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SUSITNA-WATANA HYDRO

Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Aquatic Resources Study within the Access Alignment, Transmission Alignment, and Construction Area
Study Plan Section 9.13

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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LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Abbreviation	Definition
ADF&G	Alaska Department of Fish and Game
AEA	Alaska Energy Authority
AFFI	Alaska Freshwater Fish Inventory
AWC	Anadromous Waters Catalog
FERC	Federal Energy Regulatory Commission
ILP	Integrated Licensing Process
ISR	Initial Study Report
PM&E	protection, mitigation and enhancement
Project	Susitna-Watana Hydroelectric Project
RSP	Revised Study Plan
SPD	study plan determination
USACE	United States Army Corps of Engineers

EXECUTIVE SUMMARY

Aquatic Resources Study within the Access Alignment, Transmission Alignment, and Construction Area (9.13)	
Purpose	The objectives of the study are to: 1. Characterize the aquatic habitats and fish assemblages at potential stream crossings within a 200-meter (650-foot) buffer zone along proposed access road and transmission line alignments. 2. Describe aquatic habitats and species present within the construction area for the dam and related hydropower facilities.
Status	During 2013, AEA initiated the synthesis of existing information component of the study. AEA reschedule the remaining components of the study for the next year of the study.
Study Components	1. Synthesis of existing information. 2. Field data collection of aquatic habitat and fish distribution.
2013 Variances	AEA rescheduled the implementation of the field study components to the next year of the study. No changes to the study methods are anticipated. The rescheduling of this study component is not anticipated to have any negative effect on AEA's ability to meet study objectives. Undertaking the field data collection and completing this study in the next study season will allow the study to benefit from additional information coming from other study efforts as additional results become available.
Steps to Complete the Study	As explained in the cover letter to this draft ISR, AEA's plan for completing this study will be included in the final ISR filed with FERC on June 3, 2014.
Highlighted Results and Achievements	The study is not complete but based upon the initial analysis of existing information: • The Denali Corridor would require approximately 38 stream crossings between the Watana Dam site and Denali Highway near Cantwell, and these streams include only resident fish species, if any. • The Chulitna Corridor would require approximately 23 stream crossing, including several that are known to produce anadromous fish as well as resident species. • The Gold Creek Corridor would require approximately 17 stream crossings and at least five streams are known to have anadromous fish production.

1. INTRODUCTION

On December 14, 2012, Alaska Energy Authority (AEA) filed its Revised Study Plan (RSP) with the Federal Energy Regulatory Commission (FERC or Commission) for the Susitna-Watana Hydroelectric Project, FERC Project No. 14241, which included 58 individual study plans (AEA 2012). RSP Section 9.13 describes the Aquatic Resources Study for Project areas within the access alignment, transmission alignment, and construction area. RSP Section 9.13 provided goals, objectives, and proposed methods for this aquatic resources study.

On February 1, 2013, FERC staff issued its study determination (February 1 SPD) for 44 of the 58 studies, approving 31 studies as filed and 13 with modifications. RSP Section 9.13 was one of the 31 studies approved with no modifications.

Following the first study season, FERC's regulations for the Integrated Licensing Process (ILP) require AEA to "prepare and file with the Commission an initial study report describing its overall progress in implementing the study plan and schedule and the data collected, including an explanation of any variance from the study plan and schedule." (18 CFR 5.15(c)(1)) This Initial Study Report (ISR) on Aquatic Resources Study within the Access Alignment, Transmission Alignment, and Construction Area has been prepared in accordance with FERC's ILP regulations and details AEA's status in implementing the study, as set forth in the RSP and approved by FERC's February 1 SPD (referred to herein as the "Study Plan").

2. STUDY OBJECTIVES

As described in RSP Section 9.13.1, the specific study objectives are as follows:

1) Characterize the aquatic habitats and fish assemblages at potential stream crossings within a 200-meter (650-foot) buffer zone along proposed access road and transmission line alignments.
2) Describe aquatic habitats and species present within the construction area for the dam and related hydropower facilities.

3. STUDY AREA

As described in RSP Section 9.13.3, the access corridor study area includes streams and water bodies within both the Susitna River and Tanana River watersheds (Figure 3-1). The Denali alignment would cross streams within both the Nenana River (a tributary of the Tanana River) and Susitna River watersheds. Seattle Creek and Brushkana Creek are the two major drainages that would be crossed within the Nenana River watershed. Deadman Creek is the major stream that would be crossed within the Susitna River watershed. All streams and water bodies that would be intersected by the Chulitna and Gold Creek alignments drain into the Susitna River watershed.

The study area includes the aquatic habitats (streams and lakes) in the vicinity of both temporary and permanent Project-related infrastructure including access roads, transmission lines, airports, and construction areas within a 200-meter (650-foot) buffer zone along each access alignment corridor, in the vicinity of the potential airport and hydropower facility construction areas. Figure 3-1 shows the streams and lakes (based on the most current hydrography layer) within the three potential access corridors and within the Dam and Camp Facility Area near the proposed Watana Dam location. The sample area will be determined as refinements are made to the proposed Project features and specific alignment routes.

4. METHODS AND VARIANCES IN 2013

4.1. Synthesis of Existing Information

AEA implemented the methods as described in the Study Plan with the exception of variances explained below (Section 4.1.1). A preliminary synthesis of existing information, as described in RSP Section 9.13.4.1, was begun in the fall of 2013 and will carry into 2014. AEA reviewed historical information and assembled fish distribution and abundance data from studies conducted in 2012 and 2013 (RSP Sections 9.5.1 and 9.6.1, data from the 2012 studies of barriers to fish passage (RSP Section 9.12.1) to construct preliminary summary tables and maps for each access corridor. AEA coded streams and water bodies by fish presence (e.g., anadromous fish, resident fish, no fish captured or observed) and identified streams and water bodies for which no data records were found. Locations were characterized as follows: (1) sites not previously surveyed; (2) sites with no previously documented fish presence; (3) sites with fish presence documented downstream of the potential crossing location; and (4) sites with fish presence documented upstream of the potential crossing location.

