



State of Alaska
Department of Fish and Game
Division of Sport Fish

Nomination Form
Anadromous Waters Catalog

Region AI Arctic USGS Quad(s) Kotzebue D2 D1

AWC Number of Water Body AA 331-00-10625-2015

Name of Water body Sadie Creek USGS Name Local Name

Addition Deletion Correction Backup Information

For Office Use

Nomination # 150050

Revision Year: 2016

Revision to: Atlas _____ Catalog _____
Both X

Revision Code: A-2, A-3

James J. Hasbrouck 5/8/2015
Fisheries Scientist Date

Wahl 5/8/15
Habitat Operations Manager Date

GP 4/8/15
AWC Project Biologist Date

[Signature] _____
GIS Analyst Date

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous
<u>Broad Whitefish</u>	<u>11-13 August 2012</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<u>Humpback Whitefish</u>	<u>26-28 July, 11-13 Aug 2012</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<u>Least Cisco</u>	<u>11-13 August 2012</u>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>

(12)
(10)
(4)

IMPORTANT. Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including number of fish and life stages observed, sampling methods, sampling duration and area sampled, copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as other information such as specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers, etc.

Comments Fish captures conducted by consultant biologists with ABR, Inc. during NEPA process "Kotzebue to Cape Blossom Road - Draft Environmental Assessment, Appendix C, October 2013". Their sense based upon local knowledge and catch findings is that Sadie Creek is used seasonally by fish for out migration from connected lake systems and by fish in search of summer food resources along the coast. Add local name, Add new stream 331-00-10625 w/ least cisco, broad & humpback present, add new stream

Name of Observer (please print): Laura Jacobs 331-00-10625-2015

Signature: [Signature] Date: 12/3/14

Agency: ADF&G, Division of Habitat

Address: 1300 College Rd. Fairbanks, AK 99701

ALASKA DEPT. OF FISH & GAME

This certifies that in my best professional judgment and belief the above information is evidence that this water body should be included in or deleted from the Anadromous Waters Catalog. DEC 0 2014

Signature of Area Biologist: [Signature] Date: 12-5-14 Revision 11/13

Name of Area Biologist (please print): _____

Johnson, J D (DFG)

From: Jacobs, Laura L (DFG)
Sent: Tuesday, April 07, 2015 2:06 PM
To: Johnson, J D (DFG)
Cc: Jacobs, Laura L (DFG)
Subject: FW: nomination of whitefish at Sadie Creek

J,

Bill Morris is fairly certain the least cisco are anadromous, and very certain that the broads and humpback whitefish are anadromous. He did not say whether the juveniles that were found are probably anadromous or not. Is this information enough to settle your concerns? Laura

From: Bill Morris [<mailto:bmorris@owlriddenrc.com>]
Sent: Tuesday, April 07, 2015 12:47 PM
To: Jacobs, Laura L (DFG)
Subject: RE: nomination of whitefish at Sadie Creek

Thanks, I just couldn't recall if there were humpback whitefish or not. What were the fish sizes? Some of the least cisco could be resident, but it is almost certain there would be an anadromous component to the population. I have never found a humpback whitefish or broad whitefish population that close to the coast that was not anadromous – so, yes, the humpback and broad whitefish are going to be anadromous, and most likely some of the leasts as well.

Bill

William Morris | Owl Ridge Natural Resource Consultants, Inc.
Confidentiality Notice

From: Jacobs, Laura L (DFG) [<mailto:laura.jacobs@alaska.gov>]
Sent: Tuesday, April 07, 2015 12:03 PM
To: Bill Morris
Subject: RE: nomination of whitefish at Sadie Creek

From: Bill Morris [<mailto:bmorris@owlriddenrc.com>]
Sent: Tuesday, April 07, 2015 11:48 AM

To: Jacobs, Laura L (DFG)
Subject: Re: nomination of whitefish at Sadie Creek

Remind me of the species?

Sent from my HTC

----- Reply message -----

From: "Jacobs, Laura L (DFG)" <laura.jacobs@alaska.gov>

To: "Bill Morris" <bmorris@ow/bridgenrc.com>

Subject: nomination of whitefish at Sadie Creek

Date: Tue, Apr 7, 2015 11:33

Bill,

I was phoned by J Johnson this morning to find out if we believe the juveniles documented in Sadie Creek are in fact anadromous to decide whether to consider this stretch to be rearing habitat. And then, he also wanted to know whether we feel confident that all whitefish were anadromous, as several in the report data were unidentified. Do you have any opinion?

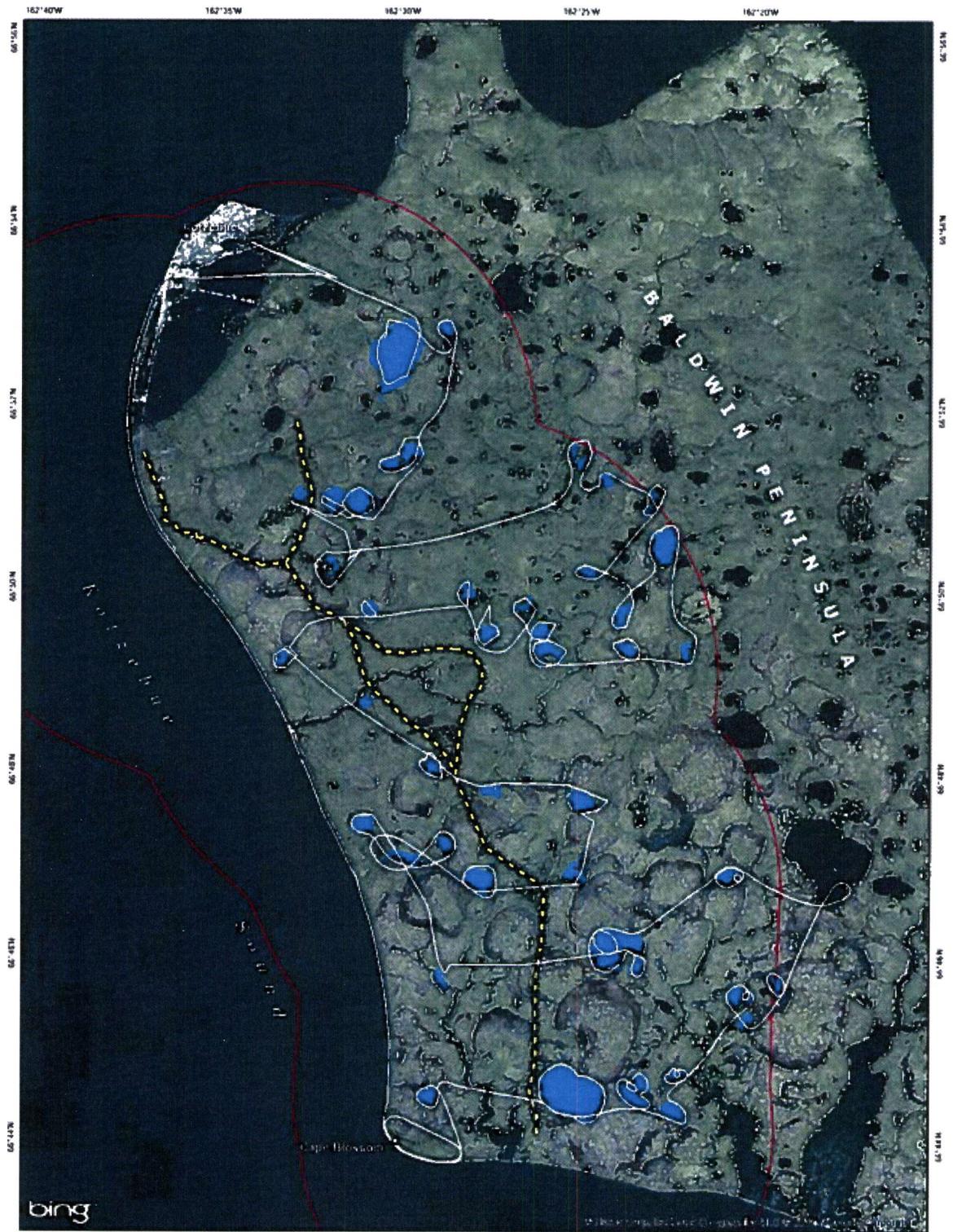
Laura Jacobs
Habitat Biologist
Alaska Dept of Fish and Game
(907)459-7284
Laura.Jacobs@alaska.gov

Anadromous Wetlands Fish Passage Fish Inventory

AWC Overlays K16n

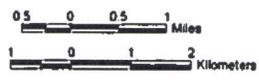


Map scale: 1:63360 COO



Cape Blossom Avian Surveys 2012

- Flight Routes
- Lakes Surveyed
- Study Area (3-mile Buffer of Proposed Road Alternatives)
- Road Alignment Alternatives



Notes: Inset map courtesy of NASA, Blue Marble Next Generation
 Map projection: Alaska State Plane Zone 7, NAD 1983, U.S. feet
 Map scale when printed at 11"x17" is 1:75,000 or 1" = 6,250'

Figure 8.
Kotzebue to Cape Blossom
Road Project Avian Study Area
and Flight Route

