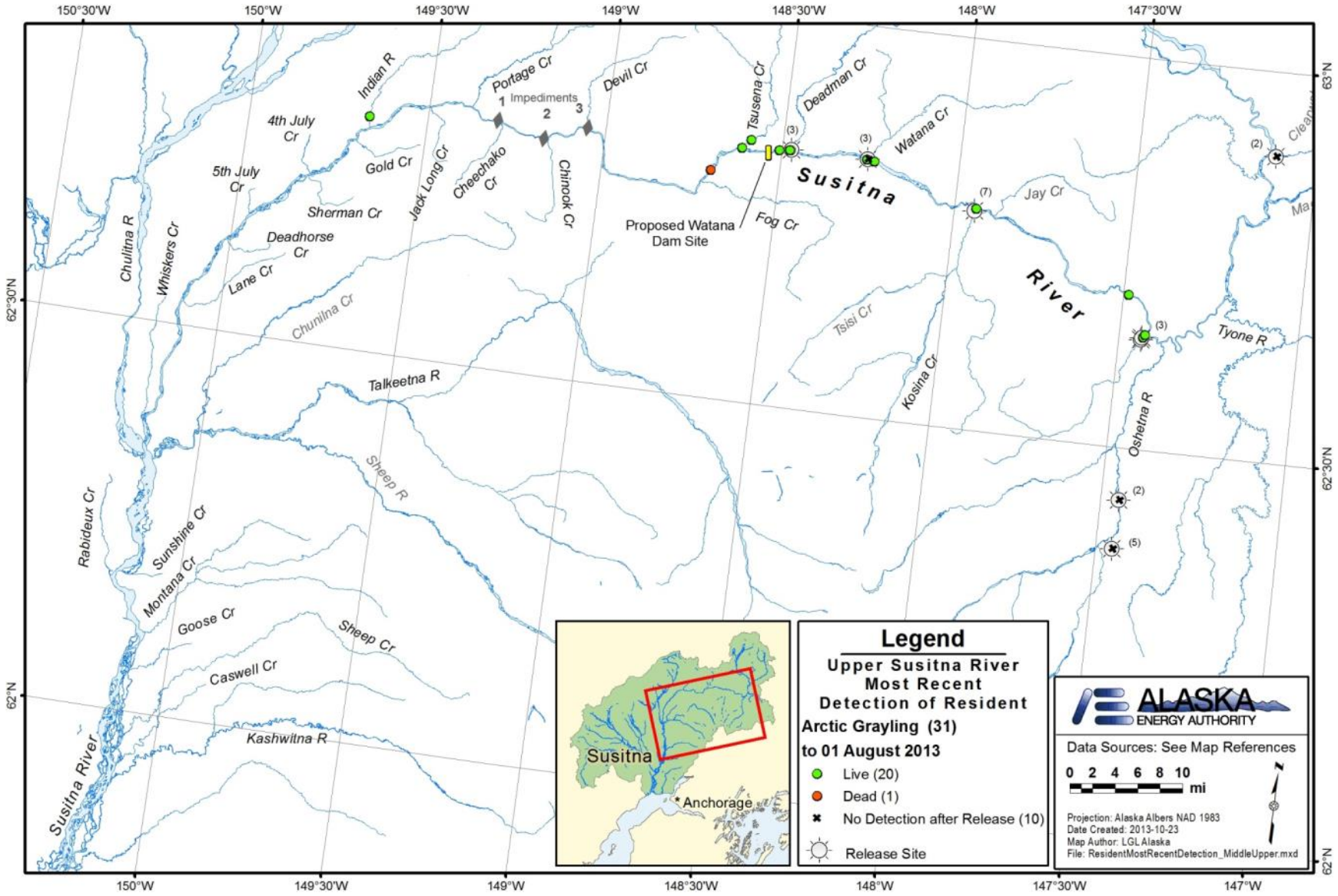

Figure A1. Distribution of Upper River radio-tagged Arctic grayling August 1, 2013.

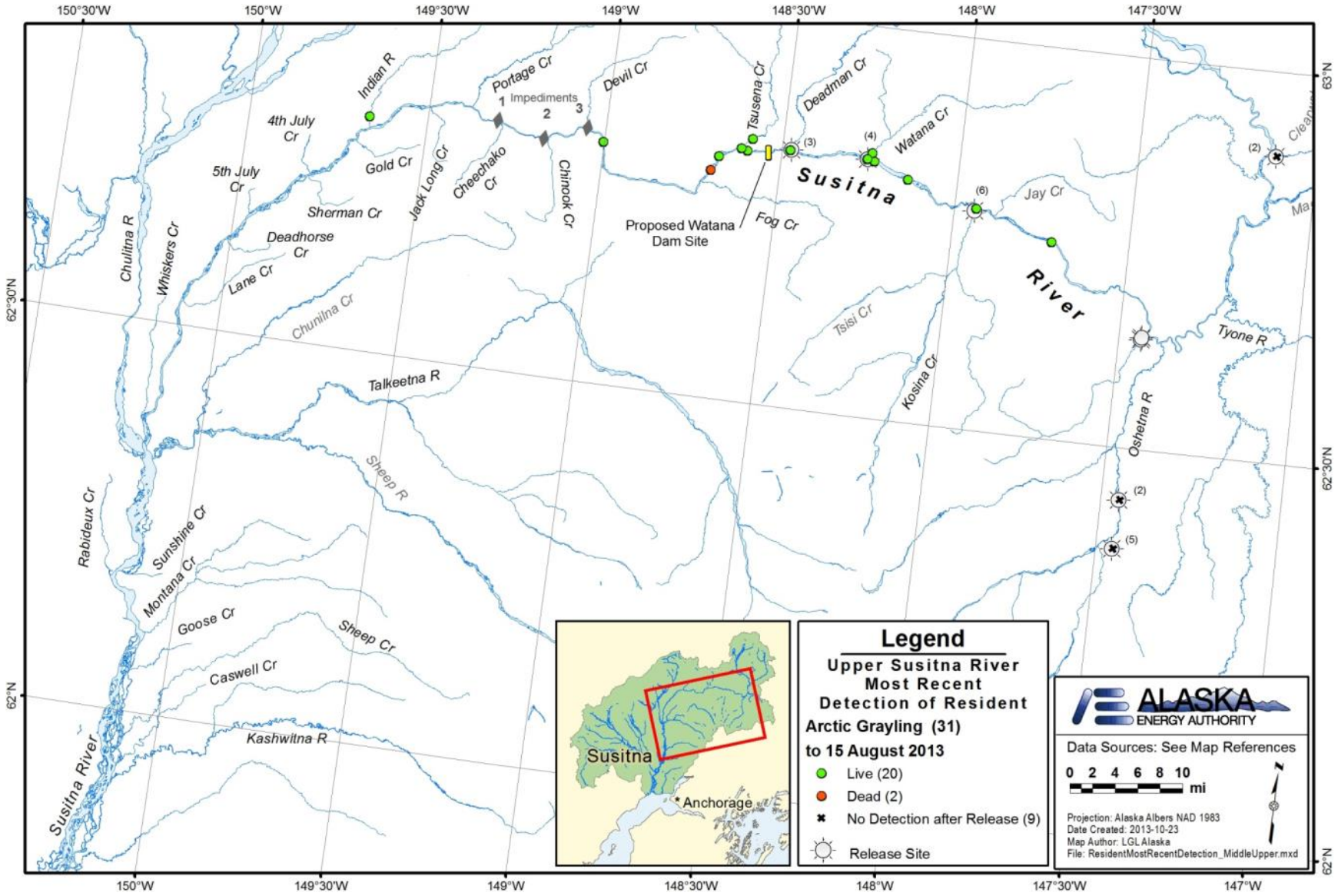

Figure A2. Distribution of Upper River radio-tagged Arctic grayling August 15, 2013.

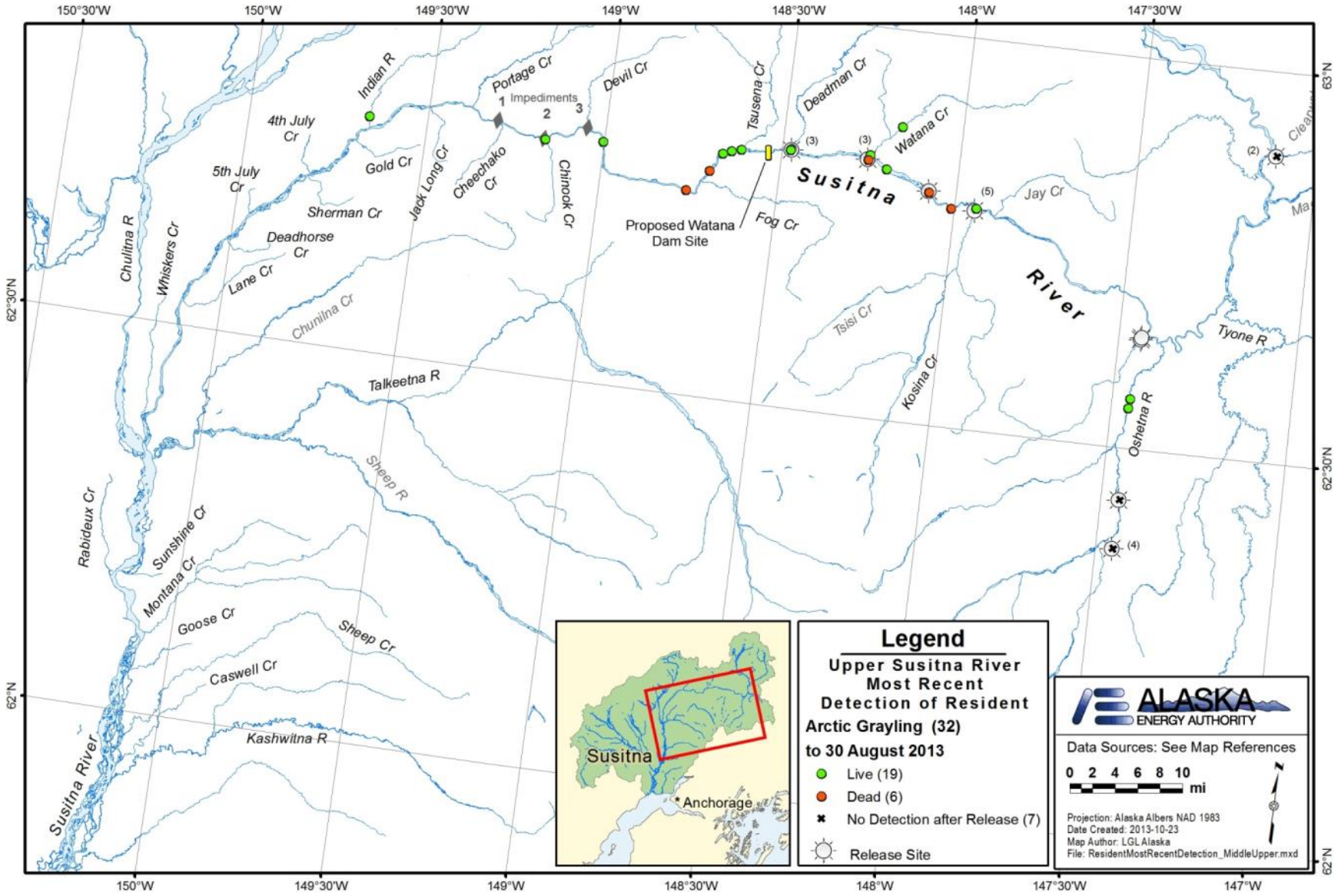

Figure A3. Distribution of Upper River radio-tagged Arctic grayling August 30, 2013.

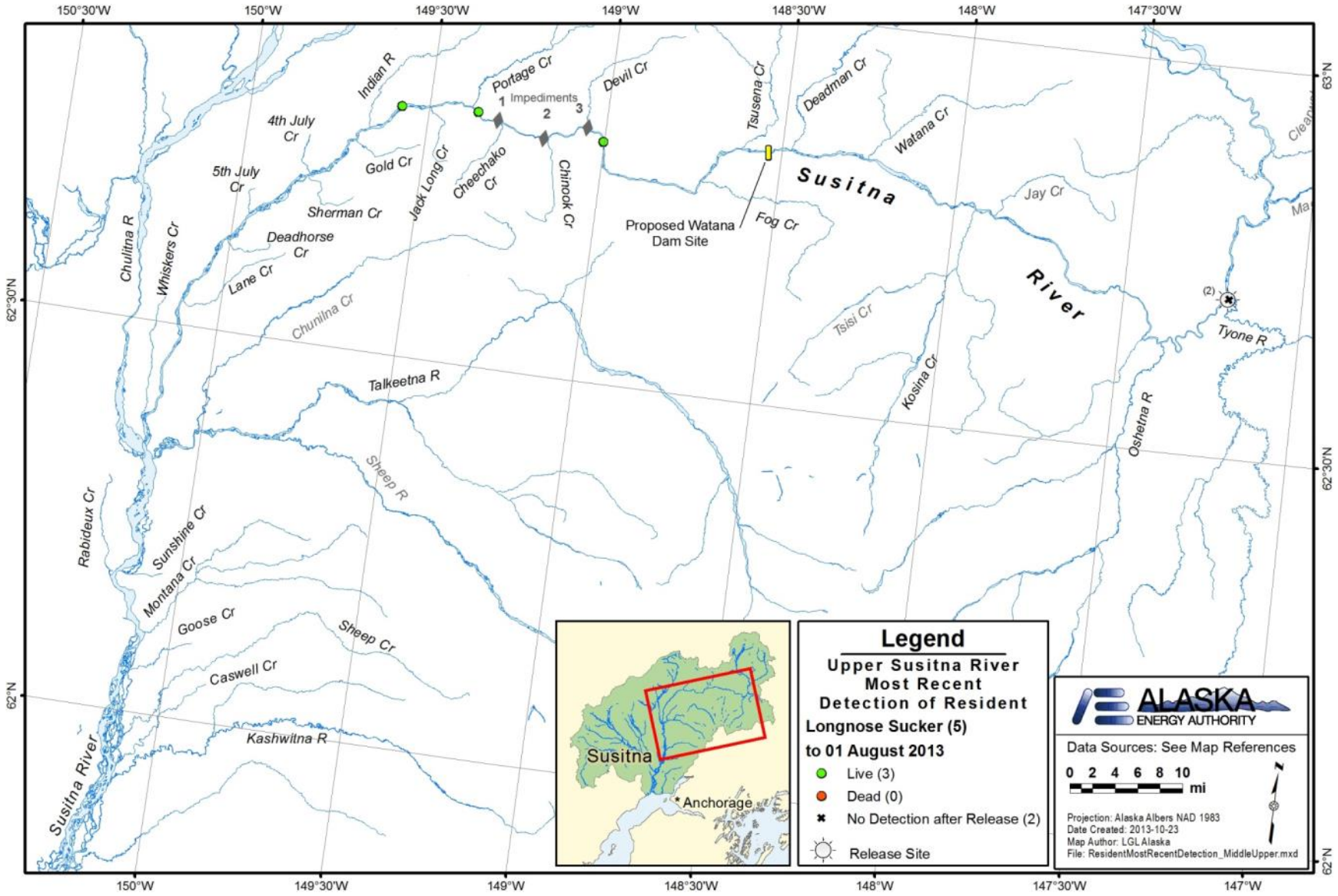

Figure A4. Distribution of Upper River radio-tagged longnose suckers August 1, 2013.

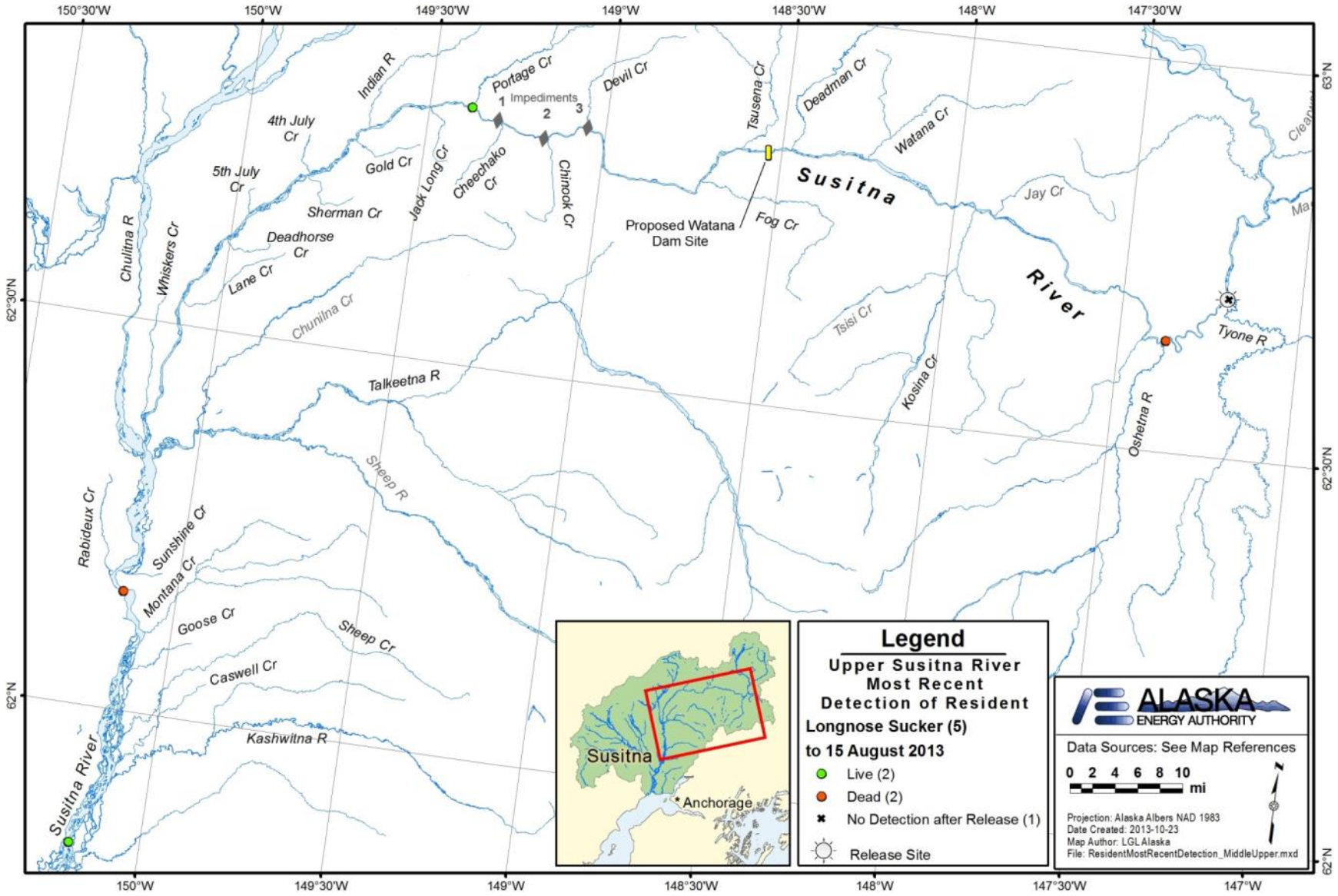

Figure A5. Distribution of Upper River radio-tagged longnose suckers August 15, 2013.