4.1.1. Variances from Study Plan

As described in RSP Section 9.13.4.1, the synthesis of existing information from Alaska Freshwater Fish Inventory (AFFI) was intended to fully occur during 2013 prior to field data collection to identify data gaps and to prioritize sampling effort. The synthesis of existing information was intended to take place in both study seasons and is on track to accomplish that. A preliminary synthesis of currently available data has been prepared. It will be updated with additional data from the AFFI, information from aquatic habitat studies (RSP Section 9.9.1) and from the 2013 study of fish passage barriers (RSP Section 9.12.1), as appropriate in the next study season without compromising the study meeting the study objectives. Other aspects of this task, including: incorporation of existing data into a geospatial database, identification of data gaps, prioritization of initial sampling and refinement of field sampling, and obtaining input from agencies have been rescheduled for the next study season which will be fully achievable.

4.2. Field Data Collection

This component of the study plan was not implemented in 2013 as proposed in RSP Section 9.13.4.2.

4.2.1. Variances from Study Plan

RSP Section 9.13.4.2 noted that AEA would undertake field data collection in the study area during 2013 and 2014, however field work did not in 2013 due to lack of access to CIRWG lands. The rescheduling of this study component is not expected to have an impact on meeting study objectives as a single study season will provide enough opportunities to sample for fish throughout feeding or rearing habitats.

5. RESULTS

With the exception of a preliminary synthesis of existing data, there are no results to report for 2013 because most effort for Study 9.13 was rescheduled for implementation during 2014.

5.1. Synthesis of Existing Information

AEA is evaluating up to three possible access alternatives for road and transmission lines. The Denali Corridor would run north from the Watana Dam site and connect to the Denali Highway by road (Figure 3-1). The Chulitna Corridor would accommodate east–west running transmission lines and a road along the north side of the Susitna River that would connect to the Anchorage–Fairbanks Intertie and the Alaska Railroad near the Chulitna station. The Gold Creek Corridor would also accommodate an east–west access and transmission corridor but would run along the south side of the Susitna River (Figure 3-1).

The most comprehensive fish and aquatic habitat dataset relevant to this study was generated during the 1980s, and no additional work specific to each of the proposed transportation access and transmission line alignments has been conducted since the 1980s. In 1983, the Alaska Department of Fish and Game (ADF&G) established study sites to characterize aquatic habitat and document fish species presence at 42 stream crossings within the then-proposed access and transmission corridors. Study sites were established at 22 stream crossing sites from the Denali Highway to the Watana Dam site, 14 sites along the Devils Canyon access corridor, and 6 sites along the then-proposed Gold Creek rail portion of the corridor (Schmidt et al. 1984). The 22 crossing sites along the then-proposed Denali-North (Seattle Creek) alignment correspond reasonably well to the present-day Denali Corridor crossing sites. The 14 study sites along the then-proposed Devils Canyon access, which extended from corridor mile 38 of the old Denali Corridor to Devils Creek dam site and the old Gold Creek intertie, relate fairly well to a portion of the present-day Chulitna Corridor. The 6 sites along the old Gold Creek intertie correspond to some of the crossings associated with the western portion of the present day Gold Creek Corridor.

In addition to the Access and Transmission Corridor Aquatic Investigations (July–October 1983) report (Schmidt et al. 1984), relevant existing information sources include fish species presence and aquatic habitat data collected and maintained under the Alaska Freshwater Fish Inventory program (e.g., Buckwalter 2011) ADF&G 2013a) and anadromous fish presence data maintained by the ADF&G Anadromous Waters Catalog (ADF&G 2013b). The Aquatic Resources Data Gap Analysis (HDR 2011) and AEA's Pre-Application Document (AEA 2011) summarized existing information and identified data gaps for aquatic conditions and fish species.

Historic data on fish species presence and aquatic habitat are available for many of the streams that could potentially be crossed; however, an updated characterization study may be needed to assess current conditions and to ensure fish presence is accounted for in streams and water bodies within the vicinity of the proposed crossing locations. Additionally, a more comprehensive and systematically-collected aquatic habitat dataset may be necessary to characterize baseline conditions prior to potential development.

A brief summary of the existing information for each of the proposed access/transmission line corridors is presented below.

5.1.1. Denali Corridor

The current Denali access alignment corridor would require approximately 38 stream crossings from the Watana Dam site to the Denali Highway near Cantwell. The Denali Corridor would cross streams within both the Susitna River and Nenana River watersheds. Deadman Creek is the major stream crossed within the Susitna River watershed (Figure 5-1); whereas, Seattle Creek and Brushkana Creek are the two major drainages crossed within the Nenana River system (Figure 5-2).

In the 1980s, biologists conducted fish presence surveys in the vicinity of 13 of these stream crossing sites and recorded general habitat and water quality conditions within both watersheds. Resident fish species (Arctic grayling, Dolly Varden and slimy sculpin) were relatively widespread throughout the Denali Corridor. Several additional resident fish species (lake trout, humpback whitefish, round whitefish and burbot) were confirmed to be present in Deadman Lake and nearby sections of Deadman Creek. No anadromous fish habitat was documented during these surveys. (Schmidt et al. 1984). In 2004, subsequent AFFI surveys in the vicinity of the Denali Corridor have included several locations on Nenana tributaries (Jack River, Brushkana Creek and two locations on Monahan Creek, above and below the Brushkana confluence). No new species were added as Arctic grayling, Dolly Varden and slimy sculpin were the only species encountered (ADF&G 2013a).

Current studies of fish distribution and abundance (RSP Section 9.5.1) used various capture methods to determine fish species presence at selected locations within the Deadman Creek drainage in 2012. Arctic grayling, sculpin and lake trout were present (Figure 5.1). An impassable waterfall on Deadman Creek (about 1.0 km upstream of the confluence with the Susitna River) blocks upstream fish migration (Figure 5-3). Fish sampling downstream of the barrier falls yielded only Arctic grayling. Similarly, aerial surveys did not encounter salmon at that location (Table 5-1). No additional work was conducted in tributaries within the Nenana River watershed. Fish species distribution within that portion of Denali Corridor (Table 5-2) is inferred from historic records (Schmidt et al. 1984) and AFFI data (ADG&G 2013a).

