Fishery Data Series No. 14-53

Delta River Drainage Fish Inventory, 2009

by

Andrew D. Gryska

December 2014

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY DATA REPORT NO. 14-53

DELTA RIVER DRAINAGE FISH INVENTORY, 2009

by

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December 2014

Development and publication of this manuscript were partially financed by the Federal Aid in Sport fish Restoration Act (16 U.S.C.777-777K) under Project F-10-25, Job No. R-3-2(e).

ADF&G Fishery Data Series was established in 1987 for the publication of Division of Sport Fish technically oriented results for a single project or group of closely related projects, and in 2004 became a joint divisional series with the Division of Commercial Fisheries. Fishery Data Series reports are intended for fishery and other technical professionals and are available through the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone editorial and peer review.

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This document should be cited as:
Gryska, A. D. 2013. Delta River drainage fish inventory, 2009. Alaska Department of Fish and Game, Fishery Data Series No. 14-53, Anchorage.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS i

PAGE i

LIST OF TABLES ii

LIST OF APPENDICES v

ABSTRACT 1

INTRODUCTION 1

OBJECTIVE 2

METHODS 2

Study Design 2

- Study Area 2
- Overview 2
- Selecting sample areas 2
- Sample methods 3

Data Collection 6

- Fish 6
- Physical, Chemical, and Weather Conditions 6

RESULTS 7

DISCUSSION 7

ACKNOWLEDGEMENTS 9

REFERENCES CITED 10

TABLES AND FIGURES 13

APPENDIX A 83

APPENDIX B 91

APPENDIX C 95

LIST OF TABLES

Table		Page
1.	Sampling effort by gear type for lakes of three size categories.	15
2.	Sample locations, their size, and indication (x=present) of fish species observed.	16
3.	Site data for Upper Garrett Creek Channel 1.	18
4.	Site data for Upper Garrett Creek Channel 2.	19
5.	Site data for Lower Garrett Creek.	21
6.	Site date for West Fork Rainy Creek.	22
7.	Site data for Goldsmith Creek.	23
8.	Site data for Bean Lake Creek.	24
9.	Site data for TK Creek.	25
10.	Site data for Speciman Creek.	26
11.	Site data for Collyard Creek.	27
12.	Site data for Seven Mile Creek.	28
13.	Site data for Five Mile Creek.	29
14.	Site data for Three Mile Creek.	30
15.	Site data for Victor Creek.	31
16.	Site data for Saskabush Slough.	32
17.	Site data for Lower Wildhorse Creek.	33
18.	Site data for South Fork Wildhorse Creek.	34
19.	Site data for North Fork Wildhorse Creek.	35
20.	Site data for Boulder Creek.	36
21.	Site data for Upper Landmark Gap Creek.	37
22.	Site data for Lower Twelve Mile Creek.	38
23.	Site data for Upper Twelve Mile Creek.	39
24.	Site data for Ann Creek.	40
25.	Site data for Upper Fish Lake Creek.	41
26.	Site data for Middle Fish Lake Creek.	42
27.	Site data for Lower Fish Lake Creek.	43
28.	Site data for Lost Creek.	44
29.	Site data for Moose Creek.	46
30.	Site data for One Mile Creek.	47
31.	Site data for Rainbow Mountain Lake.	48
32.	Sample gear data for Rainbow Mountain Lake.	48
33.	Site data for Dude Lake.	49
34.	Sample gear data for Dude Lake.	49
35.	Site data for Gulch Lake.	51
36.	Sample gear data for Gulch Lake.	51
37.	Site data for Mouskateer Lake.	52
38.	Sample gear data for Mouskateer Lake.	52
39.	Site data for Sluggo Lake.	53
40.	Sample gear data for Sluggo Lake.	53
41.	Site data for Victor Lake.	55
42.	Sample gear data for Victor Lake.	55
43.	Site data for Hidden Lake.	57
44.	Sample gear data for Hidden Lake.	57
45.	Site data for Petrokov Lake.	59
46.	Sample gear data for Petrokov Lake.	59
47.	Site data for No Good Lake.	61
48.	Sample gear data for No Good Lake.	61
49.	Site data for Bean Lake.	63
50.	Sample gear data for Bean Lake.	63
51.	Site data for Upper Landmark Gap Lake.	65
52.	Sample gear data for Upper Landmark Gap Lake.	65
53.	Site data for Thing Two Lake.	67

54. Sample gear data for Two Thing Lake. 67
55. Site data for Fish Lake, July 14. 69
56. Sample gear data for Fish Lake, July 14. 69
57. Site data for Fish Lake, July 15. 71
58. Sample gear data for Fish Lake, July 15. 71
59. Site data for Fish Lake, July 16. 72
60. Sample gear data for Fish Lake, July 16. 72
61. Site data for Big Wuttie Lake. 73
62. Sample gear data for Big Wuttie Lake. 73
63. Site data for Little Wuttie Lake. 75
64. Sample gear data for Little Wuttie Lake. 75
65. Site data for Collyard Lake. 77
66. Sample gear data for Collyard Lake. 77
67. Site data for High Lake. 79
68. Sample gear data for High Lake. 79
69. Site data for Little Moose Lake. 80
70. Sample gear data for Little Moose Lake. 80

LIST OF FIGURES

Figure **Page**

1. Map of study area and sample locations except One Mile Creek, which was located 25 km north of milepost 212. 14
2. Upper Garrett Creek. 20
3. Lower Garrett Creek. 21
4. Lower Garrett Creek. 21
5. West Fork Rainy Creek. 22
6. West Fork Rainy Creek. 22
7. Goldsmith Creek. 23
8. Goldsmith Creek. 23
9. Bean Lake Creek. 24
10. TK Creek. 25
11. TK Creek. 25
12. Mouth of Speciman Creek. 26
13. Mouth of Speciman Creek. 26
14. Collyard Creek. 27
15. Seven Mile Creek. 28
16. Seven Mile Creek. 28
17. Five Mile Creek. 29
18. Five Mile Creek. 29
19. Three Mile Creek. 30
20. Three Mile Creek. 30
21. Victor Creek. 31
22. Victor Creek. 31
23. Saskabush Slough. 32
24 Saskabush Slough. 32
25. Lower Wildhorse Creek. 33
26. Lower Wildhorse Creek. 33
27. South Fork Wildhorse Creek. 34
28. South Fork Wildhorse Creek. 34
29. North Fork Wildhorse Creek. 35
30. North Fork Wildhorse Creek. 35
31. Boulder Creek. 36
32. Boulder Creek. 36
33. Upper Landmark Gap Creek. 37

34. Upper Landmark Gap Creek. 37
35. Lower Twelve Mile Creek. 38
36. Lower Twelve Mile Creek. 38
37. Upper Twelve Mile Creek. 39
38. Upper Twelve Mile Creek. 39
39. Ann Creek. 40
40. Ann Creek. 40
41. Upper Fish Lake Creek. 41
42. Upper Fish Lake Creek. 41
43. Middle Fish Lake Creek. 42
44. Middle Fish Lake Creek. 42
45. Lower Fish Lake Creek. 43
46. Lower Fish Lake Creek. 43
47. Lost Creek. 45
48. Lost Creek. 45
49. Moose Creek. 46
50. Moose Creek. 46
51. One Mile Creek. 47
52. One Mile Creek. 47
53. Rainbow Mountain Lake 48
54. Rainbow Mountain Lake. 48
55. Dude Lake. 50
56. Dude Lake. 50
57. Gulch Lake. 51
58. Gulch Lake. 51
59. Mouskateer Lake. 52
60. Mouskateer Lake. 52
61. Sluggo Lake. 54
62. Sluggo Lake. 54
63. Victor Lake. 56
64. Victor Lake. 56
65. Hidden Lake. 58
66. Hidden Lake. 58
67. Petrokov Lake. 60
68. Petrokov Lake. 60
69. No Good Lake. 62
70. No Good Lake 62
71. Bean Lake. 64
72. Bean Lake. 64
73. Upper Landmark Gap Lake. 66
74. Upper Landmark Gap Lake. 66
75. Thing Two Lake. 68
76. Thing Two Lake. 68
77. Fish Lake. 70
78. Fish Lake. 70
79. Big Wuttie Lake. 74
80. Big Wuttie Lake. 74
81. Little Wuttie Lake. 76
82. Little Wuttie Lake. 76
83. Collyard Lake. 78
84. Collyard Lake. 78
85. High Lake. 79
86. High Lake Outlet. 79
87. Little Moose Lake. 80
88. Little Moose Lake. 80

89. Eureka Glacier and its bifurcated outlet stream that forms the headwaters of Eureka Creek and the East Fork Maclaren River. 81

LIST OF APPENDICES

Appendix **Page**

A1. Potential sample locations, their size, accessibility, characterization, region and prioritization. 84
A2. Sample schedule and prioritization. 86
A3. Fish species known to occur within the Upper Delta and Upper Maclaren river drainages. 89
B1. Sample data for Dude Lake, 1995 92
B2. Sample data for Fish Lake, 1996 93
C1. Files[a] for fish inventory of the Delta River drainage, 2009. 96

ABSTRACT

The Alaska Department of Fish and Game and the U.S. Bureau of Land Management cooperated to perform a fish inventory of the Upper Delta River drainage during July and August, 2009. This information was desired because of the potential for increases in mining on lands adjacent to these waters in the foreseeable future. The inventory study area was approximately 1,000 km^2, and sampling was completed in 18 lakes and 21 streams. A variety of gear types (gill net, minnow trap, electrofishing, set lines, and angling) were used in an attempt to capture all species of fish present. In 13 of 18 lakes, one or more of the following fish species were captured: slimy sculpin *Cottus cognatus*, humpback whitefish *Coregonus pidschian*, round whitefish *Prosopium cylindraceum*, burbot *Lota lota*, lake trout *Salvelinus namaycush*, Arctic grayling *Thymallus arcticus*, and longnose sucker *Catostomus catostomus*. In 16 of 21 streams, one or more of the following fish species were captured: slimy sculpin, round whitefish, burbot, Dolly Varden *Salvelinus malma*, and Arctic grayling. While the study demonstrated the presence of fish in most of the water bodies sampled, greater sampling rigor is needed to verify the absence of fish in the remaining water bodies.

Keywords: Fish inventory, Delta River, Alaska.

INTRODUCTION

The Delta River begins at the outlet of Lower Tangle Lake in the Alaska Range about 100 km south-southwest of Delta Junction, Alaska. A large portion of the river and drainage have been designated a wild and scenic river by the U.S. Bureau of Land Management (BLM); specifically, the Tangle Lakes portion of the drainage is classified as scenic, the Delta River from Lower Tangle Lake to mile 212 of the Richardson Highway is classified as wild, and the remaining portion through Black Rapids is classified as recreational (Figure 1).

In addition to being a recreationally significant area, this region between the Alaska Range and the Amphitheater Mountains holds large deposits of economically important minerals, and gold has been intermittently mined by small operations. The scope of the mining operations may increase dramatically with the development of the Pure Nickel Inc. MAN Alaska project that has located significant amounts of platinum group elements, nickel, gold, cobalt, and copper in a 725 km^2 area. Actual mining is projected to begin within as little as 5 years and this potential development increased the need for a more comprehensive understanding of resident fishes within the impacted area.

This need prompted a cooperative project between the BLM and the Alaska Department of Fish and Game (ADF&G), Division of Sport Fish for which two mutual informational needs were identified: improved understanding of the Arctic grayling population within the Delta River (between the falls and Eureka Creek) that is popular with anglers, and more comprehensive information on fish inventories and distributions in the region. Information on the Arctic grayling *Thymallus arcticus* population was very limited and based on a few small-scaled studies during which fish were sampled (Peckham 1974, 1975; Baker 1989; Holmes et al. 1990). Inventory and distribution information of fish species was collected by Carlton (1976) and Peckham (1976), but their utility was limited because they did not include much of the area where the proposed mine may exist.

This project had three goals to be completed over a 2-year period: 1) determine seasonal distribution and habitat use of Arctic grayling in the Delta River between the falls and Eureka Creek using radiotelemetry; 2) estimate population size of Arctic grayling between the falls and Eureka Creek; and 3) conduct fish inventory and distribution of streams and lakes within the larger region of the Upper Delta River drainage. This report focuses on the last goal: a species inventory of the region.

OBJECTIVE

The research objective for this project was to:

1. inventory the distribution, by species, of fish in the study area.

METHODS

STUDY DESIGN

Study Area

The study area was approximately 1,000 km^2 in size, centered on the Yost Trail and adjacent to numerous mineral resources (Figure 1). The sample area ranged from 650 m to 1,290 m elevation and has over 300 km of streams and numerous small lakes. Within this area, 18 lakes and 21 streams were sampled. Sampled lakes have a combined surface area of 3.8 km^2, and the 18 streams have a combined drainage area of 636 km^2.

Overview

Survey work was supported by either a commercial Robinson R44 helicopter or four-wheel all terrain vehicles (ATVs). During the first week, each two-person crew reached the most remote and inaccessible locations using chartered helicopter transport. The helicopter was capable of carrying 300 kg (about 3 people and 50 kg of gear), and a full fuel load. During the second and third weeks, a two- or three-person crew reached more accessible locations along the Yost trail and Richardson Highway via truck, ATV, or boat.

At selected locations, the fish communities were sampled with standardized methods and effort. Because each gear type is selective by size and species, several different gear types were used to ensure all fish species were susceptible to capture. In streams, the extant fish community was collected primarily by single-pass electrofishing and occasionally by fish traps and hook-and-line. In lakes, fish were collected by gill nets, trot lines, minnow traps, and occasionally by electrofishing. Collected fish were identified by species, tallied, and measured for fork length. Additionally, other variables related to water chemistry, channel morphology, bathymetry, and riparian habitat parameters were recorded at each sample site.