Map prepared by
 ABR Inc. – Environmental Research & Services

28 November 2012 Coordinate: Esri SA 12.2.1.mxd

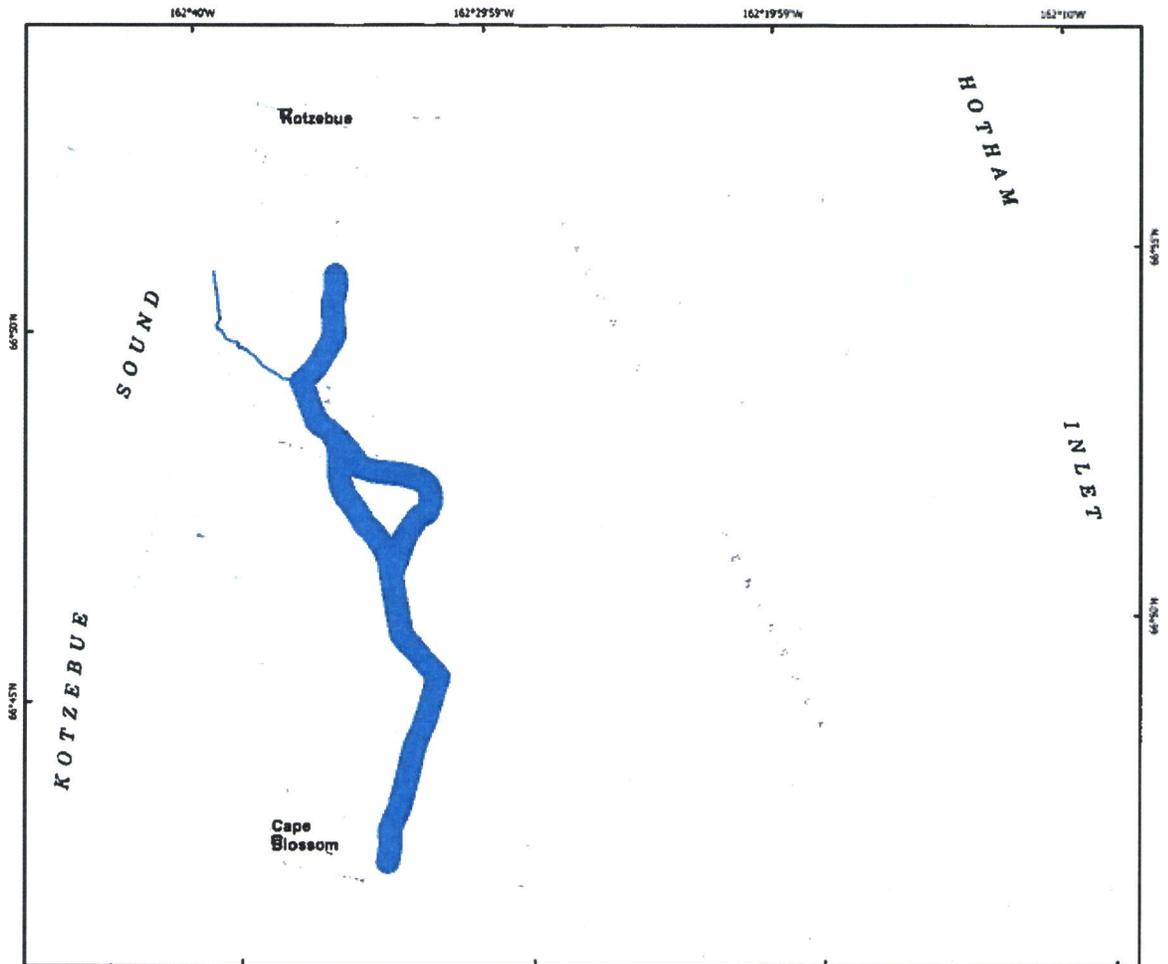


Figure 2 Map Legend

NWI Code	Description
Non-Navigable Waters	
E1UBH	Permanently Flooded Subtidal Estuarine
R2UBH	Lower Perennial River
R2USA	Lower Perennial Unconsolidated Shore
L1UBH	Permanently Flooded Lakes
PUBH	Permanently Flooded Ponds
Wetlands	
L2UB3H	Lacustrine Littoral Unconsolidated Bottom
L2AB3H	Lacustrine Permanently Flooded Aquatic Bed
PAB3H	Palustrine Permanently Flooded Aquatic Bed
PEM1H	Permanently Flooded Persistent Emergent
PEM1F	Semi-Permanently Flooded Persistent Emergent
PEM1E	Seasonally Flooded-Saturated Persistent Emergent
PEM1B	Saturated Persistent Emergent
PEM1/SS1F	Semi-Permanently Flooded Persistent Emergent / Broadleaf Deciduous Shrub
PEM1/SS1E	Seasonally Flooded – Saturated Persistent Emergent / Broadleaf Deciduous Shrub
PEM1/SS1B	Saturated Persistent Emergent / Broadleaf Deciduous Shrub
PEM1/SS3B	Saturated Persistent Emergent / Broadleaf Evergreen Shrub
PSS1/EM1B	Saturated Broadleaf Deciduous Shrub / Persistent Emergent
PSS3/EM1B	Saturated Broadleaf Evergreen Shrub / Persistent Emergent
PSS1E	Seasonally Flooded-Saturated Broadleaf Deciduous Shrub
PSS1C	Seasonally Flooded Broadleaf Deciduous Shrub
PSS1B	Saturated Broadleaf Deciduous Shrub
PSS1/3B	Saturated Broadleaf Deciduous / Broadleaf Evergreen Shrub
PSS3/1B	Saturated Broadleaf Evergreen / Broadleaf Deciduous Shrub
PSS3B	Saturated Broadleaf Evergreen Shrub
PSS4B	Saturated Needleleaf Evergreen Shrub
Uplands	
U	Upland
Us	Upland (Fill)

¹ Follows National Wetlands Inventory (NWI) map conventions and Cowardin et al. (1979) classification system.

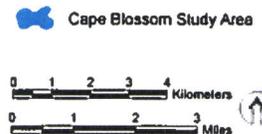


Figure 1.
Kotzebue to Cape Blossom
Road Project Area and
Figure 2 Map Legend

Map prepared by
ABR Inc. – Environmental Research & Services

28 November 2017 Cape Blossom Wetlands SA 122.1.mxd



THE STATE
of **ALASKA**

GOVERNOR SEAN PARNELL

Department of
Fish and Game

DIVISION OF SPORT FISHERY
Headquarters Office

1255 West 8th Street
P.O. Box 1155
Juneau, Alaska 99811-55
Main: 907.465.41
Fax: 907.465.27

July 22, 2012

John Seigle
ABR Inc., Environmental Research
Box 240268
Anchorage, AK99524

Dear Mr. Seigle:

Please find enclosed your ADF&G Fish Resource Permit (#SF2012-259). You need to read this permit carefully not only to understand what you are authorized and required to do, but also to check for mistakes that must be corrected immediately by contacting us. If your plans are modified later on (e.g. personnel changes, larger than expected collections, different sampling locations, etc), contact us as soon as you know so that an amendment to your permit can be prepared and issued in time to avert disruptions to planned field work. Failure to abide by permit requirements or to amend your permit when conditions change are permit violations that can result in a citation and/or loss of your permit.

Please be sure that you and all authorized personnel carry a copy of the permit while conducting collecting activities.

A report detailing all collections for this permit is due on or before October 30, 2012. Please use the ADF&G data submissions form for this task. If you do not have the opportunity to utilize your permit, please submit a letter or email stating that the permit was not used. A telephone message is not sufficient.

Wishing you success with your project,

Bob Piorkowski

Bob Piorkowski
(907)465-6109
Robert.Piorkowski@alaska.gov

Enclosure

SF2012-259 continued (page 2 of 2)

Authorized Personnel: The following persons may perform collecting activities under terms of this permit:

**Matt Appling, Joel Gottschalk, Laura Gutierrez, Jena Lemke, Elizabeth Miner,
John Rose, John Selgle, Adam Webber**

Employees and volunteers under the direct supervision of, and in the presence of, one of the authorized personnel listed above may participate in collecting activities under terms of this permit.

Permit Stipulations:

- 1) The local Area Management Biologist (AMB), **Brendan Scanlon** (443-5796; brendan.scanlon@alaska.gov) Northwest/North slope, must be notified prior to you engaging in any collecting activities. The time/date of this contact must be included in your collections report (using the "data submission form" furnished by ADF&G). This biologist has the right to specify methods for collecting, as well as limiting the collections of any species by number/time/location.
- 2) Felt or absorbent soles on waders and wading boots are prohibited.
- 3) An instance of >10% unintended collecting mortality requires sampling at a site to cease and the AMB contacted.
- 4) Each piece of unattended sampling gear must be; 1) labeled with the permittee's name, telephone number, and permit number, 2) securely tied to substrate, 3) soak no more than twenty-four hours at a time 4) located with GPS coordinates, and 5) accounted for/ removed at the conclusion of sampling.
- 5) Salmon eggs used as bait in traps must either be; sterilized commercial eggs or, if raw, be disinfected prior to use. A 10-minute soak in 1/100 Betadine solution or some other iodophor disinfectant is adequate.
- 6) Gloves, boots, and collecting gear should be disinfected initially to reduce the potential of pathogen transmission. A wash/rinse in 1/100 Betadine solution is adequate.
- 7) If anadromous fish species new to permitted streams and rivers are found, the permit holder will work closely with ADF&G to see that information is included in the database for the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*. Anadromous fish include *Oncorhynchus spp.*, Arctic char, Dolly Varden, sheefish, smelts, lamprey, whitefish, and sturgeon. Please direct questions to J. Johnson, 267-2337 or j.johnson@alaska.gov
- 8) Atlantic salmon and other non-native invasive aquatic species encountered should be killed. Contact the nearest AMB (**Stipulation #1**) immediately with species identification or description, capture or sighting location, number captured, size, and sex. Preserve/turn in the whole specimen to the nearest ADF&G office.
- 9) A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.
- 10) Issuance of this permit does not absolve the permittee from compliance in full with any and all other applicable federal, state, or local laws, regulations, or ordinances.
- 11) A report of collecting activities, referenced to this fish resource permit number, must be submitted to the Alaska Department of Fish and Game, Division of Sport Fish HQ, P.O. Box 115525, Juneau, AK 99811-5525, Attention: Bob Piorkowski (465-6109; Robert.Piorkowski@alaska.gov), and to the AMB (**Stipulation #1**) within 30 days after the expiration of this permit. This report must summarize the number of fish captured by date, by location (provide GPS coordinates and datum), and by species, and the fate of those fish. Fish length, weight, sex, and age data should be included if collected. A completion report (abstract/background/methods /data/analysis), if not submitted with the collection report described above, must be submitted to the department within six months of the expiration of the permit. Data from such reports are considered public information. A report is required whether or not collecting activities were undertaken.

PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:

Signature of Permittee

cc: Brendan Scanlon, Division of Sport Fish, Fairbanks
Jim Menard, Division of Commercial Fisheries, Nome
Will Morris, Division of Habitat, Fairbanks
Fish and Wildlife Protection, Fairbanks



STATE OF ALASKA
DEPARTMENT OF FISH AND GAME-SPORT FISH
P.O. BOX 115525
JUNEAU, ALASKA 99811-5525

FISH RESOURCE PERMIT AMENDMENT #1

Permit No. SF2012-259

Permit Issued To: John Seigle (signature required below for permit validation)

This amendment of Fish Resource Permit SF2012-259:

1) under Final Disposition; modifies it to read:

**Any number fish may be captured/released alive at each sampling site.
If lake trout are captured, kill and collect age/sex/length measurements and
their otoliths for the AMB (Stipulation #1)
S2 individuals of each unknown species may be killed and saved for later
identification
Unintended mortalities must be recorded and returned to the capture site.**

2) under Authorized Personnel; adds the following name:

Nick Haxton

All other conditions specified in Fish Resource Permit SF2012-259 remain in effect.

This amendment must be attached to the original permit.

Bob Prokhoruk
Division of Sport Fish

7/31/12
Date

PERMIT AMENDMENT VALIDATION requires permittee's signature agreeing to abide by conditions of this permit amendment:

Signature of Permittee

cc: Brendan Scanlon, Division of Sport Fish, Fairbanks
Jim Menard, Division of Commercial Fisheries, Nome
Will Morris, Division of Habitat, Fairbanks
Fish and Wildlife Protection, Fairbanks



STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
P.O. BOX 115525
JUNEAU, ALASKA 99811-5525

Permit #: SF2012-259

Expires: 9/30/2012

Collections Report Due: 10/30/2012

FISH RESOURCE PERMIT
(For Scientific/Educational Purposes)

This permit authorizes John Seigle (whose signature is required on page 2 for permit validation)
person

of ABR Inc.-Environmental Research at Box 240268, Anchorage, AK 99524
agency or organization address

to conduct the following activities from July 16, 2012 to September 30, 2012 in accordance with AS 16.05.930:

Purpose: To determine resident and/or anadromous fish presence and evaluate potential habitat for spawning, rearing and overwintering in the study location.

Location: Sadie Creek near Kotzebue.

Species Collected: Local species

Method of Capture: Fyke net, beach seine, minnow trap

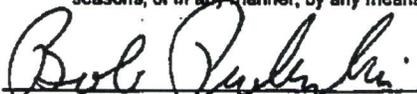
Final Disposition: ≤50 of each species may be captured and released alive at each capture site. Species specific sampling must end at a sampling site once that species has been detected. If lake trout are captured, kill and collect age/sex/length measurements and their otoliths for the AMB (Stipulation #1) ≤2 individuals of each unknown species may be killed and saved for later identification. All unintended mortalities must be recorded and returned to capture site waters.