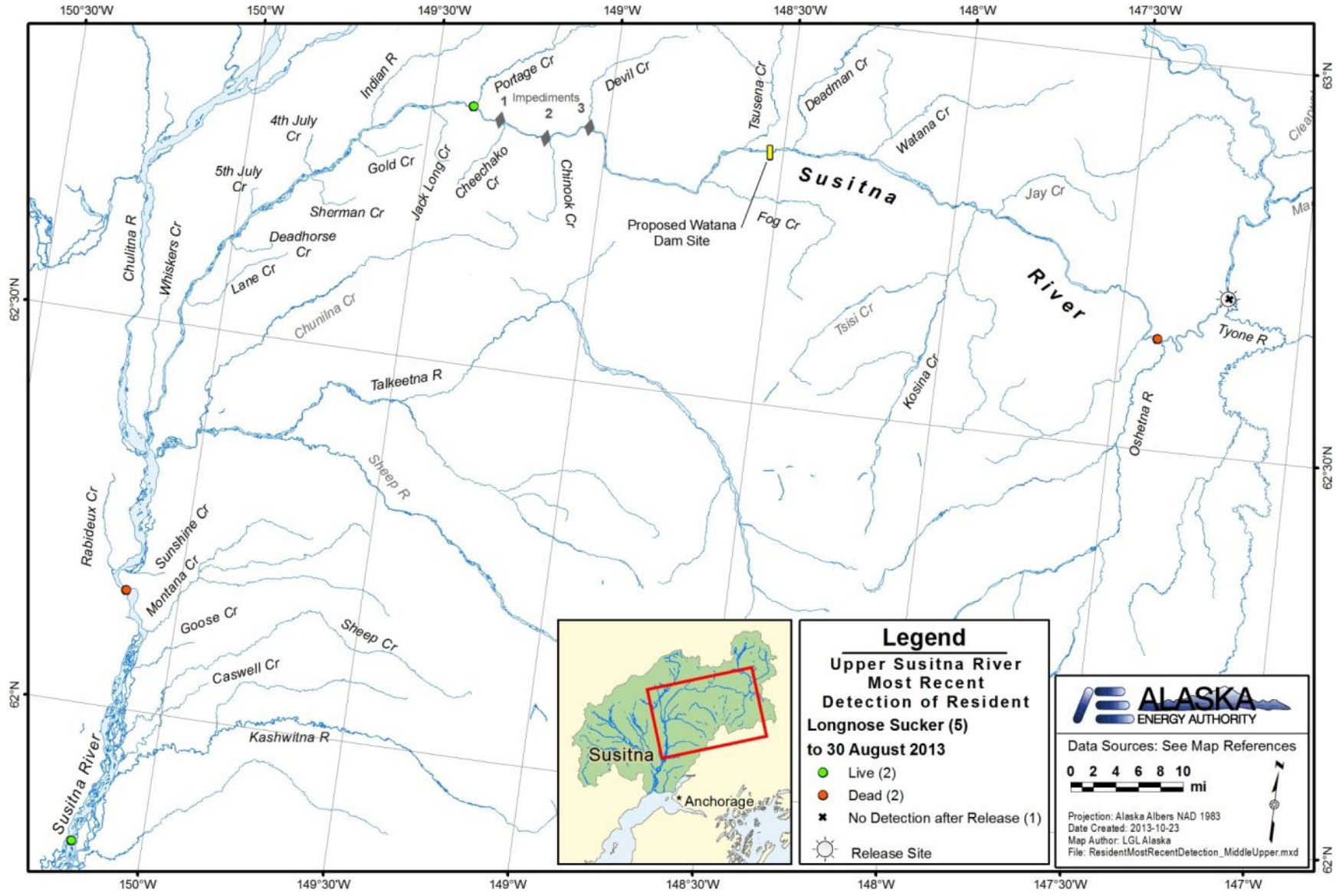

Figure A6. Distribution of Upper River radio-tagged longnose suckers August 30, 2013.

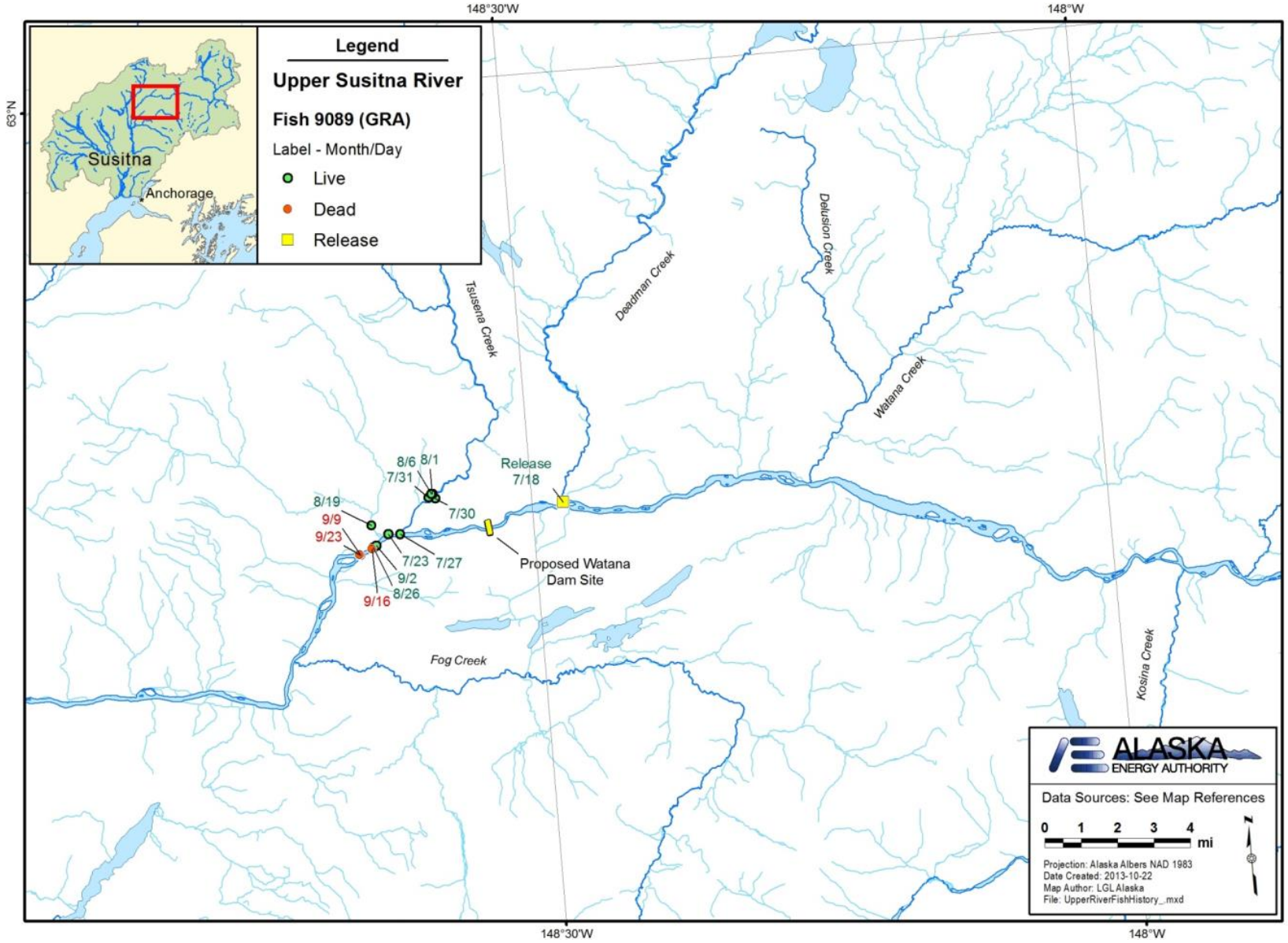

Figure A7. Movements of Upper River Arctic grayling tag ID 9089 through September, 2013.

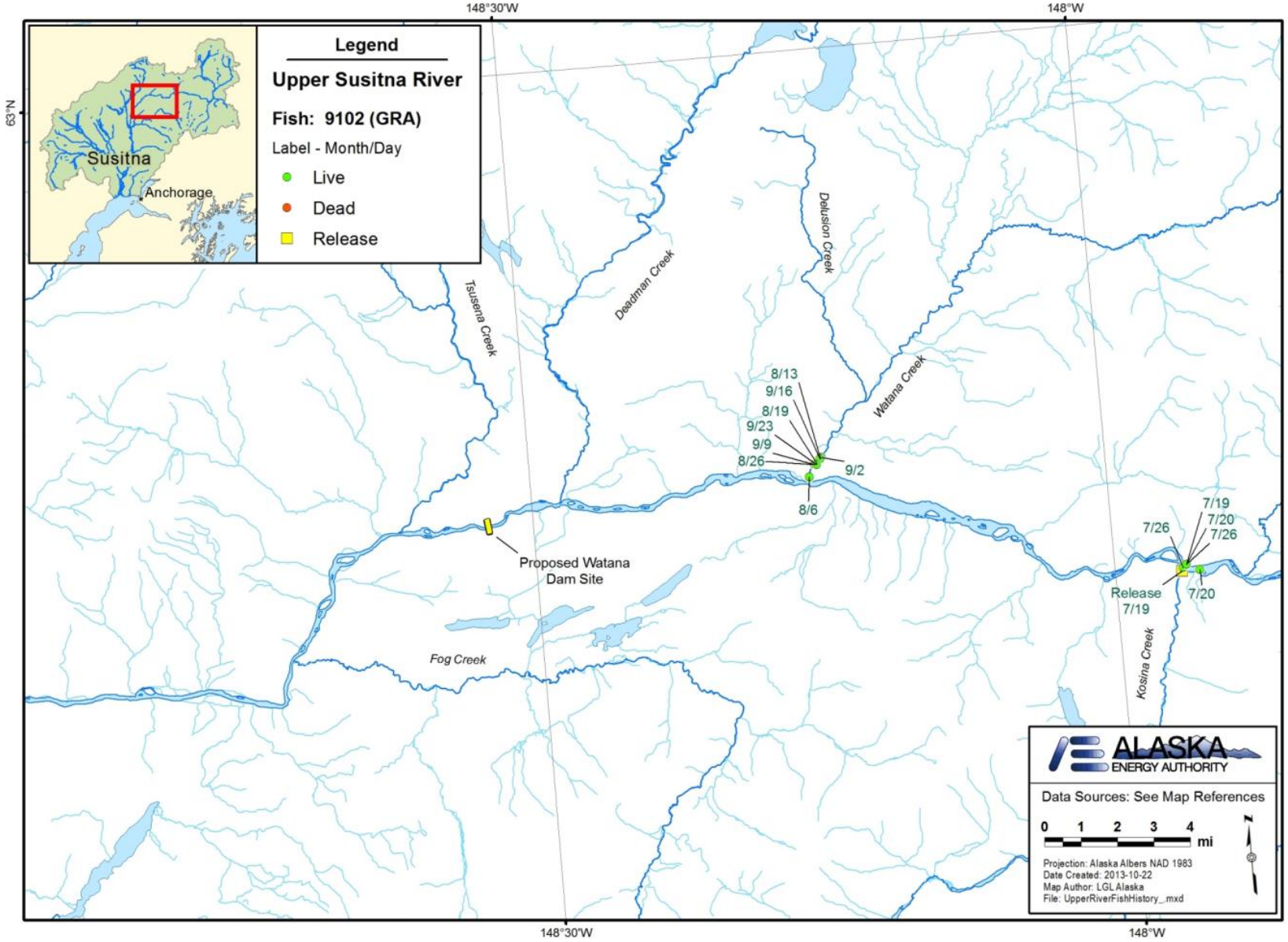

Figure A8. Movements of Upper River Arctic grayling tag ID 9102 through September, 2013.

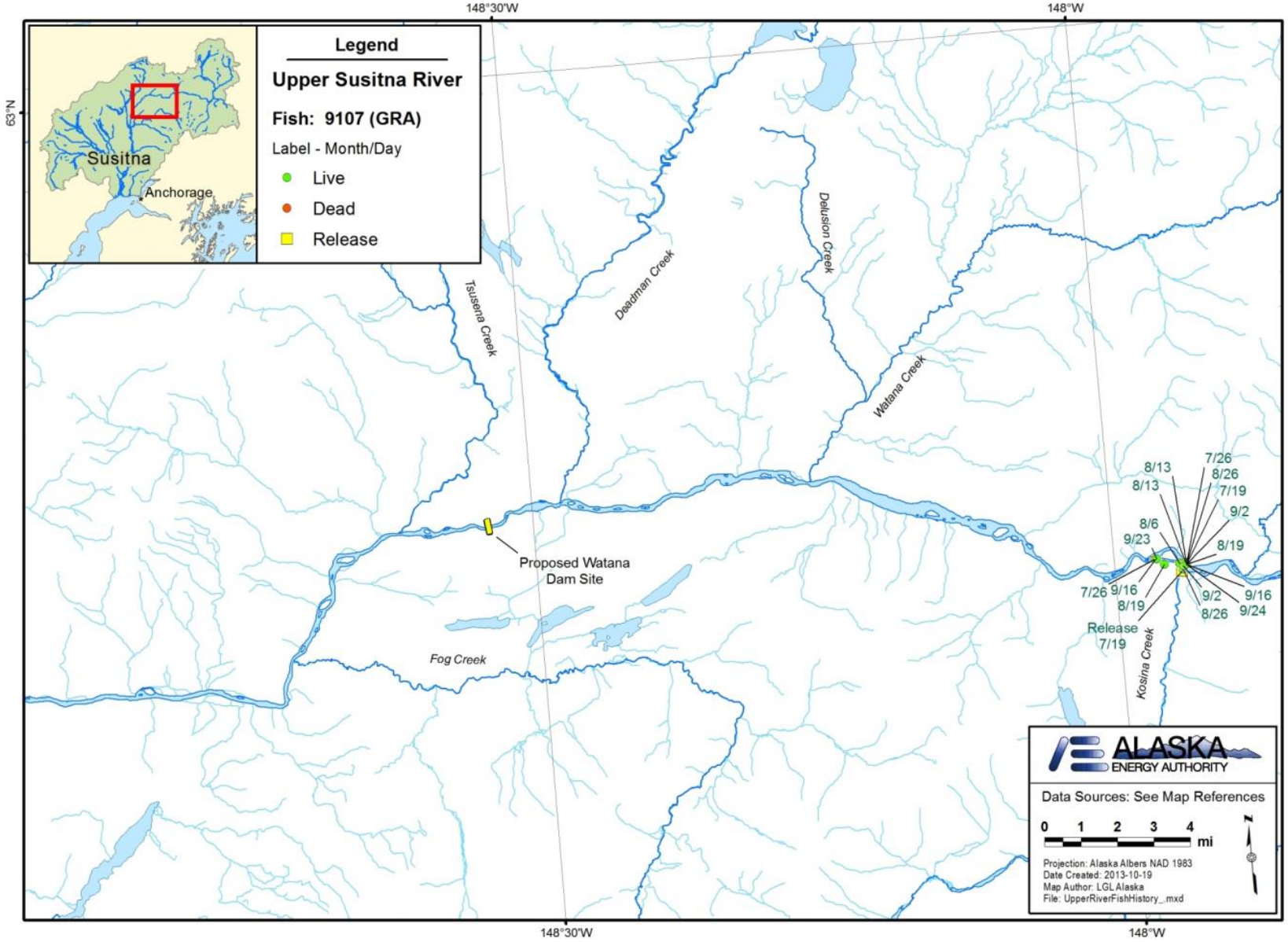

Figure A9. Movements of Upper River Arctic grayling tag ID 9107 through September, 2013.

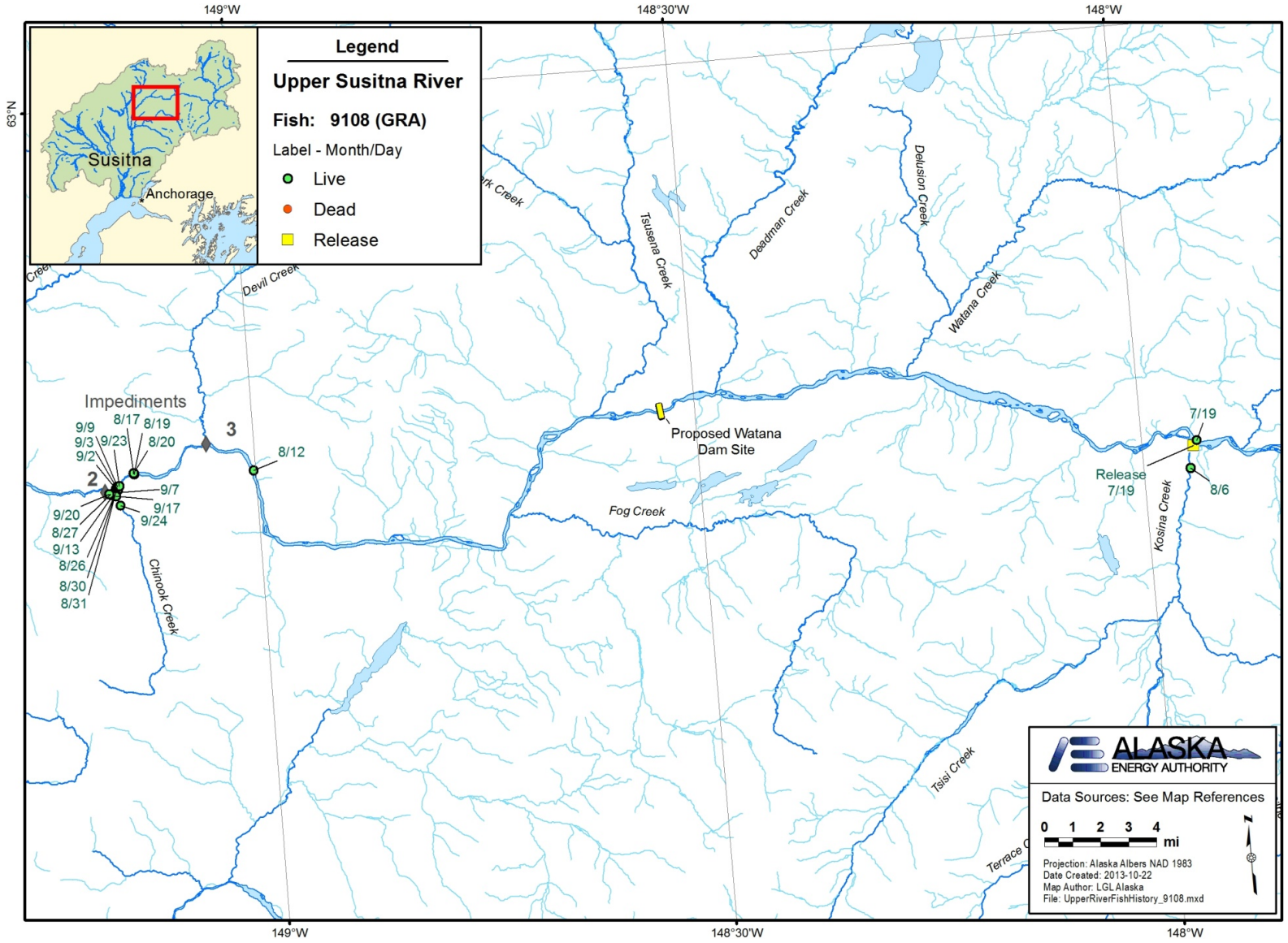

Figure A10. Movements of Upper River Arctic grayling tag ID 9108 through September, 2013.

