Faro Mine Fish and Fish Habitat Literature Review

Prepared for:

Yukon
Energy Mines and Resources
Assessment and Abandoned Mines Branch
Box 2703, K-419
Whitehorse, Yukon
Y1A 2C6

Prepared by:

EDI Environmental Dynamics Inc.
#3-478 Range Road
Whitehorse, Yukon
Y1A 3A2

EDI Contact:

Meighan Kearns
867-393-4882

EDI Project No:

11-Y-0335
July, 2012

2012 ENVIRONMENTAL EMPLOYER OF THE YEAR

EDI ENVIRONMENTAL DYNAMICS INC.

PRINCE GEORGE • VANCOUVER • NANAIMO • GRANDE PRAIRIE • WHITEHORSE

www.edynamics.com

This page is intentionally blank.

EXECUTIVE SUMMARY

This report provides a summary of the existing fish and fish habitat information for the Faro Mine Complex. Studies have been ongoing since the 1970s. A literature search was conducted and all documents found were reviewed for fish habitat information and fish species distribution. Results were organized spatially (i.e., by watercourse/ watershed).

The Rose Creek watershed included the Rose Creek mainstem (three reaches), the North Fork of Rose Creek (three reaches), the South Fork of Rose Creek (six reaches), and any waterbodies and tributaries with existing information. Notable watershed alterations resulting from mine activities included: the Rose Creek diversion channel, the North Fork diversion channel, Pumphouse Pond, a series of ponds in the North Fork, the former Fresh Water Supply Reservoir and several barriers to fish migration resulting from road crossings. The Vangorda Creek watershed was also physically altered by the Vangorda Plateau development; however, a natural barrier to fish migration exists downstream of the mine site.

Fish species captured in the Rose Creek watershed included Arctic grayling (*Thymallus arcticus*), burbot (*Lota lota*), Chinook salmon (*Oncorhynchus tshawytscha*), slimy sculpin (*Coregonus cognatus*) and round whitefish (*Prosopium cylindraceum*). Arctic grayling and slimy sculpin were the most commonly captured species and are distributed throughout the entire watershed.

Three populations of Arctic grayling are suspected in (1) the upper North Fork upstream of the haul road; (2) the upper South Fork upstream of the haul road; and (3) the Rose Creek mainstem. Each of the three areas provides habitat potential to support all life stage activities (i.e., spawning, rearing, adult feeding and overwintering).

Observations of adult Chinook in the Rose Creek diversion channel indicate it was used for spawning activities in 2003 and 2009; the capture of juvenile Chinook in 2004 upstream and downstream of the diversion channel appears to indicate spawning and incubation was successful. Juvenile Chinook captured in the South Fork (Reach 1) and Rose Creek (reaches 1 and 3) suggest rearing utilization; however, fish may have migrated from downstream spawning/incubation areas (e.g., Anvil Creek or lower Rose Creek).

Fish species captured in lower Vangorda Creek included Arctic grayling, burbot, Chinook salmon, lake chub (*Couesius plumbeus*), longnose sucker (*Catostomus catostomus*), slimy sculpin, and round whitefish. Juvenile Chinook were captured in the highest densities. Information suggests lower Vangorda Creek is utilized for rearing by various species and contains potential overwintering habitat.

AUTHORSHIP

This report was prepared by EDI Environmental Dynamics Inc. (EDI). EDI staff who contributed to this project includes:

Meighan Kearns, B.Sc., R.P.Bio. ..... Primary Author

Pat Tobler, B.Sc., R.P.Bio. ..... Senior Review

Matt Power, A.Sc.T. ..... GIS Mapping

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

The Government of Yukon Assessment and Abandoned Mines (AAM) retained EDI Environmental Dynamics Inc. (EDI) to search and compile fish and fish habitat information relevant to the Faro Mine Complex.

The Faro Mine Complex is one of three Type II abandoned mines in the Yukon under the care of AAM. The mine complex is composed of two mining areas, the Faro Mine and the Vangorda Plateau, north of the Town of Faro (Figure 1). The Faro Mine is situated within the Rose Creek drainage, a tributary to Anvil Creek, which flows into Pelly River. The Vangorda Plateau occurs in the headwaters of Vangorda Creek, a direct tributary to Pelly River.

Production (lead, zinc, silver and gold) began at the Faro Mine in 1969 and continued until 1990. Development of the Vangorda Plateau began in 1988, which was in production from 1990 to 1998. The Faro Mine Complex has been operated under various owners and production was intermittent over the life of the mine. Anvil Range Mining Corporation, the last owner, declared bankruptcy and was placed into receivership in 1998. In 2003, the federal and territorial governments acknowledged that the mine would not reopen and a permanent, long-term closure plan was needed. Since then, planning for remediation of the mine complex has been ongoing.

Since 1970s there have been numerous fish and fish habitat studies completed on the streams within the influence of the Faro Mine Complex. The studies have each had different purposes/scopes and have been completed by several individuals and companies. The combined knowledge represents a significant amount of fish and fish habitat data/knowledge for the site. This report summarizes the combined knowledge base of fish and fish habitat for the Faro Mine Complex.

580000

6920000

6900000

Anvil Creek/Rose Creek Confluence

Faro Mine Complex

Vangorda/Grum Mine Complex

Town of Faro

Robert Campbell Highway

N

Legend

- Settlement/Community
- Robert Campbell Highway
- Secondary Road
- Watercourse
- Waterbody

Overview Map of Project Study Area

Topographic Spatial Data provided by Natural Resources Canada via online source geogratis.cgdi.gc.ca.

Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. was obtained using Garmin GPS technology.

This document is not an official land survey and the spatial data presented is subject to change.

0 2 4 6 8 10

kilometres

Map Scale = 1:130,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Drawn:	Checked:		
MP	MK / PT	FIGURE 1	Date: 7/10/2012

Path: J:\Yukon\Projects\2011\11_Y_0335_YG AAM_Faro Fish\Mapping\Fig1_Project_StudyArea27Mar2012.mxd

2 METHODS

A literature search was conducted to find existing fish and fish habitat information (historical and current) for the watercourses and waterbodies in the project area (Figure 1). Numerous fish and fish habitat studies have been completed for the Faro Mine Complex (Table 1). Resources used to find existing information and documents included the following.

- AAM internal documents;
- Energy, Mines and Resources (EMR) library;
- Fisheries and Oceans Canada (DFO) stream files;
- Yukon Fisheries Information Summary System (FISS) online database; and,
- Faro Mine Remediation Project online library.

Fish sampling data was entered into an Excel spreadsheet and the following information was recorded, where available: sampling site location (UTM coordinate or estimate based on map), date, method, effort, fish species, life stage and number captured. Particularly with historical data, there were inconsistencies with data; details such as sampling location, effort and fish life stage were not always provided or provided in different formats. Previous fish habitat data summaries were noted, as well as fish utilization and other supporting information. Table 1 below lists the documents reviewed.

Table 1. Documents reviewed for existing fish and fish habitat information.

Reference	Fish Habitat Information	Fish Sampling Data	Other Supporting Information (1)
Baker 1979	-	✓	✓
Cornish 1986	-	-	✓
Curragh 1987	✓	✓	✓
Deloitte & Touche 2002	- (2)	- (2)	✓
Deloitte & Touche 2003	- (2)	- (2)	✓
DES 2010	✓	✓	✓
DFO 2003	-	✓	-
DFO 2009	-	✓	-
Gartner Lee 2002	- (2)	- (2)	✓
Gartner Lee 2003	✓	✓	✓
Gartner Lee 2005	✓	✓	✓
Gartner Lee 2006	-	✓	✓
Gartner Lee 2007	-	✓	✓
Gartner Lee 2008	-	✓	✓
Godin and Osler 1985	-	-	✓
Harder 1989	✓	✓	✓

Table continued on next page.

Table 1. Continued

Reference	Fish Habitat Information	Fish Sampling Data	Other Supporting Information (1)
Harder 1990	-	-	✓
Harder 1991	✓	✓	✓
Harder 1992	✓	✓	✓
Harder 1993a	-	-	✓
Harder 1993b	-	✓	✓
Harder and Bustard 1988	✓	✓	✓
Hoos and Holman 1973	-	✓	✓
Laberge 2002	-	-	✓
Laberge et al. 2005	✓	✓	✓
Leverton 1986	-	-	✓
Minnow 2007a	-	-	-
Minnow 2007b	- (2)	- (2)	✓
Minnow 2010	-	-	-
Minnow and White Mountain 2009	✓	✓	✓
MECL 1976a	-	✓	✓
MECL 1976b	-	✓	✓
Robertson 1996	- (2)	- (2)	✓
Weagle 1981a	-	-	✓
Weagle 1981b	-	✓	-
Weagle 1981c	-	✓	-
White Mountain 2004	✓	✓	-
White Mountain 2005a	✓	✓	-
White Mountain 2005b	✓	✓	-
White Mountain 2005c	✓	✓	-
White Mountain 2006a	✓	✓	-
White Mountain 2006b	✓	✓	✓
White Mountain 2008	✓	✓	-
White Mountain 2009	✓	✓	-
White Mountain 2010	-	-	✓

Notes:

(1) Supporting information such as benthic invertebrate or water quality data.

(2) Provides summary of previous fish and fish habitat studies; may include data from sources not otherwise found.

3 RESULTS

An overview of the watershed features is provided for context. Results are further organized using the following spatial areas (Figure 1):

- Anvil Creek – receiving waters for Rose Creek, flows into the Pelly River ~50 km northwest of Faro
- Rose Creek watershed:
  - Rose Creek mainstem
  - North Fork of Rose Creek
  - South Fork of Rose Creek
- Vangorda Creek – flows into the Pelly River near Faro

Each area is discussed in terms of fish habitat, fish species distribution and fish utilization. Only a brief summary of the fish species in Anvil Creek is provided for context as the receiving waters of the Rose Creek watershed. A summary of fish habitat by reach[1] is provided in Table 2, initially compiled by Gartner Lee (2003) and updated with more recent monitoring data from White Mountain (2004, 2005c, 2006a, 2008, 2009). Fish species distributions are summarized in Table 3. Appendix A contains fish capture data compiled from all documents reviewed.

3.1 OVERVIEW OF WATERSHED ALTERATIONS

The following subsections provide an overview of how the mine complex has altered the watersheds.

3.1.1 Anvil Creek / Rose Creek Watershed

The development of the Faro Mine Site and associated tailings impoundments resulted in several stream channel diversions in the Rose Creek watershed (Figure 2), including:

- Rose Creek Diversion;
- North Fork Diversion; and,
- Faro Creek Diversion.

Other physical watershed alterations included the development of Pumphouse Pond and a series of ponds between the North and South Forks. Guardhouse Creek, a small tributary to Rose Creek, was also altered; it flows into the mine site. The development of the Haul Road resulted in the construction of a rock drain in 1987 across the North Fork of Rose Creek, which created a large pond upstream and an impediment to fish migration. A Fresh Water Supply Dam was constructed in the South Fork of Rose Creek but was dewatered in the fall and early winter of 2003; a new channel was constructed through the former reservoir (White Mountain 2005a).

[1] Reach: a length of stream with similar channel morphology.

Table 2. Summary of fish habitat information for the Rose Creek watershed and Vangorda Creek.

Watercourse / Waterbody	Reach	Mean Channel Width (m)	Gradient (%)	Habitat Units [1]	Substrate [2]	Cover	Other Features / Notes
Rose Creek	1	20 - 25	1.5	Riffle (Pool, Run)	gravel (cobble, boulder, fines)	boulders, pools, overhanging vegetation	side channels; flow in winter
	2	15	1	Run (Riffle, Pool)	cobble, gravel (boulder, fines)	20% - pools, cutbanks, boulders, woody debris	side channels; flow in winter
	3	14 - 20	1.5	Run (Riffle, Pool)	gravel, cobble (boulders)	Diversion: 5% - boulders Downstream end: large woody debris, undercut banks and pools	step-pools in the diversion channel may be a barrier to juvenile fish; flow in winter
South Fork	1	4 - 10	1.2	Riffle (Pool, Run)	cobble, boulder (gravel, fines)	pools, boulders, undercut banks, overhanging vegetation	Pumphouse pond is included in this reach
	2	6	0.5	Pool (Run)	fines	undercut banks, pools, deep water	Beaver dams; multiple channels
(after reservoir removal)	3	-	-	-	-	-	-
	4	7	2.2	Riffle (Pool, Run)	boulder (cobble, gravel)	20% - boulders, pools, vegetation, cutbanks	-

Table continued on next page.