Selecting sample areas

To select sample sites, the area was divided into four regions, three of which were largely accessible by helicopter only (Figure 1). The central region was centered on the ATV-accessible Yost trail, and surrounding the central region were the north, west, and south regions. In each region, maps, aerial photos, and satellite photos were used to identify lakes and streams that appeared to have characteristics capable of supporting fish (e.g., depth of lakes and width and depth of rivers; Appendix A1). In addition, the catchment of each stream basin was determined as was the surface area of each lake. Streams were initially selected if they had catchments greater than 10 km^2 or, if smaller, originated from a headwater lake. Lakes were initially selected by their color using photos (darker hues being indicative of greater depth), their size (> 0.01 km^2; i.e., 1 hectare), and presence of inlet and outlet streams. Sampling of the 61 selected streams and lakes (Appendix A2) was scheduled to ensure the most efficient use of transportation and sample time. In addition, these locations were prioritized to allow deletions or additions of sites to account for unforeseen events during sampling. For all target stream and

lake locations, actual sample locations were further refined during reconnaissance from either slow, low-level helicopter flights or from an ATV.

For streams, reconnaissance usually began several kilometers downstream of the generalized location identified from aerial and Google Earth photos and proceeded upstream several kilometers above the target stream location. During visual inspection, the crew evaluated the stream's or lake's aquatic habitat, paying particular attention to water flow, gradient, depth, and barriers to fish passage. The accumulated experience of the crew was used to select a stream sampling reach or lake by identifying areas of habitat that were plausibly suitable to fish and could easily and safely be accessed.

In some cases, the crew leader judged that the targeted stream reach or lake was very unlikely to provide suitable fish habitat, and that the goal of identifying fish habitat would be better served by devoting effort to another water body. For example, upon observation a lake was found to be landlocked and too shallow (< 1 m) to support overwintering fish. In such cases, the crew leader deleted the prospective site and travelled to the next target stream or lake.

Sample methods

Streams

Once a sampling reach was selected, the crew leader established a station location at the upstream terminus of the sampling reach. The total sampling reach length was equal to 40 wetted channel widths (Reynolds et al. 2003; Kaufmann et al. 1999; Lyons 1992). If possible, the reach included at least 2 examples each of 2 types of Geomorphic Channel Units (GCU's; e.g., riffle, run, pool) as described in Bisson et al. (1981). For channel wetted widths < 3.75 m, sampled reach length was 150 m (4 consecutive 37.5 m sampling sub-reaches) to ensure sufficient minimum sampling effort and to ensure that most or all segment geomorphic habitat types were encountered. For wetted channel widths > 7.5 m, the surveyed channel reach was 300 m (4 consecutive 75-m sampling sub-reaches) for the following reasons: a) in larger streams habitat features such as pools tend to repeat every 5–7 channel widths as a function of hydraulics (Moulton et al. 2002); b) a 300-m reach should contain at least one complete meander for channels up to 15 m (Leopold et al. 1964); c) as wetted width increases, sample length requirements remain relatively constant (Patton et al. 2000); and d) to place a maximum effort threshold for each individual sampling effort. Historic ADF&G, Division of Habitat inventories predominantly selected stations on streams within the following ranges: 73% of survey stations have been at locations with wetted channel widths < 3.75 m; 89% have been at locations with wetted channel widths < 7.5 m (n = 576). This range (150–300 m) of potential sample reach lengths was consistent with the National Water-Quality Assessment Program (NAWQA) stream habitat characterization protocols (Fitzpatrick et al. 1998) and with recommendations developed for small Wyoming streams (Patton et al. 2000).

In most situations, a station was defined as the upstream boundary of the sampling reach, and only a single station was established for each sampling reach. At this station, geographic coordinates were marked using a Global Positioning System (GPS) receiver and most habitat parameters were measured or observed. If a team deviated from the main channel sampling reach to collect fish in a side- or off-channel habitat or tributary to the target stream, these observations were recorded as a separate station. A unique Station ID was assigned to each survey station. The structure of the Station ID was that the first 6 characters represented the date

(e.g., 090609 is September 6, 2009), and the next set of characters represented the location name (e.g., North Fork Rainy Creek).

Fish capture

The fish capture procedures were adapted and modified from McCormick and Hughes (1998) with the objective to collect a sample of all, except very rare, species in the assemblage. Backpack electrofishing equipment was the principal sampling gear, supplemented on a limited basis by hook-and-line in habitats where flow, substrate, and structure precluded electrofishing.

A Smith-Root Model LR-24[a] backpack electrofisher was used and the output settings were adjusted to achieve fish taxis (forced swimming toward the anode) in order to maximize sampling effectiveness and minimize stress and injury to fish. Selected output settings varied from site to site based on aquatic parameters influencing the fundamental performance of the electrofishers. Typically, pulsed-DC waveforms (rather than unpulsed, smooth DC) were selected to extend battery life. Pulse frequency did not exceed 50 pulses per second to avoid exposing fish to more harmful higher pulse frequencies.

After calculating the length of the sampling reach, the crew walked the prescribed distance downstream using a handheld GPS unit (Garmin™ GPSMAP 60CSx) in trip odometer mode, being careful not to disturb fish. Beginning at the downstream terminus of the sample reach, the electrofishing crew used a zigzag pattern in each encountered habitat unit, alternating between left bank, thalweg, and right bank, with an emphasis on cover types (Hughes et al. 2002). Habitat cover consisted of any mineral or organic matter producing shelter for fish to rest, hide, or feed, and includes large substrate elements, debris piles (e.g., large woody debris), undercut banks, aquatic macrophyte beds, and overhanging vegetation. One crewmember operated the electrofisher, and the other captured the stunned fish with a non-conductive dip net and placed the captured fish in a plastic 20-L bucket ≤ 1/2 full with stream water. The crew operated the electrofisher discontinuously (approximately every 1–3 m) to avoid herding fish on the edge of the electric field. The crew returned to the upstream station within 30 minutes and with a cumulative electrofishing time of ≥ 300 s.

Aquatic and riparian habitat assessment

Coordinates of the station were measured in decimal degrees (WGS84 datum) with handheld GPS units. Wetted channel widths were measured with a metric fiberglass tape (measured to the nearest 0.1 m), channel thalweg depth was measured (nearest 0.1 m) with a metric top-setting wading rod, and channel gradient was measured (nearest percent) with a Suunto™ PM5/66PC clinometer. Water conductivity was measured with a Hach™ 17250 meter. The immediate surroundings (up to 5 m from shore) of the stream were described through visual observations and documented with digital photographs (of approximately 1 MB each). This included documenting tributaries and noting the general vegetation cover as tundra, shrub (willow), deciduous, coniferous, or a combination of these types. Several photos were taken of the sampling reach and from above when in the helicopter.

Lakes

Once a lake had been selected, the crew leader established a station location usually at an outlet (preferably), inlet stream (if present), or other safe landing/accessible locations. At the station,

[a] Product names used in this report are included for scientific completeness but do not constitute a product endorsement.

geographic coordinates were marked and most habitat parameters were measured or observed. Additionally, during in-flight reconnaissance of the lake and outlet and inlet streams, locations of observable adult fish concentrations, waterfalls or other potential or historic migratory barriers, or other features of interest, were recorded. Notes about the observation (e.g., species and number of fish) were recorded in a field notebook and indexed to provide a one-to-one relationship between the notes and the station coordinates. Unique alphanumeric values (Station ID) were assigned to each survey station as described above.

Fish capture

Fish were captured using gill nets, minnow traps, backpack electrofisher, and baited trot lines. Amount of capture gear varied with lake size (Table 1). Various types of capture gear were used to maximize the ability to capture all species and life stages within a given lake. Set and pull times were noted for all gear types to record sampling effort.

Gill nets were used in lakes to capture fish in water deeper than 2 meters. Dependent on lake size, 1–3 nets were set perpendicular to shore, and lake depth at the distal/pelagic end was recorded at each set location. Nets were deployed by one crew member swimming away from shore in an individual float tube. Gill nets measured 45 m (150 ft) long by 4.9 m (16 ft) deep, were made of 22-mm (7/8-in) bar fine thread monofilament, and had a triple float line and 13.6 kg lead line. Generally, gill nets were set for 19–24 hours.

Baited trot lines were primarily used to capture burbot *Lota lota*. The trot line was used because burbot can be fairly elusive for some other gear types, and, unlike other effective gear types (e.g., hoop traps), this gear is small and light. Dependent on lake size, 2–4 trot lines were set perpendicular to shore for 19–24 hours and lake depth at the distal/pelagic end was recorded at each set location. The baited lines were deployed by one crew member swimming away from shore in a float tube and were retrieved the following day. Each trot line had 5–9 hooks, each 10 feet apart beginning 20 feet from the shore, and were baited with cut whitefish.

At each lake, 4–8 minnow traps baited with unsalted salmon roe were placed in both nearshore and offshore areas and fished for 19 to 24 h. Lake depth at each set location was recorded. Minnow traps were 0.22 m in diameter and 0.42 m long with a throat at each end. Traps were made of 6-mm galvanized steel mesh and were attached to a line that either had a float or was attached to the shore.

Electrofishing was used in the littoral zone (<1 m depth). The methods described above were similarly used. A length of shoreline appropriate to lake size was delineated, typically beginning from the outlet. Following the shoreline, shallow water habitat (rocks and vegetation) were electrofished to capture fish species and life stages that might not be captured by other methods. The crew used the electrofisher discontinuously approximately every 1–3 m, which avoided herding fish on the edge of the electric field.

Aquatic and riparian habitat assessment

At the terminal ends of gill nets and other locations while swimming back to shore, a handheld sonar unit measured depth, and the maximum observed depth was recorded. To assess productivity, two measurements were recorded: water clarity and conductivity. Water clarity was measured using a Secchi disk using methods described by Koenings et al. (1987). Conductivity was measured at the surface with a Hach 17250™ meter.

The immediate surroundings (up to 5 m from shore) of the lake were described through visual observations and documented with a series of digital photographs (of approximately 1 MB each). Visual observations included the general vegetation cover as tundra, shrub (willow), deciduous, coniferous, or a combination of these types. At a minimum, photos included the inlet, outlet, and an aerial photo either from a higher vantage point or from the helicopter.

At the outlet, channel width was measured with a metric fiberglass tape (measured to the nearest 0.1 m), channel thalweg depth was measured (nearest 0.1 m) with a metric top-setting wading rod, and channel gradient was measured (nearest percent) with a Suunto PM5/66PC clinometer.

DATA COLLECTION

Fish

All captured fish were enumerated and identified to species in the field. A listing of all fish species captured in the study lakes and streams is provided in Appendix A3. If a species could not be confidently identified, the fish was recorded at a higher taxonomic level, and a photograph and/or a specimen was taken for further examination at the regional office. For each gear type, the different species of fish, the number of each species identified, and the location of the gear type was documented (WGS84 datum, decimal degrees). All fish for each species were measured to the nearest mm fork length using a measuring board or tape and recorded onto a data sheet. If fish died due to the effects of sampling or processing, mortality was noted in the field notebook. After fish (alive and dead) were processed, they were released at the station.

Physical, Chemical, and Weather Conditions

Streams

At each station, a transect was established where data were recorded, including stream name, date, time, weather conditions (e.g., cloud cover, air temperature), GPS coordinates (WGS84 datum, decimal degrees), and elevation. The transect was a representative cross-section within a non-pool GCU; a run or glide preferred. At the transect, wetted channel width and thalweg depth at the wetted level were measured. The channel gradient as a percent was measured across at least one GCU interval (e.g., from the downstream end of one pool to the downstream end of the next pool).

Water specific conductivity (µS/cm), which was temperature-compensated, and water temperature were measured by a Hach 17250™ meter and were recorded on a field data sheet. The water conductivity probe was inserted directly into the channel in or near the thalweg in still or slowly flowing water. In channels with faster currents (≥ 0.3 m/s), or where shallow water depth prevented use of the probe *in situ*, the probe was placed in a bucket containing a 12-L sample of stream water to prevent damage of the probe by strong currents. In both cases, the probe was gently agitated to ensure proper mixing. Water conductivity measurements were recorded after readings had stabilized.

Water color (clear, ferric, glacial-high turbidity, glacial-low turbidity, humic, or muddy), apparent stream stage based on recent precipitation and amount of exposed channel (dry, low, medium, high), and dominant stream substrate (bedrock, boulders, cobbles, pebbles, sand, silt) were used as descriptors. The general riparian vegetation community was visually assessed as tundra, shrub (willow), deciduous, coniferous, or a combination of these types.

At each station, an initial photograph of the data sheet, providing date, crew, and location was taken to ensure the following photographs were associated with the site. Subsequent photos were taken of the start and end points, a representative stream channel between endpoints, and an aerial photo from the helicopter or high vantage point. Additional photographs were taken of interesting habitat features or other subjects.

Lakes

A station was established usually at the lake outlet (as described above). GPS coordinates (WGS84 datum, decimal degrees) were collected at this location. Lake name, date, time, and weather conditions (e.g., cloud cover, air temperature) were noted on a field data sheet. A single depth measurement at the terminal end of a gill net or other nearby deep feature was measured with a handheld sonar unit. At or near the deepest location, the water transparency and conductivity was measured. The depths where a Secchi disk disappears and reappears as it is lowered and raised in the water was recorded on a field data sheet. The average of these 2 readings is the Secchi disk transparency (SD). Lake water color was visually assessed in the field as clear, ferric, glacial-high turbidity, glacial-low turbidity, humic, or muddy. Water specific conductivity (i.e., temperature-compensated) and temperature, were measured in µS/cm units and C^{o} by a Hach 17250™ meter and recorded on a field data sheet.