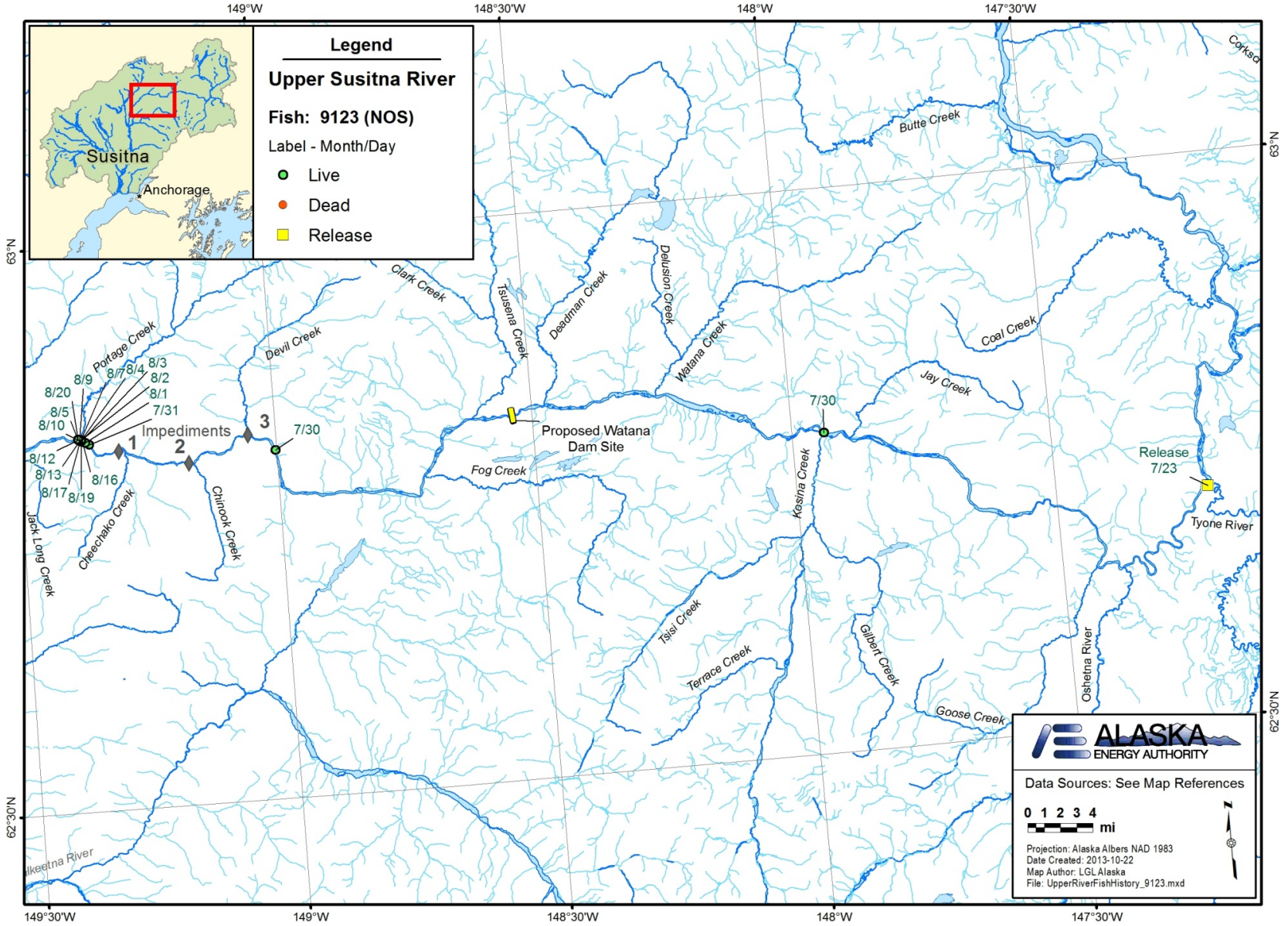

Figure A11. Movements of Upper River longnose sucker tag ID 9123 through September, 2013.

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Appendix B

Fish Distribution Maps for the Upper Susitna River, 2012 and 2013

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1. FISH DISTRIBUTION

The following distribution maps depict the occurrence of species from Fish Distribution and Abundance sampling efforts including early life history sampling, directed tributary sampling, GRTS tributary sampling, mainstem transect sampling, rotary screw trapping,, PIT array detections, resident fish radio-telemetry detections, directed fish sampling efforts for interrelated studies, genetics sampling efforts (ISR Study 9.14), and metal/mercury sampling efforts (ISR Study 5.5). The 2013 data for fish distribution was pooled with 2012 fish distribution data (HDR 2013). These maps do not represent the distribution of adult Chinook salmon, as that was documented in detail in ISR Study 9.7.

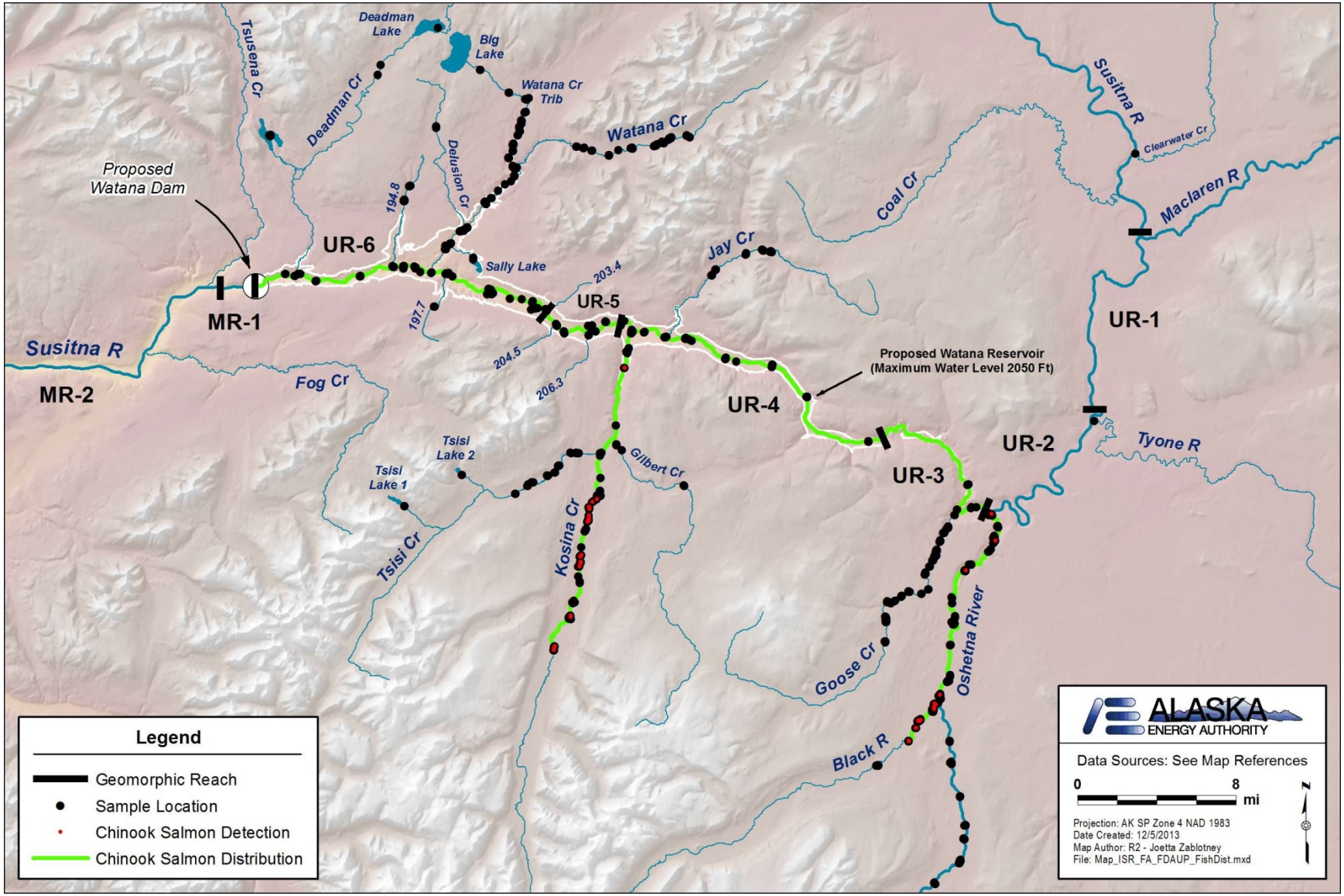

Figure B1. Upper Susitna River juvenile Chinook salmon distribution 2013. No juvenile Chinook were detected upstream of the proposed dam site in 2012. Adult Chinook distributions are reported in ISR Study 9.7.

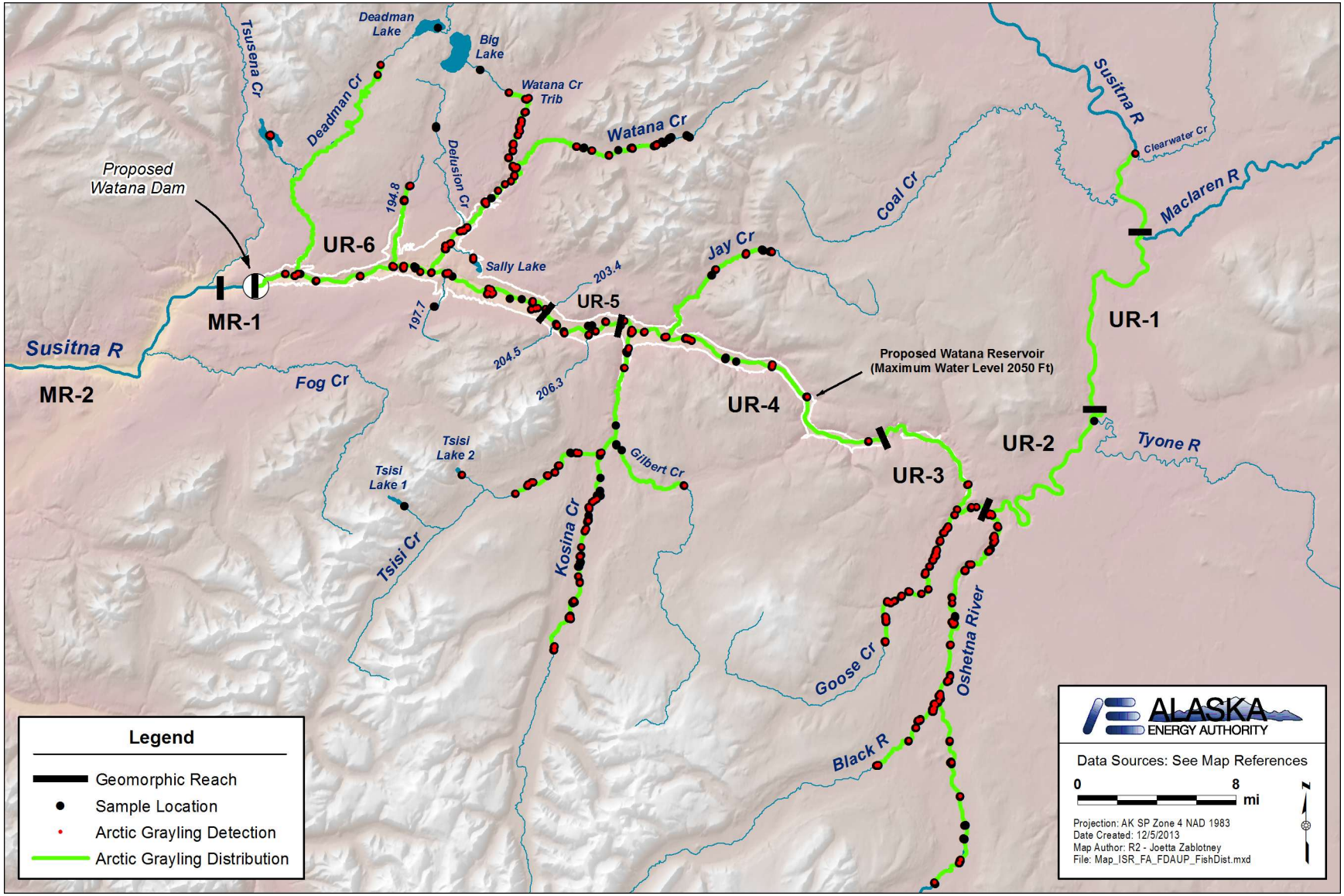

Figure B2. Upper Susitna River Arctic grayling distribution 2012 and 2013.

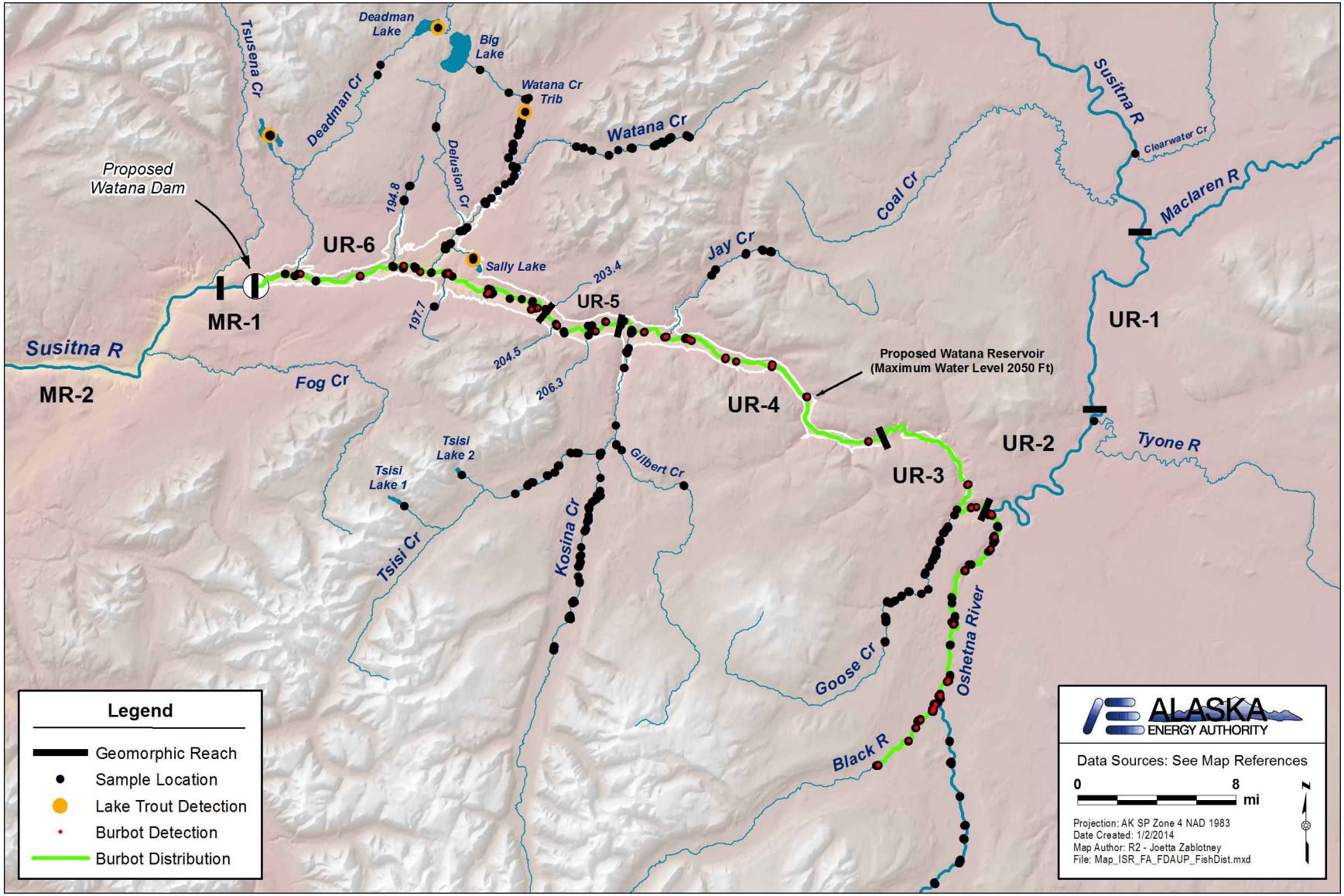

Figure B3. Upper Susitna River burbot and lake trout distribution 2012 and 2013.