5.1.2. Chulitna Corridor

The current Chulitna Corridor alignment would require approximately 23 stream crossings. All streams and water bodies that would be intersected by this corridor drain into the Susitna River watershed. The majority of streams that would be crossed by this alignment are smaller tributary streams that likely support only resident fish species, if any. However, this alignment would also

cross a number of larger streams, including the Indian River, and Portage, Thoroughfare, Devil, and Tsusena creeks (Figure 5-4). Three of these are recognized anadromous streams — Indian River (Anadromous Waters Catalog (AWC) No. 247-41-10200-2551), Portage Creek (AWC No. 247-41-10200-2585) and Thoroughfare Creek (AWC No. 247-41-10200-2582-3201) — each has been cataloged as providing habitat for anadromous fish at the potential crossing sites (ADF&G 2013b).

The Chulitna alignment would also cross multiple small, unnamed tributaries of Portage Creek, several tributaries to the mainstem of Devils Creek, several smaller tributaries to the Upper Susitna River (in the Swimming Bear drainages; Schmidt et al. 1984), as well as Tsusena Creek and two of its tributaries (Figure 5-4). Based primarily on historic data (Schmidt et al. 1984), along with AFFI information (ADF&G 2013a) and present study data, the resident fish species within streams along the Chulitna Corridor alignment may include Arctic grayling, Dolly Varden, and slimy sculpin. Anadromous species may include Chinook, chum, coho, and pink salmon (Table 5-3).

Fish have not been sampled throughout all reaches of the tributary streams; however, and passage barriers have not been fully evaluated. The presence of barriers on some of the Susitna River tributaries above Devils Canyon was documented as part of ISR Studies 9.9 and 9.12 and is indicated on Figure 5-4. Notably, there are impassable waterfalls on Devil Creek (Figure 5-5) and Tsusena Creek (Figure 5-6) that block fish migration into upstream reaches crossed by the Chulitna alignment.

5.1.3. Gold Creek Corridor

The current road and transmission line alignment within the Gold Creek Corridor would require approximately 17 stream crossings (Figure 5-4). All streams and water bodies that would be intersected by this alignment drain into the Susitna River watershed. Major streams that would be crossed include five drainages that support anadromous fish species — Gold Creek (AWC No. 247-41-10200-2540), an unnamed tributary stream (AWC No. 247-41-10200-2570), Cheechako Creek (AWC No. 247-41-10200-2596), Chinook Creek (AWC No. 247-41-10200-2630), and Fog Creek (AWC No. 247-41-10200-2696) — except for Chinook Creek (which is blocked downstream of the alignment), each has been cataloged as providing anadromous fish habitat in the vicinity of the proposed crossing (ADF&G 2013b). Smaller streams that would be crossed include a number of unnamed tributaries to the Susitna River.

Fish data are available for a number of streams that would be crossed, but much of the data were collected downstream from (i.e., not in the direct vicinity of) the proposed crossing sites (Delaney et al.1981, ADF&G 2013a, Schmidt et al. 1984, ISR Study 9.6). However, it may be inferred that resident fish species along Gold Creek alignment may include Arctic grayling, Dolly Varden, rainbow trout, and slimy sculpin; anadromous fish species may include Chinook, chum, coho, and pink salmon (Table 5-4).

6. DISCUSSION

With the exception of a preliminary synthesis of existing information, implementation of Study 9.13 was rescheduled for the next study season.

The available information suggests approximately 38 stream crossings would be required for the Denali Corridor between the Watana Dam site and Denali Highway near Cantwell, and these streams include only resident fish species, if any.

The Chulitna Corridor would require approximately 23 stream crossing, including several that are known to produce anadromous fish as well as resident species.

The Gold Creek Corridor would require approximately 17 stream crossings and at least five streams are known to have anadromous fish production.

Additional surveys may be needed at all potential stream crossings because the existing data is primarily from the 1980s and the fish community structure and habitat conditions may have changed since that time.

AEA made considerable progress in gathering data for the other licensing studies as described in the ISRs for the following studies:

- The Study of Fish Distribution and Abundance in the Upper Susitna River (ISR Study 9.5)
- The Study of Fish Distribution and Abundance in the Middle and Lower Susitna River (ISR Study 9.6)
- The Characterization and Mapping of Aquatic Habitats (ISR Study 9.9)
- The Study of Fish Passage Barriers in the Middle and Upper Susitna River and Susitna Tributaries (ISR Study 9.12)

The data from these other studies will be used in completion of this study.

7. COMPLETING THE STUDY

[As explained in the cover letter to this draft ISR, AEA's plan for completing this study will be included in the final ISR filed with FERC on June 3, 2014.]

8. LITERATURE CITED

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9. TABLES

Table 5-1. Distribution of Fish Species within the Deadman Creek Drainage along the Denali Corridor.