At each lake, an initial photograph of the data sheet, providing date, crew, and location were taken to ensure the following photographs were associated with the site. Subsequent photos were taken of the inlet and outlet, and an aerial photo was taken either from a higher vantage point or from the helicopter. Additional photographs were taken of interesting habitat features or other subjects and noted on the data sheet. Aerial photographs (when possible) were taken of the entire shoreline.

RESULTS

Sampling was completed at one or more sites at 18 lakes and 21 streams within about a 1,000 km^2 area (Table 2). In 13 of 18 lakes, 1 or more fish species were found; slimy sculpin *Cottus cognatus*, humpback whitefish *Coregonus pidschian*, round whitefish *Prosopium cylindraceum*, burbot, lake trout *Salvelinus namaycush*, Arctic grayling, or longnose sucker *Catostomus catostomus*. In 16 of 21 streams, one or more fish species were found; slimy sculpin, round whitefish, burbot, Dolly Varden *Salvelinus malma*, or Arctic grayling. Detailed results have been summarized by individual sampling site (Tables 3–50). Results from previous sampling in the area conducted by ADF&G during 1995 and 1996 that had not been published are included in Appendices B1 and B2.

DISCUSSION

The purpose of this project was to provide an initial fish inventory of a large area (>1,000 km^2) containing numerous small lakes and over 300 km of streams that may be developed for mining in the near future. Although the amount of helicopter time and personnel was limited, the project was designed to achieve enough observations to make reasonable inferences about fishes throughout the area despite: 1) limited fishing effort at each location, 2) minimal number of sample locations relative to the number of potential sites, and 3) seasonal variations in fish behavior that may have affected capture probability. The surveys demonstrated that fish are widely distributed throughout the area because a high proportion of the sampled sites (13 of 18 lakes and 16 of 21 streams) had fish present. The most widely distributed fish were Arctic

grayling and slimy sculpin, followed by Dolly Varden in streams and lake trout in lakes. Burbot and round whitefish were only encountered twice. Longnose sucker and humpback whitefish were captured at only one location in a lake that was in the Maclaren River drainage. Conspicuously absent from surveys at Dude and Fish lakes were Dolly Varden, which had been captured previously (Appendices B1 and B2), although a Dolly Varden was captured in Lower Fish Lake Creek.

Because the sites were widely dispersed across the area, it is conceivable that any mine development (i.e., the mine and its infrastructure of roads and utilities) would likely occur within the drainage of one or more of the sample sites in this study. In addition, these surveys indicate fish are likely to occur in numerous other water bodies, as fish were widespread across the area and were found in seemingly unlikely places. For example, High Lake, which has a significant barrier (a 10-meter, nearly-vertical waterfall), contained slimy sculpin. Therefore, a more extensive survey that has no assumptions of fish presence or absence based upon size or type of water body should be undertaken prior to development.

While the study successfully sampled many lakes and streams and found many fish, some improvements could be made for future studies. Accessing most sample areas with a helicopter is recommended as it is much more efficient than using ATVs along the Yost trail, which only provided access to a limited number of sites. Sampling techniques can also be improved. With regards to electrofishing in swift and turbulent rivers, it was quite difficult to capture fish with a single dipnet, and it was likely that some species were not captured by this method in those systems. It may have been more effective to have had a three-person crew and push fish into a downstream bag seine. Additional sampling equipment may have proven useful as well, such as a fyke net and shovel. Fyke nets were used to catch Dolly Varden in Fish Lake during 1996 (Appendix B2), and a shovel is a useful tool for capturing Arctic lamprey *Lampetra camtschaticum* located within the silty stream bottoms. Although there was low expectation of capturing Arctic lamprey in these headwater areas, the equipment used during this project was unlikely to capture any if they were present. Finally, sampling during multiple seasons may prove useful for two reasons. First, habitats may be occupied or vacated seasonally, so documentation of use by fish may not occur without different sample periods. Second, some fish may be captured more easily during one season or another. For example, Dolly Varden may be more readily found in larger congregations in smaller, discrete winter habitats (Ayers 2010), and burbot may avoid warmer water ($\geq$ 13°C; McPhail and Paragamian 2000), therefore they may be difficult to find and capture during summer.

Lastly, the project provided a unique opportunity to make observations regarding the distribution of fishes across the area as well as mechanisms of distribution. For example, slimy sculpin were most widely distributed and found in unexpected locations such as High Lake, but lakes with similar and significant barriers either did not have slimy sculpin (No Good Lake) or contained different species (lake trout in Upper Landmark Gap Lake). The presence or absence of fish from a location is the result of colonization and extinction events, which are dependent upon variables that operate over differing time scales (from seasonal to geologic) and usually beyond direct observation (Hershey et al. 2006). For example, species exchanges between drainages in headwaters by way of river bifurcation have been implicated in expansion of species ranges, but occurrences are usually based on circumstantial evidence. During these surveys, an example of river bifurcation was observed (Figure 89) where the Yukon and Susitna river drainages are clearly connected by way of the Eureka Glacier outflow into Eureka Creek (Yukon Drainage)

and the East Fork Maclaren River (Susitna Drainage). Historically, it is unlikely that this is the only instance of these drainages being connected, but it does provide a visualization of the process for the introduction of resident species to the Susitna from the Yukon as postulated by Lindsey and McPhail (1986).

ACKNOWLEDGEMENTS

The author thanks the Bureau of Land Mangement for being a cooperator and providing funding to complete the study. Thanks to Brian Collyard, Andy Garry, Matt Albert, Klaus Wuttig, Audra Brase, and Matt Evenson for their assistance in sampling and logistical support. Thanks to Don Roach, Matt Evenson, and Klaus Wuttig for their supervisory support, Rachael Kvapil for the editing and formatting of this report for publication, and Anton Antonovich for his biometric review. Finally thanks to our pilot Troy Cambier for safely transporting us to our many locations.

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TABLES AND FIGURES

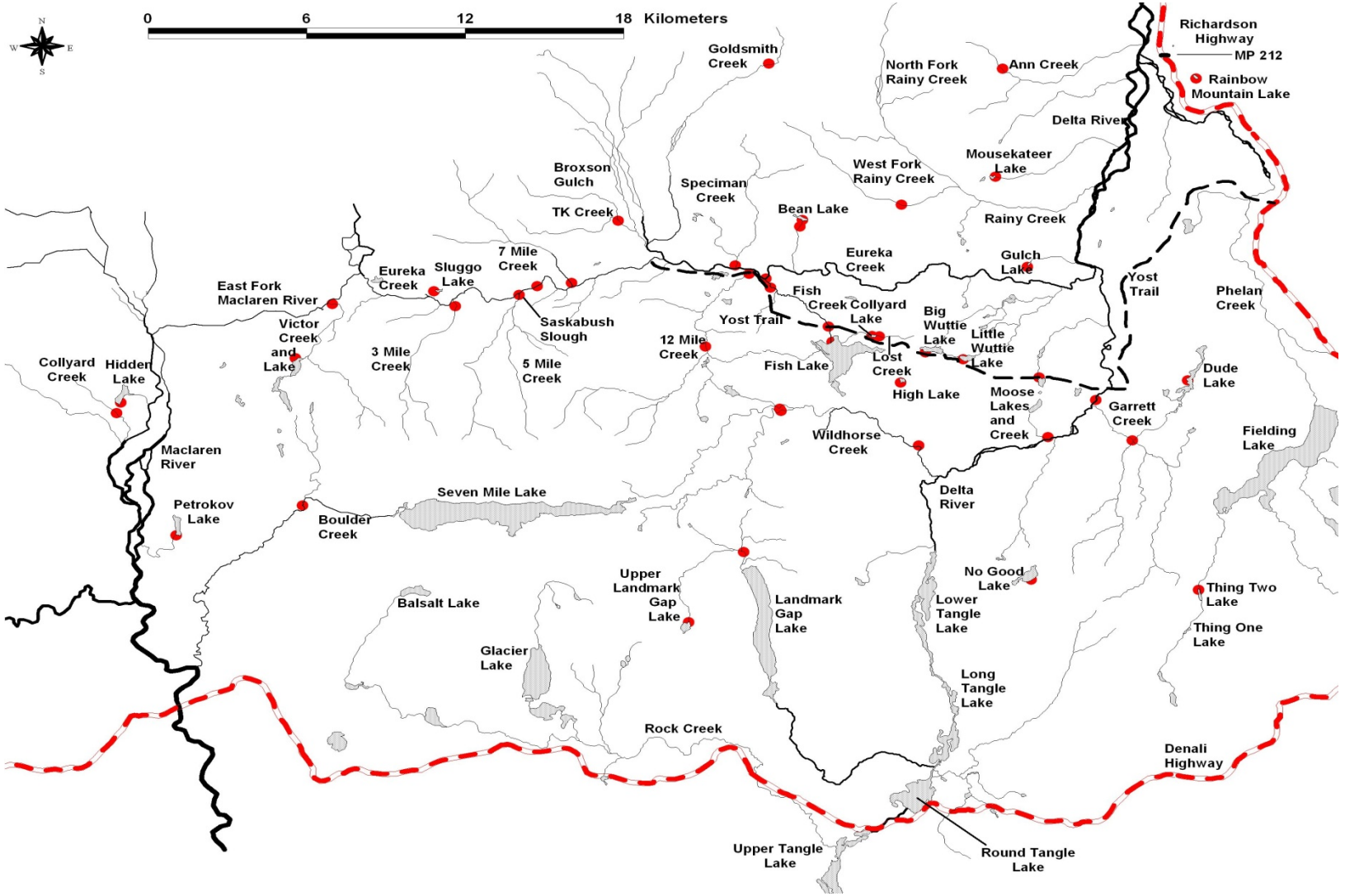

Figure 1.–Map of study area and sample locations (•) except One Mile Creek, which was located 25 km north of milepost (mp) 212.

Table 1.–Sampling effort by gear type for lakes of three size categories.

Lake size hectares (acres)	Number of gill nets	Number of minnow traps	Number of trot lines (5 hooks each)	Distance of shoreline electrofished
0 to 20 (50)	1	4	2	150 m
20 to 100 (250)	2	6	3	225 m
100+ (250+)	3	8	4	300 m

Table 2.–Sample locations, their size, and indication (x=present) of fish species observed.

Name	Drainage area or surface area km^2	Fish							
		Arctic grayling	Dolly Varden	Lake trout	Humpback whitefish	Round whitefish	Slimy sculpin	Burbot	Longnose sucker
Streams									
Garrett Creek	41.0	x						x	
West Fork Rainy Creek	21.0		x						
Speciman Creek	16.0						x		
Collyard Creek	1.5	x							
Bean Lake Creek	2.0								
Three Mile Creek	11.0								
Five Mile Creek	31.0	x							
Seven Mile Creek	23.0	x					x		
Twelve Mile Creek	28.0	x	x						
TK Creek	18.8		x				x		
Goldsmith Creek	30.0								
Victor Creek	15.0	x							
Saskabush Slough	170.0	x	x				x		
Wildhorse Creek	59.0		x				x		
Boulder Creek	92.0	x							
Upper Landmark Gap Creek	27.0	x					x		
Ann Creek	20.0								
Fish Lake Creek	21.0	x	x				x		
Lost Creek	1.0	x					x		
Moose Creek	3.0								
One Mile Creek	5.0	x				x			
Lakes									
Rainbow Mountain Lake	0.02								
Dude Lake	0.44						x		
Gulch Lake	0.01								
Mousekateer Lake	0.02								

-continued-

Table 2.–Page 2 of 2.

Name	Drainage area or aurface area km^2	Fish							
		Arctic grayling	Dolly Varden	Lake trout	Humpback whitefish	Round whitefish	Slimy sculpin	Burbot	Longnose sucker
Sluggo Lake	0.02	x					x		
Bean Lake	0.05								
Hidden Lake	0.17	x			x	x			x
Victor Lake	0.19	x					x		
Petrokov Lake	0.15	x		x			x	x	
No Good Lake	0.30								
Upper Landmark Gap Lake	0.12			x					
Thing Two Lake	0.04	x		x			x		
Fish Lake	1.87	x					x		
Big Wuttie Lake	0.16	x							
Little Wuttie Lake	0.10	x					x		
Collyard Lake	0.03	x					x		
High Lake	0.03						x		
Little Moose Lake	0.08						x		

Table 3.–Site data for Upper Garrett Creek Channel 1.

Location data		
Date	July 7, 2009	
Time	14:30	
Site code	DRD090708UpGarrettCk CH1	
Latitude; Longitude	63.18543; -145.79149	
Elevation	864 m	
Vegetation	Willow, alder, and moss	
Weather		
Air temperature	28.0°C	
Sky	Mostly clear	
Wind	Very light	
Water		
Water temperature	12.0°C	
Conductivity	ND	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	3.1 m	
Thalweg	0.2 m	
Gradient	4.0%	
Substrate	Cobble	
Species identified	Electrofishing	Visual
Arctic Grayling	2	0

Note: This channel split into several rocky channels at downstream end. The captured Arctic grayling were 215 and 127 mm FL. Several other Arctic grayling were observed fleeing during electrofishing.

Table 4.–Site data for Upper Garrett Creek Channel 2.