Table 2. Continued

Watercourse / Waterbody	Reach	Mean Channel Width (m)	Gradient (%)	Habitat Units [1]	Substrate [2]	Cover	Other Features / Notes
South Fork	5	7	4.3	Riffle (Pool, Run)	boulder	-	-
	6	5	5	Riffle (Run, Pool)	boulder, cobble	20% - boulders, vegetation, cutbanks	Step-pools
North Fork	1	7	1.4	Pool (Run)	boulder (cobble, gravel, fines)	undercut banks, deep pools, boulders, overhanging vegetation	Downstream section - flow goes through either the North Fork diversion channel to the Rose Creek diversion channel or through a series of ponds to the South Fork
	2	10	2	Riffle (Pool, Run)	cobble (gravel, fines)	20% - pools, cutbanks, boulders	-
	3	9	2	Run (Riffle, Pool)	cobble (fines, gravel)	-	-
	4	-	-	ponds	fines	-	Beaver dams/ponds; very low pH (3) recorded in this reach
Vangorda Creek	1	20	1	Riffle (Pool)	gravel (cobble)	-	-
	2	13	2	Riffle	boulder (cobble)	woody debris	-
	3	6 - 13	2.5	Riffle (Pool)	boulder (cobble)	overhanging vegetation, woody debris, boulders	No fish upstream from this reach

Sources: Gartner Lee (2003); Harder (1991); White Mountain (2004, 2005c, 2006a, 2008, 2009)
Notes: - = not recorded; [1] Where the subdominant habitat is in brackets; [2] Where fines <2mm, gravel = 2 - 64mm, cobble = 64-256mm, boulder >256mm; subdominant substrate is in brackets

Table 3. Summary of fish species distribution in the Rose Creek watershed and Vangorda Creek.

Watercourse / Waterbody	Reach	Arctic grayling	burbot	Chinook	longnose sucker	slimy sculpin	lake chub	round whitefish	Method	Source
Rose Creek	1	U, J, A	U	J	-	U, F, A	-	-	AG, EF, MT	White Mountain (2004, 2005c, 2006a, 2008, 2009)
	2	U, A	U	-	-	F	-	-	AG, EF, MT, SN	Baker (1979); Gartner Lee (2003); Harder (1991); Hoos and Holman (1973)
	3	U, J, A	U, A	J, A	-	U, F, A	-	J, A	AG, EF, MT, SN	Baker (1979); Curragh (1987); DFO (2009); Gartner Lee (2003); Harder (1991, 1993); Harder and Bustard (1988); Hoos and Holman (1973); Minnow and White Mountain (2009); MECL (1976a, b); Weagle (1981b, 1981c); White Mountain (2004, 2005c, 2006a, 2008, 2009)
South Fork	Pumphouse Pond	U, A	-	-	-	-	-	-	AG, GN	Harder (1993); Hoos and Holman (1973); Weagle (1981b, 1981c); White Mountain (2005a)
	1	U, F, J, A	A	J	-	U, A	-	A	AG, EF, MT	Baker (1979); Harder (1991); Harder and Bustard (1988); Weagle (1981b); White Mountain (2004, 2005a, 2005c, 2006a, 2008, 2009)
	2	U, J, A	U	-	-	U	-	-	AG, EF, GN	Harder (1991); Weagle (1981b, 1981c); White Mountain (2005a)
(reservoir)	3	U, F, J, A	U	-	-	U	-	-	AG, GN, MT, SN	Gartner Lee (2003); Harder (1991, 1993); Weagle (1981a, 1981b)
(after reservoir removal)	3	J	U	-	-	-	-	-	EF, VO	White Mountain (2005a)
	4	U, J, A	U	-	-	U	-	-	EF	Gartner Lee (2003); Harder (1991); Weagle (1981b); White Mountain (2005a)
	5	U, J	-	-	-	U	-	-	EF, MT	Harder and Bustard (1988); Minnow and White Mountain (2009); Weagle (1981b); White Mountain (2005a)
	6	A	-	-	-	-	-	-	EF	Gartner Lee (2003); Harder and Bustard (1988)
(Dixon Lake)	7	A	-	-	-	-	-	-	AG, VO	Kearns 2012
North Fork	1	U, J, A	-	-	-	U, F, A	-	-	AG, EF, MT, SN, VO	Curragh (1987); Harder (1991); Harder and Bustard (1988); Weagle (1981b); White Mountain (2005b, 2006b)
	2	U	-	-	-	U	-	-	AG, EF, MT, VO	Gartner Lee (2003); Harder (1991, 1993); Minnow and White Mountain (2009); White Mountain (2005b, 2006b)
	3	U, J, A	A	-	-	U	-	A	AG, EF, VO	Gartner Lee (2003); Harder (1991); Harder and Bustard (1988); White Mountain (2005b)
Faro Creek	1	-	-	-	-	-	-	-	AG, MT, SN	Hoos and Holman (1973); Minnow and White Mountain (2009)
Vangorda Creek	1	U, J, A	U	U, F	U	U	-	U	AG, EF, MT, SN, VO	Gartner Lee (2003); Harder (1989, 1992)
	3	U, J, A	U, A	F, J	-	U, A	U	U, A	AG, EF, MT	Harder (1989, 1992); Harder and Bustard (1988); Minnow and White Mountain (2009); White Mountain (2004, 2005c, 2006a, 2008, 2009)
	4	-	-	-	-	-	-	-		Robertson (1996)
	7	-	-	-	-	-	-	-		Robertson (1996)
	8	-	-	-	-	-	-	-	EF, MT	Minnow and White Mountain (2009); MECL (1976a, b)

Notes: U = unspecified life stage; F = fry; J = juvenile; A = adult; - = not captured; AG = angling; EF = electrofishing; GN = gill netting; MT = minnow trapping; SN = seining; VO = visually observed

Fish and Fish Habitat Winter Site Locations, Rose Creek Watershed

Legend

- Stream Reach Breaks
- Road (mine access/haul)
- Contours
- Waterbody (natural/man-made)

0 1,000 2,000 3,000 4,000 5,000

metres

Map Scale = 1:100,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Notes

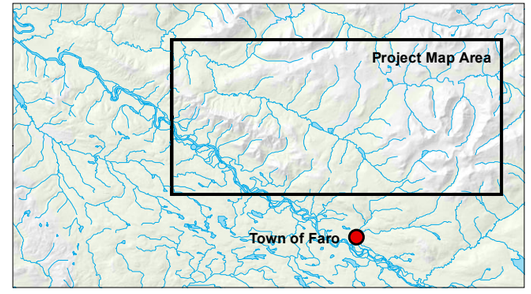
1:250,000 and 1:50,000 Topographic Spatial Data provided by Natural Resources Canada via online source geogratis.cgdi.gc.ca.

Detailed toppgraphic features of the Faro, Grum and Vangorda mine sites was provided by Yukon Government - Energy, Mines and Resources - Assessment and Abandoned Mines Branch (March 2012).

Reach Breaks were based on Gartner Lee (2003). Locations are approximated.

This document is not an official land survey and the spatial data presented is subject to change.

Drawn:	Checked:		
MP	MK/PT	FIGURE 2	Date: 7/10/2012



Path: J:\Yukon\Projects\2011\11_Y_0335_YG AAM_Faro Fish\Mapping\Fig2_RoseCr_Features.mxd

Existing fish barriers documented as a result of the mining activities in the Rose Creek watershed include:

- Haul Road rock drain – North Fork;
- Culvert to pond series – North Fork;
- Haul Road culverts – South Fork;
- Mine access road culvert – South Fork; and,
- Rose Creek Diversion step pools (juvenile fish only).

3.1.2 Vangorda Creek Watershed

Although the Vangorda Creek watershed was also physically altered by the Vangorda Plateau development, a natural barrier to fish migration exists downstream of the mine site. As no fish have been documented upstream of the falls, the focus of fish and fish habitat studies was typically in the lower three reaches of Vangorda Creek. Vangorda Creek fish populations are relevant to the mine site primary related to downstream water quality and possibly water quantity concerns.

3.2 ANVIL CREEK

Fish inhabiting Anvil Creek have the opportunity to migrate into the Rose Creek watershed for seasonal habitat utilization. Seven fish species were documented in Anvil Creek: Arctic grayling, burbot, Chinook, lake chub, longnose sucker, slimy sculpin, and round whitefish (Baker 1979; Harder 1991, 1993; Laberge et al. 2005; White Mountain 2004, 2005c, 2006a, 2008, 2009).

Chinook spawning activity has been documented in the lower reaches of Anvil Creek, downstream from the Rose Creek confluence. Redds were identified in Reach 1 during an aerial surveys in 1989, but not 1990 or 2002 (Gartner Lee 2003). In 2002, a single Chinook carcass and an adult spawner were observed (Gartner Lee 2002).

3.3 ROSE CREEK MAINSTEM

3.3.1 Fish Habitat

The mainstem of Rose Creek is composed of three reaches (Gartner Lee 2003). Fish habitat has been surveyed and summarized in several documents, including Gartner Lee (2003), Harder (1991, 1993), Minnow (2007b), and Robertson (1996). The monitoring program required under the Water Licence adds supplemental habitat information for reaches 1 and 3 (White Mountain 2004, 2005c, 2006a, 2008, 2009). Table 2 provides a compilation of this existing habitat data.

Downstream from mine development, lower Rose Creek (reaches 1 and 2) has maintained its natural meandering channel. Reach 1 was dominated by riffle habitat with gravel substrate (Gartner Lee 2003; White Mountain 2004). Cover for fish was provided by boulders, pools and overhanging vegetation (Harder 1991; White Mountain 2004). Reach 2 was dominated by run habitat with cobble substrate (Gartner Lee 2003). A variety of cover was identified in pools, cutbanks, boulders and woody debris (Gartner Lee 2003; Harder 1991). Side channels were found throughout both reaches (Gartner Lee 2003; Harder 1991). The habitat of lower Rose Creek was rated as moderate for Arctic grayling spawning and overwintering but poor for rearing (Minnow 2007b). Habitat ratings for slimy sculpin varied from poor to moderate for spawning, rearing and overwintering (Minnow 2007b).

Reach 3 includes the natural channel immediately upstream and downstream of the tailings discharge and the Rose Creek diversion channel to the confluences of the North and South Forks at Pumphouse Pond (Gartner Lee 2003). The natural channel in the downstream portion of Reach 3 provides the most diverse habitats in the reach, with a variety of cover types (e.g., large woody debris, undercut banks) and deep water pool habitat suitable for overwintering (White Mountain 2004; Deloitte & Touche 2002). A series of step-pools in the lower portion of the diversion channel provides pool habitat but may also be a barrier to juvenile and small-bodied fish (Gartner Lee 2003; Harder 1991; Harder and Bustard 1988). The remaining upstream portion of the diversion channel is composed of relatively straight, homogenous run habitat dominated by cobble and gravel substrate (Gartner Lee 2003). The habitat of Reach 3 was rated as moderate for spawning, low for rearing and moderate for overwintering Arctic grayling (Gartner Lee 2003).

3.3.2 Fish Distribution

Fish sampling in Rose Creek started in the summer of 1973 with Hoos and Holman (1973); however, no fish were captured. Subsequent sampling resulted in the capture of five fish species: Arctic grayling, burbot, Chinook, slimy sculpin and round whitefish (Baker 1979; Curragh 1987; DFO 2009; Gartner Lee 2003; Harder 1991, 1993; Harder and Bustard 1988; Hoos and Holman 1973; Minnow and White Mountain 2009; MECL 1976a, b; Weagle 1981b, 1981c; White Mountain 2004, 2005c, 2006a, 2008, 2009). A variety of sampling methods were utilized, including angling, electrofishing, minnow trapping and seining. The majority of sampling was conducted in the spring and summer with limited fall sampling; no winter sampling was conducted. A summary of fish distribution by reach is provided in Figures 3 and 4 and Table 3.

Rose Creek Watershed - Arctic grayling and Chinook salmon distribution.

Legend

- Stream Reach Breaks
- Chinook salmon Documented
- Arctic grayling Documented
- Road (mine access/haul)
- Contours
- Waterbody (natural/man-made)

RC-001 Label represents a site reference identification number; unique numbers were generated to accommodate for multi-year/multiple sampling events at each individual sampling location.

0 1,000 2,000 3,000 4,000 5,000
metres

Map Scale = 1:100,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Notes

1:250,000 and 1:50,000 Topographic Spatial Data provided by Natural Resources Canada via online source geogratis.cgdi.gc.ca.

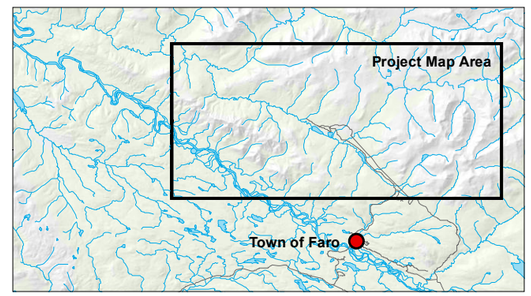
Detailed toppgraphic features of the Faro, Grum and Vangorda mine sites was provided by Yukon Government - Energy, Mines and Resources - Assessment and Abandoned Mines Branch (March 2012).