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Species [2]	Present Species [3]	Sample Information [4]	Comment
Deadman Creek	above mouth	3	Resident		Arctic grayling	Elrctrofishing	Sample taken below corridor and below barrier falls
Deadman Creek	below corridor	4	Resident	Arctic grayling, Dolly Varden, slimy sculpin			No current samples below corridor and above barrier falls
Deadman Creek	D1	4	Resident	Arctic grayling, Dolly Varden, slimy sculpin	Arctic grayling, slimy sculpin, lake trout	Aerial surveys, angling, visual observations, nothing found at one location	Crossing D1 - D2 and Unnamed lake
Deadman Creek	D2	4	Resident	Arctic grayling, Dolly Varden, slimy sculpin	no captures	Electrofishing, angling, visual observations at 10 locations.	Crossing D2 to D3
Deadman Creek	D3	4	Resident	Dolly Varden, slimy sculpin	Arctic grayling, sculpin	Electrofishing, angling, visual observations	Crossing D3 to D4, Fish located between D3 and D4
Deadman Creek	D4	4	Resident	Arctic grayling, Dolly Varden, lake trout, slimy sculpin			No current samples above D4
Deadman Creek	D5	3	Resident	Arctic grayling, Dolly Varden, lake trout, slimy sculpin			No current samples above D4
Deadman Creek	D6	1					No current samples above D4
Deadman Creek	D7	1					No current samples above D4
Deadman	D8	1					No current samples above

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Species [2]	Present Species [3]	Sample Information [4]	Comment
Creek							D4
Deadman Creek	D9	1					No current samples above D4
Deadman Lake	D10	4	Resident	lake trout, burbot, round whitefish, humpback whitefish	lake trout	For mercury analysis, sample method not recorded	Between crossing D10 to D11
Deadman Creek	D11	1					No current samples above Deadman Lake
Deadman Creek	D12	1					No current samples above Deadman Lake
Deadman Creek	D13	1					No current samples above Deadman Lake
Deadman Creek	D14	1					No current samples above Deadman Lake
Deadman Creek	D15	1					No current samples above Deadman Lake
Deadman Creek	D16	1					No current samples above Deadman Lake
Deadman Creek	D17	1					No current samples above Deadman Lake
Deadman Creek	D18	1					No current samples above Deadman Lake
Deadman Creek	D19	1					No current samples above Deadman Lake

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Species [2]	Present Species [3]	Sample Information [4]	Comment
Deadman Creek	D20	3	Resident	Arctic grayling, slimy sculpin			No current samples above Deadman Lake

Notes:

1. 1 = Sites not previously surveyed. 2 = No previous fish presence. 3 = Fish found downstream of crossing. 4 = Fish found upstream of crossing.
2. From Schmidt et al. 1984
3. From ISR Study 9.5
4. From ISR Study 9.5

Table 5-2. Distribution of Fish Species within the Nenana River Drainage along the Denali Corridor.

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]
Jack River	N1	3	Resident	slimy sculpin	Unknown
Jack River	N1	4	Resident	Arctic grayling, Dolly Varden	Unknown
Unnamed	N2	3	Resident	slimy sculpin	Unknown
Unnamed	N3	3	Resident	slimy sculpin	Unknown
Unnamed	N4	3	Resident	slimy sculpin	Unknown
Unnamed	N5	3	Resident	slimy sculpin	Unknown
Edmonds Creek	N6	1			Unknown
Unnamed	N7	1			Unknown
Unnamed	N8	1			Unknown
Unnamed	N9	1			Unknown
Unnamed	N10	1			Unknown
Unnamed	N11	1			Unknown
Lily Creek Tributary	N12	3	Resident	Arctic grayling, Dolly Varden, slimy sculpin	Unknown
Lily Creek	N13	3	Resident	Arctic grayling, Dolly Varden, slimy sculpin	Unknown
Seattle Creek	N14	3	Resident	Arctic grayling, Dolly Varden, slimy sculpin	Unknown

Brushkana Creek	N15	3	Resident	Arctic grayling, slimy sculpin	Unknown
Brushkana Creek tributary	N16	3	Resident	Arctic grayling, slimy sculpin	Unknown
Brushkana Creek tributary	N17	3	Resident	Arctic grayling	Unknown
Brushkana Creek tributary	N18	3	Resident	Arctic grayling, Dolly Varden, slimy sculpin	Unknown

Notes:

1. 1 = Sites not previously surveyed. 2 = No previous fish presence. 3 = Fish found downstream of crossing. 4 = Fish found upstream of crossing.
2. From Schmidt et al. 1984 and AFFI sites 1017800064 (no survey date), and FS10408A01, FS10407A02, FS10407A04, and FS10407A05 (from 2004 surveys).
3. No new survey work was conducted in this portion of the Denali Corridor.

Table 5-3. Distribution of Fish Species within Stream Drainages along the Chulitna Corridor.

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]	Sample Information [4]	Comment
Indian River	C1	3	Anadromous	Chinook, chum, coho, and pink salmon (lower) and Chinook salmon (upper)		No	In AWC
Indian River	C2	3	Anadromous	Chinook, chum, coho, and pink salmon (lower) and Chinook salmon (upper)		No	In AWC
Indian River	C3	4	Anadromous	Chinook, chum, coho, and pink salmon (lower) and Chinook salmon (upper)	Chinook and chum salmon	Telemetry	In AWC
Portage Creek	C4	1				No	Anadromous Waters connected downstream
Portage Creek	C5	1				No	Anadromous Waters connected downstream
Portage Creek	C6	1				No	Anadromous Waters connected downstream
Portage Creek	C7	1				No	Anadromous Waters connected downstream
Portage Creek	C8	1				No	Anadromous Waters connected downstream
Thoroughfare Creek	C9	4	Anadromous	Chinook salmon		No	In AWC

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]	Sample Information [4]	Comment
Portage Creek	C10	4	Anadromous	Chinook, chum, coho, and pink salmon (lower) and Chinook salmon (upper)	Chinook	Telemetry	In AWC
Portage Creek	C10	4	Resident	Dolly Varden, slimy sculpin		No	In AWC
Devil Creek	C11	1	Resident	Dolly Varden, slimy sculpin		No	Not in AWC, barrier falls blocks upstream migration, resident fish sampled downstream of Corridor
Devil Creek	C12	1	Resident	Dolly Varden, slimy sculpin		No	Not in AWC, barrier falls blocks upstream migration, resident fish sampled downstream of Corridor
Devil Creek	C13	1	Resident	Dolly Varden, slimy sculpin		No	Not in AWC, barrier falls blocks upstream migration, resident fish sampled downstream of Corridor
Devil Creek	C14	1	Resident	Dolly Varden, slimy sculpin		No	Not in AWC, barrier falls blocks upstream migration, resident fish sampled downstream of Corridor
Devil Creek	C15	3	Resident	Dolly Varden, slimy sculpin	Chinook salmon (below barrier); Dolly Varden, slimy sculpin, and sculpin spp. (below Corridor)	Electrofishing and telemetry	Not in AWC, barrier falls blocks upstream migration, resident fish sampled downstream of Corridor
Unnamed Susitna River tributary	C16	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in AFFI
Unnamed Susitna River	C17	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in AFFI