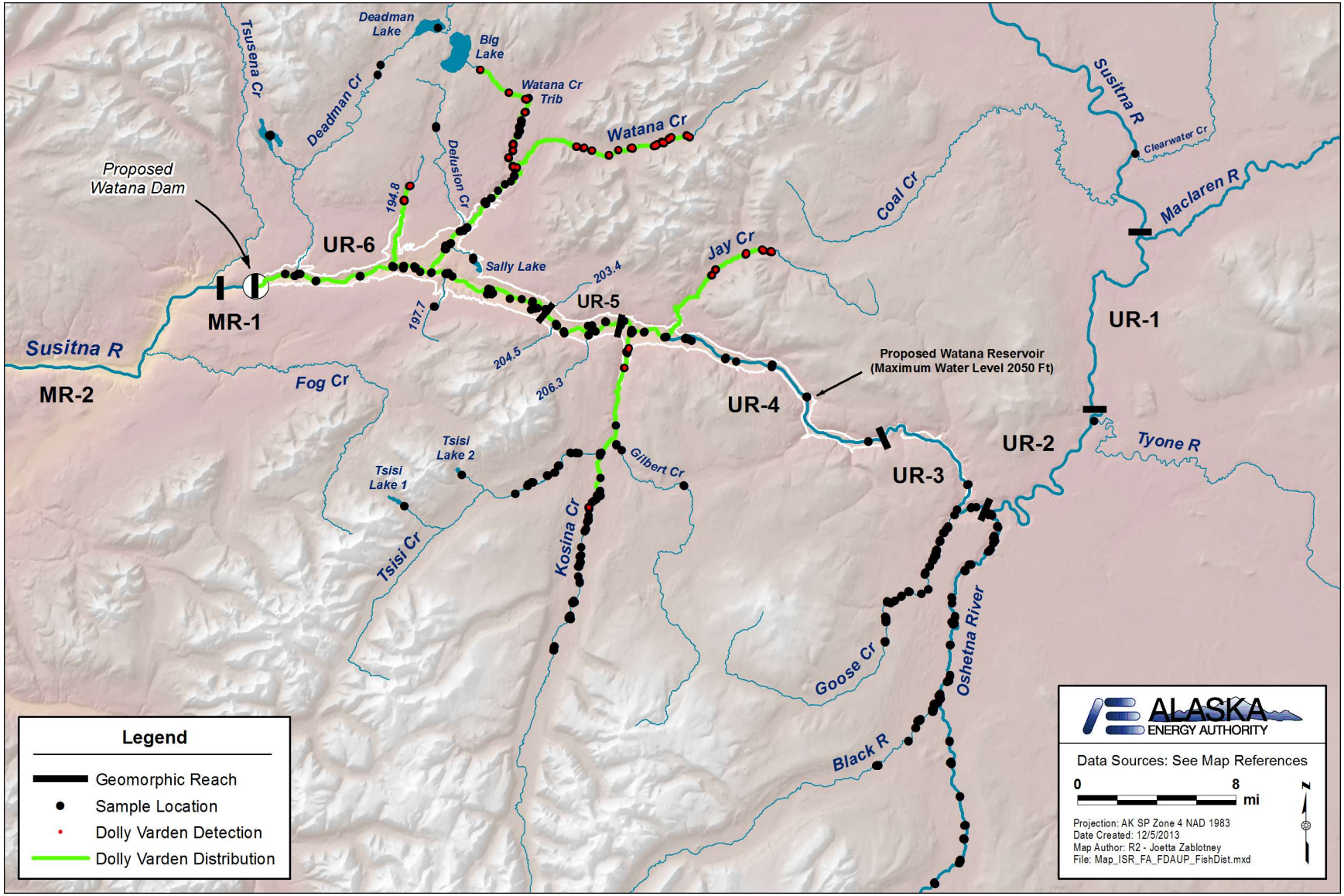

Figure B4. Upper Susitna River Dolly Varden distribution 2012 and 2013.

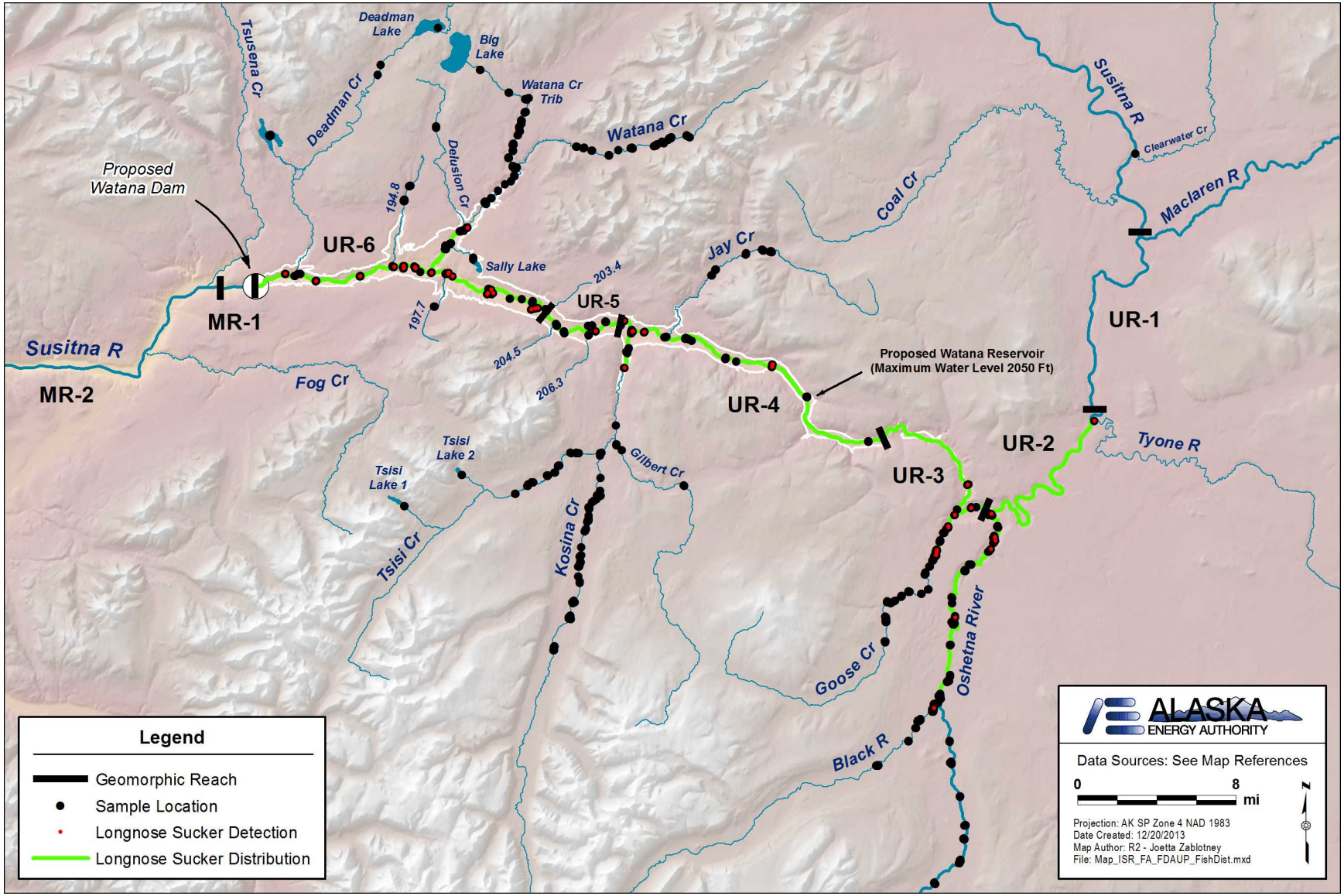

Figure B5. Upper Susitna River longnose sucker distribution 2012 and 2013.

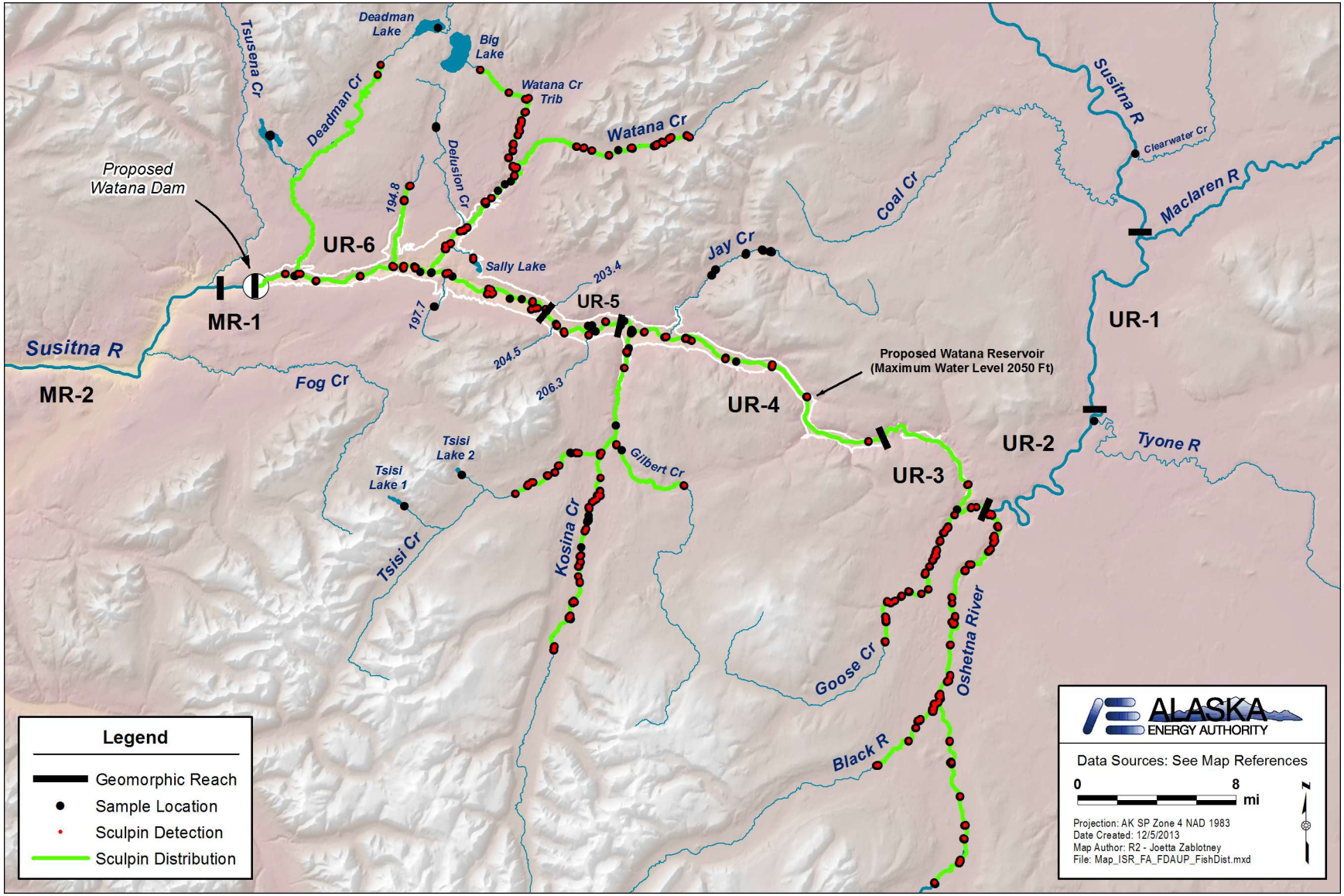

Figure B6. Upper Susitna River sculpin distribution 2012 and 2013.

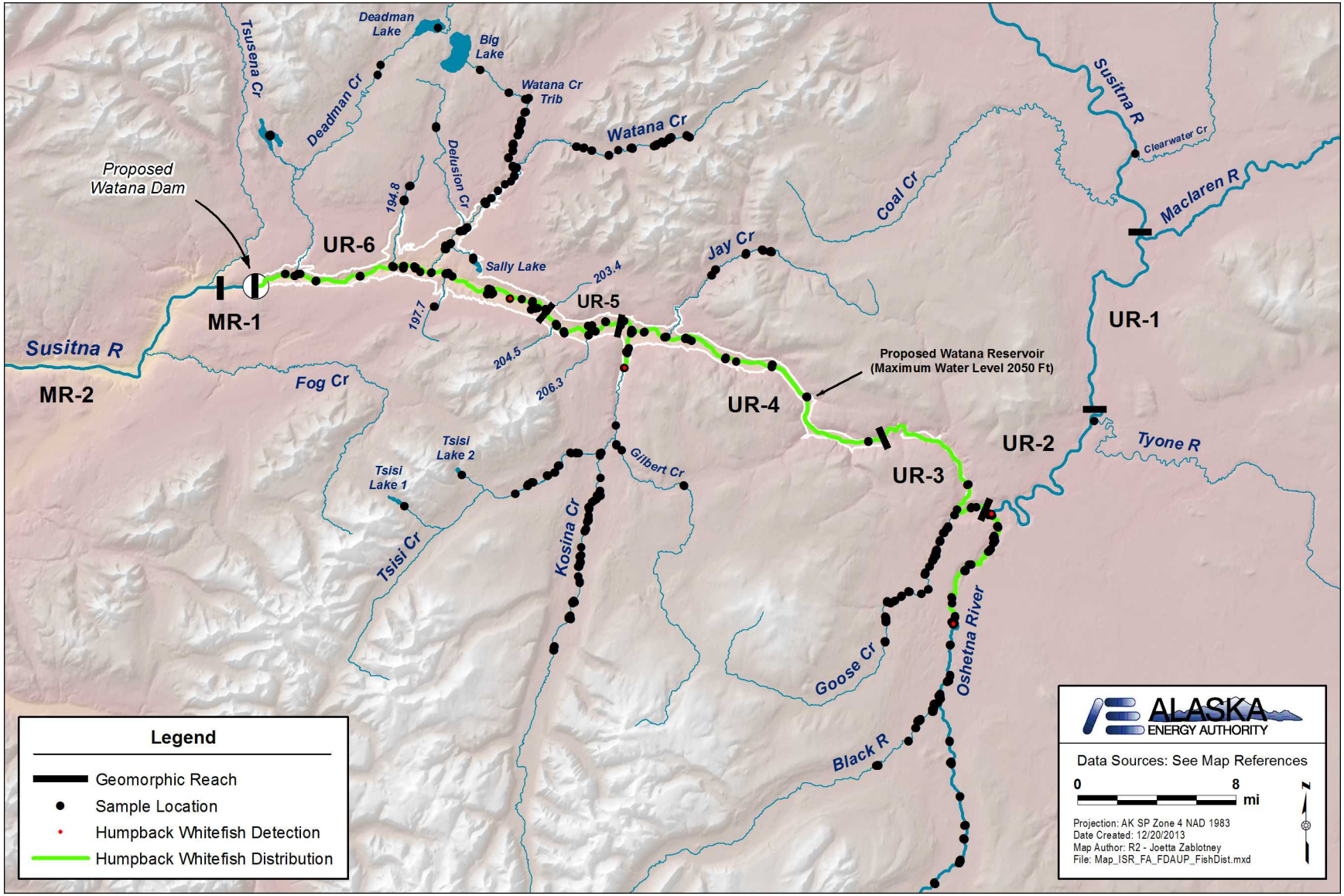

Figure B7. Upper Susitna River humpback whitefish distribution 2012 and 2013.

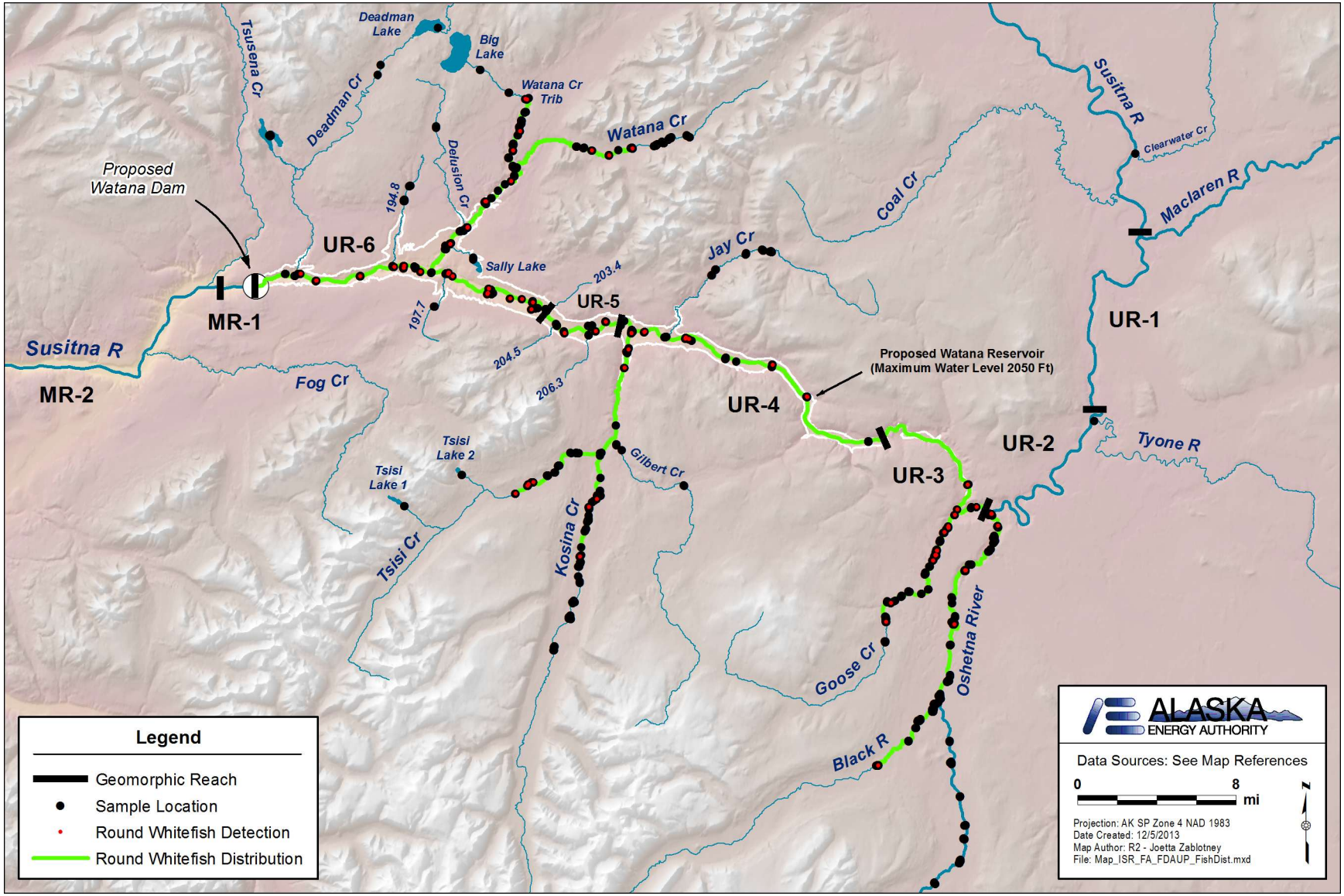

Figure B8. Upper Susitna River round whitefish distribution 2012 and 2013.