Fish Sampling points were derived from a collection of historic fish sampling programs (refer to references section in the accompanying report, Faro Mine Fish and Fish Habitat, EDI (2012). EDI assumes no responsibility for thrid party data and cannot ensure the accuracy of the data.

Reach Breaks were based on Gartner Lee (2003). Locations are approximated.

This document is not an official land survey and the spatial data presented is subject to change.

Drawn:	Checked:		
MP	MK/PT	FIGURE 3	Date: 7/10/2012



Path: J:\Yukon\Projects\2011\11_Y_0335_YG AAM_Faro Fish\Mapping\Fig3_RoseCr_CH_GR_Pts.mxd

Rose Creek Watershed - Burbot, round whitefish and slimy sculpin distribution.

Legend

- Stream Reach Breaks (1, 2, 3, 4, 5, 6, 7)
- Round whitefish documented
- Slimy sculpin documented
- Burbot documented
- Road (mine access/haul)
- Contours
- Waterbody (natural/man-made)

RC-001 Label represents a site reference identification number; unique numbers were generated to accommodate for multi-year/multiple sampling events at each individual sampling location.

0 1,000 2,000 3,000 4,000 5,000
metres

Map Scale = 1:100,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Notes

1:250,000 and 1:50,000 Topographic Spatial Data provided by Natural Resources Canada via online source geogratis.cgdi.gc.ca.

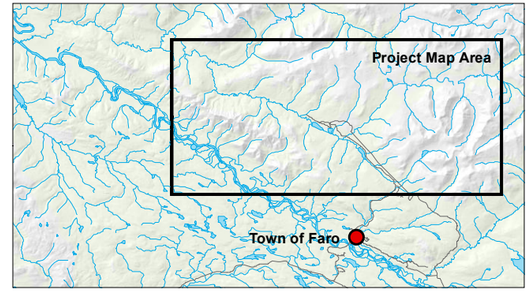
Detailed toppgraphic features of the Faro, Grum and Vangorda mine sites was provided by Yukon Government - Energy, Mines and Resources - Assessment and Abandoned Mines Branch (March 2012).

Fish Sampling points were derived from a collection of historic fish sampling programs (refer to references section in the accompanying report, Faro Mine Fish and Fish Habitat, EDI (2012). EDI assumes no responsibility for third party data and cannot ensure the accuracy of the data.

Reach Breaks were based on Gartner Lee (2003). Locations are approximated.

This document is not an official land survey and the spatial data presented is subject to change.

Drawn:	Checked:	FIGURE 4	Date: 7/10/2012
MP	MK/PT		



Path: J:\Yukon\Projects\2011\11_Y_0335_YG AAM_Faro Fish\Mapping\Fig4_RoseCr_BB_CCG_Pts.mxd

In Reach 1, the most commonly captured species was slimy sculpin, followed by Arctic grayling. Fry and adult life stages of slimy sculpin were documented. Juvenile and adult life stages of Arctic grayling were documented. Additionally, one burbot was captured in August 2007 (White Mountain 2008) and three Chinook fry were captured in August 2004 (White Mountain 2004).

Reach 2 had relatively low densities of fish, which has been noted and discussed in previous studies, including Harder (1991, 1993) and Minnow (2007b). Arctic grayling was the most commonly captured species. Burbot and slimy sculpin were also documented.

Reach 3 had the highest sampling effort, resulting in more fish captures. Similar to lower Rose Creek, the most commonly captured fish was slimy sculpin, followed by Arctic grayling, with fry, juvenile and adult life stages recorded. In addition, White Mountain (2004, 2005c, 2006a, 2009) captured juvenile Chinook at the downstream end of the reach in the natural channel August 2004, 2005, 2006 and 2009. In August 2009, a Chinook carcass was documented in the diversion channel (DFO 2009). Recent sampling has resulted in occasional captures of burbot (White Mountain 2004, 2005c, 2006a, 2009) and there were historic accounts of round whitefish (Harder 1991; Harder and Bustard 1988)

3.3.3 Fish Utilization

The documentation of juvenile and adult Arctic grayling indicates Rose Creek is utilized for rearing and feeding. Arctic grayling fry were observed in the tailings discharge channel (Cornish 1986). Both Harder and Bustard (1988) and Weagle (1981) captured very ripe and recently spent Arctic grayling throughout Rose Creek, including the diversion channel. Moderate to high quality Arctic grayling spawning habitat has been identified in the lower reaches as well as the upper end of the diversion channel (Deloitte & Touche 2002; Gartner Lee 2002, 2003). Although Arctic grayling spawning activity was not directly observed, the information supports that Rose Creek is used as such.

White Mountain (2005c) noted that mine personnel observed an adult salmon downstream from the tailings discharge channel (Reach 2), indicating Chinook may spawn in the lower reaches. DFO (2003, 2009) have received several reports of adult Chinook observations in the diversion channel upstream from the step-pools during spawning season and confirmed the presence of one carcass in August 2009. Local knowledge indicates Chinook may have used the Rose Creek drainage prior to mine development (DFO 2003). The presence of Chinook fry in the lower end of reaches 1 and 3 confirm Rose Creek was used for rearing activities; the origin of these fish, however, is unknown.

The documentation of fry and adult slimy sculpin, in combination with their small home range, indicates this species uses the lower reaches for all life stage activities (i.e., spawning, rearing and overwintering). Although catch rates were low, the occurrence of burbot and round whitefish suggest at a minimum, these species rear in Rose Creek.

3.4 SOUTH FORK OF ROSE CREEK

3.4.1 Fish Habitat

The South Fork of Rose Creek includes six mainstem stream reaches, Pumphouse Pond at the confluence of Rose Creek and Dixon Lake in the headwaters (Gartner Lee 2003). Fish habitat has been surveyed and summarized in several documents, including Deloitte and Touche (2002), Gartner Lee (2003), Harder (1991, 1993), Minnow (2007b), and Robertson (1996). A monitoring site established in Reach 1 adds more recent habitat information (White Mountain 2004, 2005c, 2006a, 2008, 2009). Table 2 provides a compilation of this existing habitat data.

Reach 1 includes Pumphouse Pond, which provides deep water habitat. The remaining stream reach was primarily riffle habitat with pools and runs (Gartner Lee 2003; White Mountain 2004). Substrate was dominated by cobble and boulders (Gartner Lee 2003; White Mountain 2004). A variety of cover for fish was identified in pools, undercut banks, overhanging vegetation and boulders (Harder 1991; White Mountain 2004). This reach was rated as providing moderate spawning and high rearing and overwintering habitat for Arctic grayling (Gartner Lee 2003). The habitat at the monitoring site was rated as poor for Chinook, but this appears to be based on low densities observed (Minnow 2007b). Habitat at the monitoring site was rated as excellent for all life stages of slimy sculpin (Minnow 2007b).

Reach 2 extends upstream to the former Fresh Water Supply Dam. This reach is described as meandering, with side channels created by beaver dams (Gartner Lee 2003). The habitat was dominated by pools and runs with fine substrate (Gartner Lee 2003; Harder 1991). Undercut banks and deep pools and runs provided cover for fish (Harder 1991). High rearing and overwintering habitat ratings for Arctic grayling were based on the prevalence of deep water habitat; the dominance of fine substrate resulted in a low spawning habitat rating (Gartner Lee 2003).

Reach 3 is the former Fresh Water Supply Reservoir, which historically provided important rearing, feeding and overwintering habitat for Arctic grayling (Gartner Lee 2003). The reservoir outlet structure served as a barrier to upstream migration; therefore, during the life of the reservoir, this fish community was restricted to reaches 3 and 4 of the South Fork. Since the decommissioning of the reservoir, White Mountain (2005a) examined the reach for bank stability and erosion but detailed habitat surveys were not conducted. The barrier to fish passage no longer exists.

Reach 4 extends to the road crossing, where a hanging culvert prevents upstream migration. The surveyed habitat was composed primarily of riffles with cobble and boulder substrate (Gartner Lee 2003). Beaver dams were noted in the upper end of the reach (Gartner Lee 2003). Cover for fish was identified in boulders, occasional pools, vegetation and cutbanks (Gartner Lee 2003; Harder 1991). Habitat was rated as moderate for all life stages of Arctic grayling (Gartner Lee 2003).

Reaches 5 and 6 are much steeper than the previous reaches, with average gradients of 4.3% and 5%, respectively (Gartner Lee 2003). Both reaches are predominantly riffle habitat with coarse substrate (Gartner

Lee 2003; Harder 1991). Pools and runs were noted in both reaches (Gartner Lee 2003). Three barriers to upstream migration were identified in Reach 5: the mine access road crossing, the haul road crossing, and a steep cascade (greater than 20% gradient) (Gartner Lee 2003). Habitat in Reach 5 was rated as low for Arctic grayling spawning, rearing and overwintering and moderate for summer feeding (Gartner Lee 2003). In Reach 6, the habitat was rated as moderate for spawning and low for rearing, feeding and overwintering (Gartner Lee 2003).

Dixon Lake was described as a shallow basin with low spawning, high rearing, moderate feeding and moderate overwintering habitat potential for Arctic grayling (Gartner Lee 2003).

3.4.2 Fish Distribution

Historical and current fish sampling data was available and is summarized in Figures 3 and 4 and Table 3. A total of five fish species was recorded in the South Fork: Arctic grayling, burbot, chinook, slimy sculpin and round whitefish.

Pumphouse Pond was sampled via angling and gillnetting, targeting and resulting in the capture of numerous adult Arctic grayling (Harder 1993; Hoos and Holman 1973; Weagle 1981b, 1981c; White Mountain 2005a). No other species were recorded in Pumphouse Pond.

Reach 1, upstream from Pumphouse Pond, has the highest diversity of fish species captured, with all five species recorded. Historic sampling in Reach 1 started in the 1970s with Baker (1979) and had additional occurrences in the late 1980s /early 90s (Harder 1991; Harder and Bustard 1988; Weagle 1981b); more recent sampling was due to the establishment of monitoring site R1 (White Mountain 2004, 2005a, 2005c, 2006a, 2008, 2009). Arctic grayling and slimy sculpin were the most commonly captured species. All life stages of Arctic grayling were recorded. Burbot were only recently captured by White Mountain (2004, 2005a) and only sub-adult and adult life stages. Four chinook fry and one adult round whitefish were captured in 2004, marking the first occurrence of these species in the South Fork (White Mountain 2004).

Three fish species have been documented in Reach 2, Arctic grayling, burbot and slimy sculpin (Harder 1991; Weagle 1981b, 1981c; White Mountain 2005a); however, sampling effort was substantially less. Methods used include angling, electrofishing and gillnetting. Similar to Reach 1, the most commonly capture fish were Arctic grayling and slimy sculpin. Both juvenile and adult life stages of Arctic grayling were recorded. Only one sampling event captured burbot (Harder 1991).

When Reach 3 was a reservoir, Arctic grayling, burbot and slimy sculpin were recorded (Gartner Lee 2003; Harder 1991, 1993; Weagle 1981, b). Since then, White Mountain (2005a) electrofished the channel and captured one burbot and observed 12 juvenile Arctic grayling.

Reach 4 has been sampled by Gartner Lee (2003), Harder (1991), Weagle (1981b) and White Mountain (2005a) via electrofishing, resulting in the documentation of Arctic grayling, burbot and slimy sculpin. Arctic grayling was most commonly captured; both juveniles and adults were recorded. Slimy sculpin were less common and only one burbot was recorded by Harder (1991).

Sampling effort in Reach 5 was marginal and observed fish densities were relatively low. Harder and Bustard (1988), Minnow and White Mountain (2009), Weagle (1981b) and White Mountain (2005a) sampled via electrofishing and minnow trapping, resulting in the capture of six Arctic grayling and five slimy sculpin upstream from the road barriers. Weagle (1981b) and White Mountain (2005a) did not capture any fish.

In August 2002, Reach 6 was sampled by Gartner Lee (2003) via electrofishing; no fish were captured. No other record of sampling was found; however, Arctic grayling were visually observed at the outlet of Dixon Lake (Harder and Bustard 1988).

3.4.3 Fish Utilization

All life stages of Arctic grayling were captured in the lower four reaches of the South Fork, indicating this section is used for rearing and feeding activities. Arctic grayling were observed spawning at Pumphouse Pond and other spawning evidence was noted at the inlet to Pumphouse Pond (White Mountain 2005a). The presence of potential overwintering habitat and the knowledge that fish previously overwintered in the reservoir suggests Arctic grayling may still overwinter in the South Fork, leading to the conclusion that the lower South Fork may be utilized year-round.