Location data		
Date	July 7, 2009	
Time	15:00	
Site code	DRD090708UpGarrettCk CH2	
Latitude; Longitude	63.18559; -145.79062	
Elevation	868 m	
Vegetation	Willow, alder, and moss	
Weather		
Air temperature	28.0°C	
Sky	Mostly clear	
Wind	Very light	
Water		
Water temperature	12.0°C	
Conductivity	ND	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	4.3 m	
Thalweg	0.3 m	
Gradient	4.0%	
Substrate	Boulder and cobble	
Species identified	Electrofishing	Visual
Arctic Grayling	1	0

Note: This channel was very difficult to shock because of very swift water and overhanging willows and alders. The captured Arctic grayling was 382 mm FL.

Figure 2.–Upper Garrett Creek.

Table 5.–Site data for Lower Garrett Creek.

Location data		
Date	August 19, 2009	
Time	12:10	
Site code	DRD090819LoGarrettCk	
Latitude; Longitude	63.20269; -145.81432	
Elevation	805 m	
Vegetation	Mostly willow and some grass	
Weather		
Air temperature	9.0°C	
Sky	Overcast and light rain	
Wind	Calm	
Water		
Water temperature	6.0°C	
Conductivity	ND	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	3.3 m	
Thalweg	0.3 m	
Gradient	1.0%	
Substrate	Gravel and cobble	
Species identified	Electrofishing	Visual
Arctic Grayling	4	0
Burbot	2	0

Note: Many fish seen but difficult to catch. Four Arctic grayling (195, 325, 343, and 376 mm FL) and two burbot were captured (178 and 220 mm FL). Given the difficulty of identifying species in the turbulent water, it was quite possible other species were present.

Figure 3.–Lower Garrett Creek.

Figure 4.–Lower Garrett Creek.

Table 6.–Site date for West Fork Rainy Creek.

Location data		
Date	July 7, 2009	
Time	17:00	
Site code	DRD090707WFRainyCk	
Latitude; Longitude	63.28638; -145.93939	
Elevation	1,152 m	
Vegetation	Willow and grass	
Weather		
Air temperature	20.0°C	
Sky	Clear	
Wind	Calm	
Water		
Water temperature	9.0°C	
Conductivity	295 µS/cm	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	5.5 m	
Thalweg	0.5 m	
Gradient	5.0%	
Substrate	Boulder, cobble, gravel, and sand	
Species identified	Electrofishing	Visual
Dolly Varden	3	0

Note: The captured Dolly Varden were 74, 85, and 173 mm FL.

Figure 5.–West Fork Rainy Creek.

Figure 6.–West Fork Rainy Creek.

Table 7.–Site data for Goldsmith Creek.

Location data	
Date	July 9, 2009
Time	11:15
Site code	DRD090709GoldsmithCk
Latitude; Longitude	63.34660; -146.02388
Elevation	1,191 m
Vegetation	Some willow and grass
Weather	
Air temperature	18.0°C
Sky	Mostly cloudy
Wind	Brisk breeze
Water	
Water temperature	4.0°C
Conductivity	95 µS/cm
Stage	Medium
Color	Glacial high turbidity
Channel	
Wetted width	4.0 m
Thalweg	0.7 m
Gradient	6.0%
Substrate	Boulder and cobble

Note: No fish captured or seen. Extremely strong, turbulent current. Unable to ford the creek to obtain accurate wetted width measurement.

Figure 7.–Goldsmith Creek.

Figure 8.–Goldsmith Creek.

Table 8.–Site data for Bean Lake Creek.

Location data	
Date	July 8, 2009
Time	11:45
Site code	DRD090708BeanLkCk
Latitude; Longitude	63.28205; -146.01787
Elevation	1,198 m
Vegetation	Willow, grass, and sedge
Weather	
Air temperature	24.0°C
Sky	Clear
Wind	Light
Water	
Water temperature	20.0°C
Conductivity	ND
Stage	Medium
Color	Clear/tannic
Channel	
Wetted width	1.2 m
Thalweg	0.2 m
Gradient	2.0%
Substrate	Boulder, cobble, and gravel

Note: No fish caught or seen.

Figure 9.–Bean Lake Creek.

Table 9.–Site data for TK Creek.

Location data		
Date	July 8, 2009	
Time	15:20	
Site code	DRD090708TKCk	
Latitude; Longitude	63.29159; -146.15349	
Elevation	1,003 m	
Vegetation	Willow, grass, and moss	
Weather		
Air temperature	29.0°C	
Sky	Clear	
Wind	Calm	
Water		
Water temperature	14.0°C	
Conductivity	200 µS/cm	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	7.6 m	
Thalweg	0.3 m	
Gradient	1.0%	
Substrate	Cobble and gravel	
Species identified	Electrofishing	Visual
Dolly Varden	1	0
Slimy sculpin	0	1

Note: The captured Dolly Varden was 161 mm FL, and the slimy scuplin was observed but not captured.

Figure 10.–TK Creek.

Figure 11.–TK Creek.

Table 10.–Site data for Speciman Creek.

Location data	
Date	July 8, 2009
Time	17:45
Site code	DRD090708 SpecimanCk
Latitude; Longitude	63.26958; -146.07021
Elevation	967 m
Vegetation	Willow and grass
Weather	
Air temperature	28.0°C
Sky	Clear
Wind	Calm
Water	
Water temperature	13.5°C
Conductivity	ND
Stage	Medium
Color	Clear
Channel	
Wetted width	4.4 m
Thalweg	0.4 m
Gradient	2.0%
Substrate	Cobble and gravel

Note: No fish caught or seen, though habitat looked conducive to having fish. Shock time not recorded.

Figure 12.–Mouth of Speciman Creek.

Figure 13.–Mouth of Speciman Creek.

Table 11.–Site data for Collyard Creek.

Location data		
Date	July 8, 2009	
Time	16:30	
Site code	DRD090708CollyardCk	
Latitude; Longitude	63.23650; -146.54910	
Elevation	915 m	
Vegetation	Willow	
Weather		
Air temperature	27.0°C	
Sky	Partly cloudy	
Wind	Light	
Water		
Water temperature	18.0°C	
Conductivity	ND	
Stage	Medium	
Color	Clear with rusty mineral iron tint	
Channel		
Wetted width	Varied, 2 - 10 m	
Thalweg	1.0 m	
Gradient	<0.5%	
Substrate	Boulder, cobble, and silt	
Species identified	Electrofishing	Visual
Arctic grayling	10	0

Note: This creek flowed through a beaver pond complex and had very little flow at the medium water level. The water level in ponds was fairly consistently 1 m and the wetted width varied from 2–10 m. Ten Arctic grayling were captured and were between 200 and 300 mm FL. Shock time not recorded.

Figure 14.–Collyard Creek.

Table 12.–Site data for Seven Mile Creek.

Location data		
Date	July 8, 2009	
Time	17:00	
Site code	DRD090708SevenMileCk	
Latitude; Longitude	63.26940; -146.19470	
Elevation	1,028 m	
Vegetation	Willow, grass, and horsetail	
Weather		
Air temperature	26.0°C	
Sky	Mostly clear	
Wind	Light	
Water		
Water temperature	13.0°C	
Conductivity	100 µS/cm	
Stage	Medium/high	
Color	Glacial high turbidity	
Channel		
Wetted width	6.6 m	
Thalweg	0.5 m	
Gradient	4.5%	
Substrate	Boulder and cobble	
Species identified	Electrofishing	Visual
Arctic grayling	1	1
Slimy sculpin	1	

Note: The captured Arctic grayling was 163 mm FL, and the slimy scuplin was 51 mm FL. One other Arctic grayling was observed swimming away from electrofisher, but it was not captured.

Figure 15.–Seven Mile Creek.

Figure 16.–Seven Mile Creek.

Table 13.–Site data for Five Mile Creek.

Location data		
Date	July 9, 2009	
Time	12:28	
Site code	DRD090709 5-MileCk	
Latitude; Longitude	63.26679; -146.23529	
Elevation	1,049 m	
Vegetation	Sedge and willow	
Weather		
Air temperature	17.0°C	
Sky	Cloudy	
Wind	Calm	
Water		
Water temperature	9.0°C	
Conductivity	190 µS/cm	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	6.7 m	
Thalweg	0.4 m	
Gradient	4.0%	
Substrate	Boulder, cobble, and gravel	
Species identified	Electrofishing	Visual
Arctic grayling	3	0

Note: No fish were captured, but three Arctic grayling were observed fleeing. They were about 200, 200, and 300 mm FL. This creek tumbled out of higher elevation plateau through a narrow ravine and panned out into a cobble field. Shock time not recorded.

Figure 17.–Five Mile Creek.

Figure 18.–Five Mile Creek.

Table 14.–Site data for Three Mile Creek.

Location data	
Date	July 9, 2009
Time	15:00
Site code	DRD090709 3-MileCk
Latitude; Longitude	63.26497; -146.28432
Elevation	1,066 m
Vegetation	Dense willow thickets
Weather	
Air temperature	19.0°C
Sky	Cloudy
Wind	Calm
Water	
Water temperature	12.0°C
Conductivity	80 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	6.5 m
Thalweg	0.3 m
Gradient	4.0%
Substrate	Boulder, cobble, and gravel

Note: No fish caught or seen, though habitat looked conducive to having fish. Shock time not recorded.

Figure 19.–Three Mile Creek.

Figure 20.–Three Mile Creek.

Table 15.–Site data for Victor Creek.

Location data		
Date	July 9, 2009	
Time	16:00	
Site code	DRD090709VictorCk	
Latitude; Longitude	63.27065; -146.37642	
Elevation	1,071 m	
Vegetation	Willow	
Weather		
Air temperature	17.0°C	
Sky	Cloudy	
Wind	Light	
Water		
Water temperature	14.0°C	
Conductivity	100 µS/cm	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	15.3 m	
Thalweg	0.3 -0.7 m	
Gradient	3.5%	
Substrate	Boulder, cobble, gravel, and silt	
Species identified	Electrofishing	Visual
Arctic grayling	4	0

Note: This creek flowed through a narrow gully. Four Arctic grayling were captured and were 390, 323, 322, and 308 mm FL. An additional five other Arctic grayling and possibly three small Dolly Varden were seen but not captured. Shock time not recorded.

Figure 21.–Victor Creek.

Figure 22.–Victor Creek.

Table 16.–Site data for Saskabush Slough.

Location data	
Date	July 9, 2009
Time	17:25
Site code	DRD090709SaskabushSl
Latitude; Longitude	63.26947; -146.22095
Elevation	1,033 m
Vegetation	Willow, grass, and moss
Weather	
Air temperature	17.0°C
Sky	Partly cloudy
Wind	Light and variable
Water	
Water temperature	17.0°C
Conductivity	90 µS/cm
Stage	Medium
Color	Variable: clear to glacial high turbidity
Channel	
Wetted width	1 - 20 m
Thalweg	0.2 – 1.0 m
Gradient	<0.5%
Substrate	Cobble, gravel, sand, and silt
Species identified	Electrofishing
Arctic grayling	1
Dolly Varden	4
Slimy sculpin	30

Note: This was a side slough of Eureka Creek and conditions varied throughout channel from clear to turbid when nearing towards its mouth on Eureka Creek. Some beaver activity and flooded vegetation. One Arctic grayling and one Dolly Varden measuring 150 mm FL each were captured and an additional 30 slimy sculpin were caught and about 20 others observed, ranging from 20 – 60 mm FL. Shock time was not recorded.

Figure 23.–Saskabush Slough.

Figure 24–Saskabush Slough.

Table 17.–Site data for Lower Wildhorse Creek.

Location data	
Date	July 10, 2009
Time	11:15
Site code	DRD090710LoWildhorseCk
Latitude; Longitude	63.19234; -145.95174
Elevation	883 m
Vegetation	Dense willow thickets
Weather	
Air temperature	26.0°C
Sky	Clear
Wind	Calm
Water	
Water temperature	13.0°C
Conductivity	40 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	4.3 m
Thalweg	0.5 m
Gradient	2.5%
Substrate	Cobble

Note: No fish caught or observed in the turbulent water. Habitat consisted of undercut banks and deep pools. Shock time was not recorded.

Figure 25.–Lower Wildhorse Creek.

Figure 26.–Lower Wildhorse Creek.

Table 18.–Site data for South Fork Wildhorse Creek.

Location data	
Date	July 10, 2009
Time	16:10
Site code	DRD090710SFWildhorseCk
Latitude; Longitude	63.21139; -146.05109
Elevation	985 m
Vegetation	Sedge, willow, and grass
Weather	
Air temperature	26.0°C
Sky	Clear
Wind	Light
Water	
Water temperature	13.0°C
Conductivity	40 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	3 m
Thalweg	0.3 m
Gradient	2.0%
Substrate	Cobble and gravel
Species identified	Electrofishing
Dolly Varden	2
Slimy sculpin	15

Note: Shock time and fish length was not recorded.

Figure 27.–South Fork Wildhorse Creek.

Figure 28.–South Fork Wildhorse Creek.

Table 19.–Site data for North Fork Wildhorse Creek.

Location data	
Date	July 10, 2009
Time	16:40
Site code	DRD090710NFWildhorseCk
Latitude; Longitude	63.21224; -146.05170
Elevation	985 m
Vegetation	Sedge, willow, and grass
Weather	
Air temperature	26.0°C
Sky	Clear
Wind	Light
Water	
Water temperature	14.0°C
Conductivity	ND
Stage	Medium
Color	Clear
Channel	
Wetted width	5.2 m
Thalweg	0.7 m
Gradient	2.0%
Substrate	Cobble and gravel

Note: No fish captured or seen in 300 m of shocked water. Shock time wasnot recorded.

Figure 29.–North Fork Wildhorse Creek.

Figure 30.–North Fork Wildhorse Creek.

Table 20.–Site data for Boulder Creek.