-Continued on Back-

COLLECTIONS REPORT DUE October 30, 2012. The report, using a data submission form furnished by ADF&G, shall include ALL species, numbers, dates, and locations of collection (datum/GPS coordinates in the decimal degrees format (dd.ddddd)) and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish handled. It must also include the date/time the local biologist was contacted for final authorization to carry out collecting activities. A completion report (abstract, background, methods, data, analysis), if not submitted with the collection report described above, must be submitted to the FRP program coordinator by: March/2013. Data from such reports are considered public information. The report shall also include other information as may be required under the permit stipulations section.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No re-delegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.
4. Permits will not be renewed until the department has received detailed reports, as specified above.
5. **UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE** the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.


Fish Resource Permit Coordinator
Division of Sport Fish


Director
Division of Sport Fish

7/20/12
Date



Kotzebue to Cape Blossom Road Draft Environmental Assessment

Project No. 76884/NCPD-0001(204)

Appendix C

October 2013

KOTZEBUE TO CAPE BLOSSOM ROAD PROJECT

2012 ENVIRONMENTAL STUDY

FINAL REPORT

Prepared for:

Alaska Department of Transportation and Public Facilities, Northern Region

Under contract to:

Michael Baker Jr., Inc.

1400 West Benson Boulevard, Suite 200

Anchorage, AK 99503

Prepared by:

ABR, Inc.—Environmental Research & Services

P.O. Box 240268

Anchorage, AK 99524

and

P.O. Box 80410

Fairbanks, AK 99708

September 2013



Printed on recycled paper.

FINAL REPORT

KOTZEBUE TO CAPE BLOSSOM ROAD PROJECT

2012 ENVIRONMENTAL STUDY

PREPARED FOR
**ALASKA DEPARTMENT OF TRANSPORTATION AND
PUBLIC FACILITIES, NORTHERN REGION**
FAIRBANKS, ALASKA

UNDER CONTRACT TO
MICHAEL BAKER JR., INC.
ANCHORAGE, ALASKA

PREPARED BY
ABR, INC.—ENVIRONMENTAL RESEARCH & SERVICES
FAIRBANKS ♦ ANCHORAGE

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ACKNOWLEDGMENTS

The work described here was conducted for the Alaska Department of Transportation and Public Facilities (DOT&PF; Ryan Anderson, Project Manager), under subcontract to Michael Baker Jr. (Derek Christianson Project Manager).

Janet Kidd served as ABR’s technical manager for the subcontract and edited this report; Tom DeLong was ABR’s contract manager. The loon and raptor surveys were conducted by Ann Wildman of ABR. Victor Jones and Sam Barr served as subsistence advisors from Kotzebue during the surveys (hired by DOT&PF). Corey Konik of Bering Air piloted the survey helicopter for loons and raptors. The wetland field survey was completed by Susan Ives and Erin Johnson of ABR. The fisheries field work was completed by Joel Gottschalk, Nick Haxton, Liz Miner, and Laura Gutierrez of ABR. Russel Row of Bering Air piloted the helicopter used for site access for the fisheries and wetlands surveys. Office support for report preparation was provided by ABR employees Dorte Dissing, Pam Odom, Nathan Jones, and Kim Allen.

INTRODUCTION

The Northern Region State of Alaska Department of Transportation & Public Facilities (DOT&PF) is evaluating potential development of an all season road from Kotzebue to Cape Blossom, on the Baldwin Peninsula, in the Northwest Arctic Borough, Alaska. The Kotzebue to Cape Blossom Road would connect the community of Kotzebue to Cape Blossom via an approximately 12 mile road. DOT&PF originally considered 4 build alternatives, 3 of which have been dismissed due to higher costs, larger footprints, environmental concerns and land ownership issues. The alternative currently being carried forward is the Upgrade Route and is the focus for further detailed environmental studies. The Upgrade Route would involve reconstructing Air Force Road south of the Hillside Road intersection, ending adjacent to the Kotzebue Electric Association. A new road would be constructed to the terminus at a beach access ramp near Cape Blossom. The Upgrade Route will cross Sadie Creek. When developing the study area for the environmental surveys, a new road from New Hillside Road was also being considered as a separate option. This option is part of the study area but has since been dismissed from consideration.

To satisfy permitting requirements associated with the study area, ABR, Inc.—Environmental Research & Services (ABR) performed several environmental surveys within the study area during the summer of 2012. The environmental surveys investigated the current condition of wetlands, fisheries, and avian resources within the study area. A wetlands assessment, wetland functional assessment, and wildlife habitat assessment were completed in support of the U.S. Army Corps of Engineers (USACE) Section 404 wetland permit application process. A survey of the study area was completed to assess resident and anadromous fish assemblages relative to available habitat in Sadie Creek. Studies of avian resources included an aerial survey for Yellow-billed Loons and cliff-nesting raptors. All environmental studies will be used to support an Environmental Assessment that is being prepared by DOT&PF as part of the National Environmental Policy Act (NEPA) process.

FISHERIES

DOT&PF has provided several corridor alternatives to connect Kotzebue to Cape Blossom. Some of the proposed road corridor alternatives cross streams. The evaluation and sustainability of Essential Fish Habitat (EFH) is mandated by the Federal management plan for Pacific salmon species, as prescribed by the National Marine Fisheries Service (NMFS). Furthermore, Alaska Title 16 Fish Passage regulations stipulate maintenance of resident fish passage routes.

The most significant stream in the study area is Sadie Creek and its network of smaller tributaries would be traversed by this proposed road project. Information regarding fish assemblages and habitat in this drainage is limited to word of mouth, and no fish surveys have previously been conducted. Additionally, the Alaska Department of Fish and Game (ADFG) *Atlas to the Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes* (ADFG 2012) has not identified any anadromous fish streams in the study area. Thus, an assessment of fish assemblages in Sadie Creek and its smaller tributaries was recommended to gather information regarding passage needs for migrating resident and/or anadromous fish populations. The purpose of this survey was to assess resident and anadromous fish assemblages in streams near the alternative road corridors. Information collected in this survey will inform decisions regarding the need for and potential design of crossing structures within the study area.

METHODS

SITE SELECTION

ABR biologists selected fish sampling sites on Sadie Creek and its tributaries with the guidance of Bill Morris, regional supervisor of Division of Habitat at ADFG, and the DOT&PF report “Kotzebue to Cape Blossom Road Reconnaissance Study, State Project No. 76884, February 2011” (ADOT&PF 2011). The location of sites MS1 (main stem Sadie Creek), NF1 (north fork Sadie Creek), and SF1 (south fork Sadie Creek) were selected to be near stream crossings. Site MS1 is located directly downstream from a potential stream crossing identified as crossing #1 (Figure 4; Appendix D, Plate 1). Sites NF1 and SF1 were chosen to collect information regarding fish presence near 2 other potential stream crossings identified as crossing #2a and #2b (Figure 4;

Appendix D, Plate 2). Site NF2 was chosen to directly overlap with potential stream crossing #2a (Appendix D, Plate 3). Three fish sampling sites upstream of the main forks of Sadie Creek were chosen to investigate fish presence in headwater tributaries in the study area (TR1, TR2 and TR3) (Figure 4). The type of fishing gear used and exact gear placement was chosen based on-site assessments of water levels and flow.

SITE VISITS

Sampling was conducted near potential stream crossing in July and August 2012. In August, some of the July sampling sites were resampled and additional sites were added. All sites were accessed by R-44 helicopters operated by Pollux Aviation in July and by Bering Air in August.

WATER CHEMISTRY AND DISCHARGE

In-situ water chemistry (temperature [$^{\circ}$ C], pH, specific conductance [μ S/cm $^{-1}$], and dissolved oxygen [%]) were measured at 8 sites in Sadie Creek with a YSI Professional Plus Multi-parameter Meter during 26–28 July and 11–13 August 2012.

Discharge was measured at 3 sites, 1 on each of the main forks (site NF3 and SF2 on 11 August), as well as on 1 of the tributaries (TR2 on 13 August). Water velocities and depths were measured at 10 points along the wetted width cross section using a Marsh McBirney 2000 Flo-Mate. Overall discharge was then calculated from the cross sectional velocities and depth data (Appendix E).

FISH SAMPLING

Sadie Creek and its tributaries were surveyed for fish using 3 different gear types: minnow traps, seine nets, and fyke nets (Table 5). Minnow traps were baited with sterilized salmon roe and deployed from the stream bank where they were attached by a length of rope. Each trap was set out for a minimum of 3 hours and a maximum of 6 hours.

Seine net hauls were conducted by pulling a 10 foot long, 5 foot high, 0.25-inch mesh seine with a lead line bottom and surface float line in a half-circle 1–3 times nearshore at a subset of sites. One individual extended the net from shore into the water while the other end was held in place. After extending the net, the individual in the water then walked the net into deeper water

and arced back toward shore. The net was then pulled onto shore with care taken to keep the lead line on the bottom of the stream and in front of or even with the cork line.

Fyke nets had 1.2 m² frame openings and 0.25-inch mesh with 25 foot wings. Because water levels during the July sampling event were high, the nets could not be set across the entire stream. Instead, the nets were set along the stream margins and thus did not fish the entire stream width. Fyke net wings were set from 1 side of the frame opening to the vegetated stream margin on 1 bank and then from the other side of the frame out to the deepest section of wadeable stream. Two fyke nets were set per site on opposite banks, 1 facing upstream, and 1 facing downstream (Appendix D, Plate 4). During the August sampling event, water levels had dropped sufficiently to allow for 2 fyke nets to be set across the full width of the stream at each site sampled (Appendix D, Plate 5).

Fish captured were removed, anesthetized using clove oil, identified, enumerated, and measured for length. Fish were placed in a holding tub to recover from anesthesia before being returned live to the site of their trapping location. Fish caught in fyke nets were returned to the water opposite the opening of the net they were captured in. Voucher samples were preserved in formalin and returned to the laboratory for identification. All fishing effort was conducted under Alaska Department of Fish and Game Fish Resource Permit SF2012-259 and Amendment 1: Fish Resource Permit SF2012-259 (Appendix F).

RESULTS AND DISCUSSION

WATER CHEMISTRY AND DISCHARGE

Sadie Creek and its tributaries are low gradient, tundra-stained streams that flow slowly over mud and other organic substrates. The riparian vegetation along the majority of the sites was dominated by either grasses or mix of alder (*Alnus spp*) and willow (*Salix spp.*) (Appendix D, Plate 7). Most sample sites were located in stream reaches with deeply incised, near vertical channel walls with high depth to width ratios (Appendix D, Plate 6). The total discharge during August sampling was 0.1 m³/s at NF3, 0.1 m³/s at TR2, and 0.3 m³/s at SF2 (Appendix E). Mean water temperatures in the Sadie Creek main fork and tributary sampling stations were 10.6–14.5 °C. Water

temperatures were 10.6–12.1°C in July and 14.0–16.5°C in August (Table 6). The pH was 6.0–7.1, normal for tundra streams, which often have a low pH (Table 6) (Oswood et al. 1989). Specific conductance had high variability across sites and between sampling trips, ranging from 59.2 to 964.0 $\mu\text{S}/\text{cm}^{-1}$ (Table 6). This high variation was likely due to changes in water levels between sampling events but could also be because most sites were not resampled between July and August events. Although MS1 was the only site at which water chemistry was measured during both July and August events, the variability in conductance between those events is illustrative of variability across the wider sampling area over the sampling season. Specific conductance across all sites had a range of 420.6–964 $\mu\text{S}/\text{cm}^{-1}$ in July, and a much lower range of 59.2–255.7 $\mu\text{S}/\text{cm}^{-1}$ in August (Table 6). The higher range in conductivity during July may have been due in part to intrusion of salt water into Sadie Creek, although we did not measure salinity directly. Additionally, the higher water levels and associated terrestrial runoff in Sadie Creek and its tributaries in July may have resulted in increased concentrations of dissolved solids and higher specific conductance, which is typical after flood events (Wetzel 2001). Site MS1, closest to the brackish water mouth of Sadie Creek, had the highest specific conductance during the August sampling, but the July values were nearly twice as high at this site (255.7 vs. 461.1 $\mu\text{S}/\text{cm}^{-1}$) (Table 6). Dissolved oxygen was 66.2–91.2% (Table 6).