Arctic grayling were visually observed spawning at the outlet of Dixon Lake (Harder and Bustard 1988) and documented overwintering in the lake in 2012 (Kearns 2012, pers. comm.). As the upper reaches of the South Fork are isolated from upstream migration and both Arctic grayling and slimy sculpin were captured upstream of the road barriers, it is assumed that resident populations of Arctic grayling and slimy sculpin reside in the upper South Fork.

Based on the small home range and non-migratory nature of slimy sculpin (Cunjak et al. 2005; Gray et al. 2004), their presence indicates they use the lower reaches for all life stage activities (i.e., spawning, rearing and overwintering). The documentation of burbot (Harder 1991; White Mountain 2004, 2005a, c), Chinook fry (White Mountain 2004) and one adult round whitefish (White Mountain 2004) suggest that these species likely use the lower South Fork for rearing and feeding activities and possibly overwintering.

3.5 NORTH FORK OF ROSE CREEK

3.5.1 Fish Habitat

The North Fork of Rose Creek includes three mainstem reaches (Gartner Lee 2003). Fish habitat has been surveyed and summarized in documents by Deloitte and Touche (2002), Gartner Lee (2003), Harder (1991, 1993), Minnow (2007b), Robertson (1996), and White Mountain (2005b). There is no regularly monitored site in the North Fork. Existing habitat information is summarized in Table 2.

Reach 1 contains two channels at its downstream end: 1) the North Fork diversion channel, from just below Pumphouse Pond, upstream to the mine access road, and 2) a series of ponds constructed in the natural channel that flow into Reach 1 of the South Fork. The diversion channel is primarily shallow riffle habitat with cobble/gravel substrate (Harder 1991). The culvert at the upstream end of the ponds was determined

to be a barrier to upstream fish migration (Gartner Lee 2003). Habitat assessed upstream from the mine access road to the Haul Road was rated as moderate for all life stages of Arctic grayling (Gartner Lee 2003). Cover was identified in undercut banks, deep pools, boulders and overhanging vegetation (Harder 1991).

The Haul Road rock drain marks the upstream end of Reach 1 and is thought to be a barrier to fish migration in either direction (Gartner Lee 2003; Harder 1991). The rock drain was examined in the winter season by White Mountain (2006b). It was determined that the area on both sides of the rock drain provided suitable overwintering habitat; however, bottom ice was prevalent and ice free substrate was limited (White Mountain 2006b).

Reach 2 contains a diverse array of habitat types (Gartner Lee 2003). The downstream end of the reach is an impoundment, created by the construction of the Haul Road rock drain. The natural channel was primarily riffle habitat over cobble substrate (Gartner Lee 2003). Pool and run habitat with gravels and fines were also present (Gartner Lee 2003). Cover for fish was identified in pools, cutbanks and boulders (Gartner Lee 2003). Habitat for Arctic grayling was rated as low to moderate for overwintering, moderate for spawning and summer feeding, and moderate to excellent for rearing (Gartner Lee 2003; Minnow 2007b). Habitat for slimy sculpin was rated as moderate for all life stages (Minnow 2007b).

Reach 3 was dominated by run habitat with cobble substrate (Gartner Lee 2003). Beaver activity created numerous side channels and ponds throughout the reach (Gartner Lee 2003; Harder 1991). Rearing, summer feeding and overwintering habitats were rated as moderate for Arctic grayling (Gartner Lee 2003). Spawning habitat was rated as high for Arctic grayling (Gartner Lee 2003).

Reach 4 was found to contain very low pH and low dissolved oxygen (Gartner Lee 2003). The reach was described as mostly pond habitat with fine substrate (Gartner Lee 2003). Spawning, rearing, summer feeding and overwintering habitats were all rated as low due to the unsuitable pH and low dissolved oxygen conditions noted (Gartner Lee 2003).

A North Fork tributary stream with a headwater lake was investigated by Leverton and Associates (1986), Harder (1988) and White Mountain (2005b). The stream enters North Fork in Reach 3 just downstream from an old exploration road bridge. No fish were found in the lake and the stream was determined to be too steep for fish passage (Leverton and Associates 1986; Harder 1988; White Mountain 2005b).

Faro Creek, a former tributary to Rose Creek, was diverted around the mine site into Reach 2 of the North Fork. The morphology of this stream was described as low flow, step-pool with a stream gradient greater than 10% (Gartner Lee 2003). Habitat for Arctic grayling was considered low quality (Gartner Lee 2003).

3.5.2 Fish Distribution

Available fish sampling data is summarized in Figures 3 and 4 and Table 3. A total of four fish species have been recorded in the North Fork: Arctic grayling, burbot, slimy sculpin and round whitefish.

Reach 1 was sampled by Curragh (1987), Harder (1991), Harder and Bustard (1988), Weagle (1981b), and White Mountain (2005b, 2006b), resulting in the capture of two species: Arctic grayling and slimy sculpin. Sampling methods included angling, electrofishing, gill netting, minnow trapping and beach seining. Both species were relatively abundant and equally common. Juvenile and adult life stages of Arctic grayling and fry and adult life stages of slimy sculpin were documented.

Similarly, Arctic grayling and slimy sculpin were the only fish species captured in Reach 2; however, the number of fish captured was low. Angling, electrofishing and minnow trapping was conducted by Gartner Lee (2003), Harder (1991, 1993), Minnow and White Mountain (2009), and White Mountain (2005b, 2006b). White Mountain (2006b) conducted the only winter sampling in the study area, at the rock drain in March 2006.

Reach 3 contained the highest diversity of fish species, which included Arctic grayling, burbot, slimy sculpin and round whitefish. Angling and electrofishing was conducted by Gartner Lee (2003), Harder (1991), Harder and Bustard (1988), and White Mountain (2005b). The most common fish species captured were Arctic grayling and slimy sculpin. One adult burbot and one adult round whitefish were the only occurrences of these two species in the North Fork (White Mountain 2005b).

Faro Creek was sampled by Hoos and Holman (1973) and Minnow and White Mountain (2009) but no fish were captured.

3.5.3 Fish Utilization

Ripe and spent Arctic grayling were captured in the upper end of Reach 1 at the rock drain in 1988 (Harder and Bustard 1988), suggesting spawning took place in the lower reaches of the North Fork. These fish may have been migrating further upstream to spawn, but were impeded by the rock drain constructed in 1987. The presence of juvenile and adult life stages of Arctic grayling in Reach 1 infer that the lower North Fork is utilized for rearing and adult feeding activities.

Arctic grayling in the upper reaches of the North Fork are thought to be a resident population, carrying out all life stage activities upstream from the rock drain; fish have been captured as recently as 2005 (White Mountain 2005b).

Based on the small home range of slimy sculpin, their presence indicates they use both the lower and upper reaches for all life stage activities (i.e., spawning, rearing and overwintering). Slimy sculpin were observed overwintering in the ponded area upstream from the rock drain (White Mountain 2006b).

The documentation of one burbot and one round whitefish suggests that the rock drain may not be a complete barrier to fish movement. White Mountain (2005b) discussed the possibility of fish passage through the rock drain, particularly for smaller species and early life stages.

3.6 VANGORDA CREEK

3.6.1 Fish Habitat

Vangorda Creek is composed of eight reaches; however, only the lower three reaches are fish bearing. The Town of Faro access road culvert at the upstream end of Reach 3 and a vertical waterfall in Reach 4 were identified as upstream migration barriers (Gartner Lee 2003). Fish habitat in Vangorda Creek has been surveyed and summarized in documents by Gartner Lee (2003), Harder (1989), Harder and Bustard (1988), Minnow (2007b), Minnow and White Mountain (2009), and White Mountain (2004, 2005c, 2006a, 2008, 2009). Habitat information is summarized in Table 2.

The lower three reaches provided important rearing habitat for all fish species present and some overwintering habitat for Arctic grayling (Robertson 1996). The confluence of Vangorda Creek connects to the Pelly River at a side channel (Harder 1989). Reach 1 was dominated by riffle-pool morphology with gravel/cobble substrate (Gartner Lee 2003; Harder 1989). Side channel habitat was common throughout this short reach (Harder 1989). Arctic grayling spawning habitat was rated as moderate; whereas, rearing, summer feeding and overwintering habitat was rated as low (Gartner Lee 2003).

Reach 2 was primarily riffle habitat with cobble/boulder substrate (Harder 1989; Gartner Lee 2003). This reach had relatively little side channel or pool habitat (Harder 1989). Arctic grayling habitat was rated as low for spawning and moderate for rearing, summer feeding and overwintering (Gartner Lee 2003).

Reach 3 was dominated by riffle habitat with cobble substrate (Gartner Lee 2003). More pool habitat was documented in Reach 3 compared to the lower reaches (Harder 1989). White Mountain (2004) describes the morphology at the monitoring site in Reach 3 as gently meandering with small islands and limited instream braiding. Arctic grayling habitat was rated as low for spawning and moderate for rearing, summer feeding and overwintering (Gartner Lee 2003). The habitat at the monitoring site was rated as poor for spawning and overwintering and moderate for rearing Arctic grayling (Minnow 2007b). Minnow (2007b) rated the same site as poor for spawning, excellent for rearing and moderate for overwintering Chinook. For slimy sculpin, Minnow (2007 b) rated the habitat as moderate for all life stages.

3.6.2 Fish Distribution

Fish sampling data is summarized in Figures 5 and 6 and Table 3. Seven fish species were documented in Vangorda Creek: Arctic grayling, burbot, Chinook, lake chub, longnose sucker, slimy sculpin, and round whitefish.

580000

590000

6900000

N

Upstream Barrier
Vangorda Falls

Reach 4

Vangorda Creek

Reach 3

VC-003

VC-005

VC-004

VC-002

Town of Faro

Reach 2

VC-001

VC-006

Reach 1

PELLY RIVER

Reach 2

Rose Creek South Fork

Reach 8

Reach 7

Reach 6

Reach 5

Vangorda Creek

Upstream Barrier
Vangorda Falls

Reach 4

Reach 3

Town of Faro

Reach 2

Reach 1

PELLY RIVER

Vangorda Creek Watershed - Arctic grayling and Chinook salmon distribution.

Legend

- Upstream Barrier- Vangorda Falls
- Stream Reach Breaks
- Arctic grayling documented
- Chinook salmon documented
- Road (mine/access/haul)
- Contours
- Waterbody (natural/man-made)

RC-001 Label represents a site reference identification number; unique numbers were generated to accommodate for multi-year/multiple sampling events at each individual sampling location.

0 1,000 2,000 3,000

metres

Map Scale = 1:100,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Notes

1:250,000 and 1:50,000 Topographic Spatial Data provided by Natural Resources Canada via online source geogratis.cgdi.gc.ca.

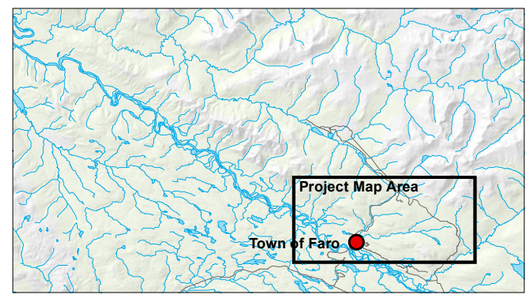
Detailed toppgraphic features of the Faro, Grum and Vangorda mine sites was provided by Yukon Government - Energy, Mines and Resources - Assessment and Abandoned Mines Branch (March 2012).

Fish Sampling points were derived from a collection of historic fish sampling programs (refer to references section in the accompanying report, Faro Mine Fish and Fish Habitat, EDI (2012). EDI assumes no responsibility for thrid party data and cannot ensure the accuracy of the data.

Reach Breaks were based on Gartner Lee (2003). Locations are approximated.

This document is not an official land survey and the spatial data presented is subject to change.

Drawn:	Checked:	FIGURE 5	Date: 7/30/2012
MP	MK/PT		



Yukon EDI

Path: J:\Yukon\Projects\2011\11_Y_0335_YG AAM_Faro Fish\Mapping\Fig5_VangordaCr_CH_GR_Pts.mxd

580000

590000

6900000

N

Upstream Barrier
Vangorda Falls

Reach 4

Vangorda Creek

Reach 3

VC-003

VC-005

VC-004

VC-002

Town of Faro

Reach 2

VC-001

VC-006

Reach 1

PELLY RIVER

Burbot, slimy sculpin, round whitefish and longnose sucker

Slimy sculpin, round whitefish and lake chub

Reach 2

Rose Creek South Fork

Reach 8

Reach 7

Reach 6

Reach 5

Vangorda Creek

Upstream Barrier
Vangorda Falls

Reach 4

Reach 3

Town of Faro

Reach 2

Reach 1

PELLY RIVER

Vangorda Creek Watershed - burbot, slimysculpin, round whitefish, longnose sucker and lake chub distribution.