Location data	
Date	July 10, 2009
Time	14:10
Site code	DRD090710BoulderCk
Latitude; Longitude	63.19351; -146.41873
Elevation	1,046 m
Vegetation	Grass, sedge, and willow
Weather	
Air temperature	24.0°C
Sky	Mostly Clear
Wind	Light
Water	
Water temperature	17.0°C
Conductivity	30 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	7.3 m
Thalweg	0.9 m
Gradient	1.0%
Substrate	Gravel and sand
Species identified	Hook-and-line
Arctic grayling	5

Note: Unable to shock due to water being quite deep in holes (over waders). Hook-and-line sampling was used to capture 5 Arctic grayling >330 mm FL (14 inches). Several larval grayling were captured from among several hundred seen in a shallow backwater. It appeared as though there may have been several round whitefish at the bottom of the deep holes.

Figure 31.–Boulder Creek.

Figure 32.–Boulder Creek.

Table 21.–Site data for Upper Landmark Gap Creek.

Location data	
Date	July 10, 2009
Time	12:40
Site code	DRD090710UpperLandmarkGapCk
Latitude; Longitude	63.15816; -146.09351
Elevation	999 m
Vegetation	Sedge, willow, and grass
Weather	
Air temperature	24.0°C
Sky	Mostly clear
Wind	Calm
Water	
Water temperature	11.5°C
Conductivity	90 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	3.3 m
Thalweg	0.3 m
Gradient	ND
Substrate	Cobble and gravel
Species identified	Electrofishing
Arctic grayling	25
slimy sculpin	1

Note: Twenty-five Arctic grayling 250-350 mm FL and one slimy sculpin were captured. This location is 5 river km distant from the upstream lake, which is 268 m higher elevation and indicates an overall gradient of 5.2%.

Figure 33.–Upper Landmark Gap Creek.

Figure 34.–Upper Landmark Gap Creek.

Table 22.–Site data for Lower Twelve Mile Creek.

Location data	
Date	July 15, 2009
Time	17:15
Site code	DRD090709Lo12MileCk
Latitude; Longitude	63.26576; -146.06076
Elevation	961 m
Vegetation	Willow and grass
Weather	
Air temperature	18.0°C
Sky	Cloudy
Wind	Calm
Water	
Water temperature	10.0°C
Conductivity	60 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	9.6 m
Thalweg	0.3 m
Gradient	3.0%
Substrate	Cobble

Species identified	Electrofishing
Arctic grayling	1
Dolly Varden	1

Note: The Dolly Varden was 99 mm FL, and the Arctic grayling was 86 mm FL.

Figure 35.–Lower Twelve Mile Creek.

Figure 36.–Lower Twelve Mile Creek.

Table 23.–Site data for Upper Twelve Mile Creek.

Location data	
Date	July 11, 2009
Time	10:55
Site code	DRD090711Up12MileCk
Latitude; Longitude	63.23937; -146.10085
Elevation	1060 m
Vegetation	Sedge, willow, and grass
Weather	
Air temperature	20.0°C
Sky	Mostly cloudy
Wind	Light
Water	
Water temperature	9.0°C
Conductivity	200 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	4.0 m
Thalweg	0.5 m
Gradient	2.0%
Substrate	Cobble and gravel
Species identified	Electrofishing
Arctic grayling	1
Dolly Varden	1

Note: Steep undercut banks. 180 m shocked. The Dolly Varden was 100 mm FL, and the Arctic grayling was 250 mm FL. Shock time was not recorded.

Figure 37.–Upper Twelve Mile Creek.

Figure 38.–Upper Twelve Mile Creek.

Table 24.–Site data for Ann Creek.

Location data	
Date	July 11, 2009
Time	12:00
Site code	DRD090711AnnCk
Latitude; Longitude	63.33500; -145.84885
Elevation	1,128 m
Vegetation	Tundra, grass, and some willow
Weather	
Air temperature	15.5°C
Sky	Partly cloudy
Wind	Light
Water	
Water temperature	5.0°C
Conductivity	75 µS/cm
Stage	Medium
Color	Clear/low glacial turbidity
Channel	
Wetted width	4.1 m
Thalweg	0.3 m
Gradient	6.0%
Substrate	Boulder, cobble, and gravel

Note: No fish caught or seen. Significant falls downstream of sample location likely inhibit upstream travel of fish. Shock time was not recorded.

Figure 39.–Ann Creek.

Figure 40.–Ann Creek.

Table 25.–Site data for Upper Fish Lake Creek.

Location data	
Date	July 14, 2009
Time	17:55
Site code	DRD090714UpFishLkCk
Latitude; Longitude	63.24215; -146.00670
Elevation	975 m
Vegetation	Willow, grass, and moss
Weather	
Air temperature	27.0°C
Sky	Mostly sunny
Wind	Light
Water	
Water temperature	16.0°C
Conductivity	240 µS/cm
Stage	Medium
Color	Clear
Channel	
Wetted width	9.0 m
Thalweg	0.3 m
Gradient	0.5%
Substrate	Gravel and cobble smothered with algae

Species identified	Electrofishing
Arctic grayling	8
Slimy sculpin	22

Note: Substrate completely covered in algae. After electrofishing for 735 seconds, eight Arctic grayling (27 – 93 mm FL) and 22 slimy sculpin (37 – 79 mm FL) were captured.

Figure 41.–Upper Fish Lake Creek.

Figure 42.–Upper Fish Lake Creek.

Table 26.–Site data for Middle Fish Lake Creek.

Location data	
Date	July 15, 2009
Time	13:40
Site code	DRD090715MidFishLkCk
Latitude; Longitude	63.25960; -146.04616
Elevation	965 m
Vegetation	Willow and grass
Weather	
Air temperature	17.0°C
Sky	Overcast and light rain
Wind	Calm
Water	
Water temperature	14.0°C
Conductivity	160 µS/cm
Stage	Medium
Color	Clear/slightly tannic
Channel	
Wetted width	7.0 m
Thalweg	0.3 m
Gradient	1.5%
Substrate	Gravel and cobble
Species identified	Electrofishing
Arctic grayling	7
Slimy sculpin	27

Note: Undercut banks of willow. Shallow water over tannic stained cobbles. Seven Arctic grayling (26 – 92 mm FL) and 27 slimy sculpin (29 – 66 mm FL) were captured.

Figure 43.–Middle Fish Lake Creek.

Figure 44.–Middle Fish Lake Creek.

Table 27.–Site data for Lower Fish Lake Creek.

Location data	
Date	July 15, 2009
Time	11:20
Site code	DRD090715LoFishLkCk
Latitude; Longitude	63.26324; -146.04854
Elevation	949 m
Vegetation	Willow and grass
Weather	
Air temperature	18.0°C
Sky	Overcast
Wind	Calm
Water	
Water temperature	12.0°C
Conductivity	160 µS/cm
Stage	Medium
Color	Clear/slightly tannic and glacial high turbidity
Channel	
Wetted width	5.3 m
Thalweg	0.3 m
Gradient	2.5%
Substrate	Gravel and cobble

Species identified	Electrofishing
Arctic grayling	33
Slimy sculpin	29
Dolly Varden	1

Note: Banks of overhanging willow. This sample area had a small slough of glacial Eureka Creek enter the Fish Lake Creek just prior to its mouth. The glacial water was highly turbid, 6°C, and all fish were captured there. The crew captured 33 Arctic grayling (28 – 259 mm FL), 29 slimy sculpin (42 – 89 mm FL), and one Dolly Varden (130 mm FL). Although the grade from the mouth to the lake is 0.7% (30m/4,110m), the creek rises 13 m the first 215 m, or a at a 6.0% grade.

Figure 45.–Lower Fish Lake Creek.

Figure 46.–Lower Fish Lake Creek.

Table 28.–Site data for Lost Creek.

Location data		
Date	July 16, 2009	
Time	17:00	
Site code	DRD090716LostCk	
Latitude; Longitude	63.23630; -145.96989	
Elevation	1,020 m	
Vegetation	Grass and willow	
Weather		
Air temperature	20.0°C	
Sky	Partly cloudy	
Wind	Light breeze	
Water		
Water temperature	15.0°C	
Conductivity	ND	
Stage	Medium	
Color	Clear	
Channel		
Wetted width	0.5 m	
Thalweg	0.2 m	
Gradient	0.5%	
Substrate	Boulder, cobble, gravel, and algal cover	
Species identified	Minnow trap	Visual
Arctic grayling	2	4
Slimy sculpin		1
Minnow trap locations	Depth	Duration
63.23630; -145.96989	0.3 m	21:02
63.23630; -145.96976	1.0 m	21:08
63.23619; -145.96812	0.2 m	21:00
63.23609; -145.96781	0.8 m	21:07

Note: This small spring stream enters Collyard Lake, which in turn is tributary to Fish Lake. It has a small drainage and incised banks. Several Arctic grayling and a slimy sculpin were observed swimming in the stream.

Figure 47.–Lost Creek.

Figure 48.–Lost Creek.

Table 29.–Site data for Moose Creek.

Location data	
Date	August 19, 2009
Time	11:30
Site code	DRD090819MooseCk
Latitude; Longitude	63.18961; -146.85425
Elevation	811 m
Vegetation	Willow, alder, and moss
Weather	
Air temperature	9.0°C
Sky	Overcast and light rain
Wind	Light breeze
Water	
Water temperature	6.0°C
Conductivity	ND
Stage	Medium
Color	Clear
Channel	
Wetted width	1.1 m
Thalweg	0.2 m
Gradient	ND
Substrate	Boulder and cobble

Note: No fish were captured or observed in this small stream; however, no effective shocking occurred because thick overhead canopy of interwoven willow branches made walking, let alone shocking, extremely difficult to accomplish. The moss covered rocks indicate the stream is not prone to large fluctuations in discharge.

Figure 49.–Moose Creek.

Figure 50.–Moose Creek.

Table30.–Site data for One Mile Creek.

Location data	
Date	August 18, 2009
Time	17:00
Site code	DRD090818OneMileCk
Latitude; Longitude	63.54577; -145.87474
Elevation	650 m
Vegetation	Willow and alder
Weather	
Air temperature	10.0°C
Sky	Overcast
Wind	Brisk
Water	
Water temperature	8.5°C
Conductivity	ND
Stage	Medium
Color	Clear
Channel	
Wetted width	2.4 m
Thalweg	0.2 m
Gradient	1.5%
Substrate	Gravel and cobble
Species identified	Electrofishing
Arctic grayling	84
Round whitefish	13

Note: The channel was wide and shallow for the volume of water. Portions of the creek near the Richardson Highway are disturbed annually by the Department of Transportation to maintain flood control. No real pools and many fish took cover behind cobbles. 338 m of the creek were shocked. Many fish were seen but only Arctic grayling (45 – 132 mm FL) and round whitefish (45–100) were captured or observed.

Figure 51.–One Mile Creek.

Figure 52.–One Mile Creek.

Table 31.–Site data for Rainbow Mountain Lake.

Location data	
Date	July 7, 2009
Time	15:30
Site code	DRD090707RbwMtLk
Latitude; Longitude	63.32310; -145.70471
Elevation	838 m
Vegetation	Alder and grass
Weather	
Air temperature	28.0°C
Sky	Mostly clear, some cumulus
Wind	Slight breeze
Water	
Water temperature	18.0°C
Conductivity	ND
Depth	6.5 m
Sechhi	ND
Color	Clear
Outlet channel	
	No outlet, ephemeral inlets

Table 32.–Sample gear data for Rainbow Mountain Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.32293; -145.70389		19:05	0
Minnow Trap 2	63.32310; -145.70471		19:10	0
Minnow Trap 3	63.32352; -145.70586		18:30	0
Minnow Trap 4	63.32365; -145.70605		18:25	0
Gill Net	63.32306; -145.70499	5.1 m	18:50	0
Trot Line	63.32304; -145.70485		18:35	0
Electrofish			355 s	0

Note: No fish seen or captured. None were expected due to lack of inlet or outlet in the isolated basin.

Figure 53.–Rainbow Mountain Lake

Figure 54.–Rainbow Mountain Lake.

Table 33.–Site data for Dude Lake.

Location data		
Date	July 7, 2009	
Time	11:15	
Site code	DRD090707DudeLk	
Latitude; Longitude	63.20641; -145.74352	
Elevation	1,021 m	
Vegetation	Mostly tundra, some willow and alder	
Weather		
Air temperature	23.0°C	
Sky	Mostly clear	
Wind	Light breeze	
Water		
Water temperature	17.0°C	
Conductivity	ND	
Depth	13.0 m	
Secchi	ND	
Color	Clear/slightly tannic	
Outlet channel		
	Small, not measured due to distance from landing site	
Species identified	Electrofishing	Minnow trap
slimy sculpin	4	2

Table 34.–Sample gear data for Dude Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.20060; -145.74442		23:25	0
Minnow Trap 2	63.20473; -145.74655		22:20	1
Minnow Trap 3	63.20453; -145.74409		23:12	0
Minnow Trap 4	63.20546; -145.74400		22:20	1
Minnow Trap 5	63.20564; -145.74419		22:18	0
Minnow Trap 6	63.20579; -145.74420		22:20	0
Gill Net 1	63.20454; -145.74422	13.0 m	23:15	0
Gill Net 2	63.20614; -145.74358	9.1 m	23:16	0
Trot Line 1	63.20455; -145.74434		22:40	0
Trot Line 2	63.20466; -145.74390		22:17	0
Trot Line 3	63.20639; -145.74347		22:30	0
Electrofish	63.20455; -145.74434		520 s	4

Note: Shoreline was variable having areas of boulder, cobble, gravel, sand, silt and vegetation. The landing area was distant from a small outlet stream that is tributary to Garrett Creek, a tributary of the Delta River. This outlet stream has a very steep gradient (10% for 150 m) beginning 1 km downstream of the lake. No notable inlet streams were observed in small basin. No fish other than slimy sculpin (10 – 62 mm FL) were seen in the lake. When returning to pick up sample gear, four otters were swimming in the lake and likely through gill nets as a couple of holes were found in them.