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Appendix C
Seasonal Fish Distribution, Upper Susitna River 2012 and 2013

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Table C1. Seasonal distribution of juvenile Chinook salmon in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X		
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4				
Susitna River UR-5	203.4-208.1				
Susitna River UR-4	208.1-224.9				
Susitna River UR-3	224.9-234.5				
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5				
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4				
Unnamed Tributary	194.8				
Watana Creek	196.9				
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A				
Unnamed Tributary	197.7				
Unnamed Tributary	198.4				
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1		X	X	X
Kosina Creek Tributary: Tsisi Creek	N/A				
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0				
Goose Creek	232.8				
Oshetna River	235.1		X		X
Oshetna River Tributary: Black River	N/A	X	X	X	X
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A				
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				
Notes: Shaded cells indicate that a given location was sampled.					

Table C2. Seasonal distribution of Arctic grayling in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X	X	X
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4		X	X	X
Susitna River UR-5	203.4-208.1		X		X
Susitna River UR-4	208.1-224.9		X	X	X
Susitna River UR-3	224.9-234.5		X		X
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5		X	X	
Aerial Mainstem - Dam site to Oshetna	187.1-235.1		X	X	
Deadman Creek	189.4		X	X	
Unnamed Tributary	194.8		X		
Watana Creek	196.9		X	X	X
Watana Creek Tributary: Unnamed L1	N/A		X		
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A		X		
Watana Creek Tributary: Unnamed R5	N/A			X	
Unnamed Tributary	197.7		X		
Unnamed Tributary	198.4				
Unnamed Tributary	203.4		X		
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1	X	X	X	X
Kosina Creek Tributary: Tsisi Creek	N/A	X	X	X	X
Kosina Creek Tributary: Gilbert Creek	N/A		X		
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0		X	X	X
Goose Creek	232.8		X	X	X
Oshetna River	235.1	X	X	X	X
Oshetna River Tributary: Black River	N/A	X	X	X	X
Tyone River	247.3				
Clearwater Creek	266.6		X		
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A			X	
Watana Basin Lake: Sally Lake	N/A		X		
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A	X			

Notes: Shaded cells indicate that a given location was sampled. Stippled cells indicate that aerial flight for radio tags occurred.

Table C3. Seasonal distribution of burbot in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X	X	X
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4		X	X	X
Susitna River UR-5	203.4-208.1		X		X
Susitna River UR-4	208.1-224.9		X	X	X
Susitna River UR-3	224.9-234.5		X	X	X
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5				
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4				
Unnamed Tributary	194.8				
Watana Creek	196.9				
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A				
Unnamed Tributary	197.7				
Unnamed Tributary	198.4				
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1	X			
Kosina Creek Tributary: Tsisi Creek	N/A				
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0			X	X
Goose Creek	232.8				
Oshetna River	235.1	X	X	X	X
Oshetna River Tributary: Black River	N/A	X	X	X	X
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A				
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled.

Table C4. Seasonal distribution of Dolly Varden in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X	X	X
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4				
Susitna River UR-5	203.4-208.1				
Susitna River UR-4	208.1-224.9				
Susitna River UR-3	224.9-234.5				
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5				
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4				
Unnamed Tributary	194.8		X	X	X
Watana Creek	196.9		X	X	X
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A		X	X	X
Unnamed Tributary	197.7				
Unnamed Tributary	198.4			X	
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1	X		X	X
Kosina Creek Tributary: Tsisi Creek	N/A				
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0		X	X	X
Goose Creek	232.8				
Oshetna River	235.1				
Oshetna River Tributary: Black River	N/A				
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A				
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled.

Table C5. Seasonal distribution of lake trout in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1				
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4				
Susitna River UR-5	203.4-208.1				
Susitna River UR-4	208.1-224.9				
Susitna River UR-3	224.9-234.5				
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5				
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4				
Unnamed Tributary	194.8				
Watana Creek	196.9				
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A				X
Unnamed Tributary	197.7				
Unnamed Tributary	198.4				
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1				
Kosina Creek Tributary: Tsisi Creek	N/A				
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0				
Goose Creek	232.8				
Oshetna River	235.1				
Oshetna River Tributary: Black River	N/A				
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				X
Deadman Basin Lake: Unnamed	N/A			X	
Watana Basin Lake: Sally Lake	N/A		X		
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled.

Table C6. Seasonal distribution of longnose sucker in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X	X	X
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4		X	X	X
Susitna River UR-5	203.4-208.1				X
Susitna River UR-4	208.1-224.9	X	X	X	X
Susitna River UR-3	224.9-234.5			X	X
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5		X	X	
Aerial Mainstem - Dam site to Oshetna	187.1-235.1		X	X	
Deadman Creek	189.4				
Unnamed Tributary	194.8				
Watana Creek	196.9		X		
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A				
Unnamed Tributary	197.7				
Unnamed Tributary	198.4				
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1	X			X
Kosina Creek Tributary: Tsisi Creek	N/A				
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0				
Goose Creek	232.8		X	X	
Oshetna River	235.1	X	X	X	X
Oshetna River Tributary: Black River	N/A			X	
Tyone River	247.3		X		
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A				
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled. Stippled cells indicate that aerial flight for radio tags occurred.

Table C7. Seasonal distribution of sculpin in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X	X	X
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4		X	X	X
Susitna River UR-5	203.4-208.1		X	X	X
Susitna River UR-4	208.1-224.9		X	X	X
Susitna River UR-3	224.9-234.5		X	X	X
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5		X		
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4		X		
Unnamed Tributary	194.8		X	X	X
Watana Creek	196.9		X	X	X
Watana Creek Tributary: Unnamed L1	N/A		X		
Watana Creek Tributary: Unnamed L3	N/A		X		
Watana Creek Tributary: Unnamed R3	N/A		X		
Watana Creek Tributary: Unnamed R5	N/A			X	
Unnamed Tributary	197.7		X		
Unnamed Tributary	198.4				
Unnamed Tributary	203.4		X		
Unnamed Tributary	204.3				
Unnamed Tributary	206.3		X		
Kosina Creek	209.1	X	X	X	X
Kosina Creek Tributary: Tsisi Creek	N/A	X	X	X	X
Kosina Creek Tributary: Gilbert Creek	N/A		X		
Kosina Creek Tributary: Unnamed	N/A		X		
Jay Creek	211.0		X	X	X
Goose Creek	232.8		X	X	X
Oshetna River	235.1	X	X	X	X
Oshetna River Tributary: Black River	N/A	X	X	X	X
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A		X		
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled.

Table C8. Seasonal distribution of humpback whitefish in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1				
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4				X
Susitna River UR-5	203.4-208.1				
Susitna River UR-4	208.1-224.9				
Susitna River UR-3	224.9-234.5				
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5				
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4				
Unnamed Tributary	194.8				
Watana Creek	196.9				
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A				
Unnamed Tributary	197.7				
Unnamed Tributary	198.4				
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1				X
Kosina Creek Tributary: Tsisi Creek	N/A				
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0				
Goose Creek	232.8				
Oshetna River	235.1	X	X	X	
Oshetna River Tributary: Black River	N/A				
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A				
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled.

Table C9. Seasonal distribution of round whitefish in the Upper Susitna River, 2012 and 2013.

Location	PRM	ELH (June 4-June 30)	Early Summer (July 1- August 10)	Late Summer (August 11 - Sept 9)	Fall (Sept 10 - Oct 7)
Susita River Devils Canyon to Watana Dam	166.1-187.1		X	X	X
Watana Dam	187.1	---	---	---	---
Susitna River UR-6	187.1-203.4		X	X	X
Susitna River UR-5	203.4-208.1				X
Susitna River UR-4	208.1-224.9			X	X
Susitna River UR-3	224.9-234.5			X	X
Watana Reservoir at Full Pool	232.5	---	---	---	---
Susitna above Oshetna	>234.5				
Aerial Mainstem - Dam site to Oshetna	187.1-235.1				
Deadman Creek	189.4				
Unnamed Tributary	194.8				
Watana Creek	196.9		X	X	
Watana Creek Tributary: Unnamed L1	N/A				
Watana Creek Tributary: Unnamed L3	N/A				
Watana Creek Tributary: Unnamed R3	N/A				
Watana Creek Tributary: Unnamed R5	N/A		X	X	
Unnamed Tributary	197.7				
Unnamed Tributary	198.4				
Unnamed Tributary	203.4				
Unnamed Tributary	204.3				
Unnamed Tributary	206.3				
Kosina Creek	209.1	X	X	X	X
Kosina Creek Tributary: Tsisi Creek	N/A		X		
Kosina Creek Tributary: Gilbert Creek	N/A				
Kosina Creek Tributary: Unnamed	N/A				
Jay Creek	211.0				
Goose Creek	232.8		X	X	X
Oshetna River	235.1	X	X	X	X
Oshetna River Tributary: Black River	N/A		X		
Tyone River	247.3				
Clearwater Creek	266.6				
Deadman Basin Lake: Deadman Lake	N/A				
Deadman Basin Lake: Unnamed	N/A				
Watana Basin Lake: Sally Lake	N/A				
Unnamed Tributary Lake: Unnamed	205.9				
Kosina Basin Lake: Tsisi Lake	N/A				

Notes: Shaded cells indicate that a given location was sampled.

Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Study of Fish Distribution and Abundance in the Upper Susitna River (9.5)

Appendix D

Upper River Fish Observations and Relative Abundance, 2013

Initial Study Report

Prepared for

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

Prepared by

R2 Resource Consultants, Inc.

February 2014 Draft

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Table D1. Upper Susitna River fish observations, 2013.

Upper River													
Geomorphic Reach/PRM	Habitat	Sample Type	Salmon, Chinook (juvenile)	Arctic grayling	Burbot	Dolly Varden	Longnose sucker	Sculpin	Trout, lake	Whitefish, humpback	Whitefish, round	Whitefish, undifferentiated	Grand Total
UR-2 234.5-248.6	Oshetna River	ELH, GRTS	2	329	18		5	1,887		1	5		**2,247**
	Oshetna River: Off-Channel	GRTS		7				84					**91**
	Black River	ELH, GRTS	73	103	13		1	939			3		**1,132**
	Black River: Off-Channel	GRTS	2	19	1			121					**143**
Upper Extent Watana Reservoir PRM 232.5													
UR-3 224.9-234.5	Susitna River	Transect		57	12		4	44		2	17		**136**
	Goose Creek	GRTS		1,502			7	281			42		**1,832**
UR-4 208.1-224.9	Susitna River	Transect		81	46		15	132		1	20		**295**
	Jay Creek	Direct		42	3	137		37					**219**
	Kosina Creek	ELH, GRTS	116	339	1	3	9	447		1	14		**930**
	Tsisi Creek	ELH, GRTS		310				487			4	1	**802**
	Tsisi Creek: Off-Channel	GRTS		23				32					**55**
UR-5 203.4-208.1	Susitna River	Transect		19	6			25			13		**63**
UR-6 187.1-203.4	Susitna River	Transect		161	16		79	188			28		**472**
	Susitna River: Off-Channel	Transect		3			16	75			1		**95**
	Watana Creek	GRTS		272		449	1	563			17		**1,302**
	Watana Creek: Off-Channel	GRTS				13		15					**28**
	Watana Creek Tributary	GRTS		736		56		169	1		7		**969**
	Watana Creek Tributary: Off-channel	GRTS				2		24					**26**
	Unnamed Tributary 194.8	GRTS		16		71	1	158					**246**
Proposed Watana Dam Location PRM 187.1													
Grand Total			**193**	**4,019**	**116**	**731**	**138**	**5,708**	**1**	**5**	**171**	**1**	**11,083**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D2. Upper River Chinook salmon observations by habitat, 2013.

Juvenile Chinook salmon

Geomorphic Reach /PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
UR-2 234.5-248.6	**Black River**		Boulder Riffle		4	10	3	17
			Riffle	6			1	7
			Run		38	5	6	49
	Black River: Off-Channel	Upland Slough	Run		2			2
	Oshetna River		Boulder Riffle		1			1
			Riffle				1	1
Upper Extent Watana Reservoir PRM 232.5								
UR-4 208.1-224.9	**Kosina Creek**		Boulder Riffle		28	24	16	68
			Glide				3	3
			Riffle			6	8	14
			Run			27	4	31
Proposed Watana Dam Location PRM 187.1								
Grand Total				**6**	**73**	**72**	**42**	**193**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D3. Upper River Arctic grayling (all life stages) observations by habitat, 2013.

				Arctic grayling				
Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
	Black River		Boulder Riffle		15	7	14	36
			Pool	1				1
			Riffle	10	2		5	17
			Run	3	35	5	6	49
	Black River: Off-Channel	Upland Slough	Pool		15	2	1	18
			Run		1			1
UR-2	**Oshetna River**		Boulder Riffle		52	27	28	107
234.5-248.6			Glide			2	2	4
			Percolation Channel		1	1		2
			Rapid	16	1			17
			Riffle	67	21	8	24	120
			Run	22	22	20	15	79
	Oshetna River: Off-Channel	Side Slough	Glide		1	1	1	3
			Beaver Pond	4				4
Upper Extent Watana Reservoir PRM 232.5								
	Susitna River	Main Channel	Riffle		1		16	17
			Run		10		30	40
UR-3	**Goose Creek**		Boulder Riffle		394	192	67	653
224.9-234.5			Pool		233	233	19	485
			Riffle		39	13	12	64
			Run		147	113	40	300
	Susitna River	Main Channel	Run		5	6	18	29
		Split Main Channel	Run		7	1	13	21
		Clearwater Plume	Clearwater Plume	14	8	2	7	31
	Jay Creek		Pool		5	1	18	24
			Riffle		1	1		2
			Run		11	1	4	16
	Kosina Creek		Boulder Riffle	2	21	47	60	130
			Glide				46	46
UR-4			Percolation Channel	1				1
208.1-224.9			Pool	78				78
			Rapid	11				11
			Riffle	67				67
			Run		2	1	3	6
	Tsisi Creek		Boulder Riffle		70	2	17	89
			Glide	113				113
			Riffle	22	53	6	7	88
			Run		18	2		20
	Tsisi Creek: Off-Channel	Side Slough	Percolation Channel		6	14	3	23
UR-5 203.4-208.1	**Susitna River**	Main Channel	Run		1	1	17	19
	Susitna River	Main Channel	Run		2	21	96	119
		Side Channel	Pool		7	2	3	12
			Riffle		1	1	3	5
		Split Main Channel	Run		8	3	14	25
	Susitna River: Off-Channel	Side Slough	Pool		2		1	3
	Unnamed Tributary 194.8		Pool		9			9
			Run		7			7
UR-6	**Watana Creek**		Boulder Riffle		43	15	24	82
187.1-203.4			Pool		24	5		29
			Riffle		18	10	21	49
			Run		35	51	26	112
	Watana Creek Tributary		Boulder Riffle		5	17	24	46
			Rapid			13	5	18
			Riffle		235	78	52	365
			Run		224	27	56	307
Proposed Watana Dam Location PRM 187.1								
Grand Total				**431**	**1,818**	**952**	**818**	**4,019**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D4. Upper River juvenile Arctic grayling observations by habitat, 2013.

Arctic grayling, juvenile (<190mm)

Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
UR-2 234.5-248.6	Black River		Boulder Riffle		13	5	7	25
			Pool	1				1
			Riffle	7	2		1	10
			Run	1	31	4	5	41
	Black River: Off-Channel	Upland Slough	Pool		2		1	3
	Oshetna River		Boulder Riffle		20	13	9	42
			Glide			1	2	3
			Percolation Channel		1	1		2
			Rapid	6				6
			Riffle	57	18	8	16	99
			Run	19	8	2	6	35
	Oshetna River: Off-Channel	Side Slough	Glide		1	1	1	3
			Beaver Pond	2				2
Upper Extent Watana Reservoir PRM 232.5								
UR-3 224.9-234.5	Susitna River	Main Channel	Riffle		1		10	11
			Run		10		5	15
	Goose Creek		Boulder Riffle		267	148	56	471
			Pool		72	92	10	174
			Riffle		31	9	10	50
			Run		82	21	17	120
UR-4 208.1-224.9	Susitna River	Main Channel	Run		2		7	9
		Split Main Channel	Run		1	1	5	7
		Clearwater Plume	Clearwater Plume	10	8	2	3	23
	Jay Creek		Pool		3		6	9
			Riffle		1	1		2
			Run		1	1	3	5
	Kosina Creek		Boulder Riffle	2	12	41	53	108
			Glide				46	46
			Pool	35				35
			Rapid	2				2
			Riffle	48				48
			Run		1		1	2
	Tsisi Creek		Boulder Riffle		33	2	11	46
			Glide	72				72
			Riffle	1	38	4	5	48
			Run		12	2		14
	Tsisi Creek: Off-Channel	Side Slough	Percolation Channel		4	13	3	20
UR-5 203.4-208.1	Susitna River	Main Channel	Run				6	6
UR-6 187.1-203.4	Susitna River	Main Channel	Run		2	3	21	26
		Side Channel	Pool		7	2	3	12
			Riffle		1	1	2	4
		Split Main Channel	Run		8	2	8	18
	Susitna River: Off-Channel	Side Slough	Pool		2		1	3
	Unnamed Tributary 194.8		Run		2			2
	Watana Creek		Boulder Riffle		22	7	2	31
			Pool		4	4		8
			Riffle		7	2	19	28
			Run		25	25	21	71
	Watana Creek Tributary		Boulder Riffle		5	11	10	26
			Rapid			5	2	7
			Riffle		122	53	38	213
			Run		135	14	38	187
Proposed Watana Dam Location PRM 187.1								
Grand Total				**263**	**1,017**	**501**	**470**	**2,251**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D5. Upper River juvenile or adult Arctic grayling observations by habitat, 2013.