Legend

- Upstream Barrier- Vangorda Falls
- Stream Reach Breaks
- Round whitefish documented
- Longnose sucker documented
- Lake chub documented
- Slimy sculpin documented
- Burbot documented
- Road (mine/access/haul)
- Contours
- Waterbody (natural/man-made)

RC-001 Label represents a site reference identification number; unique numbers were generated to accommodate for multi-year/multiple sampling events at each individual sampling location.

0 1,000 2,000 3,000

metres

Map Scale = 1:100,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Notes

1:250,000 and 1:50,000 Topographic Spatial Data provided by Natural Resources Canada via online source geogratis.cgdi.gc.ca.

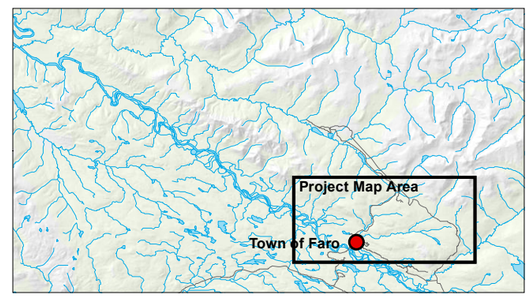
Detailed toppgraphic features of the Faro, Grum and Vangorda mine sites was provided by Yukon Government - Energy, Mines and Resources - Assessment and Abandoned Mines Branch (March 2012).

Fish Sampling points were derived from a collection of historic fish sampling programs (refer to references section in the accompanying report, Faro Mine Fish and Fish Habitat, EDI (2012). EDI assumes no responsibility for thrid party data and cannot ensure the accuracy of the data.

Reach Breaks were based on Gartner Lee (2003). Locations are approximated.

This document is not an official land survey and the spatial data presented is subject to change.

Drawn:	Checked:		
MP	MK/PT	FIGURE 6	Date: 7/30/2012



Yukon EDI

Path: J:\Yukon\Projects\2011\11_Y_0335_YG AAM_Faro Fish\Mapping\Fig6_VangordaCr_BB_LSU_CCG_Pts.mxd

Six fish species were captured in Reach 1: Arctic grayling, burbot, Chinook (juvenile), longnose sucker, slimy sculpin, and round whitefish (Gartner Lee 2003; Harder 1989, 1992). The highest densities of fish captured were Chinook fry, followed by slimy sculpin. Only one occurrence of longnose sucker was recorded (Harder 1992).

No fish sampling data was available for Reach 2 but it is assumed the fish species captured in Reach 1 and 3 may utilize this reach as well.

Six fish species were captured in Reach 3: Arctic grayling, burbot, Chinook, lake chub, slimy sculpin, and round whitefish (Harder 1989, 1992; Harder and Bustard 1988; Minnow and White Mountain 2009; White Mountain 2004, 2005c, 2006a, 2008, 2009). The highest densities of fish captured were Chinook fry, followed by Arctic grayling and slimy sculpin. Occurrences of burbot, lake chub and round whitefish were relatively rare.

Historically, no fish have been captured upstream of the falls (MECL 1976a, b; Robertson 1996). More recently, Minnow and White Mountain (2009) sampled one site in Reach 8; no fish were captured.

3.6.3 Fish Utilization

Based on the presence of both juvenile and adult Arctic grayling, Vangorda Creek was, at a minimum, used for rearing and adult feeding activities. Harder (1989) captured Arctic grayling in the fall season and concluded that these fish likely overwinter in Vangorda Creek.

Lower Vangorda Creek was evidently utilized by Chinook for rearing activities. Harder (1989) suggested that decreased catch rates in the fall may indicate Chinook fry rear in Vangorda Creek in the summer and then move into the Pelly River to overwinter. However, suitable overwintering habitat was noted (Gartner Lee 2003; Minnow 2007b; Robertson 1996). No adult Chinook have been captured or reported in Vangorda Creek; spawning was not suspected in Vangorda Creek (Harder 1989).

Based on the small home range of slimy sculpin, their presence indicates they use Vangorda Creek for all life stage activities (i.e., spawning, rearing and overwintering).

The occasional records of burbot, lake chub, longnose sucker and round whitefish suggest these species are likely seasonal users of lower Vangorda Creek.

4 DISCUSSION

The following key points were discovered during the review of existing literature.

- No fish and fish habitat studies were conducted prior to mine development.
- Although a variety of sampling has been conducted in the study area since the 1970's, the majority was conducted in the summer season and there was almost no winter sampling.
- Arctic grayling and slimy sculpin were the most commonly captured fish species in the Rose Creek watershed; whereas, Chinook were more common in Vangorda Creek.
- Drainage alterations in the Rose Creek watershed, such as diversion channels and constructed ponds, are utilized by fish.
- There is information to suggest Chinook have at least occasionally used the Rose Creek diversion channel for spawning activities. This includes the observation of adult Chinook during spawning season in 2003 and 2009 (DFO 2003 and 2009). Additionally, juvenile Chinook were captured upstream of the diversion channel in the South Fork in 2004, suggesting spawning and incubation was successful. Juvenile Chinook were also captured immediately downstream of the diversion channel in 2004, 2005, 2006 and 2009 (White Mountain 2004, 2005c, 2006a, 2009) the origin of these fish, however, is unknown.
- Three separate populations of Arctic grayling are suspected in the Rose Creek watershed due to fish migration impediments. The following three areas have habitat required to sustain resident populations:
  - Upper North Fork (upstream from the Haul Road) – possible resident population;
  - Upper South Fork (upstream from the Haul Road) – resident population;
  - Rose Creek – possible resident population or seasonal usage from Anvil Creek.
- The rock drain may not be a complete barrier to fish movement, as previously thought (White Mountain 2005b).
- Vangorda Creek is non-fish bearing in the upper reaches in the vicinity of the mine site; however, the lower reaches provide important habitat for several species, including Arctic grayling and Chinook.

5 REFERENCES

5.1 LITERATURE

Baker, S.A. 1979. Environmental Quality of Rose Creek as Affected by Cyprus Anvil Mining Corporation Ltd. Environmental Protection Service, Environmental Protection Branch, Pacific Region. Regional Program Report No. 79-25.

Cornish, N.G. 1986. Water Licence Y1N85-07LE 1985 Annual Report. Prepared for Curragh Resources Cyprus Anvil Mining Corporation.

Cunjak, R.A., J.M. Roussel, M.A. Gray, J.P. Dietrich, D.F. Cartwright, K.R. Munkittrick and T.D. Jardine. 2005. Using stable isotope analysis with telemetry or mark-recapture data to identify fish movement and foraging. Oecologia (2005) 144: 636–646.

Curragh Resources Inc. 1987. Water License Y-IN85-05AL 1987 Annual Report.

Deloitte & Touche Inc. 2002. Environmental Assessment of the Lowering of the Fresh Water Supply Dam Project. Prepared by Deloitte & Touche Inc. as Interim Receiver of Anvil Range Mining Corporation, with assistance of Gartner Lee Ltd. and SRK Consulting Engineers.

Deloitte & Touche Inc. 2003. Anvil Range Mining Complex 2004 to 2008 Water Licence Renewal – Environmental Assessment Report. Volume 2 of 3 – Description of the Existing Environment. Submitted by Deloitte & Touche Inc., in association with Gartner Lee Ltd.

DFO (Fisheries and Oceans Canada). 2003. Chinook salmon in Rose Creek – report and investigation. Stream File Memo prepared by Al von Finster, August 31, 2003.

DFO. 2009. Chinook spawning – Rose Creek diversion channel. Stream File Memo prepared by Jody Mackenzie-Grieve, August 27, 2009.

DES (Denison Environmental Services). 2010. Faro Mine Complex Annual Environmental Monitoring and Activity Report. March 2010.

Gartner Lee (Gartner Lee Ltd.). 2002. Anvil Range Mine Complex 2002 Baseline Environmental Information. Volume 2. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation.

Gartner Lee. 2003. Fisheries and Aquatic Studies at the Anvil Range Mine Complex in 2002 – Technical Memorandum. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation.

Gartner Lee. 2005. Anvil Range Mining Complex 2004 Annual Environmental Report Water Licence QZ03-059. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation. February 2005.

Gartner Lee. 2006. Anvil Range Mining Complex 2005 Annual Environmental Report Water Licence QZ03-059. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation. February 2006.

Gartner Lee. 2007. Anvil Range Mining Complex 2006 Annual Environmental Report Water Licence QZ03-059. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation. February 2007.

Gartner Lee. 2008. Anvil Range Mining Complex 2007 Annual Environmental Report Water Licence QZ03-059. Prepared for Deloitte & Touche Inc. In association with Gomm Environmental Engineering Consulting. February 2008.

Godin, B. and T. Olser. 1985. Environmental Quality of Rose Creek as Affected by Discharges from the Cyprus Anvil Mine, Yukon Territory (1983). Environment Canada, Environmental Protection Service, Pacific Region, Yukon Branch. Regional Program Report No. 85-12.

Gray, M.A., R.A. Cunjak, and K.R. Munkittrick. 2004. Site fidelity of slimy sculpin: insights from stable isotope analysis. Can J Fish Aquatic Sci 61:1717–1722.

Harder (P.A. Harder and Associates Ltd.). 1989. Impact Assessment of Fish Resources in Vangorda Creek. Prepared for Curragh Resources Inc.

Harder. 1990. Impact Assessment of Fish Resources in Vangorda Creek Addendum: "Further Discussion and Recommendations". Prepared for Curragh Resources Inc.

Harder. 1992. Aquatic Studies on Vangorda Creek – 1990 Data Report. Prepared for Curragh Resources Inc. Prepared by P.A. Harder and Associates and Limnotek Research and Development Corporation. January 1992.

Harder. 1993. Environmental Assessment of Rose and Anvil Creeks – 1992 Study. Prepared for Curragh Inc.

Harder and Bustard (D. Bustard and Associates). 1988. Rose Creek Fisheries Study Interim Report No. 2. Prepared for Curragh Resources Inc.

Harder and Bustard . 1991. Overview Assessment of Fish Resources in Anvil and Rose Creeks. Prepared for Curragh Resources Inc.

Hoos, R.A.W. and W.N. Holman. 1973. A Preliminary Assessment of the Effects of Anvil Mine on the Environmental Quality of Rose Creek, Yukon. Report No. EPS 5-PR-73-8. Pollution Abatement Branch, Environmental Protection Service, Pacific Region.

Laberge (Laberge Environmental Services). 2002. Biological Monitoring Program at Rose and Anvil Creeks, Faro, YT, 2002. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation.

Laberge, Access Consulting Group and White Mountain Environmental Consulting. 2005. Pelly River Aquatic Effects Assessment – 2004. Prepared for Selkirk First Nation.

Leverton and Associates. 1986. Biological Monitoring Program: Curragh Minesite. Prepared for Curragh Resources Ltd.

MECL (Montreal Engineering Company, Ltd.). 1976a. 1975 Biophysical and Socio-Economic Program. Prepared for Kerr-AEX Grum Joint Venture. January 1976.

MECL. 1976b. Preliminary Engineering and Environmental Investigation of the Proposed Kerr-AEX Grum Joint Venture. Prepared for Kerr-AEX Grum Joint Venture. January 1976.

Minnow (Minnow Environmental Inc.). 2007a. Aquatic Ecosystem Monitoring Program, Faro Mine, Yukon. Prepared for Assessment and Abandoned Mines, Yukon Government.

Minnow. 2007b. Ecological Impact Assessment, Faro Mine, Yukon. Prepared for Faro Mine Closure Office. May 2007.

Minnow. 2010. Aquatic Ecosystem Monitoring Program, Faro Mine, Yukon (Updated 2010). Prepared for Assessment and Abandoned Mines, Yukon Government.

Minnow and White Mountain Environmental Consulting (White Mountain). 2009. Faro Mine Slimy Sculpin Reconnaissance Survey, May 2008. Prepared for Assessment and Abandoned Mines, Yukon Government.

Robertson Geoconsultants Inc. 1996. Anvil Range Mining Complex – Integrated Comprehensive Abandonment Plan. Volume 1 of 3 (Background). Prepared for Anvil Range Mining Corporation. November 1996.

Weagle, K. 1981a. An Examination of the Impact of the Discharges from Cyprus Anvil Mine on the Aquatic Environmental Quality of Rose Creek, Yukon Territory (1977 and 1978). Regional Program Report: 81-25. Department of Environment, Environmental Protection Service, Pacific Region, Yukon Branch.