FISH PRESENCE

To determine fish presence, ABR sampled 9 different sites within the Sadie Creek drainage during 2 sampling trips using fyke nets, seines, and minnow traps (Table 5, Figure 4). Fyke nets were fished for a total of 245.3 hours, minnow traps were fished for 42.8 hours, and 18 seine hauls were pulled. Fish species captured were ninespine stickleback (*Pungitius pungitius*), threespine stickleback (*Gasterosteus aculeatus*), humpback whitefish (*Coregonus clupeaformis*), broad whitefish (*Coregonus nasus*), least cisco (*Coregonus sardinella*), northern pike (*Esox lucius*), and Alaska blackfish (*Dallia pectoralis*) (Table 7). This assemblage of species is typical for small coastal freshwater streams (see Appendix G) (Morrow 1980).

A total of 44 juvenile whitefish were caught but not identified to species in the field. Misidentification of juvenile whitefish is a common problem (Brown et al. 2012). Four voucher sam-

ples were later identified by ABR senior biologists as 1 humpback whitefish and 3 broad whitefish. Analysis of digital photographs allowed for the positive identification of an additional 10 whitefish as either humpback or broad whitefish.

Adult chum salmon (*Oncorhynchus keta*) are known to occur in Kotzebue Sound (Menard and Kent 2011). Additionally, an ADFG study of near-shore marine fish in Kotzebue Sound documented juvenile chum salmon between Lockhart Point (a coastal point on the Baldwin Peninsula northwest of Kotzebue) and Sadie Creek (Raymond et al. 1984). However, no juvenile or adult Pacific salmon were captured in Sadie Creek. The physical characteristics of Sadie Creek and its tributaries (low gradient, slow flowing, and fine organic substrates) suggest that salmon runs are unlikely to occur now or in the future (Bjornn and Reiser 1991), although occasional strays may be present.

FISH ABUNDANCE BY SAMPLING EVENT AND SITE

Different types of fishing gear catch different fish and at distinct rates (Pope et al. 1975). We used multiple combinations of sampling gear by site and between sampling events in response to on-site assessments of current water levels and flow (Table 5). For instance, fyke nets were deployed at some sites and only minnow traps were deployed at other sites. At some sampling sites, multiple gear types were deployed. We are confident that a thorough cross section of the fish community was collected in the sampling area through the use of this variety of capture methods.

Ninespine stickleback (Appendix D, Plate 8) were the most common fish caught during July and August surveys (Table 7) and were collected at all sample sites except the most inland site (TR3) (Table 8). Ninespine sticklebacks ranged in length from 16 to 72 mm, with a median of 35 mm and a mean of 37 mm ($n = 475$) (Figure 5, Appendix H). Most ninespine stickleback were caught in minnow traps, with a mean catch per unit effort (CPUE) of 21.22 fish/hour. Because of this high capture rate, overnight sets of minnow traps were not employed, due to concerns regarding the potential for high fish mortality. CPUE of ninespine stickleback was higher in August than in July (Figure 6).

Threespine stickleback were captured on both July and August survey trips, but in low numbers (Table 7). All threespine sticklebacks were caught with fyke nets and at the farthest downstream sites: NF1, NF3, and SF1 (Table 8).

Northern pike were captured primarily in fyke nets and, with 38 fish total, they were the second most common fish caught (Table 7; Appendix D, Plate 13). Two northern pike were caught in a minnow trap and none were caught in the seine net. Fork length ranged from 90–461 mm, with a median of 145 mm and a mean of 219 mm (Figure 5, Appendix H). Northern pike CPUE was higher in August (0.2 fish/hour) than in July (0.1 fish/hour) (Figure 6). Two different size classes of northern pike were captured: 100–200 mm and 350–500 mm (Figure 7). Although northern pike growth rates can vary widely in different waterbodies, depending on such factors as prey size, intraspecific competition, and number of warm degree days (Jacobson 1992), the size disparity within the Sadie Creek system may represent the failure of a year class within the fishery.

Three species of whitefish: broad whitefish, humpback whitefish, and least cisco (Appendix D, Plates 10, 11, and 12, respectively) were captured in the north and south forks of Sadie Creek (Table 8) and only in fyke nets. In July, only adult humpback whitefish were caught (Table 7). In August, juvenile and adult humpback whitefish, juvenile broad whitefish, and adult least cisco were caught. These capture results suggest temporal differences in the use of sampled creeks by different species and age classes of whitefish, but the capture of multiple life history stages and species in August may also have been because fyke net sets completely crossed the stream during that sampling period, whereas high water levels in July had precluded this.

Only juvenile broad whitefish were captured during sampling surveys (and only in August), suggesting that adults may have been in lakes or in the nearshore environment during the earlier sampling event. Many whitefish populations in Arctic Alaska migrate along the coast and into brackish and freshwater during summer to rear, feed, and sometimes overwinter (Brown et al. 2012). Juvenile broad whitefish may use Sadie Creek as a rearing and feeding area during the late summer period. It is possible that a June sampling trip would have yielded more adult specimens of all whitefish, as this is a period when subsistence fishers harvest whitefish at the mouth of Sadie Creek (S. Barr, personal communication, 27 July 2012).

Alaska blackfish were caught primarily in minnow traps and at only 2 sites, NF3 and TR3, during August sampling (Table 8; Appendix D, Plate 14). Most blackfish were caught at TR3, which is the farthest inland site and exhibited near slack flow. Blackfish primarily live in waters with low flow and are tolerant of low dissolved oxygen levels. For a complete list of species and lengths by site, refer to Appendix H.

SUMMARY

Harvest rates were low for most fish species captured during 2012 surveys, but the species assemblage was typical of Arctic Coastal Plain tundra streams (Morrow 1980). High water events during July sampling likely affected capture rates due to the inability to completely sample the cross sectional width of Sadie Creek at several locations. Furthermore, it is likely that several fish species migrate in and out of the Sadie Creek and its tributaries during early summer (mid to late June) and in fall (late August to early September). Indeed, juvenile humpback and broad whitefish were captured during Sadie Creek surveys, which is to be expected in smaller coastal streams as they go in search of summer food resources (Chang-Kue and Jessop 1992). In the case of adult of adult humpback whitefish, we know that they are likely not spawning/overwintering in Sadie Creek as they prefer to spawn in waters with gravel bottoms, while Sadie Creek substrate is predominately mud/organic in nature (McPhail and Lindsey 1970, Morrow 1980, Brown 2004, Brown 2009).

Further evidence for seasonal use of Sadie Creek by anadromous fish (e.g., whitefish) comes in the form of local knowledge by area residents who fish the mouth of Sadie Creek in early summer as fish out-migrate from the system, presumably from lakes but possibly from deeper pools in Sadie Creek. Thus, additional early summer sampling may have uncovered larger numbers of out-migrating fish of various life history stages, particularly from the connected lake systems in the survey area. EFH is of little concern in Sadie Creek as no federally protected fish species (i.e., Pacific salmon) have been identified in the stream to date. Furthermore, the substrate in Sadie Creek is not appropriate for the spawning needs of salmon.

Winter abundance and distribution of fish in Sadie Creek may differ from summer. This system supports ninespine and threespine stickleback, at least three species of whitefish (broad

whitefish, humpback whitefish, and least cisco), as well as northern pike and Alaska blackfish. No adult or juvenile salmon were captured in the system. Sadie Creek and its tributaries are relatively slow flowing, deeply incised streams with soft mud and organic bottoms. Though a complete bathymetric survey was not completed during fishing efforts, depths at fish sampling locations indicate that Sadie Creek does not necessarily freeze to the bottom throughout the course of its drainage in winter. ABR biologists were unable to cross Sadie Creek at any of the potential road crossings in July and August due to high waters. Larger pools of appropriate depth (i.e., >6 feet) in Sadie Creek could provide overwintering habitat for some fishes, particularly juvenile fishes (Moulton and George 2000). Further investigation of stream bathymetry and ice depths are needed to assess the availability of overwintering habitat in Sadie Creek and inform decisions regarding the need for and potential design of crossing structures within the study area.

Table 4. Continued.

	Wildlife Habitat (acres)			
Polar Bear ^c	x			
Red Fox				
Snowshoe Hare				
Tundra Hare				
	<i>Ursus maritimus</i>	<i>Vulpes vulpes</i>	<i>Lepus americanus</i>	<i>Lepus othus</i>
	(0.80)	(15.47)	(94.14)	(15.29)
	Coastal Beach and Waters	Rivers and Streams	Freshwater Lake or Pond	Littoral Aquatic Bed and Lacustrine Fringe
	(1052.88)	(3.94)	(45.70)	(1355.10)
	Wet Sedge-Shrub Meadow	Sedge Marsh	Moist Dwarf Shrub Tundra	Moist Sedge-Shrub Meadow
	(395.92)	(349.33)	(395.92)	(395.92)
	Low and Tall Willow Scrub	Low Birch-Ericaceous Scrub	Low and Tall Willow Scrub	Low Birch-Ericaceous Scrub
	(3.28)	(15.66)	(3.28)	(15.66)
	Tall Alder Scrub	Gravel Fill	Tall Alder Scrub	Gravel Fill

^a Species listed are likely to be common in the study area during some portion of their life history (e.g., breeding/mating, migration, staging, etc.). Uncommon or rare species that could occur sporadically are not listed. Habitat use for birds and mammals was determined from field observations in the study area in June 2012 and from available literature (Armstrong 1995, Schroeder 1996, Cook and MacDonald 2006, ADOT 2011).

^b The Yellow-billed Loon is a candidate species for listing as threatened or endangered under the U.S. Endangered Species Act.

^c The polar bear is a threatened species under the U.S. Endangered Species Act. The marine habitats surrounding the study area are designated critical habitat for this species. Potential use of terrestrial habitat is seasonal; limited to winter and spring.

Table 5. Site locations, sampling dates, and gear types deployed in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012. (F = fyke net, M = minnow trap, S = seine).

Site	Latitude	Longitude	Gear Type by Date					
			26 Jul	27 Jul	28 Jul	11 Aug	12 Aug	13 Aug
MS1	N66.81470	W162.51610			S			S
NF1	N66.81918	W162.48747	F	F, M	F, M	M		
NF2	N66.82193	W162.46741			M			
NF3	N66.82135	W162.48117				F	F	F
SF1	N66.81818	W162.48817	F	F, M	F, M	M		
SF2	N66.82412	W162.41506						F
TR1	N66.80969	W162.43021		M, S				
TR2	N66.86499	W162.41172				F	F	
TR3	N66.84338	W162.41017						M

Table 6. Ambient water chemistry by site in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012.