				Arctic grayling, juvenile or adult (190-328mm)				
Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
UR-2 234.5-248.6	Black River		Boulder Riffle		2	2	6	10
			Riffle				4	4
			Run	2	4	1	1	8
	Black River: Off-Channel	Upland Slough	Pool		8	2		10
			Run		1			1
	Oshetna River		Boulder Riffle		22	10	7	39
			Glide			1		1
			Rapid		1			1
			Riffle	5	1		8	14
			Run	3	12	4	7	26
Upper Extent Watana Reservoir PRM 232.5								
UR-3 224.9-234.5	Susitna River	Main Channel	Riffle				6	6
			Run				9	9
	Goose Creek		Boulder Riffle		96	41	9	146
			Pool		100	128	7	235
			Riffle		3	4	1	8
			Run		50	84	18	152
UR-4 208.1-224.9	Susitna River	Main Channel	Run		2	4	9	15
		Split Main Channel	Run		3		4	7
		Clearwater Plume	Clearwater Plume				2	2
	Jay Creek		Pool		2		3	5
			Run		4		1	5
	Kosina Creek		Boulder Riffle		7	5	6	18
			Pool	36				36
			Rapid	8				8
			Riffle	15				15
			Run		1	1	1	3
	Tsisi Creek		Boulder Riffle		34		6	40
			Glide	26				26
			Riffle	20	14	2	2	38
			Run		6			6
	Tsisi Creek: Off-Channel	Side Slough	Percolation Channel		2	1		3
UR-5 203.4-208.1	Susitna River	Main Channel	Run		1		9	10
UR-6 187.1-203.4	Susitna River	Main Channel	Run			14	44	58
		Side Channel	Riffle				1	1
		Split Main Channel	Run				3	3
	Unnamed Tributary 194.8		Pool		7			7
			Run		5			5
	Watana Creek		Boulder Riffle		14	8	17	39
			Pool		13	1		14
			Riffle		11	7	2	20
			Run		10	19	4	33
	Watana Creek Tributary		Boulder Riffle			5	10	15
			Rapid			7	3	10
			Riffle		93	21	13	127
			Run		79	12	18	109
Proposed Watana Dam Location PRM 187.1								
Grand Total				**115**	**608**	**384**	**241**	**1,348**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D6. Upper River adult Arctic grayling observations by habitat, 2013.

				Arctic grayling, adult (>328 mm)				
Geomorphic Reach/PRM	**Habitat**	**Macrohabitat**	**Mesohabitat**	**Spring**	**Early Summer**	**Late Summer**	**Fall**	**Grand Total**
UR-2 234.5-248.6	**Black River**		Boulder Riffle				1	1
			Riffle	3				3
	Black River: Off-Channel	Upland Slough	Pool		5			5
	Oshetna River		Boulder Riffle		10	4	12	26
			Rapid	10				10
			Riffle	5	2			7
			Run		2	14	2	18
	Oshetna River: Off-Channel		Beaver Pond	2				2
Upper Extent Watana Reservoir PRM 232.5								
UR-3 224.9-234.5	**Susitna River**	Main Channel	Run				16	16
	Goose Creek		Boulder Riffle		26	3	2	31
			Pool		61	13	2	76
			Riffle		5		1	6
			Run		12	8	5	25
UR-4 208.1-224.9	**Susitna River**	Main Channel	Run		1	2	2	5
		Split Main Channel	Run		3		4	7
		Clearwater Plume	Clearwater Plume	4			2	6
	Jay Creek		Pool			1	9	10
			Run		6			6
	Kosina Creek		Boulder Riffle		2	1	1	4
			Percolation Channel	1				1
			Pool	7				7
			Rapid	1				1
			Riffle	4				4
			Run				1	1
	Tsisi Creek		Boulder Riffle		3			3
			Glide	15				15
			Riffle	1	1			2
UR-5 203.4-208.1	**Susitna River**	Main Channel	Run			1	2	3
UR-6 187.1-203.4	**Susitna River**	Main Channel	Run			4	31	35
		Split Main Channel	Run			1	3	4
	Unnamed Tributary 194.8		Pool		2			2
	Watana Creek		Boulder Riffle		7		5	12
			Pool		7			7
			Riffle			1		1
			Run			7	1	8
	Watana Creek Tributary		Boulder Riffle			1	4	5
			Rapid			1		1
			Riffle		20	4	1	25
			Run		10	1		11
Proposed Watana Dam Location PRM 187.1								
Grand Total				**53**	**185**	**67**	**107**	**412**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D7. Upper River burbot observations by habitat, 2013.

				Burbot				
Geomorphic Reach/PRM	**Habitat**	**Macrohabitat**	**Mesohabitat**	**Spring**	**Early Summer**	**Late Summer**	**Fall**	**Grand Total**
UR-2 234.5-248.6	**Black River**		Boulder Riffle		1	2	3	6
			Riffle	1				1
			Run	2		1	3	6
	Black River: Off-Channel	Upland Slough	Run		1			1
	Oshetna River		Boulder Riffle		1		1	2
			Glide		1	2		3
			Percolation Channel	1				1
			Riffle				4	4
			Run	1	3	1	3	8
Upper Extent Watana Reservoir PRM 232.5								
UR-3 224.9-234.5	**Susitna River**	Main Channel	Riffle		2	3	1	6
			Run		2	1	3	6
UR-4 208.1-224.9	**Susitna River**	Main Channel	Run		5	5	14	24
		Split Main Channel	Run		3			3
		Clearwater Plume	Clearwater Plume	1	3	6	9	19
	Jay Creek		Pool		1		2	3
	Kosina Creek		Riffle	1				1
UR-5 203.4-208.1	**Susitna River**	Main Channel	Run		6			6
UR-6 187.1-203.4	**Susitna River**	Main Channel	Run		1	8	1	10
		Side Channel	Pool		1			1
			Riffle		1		1	2
		Split Main Channel	Run		3			3
Proposed Watana Dam Location PRM 187.1								
Grand Total				**7**	**35**	**29**	**45**	**116**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D8. Upper River Dolly Varden observations by habitat, 2013.

				Dolly Varden				
Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
Upper Extent Watana Reservoir PRM 232.5								
UR-4 208.1-224.9	Jay Creek		Pool		69		17	86
			Run		43	1	7	51
	Kosina Creek		Pool	1				1
			Riffle	2				2
UR-6 187.1-203.4	Unnamed Tributary 194.8		Pool		2	5	10	17
			Riffle		9	3		12
			Run		15	21	6	42
	Watana Creek		Boulder Riffle		23	8	1	32
			Pool		187	2	1	190
			Riffle		84	13	12	109
			Run		68	44	6	118
	Watana Creek: Off-Channel	Side Slough	Glide		4	5	3	12
			Percolation Channel			1		1
	Watana Creek Tributary		Rapid			1		1
			Riffle		12	26	11	49
			Run		5	1		6
	Watana Creek Tributary: Off-channel	Side Slough	Glide		2			2
Proposed Watana Dam Location PRM 187.1								
Grand Total				3	523	131	74	731

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D9. Upper River lake trout observations by habitat, 2013.

			Lake trout		
Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Fall	Grand Total
Upper Extent Watana Reservoir PRM 232.5					
UR-6 / 187.1-203.4	Watana Creek Tributary		Riffle	1	1
Proposed Watana Dam Location PRM 187.1					
Grand Total				1	1

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D10. Upper River longnose sucker observations by habitat, 2013.

				Longnose sucker				
Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
UR-2 234.5-248.6	Black River		Run			1		1
	Oshetna River		Boulder Riffle				1	1
			Run	3	1			4
Upper Extent Watana Reservoir PRM 232.5								
UR-3 224.9-234.5	Susitna River	Main Channel	Riffle				1	1
			Run			3		3
	Goose Creek		Boulder Riffle		4			4
			Pool		1	1		2
			Run		1			1
UR-4 208.1-224.9	Susitna River	Main Channel	Run				2	2
		Split Main Channel	Run		2			2
		Clearwater Plume	Clearwater Plume	2	2	2	5	11
	Kosina Creek		Riffle	9				9
UR-6 187.1-203.4	Susitna River	Main Channel	Run		10	9		19
		Side Channel	Pool		6	2	2	10
			Riffle		11		15	26
		Split Main Channel	Run		10	14		24
	Susitna River: Off-Channel	Side Slough	Pool		4	10	2	16
	Unnamed Tributary 194.8		Run		1			1
	Watana Creek		Boulder Riffle		1			1
Proposed Watana Dam Location PRM 187.1								
Grand Total				14	54	42	28	138

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D11. Upper River sculpin observations by habitat, 2013.

				Sculpin				
Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Late Summer	Fall	Grand Total
	Black River		Boulder Riffle		177	92	71	340
			Pool	22				22
			Riffle	90	35	34	13	172
			Run	26	214	95	70	405
	Black River: Off-Channel	Upland Slough	Pool		5	51	33	89
			Run		11	5	16	32
UR-2	**Oshetna River**		Boulder Riffle		234	149	159	542
234.5-248.6			Glide		51	6	8	65
			Percolation Channel		4	4	12	20
			Pool		44		11	55
			Rapid	41	30	16	28	115
			Riffle	233	163	142	92	630
			Run	105	142	125	88	460
	Oshetna River: Off-Channel	Side Slough	Glide		34	25	25	84
Upper Extent Watana Reservoir PRM 232.5								
	Susitna River	Main Channel	Riffle		4	9	1	14
			Run		25	3	2	30
UR-3	**Goose Creek**		Boulder Riffle		120	47	25	192
224.9-234.5			Pool		2	2	6	10
			Riffle		15	7	10	32
			Run		27	7	13	47
	Susitna River	Main Channel	Run		8	17	24	49
		Split Main Channel	Run		5	2	13	20
		Clearwater Plume	Clearwater Plume	5	17	10	31	63
	Jay Creek		Pool		5	1		6
			Riffle		13	3	4	20
			Run		6		5	11
	Kosina Creek		Boulder Riffle	23	40	63	79	205
			Glide	27			20	47
UR-4			Percolation Channel	11				11
208.1-224.9			Rapid	4				4
			Riffle	71	19	10	47	147
			Run		1	16	16	33
	Tsisi Creek		Boulder Riffle		38	14	40	92
			Glide	160				160
			Riffle	1	72	41	46	160
			Run		34	35	6	75
	Tsisi Creek: Off-Channel	Side Slough	Percolation Channel			6	26	32
UR-5 203.4-208.1	**Susitna River**	Main Channel	Run		1	4	20	25
	Susitna River	Main Channel	Run		17	34	15	66
		Side Channel	Pool		16	14	17	47
			Riffle		2	12	9	23
		Split Main Channel	Run		8	21	23	52
	Susitna River: Off-Channel	Side Slough	Pool		4	55	16	75
	Unnamed Tributary 194.8		Pool		25	25	39	89
			Riffle		3	1		4
			Run		30	20	15	65
	Watana Creek		Boulder Riffle		21	42	9	72
UR-6			Pool		9	2	2	13
187.1-203.4			Riffle		164	45	49	258
			Run		80	74	66	220
	Watana Creek: Off-Channel	Side Slough	Glide		1	3	2	6
			Percolation Channel			1		1
		Side Slough Beaver Complex	Beaver Pond		1	4	3	8
	Watana Creek Tributary		Boulder Riffle		10	4		14
			Rapid			5	5	10
			Riffle		85	31	17	133
			Run		1	8	3	12
	Watana Creek Tributary: Off-channel	Side Slough	Glide		8	14	2	24
Proposed Watana Dam Location PRM 187.1								
Grand Total				**819**	**2,081**	**1,456**	**1,352**	**5,708**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D12. Upper River humpback whitefish observations by habitat, 2013.

Whitefish, humpback

Geomorphic Reach/PRM	Habitat	Macrohabitat	Mesohabitat	Spring	Early Summer	Grand Total
Upper Extent Watana Reservoir PRM 232.5						
UR-2 234.5-248.6	**Oshetna River**		Riffle	1		1
UR-3 224.9-234.5	**Susitna River**	Main Channel	Run		2	2
UR-4 208.1-224.9	**Susitna River**	Clearwater Plume	Clearwater Plume	1		1
	Kosina Creek		Riffle	1		1
Proposed Watana Dam Location PRM 187.1						
Grand Total				**3**	**2**	**5**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

Table D13. Upper River round whitefish observations by habitat, 2013.

				Whitefish, round				
Geomorphic Reach/PRM	**Habitat**	**Macrohabitat**	**Mesohabitat**	**Spring**	**Early Summer**	**Late Summer**	**Fall**	**Grand Total**
UR-2 234.5-248.6	**Black River**		Boulder Riffle		1			1
			Run		2			2
	Oshetna River		Rapid	1				1
			Riffle				3	3
			Run	1				1
Upper Extent Watana Reservoir PRM 232.5								
UR-3 224.9-234.5	**Susitna River**	Main Channel	Riffle			1	1	2
			Run				15	15
	Goose Creek		Boulder Riffle		8	1		9
			Pool		10	14		24
			Run		2	7		9
UR-4 208.1-224.9	**Susitna River**	Main Channel	Run			4	6	10
		Split Main Channel	Run			1	2	3
		Clearwater Plume	Clearwater Plume	1			6	7
	Kosina Creek		Boulder Riffle		2			2
			Pool	12				12
	Tsisi Creek		Riffle		2			2
			Run		2			2
UR-5 203.4-208.1	**Susitna River**	Main Channel	Run		1	2	10	13
UR-6 187.1-203.4	**Susitna River**	Main Channel	Run		3	6	4	13
		Side Channel	Riffle		3		3	6
		Split Main Channel	Run		4		5	9
	Susitna River: Off-Channel	Side Slough	Pool		1			1
	Watana Creek		Boulder Riffle		3	1		4
			Pool		3			3
			Riffle		7	1		8
			Run		2			2
	Watana Creek Tributary		Rapid			1		1
			Riffle		4	1		5
			Run		1			1
Proposed Watana Dam Location PRM 187.1								
Grand Total				**15**	**61**	**40**	**55**	**171**

Notes: All data are provisional and subject to ongoing QA/QC. Observations are reported within tributaries or mainstem geomorphic reach by habitat type by season: Spring (June 4-29), Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: Early-Life History sampling (ELH), GRTS tributary sampling (GRTS), direct tributary sampling (Direct), mainstem transect sampling (Transect), and visual observations.

2. RELATIVE ABUNDANCE

As discussed in ISR Study 9.5, Section 4.4.2.2, catch per unit effort (CPUE) estimates were used to describe the relative abundance of fish species among habitats within the Upper River study area. Additional details concerning the calculation of CPUE are provided below, along with a summary of sampling effort (Table D15 through D18), gear-specific CPUE by species (Table D14), and gear-specific average CPUE by habitat type (Tables D19 through D43).

Catch per unit effort estimates were derived for each of the three types of Fish Distribution and Abundance protocols used in the Upper River: GRTS-sampling tributaries, direct-sampling tributaries, and mainstem Susitna River transects. The approach used to estimate CPUE was largely similar among each of these components. In all cases, CPUE was evaluated specific to gear type, species, and sampling event (i.e., early summer, late summer, or fall), and the analysis also distinguished between juvenile and adult life stages for Pacific salmon. Furthermore, the analysis conducted for each sampling component was specific to mesohabitat type. However, as a direct result of differences in the study design and site selection process among the sampling components, different analytical approaches were used to derive average CPUE values at the macrohabitat scale. Average CPUE values for each GRTS-sampled tributary represent the average CPUE among individual GRTS segments with a given tributary. For direct-sampling tributaries, average CPUE was calculated as the average among sampling reaches within a given tributary. In the mainstem Susitna River, the mesohabitat-specific CPUE estimates were averaged among macrohabitat units within each geomorphic reach. In the analysis that follows, these differences are discussed when relevant to the calculations being described.

At the mesohabitat unit level, CPUE was calculated as follows for each gear type, species, life stage, and sampling event combination:

$CPUE_{Meso} = C_{Meso}/E_{Meso}$,

where $CPUE_{Meso}$ = catch per unit effort for a given mesohabitat unit,

C_{Meso} = total fish captured within a given mesohabitat unit, and

E_{Meso} = total effort within a given mesohabitat unit.

For backpack and boat electrofishing, E_{Meso} was recorded as the electrofishing pulse duration in seconds, and for reporting purposes was expressed in hours. That is,

E_{Meso} = pulse duration in seconds × (1 minute/60 seconds) × (1 hour/60 minutes) = pulse duration in hours.

For snorkeling and seining, E_{Meso} was calculated by determining the total area sampled at a given mesohabitat unit. Specifically,

E_{Meso} = length of area sampled in meters × width of area sampled in meters = area sampled in square meters.

For snorkeling and seining, $CPUE_{Meso}$ estimates were then standardized to 1,000 m^2 using a factor of 1,000.

When sampling within a GRTS segment, a direct sampling reach, or a mainstem macrohabitat site included multiple mesohabitat units of the same type (e.g., two distinct pools), the associated $CPUE_{Meso}$ values were calculated using the total catch and the total effort across mesohabitat units. For example,

$$CPUE_{Meso} = (C_{Meso1} + C_{Meso2} + \ldots + C_{Meson}) / (E_{Meso1} + E_{Meso2} + \ldots + E_{Meson})$$

After determining $CPUE_{Meso}$ values for a given mesohabitat type, the average CPUE was calculated as:

$$CPUE_{Avg} = (\Sigma\ CPUE_{Meso})/N,$$

where N = sample size.

Specific definitions for N vary among the three sampling components. For GRTS-sampled tributaries,

$N_{m,g,e}$ = number of GRTS segments within a given tributary containing mesohabitat type "m" that was sampled using gear type "g" during sampling event "e".

For direct sampling tributaries,

$N_{m,g,e}$ = number of sampling reaches within a given tributary containing mesohabitat type "m" that was sampled using gear type "g" during sampling event "e".

For mainstem transect sampling, average CPUE estimates for each mesohabitat type were calculated specific to mainstem macrohabitat types within each geomorphic reach. In this case,

$N_{M,m,g,e}$ = number of macrohabitat units of type "M" within a given geomorphic reach containing mesohabitat type "m" that was sampled using gear type "g" during sampling event "e".

Actual sample sizes and the total effort supporting gear-specific average CPUE values are provided in Tables D15 through D18.

Table D14. Summary of relative abundance by capture method for main channel, off-channel, and tributary habitats of the Upper River, 2013.