Weagle, K. 1981b. Draft Report: The Impact of the Scheme 2 Abandonment Plan on the Grayling Population of Rose Creek. Prepared for Cyprus Anvil Mining Corp. Prepared by Ken Weagle Environmental Consultant Ltd.

Weagle, K. 1981c. The Surveillance and Transportation of Fish During the Completion of the Diversion Canal at Cyprus Anvil Mine, Faro, YT, May 4 to May 15, 1981. Prepared for Cyprus Anvil Mining Corp. Prepared by Ken Weagle Environmental Consultant Ltd.

White Mountain (White Mountain Environmental Consulting). 2004. Aquatic Life Sampling and Testing Program for the Anvil Range Mine Site, Rose and Vangorda Creeks Watersheds, Faro, Yukon to Meet the Requirements of Water Licence QZ03-059. Prepared for Deloitte & Touche Inc. October 2004.

White Mountain. 2005a. Fish Habitat and Fish Utilization Assessments within the De-watered Fresh Water Supply Reservoir, Anvil Range Mine Site, Faro, Yukon.

White Mountain. 2005b. An Assessment of Fish Habitat and Fish Utilization within North Fork, Rose Creek, Anvil Range Mine Site, Faro, Yukon. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation.

White Mountain. 2005c. 2005 Aquatic Life Sampling and Testing Program for the Anvil Range Mine Site, Rose and Vangorda Creek Watersheds, Faro, Yukon to Meet the Requirements of Water License QZ03-059. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation. December 2005.

White Mountain. 2006a. 2006 Aquatic Life Sampling and Testing Program for the Anvil Range Mine Site, Rose and Vangorda Creek Watersheds, Faro, Yukon to Meet the Requirements of Water License QZ03-059. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation. December 2006.

White Mountain. 2006b. North Fork, Rose Creek Rock Drain, Winter, Fish Utilization Assessment. Prepared for Deloitte & Touche Inc., Interim Receiver for Anvil Range Mining Corporation.

White Mountain. 2008. 2007 Aquatic Life Sampling and Testing Program for the Anvil Range Mine Site, Rose and Vangorda Creek Watersheds, Faro, Yukon to Meet the Requirements of Water License QZ03-059. Prepared for Deloitte & Touche Inc.

White Mountain. 2009. 2009 Aquatic Life Sampling and Testing Program for the Anvil Range Mine Site, Rose and Vangorda Creek Watersheds, Faro, Yukon. Prepared for Dennison Environmental. December 2009.

White Mountain. 2010. Report on the Findings of Investigations into Chinook Salmon Spawning Habitat Assessments Conducted on the Pelly River near Anvil Creek during August of 2009. Prepared for Assessment and Abandoned Mines, Government of Yukon.

5.2 PERSONAL COMMUNICATIONS

Kearns, M. 2012. Aquatic Biologist. EDI Environmental Dynamics Inc., Whitehorse, YT. Preliminary data from 2012 winter field study.

APPENDIX A COMPILATION OF EXISTING FISH CAPTURE DATA

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH					LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
AC-001	Laberge et al. 2005	Anvil Creek	545145	6924161	01/08/2004	EF	1213									21						147			1			
AC-001	Laberge et al. 2005	Anvil Creek	545145	6924161	01/08/2004	EF	246									8						45			8			
AC-001	Laberge et al. 2005	Anvil Creek	545145	6924161	01/08/2004	EF	525									16						47			18			
AC-001	Laberge et al. 2005	Anvil Creek	545145	6924161	31/07/2004	MT	87									141								2				
AC-001	Laberge et al. 2005	Anvil Creek	545145	6924161	31-Jul-04 or 01-Aug-04	SN	-			4		2												3			8	
AC-001	Laberge et al. 2005	Anvil Creek	545145	6924161	31-Jul-04 or 01-Aug-04	AG	0.67	X																				
AC-002	Laberge et al. 2005	Anvil Creek	552750	6925950	30/07/2004	EF	783									118							>20	125				
AC-002	Laberge et al. 2005	Anvil Creek	552750	6925950	30/07/2004	MT	111.6									148								1				
AC-002	Laberge et al. 2005	Anvil Creek	552750	6925950	30/07/2004	AG	0.33					2																
AC-002	Laberge et al. 2005	Anvil Creek	552750	6925950	30/07/2004	SN	-			2		3				18								2				
AC-003	Laberge et al. 2005	Anvil Creek	557272	6923759	30/07/2004	EF	763									8							*	98				
AC-003	Laberge et al. 2005	Anvil Creek	557272	6923759	30/07/2004	MT	112.8									41	5							4				
AC-003	Laberge et al. 2005	Anvil Creek	557272	6923759	30/07/2004	AG	0.33					2																
AC-004	Laberge et al. 2005	Anvil Creek	563796	6924470	30/07/2004	EF	701									3								47				
AC-004	Laberge et al. 2005	Anvil Creek	563796	6924470	30/07/2004	MT	156.8									43								4				
AC-004	Laberge et al. 2005	Anvil Creek	563796	6924470	30/07/2004	SN	-				8					3							10					
AC-004	Laberge et al. 2005	Anvil Creek	563796	6924470	30/07/2004	AG	0.33	X																				
AC-004	Laberge et al. 2005	Anvil Creek	563796	6924470	30/07/2004	VO	-				>20																	
AC-005	White Mtn 2005c	Anvil Creek	567917	6921804	17/08/2005	EF	1021																1	43				
AC-005	White Mtn 2005c	Anvil Creek	567917	6921804	01/08/2005	MT	228.6															2						
AC-005	White Mtn 2005c	Anvil Creek	567917	6921804	17/08/2005	AG	0.83		1																			
AC-005	White Mtn 2005c	Anvil Creek	567917	6921804	18/08/2005	AG	0.5		1																			
AC-005	White Mountain 2008	Anvil Creek	567917	6921804	17/08/2007	EF	1096							2										55				
AC-005	White Mountain 2008	Anvil Creek	567917	6921804	01/08/2007	MT	193.14															2						
AC-005	White Mountain 2008	Anvil Creek	567917	6921804	01/08/2007	AG	0.67		12																			
AC-005	White Mtn 2004	Anvil Creek	567917	6921804	13/08/2004	EF	875					1										1		25				
AC-005	White Mtn 2004	Anvil Creek	567917	6921804	12/08/2004	MT	136															4						
AC-006	White Mtn 2006a	Anvil Creek	568768	6921412	17/08/2006	EF	779							2									10	49				
AC-006	White Mtn 2006a	Anvil Creek	568768	6921412	01/08/2006	AG	0.83		3																			
AC-006	White Mtn 2006a	Anvil Creek	568768	6921412	01/08/2006	MT	207																	2				
AC-006	White Mtn 2009	Anvil Creek	568768	6921412	15/08/2009	EF	995																	63				
AC-006	White Mtn 2009	Anvil Creek	568768	6921412	01/08/2009	MT	198															1						
AC-006	White Mtn 2009	Anvil Creek	568768	6921412	01/08/2009	AG	0.83		12																			

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH					LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
ACT-001	White Mtn 2009	Anvil Creek tributary	566951	6928686	15/08/2009	EF	676			3	11	3							1			38						
ACT-001	White Mtn 2009	Anvil Creek tributary	566951	6928686	01/08/2009	MT	160						1				1					7						
BC-001	White Mtn 2005c	Blind Creek	536680	6896005	01/08/2005	MT	447.2		2								6		10 45			6						
BC-001	White Mtn 2005c	Blind Creek	536680	6896005	20/08/2005	AG	1.17		7																			
BC-001	White Mountain 2008	Blind Creek	536680	6896005	01/08/2007	MT	298.06										38		222									
BC-001	White Mountain 2008	Blind Creek	536680	6896005	01/08/2007	AG	1		12																			
BC-001	White Mtn 2004	Blind Creek	536680	6896005	14/08/2004	MT	180.7										4		572			1						
BC-001	White Mtn 2006a	Blind Creek	536680	6896005	01/08/2006	AG	4		5																			
BC-001	White Mtn 2006a	Blind Creek	536680	6896005	01/08/2006	MT	350									135	5											
BC-001	White Mtn 2006a	Blind Creek	536680	6896005	01/08/2006	SN	-												60				40	12			11	
BC-001	White Mtn 2009	Blind Creek	536680	6896005	01/08/2009	MT	460						1				5		150			5						
BC-001	White Mtn 2009	Blind Creek	536680	6896005	01/08/2009	AG	2.33		11																			
BC-002	Gartner Lee 2003	Blind Creek	593801	6895809	07/08/2002	AG	1				1	6																
BC-002	Gartner Lee 2003	Blind Creek	593801	6895809	08/08/2002	MT	88								37							1						
BC-002	Gartner Lee 2003	Blind Creek	593801	6895809	08/08/2002	SN	20		2						90							8				4		
BC-003	Minnow and White Mtn 2009	Blind Creek	594701	6897077	01/05/2008	EF	825												2			16						
BC-003	Minnow and White Mtn 2009	Blind Creek	594701	6897077	01/05/2008	MT	223.2												6			2						
BC-003	Minnow and White Mtn 2009	Blind Creek	594701	6897077	01/05/2008	EF	240	X																				
BC-003	Minnow and White Mtn 2009	Blind Creek	594701	6897077	01/05/2008	MT	156												3			3						
FC-001	Minnow and White Mtn 2009	Faro Creek	585359	6916761	01/05/2008	MT	232.8	X																				
NF-001	Weagle 1981b	North Fork	583644	6912670	14/07/1981	AG	-					1																
NF-001	Harder and Bustard 1988	North Fork	583644	6912670	08/06/1988	EF	-				1																	
NF-002	White Mtn 2005a	North Fork	583830	6912607	31-May-05 to 02-Jun-05	AG	-					[f]																
NF-003	Weagle 1981b	North Fork	584049	6912707	15/07/1981	EF	-		17																			
NF-003	Harder and Bustard 1988	North Fork	584049	6912707	08/06/1988	EF	-															1						
NF-003	Harder and Bustard 1988	North Fork	584049	6912707	08/06/1988	EF	-				4											1						

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR --	GR f	GR j	GR a	BB --	BB a	CH --	CH 0+	CH 1+	CH f	CH j	CH a	LSU --	CCG --	CCG f	CCG a	LKC --	RW --	RW j	RW a
NF-003	Curragh 1987	North Fork	584049	6912707	01/05/1987	EF	-		4.7 [g]																			
NF-003	Harder 1991	North Fork	584049	6912707	11/06/1905	-	-		49													34						
NF-004	Weagle 1981b	North Fork	584062	6912747	15/08/1981	EF	-	X																				
NF-005	White Mtn 2005b	North Fork	584716	6913017	01/06/2005	MT	115.3	X																				
NF-005	White Mtn 2005b	North Fork	584716	6913017	01/06/2005	SN	-																3					
NF-005	White Mtn 2005b	North Fork	584716	6913017	01/06/2005	VO	-					3																
NF-005	White Mtn 2005b	North Fork	584716	6913017	01/06/2005	AG	0.33					1																
NF-005	White Mtn 2005b	North Fork	584716	6913017	19/08/2005	EF	148				7													5				
NF-005	White Mtn 2005b	North Fork	584716	6913017	19/08/2005	EF	352															41	9					
NF-005	White Mtn 2005b	North Fork	584716	6913017	19/08/2005	MT	127.6				1													9				
NF-005	White Mtn 2005b	North Fork	584716	6913017	19/08/2005	AG	0.42		7																			
NF-005	White Mtn 2005b	North Fork	584716	6913017	19/08/2005	VO						>40																
NF-005	Harder and Bustard 1988	North Fork	584716	6913017	31/05/1988	GN	-					3																
NF-005	Harder and Bustard 1988	North Fork	584716	6913017	01/06/1988	AG	-					1																
NF-005	Harder and Bustard 1988	North Fork	584716	6913017	07/06/1988	AG	-					1																
NF-005	Harder and Bustard 1988	North Fork	584716	6913017	07/06/1988	SN	-				3	2																
NF-005	Harder and Bustard 1988	North Fork	584716	6913017	08/06/1988	AG	-					1																
NF-006	White Mtn 2005b	North Fork	584864	6913183	31/05/2005	GN	4.26	X																				
NF-006	White Mtn 2005b	North Fork	584864	6913183	31/05/2005	AG	1.33	X																				
NF-006	White Mtn 2005b	North Fork	584864	6913183	19/08/2005	AG	2.6		11																			
NF-006	White Mtn 2005b	North Fork	584864	6913183	19/08/2005	VO	-		[f]																			
NF-006	White Mtn 2006b	North Fork	584864	6913183	22/03/2006	MT	-	X																				
NF-006	White Mtn 2006b	North Fork	584864	6913183	21/03/2006	AG	4	X																				
NF-006	White Mtn 2006b	North Fork	584864	6913183	21/03/2006	VO	-															1						
NF-007	Gartner Lee 2003	North Fork	586347	6914396	08/08/2002	EF	405															1						
NF-008	Minnow and White Mtn 2009	North Fork	586496	6914366	01/05/2008	EF	374	X																				
NF-009	Harder 1993	North Fork	587642	6915985	01/08/1992	EF	-	X																				
NF-009	Harder 1991	North Fork	587642	6915985	11/06/1905	-	-		1													19						
NF-010	White Mtn 2005b	North Fork	589452	6918400	17/08/2005	EF	326		2													39						
NF-010	White Mtn 2005b	North Fork	589452	6918400	17/08/2005	AG	0.33		3																			