Site	Temperature (°C)		pH		Dissolved Oxygen (%)		Specific Conductance (µS/cm ¹)	
	July	August	July	August	July	August	July	August
MS1	12.1	16.5	7.1	6.3	98.1	84.3	461.1	255.7
NF1	11		7		82.8		420.6	
NF3		14		6.1		66.2		92.5
SF1	12		7.1		84.9		597.7	
SF2		14.3		6		91.2		68.1
TR1	10.6		6.7		66.7		964	
TR2		14.5		6.2		83.3		59.2
TR3		14.1		6		79.4		77.6

Table 7. Total catch by fish species in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012.

Species	Scientific name	July	August
Ninespine stickleback	<i>Pungitius pungitius</i>	299	888
Threespine stickleback	<i>Gasterosteus aculeatus</i>	4	4
Broad whitefish	<i>Coregonus nasus</i>		12
Humpback whitefish	<i>Coregonus clupeaformis</i>	3	10
Unidentified juvenile whitefish	<i>Coregonus</i> spp.		33
Least cisco	<i>Coregonus sardinella</i>		4
Northern pike	<i>Esox lucius</i>	1	37
Alaska blackfish	<i>Dallia pectoralis</i>		4

Table 8. Total catch by fish species and site in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012.

Species	MSI		NF1		NF2		NF3		SF1		SF2		TR1		TR2		TR3	
	July	Aug																
Ninespine stickleback	27	90	230	1	1	1	112	12	543	20	29							122
Threespine stickleback			1				4	3										
Broad whitefish							12											
Humpback whitefish			2				10	1										
Unknown juvenile whitefish							26			7								
Least cisco							4											
Northern pike							9	1		19								2
Alaska blackfish							1											3

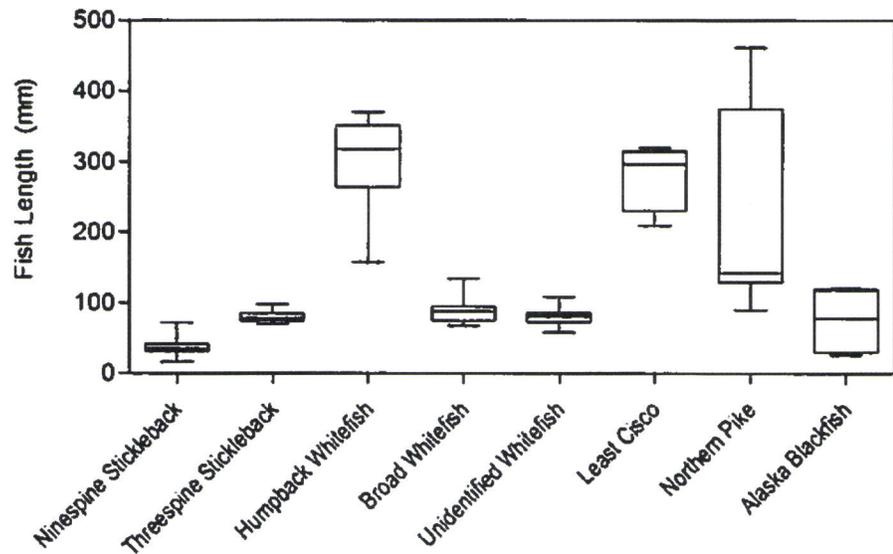


Figure 5. Fish length by species for fish caught in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012. Boxes represent the lower quartile, median, and upper quartile and whiskers represent minimum and maximum values.

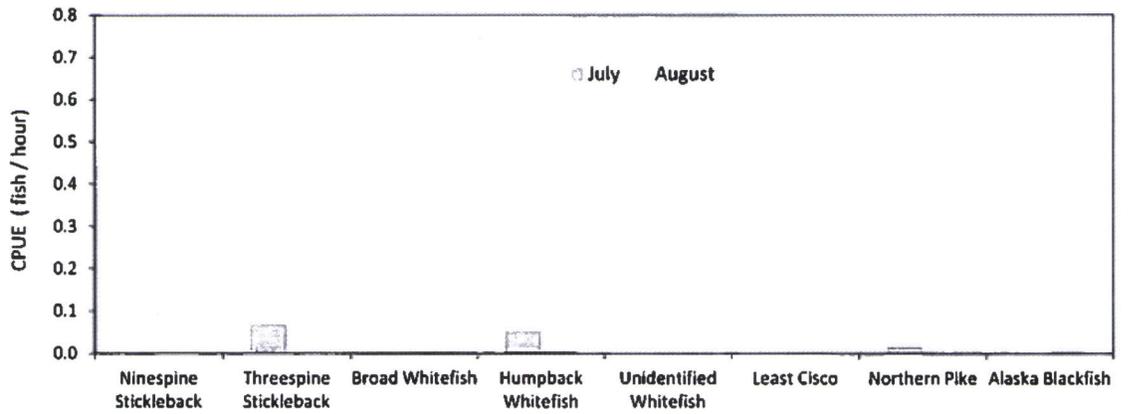


Figure 6. Catch per unit effort (CPUE) by species in fyke nets in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012.

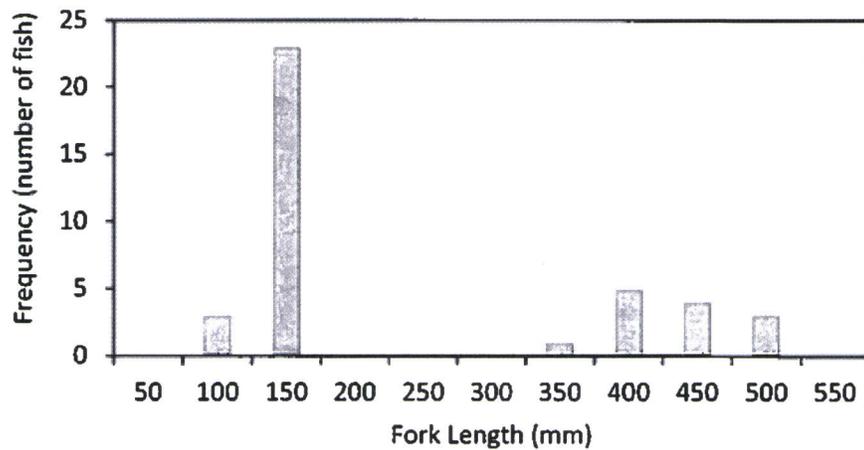


Figure 7. Distribution of values of fork length (mm) of northern pike caught in fyke nets and minnow traps in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012.

Appendix D. Plates 1–13: photos documenting fisheries investigations for the Cape Blossom to Kotzebue Road, Alaska, 2012.

SITE PHOTOS



Plate 1. Site MS1, looking upstream



Plate 2. Aerial photo looking upstream of the north and south of Sadie Creek



Plate 3. Site NF2, looking upstream on north fork of Sadie Creek



Plate 4. Example of a fyke net set along stream margins, Site NF1



Plate 5. Aerial view of fyke nets set cod-end to cod-end



Plate 6. Fyke net blocking stream, Site NF3



Plate 7. Looking upstream on typical riparian vegetation of grasses, Site SF2



Plate 8. Nine-spine stickleback caught at Site TR1



Plate 9. Three-spine stickleback caught at Site NF3



Plate 10. Juvenile broad whitefish caught at Site SF2



Plate 11. Adult humpback whitefish caught at Site NF3

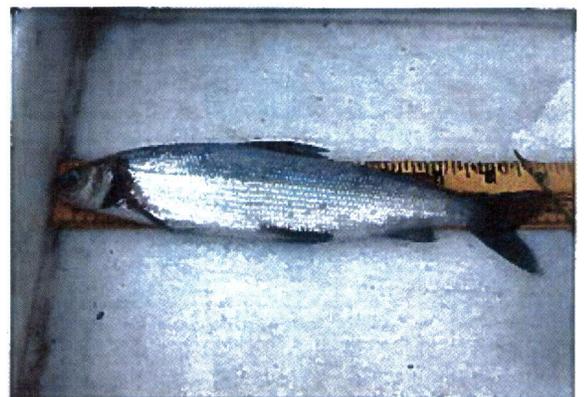


Plate 12. Adult least cisco caught at Site NF3



Plate 13. Northern pike caught at Site TR2

Appendix E. Stream wetted widths, depths, velocity, and discharge data measured at 3 sites in Sadie Creek and its tributaries near Kotzebue, Alaska, 11–13 August 2012. Discharge for each width increment was calculated by multiplying that increment's depth and velocity. Total discharge for the entire wetted width was calculated by adding incremental discharge by site.

Site	Date	Wetted Width (m)	Width Increment (m)	Increment Depth (m)	Increment Velocity (m/s)	Increment Discharge (m ³ /s)	Total Discharge by Site (m ³ /s)
NF3	11 Aug 12	2.2	0.22	0.73	0.02	0.003	0.069
NF3	11 Aug 12		0.44	0.88	0.02	0.004	
NF3	11 Aug 12		0.66	0.9	0.06	0.012	
NF3	11 Aug 12		0.88	0.79	0.04	0.007	
NF3	11 Aug 12		1.1	0.9	0.05	0.010	
NF3	11 Aug 12		1.32	0.9	0.04	0.008	
NF3	11 Aug 12		1.54	0.9	0.03	0.006	
NF3	11 Aug 12		1.76	0.88	0.05	0.010	
NF3	11 Aug 12		1.98	0.86	0.03	0.006	
NF3	11 Aug 12		2.2	0.44	0.04	0.004	
TR2	11 Aug 12	8	0.80	0.64	0.02	0.010	0.131
TR2	11 Aug 12		1.60	0.58	0.01	0.005	
TR2	11 Aug 12		2.40	0.68	0.04	0.022	
TR2	11 Aug 12		3.20	0.66	0.03	0.016	
TR2	11 Aug 12		4.00	0.72	0.03	0.017	
TR2	11 Aug 12		4.80	0.74	0.02	0.012	
TR2	11 Aug 12		5.60	0.7	0.03	0.017	
TR2	11 Aug 12		6.40	0.66	0.02	0.011	
TR2	11 Aug 12		7.20	0.52	0.02	0.008	
TR2	11 Aug 12		8.00	0.56	0.03	0.013	
SF2	13 Aug 12	5.5	0.55	0.52	0.08	0.023	0.290
SF2	13 Aug 12		1.10	0.58	0.13	0.041	
SF2	13 Aug 12		1.65	0.56	0.09	0.028	
SF2	13 Aug 12		2.20	0.62	0.08	0.027	
SF2	13 Aug 12		2.75	0.66	0.01	0.004	
SF2	13 Aug 12		3.30	0.64	0.11	0.039	
SF2	13 Aug 12		3.85	0.7	0.14	0.054	
SF2	13 Aug 12		4.40	0.62	0.05	0.017	
SF2	13 Aug 12		4.95	0.58	0.1	0.032	
SF2	13 Aug 12		5.50	0.58	0.08	0.026	

Appendix F. ADFG Fish Resource Permit #SF2012-259.

Appendix G. Typical fish species found in fresh and brackish waters in northern Alaska.