		Main Channel			Off-Channel		Tributary			All
Species		**Backpack Electrofishing** (N=60; CPUE in fish/hour)	**Boat Electrofishing** (N=47; CPUE in fish/hour)	**Seine** (N=13; CPUE in fish/1,000 m^2)	**Backpack Electrofishing** (N=3; CPUE in fish/hour)	**Boat Electrofishing** (N=3; CPUE in fish/hour)	**Backpack Electrofishing** (N=396; CPUE in fish/hour)	**Snorkel** (N=172; CPUE in fish/1,000 m^2)	**Seine** (N=4; CPUE in fish/1,000 m^2)	**Percent of Sites with CPUE=0** (N=472; all methods)
Salmon, juvenile Chinook	% CPUE=0	100%	100%	100%	100%	100%	94%	98%	100%	95%
	Max CPUE						160	31.4		
Arctic grayling	% CPUE=0	50%	64%	38%	33%	100%	49%	40%	100%	41%
	Max CPUE	86.9	226.3	21.7	9.9		253.1	1500		
Burbot	% CPUE=0	70%	77%	92%	100%	100%	96%	100%	100%	90%
	Max CPUE	32.4	12.2	0.7			34.1			
Dolly Varden	% CPUE=0	100%	100%	100%	100%	100%	88%	88%	100%	88%
	Max CPUE						453.3	330		
Longnose sucker	% CPUE=0	78%	94%	38%	33%	67%	98%	97%	100%	93%
	Max CPUE	24.1	11.9	47.2	9.9	5.6	12	11		
Sculpin, undifferentiated	% CPUE=0	25%	91%	62%	0%	100%	20%	93%	100%	22%
	Max CPUE	162.4	7.3	10.9	59		363	100		
Trout, lake	% CPUE=0	100%	100%	100%	100%	100%	>99%	100%	100%	>99%
	Max CPUE						18.5			
Whitefish, round	% CPUE=0	83%	68%	54%	67%	100%	98%	88%	100%	88%
	Max CPUE	40.8	22.3	5.1	5		46.2	69		
Whitefish, undifferentiated	% CPUE=0	100%	100%	100%	100%	100%	100%	99%	100%	>99%
	Max CPUE							0.5		
Percent of Sites with No Fish		17%	47%	23%	0%	67%	10%	31%	100%	

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D15. Sample sizes and total effort used for calculating average CPUE for backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macro-habitat Type	Meso-habitat Type	Sample Size (*N*)			Total Effort (pulse duration in seconds)		
				Early Summer	Late Summer	Fall	Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	7	7	7	3087	2735	3550
			Glide	2	2	2	628	490	852
			Percolation Channel	1	1	1	305	191	189
			Pool	1		1	301		247
			Rapid	1	1	1	320	250	370
			Riffle	5	5	5	2513	1540	2470
			Run	7	7	7	2913	2707	3332
	Black River	Tributary	Boulder Riffle	4	4	4	1763	1298	1581
			Pool	1	1	1	328	256	455
			Riffle	1	1	1	316	313	261
			Run	3	3	3	1748	1382	1767
Watana Reservoir at Full Pool (PRM 232.5)									
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	1	1	1	580	794	556
			Run	1	1	1	800	988	441
	Goose Creek	Tributary	Boulder Riffle	19	18	17	9120	5880	6597
			Pool	4	4	4	812	873	1283
			Riffle	3	3	4	834	670	923
			Run	6	7	6	1945	2562	2109
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	3	3	2	1643	1780	2250
		Main Channel	Run	4	4	5	2892	2559	3438
		Split Main Channel	Run	1	1	1	939	904	902
	Jay Creek[1]	Tributary	Pool	1	2	2	587	522	641
			Riffle	1	1	1	224	117	85
			Run	2	2	2	363	690	380
	Kosina Creek	Tributary	Boulder Riffle	4	4	4	2152	2408	2829
			Glide			1			163
			Riffle	2	2	2	845	851	1006
			Run	1	2	2	510	701	673
	Tsisi Creek	Tributary	Boulder Riffle	2	2	2	933	865	1040
			Percolation Channel	1	1	1	498	678	256
			Riffle	4	4	4	1148	1528	1719
			Run	2	2	1	526	794	395

Table D15. Continued.

Geo-morphic Reach	Stream	Macro-habitat Type	Meso-habitat Type	Sample Size (*N*)			Total Effort (pulse duration in seconds)		
				Early Summer	Late Summer	Fall	Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	2	2	2	1404	1474	1128
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	4	4	4	2361	2695	2165
		Side Channel	Pool	1	1	1	747	606	755
			Riffle	1	1	1	527	738	585
		Side Slough	Pool	1	1	1	725	1098	669
		Split Main Channel	Run	2	2	2	1377	1129	1024
	Watana Creek	Tributary	Beaver Pond	1	1	2	180	316	478
			Boulder Riffle	3	3	3	1225	861	1053
			Glide	1	1	1	174	564	212
			Percolation Channel	1	1	1	100	76	137
			Pool	1	3	1	175	614	250
			Riffle	8	8	8	2954	2518	2043
			Run	10	9	10	2960	3647	3145
	Watana Creek Tributary	Tributary	Boulder Riffle	2	2	1	551	458	128
			Glide	1	1	1	298	454	110
			Rapid		2	1		385	367
			Riffle	12	10	10	4235	3939	3229
			Run	3	2	3	546	325	530
	Unnamed Tributary 194.8	Tributary	Pool	2	2	2	666	907	724
			Riffle	1	1	1	317	320	186
			Run	1		1	574		467
Proposed Watana Dam Location (PRM 187.1)									

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D16. Sample sizes and total effort used for calculating average CPUE for boat electrofishing in the Upper River, 2013.

Geomorphic Reach	Macrohabitat Type	Mesohabitat Type	Sample Size (*N*)			Total Effort (pulse duration in seconds)		
			Early Summer	Late Summer	Fall	Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)								
UR-3 (PRM 224.9-234.5)	Main Channel	Riffle	1	1	1	169	184	309
		Run	1	1	1	310	123	695
UR-4 (PRM 208.1-224.9)	Clearwater Plume	Clearwater Plume		1	1		127	909
	Main Channel	Run	5	5	5	3493	1374	3216
	Split Main Channel	Run	1	1	1	912	273	495
UR-5 (PRM 203.4-208.1)	Main Channel	Run	2	2	2	1899	520	1731
UR-6 (PRM 187.1-203.4)	Main Channel	Run	4	4	4	3325	3320	2360
	Side Slough	Pool	1	1	1	645	401	439
	Split Main Channel	Run	1	1	1	477	382	485
Proposed Watana Dam Location (PRM 187.1)								

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: mainstem transect sampling.

Table D17. Sample sizes and total effort used for calculating average CPUE for seining in the Upper River, 2013.

Geo-morphic Reach	Stream	Macro-habitat Type	Meso-habitat Type	Sample Size (*N*)			Total Effort (area sampled in square meters)		
				Early Summer	Late Summer	Fall	Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Pool	1			21		
			Riffle	1			147		
			Run	1			700		
Watana Reservoir at Full Pool (PRM 232.5)									
UR-4 (PRM 208.1-224.9)	Susitna River	Main Channel	Run	2			375		
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	1	1	1	1400	600	780
		Side Channel	Pool	1	1	1	900	92	150
			Riffle	1		1	212		390
		Split Main Channel	Run	1	1	1	1530	960	475
	Watana Creek	Tributary	Riffle	1			240		
Proposed Watana Dam Location (PRM 187.1)									

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and mainstem transect sampling.

Table D18. Sample sizes and total effort used for calculating average CPUE for snorkeling in the Upper River, 2013.

Geo-morphic Reach	Stream	Mesohabitat Type	Sample Size (*N*)			Total Effort (area sampled in square meters)		
			Early Summer	Late Summer	Fall	Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)								
UR-3 (PRM 224.9-234.5)	Goose Creek	Boulder Riffle	8	8	7	6396	8363	8647
		Pool	4	3	2	2193	1121	1596
		Riffle	1		1	10		32
		Run	5	6	4	2021	2737	3684
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	1	1	1	345	400	475
		Run	1	1	1	400	1039	500
	Kosina Creek	Boulder Riffle	4	4	3	4145	9900	7500
		Glide			1			140
		Run		1	1		3900	3000
	Tsisi Creek	Boulder Riffle	2	1	2	2700	2600	2000
		Percolation Channel	1	1	1	280	760	50
		Riffle	4	3	4	4375	3000	3100
		Run	2	1	1	3400	2500	1000
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	1	1	1	1000	1250	1500
		Boulder Riffle	2	2	1	2020	3300	2000
		Pool	3	3	3	975	941	1220
		Riffle	3	2	4	2750	1500	4300
		Run	6	6	4	5600	5610	3900
	Watana Creek Tributary	Boulder Riffle		1	2		200	435
		Rapid		1	1		300	1030
		Riffle	8	4	5	4348	2290	3875
		Run	3	2	3	640	300	1750
	Unnamed Tributary 194.8	Pool	2	2		325	450	
		Riffle	1	1		150	200	
		Run	1	1		190	300	
Proposed Watana Dam Location (PRM 187.1)								

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D19. Average CPUE (fish per hour of shocking time) for Chinook salmon using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Salmon, Chinook (juvenile)		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	2.3	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	0	0	1.6
			Run	0	0	0
	Black River	Tributary	Boulder Riffle	1.5	12.4	6.5
			Pool	0	0	0
			Riffle	0	0	0
			Run	47.5	7.6	10.6
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	0	0	0
			Run	0	0	0
	Goose Creek	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	0	0	0
		Main Channel	Run	0	0	0
		Split Main Channel	Run	0	0	0
	Jay Creek[1]	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Kosina Creek	Tributary	Boulder Riffle	7.6	19.5	17.4
			Glide			44.2
			Riffle	0	4.0	10.5
			Run	0	80.0	0
	Tsisi Creek	Tributary	Boulder Riffle	0	0	0
			Percolation Channel	0	0	0
			Riffle	0	0	0
			Run	0	0	0

Table-D19. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Salmon, Chinook (juvenile)		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0	0	0
		Side Channel	Pool	0	0	0
			Riffle	0	0	0
		Side Slough	Pool	0	0	0
		Split Main Channel	Run	0	0	0
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	0	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Watana Creek Tributary	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Rapid		0	0
			Riffle	0	0	0
			Run	0	0	0
	Unnamed Tributary 194.8	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0		0
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D20. Average CPUE (fish per 1,000 square meters) for Chinook salmon using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Salmon, Chinook (juvenile)		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0		0
		Run	0	0	0
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	0	0	0
		Run	0	0	0
	Kosina Creek	Boulder Riffle	9.2	0	0
		Glide			0
		Run		0	0
	Tsisi Creek	Boulder Riffle	0	0	0
		Percolation Channel	0	0	0
		Riffle	0	0	0
		Run	0	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0	0	0
		Run	0	0	0
	Watana Creek Tributary	Boulder Riffle		0	0
		Rapid		0	0
		Riffle	0	0	0
		Run	0	0	0
	Unnamed Tributary 194.8	Pool	0	0	
		Riffle	0	0	
		Run	0	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D21. Average CPUE (fish per hour of shocking time) for Arctic grayling using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Arctic grayling		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	25.9	9.7	5.6
			Glide	0	14.7	14.1
			Percolation Channel	11.8	18.8	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	21.5	11.6	27.0
			Run	5.8	2.8	3.2
	Black River	Tributary	Boulder Riffle	21.4	8.5	16.2
			Pool	87.8	0	7.9
			Riffle	22.8	0	0
			Run	48.4	13.8	11.5
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	6.2	0	77.7
			Run	4.5	0	57.1
	Goose Creek	Tributary	Boulder Riffle	33.0	31.4	14.4
			Pool	0	27.8	20.5
			Riffle	59.4	72.6	73.8
			Run	30.7	43.6	9.7
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	30.1	6.7	6.5
		Main Channel	Run	0	0	7.6
		Split Main Channel	Run	15.3	4.0	8.0
	Jay Creek[1]	Tributary	Pool	30.7	0	59.7
			Riffle	16.1	30.8	0
			Run	78.3	0	23.8
	Kosina Creek	Tributary	Boulder Riffle	1.8	13.6	32.7
			Glide			176.7
			Riffle	0	0	0
			Run	0	0	5.5
	Tsisi Creek	Tributary	Boulder Riffle	18.3	3.1	3.6
			Percolation Channel	21.7	21.2	28.1
			Riffle	22.9	8.3	15.6
			Run	6.3	9.4	0

Table-D21. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Arctic grayling		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	18.9
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0	1.9	27.0
		Side Channel	Pool	4.8	0	14.3
			Riffle	6.8	4.9	12.3
		Side Slough	Pool	9.9	0	5.4
		Split Main Channel	Run	5.3	0	7.2
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	38.6	7.5	36.2
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0	0	0
			Riffle	6.3	5.4	28.5
			Run	26.2	13.2	20.8
	Watana Creek Tributary	Tributary	Boulder Riffle	11.8	16.6	112.5
			Glide	0	0	0
			Rapid		36.0	9.8
			Riffle	33.3	15.3	12.7
			Run	76.5	55.6	104.3
	Unnamed Tributary 194.8	Tributary	Pool	27.3	0	0
			Riffle	0	0	0
			Run	18.8		0
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D22. Average CPUE (fish per hour of shocking time) for Arctic grayling using boat electrofishing in the Upper River, 2013.

Geomorphic Reach	Macrohabitat Type	Mesohabitat Type	Arctic grayling		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 224.9-234.5)	Main Channel	Riffle	0	0	46.6
		Run	0	0	15.5
UR-4 (PRM 208.1-224.9)	Clearwater Plume	Clearwater Plume		0	11.9
	Main Channel	Run	1.1	0	1.7
	Split Main Channel	Run	0	0	36.4
UR-5 (PRM 203.4-208.1)	Main Channel	Run	1.6	0	16.4
UR-6 (PRM 187.1-203.4)	Main Channel	Run	0	6.4	72.7
	Side Slough	Pool	0	0	0
	Split Main Channel	Run	0	0	22.3
Proposed Watana Dam Location (PRM 187.1)					

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: mainstem transect sampling.

Table D23. Average CPUE (fish per 1,000 square meters) for Arctic grayling using seining in the Upper River, 2013.

Geomorphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Arctic grayling		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Pool	0		
			Riffle	0		
			Run	0		
Watana Reservoir at Full Pool (PRM 232.5)						
UR-4 (PRM 208.1-224.9)	Susitna River	Main Channel	Run	0		
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	1.4	1.7	1.3
		Side Channel	Pool	6.7	21.7	0
			Riffle	0		0
		Split Main Channel	Run	3.9	3.1	10.5
	Watana Creek	Tributary	Riffle	0		
Proposed Watana Dam Location (PRM 187.1)						

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and mainstem transect sampling.

Table D24. Average CPUE (fish per 1,000 square meters) for Arctic grayling using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Arctic grayling		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	43.3	19.8	1.8
		Pool	111.2	135.3	2.5
		Riffle	1500.0		0
		Run	52.6	90.0	12.6
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	0	0	2.1
		Run	0	0	0
	Kosina Creek	Boulder Riffle	4.0	3.1	2.7
		Glide			221.4
		Run		0	0.3
	Tsisi Creek	Boulder Riffle	13.0	0	7.5
		Percolation Channel	10.7	10.5	0
		Riffle	15.3	10.0	0.3
		Run	5.3	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	37.0	2.9	7.0
		Pool	17.4	37.0	0
		Riffle	2.2	0.6	0
		Run	1.4	1.2	0
	Watana Creek Tributary	Boulder Riffle		55.0	57.9
		Rapid		26.7	1.9
		Riffle	38.9	20.5	9.4
		Run	227.5	50.0	28.0
	Unnamed Tributary 194.8	Pool	12.9	0	
		Riffle	0	0	
		Run	21.1	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D25. Average CPUE (fish per hour of shocking time) for burbot using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Burbot		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	0.9	0	0.6
			Glide	5.8	7.8	0
			Percolation Channel	0	0	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	0	0	4.1
			Run	3.1	0.4	3.4
	Black River	Tributary	Boulder Riffle	1.5	3.0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	1.9	1.9	6.8
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	6.2	4.5	0
			Run	0	3.6	8.2
	Goose Creek	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	5.1	12.1	2.3
		Main Channel	Run	3.2	3.1	3.4
		Split Main Channel	Run	3.8	0	0
	Jay Creek[1]	Tributary	Pool	6.1	0	17.1
			Riffle	0	0	0
			Run	0	0	0
	Kosina Creek	Tributary	Boulder Riffle	0	0	0
			Glide			0
			Riffle	0	0	0
			Run	0	0	0
	Tsisi Creek	Tributary	Boulder Riffle	0	0	0
			Percolation Channel	0	0	0
			Riffle	0	0	0
			Run	0	0	0

Table-D25. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Burbot		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0	1.0	0
		Side Channel	Pool	4.8	0	0
			Riffle	6.8	0	6.2
		Side Slough	Pool	0	0	0
		Split Main Channel	Run	0	0	0
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	0	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Watana Creek Tributary	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Rapid		0	0
			Riffle	0	0	0
			Run	0	0	0
	Unnamed Tributary 194.8	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0		0
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D26. Average CPUE (fish per hour of shocking time) for burbot using boat electrofishing in the Upper River, 2013.

Geomorphic Reach	Macrohabitat Type	Mesohabitat Type	Burbot		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 224.9-234.5)	Main Channel	Riffle	0	0	11.7
		Run	0	0	5.2
UR-4 (PRM 208.1-224.9)	Clearwater Plume	Clearwater Plume		0	0
	Main Channel	Run	0.6	2.4	5.7
	Split Main Channel	Run	0	0	0
UR-5 (PRM 203.4-208.1)	Main Channel	Run	3.3	0	0
UR-6 (PRM 187.1-203.4)	Main Channel	Run	1.0	3.1	0
	Side Slough	Pool	0	0	0
	Split Main Channel	Run	0	0	0
Proposed Watana Dam Location (PRM 187.1)					

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: mainstem transect sampling.

Table D27. Average CPUE (fish per 1,000 square meters) for burbot using seining in the Upper River, 2013.

Geomorphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Burbot		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Pool	0		
			Riffle	0		
			Run	0		
Watana Reservoir at Full Pool (PRM 232.5)						
UR-4 (PRM 208.1-224.9)	Susitna River	Main Channel	Run	0		
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0	0	0
		Side Channel	Pool	0	0	0
			Riffle	0		0
		Split Main Channel	Run	0.7	0	0
	Watana Creek	Tributary	Riffle	0		
Proposed Watana Dam Location (PRM 187.1)						

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and mainstem transect sampling.