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH						LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
NF-010	White Mtn 2005b	North Fork	589452	6918400	17/08/2005	VO	-		[f]																			
NF-011	White Mtn 2005b	North Fork	590189	6918978	31-May-05 to 02-Jun-05	AG	0.33	X																				
NF-011	White Mtn 2005b	North Fork	590189	6918978	31-May-05 to 02-Jun-05	VO	-					1																
NF-012	White Mtn 2005b	North Fork	590602	6919114	17/08/2005	EF	283							1								32						
NF-012	White Mtn 2005b	North Fork	590602	6919114	17/08/2005	VO	-																					1
NF-012	White Mtn 2005b	North Fork	590602	6919114	17/08/2005	AG	0.33	X																				
NF-013	Harder 1991	North Fork	591294	6919088	11/06/1905	-	-		2													36						
NF-014	Gartner Lee 2003	North Fork	591346	6919037	08/08/2002	EF	685															16						
NF-014	Gartner Lee 2003	North Fork	591346	6919037	08/08/2002	VO	-															10						
NF-015	Harder and Bustard 1988	North Fork	594826	6919695	06/06/1988	EF	-	X																				
NF-015	Harder and Bustard 1988	North Fork	594826	6919695	05/06/1988	AG	-					2																
NF-015	Harder and Bustard 1988	North Fork	594826	6919695	05/06/1988	GN	1				5	21																
NF-015	Harder 1991	North Fork	594826	6919695	11/06/1905	-	-		1													3						
PP-001	White Mtn 2005a	Pumphouse Pond	583395	6912459	31-May-05 to 02-Jun-05	GN	-					20																
PP-001	Weagle 1981b	Pumphouse Pond	583395	6912459	05/05/1981	GN	-	X																				
PP-001	Weagle 1981b	Pumphouse Pond	583395	6912459	06/05/1981	GN	-	X																				
PP-001	Weagle 1981b	Pumphouse Pond	583395	6912459	10/05/1981	GN	-					4																
PP-001	Weagle 1981b	Pumphouse Pond	583395	6912459	11/05/1981	GN	-	X																				
PP-001	Weagle 1981b	Pumphouse Pond	583395	6912459	13/07/1981	AG	-		1																			
PP-001	Weagle 1981b	Pumphouse Pond	583395	6912459	14/07/1981	GN	-					3																
PP-001	Hoos and Holman 1973	Pumphouse Pond	583395	6912459	01/09/1973	AG	-		1																			
PP-001	Harder 1993	Pumphouse Pond	583395	6912459	summer 1992	AG	-					10																
PP-001	Weagle 1981c	Pumphouse Pond	583395	6912459	05/05/1981	GN	-	X																				
PP-001	Weagle 1981c	Pumphouse Pond	583395	6912459	06/05/1981	GN	-	X																				
PP-001	Weagle 1981c	Pumphouse Pond	583395	6912459	10/05/1981	GN	-		4																			

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR --	GR f	GR j	GR a	BB --	BB a	CH --	CH 0+	CH 1+	CH f	CH j	CH a	LSU --	CCG --	CCG f	CCG a	LKC --	RW --	RW j	RW a
PP-001	Weagle 1981c	Pumphouse Pond	583395	6912459	11/05/1981	GN	-	X																				
RC-001	White Mtn 2005c	Rose Creek	567827	6921736	17/08/2005	EF	1043				6												6	45				
RC-001	White Mtn 2005c	Rose Creek	567827	6921736	01/08/2005	MT	234.9															3						
RC-001	White Mtn 2005c	Rose Creek	567827	6921736	17/08/2005	AG	0.5		5																			
RC-001	White Mountain 2008	Rose Creek	567827	6921736	17/08/2007	EF	885				6	1	1											99				
RC-001	White Mountain 2008	Rose Creek	567827	6921736	01/08/2007	MT	210.87		1													12						
RC-001	White Mountain 2008	Rose Creek	567827	6921736	01/08/2007	AG	0.67		12																			
RC-001	White Mtn 2004	Rose Creek	567827	6921736	13/08/2004	EF	875					1												25				
RC-001	White Mtn 2004	Rose Creek	567827	6921736	12/08/2004	MT	140.8												3									
RC-001	White Mtn 2006a	Rose Creek	567827	6921736	17/08/2006	EF	980				1												50	82				
RC-001	White Mtn 2006a	Rose Creek	567827	6921736	01/08/2006	AG	0.83		6																			
RC-001	White Mtn 2006a	Rose Creek	567827	6921736	01/08/2006	MT	207	X																				
RC-001	White Mtn 2009	Rose Creek	567827	6921736	15/08/2009	EF	839																	43				
RC-001	White Mtn 2009	Rose Creek	567827	6921736	01/08/2009	MT	198															2						
RC-001	White Mtn 2009	Rose Creek	567827	6921736	01/08/2009	AG	0.83		9																			
RC-002	Hoos and Holman 1973	Rose Creek	569592	6917765	01/09/1973	AG, GN, SN	-	X																				
RC-003	Harder 1991	Rose Creek	570634	6917698	01/08/1989	EF	-	X																				
RC-003	Harder 1991	Rose Creek	570634	6917698	01/08/1990	EF	-	X																				
RC-004	Baker 1979	Rose Creek	571694	6917927	28/05/1905	EF	-		2																			
RC-005	Harder 1991	Rose Creek	576683	6916274	01/08/1989	EF	-		8														1					
RC-006	Baker 1979	Rose Creek	579364	6915026	27/05/1905	EF	-		4																			
RC-006	Baker 1979	Rose Creek	579364	6915026	28/05/1905	EF	-		3																			
RC-006	Harder 1991	Rose Creek	579364	6915026	11/06/1905	EF	-		4																			
RC-006	Harder 1991	Rose Creek	579364	6915026	12/06/1905	EF	-		17																			1
RC-007	Gartner Lee 2003	Rose Creek	579388	6915023	07/08/2002	EF	913	X																				
RC-007	Gartner Lee 2003	Rose Creek	579388	6915023	07/08/2002	MT	90						2															
RC-007	Gartner Lee 2003	Rose Creek	579388	6915023	08/08/2002	AG	3					2																
RC-008	White Mtn 2005c	Rose Creek	579401	6914972	19/08/2005	EF	884				1	16		7					2				7	76				
RC-008	White Mtn 2005c	Rose Creek	579401	6914972	01/08/2005	MT	143.1						4						5			2						
RC-008	White Mtn 2005c	Rose Creek	579401	6914972	19/08/2005	AG	1.75	X																				
RC-008	White Mountain 2008	Rose Creek	579401	6914972	15/08/2007	EF	1114				2											2		57				
RC-008	White Mountain 2008	Rose Creek	579401	6914972	01/08/2007	MT	139.5	X																				
RC-008	White Mountain 2008	Rose Creek	579401	6914972	01/08/2007	AG	1.83		5																			

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH						LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
RC-008	White Mtn 2004	Rose Creek	579401	6914972	15/08/2004	EF	741					2		2										8	116				
RC-008	White Mtn 2004	Rose Creek	579401	6914972	14/08/2004	MT	329						2						21				2						
RC-008	White Mtn 2006a	Rose Creek	579401	6914972	18/08/2006	EF	1280							1					2					7	54				
RC-008	White Mtn 2006a	Rose Creek	579401	6914972	01/08/2006	AG	3		5																				
RC-008	White Mtn 2006a	Rose Creek	579401	6914972	01/08/2006	MT	157.5				1														1				
RC-008	White Mtn 2009	Rose Creek	579401	6914972	14/08/2009	EF	668						3						1					4	21				
RC-008	White Mtn 2009	Rose Creek	579401	6914972	01/08/2009	MT	252						2						5				6						
RC-008	White Mtn 2009	Rose Creek	579401	6914972	01/08/2009	AG	1.25		5																				
RC-009	Minnow and White Mtn 2009	Rose Creek	579417	6914967	01/05/2008	EF	387	X																					
RC-009	Minnow and White Mtn 2009	Rose Creek	579417	6914967	01/05/2008	MT	268.8	X																					
RC-010	Weagle 1981b	Rose Creek Diversion	579460	6914702	13/07/1981	EF	-																						
RC-010	Harder and Bustard 1988	Rose Creek	579460	6914702	01/06/1988	-	-					1																	1
RC-010	Harder and Bustard 1988	Rose Creek	579460	6914702	02/06/1988	-	-	X																					3
RC-010	Harder and Bustard 1988	Rose Creek	579460	6914702	03/06/1988	-	-					3																	1
RC-010	Harder and Bustard 1988	Rose Creek	579460	6914702	04/06/1988	-	-					4																	
RC-010	Curragh 1987	Rose Creek	579460	6914702	01/05/1987	EF	-																3						
RC-010	Montreal Eng Co. Ltd. 1976a	Rose Creek	579460	6914702	01/08/1975	EF	1200																4						
RC-010	Weagle 1981c	Rose Creek	579460	6914702	08/05/1981	AG	-		5																				
RC-010	Weagle 1981c	Rose Creek	579460	6914702	15/05/1981	EF	-		4																				
RC-011	DFO 2009	Rose Creek Diversion	580368	6913785	25/08/2009	OB	-												1										
RC-011	Harder 1993	Rose Creek Diversion	580368	6913785	summer 1992	EF	-		4				1										2					2	
RC-012	Harder and Bustard 1988	Rose Creek Diversion	581468	6913297	01/06/1988	-	-					10																	2
RC-012	Harder and Bustard 1988	Rose Creek Diversion	581468	6913297	02/06/1988	-	-				1	8																	1
RC-012	Harder and Bustard 1988	Rose Creek Diversion	581468	6913297	03/06/1988	-	-					3																	
RC-012	Harder and Bustard 1988	Rose Creek Diversion	581468	6913297	04/06/1988	-	-	X																					
RC-012	Harder 1991	Rose Creek	581468	6913297	11/06/1905	EF	-		3														23						
RC-013	Gartner Lee 2003	Rose Creek Diversion	582275	6912963	07/08/2002	EF	-	X																					
RC-013	Gartner Lee 2003	Rose Creek Diversion	582275	6912963	07/08/2002	OB	-		1														1						