Species	Scientific name	Life Stage
Pink salmon	<i>Oncorhynchus gorbuscha</i>	Adult, juvenile
Chum salmon	<i>Oncorhynchus keta</i>	Adult, juvenile
Coho salmon	<i>Oncorhynchus ksutch</i>	Adult, juvenile
Sockeye salmon	<i>Oncorhynchus nerka</i>	Adult, juvenile
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	Adult, juvenile
Dolly Varden	<i>Salvelinus malma</i>	Adult, juvenile
Arctic grayling	<i>Thymallus arcticus</i>	Adult, juvenile
Round whitefish	<i>Prosopium cylindraceum</i>	Adult, juvenile
Broad whitefish	<i>Coregonus nasus</i>	Adult, juvenile
Humpback whitefish	<i>Coregonus clupeaformis</i>	Adult, juvenile
Bering cisco	<i>Coregonus laurettae</i>	Adult, juvenile
Least cisco	<i>Coregonus sardinella</i>	Adult, juvenile
Sheefish	<i>Stenodus leucichthys</i>	Adult, juvenile
Northern pike	<i>Esox lucius</i>	Adult, juvenile
Burbot	<i>Lota lota</i>	Adult, juvenile
Alaska blackfish	<i>Dallia pectoralis</i>	Adult, juvenile
Longnose sucker	<i>Catostomus catostomus</i>	Adult, juvenile
Slimy sculpin	<i>Cottus cognatus</i>	Adult, juvenile
Ninespine stickleback	<i>Pungitius pungitius</i>	Adult, juvenile
Threespine stickleback	<i>Gasterosteus aculeatus</i>	Adult, juvenile

Appendix H. Fish lengths by site and gear type in Sadie Creek and its tributaries near Kotzebue, Alaska, 26–28 July and 11–13 August 2012.

Date	Site	Gear	Species	Length (mm)
26 Jul 12	SF1	Fyke	Humpback Whitefish	296
26 Jul 12	NF1	Fyke	Humpback Whitefish	325
27 Jul 12	NF1	Minnow	Ninespine Stickleback	36
27 Jul 12	NF1	Minnow	Ninespine Stickleback	27
27 Jul 12	NF1	Minnow	Ninespine Stickleback	31
27 Jul 12	NF1	Minnow	Ninespine Stickleback	36
27 Jul 12	NF1	Minnow	Ninespine Stickleback	33
27 Jul 12	NF1	Minnow	Ninespine Stickleback	36
27 Jul 12	NF1	Minnow	Ninespine Stickleback	25
27 Jul 12	NF1	Minnow	Ninespine Stickleback	31
27 Jul 12	NF1	Minnow	Ninespine Stickleback	35
27 Jul 12	NF1	Minnow	Ninespine Stickleback	37
27 Jul 12	SF1	Fyke	Threespine Stickleback	70
27 Jul 12	SF1	Fyke	Northern Pike	345
27 Jul 12	TR1	Seine	Ninespine Stickleback	21
27 Jul 12	TR1	Seine	Ninespine Stickleback	35
27 Jul 12	TR1	Seine	Ninespine Stickleback	34
27 Jul 12	TR1	Seine	Ninespine Stickleback	32
27 Jul 12	TR1	Seine	Ninespine Stickleback	28
27 Jul 12	TR1	Seine	Ninespine Stickleback	26
27 Jul 12	TR1	Seine	Ninespine Stickleback	34
27 Jul 12	TR1	Seine	Ninespine Stickleback	33
27 Jul 12	TR1	Seine	Ninespine Stickleback	35
27 Jul 12	TR1	Seine	Ninespine Stickleback	34
27 Jul 12	TR1	Seine	Ninespine Stickleback	35
27 Jul 12	TR1	Seine	Ninespine Stickleback	32
27 Jul 12	TR1	Seine	Ninespine Stickleback	30
27 Jul 12	TR1	Seine	Ninespine Stickleback	29
27 Jul 12	TR1	Seine	Ninespine Stickleback	30
27 Jul 12	TR1	Seine	Ninespine Stickleback	28
27 Jul 12	TR1	Seine	Ninespine Stickleback	25
27 Jul 12	TR1	Seine	Ninespine Stickleback	30
27 Jul 12	TR1	Seine	Ninespine Stickleback	24
27 Jul 12	TR1	Seine	Ninespine Stickleback	36
27 Jul 12	TR1	Seine	Ninespine Stickleback	33
27 Jul 12	TR1	Seine	Ninespine Stickleback	31
27 Jul 12	TR1	Seine	Ninespine Stickleback	39
27 Jul 12	TR1	Seine	Ninespine Stickleback	33
27 Jul 12	TR1	Seine	Ninespine Stickleback	31

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
27 Jul 12	TR1	Seine	Ninespine Stickleback	32
27 Jul 12	TR1	Seine	Ninespine Stickleback	34
27 Jul 12	TR1	Seine	Ninespine Stickleback	32
27 Jul 12	SF1	Minnow	Ninespine Stickleback	34
27 Jul 12	SF1	Minnow	Ninespine Stickleback	34
27 Jul 12	SF1	Minnow	Ninespine Stickleback	31
27 Jul 12	SF1	Minnow	Ninespine Stickleback	31
27 Jul 12	SF1	Minnow	Ninespine Stickleback	26
27 Jul 12	SF1	Minnow	Ninespine Stickleback	26
27 Jul 12	SF1	Minnow	Ninespine Stickleback	26
27 Jul 12	SF1	Minnow	Ninespine Stickleback	40
27 Jul 12	SF1	Minnow	Ninespine Stickleback	36
27 Jul 12	SF1	Minnow	Ninespine Stickleback	33
27 Jul 12	SF1	Minnow	Ninespine Stickleback	26
27 Jul 12	SF1	Minnow	Ninespine Stickleback	23
28 Jul 12	SF1	Fyke	Threespine Stickleback	98
28 Jul 12	NF1	Fyke	Threespine Stickleback	85
28 Jul 12	NF1	Fyke	Humpback Whitefish	370
28 Jul 12	SF1	Fyke	Threespine Stickleback	85
28 Jul 12	NF2	Minnow	Ninespine Stickleback	26
28 Jul 12	MS1	Seine	Ninespine Stickleback	34
28 Jul 12	MS1	Seine	Ninespine Stickleback	32
28 Jul 12	MS1	Seine	Ninespine Stickleback	34
28 Jul 12	MS1	Seine	Ninespine Stickleback	39
28 Jul 12	MS1	Seine	Ninespine Stickleback	40
28 Jul 12	MS1	Seine	Ninespine Stickleback	34
28 Jul 12	MS1	Seine	Ninespine Stickleback	37
28 Jul 12	MS1	Seine	Ninespine Stickleback	35
28 Jul 12	MS1	Seine	Ninespine Stickleback	35
28 Jul 12	MS1	Seine	Ninespine Stickleback	26
28 Jul 12	MS1	Seine	Ninespine Stickleback	32
28 Jul 12	MS1	Seine	Ninespine Stickleback	30
28 Jul 12	MS1	Seine	Ninespine Stickleback	40
28 Jul 12	MS1	Seine	Ninespine Stickleback	31
28 Jul 12	MS1	Seine	Ninespine Stickleback	36
28 Jul 12	MS1	Seine	Ninespine Stickleback	34
28 Jul 12	MS1	Seine	Ninespine Stickleback	35
28 Jul 12	MS1	Seine	Ninespine Stickleback	35
28 Jul 12	MS1	Seine	Ninespine Stickleback	34
28 Jul 12	MS1	Seine	Ninespine Stickleback	34
28 Jul 12	MS1	Seine	Ninespine Stickleback	28

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
28 Jul 12	MS1	Seine	Ninespine Stickleback	36
28 Jul 12	MS1	Seine	Ninespine Stickleback	37
28 Jul 12	MS1	Seine	Ninespine Stickleback	35
28 Jul 12	MS1	Seine	Ninespine Stickleback	32
28 Jul 12	MS1	Seine	Ninespine Stickleback	26
28 Jul 12	MS1	Seine	Ninespine Stickleback	39
28 Jul 12	NF1	Minnow	Ninespine Stickleback	27
28 Jul 12	NF1	Minnow	Ninespine Stickleback	30
28 Jul 12	NF1	Minnow	Ninespine Stickleback	34
28 Jul 12	NF1	Minnow	Ninespine Stickleback	29
28 Jul 12	NF1	Minnow	Ninespine Stickleback	33
28 Jul 12	NF1	Minnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnow	Ninespine Stickleback	35
28 Jul 12	NF1	Minnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnow	Ninespine Stickleback	23
28 Jul 12	NF1	Minnow	Ninespine Stickleback	25
28 Jul 12	NF1	Minnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnow	Ninespine Stickleback	35
28 Jul 12	NF1	Minnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnow	Ninespine Stickleback	26
28 Jul 12	NF1	Minnow	Ninespine Stickleback	27
28 Jul 12	NF1	Minnow	Ninespine Stickleback	56
28 Jul 12	NF1	Minnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnow	Ninespine Stickleback	36
28 Jul 12	NF1	Minnow	Ninespine Stickleback	30
28 Jul 12	NF1	Minnow	Ninespine Stickleback	35
28 Jul 12	NF1	Minnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnow	Ninespine Stickleback	26
28 Jul 12	NF1	Minnow	Ninespine Stickleback	29
28 Jul 12	NF1	Minnow	Ninespine Stickleback	30
28 Jul 12	NF1	Minnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnow	Ninespine Stickleback	29
28 Jul 12	NF1	Minnow	Ninespine Stickleback	28
28 Jul 12	NF1	Minnow	Ninespine Stickleback	26
28 Jul 12	NF1	Minnow	Ninespine Stickleback	57
28 Jul 12	NF1	Minnow	Ninespine Stickleback	25
28 Jul 12	NF1	Minnow	Ninespine Stickleback	35
28 Jul 12	NF1	Minnow	Ninespine Stickleback	46
28 Jul 12	NF1	Minnow	Ninespine Stickleback	33

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	28
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	25
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	34
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	51
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	30
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	27
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	34
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	35
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	25
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	26
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	21
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	31
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	36
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	26
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	27
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	29
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	26
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	24
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	32
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	25
28 Jul 12	NF1	Minnnow	Ninespine Stickleback	26
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	36
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	39
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	25
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	34
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	33
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	38
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	25
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	40
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	34
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	33
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	31
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	33
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	38
28 Jul 12	SF1	Minnnow	Ninespine Stickleback	30