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]	Sample Information [4]	Comment
tributary							
Unnamed Susitna River tributary	C18	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in AFFI
Unnamed Susitna River tributary	C19	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in AFFI
Unnamed Susitna River tributary	C20	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in ISR Study 9.12
Unnamed Susitna River tributary	C21	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in ISR Study 9.12
Tsusena Creek	C22	1	Resident	Dolly Varden, slimy sculpin		No	Barrier below corridor identified in ISR Study 9.12
Tsusena Creek	C23	1	Resident	Arctic Grayling (below Corridor, downstream of barrier falls), Dolly Varden, slimy sculpin		No	Barrier below corridor identified in ISR Study 9.12
Tsusena Creek	C23	3	Anadromous	Chinook salmon (below Corridor, downstream of barrier falls)	Chinook (below Corridor, downstream of falls)	Telemetry, aerial survey	Not in AWC, barrier below corridor identified in ISR Study 9.12

Notes:

1. 1 = Sites not previously surveyed. 2 = No previous fish presence. 3 = Fish found downstream of crossing. 4 = Fish found upstream of crossing.
2. From Schmidt et al. 1984, Buckwalter 2011, and AFFI sites FSS1101G02 (2001 survey), FSS03USU02, FSS0305A02 (2003 surveys) and ISR Study 9.5.
3. New fish survey work only in Devil Creek below Corridor, remaining data based on telemetry and aerial surveys below barriers.
4. From AWC (ADF&G 2013b) and ISR Study 9.5.

Table 5-4. Distribution of Fish Species within Stream Drainages along the Gold Creek Corridor.

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]	Sample Information [4]	Comment
Gold Creek	G1	3	Anadromous	Chinook, chum, coho, and pink salmon (lower) and Chinook salmon (upper)	Chinook, chum, coho, and pink salmon	Telemetry	In AWC
Unnamed Susitna River tributary	G2	3	Anadromous	Chinook salmon below barrier falls, downstream of Corridor		No	ADF&G identified barrier falls just upstream from mouth
Unnamed Susitna River tributary	G2	3	Resident	Arctic grayling and slimy sculpin below barrier falls, downstream of Corridor		No	ADF&G identified barrier falls just upstream from mouth
Unnamed Susitna River tributary	G3	3	Anadromous	Chinook salmon		No	Connected to Susitna River with no identified barriers
Unnamed Susitna River tributary	G4	3	Resident	slimy sculpin		No	Connected to Susitna River with no identified barriers
Unnamed Susitna River tributary	G5	1				No	Connected to anadromous water downstream, no barrier identified
Unnamed Susitna River tributary	G6	3	Anadromous	Chinook, chum, coho, and pink salmon (lower) and coho salmon (upper)		No	In AWC , nomination 86-186 referred to this drainage as "Jack Long Creek"
Unnamed Susitna River tributary	G6	3	Resident	Arctic grayling, rainbow trout, slimy sculpin		No	Resident species reported within drainage
Unnamed Susitna River tributary	G7	3	Anadromous	Chinook, chum, coho, and pink salmon (lower) and coho salmon (upper)		No	In AWC , nomination 86-186 referred to this drainage as "Jack Long Creek"
Unnamed Susitna	G7	3	Resident	Arctic grayling, rainbow		No	Resident species reported within drainage

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]	Sample Information [4]	Comment
River tributary				trout, slimy sculpin			
Cheechako Creek	G8	3	Anadromous	Chinook salmon (upper and lower)	Chinook salmon	Aerial Survey	In AWC, two barriers identified above Corridor
Cheechako Creek	G8	4	Resident	Dolly Varden, slimy sculpin	Dolly Varden, slimy sculpin	No	In AWC, two barriers identified above Corridor
Unnamed Susitna River tributary	G9	1				No	Barrier Identified downstream of Corridor
Chinook Creek	G10	3	Anadromous	Chinook salmon	Chinook salmon (below barrier)	Electrofishing, Telemetry	In AWC, Barrier identified downstream of Corridor
Chinook Creek	G10	4	Resident		Arctic grayling, Dolly Varden, slimy sculpin, sculpin spp.	Electrofishing	In AWC, Barrier identified downstream of Corridor
Unnamed Susitna River tributary	G11	3	Resident		Arctic grayling, Dolly Varden, sculpin spp., unidentified Salmonid	Electrofishing, Fyke Net	Connected to Susitna River with no identified barriers, resident fish captured at mouth of tributary
Unnamed Susitna River tributary	G12	1				No	Lake above corridor, no barrier, connected to Susitna River, sampled in lake below Corridor (angling) - nothing captured
Unnamed Susitna River tributary	G13	3	Resident		Arctic grayling, Dolly Varden, sculpin spp., unidentified Salmonid, longnose sucker	No	Connected to Susitna River with no identified barriers, resident fish captured at mouth of tributary
Unnamed Susitna River tributary	G14	3	Resident		Arctic grayling, Dolly Varden, sculpin spp., unidentified Salmonid	No	Connected to Susitna River with no identified barriers, resident fish captured at mouth of tributary

Drainage	Stream ID	Status [1]	Present/ Absent	Historic Records [2]	Present Species [3]	Sample Information [4]	Comment
Unnamed Fog Creek tributary	G15	4	Anadromous	Chinook salmon	Chinook salmon	Electrofishing	In AWC, connected to Fog Creek within Corridor
Unnamed Fog Creek tributary	G15	4	Resident	slimy sculpin	Dolly Varden, slimy sculpin, sculpin spp., unidentified Salmonid	Electrofishing	In AWC, connected to Fog Creek within Corridor
Fog Creek	G16	3	Anadromous	Chinook salmon	Chinook salmon	Aerial Survey	Connected to anadromous water downstream of Corridor, no barrier identified; 2012 data fror ISR Study 9.5 had one location with nothing captured
Fog Creek	G16	4	Resident	Arctic grayling, Dolly Varden, slimy sculpin	Dolly Varden, slimy sculpin, sculpin spp.	Minnow Trap, Angling, Elecrofishing	Connected to anadromous water downstream of Corridor, no barrier identified; 2012 data fror ISR Study 9.5 had one location with nothing captured
Unnamed Susitna River tributary	G17	1				No	Barrier identified within Corridor, lakes above Corridor

Notes:

1 1 = Sites not previously surveyed. 2 = No previous fish presence. 3 = Fish found downstream of crossing. 4 = Fish found upstream of crossing.