Table D28. Average CPUE (fish per hour of shocking time) for Dolly Varden using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Dolly Varden		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Black River	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	0	0	0
			Run	0	0	0
	Goose Creek	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	0	0	0
		Main Channel	Run	0	0	0
		Split Main Channel	Run	0	0	0
	Jay Creek[1]	Tributary	Pool	79.7	0	50.2
			Riffle	0	0	0
			Run	120.7	0	15.7
	Kosina Creek	Tributary	Boulder Riffle	0	0	0
			Glide			0
			Riffle	0	0	0
			Run	0	0	0
	Tsisi Creek	Tributary	Boulder Riffle	0	0	0
			Percolation Channel	0	0	0
			Riffle	0	0	0
			Run	0	0	0

Table-D28. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Dolly Varden		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0	0	0
		Side Channel	Pool	0	0	0
			Riffle	0	0	0
		Side Slough	Pool	0	0	0
		Split Main Channel	Run	0	0	0
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	27.9	6.9	5.3
			Glide	62.1	12.8	50.9
			Percolation Channel	0	47.4	0
			Pool	41.1	10.2	14.4
			Riffle	82.4	7.3	17.7
			Run	18.7	3.5	5.4
	Watana Creek Tributary	Tributary	Boulder Riffle	0	0	0
			Glide	24.2	0	0
			Rapid		12.0	0
			Riffle	3.3	7.9	3.8
			Run	0	11.0	0
	Unnamed Tributary 194.8	Tributary	Pool	10.3	11.8	35.2
			Riffle	56.8	0	0
			Run	75.3		38.5
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D29. Average CPUE (fish per 1,000 square meters) for Dolly Varden using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Dolly Varden		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0		0
		Run	0	0	0
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	130.4	0	0
		Run	50.0	0	4.0
	Kosina Creek	Boulder Riffle	0	0	0
		Glide			0
		Run		0	0
	Tsisi Creek	Boulder Riffle	0	0	0
		Percolation Channel	0	0	0
		Riffle	0	0	0
		Run	0	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	13.4	0	0
		Pool	191.0	0	0
		Riffle	10.8	0	0
		Run	6.3	4.4	0
	Watana Creek Tributary	Boulder Riffle		0	0
		Rapid		0	0
		Riffle	0	0	0
		Run	0	0	0
	Unnamed Tributary 194.8	Pool	0	0	
		Riffle	20.0	5.0	
		Run	15.8	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D30. Average CPUE (fish per hour of shocking time) for longnose sucker using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Longnose sucker		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	0	0	0.6
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	0	0	0
			Run	1.7	0	0
	Black River	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	1.9	0
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	0	0	6.5
			Run	0	10.9	0
	Goose Creek	Tributary	Boulder Riffle	0.7	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0.9	0	0
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	3.0	2.6	0
		Main Channel	Run	0	0	1.6
		Split Main Channel	Run	3.8	0	0
	Jay Creek[1]	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Kosina Creek	Tributary	Boulder Riffle	0	0	0
			Glide			0
			Riffle	0	0	0
			Run	0	0	0
	Tsisi Creek	Tributary	Boulder Riffle	0	0	0
			Percolation Channel	0	0	0
			Riffle	0	0	0
			Run	0	0	0

Table-D30. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Longnose sucker		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	5.7	0	0
		Side Channel	Pool	24.1	5.9	9.5
			Riffle	0	0	12.3
		Side Slough	Pool	9.9	0	5.4
		Split Main Channel	Run	2.5	0	0
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	2.7	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Watana Creek Tributary	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Rapid		0	0
			Riffle	0	0	0
			Run	0	0	0
	Unnamed Tributary 194.8	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0		0
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D31. Average CPUE (fish per hour of shocking time) for longnose sucker using boat electrofishing in the Upper River, 2013.

Geomorphic Reach	Macrohabitat Type	Mesohabitat Type	Longnose sucker		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 224.9-234.5)	Main Channel	Riffle	0	0	0
		Run	0	0	0
UR-4 (PRM 208.1-224.9)	Clearwater Plume	Clearwater Plume		0	11.9
	Main Channel	Run	0	0	0
	Split Main Channel	Run	0	0	0
UR-5 (PRM 203.4-208.1)	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Main Channel	Run	0	2.0	0
	Side Slough	Pool	5.6	0	0
	Split Main Channel	Run	0	0	0
Proposed Watana Dam Location (PRM 187.1)					

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: mainstem transect sampling.

Table D32. Average CPUE (fish per 1,000 square meters) for longnose sucker using seining in the Upper River, 2013.

Geomorphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Longnose sucker		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Pool	0		
			Riffle	0		
			Run	0		
Watana Reservoir at Full Pool (PRM 232.5)						
UR-4 (PRM 208.1-224.9)	Susitna River	Main Channel	Run	0		
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	2.9	6.7	0
		Side Channel	Pool	1.1	10.9	0
			Riffle	47.2		30.8
		Split Main Channel	Run	1.3	11.5	0
	Watana Creek	Tributary	Riffle	0		
Proposed Watana Dam Location (PRM 187.1)						

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and mainstem transect sampling.

Table D33. Average CPUE (fish per 1,000 square meters) for longnose sucker using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Longnose sucker		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	0.2	0	0
		Pool	0.8	3.7	0
		Riffle	0		0
		Run	0	0	0
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	0	0	0
		Run	0	0	0
	Kosina Creek	Boulder Riffle	0	0	0
		Glide			0
		Run		0	0
	Tsisi Creek	Boulder Riffle	0	0	0
		Percolation Channel	0	0	0
		Riffle	0	0	0
		Run	0	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0	0	0
		Run	0	0	0
	Watana Creek Tributary	Boulder Riffle		0	0
		Rapid		0	0
		Riffle	0	0	0
		Run	0	0	0
	Unnamed Tributary 194.8	Pool	0	0	
		Riffle	0	0	
		Run	5.3	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D34. Average CPUE (fish per hour of shocking time) for sculpin using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Sculpin, undifferentiated		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	84.7	113.4	98.9
			Glide	114.3	78.9	65.1
			Percolation Channel	47.2	75.4	19.0
			Pool	71.8		14.6
			Rapid	168.8	86.4	175.1
			Riffle	56.9	71.6	82.9
			Run	39.2	57.0	68.9
	Black River	Tributary	Boulder Riffle	73.5	106.4	104.6
			Pool	54.9	210.9	197.8
			Riffle	136.7	92.0	96.6
			Run	169.0	129.2	114.1
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	24.8	27.2	6.5
			Run	13.5	10.9	8.2
	Goose Creek	Tributary	Boulder Riffle	21.2	17.5	10.9
			Pool	2.7	0	15.7
			Riffle	65.1	27.5	39.6
			Run	16.1	6.8	9.2
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	59.2	24.1	16.0
		Main Channel	Run	8.2	6.1	6.2
		Split Main Channel	Run	7.7	8.0	12.0
	Jay Creek[1]	Tributary	Pool	30.7	8.9	0
			Riffle	208.9	92.3	169.4
			Run	19.6	0	35.8
	Kosina Creek	Tributary	Boulder Riffle	37.3	31.6	52.3
			Glide			154.6
			Riffle	42.7	17.0	60.5
			Run	7.1	5.0	31.8
	Tsisi Creek	Tributary	Boulder Riffle	81.7	37.4	70.4
			Percolation Channel	0	15.9	98.4
			Riffle	193.0	72.4	40.5
			Run	106.6	156.9	36.5

Table-D34. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Sculpin, undifferentiated		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	2.3	9.2	18.5
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	1.4	9.5	15.0
		Side Channel	Pool	53.0	47.5	57.2
			Riffle	6.8	39.0	24.6
		Side Slough	Pool	19.9	59.0	48.4
		Split Main Channel	Run	18.5	19.2	47.3
	Watana Creek	Tributary	Beaver Pond	20.0	22.8	5.4
			Boulder Riffle	59.4	73.9	26.8
			Glide	20.7	6.4	17.0
			Percolation Channel	0	0	0
			Pool	41.1	0	28.8
			Riffle	139.3	18.0	81.7
			Run	84.8	25.7	65.0
	Watana Creek Tributary	Tributary	Boulder Riffle	27.9	11.0	0
			Glide	36.2	47.6	65.5
			Rapid		31.7	19.6
			Riffle	36.7	13.8	14.0
			Run	0	44.4	13.3
	Unnamed Tributary 194.8	Tributary	Pool	120.2	33.4	78.6
			Riffle	34.1	11.3	0
			Run	181.9		38.5
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D35. Average CPUE (fish per hour of shocking time) for sculpin using boat electrofishing in the Upper River, 2013.

Geomorphic Reach	Macrohabitat Type	Mesohabitat Type	Sculpin, undifferentiated		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 224.9-234.5)	Main Channel	Riffle	0	0	0
		Run	0	0	0
UR-4 (PRM 208.1-224.9)	Clearwater Plume	Clearwater Plume		0	4.0
	Main Channel	Run	0	0	0
	Split Main Channel	Run	3.9	0	7.3
UR-5 (PRM 203.4-208.1)	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Main Channel	Run	0	1.5	0
	Side Slough	Pool	0	0	0
	Split Main Channel	Run	0	0	0
Proposed Watana Dam Location (PRM 187.1)					

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: mainstem transect sampling.

Table D36. Average CPUE (fish per 1,000 square meters) for sculpin using seining in the Upper River, 2013.

Geomorphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Sculpin, undifferentiated		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Pool	0		
			Riffle	0		
			Run	0		
Watana Reservoir at Full Pool (PRM 232.5)						
UR-4 (PRM 208.1-224.9)	Susitna River	Main Channel	Run	0		
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0.7	0	0
		Side Channel	Pool	3.3	10.9	0
			Riffle	4.7		0
		Split Main Channel	Run	0.7	0	0
	Watana Creek	Tributary	Riffle	0		
Proposed Watana Dam Location (PRM 187.1)						

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and mainstem transect sampling.

Table D37. Average CPUE (fish per 1,000 square meters) for sculpin using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Sculpin, undifferentiated		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	0.1	0	0
		Pool	0	0	0
		Riffle	100.0		0
		Run	0.9	0	0
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	0	0	0
		Run	0	0	0
	Kosina Creek	Boulder Riffle	0.2	0	0
		Glide			0
		Run		0	0
	Tsisi Creek	Boulder Riffle	0.7	0	0.5
		Percolation Channel	0	0	0
		Riffle	0.1	0	0
		Run	0.2	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0	0	0
		Run	0	0	0
	Watana Creek Tributary	Boulder Riffle		0	0
		Rapid		0	0
		Riffle	0.3	0	0
		Run	0	2.8	0
	Unnamed Tributary 194.8	Pool	2.9	0	
		Riffle	0	0	
		Run	5.3	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D38. Average CPUE (fish per hour of shocking time) for lake trout using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Trout, lake		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Black River	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	0	0	0
			Run	0	0	0
	Goose Creek	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	0	0	0
		Main Channel	Run	0	0	0
		Split Main Channel	Run	0	0	0
	Jay Creek[1]	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Kosina Creek	Tributary	Boulder Riffle	0	0	0
			Glide			0
			Riffle	0	0	0
			Run	0	0	0
	Tsisi Creek	Tributary	Boulder Riffle	0	0	0
			Percolation Channel	0	0	0
			Riffle	0	0	0
			Run	0	0	0

Table-D38. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Trout, lake		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	0
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	0	0	0
		Side Channel	Pool	0	0	0
			Riffle	0	0	0
		Side Slough	Pool	0	0	0
		Split Main Channel	Run	0	0	0
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	0	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Watana Creek Tributary	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Rapid		0	0
			Riffle	0	0	1.8
			Run	0	0	0
	Unnamed Tributary 194.8	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0		0
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D39. Average CPUE (fish per hour of shocking time) for round whitefish using backpack electrofishing in the Upper River, 2013.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Whitefish, round		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0		0
			Rapid	0	0	0
			Riffle	0	0	4.7
			Run	0	0	0
	Black River	Tributary	Boulder Riffle	0	0	0
			Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
Watana Reservoir at Full Pool (PRM 232.5)						
UR-3 (PRM 224.9-234.5)	Susitna River	Main Channel	Riffle	0	4.5	0
			Run	0	0	40.8
	Goose Creek	Tributary	Boulder Riffle	0	0.7	0
			Pool	0	11.5	0
			Riffle	0	0	0
			Run	0	1.6	0
UR-4 (PRM 208.1-224.9)	Susitna River	Clearwater Plume	Clearwater Plume	0	0	6.1
		Main Channel	Run	0	1.4	0
		Split Main Channel	Run	0	4.0	0
	Jay Creek[1]	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0	0	0
	Kosina Creek	Tributary	Boulder Riffle	0	0	0
			Glide			0
			Riffle	0	0	0
			Run	0	0	0
	Tsisi Creek	Tributary	Boulder Riffle	0	0	0
			Percolation Channel	0	0	0
			Riffle	0	0	0
			Run	0	0	0

Table-D39. Continued.

Geo-morphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Whitefish, round		
				Early Summer	Late Summer	Fall
UR-5 (PRM 203.4-208.1)	Susitna River	Main Channel	Run	0	0	3.4
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	1.4	0	0
		Side Channel	Pool	0	0	0
			Riffle	13.7	0	6.2
		Side Slough	Pool	5.0	0	0
		Split Main Channel	Run	0	0	0
	Watana Creek	Tributary	Beaver Pond	0	0	0
			Boulder Riffle	5.4	3.7	0
			Glide	0	0	0
			Percolation Channel	0	0	0
			Pool	0	0	0
			Riffle	3.7	1.3	0
			Run	0	0	0
	Watana Creek Tributary	Tributary	Boulder Riffle	0	0	0
			Glide	0	0	0
			Rapid		0	0
			Riffle	0	0	0
			Run	0	0	0
	Unnamed Tributary 194.8	Tributary	Pool	0	0	0
			Riffle	0	0	0
			Run	0		0
Proposed Watana Dam Location (PRM 187.1)						

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling, direct tributary sampling, and mainstem transect sampling.

Table D40. Average CPUE (fish per hour of shocking time) for round whitefish using boat electrofishing in the Upper River, 2013.

Geomorphic Reach	Macrohabitat Type	Mesohabitat Type	Whitefish, round		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 224.9-234.5)	Main Channel	Riffle	0	0	11.7
		Run	0	0	15.5
UR-4 (PRM 208.1-224.9)	Clearwater Plume	Clearwater Plume		0	4.0
	Main Channel	Run	0	2.7	2.5
	Split Main Channel	Run	0	0	7.3
UR-5 (PRM 203.4-208.1)	Main Channel	Run	0	0	15.4
UR-6 (PRM 187.1-203.4)	Main Channel	Run	0	2.3	6.4
	Side Slough	Pool	0	0	0
	Split Main Channel	Run	0	0	22.3
Proposed Watana Dam Location (PRM 187.1)					

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: mainstem transect sampling.

Table D41. Average CPUE (fish per 1,000 square meters) for round whitefish using seining in the Upper River, 2013.

Geomorphic Reach	Stream	Macrohabitat Type	Mesohabitat Type	Whitefish, round		
				Early Summer	Late Summer	Fall
UR-2 (PRM 234.5-248.6)	Oshetna River	Tributary	Pool	0		
			Riffle	0		
			Run	0		
Watana Reservoir at Full Pool (PRM 232.5)						
UR-4 (PRM 208.1-224.9)	Susitna River	Main Channel	Run	0		
UR-6 (PRM 187.1-203.4)	Susitna River	Main Channel	Run	1.4	3.3	0
		Side Channel	Pool	0	0	0
			Riffle	4.7		5.1
		Split Main Channel	Run	2.6	0	2.1
	Watana Creek	Tributary	Riffle	0		
Proposed Watana Dam Location (PRM 187.1)						

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries or mainstem geomorphic reach as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and mainstem transect sampling.

Table D42. Average CPUE (fish per 1,000 square meters) for round whitefish using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Whitefish, round		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	2.0	0	0
		Pool	5.0	9.4	0
		Riffle	0		0
		Run	0.7	11.5	0
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	0	0	0
		Run	0	0	0
	Kosina Creek	Boulder Riffle	0.4	0	0
		Glide			0
		Run		0	0
	Tsisi Creek	Boulder Riffle	0	0	0
		Percolation Channel	0	0	0
		Riffle	1.8	0	0
		Run	0.7	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	1.7	0	0
		Pool	3.3	0	0
		Riffle	0.4	0	0
		Run	0	0	0
	Watana Creek Tributary	Boulder Riffle		0	0
		Rapid		3.3	0
		Riffle	1.8	0.3	0
		Run	0	0	0
	Unnamed Tributary 194.8	Pool	0	0	
		Riffle	0	0	
		Run	0	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.

Table D43. Average CPUE (fish per 1,000 square meters) for undifferentiated whitefish species using snorkeling in the Upper River, 2013.

Geomorphic Reach	Stream	Mesohabitat Type	Whitefish, undifferentiated		
			Early Summer	Late Summer	Fall
Watana Reservoir at Full Pool (PRM 232.5)					
UR-3 (PRM 221.9-234.5)	Goose Creek	Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0		0
		Run	0	0	0
UR-4 (PRM 208.1-224.9)	Jay Creek[1]	Pool	0	0	0
		Run	0	0	0
	Kosina Creek	Boulder Riffle	0	0	0
		Glide			0
		Run		0	0
	Tsisi Creek	Boulder Riffle	0.3	0	0
		Percolation Channel	0	0	0
		Riffle	0	0	0
		Run	0	0	0
UR-6 (PRM 187.1-203.4)	Watana Creek	Beaver Pond	0	0	0
		Boulder Riffle	0	0	0
		Pool	0	0	0
		Riffle	0	0	0
		Run	0	0	0
	Watana Creek Tributary	Boulder Riffle		0	0
		Rapid		0	0
		Riffle	0	0	0
		Run	0	0	0
	Unnamed Tributary 194.8	Pool	0	0	
		Riffle	0	0	
		Run	0	0	
Proposed Watana Dam Location (PRM 187.1)					

1. Jay Creek was a direct-sampling tributary in which non-random site selection was used. See ISR Study 9.5 Section 4.4.2.2 for details.

Notes: All data are provisional and subject to ongoing QA/QC. CPUE was calculated within tributaries as an average among sites by habitat type by season: Early Summer (July 13-August 11), Late Summer (August 12-September 9), and Fall (September 10-October 4). Data sources include: GRTS tributary sampling and direct tributary sampling.