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
28 Jul 12	SF1	Minnow	Ninespine Stickleback	47
28 Jul 12	SF1	Minnow	Ninespine Stickleback	36
28 Jul 12	SF1	Minnow	Ninespine Stickleback	37
28 Jul 12	SF1	Minnow	Ninespine Stickleback	35
28 Jul 12	SF1	Minnow	Ninespine Stickleback	39
28 Jul 12	SF1	Minnow	Ninespine Stickleback	43
28 Jul 12	SF1	Minnow	Ninespine Stickleback	41
28 Jul 12	SF1	Minnow	Ninespine Stickleback	41
28 Jul 12	SF1	Minnow	Ninespine Stickleback	36
28 Jul 12	SF1	Minnow	Ninespine Stickleback	38
28 Jul 12	SF1	Minnow	Ninespine Stickleback	36
28 Jul 12	SF1	Minnow	Ninespine Stickleback	39
28 Jul 12	SF1	Minnow	Ninespine Stickleback	32
28 Jul 12	SF1	Minnow	Ninespine Stickleback	33
28 Jul 12	SF1	Minnow	Ninespine Stickleback	36
28 Jul 12	SF1	Minnow	Ninespine Stickleback	52
11 Aug 12	NF3	Fyke	Least Cisco	209
11 Aug 12	NF3	Fyke	Humpback Whitefish	157
11 Aug 12	NF3	Fyke	Broad Whitefish	134
11 Aug 12	NF3	Fyke	Broad Whitefish	97
			Unidentified Juvenile	
11 Aug 12	NF3	Fyke	Whitefish	98
			Unidentified Juvenile	
11 Aug 12	NF3	Fyke	Whitefish	109
11 Aug 12	NF3	Fyke	Broad Whitefish	88
11 Aug 12	NF3	Fyke	Broad Whitefish	75
			Unidentified Juvenile	
11 Aug 12	NF3	Fyke	Whitefish	80
11 Aug 12	NF3	Fyke	Broad Whitefish	90
11 Aug 12	NF3	Fyke	Broad Whitefish	75
			Unidentified Juvenile	
11 Aug 12	NF3	Fyke	Whitefish	75
11 Aug 12	NF3	Fyke	Broad Whitefish	89
11 Aug 12	NF3	Fyke	Broad Whitefish	88
			Unidentified Juvenile	
11 Aug 12	NF3	Fyke	Whitefish	83
11 Aug 12	NF3	Fyke	Broad Whitefish	68
11 Aug 12	NF3	Fyke	Threespine Stickleback	80
11 Aug 12	NF3	Fyke	Humpback Whitefish	353
11 Aug 12	NF3	Fyke	Humpback Whitefish	295
			Unidentified Juvenile	
11 Aug 12	NF3	Fyke	Whitefish	85
11 Aug 12	NF3	Fyke	Unidentified Juvenile	86

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
			Whitefish	
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	94
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	58
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	75
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	81
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	83
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	71
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	71
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	81
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	73
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	75
11 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	78
11 Aug 12	NF3	Fyke	Broad Whitefish	84
11 Aug 12	NF3	Fyke	Broad Whitefish	69
11 Aug 12	NF3	Fyke	Humpback Whitefish	318
11 Aug 12	NF3	Fyke	Humpback Whitefish	330
11 Aug 12	NF3	Fyke	Humpback Whitefish	367
11 Aug 12	TR2	Fyke	Northern Pike	452
11 Aug 12	TR2	Fyke	Northern Pike	411
11 Aug 12	TR2	Fyke	Northern Pike	420
11 Aug 12	TR2	Fyke	Northern Pike	417
11 Aug 12	NF1	Minnnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	43
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	27
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	27
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	41
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	45
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	33
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	41
11 Aug 12	SF1	Minnnow	Ninespine Stickleback	38

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
11 Aug 12	SF1	Minnow	Ninespine Stickleback	32
11 Aug 12	SF1	Minnow	Ninespine Stickleback	24
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	40
11 Aug 12	SF1	Minnow	Ninespine Stickleback	41
11 Aug 12	SF1	Minnow	Ninespine Stickleback	26
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	40
11 Aug 12	SF1	Minnow	Ninespine Stickleback	30
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnow	Ninespine Stickleback	44
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	44
11 Aug 12	SF1	Minnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnow	Ninespine Stickleback	44
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	46
11 Aug 12	SF1	Minnow	Ninespine Stickleback	48
11 Aug 12	SF1	Minnow	Ninespine Stickleback	42
11 Aug 12	SF1	Minnow	Ninespine Stickleback	27
11 Aug 12	SF1	Minnow	Ninespine Stickleback	32
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	44
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	32
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	41
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	33
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
11 Aug 12	SF1	Minnow	Ninespine Stickleback	32
11 Aug 12	SF1	Minnow	Ninespine Stickleback	33
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	41
11 Aug 12	SF1	Minnow	Ninespine Stickleback	33
11 Aug 12	SF1	Minnow	Ninespine Stickleback	41
11 Aug 12	SF1	Minnow	Ninespine Stickleback	43
11 Aug 12	SF1	Minnow	Ninespine Stickleback	29
11 Aug 12	SF1	Minnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	33
11 Aug 12	SF1	Minnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	40
11 Aug 12	SF1	Minnow	Ninespine Stickleback	30
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnow	Ninespine Stickleback	40
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	42
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	29
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	37
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	40

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
11 Aug 12	SF1	Minnow	Ninespine Stickleback	59
11 Aug 12	SF1	Minnow	Ninespine Stickleback	34
11 Aug 12	SF1	Minnow	Ninespine Stickleback	32
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	35
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
11 Aug 12	SF1	Minnow	Ninespine Stickleback	29
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnow	Ninespine Stickleback	39
11 Aug 12	SF1	Minnow	Ninespine Stickleback	32
11 Aug 12	SF1	Minnow	Ninespine Stickleback	31
11 Aug 12	SF1	Minnow	Ninespine Stickleback	36
11 Aug 12	SF1	Minnow	Ninespine Stickleback	33
11 Aug 12	SF1	Minnow	Ninespine Stickleback	38
12 Aug 12	NF3	Fyke	Northern Pike	461
12 Aug 12	NF3	Fyke	Broad Whitefish	106
12 Aug 12	NF3	Fyke	Least Cisco	299
12 Aug 12	NF3	Fyke	Least Cisco	320
12 Aug 12	NF3	Fyke	Least Cisco	295
12 Aug 12	NF3	Fyke	Humpback Whitefish	240
12 Aug 12	NF3	Fyke	Humpback Whitefish	235
12 Aug 12	NF3	Fyke	Humpback Whitefish	352
12 Aug 12	NF3	Fyke	Humpback Whitefish	289
12 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	80
12 Aug 12	NF3	Fyke	Threespine Stickleback	78
12 Aug 12	TR2	Fyke	Northern Pike	359
12 Aug 12	TR2	Fyke	Northern Pike	398
12 Aug 12	TR2	Fyke	Northern Pike	385
13 Aug 12	NF3	Fyke	Threespine Stickleback	75
13 Aug 12	NF3	Fyke	Ninespine Stickleback	33
13 Aug 12	NF3	Fyke	Ninespine Stickleback	30
13 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	64
13 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	81
13 Aug 12	NF3	Fyke	Ninespine Stickleback	40
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
13 Aug 12	NF3	Fyke	Ninespine Stickleback	27
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	34
13 Aug 12	NF3	Fyke	Ninespine Stickleback	34
13 Aug 12	NF3	Fyke	Ninespine Stickleback	35
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	31
13 Aug 12	NF3	Fyke	Ninespine Stickleback	29
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	41
13 Aug 12	NF3	Fyke	Ninespine Stickleback	32
13 Aug 12	NF3	Fyke	Ninespine Stickleback	33
13 Aug 12	NF3	Fyke	Ninespine Stickleback	29
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	61
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	34
13 Aug 12	NF3	Fyke	Ninespine Stickleback	34
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	28
13 Aug 12	NF3	Fyke	Ninespine Stickleback	38
13 Aug 12	NF3	Fyke	Ninespine Stickleback	24
13 Aug 12	NF3	Fyke	Ninespine Stickleback	38
13 Aug 12	NF3	Fyke	Ninespine Stickleback	24
13 Aug 12	NF3	Fyke	Ninespine Stickleback	28
13 Aug 12	NF3	Fyke	Ninespine Stickleback	30
13 Aug 12	NF3	Fyke	Ninespine Stickleback	33
13 Aug 12	NF3	Fyke	Ninespine Stickleback	30
13 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	68
13 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	70
13 Aug 12	NF3	Fyke	Alaska Blackfish	26
13 Aug 12	NF3	Fyke	Northern Pike	114
13 Aug 12	NF3	Fyke	Northern Pike	99
13 Aug 12	NF3	Fyke	Unidentified Juvenile Whitefish	73
13 Aug 12	SF2	Fyke	Northern Pike	132
13 Aug 12	SF2	Fyke	Northern Pike	147
13 Aug 12	SF2	Fyke	Northern Pike	135
13 Aug 12	SF2	Fyke	Northern Pike	148
13 Aug 12	SF2	Fyke	Northern Pike	145

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
13 Aug 12	SF2	Fyke	Northern Pike	125
13 Aug 12	SF2	Fyke	Northern Pike	134
13 Aug 12	SF2	Fyke	Northern Pike	127
13 Aug 12	SF2	Fyke	Northern Pike	149
13 Aug 12	SF2	Fyke	Northern Pike	139
13 Aug 12	SF2	Fyke	Northern Pike	137
13 Aug 12	SF2	Fyke	Northern Pike	146
13 Aug 12	SF2	Fyke	Northern Pike	142
13 Aug 12	SF2	Fyke	Northern Pike	131
13 Aug 12	SF2	Fyke	Northern Pike	134
13 Aug 12	SF2	Fyke	Northern Pike	131
13 Aug 12	SF2	Fyke	Ninespine Stickleback	58
13 Aug 12	SF2	Fyke	Ninespine Stickleback	59
13 Aug 12	SF2	Fyke	Ninespine Stickleback	56
13 Aug 12	SF2	Fyke	Ninespine Stickleback	49
13 Aug 12	SF2	Fyke	Ninespine Stickleback	70
13 Aug 12	SF2	Fyke	Ninespine Stickleback	72
13 Aug 12	SF2	Fyke	Ninespine Stickleback	50
13 Aug 12	SF2	Fyke	Ninespine Stickleback	53
13 Aug 12	SF2	Fyke	Ninespine Stickleback	61
13 Aug 12	SF2	Fyke	Ninespine Stickleback	63
13 Aug 12	SF2	Fyke	Ninespine Stickleback	67
13 Aug 12	SF2	Fyke	Ninespine Stickleback	62
13 Aug 12	SF2	Fyke	Ninespine Stickleback	55
13 Aug 12	SF2	Fyke	Ninespine Stickleback	50
13 Aug 12	SF2	Fyke	Ninespine Stickleback	66
13 Aug 12	SF2	Fyke	Ninespine Stickleback	50
13 Aug 12	SF2	Fyke	Ninespine Stickleback	45
13 Aug 12	SF2	Fyke	Ninespine Stickleback	46
13 Aug 12	SF2	Fyke	Ninespine Stickleback	38
13 Aug 12	MS1	Seine	Ninespine Stickleback	16
13 Aug 12	MS1	Seine	Ninespine Stickleback	34
13 Aug 12	MS1	Seine	Ninespine Stickleback	37
13 Aug 12	MS1	Seine	Ninespine Stickleback	36
13 Aug 12	MS1	Seine	Ninespine Stickleback	31
13 Aug 12	MS1	Seine	Ninespine Stickleback	42
13 Aug 12	MS1	Seine	Ninespine Stickleback	38
13 Aug 12	MS1	Seine	Ninespine Stickleback	39
13 Aug 12	MS1	Seine	Ninespine Stickleback	45
13 Aug 12	MS1	Seine	Ninespine Stickleback	38
13 Aug 12	MS1	Seine	Ninespine Stickleback	39