2 From Schmidt et al. 1984, Buckwalter 2011, AFFI sites FSS0305A01, FSS03USU01, and FSS0308A01 (2003 surveys) and ISR Studies 9.5 and 9.6.

3 From AWC (ADF&G 2013b), ISR Studies 9.5 and 9.6.

4 From AWC (ADF&G 2013b), ISR Studies 9.5 and 9.6.

10. FIGURES

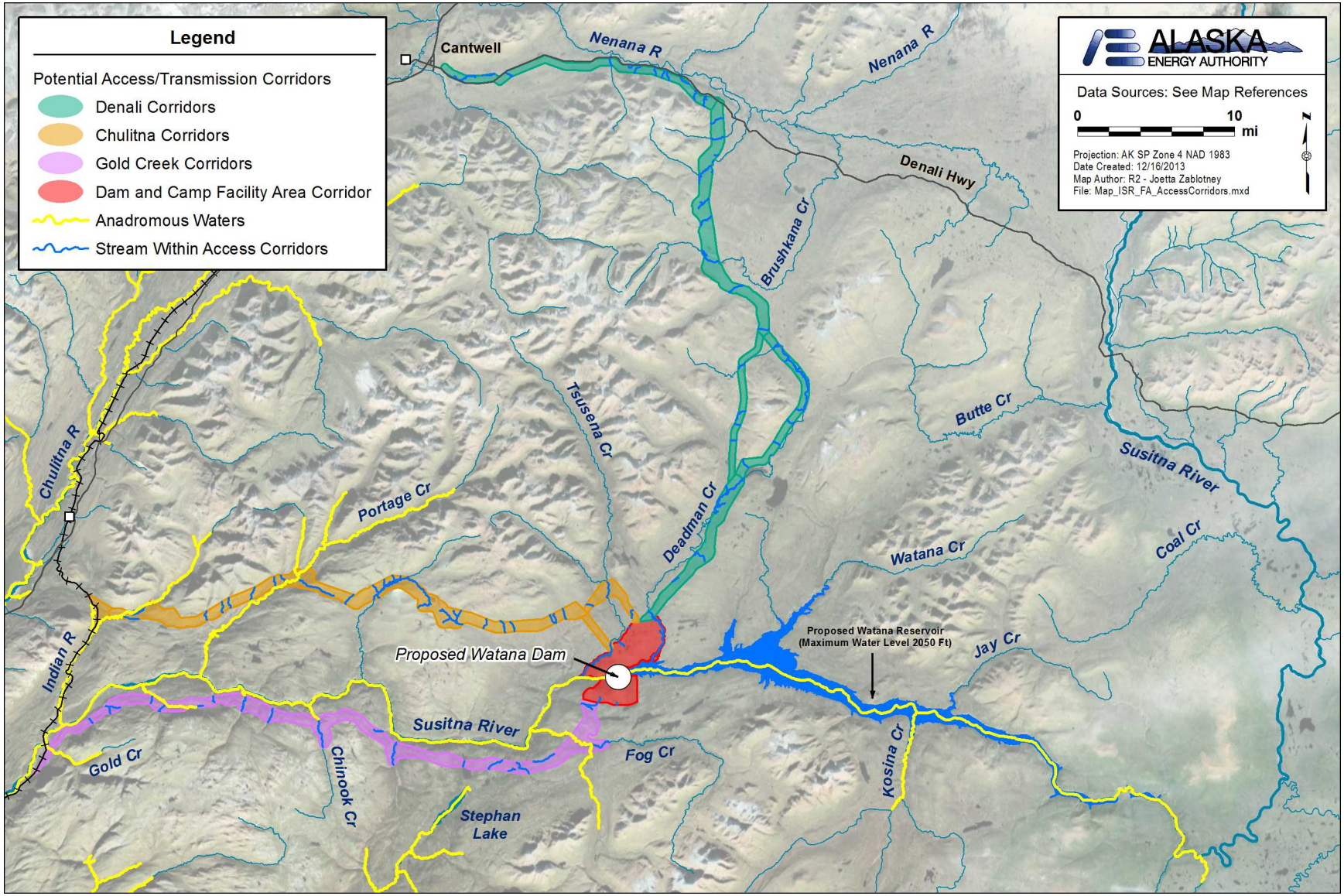

Figure 3-1. Study Area for Aquatic Resources in the Potential Access and/or Transmission Alignment Corridors