Figure 55.–Dude Lake.

Figure 56.–Dude Lake.

Table 35.–Site data for Gulch Lake.

Location data	
Date	July 7, 2009
Time	12:00
Site code	DRD090707GulchLk
Latitude; Longitude	63.25711; -145.85138
Elevation	926 m
Vegetation	Willows, sedges, and grass
Weather	
Air temperature	20.0°C
Sky	Clear
Wind	Light breeze
Water	
Water temperature	18.0°C
Conductivity	250 µS/cm
Depth	7.0 m
Sechhi	2.25 m
Color	Clear
Outlet channel	
	Beaver dam with small seeps, large rocks, and sand

Table 36.–Sample gear data for Gulch Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1		< 1.0 m	24:30	0
Minnow Trap 2		< 1.0 m	24:30	0
Minnow Trap 3		< 1.0 m	24:30	0
Minnow Trap 4		< 1.0 m	24:30	0
Gill Net		7.0 m	24:00	0
Trot Line			24:00	0
Electrofish			480 s	0

Note: Sampling conducted at inlet seep; small basin lacked inlet stream. Beaver dam and recent beaver cuts apparent at outlet. Many scuds observed.

Figure57.–Gulch Lake.

Figure 58.–Gulch Lake.

Table 37.–Site data for Mouskateer Lake.

Location data	
Date	July 7, 2009
Time	15:00
Site code	DRD090707MousekateerLk
Latitude; Longitude	63.29338; -145.86566
Elevation	1,076 m
Vegetation	Grass and sedge
Weather	
Air temperature	18.0°C
Sky	Clear
Wind	Light breeze
Water	
Water temperature	17.0°C
Conductivity	70 µS/cm
Depth	4.0 m
Sechhi	3.0 m
Color	Clear
Outlet channel	
	Beaver dam with a seep, large rocks, silt and mud

Table 38.–Sample gear data for Mouskateer Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1		< 1.0 m	20:00	0
Minnow Trap 2		< 1.0 m	20:00	0
Minnow Trap 3		< 1.0 m	20:00	0
Minnow Trap 4		< 1.0 m	20:00	0
Gill Net		4.0 m	19:30	0
Trot Line			19:30	0
Electrofish			? s	0

Note: Beaver observed.

Figure 59.–Mouskateer Lake.

Figure 60.–Mouskateer Lake.

Table 39.–Site data for Sluggo Lake.

Location data		
Date	July 8, 2009	
Time	13:30	
Site code	DRD090708SluggoLk	
Latitude; Longitude	63.27164; -146.29903	
Elevation	1,072 m	
Vegetation	Grass and sedge	
Weather		
Air temperature	28.0°C	
Sky	Mostly clear	
Wind	Calm	
Water		
Water temperature	17.5°C	
Conductivity	75 µS/cm	
Depth	2.0 m	
Sechhi	2.0 m	
Color	Clear	
Outlet channel		
	Dry and muddy	
Species identified	Electrofishing	Gill net
Arctic grayling		1
slimy sculpin	1	

Table 40.–Sample gear data for Sluggo Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1		<1 m	23:00	0
Minnow Trap 2		<1 m	23:00	0
Minnow Trap 3		<1 m	23:00	0
Minnow Trap 4		<1 m	23:00	0
Gill Net		2 m	23:15	1
Trot Line			23:05	0
Trot Line			23:10	0
Electrofish			480 s	1

Note: Water had been higher in spring and the outlet apparently connected to Eureka Creek a few hundred meters away. Gill net was strung across whole lake perpendicular to long axis. Lake bottom had large cobbles covered in loess. Arctic grayling was 250 mm FL and the slimy sculpin was 53 mm FL.

Figure 61.–Sluggo Lake.

Figure 62.–Sluggo Lake.

Table 41.–Site data for Victor Lake.

Location data		
Date	July 9, 2009	
Time	12:45	
Site code	DRD090709VictorLk	
Latitude; Longitude	63.25101; -146.40955	
Elevation	1,108 m	
Vegetation	Willow, alder, dwarf birch, and grass	
Weather		
Air temperature	20.0°C	
Sky	Partly cloudy	
Wind	Light breeze	
Water		
Water temperature	15.0°C	
Conductivity	ND	
Depth	13.0 m	
Sechhi	8.0 m	
Color	Clear	
Outlet channel		
	Small, not measured, distant from landing location	
Species identified	Gill net	Minnow trap
Arctic grayling	22	
slimy sculpin		4

Table 42.–Sample gear data for Victor Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.25101; -146.40955	0.5 m	23:55	0
Minnow Trap 2	63.25090; -146.41020	0.5 m	22:48	2
Minnow Trap 3	63.25076; -146.41040	0.4 m	22:55	0
Minnow Trap 4	63.25055; -146.41078	0.2 m	22:57	1
Minnow Trap 5	63.25046; -146.40576	0.3 m	23:10	1
Minnow Trap 6	63.24981; -146.40665	0.3 m	23:23	0
Gill Net 1	63.25098; -146.40898	6.0 m	23:40	6
Gill Net 2	63.24981; -146.40666	11.0 m	23:25	16
Trot Line 1		12.5 m	23:40	0
Trot Line 2		9.0 m	23:50	0

Note: The landing area was distant from a small outlet stream; therefore its attributes were not measured. Arctic grayling were 105 – 310 mm FL and slimy sculpin were 15–30 mm FL.

Figure 63.–Victor Lake.

Figure 64.–Victor Lake.

Table 43.–Site data for Hidden Lake.

Location data			
Date	July 8, 2009		
Time	15:15		
Site code	DRD090708HiddenLk		
Latitude; Longitude	63.24047; -146.54494		
Elevation	921 m		
Vegetation	Willow, alder, and grass		
Weather			
Air temperature	27.0°C		
Sky	Mostly clear		
Wind	Light breeze, increasing		
Water			
Water temperature	17.5°C		
Conductivity	ND		
Depth	7.5 m		
Sechhi	ND		
Color	Clear/tannic		
Outlet channel	Small, not measured, distant from landing location		
Species identified	Gill net	Minnow trap	Electrofish
Arctic grayling	5		
Longnose sucker	9	19	23
Round whitefish	8		
Humpback whitefish	77		2

Table 44.–Sample gear data for Hidden Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.23999; -146.54570	<1 m	22:40	0
Minnow Trap 2	63.24051; -146.54491	<1 m	22:40	1
Minnow Trap 3	63.23970; -146.54587	<1 m	22:10	18
Minnow Trap 4	63.23943; -146.54622	<1 m	22:15	0
Gill Net	63.24047; -146.54494	7.5 m	21:55	99
Trot Line	63.24081; -146.54442		21:20	0
Electrofish			200 s	25

Note: The landing area was distant from a small outlet stream, therefore its attributes were not measured. Electrofished a short stretch of shallow, littoral water, about 50 m. All other areas were extremely muddy or steeply dropped to >1 m. Humpback whitefish (150 – 330 mm FL), round whitefish (140 – 380 mm FL), longnose sucker (100 – 385 mm FL), and Arctic grayling (200 – 295 mm FL) were captured.

Figure 65.–Hidden Lake.

Figure 66.–Hidden Lake.

Table 45.–Site data for Petrokov Lake.

Location data				
Date	July 8, 2009			
Time	16:00			
Site code	DRD090709PetrokovLk			
Latitude; Longitude	63.18688; -146.51631			
Elevation	956 m			
Vegetation	Willow, alder, dwarf birch and sedge			
Weather				
Air temperature	20.0°C			
Sky	Mostly cloudy			
Wind	Light			
Water				
Water temperature	18.0°C			
Conductivity	ND			
Depth	6.0 m			
Sechhi	4.0 m			
Color	Tannic			
Outlet channel				
	Small, not measured, distant from landing location			
Species identified	Gill net	Minnow trap	Trot line	Visual
Arctic grayling	11			
Slimy sculpin		2		
Lake trout	16		2	
Burbot				1

Table 46.–Sample gear data for Petrokov Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.18920; -146.51276	<1 m	22:25	2
Minnow Trap 2	63.18884; -146.51288	<1 m	22:00	0
Minnow Trap 3	63.18821; -146.51362	<1 m	22:05	0
Minnow Trap 4	63.18698; -146.51611	1.0 m	21:55	0
Gill Net 1	63.18900; -146.51280	4.0 m	22:00	27
Trot Line 1	63.18902; -146.51407	6.0 m	22:20	2

Note: The landing area was distant from a small outlet stream; therefore, its attributes were not measured. It was a small beaver dammed seep. When retrieving a minnow trap, a burbot of about 150 mm FL was observed in a shoreline boulder patch, which was one of several spring seeps along the western edge of the lake. Slimy sculpin (20 and 25 mm FL), Arctic grayling (160 – 382 mm FL), and lake trout (342 – 422 mm FL) were captured.

Figure 67.–Petrokov Lake.

Figure 68.–Petrokov Lake.

Table 47.–Site data for No Good Lake.

Location data	
Date	July 10, 2009
Time	10:00
Site code	DRD090710NoGoodLk
Latitude; Longitude	63.13564; -146.88190
Elevation	1,178 m
Vegetation	Tundra
Weather	
Air temperature	18.0°C
Sky	Mostly clear
Wind	Light
Water	
Water temperature	15.0°C
Conductivity	ND
Depth	>9.0 m
Sechhi	9.0 m
Color	Clear
Outlet channel	
	Small, not measured, distant from landing location

Table 48.–Sample gear data for No Good Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.13575; -145.88167	<1.0 m	25:30	0
Minnow Trap 2	63.13564; -145.88190	<1.0 m	25:25	0
Minnow Trap 3	63.13573; -145.88123	<1.0 m	25:20	0
Minnow Trap 4	63.13594; -145.88039	<1.0 m	25:25	0
Gill Net 1	63.13564; -145. 88190	8.0 m	25:00	0
Trot Line 1	63.13562; -145.88210		24:50	0

Note: No fish were captured or seen. The landing area was distant from a small outlet stream; therefore, its attributes were not measured. Many scuds were observed in the water. A loon was present at lake when retrieving sets. The shoreline was strewn with many large cleaved boulders that had fallen in from the adjacent mountain. The small outlet stream travels about 5 km and drops 330 m (6% grade) before entering Lower Tangle Lake. In addition, there are several significant cataracts including one which drops 20 m within 100 m (20% grade).

Figure 69.–No Good Lake.

Figure 70.–No Good Lake

Table 49.–Site data for Bean Lake.

Location data	
Date	July 8, 2009
Time	12:30
Site code	DRD090708BeanLk
Latitude; Longitude	63.28453; -146.01529
Elevation	1,231 m
Vegetation	Grass, sedge, willow, and tundra
Weather	
Air temperature	24.0°C
Sky	Mostly sunny
Wind	Light
Water	
Water temperature	20.0°C
Conductivity	ND
Depth	7.3 m
Sechhi	ND
Color	Slightly tannic
Outlet channel	
Wetted width	2.5 m
Thalweg	0.15 m
Gradient	0.5 - >3.0%
Substrate	Silt and sand changing to boulder and cobble as gradient increased

Table 50.–Sample gear data for Bean Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.28471; -146.01564	<1.0 m	24:00	0
Minnow Trap 2	63.28424; -146.01352	<1.0 m	23:55	0
Gill Net 1	63.28453; -146. 01532	7.3 m	24:00	0

Note: Overall, there is a 12% grade (300m in 2.5 km) between Bean Lake and Eureka Creek; however, the initial grade from the outlet is 20% (20 m in 100 m).

Figure 71.–Bean Lake.

Figure 72.–Bean Lake.

Table 51.–Site data for Upper Landmark Gap Lake.

Location data			
Date	July 10, 2009		
Time	12:30		
Site code	DRD090710UpLandmkGapLk		
Latitude; Longitude	63.13313; -146.14192		
Elevation	1,290 m		
Vegetation	Mostly rock, some tundra		
Weather			
Air temperature	18.0°C		
Sky	Mostly clear		
Wind	Light		
Water			
Water temperature	10.0°C		
Conductivity	ND		
Depth	20.0 m		
Sechhi	10.0 m		
Color	Clear		
Outlet channel			
Wetted width	4.0 m		
Thalweg	0.2 m		
Gradient	3.0%		
Substrate	Boulder and cobble		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling			
Slimy sculpin			
Lake trout	5		
Burbot			

Table 52.–Sample gear data for Upper Landmark Gap Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.13313; -146.14192	<1.0 m	22:45	0
Minnow Trap 2	63.13319; -146.14191	<1.0 m	23:00	0
Minnow Trap 3	63.13353; -146.14188	<1.0 m	23:00	0
Minnow Trap 4	63.13321; -146.14264	<1.0 m	22:40	0
Gill Net 1	63.13269; -146.14142	15.6 m	23:10	5
Trot Line 1	63.13129; -146.14142		22:50	0

Note: Five lake trout (220 mm FL each) were captured in the gill net, 2 of which died. When retrieving the net, a number of fish were dimpling the surface while foraging. There is a 5% grade (300 m drop in 5.9km) between this lake and Landmark Gap Lake.

Figure 73.–Upper Landmark Gap Lake.