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
13 Aug 12	MS1	Seine	Ninespine Stickleback	42
13 Aug 12	MS1	Seine	Ninespine Stickleback	40
13 Aug 12	MS1	Seine	Ninespine Stickleback	38
13 Aug 12	MS1	Seine	Ninespine Stickleback	34
13 Aug 12	MS1	Seine	Ninespine Stickleback	45
13 Aug 12	MS1	Seine	Ninespine Stickleback	38
13 Aug 12	MS1	Seine	Ninespine Stickleback	33
13 Aug 12	MS1	Seine	Ninespine Stickleback	39
13 Aug 12	MS1	Seine	Ninespine Stickleback	43
13 Aug 12	MS1	Seine	Ninespine Stickleback	37
13 Aug 12	MS1	Seine	Ninespine Stickleback	42
13 Aug 12	MS1	Seine	Ninespine Stickleback	31
13 Aug 12	MS1	Seine	Ninespine Stickleback	33
13 Aug 12	MS1	Seine	Ninespine Stickleback	33
13 Aug 12	MS1	Seine	Ninespine Stickleback	43
13 Aug 12	MS1	Seine	Ninespine Stickleback	42
13 Aug 12	MS1	Seine	Ninespine Stickleback	44
13 Aug 12	MS1	Seine	Ninespine Stickleback	38
13 Aug 12	MS1	Seine	Ninespine Stickleback	43
13 Aug 12	NF3	Fyke	Northern Pike	393
13 Aug 12	NF3	Fyke	Ninespine Stickleback	31
13 Aug 12	NF3	Fyke	Northern Pike	124
13 Aug 12	NF3	Fyke	Northern Pike	90
			Unidentified Juvenile	
13 Aug 12	NF3	Fyke	Whitefish	91
13 Aug 12	NF3	Fyke	Northern Pike	112
13 Aug 12	NF3	Fyke	Northern Pike	113
13 Aug 12	NF3	Fyke	Threespine Stickleback	74
13 Aug 12	NF3	Fyke	Ninespine Stickleback	33
13 Aug 12	NF3	Fyke	Ninespine Stickleback	35
13 Aug 12	NF3	Fyke	Ninespine Stickleback	43
13 Aug 12	NF3	Fyke	Ninespine Stickleback	42
13 Aug 12	NF3	Fyke	Ninespine Stickleback	27
13 Aug 12	NF3	Fyke	Ninespine Stickleback	32
13 Aug 12	NF3	Fyke	Ninespine Stickleback	31
13 Aug 12	NF3	Fyke	Ninespine Stickleback	42
13 Aug 12	NF3	Fyke	Ninespine Stickleback	36
13 Aug 12	NF3	Fyke	Ninespine Stickleback	23
13 Aug 12	NF3	Fyke	Ninespine Stickleback	31
13 Aug 12	NF3	Fyke	Ninespine Stickleback	31
13 Aug 12	NF3	Fyke	Ninespine Stickleback	30
13 Aug 12	NF3	Fyke	Ninespine Stickleback	32

Appendix H. Continued.

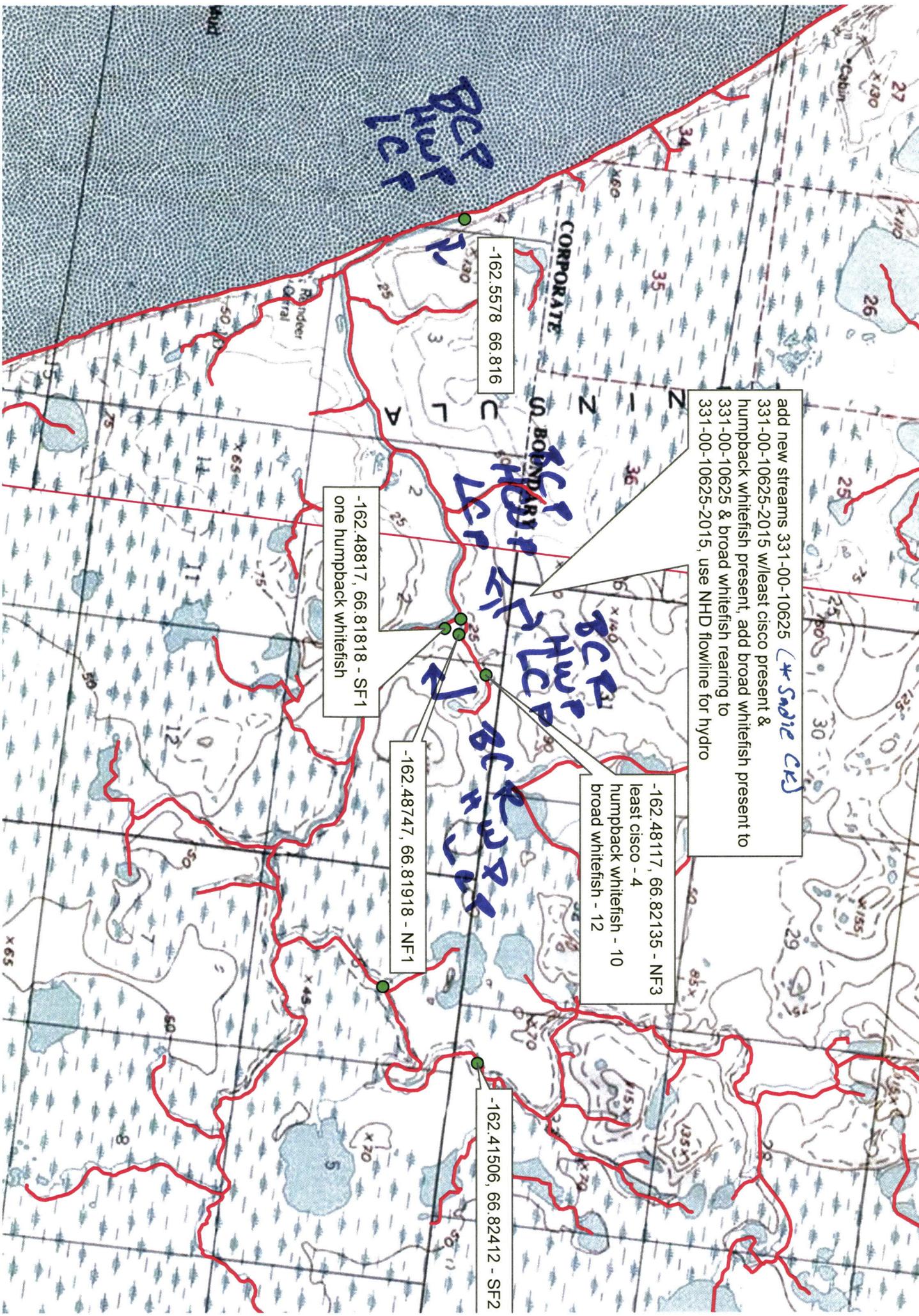
Date	Site	Gear	Species	Length (mm)
13 Aug 12	NF3	Fyke	Ninespine Stickleback	30
13 Aug 12	NF3	Fyke	Ninespine Stickleback	19
13 Aug 12	NF3	Fyke	Ninespine Stickleback	32
13 Aug 12	NF3	Fyke	Ninespine Stickleback	18
13 Aug 12	NF3	Fyke	Ninespine Stickleback	27
13 Aug 12	NF3	Fyke	Ninespine Stickleback	24
13 Aug 12	NF3	Fyke	Ninespine Stickleback	18
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	27
13 Aug 12	NF3	Fyke	Ninespine Stickleback	31
13 Aug 12	NF3	Fyke	Ninespine Stickleback	26
13 Aug 12	NF3	Fyke	Ninespine Stickleback	23
13 Aug 12	NF3	Fyke	Ninespine Stickleback	24
13 Aug 12	NF3	Fyke	Ninespine Stickleback	23
13 Aug 12	NF3	Fyke	Ninespine Stickleback	28
13 Aug 12	SF2	Fyke	Northern Pike	145
13 Aug 12	SF2	Fyke	Northern Pike	365
13 Aug 12	SF2	Fyke	Unidentified Juvenile Whitefish	88
13 Aug 12	SF2	Fyke	Unidentified Juvenile Whitefish	75
13 Aug 12	SF2	Fyke	Unidentified Juvenile Whitefish	90
13 Aug 12	SF2	Fyke	Unidentified Juvenile Whitefish	81
13 Aug 12	SF2	Fyke	Unidentified Juvenile Whitefish	86
13 Aug 12	SF2	Fyke	Ninespine Stickleback	40
13 Aug 12	SF2	Fyke	Northern Pike	446
13 Aug 12	SF2	Fyke	Unidentified Juvenile Whitefish	81
13 Aug 12	TR3	Minnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnow	Ninespine Stickleback	65
13 Aug 12	TR3	Minnow	Ninespine Stickleback	36
13 Aug 12	TR3	Minnow	Ninespine Stickleback	40
13 Aug 12	TR3	Minnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
13 Aug 12	TR3	Minnow	Ninespine Stickleback	46
13 Aug 12	TR3	Minnow	Ninespine Stickleback	39
13 Aug 12	TR3	Minnow	Ninespine Stickleback	37
13 Aug 12	TR3	Minnow	Ninespine Stickleback	35
13 Aug 12	TR3	Minnow	Ninespine Stickleback	39
13 Aug 12	TR3	Minnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnow	Ninespine Stickleback	33
13 Aug 12	TR3	Minnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnow	Ninespine Stickleback	34
13 Aug 12	TR3	Minnow	Ninespine Stickleback	52
13 Aug 12	TR3	Minnow	Ninespine Stickleback	41
13 Aug 12	TR3	Minnow	Ninespine Stickleback	40
13 Aug 12	TR3	Minnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnow	Ninespine Stickleback	38
13 Aug 12	TR3	Minnow	Ninespine Stickleback	37
13 Aug 12	TR3	Minnow	Ninespine Stickleback	39
13 Aug 12	TR3	Minnow	Ninespine Stickleback	40
13 Aug 12	TR3	Minnow	Ninespine Stickleback	43
13 Aug 12	TR3	Minnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnow	Alaska Blackfish	42
13 Aug 12	TR3	Minnow	Ninespine Stickleback	49
13 Aug 12	TR3	Minnow	Ninespine Stickleback	40
13 Aug 12	TR3	Minnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnow	Ninespine Stickleback	50
13 Aug 12	TR3	Minnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	48
13 Aug 12	TR3	Minnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnow	Ninespine Stickleback	46
13 Aug 12	TR3	Minnow	Ninespine Stickleback	43
13 Aug 12	TR3	Minnow	Ninespine Stickleback	46
13 Aug 12	TR3	Minnow	Ninespine Stickleback	54
13 Aug 12	TR3	Minnow	Ninespine Stickleback	50
13 Aug 12	TR3	Minnow	Ninespine Stickleback	48
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnow	Ninespine Stickleback	50

Appendix H. Continued.

Date	Site	Gear	Species	Length (mm)
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	53
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	50
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	55
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	48
13 Aug 12	TR3	Minnnow	Northern Pike	133
13 Aug 12	TR3	Minnnow	Alaska Blackfish	120
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	72
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	48
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	46
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	37
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	46
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	46
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	43
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	47
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	51
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	43
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	44
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	49
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	45
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	43
13 Aug 12	TR3	Minnnow	Ninespine Stickleback	42
13 Aug 12	TR3	Minnnow	Northern Pike	127
13 Aug 12	TR3	Minnnow	Alaska Blackfish	116



add new streams 331-00-10625 *(★ Sandie Cx)*
 331-00-10625-2015 w/least cisco present &
 humpback whitefish present, add broad whitefish present to
 331-00-10625 & broad whitefish rearing to
 331-00-10625-2015, use NHD flowline for hydro

-162.5578, 66.816

-162.48817, 66.81818 - SF1
 one humpback whitefish

-162.48747, 66.81918 - NF1

-162.48117, 66.82135 - NF3
 least cisco - 4
 humpback whitefish - 10
 broad whitefish - 12

-162.41506, 66.82412 - SF2

BCEP

HWP

BCEP

HWP

BCEP

CORPORATE

U BOUNDARY