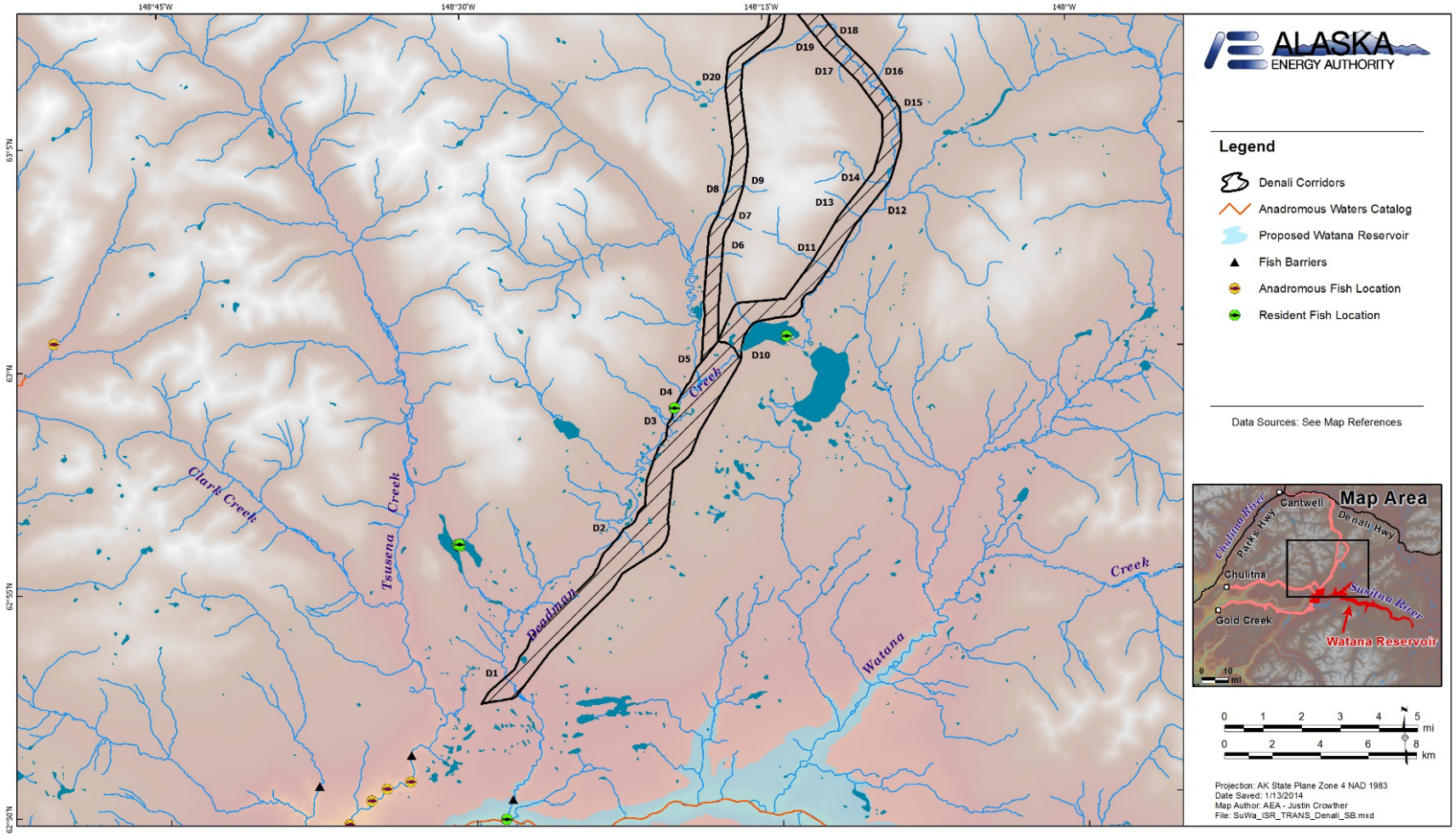

Figure 5-1. The Denali Corridor within the Susitna River Drainage

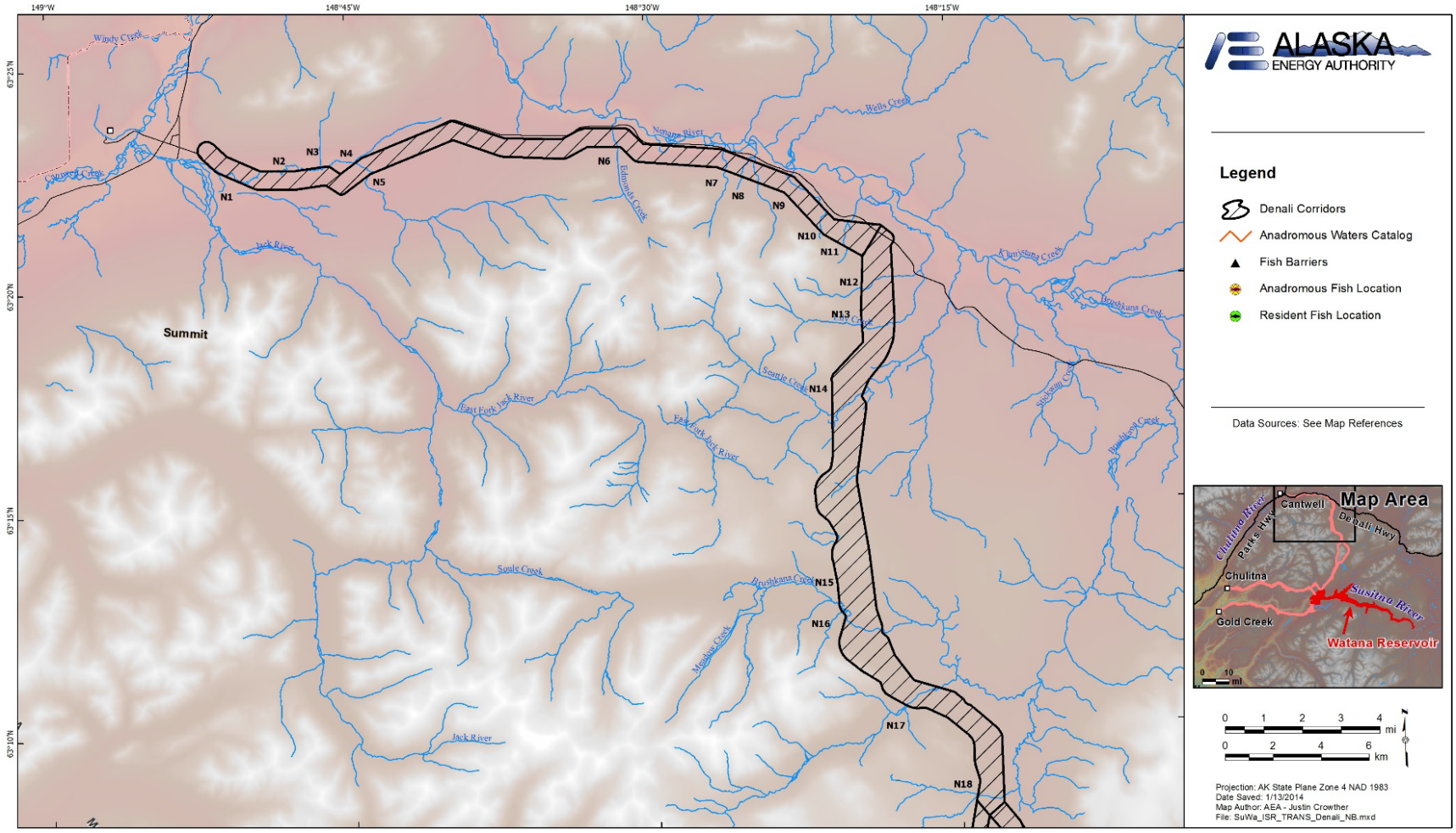

Figure 5-2. The Denali Corridor within the Nenana River Drainage

Stream: RM 186.6 – Deadman Creek
Latitude: N
Longitude: W
Barrier ID: 186.6 A

Adult salmon passage barrier 186.6 A, 6/20/2012.

Image: IMG_1176.jpg

Figure 5-3. Barrier Falls on Deadman Creek

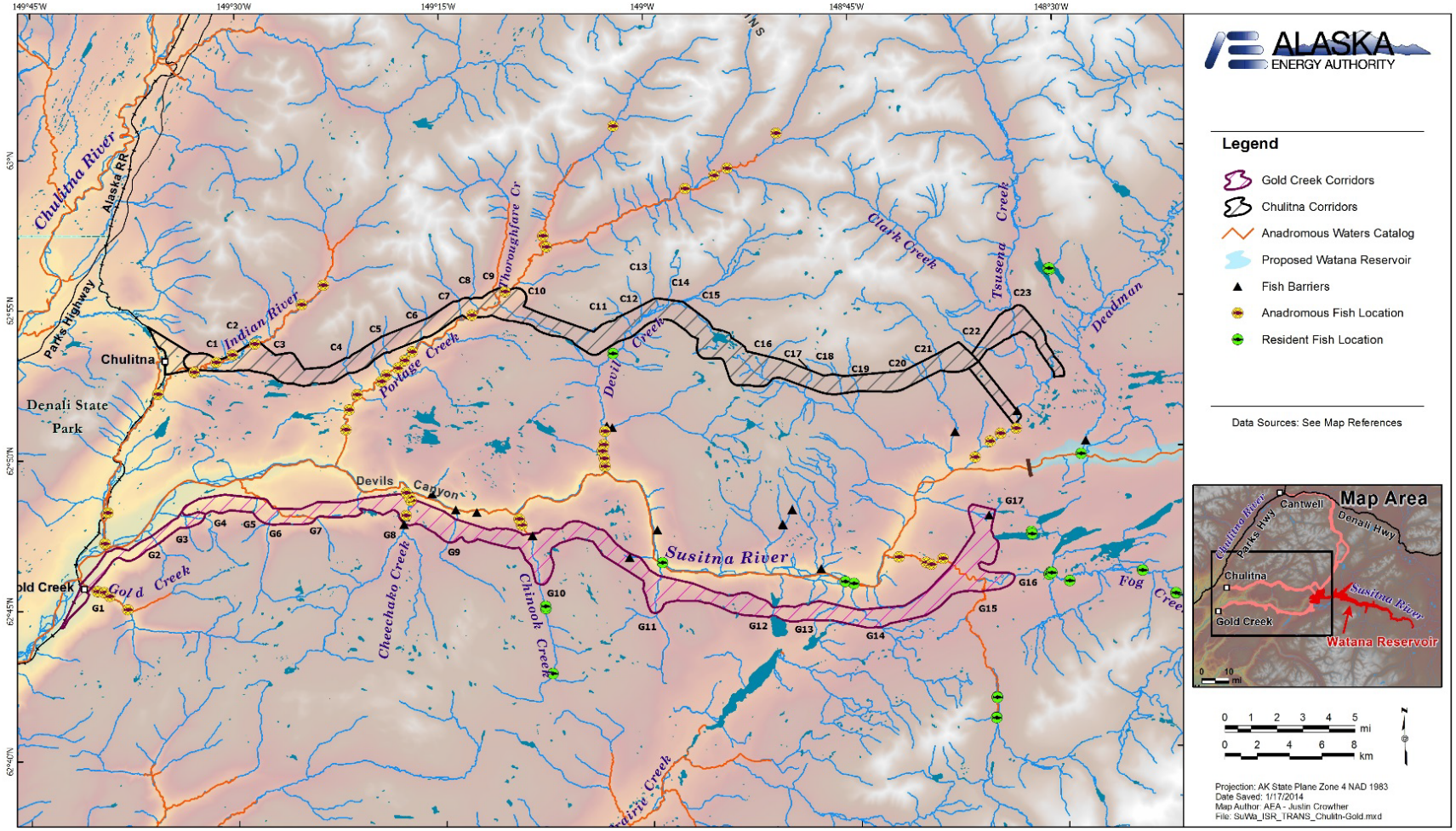

Figure 5-4. The Chulitna and Gold Creek Corridors within the Susitna River Drainage

Stream: RM 161.5 – Devils Creek
Latitude: N
Longitude: W
Barrier ID: 161.5 A

RM adult salmon passage barrier, 6/19/2012.

Image: IMG_1079.jpg

Figure 5-5. Barrier Falls on Devil Creek

Stream: RM 181.8 Tsusena Creek
Latitude: N
Longitude: W
Barrier ID: 181.8 A

Adult salmon passage barrier 181.8 A, 6/20/2012.

Image: IMG_1160.jpg

Figure 5-6. Barrier Falls on Tsusena Creek