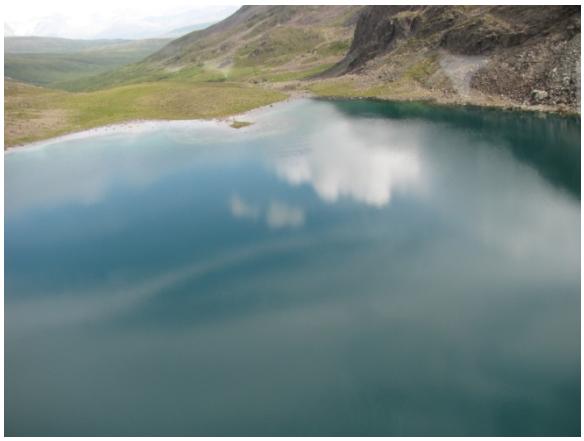

Figure 74.–Upper Landmark Gap Lake.

Table 53.–Site data for Thing Two Lake.

Location data			
Date	July 10, 2009		
Time	16:15		
Site code	DRD090710ThingTwoLk		
Latitude; Longitude	63.12482; -145.75803		
Elevation	969 m		
Vegetation	Grass, sedge, willow, and alder		
Weather			
Air temperature	24.0°C		
Sky	Mostly clear		
Wind	Light		
Water			
Water temperature	17.0°C		
Conductivity	ND		
Depth	6.0 m		
Sechhi	ND		
Color	Tannic		
Outlet channel			
Wetted width	7.0 m		
Thalweg	0.2 m		
Gradient	1.0%		
Substrate	Boulder, cobble, and gravel		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling	15		
Slimy sculpin		2	
lake trout	15		1

Table 54.–Sample gear data for Two Thing Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.12555; -145.75777	<1.0 m	20:10	2
Minnow Trap 2	63.12539; -145.75763	<1.0 m	20:10	0
Minnow Trap 3	63.12482; -145.75803	<1.0 m	20:05	0
Minnow Trap 4	63.12452; -145.75723	<1.0 m	20:05	0
Gill Net 1	63.12436; -145.75731	6.0 m	20:15	30
Trot Line 1		6.0 m	19:55	1
Trot Line 2		6.0 m	19:55	0

Note: The gill net was stretched across whole lake perpendicular to its long axis. Arctic grayling fry were observed in an outlet stream, indicating spawning occurs nearby. Both trot lines were set floating in the lake (cork and weight). The gradient is 1.5% (60 m drop in 3,800 m) between this lake and Fielding Lake. Lake trout (200 – 400 mm FL), Arctic grayling (200 – 380 mm FL), and slimy sculpin (25 mm FL) were captured.

Figure 75.–Thing Two Lake.

Figure 76.–Thing Two Lake.

Table 55.–Site data for Fish Lake, July 14.

Location data			
Date	July 14, 2009		
Time	19:30		
Site code	DRD090714FishLk		
Latitude; Longitude	63.23320; -146.00716		
Elevation	973 m		
Vegetation	Willow, alder, dwarf birch, and grass		
Weather			
Air temperature	27.0°C		
Sky	Sunny		
Wind	Light breeze		
Water			
Water temperature	10.0°C		
Conductivity	ND		
Depth			
Sechhi	10.0 m		
Color	Clear		
Outlet channel			
Wetted width	9.0 m		
Thalweg	0.3 m		
Gradient	0.5%		
Substrate	Gravel and cobble		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling	30		
Slimy sculpin		13	

Table 56.–Sample gear data for Fish Lake, July 14.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.23320; -146.00716	16.8 m	16:30	13
Minnow Trap 2	63.23287; -146.00482	1.0 m	16:25	0
Gill Net 1	63.23373; -146.00539	10.0 m	16:30	30
Trot Line 1	63.23309; -146.00520	16.8 m	16:30	0
Trot Line 2	63.23291; -146.00713	4.0 m	16:30	0

Note: Minnow trap one was suspended in deep water by a floating buoy. The near shore water temperature was 16°C. Minnow trap one and trot line one were suspended in deep water by floating buoys. Minnow trap one captured 13 slimy sculpin of about 40 mm FL and gill net one captured 30 Arctic grayling between 145 and 340 mm FL.

Figure 77.–Fish Lake.

Figure 78.–Fish Lake.

Table 57.–Site data for Fish Lake, July 15.

Location data			
Date	July 15, 2009		
Time	13:00		
Site code	DRD090715FishLk		
Latitude; Longitude	63.23320; -146.00716		
Elevation	973 m		
Vegetation	Willow, alder, dwarf birch, and grass		
Weather			
Air temperature	17.0°C		
Sky	Cloudy		
Wind	Calm		
Water			
Water temperature	10.0°C		
Conductivity	ND		
Depth			
Sechhi	10.0 m		
Color	Clear		
Outlet channel			
Wetted width	9.0 m		
Thalweg	0.3 m		
Gradient	0.5%		
Substrate	Gravel and cobble		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling	1	1	
Slimy sculpin		6	

Table 58.–Sample gear data for Fish Lake, July 15.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.23505; -146.00850	13.8 m	23:15	4
Minnow Trap 2	63.23574; -146.00713	1.0 m	22:25	1
Minnow Trap 3	63.23582; -146.00696	0.5 m	22:25	1
Minnow Trap 4	63.23584; -146.00679	0.5 m	22:25	1
Gill Net 1	63.23462; -146.00722	15.7 m	23:10	1
Trot Line 1	63.23515; -146.00858	10.0 m	23:10	0

Note: Minnow trap one, trot line, and gill net were suspended in deep water by floating buoys. Minnow trap 1 captured four slimy sculpin 90 - 105 mm FL. Minnow trap 2 caught a 70 mm FL Arctic grayling. Minnow traps 3 and 4 each caught a slimy sculpin, 30 and 40 mm FL. The gill net captured one 270 mm FL Arctic grayling.

Table 59.–Site data for Fish Lake, July 16.

Location data	
Date	July 16, 2009
Time	13:00
Site code	DRD090716FishLk
Latitude; Longitude	63.23320; -146.00716
Elevation	973 m
Vegetation	Willow, alder, dwarf birch, and grass
Weather	
Air temperature	22.0°C
Sky	Partly cloudy
Wind	Light breeze
Water	
Water temperature	10.0°C
Conductivity	ND
Depth	
Sechhi	10.0 m
Color	Clear
Outlet channel	
Wetted width	9.0 m
Thalweg	0.3 m
Gradient	0.5%
Substrate	Gravel and cobble

Table 60.–Sample gear data for Fish Lake, July 16.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.23614; -146.00610	0.5 m	24:28	0
Minnow Trap 2	63.23603; -146.00612	0.5 m	24:25	0
Minnow Trap 3	63.23603; -146.00601	0.5 m	24:27	0
Minnow Trap 4	63.23600; -146.00592	0.5 m	24:25	0
Gill Net 1	63.23609; -146.00543	5.0 m	24:30	0

Table 61.–Site data for Big Wuttie Lake.

Location data			
Date	July 15, 2009		
Time	17:15		
Site code	DRD090715BigWuttieLk		
Latitude; Longitude	63.22802; -145.93590		
Elevation	984 m		
Vegetation	Grass, tundra, and willow		
Weather			
Air temperature	17.0°C		
Sky	Cloudy		
Wind	Light breeze		
Water			
Water temperature	18.0°C		
Conductivity	ND		
Depth			
Sechhi	5.2 m		
Color	Clear		
Outlet channel			
Wetted width	Outlet dry		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling	31		

Table 62.–Sample gear data for Big Wuttie Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.22802; -145.93590	0.8 m	23:36	0
Minnow Trap 2	63.22821; -145.93680	0.2 m	23:40	0
Minnow Trap 3	63.22837; -145.93846	0.2 m	23:40	0
Trot Line 1	63.22900; -145.93590	6.1 m	23:40	0
Gill Net 1	63.22821; -145.93698	5.0 m	23:45	31

Note: No surface water was flowing through the outlet, but water did come to the surface midway on its course to Little Wuttie Lake. The trot line had 9 baited hooks suspended by its buoy. The gill net captured 31 Arctic grayling ranging from 200 – 370 mm FL. The 370 mm FL Arctic grayling had died and examination of its stomach contents revealed consumption of a substantial number of snails and clams.

Figure 79.–Big Wuttie Lake.

Figure 80.–Big Wuttie Lake.

Table 63.–Site data for Little Wuttie Lake.

Location data			
Date	July 15, 2009		
Time	19:15		
Site code	DRD090715LittleWuttieLk		
Latitude; Longitude	63.22358; -145.90990		
Elevation	980 m		
Vegetation	Grass, tundra, and willow		
Weather			
Air temperature	17.0°C		
Sky	Cloudy		
Wind	Light to moderate breeze		
Water			
Water temperature	18.5°C		
Conductivity	ND		
Depth			
Sechhi	4.0 m		
Color	Clear		
Inlet channel			
Wetted width	0.5 m		
Thalweg	0.2 m		
Gradient	1.0%		
Substrate	Cobbles, gravel, and algal covering		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling	15		
Slimy sculpin		53	

Table 64.–Sample gear data for Little Wuttie Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.22358; -145.90990	0.2 m	20:55	4
Minnow Trap 2	63.22407; -145.91121	0.2 m	20:50	44
Minnow Trap 3	63.22525; -145.91236	0.5 m	20:50	5
Trot Line 1	63.22477; -145.91008	5.7 m	19:50	0
Gill Net 1	63.22391; -145.90919	8.0 m	20:00	15

Note: Outlet channel was distant from shore and not measured, but the inlet channel was adjacent to the trail and was measured. The trot line had 9 baited hooks suspended by its buoy. The gill net captured 15 Arctic grayling ranging from 200 – 240 mm FL. The minnow traps captured 53 slimy sculpin (15 – 45 mm FL).

Figure 81.–Little Wuttie Lake.

Figure 82.–Little Wuttie Lake.

Table 65.–Site data for Collyard Lake.

Location data			
Date	July 16, 2009		
Time	18:00		
Site code	DRD090716CollyardLk		
Latitude; Longitude	63.23674; -145.97258		
Elevation	1,020 m		
Vegetation	Grass, tundra, and willow		
Weather			
Air temperature	17.0°C		
Sky	Cloudy		
Wind	Light breeze		
Water			
Water temperature	18.0°C		
Conductivity	ND		
Depth	3.8 m		
Sechhi	3.5 m		
Color	Clear		
Inlet channel			
Wetted width	0.5 m		
Thalweg	0.2 m		
Gradient	1.0%		
Substrate	Boulders, cobbles, gravel, and algal covering		
Species identified	Gill net	Minnow trap	Trot line
Arctic grayling	11		
Slimy sculpin		8	

Table 66.–Sample gear data for Collyard Lake.

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.23674; -145.97258	<1.0 m	22:35	3
Minnow Trap 2	63.23683; -145.97340	<1.0 m	22:35	0
Minnow Trap 3	63.23697; -145.97444	<1.0 m	22:25	5
Minnow Trap 4	63.23666; -145.97482	2.4 m	22:25	0
Trot Line 1	63.23652; -145.97479	3.8 m	22:30	0
Gill Net 1	63.23664; -146.97504	2.2 m	22:05	11

Note: The outlet channel was distant from sample area and not measured, but the inlet channel was adjacent to the trail and was measured as noted for the Lost Creek data. The trot line had 9 baited hooks suspended by its buoy. The gill net captured 11 Arctic grayling ranging from 185 – 235 mm FL. Slimy sculpin were (20 – 35 mm FL).

Figure 83.–Collyard Lake.

Figure 84.–Collyard Lake.

Table 67.–Site data for High Lake.

Location data		
Date	July 16, 2009	
Time	14:30	
Site code	DRD090716HighLk	
Latitude; Longitude	63.21744; -145.95862	
Elevation	1,179 m	
Vegetation	Tundra, grass, and willow	
Weather		
Air temperature	15.5°C	
Sky	Partly sunny	
Wind	Light breeze	
Water		
Water temperature	16.0°C	
Conductivity	ND	
Depth	10.0 m	
Sechhi	ND	
Color	Clear	
Outlet channel		
Wetted width	Outlet dry	
Species identified	Gill net	Visual
Slimy sculpin		4

Table 68.–Sample gear data for High Lake.

Gear	Location	Depth	Duration	Catch
Gill Net	63.21744; -145.95862	10 m	23:00	4

Note: No fish were captured but four slimy sculpin were observed in the lake. Some water was leaking from seeps in the falls. The outlet drops quite precipitously in places. Initially falling 80 meters in 300 m (27% grade), and falling 190 m in 990 m (19% grade) from the lake to the valley bottom.

Figure 85.–High Lake.

Figure 86.–High Lake Outlet.

Table 69.–Site data for Little Moose Lake.

Location data			
Date	July 16, 2009		
Time	16:00		
Site code	DRD090716LittleMooseLk		
Latitude; Longitude	63.21371; -145.85445		
Elevation	948 m		
Vegetation	Willow, alder, dwarf birch, and grass		
Weather			
Air temperature	20.0°C		
Sky	Clear		
Wind	Calm		
Water			
Water temperature	16.0°C		
Conductivity	ND		
Depth	5 m		
Sechhi	ND		
Color	Clear		
Outlet channel			
	No outlet channel observed		
Species identified	Gill net	Minnow trap	Visual
Slimy sculpin		1	1

Table 70.–Sample gear data for Little Moose Lake.

Gear	Location	Depth	Duration	Catch
Gill Net	63.21371; -145.85445	2.2 m	23:00	
Minnow trap	63.21371; -145.85445	3.0 m	23:00	1

Note: No outlet channel was observed though the distant shore was not investigated. A slimy sculpin was observed along rocky shoreline and one (30 mm FL) was captured in a minnow trap suspended in 3 m of water.

Figure 87.–Little Moose Lake.

Figure 88.–Little Moose Lake.

Figure 89.–Eureka Glacier and its bifurcated outlet stream that forms the headwaters of Eureka Creek and the East Fork Maclaren River. Clearly depicted are interconnected channels flowing towards both the Yukon (right channel) and Susitna (left channel) rivers providing a pathway for fish between drainages.