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR --	GR f	GR j	GR a	BB --	BB a	CH --	CH 0+	CH 1+	CH f	CH j	CH a	LSU --	CCG --	CCG f	CCG a	LKC --	RW --	RW j	RW a
RC-014	Curragh 1987	Rose Creek Diversion	583136	6912547	01/05/1987	EF	-		1													1						
RC-015	Harder and Bustard 1988	Rose Creek Diversion	583252	6912544	08/06/1988	EF	-						3									13						
RC-016	Gartner Lee 2003	Rose Creek	571066	6917656	08/08/2002	EF	264	X																				
RC-017	Gartner Lee 2003	Rose Creek	573779	6917335	08/08/2002	EF	288	X																				
RES-001	Gartner Lee 2003	Reservoir	585746	6911064	09/08/2002	GN	15					1																
RES-002	Gartner Lee 2003	Reservoir	585979	6910893	09/08/2002	MT	250															6						
RES-002	PA Harder 1991	Reservoir	585979	6910893	11/06/1905	GN	4		24																			
RES-002	PA Harder 1991	Reservoir	585979	6910893	11/06/1905	SN	-			21																		
RES-002	PA Harder 1991	Reservoir	585979	6910893	12/06/1905	-	-		12																			
RES-002	PA Harder 1993	Reservoir	585979	6910893	14/06/1905	-	-		(f)																			
RES-002	PA Harder 1993	Reservoir	585979	6910893	14/06/1905	-	-		(f)																			
RES-002	PA Harder 1993	Reservoir	585979	6910893	14/06/1905	AG	2		10																			
RES-002	White Mtn 2005a	South Fork	585979	6910893	31-May-05 to 02-Jun-05	EF	-						1															
RES-002	White Mtn 2005a	South Fork	585979	6910893	31-May-05 to 02-Jun-05	VO	-				12																	
RES-002	Weagle 1981b	Reservoir	585979	6910893	14/07/1981	GN	-					7																
RES-002	Weagle 1981b	Reservoir	585979	6910893	15/07/1981	GN	-					3																
RES-002	Weagle 1981b	Reservoir	585979	6910893	26/08/1981	GN	-					2																
RES-002	Weagle 1981b	Reservoir	585979	6910893	27/08/1981	GN	-					5																
RES-002	Weagle 1981b	Reservoir	585979	6910893	01/10/1981	GN	-																					
RES-002	Weagle 1981a	Reservoir	585979	6910893	02/10/1981	GN	-																					
RES-002	Harder 1993	Reservoir	585979	6910893	summer 1992	GN	-					26																
RES-003	Gartner Lee 2003	Reservoir	586280	6910830	09/08/2002	GN	16				7	39																
RES-004	Gartner Lee 2003	Reservoir	586347	6910210	09/08/2002	GN	20.5				2	15	1															
SF-001	Weagle 1981b	South Fork	583547	6912364	15/07/1981	EF	-																					
SF-001	Harder and Bustard 1988	South Fork	583547	6912364	08/06/1988	EF	-															6						
SF-002	White Mtn 2005c	South Fork	583739	6912390	18/08/2005	EF	849				13			2										41				
SF-002	White Mtn 2005c	South Fork	583739	6912390	01/08/2005	MT	162.9		2													1						
SF-002	White Mtn 2005c	South Fork	583739	6912390	18/08/2005	AG	0.75		4																			
SF-002	White Mountain 2008	South Fork	583739	6912390	15/08/2007	EF	873				3											1		27				
SF-002	White Mountain 2008	South Fork	583739	6912390	01/08/2007	MT	166.5	X																				
SF-002	White Mountain 2008	South Fork	583739	6912390	01/08/2007	AG	1.5		9																			
SF-002	White Mtn 2004	South Fork	583739	6912390	14/08/2004	EF	835			15		3		2				3						29				1

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH						LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
SF-002	White Mtn 2004	South Fork	583739	6912390	13/08/2004	MT	147.2		1										1			3						
SF-002	White Mtn 2006a	South Fork	583739	6912390	17/08/2006	EF	859																	15				
SF-002	White Mtn 2006a	South Fork	583739	6912390	01/08/2006	AG	3.17		9																			
SF-002	White Mtn 2006a	South Fork	583739	6912390	01/08/2006	MT	148.5				1											1						
SF-002	White Mtn 2009	South Fork	583739	6912390	14/08/2009	EF	635																	16				
SF-002	White Mtn 2009	South Fork	583739	6912390	01/08/2009	MT	252		1													1						
SF-002	White Mtn 2009	South Fork	583739	6912390	01/08/2009	AG	3		4																			
SF-003	Weagle 1981b	South Fork	584179	6912410	11/05/1981	EF	-					4																
SF-003	Weagle 1981b	South Fork	584179	6912410	13/07/1981	AG	-				2	2																
SF-003	Weagle 1981b	South Fork	584179	6912410	15/07/1981	EF	-		10																			
SF-003	Weagle 1981b	South Fork	584179	6912410	27/08/1981	EF	-					1																
SF-003	Weagle 1981b	South Fork	584179	6912410	30/09/1981	EF	-																					
SF-004	White Mtn 2005a	South Fork	584550	6912266	31-May-05 to 02-Jun-05	EF	-				2											4						
SF-004	Baker 1979	South Fork	584550	6912266	27/05/1905	EF	-		5													3						
SF-004	Baker 1979	South Fork	584550	6912266	28/05/1905	EF	-		4													1						
SF-004	Baker 1979	South Fork	584550	6912266	29/05/1905	EF	-		2																			
SF-004	Harder 1991	South Fork	584550	6912266	11/06/1905	EF	-	X																				
SF-005	White Mtn 2005a	South Fork	585262	6911478	31-May-05 to 02-Jun-05	EF	-															3						
SF-005	Weagle 1981b	South Fork	585262	6911478	06/05/1981	GN	-	X																				
SF-005	Weagle 1981b	South Fork	585262	6911478	06/05/1981	AG	-				2	8																
SF-005	Weagle 1981b	South Fork	585262	6911478	07/05/1981	AG	-				4	8																
SF-005	Weagle 1981b	South Fork	585262	6911478	08/05/1981	AG	-					1																
SF-005	Weagle 1981b	South Fork	585262	6911478	08/05/1981	AG	-				1	3																
SF-005	Weagle 1981b	South Fork	585262	6911478	13/07/1981	GN	-	X																				
SF-005	Weagle 1981b	South Fork	585262	6911478	13/07/1981	AG	-				2	4																
SF-005	Weagle 1981b	South Fork	585262	6911478	14/07/1981	GN	-				1	4																
SF-005	Weagle 1981b	South Fork	585262	6911478	15/07/1981	EF	-		3		2																	
SF-005	Weagle 1981c	South Fork	585262	6911478	05/05/1981	GN	-	X																				
SF-005	Weagle 1981c	South Fork	585262	6911478	06/05/1981	AG	-		10																			
SF-005	Weagle 1981c	South Fork	585262	6911478	07/05/1981	AG	-		12																			
SF-005	Weagle 1981c	South Fork	585262	6911478	10/05/1981	AG	-	X																				
SF-005	Harder 1991	South Fork	585262	6911478	11/06/1905	-	-		93				5									104						
SF-006	Weagle 1981b	South Fork	585338	6911395	15/07/1981	EF	-		2		19																	
SF-006	Weagle 1981b	South Fork	585338	6911395	01/10/1981	EF	-																					
SF-007	Weagle 1981b	South Fork	586984	6909504	14/07/1981	EF	-		9		1	2																
SF-007	Weagle 1981b	South Fork	586984	6909504	26/08/1981	EF	-				7	5																
SF-007	Weagle 1981b	South Fork	586984	6909504	30/09/1981	EF	-	X																				

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH					LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
SF-008	Gartner Lee 2003	South Fork	587116	6909385	07/08/2002	EF	381															2						
SF-009	White Mtn 2005a	South Fork	588234	6908470	31-May-05 to 02-Jun-05	EF	-				2											3						
SF-009	Harder 1991	South Fork	588234	6908470	11/06/1905	-	-		13				1									13						
SF-010	Weagle 1981b	South Fork	589356	6907448	14/07/1981	EF	-				5	2																
SF-010	Weagle 1981b	South Fork	589356	6907448	25/08/1981	EF	-				10																	
SF-010	Weagle 1981b	South Fork	589356	6907448	30/09/1981	EF	-																					
SF-011	Weagle 1981b	South Fork	589846	6907394	15/08/1981	EF	-	X																				
SF-012	Minnow and White Mtn 2009	South Fork	590197	6907340	01/05/2008	EF	499		5																			
SF-012	Minnow and White Mtn 2009	South Fork	590197	6907340	01/05/2008	MT	259.2	X																				
SF-013	White Mtn 2005a	South Fork	590529	6907325	31-May-05 to 02-Jun-05	EF	-	X																				
SF-013	Harder and Bustard 1988	South Fork	590529	6907325	07/06/1988	EF	-				1											5						
SF-014	Gartner Lee 2003	South Fork	592543	6909889	08/08/2002	EF	160	X																				
VC-001	Harder 1989	Vangorda Creek	544754	6899965	10/08/1989	EF	-								67							32					3	
VC-001	Harder 1989	Vangorda Creek	544754	6899965	08/08/1989	EF	-								394							27					7	
VC-001	Harder 1992	Vangorda Creek	544754	6899965	01/08/1990	EF	-				1				28						1	37					2	
VC-001	Harder 1992	Vangorda Creek	544754	6899965	01/08/1990	EF	-						2		77							41						
VC-001	Harder 1992	Vangorda Creek	544754	6899965	Jun - Oct 1990	EF	-		7				6				1700					23						
VC-002	White Mtn 2005c	Vangorda Creek	584790	6900606	18/08/2005	EF	1015					3						189						5				
VC-002	White Mtn 2005c	Vangorda Creek	584790	6900606	18/08/2005	EF	800					7						[f]						2				
VC-002	White Mtn 2005c	Vangorda Creek	584790	6900606	01/08/2005	MT	218.7											164										
VC-002	White Mtn 2005c	Vangorda Creek	584790	6900606	18/08/2005	AG	0.25	X																				
VC-002	White Mountain 2008	Vangorda Creek	584790	6900606	01/08/2007	MT	226.46											285										
VC-002	White Mountain 2008	Vangorda Creek	584790	6900606	18/08/2007	EF	893		23		18			1				138						2				1
VC-002	White Mtn 2004	Vangorda Creek	584790	6900606	15/08/2004	EF	1012				6	11						168				7						1

Table continued on next page. Notes provided at end of table.

EDI Ref ID [a]	Source [b]	Watercourse / Waterbody	E	N	Date (dd-mm-yyyy)	Method [c]	Effort [d]	NFC [e]	GR				BB		CH					LSU	CCG			LKC	RW		
									--	f	j	a	--	a	--	0+	1+	f	j	a	--	--	f	a	--	--	j	a
VC-002	White Mtn 2004	Vangorda Creek	584790	6900606	14/08/2004	MT	118.4												391									
VC-002	White Mtn 2006a	Vangorda Creek	584790	6900606	18/08/2006	EF	782					8		1					39					2				
VC-002	White Mtn 2006a	Vangorda Creek	584790	6900606	01/08/2006	MT	198												98									
VC-002	White Mtn 2009	Vangorda Creek	584790	6900606	13/08/2009	EF	746					17		2					30									1
VC-002	White Mtn 2009	Vangorda Creek	584790	6900606	01/08/2009	MT	266.5												51									
VC-003	Gartner Lee 2003	Vangorda Creek	584848	6899702	07/08/2002	EF	344											5				10						
VC-003	Gartner Lee 2003	Vangorda Creek	584848	6899702	07/08/2002	VO	-		5						40							10						
VC-003	Gartner Lee 2003	Vangorda Creek	584848	6899702	07/08/2002	SN	3					1			64							1						
VC-003	Gartner Lee 2003	Vangorda Creek	584848	6899702	07/08/2002	MT	110		4						81													
VC-003	Gartner Lee 2003	Vangorda Creek	584848	6899702	07/08/2002	AG	1				5	1																
VC-004	Harder 1989	Vangorda Creek	584869	6900672	08/08/1989	EF	-		2							90						15						
VC-004	Harder 1989	Vangorda Creek	584869	6900672	18/10/1989	EF	-		9							32						1						
VC-004	Harder and Bustard 1988	Vangorda Creek	584869	6900672	08/06/1988	EF	-															3						
VC-004	Harder and Bustard 1988	Vangorda Creek	584869	6900672	08/06/1988	EF	-															4					1	
VC-004	Harder 1992	Vangorda Creek	584869	6900672	01/08/1990	EF	-		8				1			107						32						
VC-005	Harder 1989	Vangorda Creek	585262	6912607	08/08/1989	EF	-									243						20						
VC-005	Harder 1989	Vangorda Creek	585262	6912607	18/10/1989	EF	-		1							32						1						
VC-005	Harder 1989	Vangorda Creek	585262	6912607	19/10/1989	EF	-		16							54												
VC-005	Harder 1992	Vangorda Creek	585262	6912607	01/08/1990	EF	-									170						19					1	
VC-006	Minnow and White Mtn 2009	Vangorda Creek	584725	6899934	01/05/2008	EF	795		1										12			1			1	2		
VC-006	Minnow and White Mtn 2009	Vangorda Creek	584725	6899934	01/05/2008	MT	333.6												5						2			
VC-007	Minnow and White Mtn 2009	Vangorda Creek	594434	6903714	01/05/2008	EF	283	X																				
VC-007	Minnow and White Mtn 2009	Vangorda Creek	594434	6903714	01/05/2008	MT	175.2	X																				

Notes:

(a) EDI Reference ID: Correlates with id's displayed on Figures 3 to 6

(b) Source: References listed in Table 1, Section 2

(c) Methods: AG = angling, EF = electrofishing, MT = minnow trapping, SN = beach seining, VO = visual observation

(d) Effort units are specific to method: EF = seconds, AG = angler-hours, MT = trap-hours, SN = n/a, VO = n/a

(e) Where: NFC = no fish captured, GR = Arctic grayling, BB = burbot, CH = Chinook salmon, LSU = longnose sucker, CCG = slimy sculpin, LKC = lake chub, LW = lake whitefish, RW = round whitefish, -- = life stage not specified, f = fry, j = juvenile, a = adult

(f) Count not provided

(g) Results in fish per 100 m^2, no count provided

Disclaimer: Where UTM coordinates were not provided in the source, locations were approximated, based on maps or site descriptions.