APPENDIX A

Appendix A1.—Potential sample locations, their size, accessibility, characterization, region and prioritization.

Lake/Stream	Name	Drainage area or Surface area (Hectares)	ATV, boat or Helicopter	Access Road	Glacial/Clear	Headwater Lake	Region	Priority*
Stream	Upper Garrett Creek	41 km^2	Helicopter		clear	yes	North	1
Lake	Mousekateer	2	Helicopter				North	2
Lake	Gulch	1	Helicopter				North	1
Lake	Oval	2	Helicopter	Broxson			North	2
Lake	Bean	5	Helicopter	Broxson			North	1
Stream	WF Rainy Creek	21 km^2	Helicopter	Broxson	clear	yes	North	1
Stream	NF Rainy Creek	36 km^2	Helicopter	Broxson	clear	yes	North	1
Stream	Bean Lake Creek	3 km^2	Helicopter	Broxson	clear	yes	North	1
Stream	Speciman Creek	16 km^2	Helicopter	Broxson	clear ?	no	North	1
Stream	Broxson Gulch	133 km^2	Helicopter	Broxson	Glacial/clear	no	North	1
Lake	Nub	1	Helicopter				North	2
Lake	Beaver Lodge	2	Helicopter				North	2
Lake	Big Nose	1	Helicopter				North	2
Lake	Hole	4	Helicopter				North	2
Stream	SF Rainy Creek	12 km^2	Helicopter	Broxson	clear	yes	North	4
Stream	Mousekateer Lake Creek	15 km^2	Helicopter		clear	yes	North	4
Stream	Minime Lake Creek	8 km^2	Heli/Boat	Delta River	clear	yes	North	1
Stream	Ann Creek	20 km^2	Heli/Boat	Delta River	clear	yes	North	2
Stream	Rainy Creek	71 km^2	HeliBoat	Broxson	glacial	yes	North	3
Lake	Thing One	2	ATV	Denali			South	1
Lake	Thing Two	4	ATV	Denali			South	1
Stream	Thing One-Two Creek	27 km^2	ATV	Denali	Clear	yes	South	1
Lake	Upper Landmark Gap	12	Helicopter				South	1
Lake	Moraine	3	Helicopter				South	1
Lake	Lagoon	2	Helicopter				South	1
Lake	Perch	3	Helicopter				South	3
Lake	No Good	30	Helicopter				South	1
Stream	South Fork Wildhorse Cr.	19 km^2	Helicopter		clear	yes	South	1

-continued-

Appendix A1.–2 of 2.

Lake/Stream	Name	Drainage area or Surface area (Hectares)	ATV, boat or Helicopter	Access Road	Glacial/Clear	Headwater Lake	Region	Priority*
Stream	West Fork Wildhorse Creek	16 km^2	Helicopter		clear	yes	South	2
Stream	Landmark Gap Creek	27 km^2	Helicopter				South	2
Lake	Cheenadon	29	Helicopter				West	1
Lake	Victor	19	Helicopter				West	1
Lake	Sluggo	2	Helicopter				West	2
Lake	Leech	1	Helicopter				West	1
Lake	Cheeno 2	7	Helicopter				West	1
Lake	Cheeno 4	7	Helicopter				West	2
Stream	Cheenadon Lake Creek	15 km^2	Helicopter		Clear	yes	West	1
Stream	3 Mile Creek	11 km^2	Helicopter		Clear	no	West	1
Stream	5 Mile Creek	31 km^2	Helicopter		Clear	no	West	1
Stream	7 Mile Creek	23 km^2	Helicopter		Glacial	no	West	1
Stream	Upper Eureka Creek	170 km^2	Helicopter		Glacial	yes	West	2
Lake	Cheeno 1	2	Helicopter				West	2
Lake	Cheeno 3	2	Helicopter				West	2
Lake	Cheeno 5	4	Helicopter				West	2
Lake	Basalt	32	Helicopter				West	3
Stream	Eureka Glacier Creek	65 km^2	Helicopter		Glacial	no	West	3

* Time permitting, this location will be accessed via helicopter, otherwise it will be accessed via ATV the following week.

Appendix A2.–Sample schedule and prioritization.

Date	Day	Priority	Location	Operation	Time	Priority	Location	Operation	Time
6-Jul	Mon	1	Dude Lake	SET	:20	1	Gulch Lake	SET	:20
		2	Rainbow Mountain Lake	SET	:20	2	Mousekateer Lake	SET	:20
		1	Upper Garrett Creek	SAMPLE	1:00	1	WF Rainy Creek	SAMPLE	1:00
7-Jul	Tue		Rainbow Mountain Lake	Pull	1:00		Mouskateer Lake	Pull	1:00
			Dude Lake	Pull	1:00		Gulch Lake	Pull	1:00
		1	Bean Lake	SET	:20	1	Leech Lake	SET	:20
		2	Oval Lake	SET	:20	2	Sluggo Lake	SET	:20
		1	Bean Lake Creek	SAMPLE	1:00	1	Broxson Gulch	SAMPLE	1:00
		1	Speciman Creek	SAMPLE	1:00	1	7-Mile Creek	SAMPLE	1:00
						2	Upper Eureka Creek	SAMPLE	1:00
8-Jul	Wed		Bean Lake	Pull	1:00		Leech Lake	Pull	1:00
			Oval Lake	Pull	1:00		Sluggo Lake	Pull	1:00
		1	Cheenadon Lake	SET	:20	1	Cheeno Lake 2	SET	:20
		1	Victor Lake	SET	:20	2	Cheeno Lake 4	SET	:20
		1	Chenadon Lake Creek	SAMPLE	1:00	1	5 Mile Creek	SAMPLE	1:00
		2	Landmark Gap Creek	SAMPLE	1:00	1	3 Mile Creek	SAMPLE	1:00
9-Jul	Thur		Cheenadon Lake	Pull	1:00		Cheeno Lake 2	Pull	1:00
			Victor Lake	Pull	1:00		Cheeno Lake 4	Pull	1:00
		1	Upper Landmark Gap Lake	SET	:20	1	Lagoon Lake	SET	:20
		1	No Good Lake	SET	:20	1	Moraine Lake	SET	:20
		1	Upper 12 Mile Creek*	SAMPLE	1:00	1	South Fork Wildhorse	SAMPLE	1:00
		2	Lower Wildhorse Creek	SAMPLE	1:00	2	West Fork Wildhorse	SAMPLE	1:00
		3	High Lake*			3	Perch Lake		
10-Jul	Fri		Upper L Gap Lake	Pull	1:00		Lagoon Lake	Pull	1:00
			No Good Lake	Pull	1:00		Moraine Lake	Pull	1:00
		1	Ann Creek	SAMPLE	1:00	1	Minime Lake Creek	SAMPLE	1:00

-continued-

		Crew 1				Crew 2		
Date	Day	Priority	Location	Operation	Time	Priority	Location	Operation	Time
13-Jul	Mon	1	Fish Lake	SET	1:00	1	Big Wuttie Lake	SET	:20
		1	Fish Lake Creek	SAMPLE	1:00	1	Little Wuttie Lake	SET	:20
						1	Wuttie Lake Creek	SAMPLE	1:00
14-Jul	Tue								
			Fish Lake	Pull	2:00		Big Wuttie Lake	Pull	1:00
		1	Jellyfish Lake	SET	:20		Little Wuttie Lake	Pull	1:00
		1	Crinkle Lake 1	SET	:20	1	Cabin Lake	SET	:20
		1	Crinkle Lake 2	SET	:20	1	Big Moose Lake	SET	:20
		1	Crinkle Lake 3	SET	:20	1	Little Moose Lake	SET	:20
						1	First Lake	SET	:20
15-Jul	Wed								
			Jellyfish Lake	Pull	1:00		Cabin Lake	Pull	1:00
			Crinkle Lake 1	Pull	1:00		Big Moose Lake	Pull	1:00
			Crinkle Lake 2	Pull	1:00		Little Moose Lake	Pull	1:00
			Crinkle Lake 3	Pull	1:00		First Lake	Pull	1:00
		1	Twin Lakes 1	SET	:20	1	High Lake	SET	:20
		1	Twin Lakes 2	SET	:20	1	Lower Wildhorse Creek	SAMPLE	1:00
16-Jul	Thurs								
			Twin Lakes 1	Pull	1:00		High Lake	Pull	1:00
			Twin Lakes 2	Pull	1:00	1	North Flats Fork Wildhorse Creek	SAMPLE	1:00
		1	Middle Eureka Ck.	SAMPLE	1:00	1	Upper 12 Mile Creek	SAMPLE	1:00
		1	12 Mile Creek	SAMPLE	1:00				
17-Jul	Fri	1	Moose Lake Creek	SAMPLE	1:00	1	Cabin Lake Creek	SAMPLE	1:00
		1	Eureka Creek Mouth	SAMPLE	1:00	1	Wildhorse Creek mouth	SAMPLE	1:00

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Date	Day	Priority	Location	Crew 1 Operation	Sample Time	Priority	Location	Crew 2 Operation	Time
20-Jul	Mon	1	Thing One Lake	SET	:20				
		1	Thing Two Lake	SET	:20				
		1	Thing One-Two Creek	Sample	1:00				
21-Jul	Tues		Thing One Lake	Pull	1:00				
			Thing Two Lake	Pull	1:00				

Appendix A3.–Fish species known to occur[a] within the Upper Delta and Upper Maclaren river drainages.

Species code	Common name	Scientific name
LAR	Arctic lamprey	*Lampetra camtschatica*
MIN	lake chub	*Couesius plumbeus*
NOS	longnose sucker	*Catostomus catostomus*
PIK	northern pike	*Esox lucius*
DAL	Alaska blackfish	*Dallia pectoralis*
WLC	least cisco	*Coregonus sardinella*
WBC	bering cisco	*Coregonus laurettae*
WBD	broad whitefish	*Coregonus nasus*
WHB	humpback whitefish	*Coregonus pidschian*
WRN	round whitefish	*Prosopium cylindraceum*
GRA	Arctic grayling	*Thymallus articus*
LKT	lake trout	*Salvelinus namaycush*
CDV	Dolly Varden	*Salvelinus malma*
SCO	coho salmon	*Oncorhynchus kisutch*
GBR	burbot	*Lota lota*
KNS	ninespine stickleback	*Pungitius pungitius*
USL	slimy sculpin	*Cottus cognatus*

[a] *Sensu* Mecklenburg et al. 2002.

APPENDIX B

PREVIOUSLY UNPUBLISHED SAMPLE DATA

Appendix B1.–Sample data for Dude Lake, 1995

Dude Lake

Location data:	Site code	DRD062695DudeLk
	Location	63.20641; -145.74352
	Elevation	1,021 m
	Date	June 26, 1995
	Time	16:00
	Vegetation	Mostly tundra, some willow and alder
Weather:	Air temperature C	
	Sky	
	Wind	Windy
Water:	Water temperature	11.0°C
	Conductivity	ND
	Depth	ND
	Sechhi	Estimated as 2.5 m
	Color	Tannic
Outlet:	Width	2.0 m
	Maximum Depth	0.5 m

Sampling data:

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.19702; -145.75284	0.5 m	17:00	5
Minnow Trap 2	63.20954; -145.73956	8.0 m	16:15	1
Minnow Trap 3	63.21830; -145.73200	1.5 m	16:00	2
Gill Net 1	63.20255, -145.74637	8.0 m	16:30	0
Gill Net 2	63.21830; -145.73200	8.0 m	16:00	1

Catch data by species and gear:

Species	Gill Net	Minnow trap
slimy sculpin		7
Dolly Varden	1	

Note: Minnow trap 2 suspended 1.5 m in 8.0 m of water. The Dolly Varden was 395 mm FL and the slimy sculpin were 30 – 80 mm FL.

Appendix B2.–Sample data for Fish Lake, 1996

Fish Lake

Location data:	Site code	DRD070896FishLk
	Location	63.23512; -146.00588
	Elevation	973 m
	Date	July 8, 1996
	Time	12:00
	Vegetation	Mostly tundra, some willow and alder
Weather:	Air temperature C	
	Sky	Overcast, light rain
	Wind	Light breeze
Water:	Water temperature	13.0°C
	Conductivity	ND
	Depth	ND
	Sechhi	ND
	Color	Clear
Outlet:	Width	3.0 m
	Depth	0.5 m

Sampling data:

Gear	Location	Depth	Duration	Catch
Minnow Trap 1	63.23690; -146.00570	0.3 m	23:00	3
Minnow Trap 2	63.23617; -146.00598	0.3 m	23:00	3
Minnow Trap 3	63.23594; -146.00594	0.3 m	23:00	1
Gill Net 1	63.23580; -146.01743	8.0 m	17:00	22
Gill Net 2	63.23291; -146.00459	13.0 m	17:45	8
Gill Net 3	63.22778; -146.00278	13.0 m	17:00	27
Fyke Net 1	63.23594; -146.00565	1.0 m	17:00	24
Fyke Net 2	63.23676; -146.01941	1.0 m	17:00	37

Catch data by species and gear:

Species	Minnow trap	Gill Net	Fyke Net
slimy sculpin	7		27
Arctic grayling		57	31
Dolly Varden			3

APPENDIX C

DATA FILE LISTING

Appendix C1.–Files[a] for fish inventory of the Delta River drainage, 2009.

File Name[a]
Delta River drainage fish inventory files for archive-2009.xls

[a] Data files are archived at and are available from the Alaska Department of Fish and Game, Sport Fish Division, 1300 College Road, Fairbanks, Alaska 99701-1599.