APPENDIX A

Photographs

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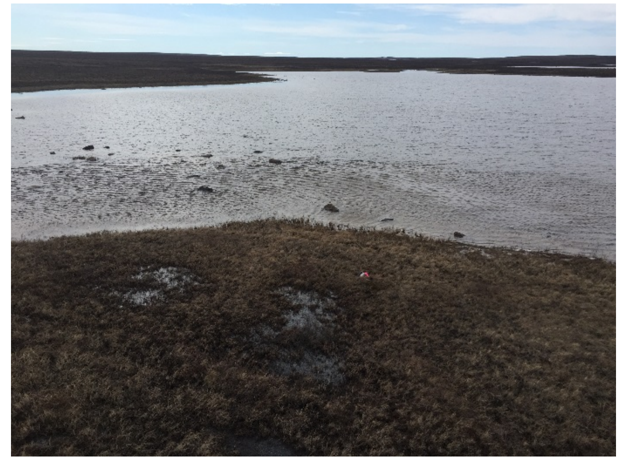
Photograph 4: Seep Creek looking upstream representing run-riffle morphology, September 2016

Photograph 5: Seep Creek pool containing aquatic vegetation, looking downstream, September 2016



Photograph 6: Seep Creek Pond 2 looking southwest, June 2016

Photograph 7: Seep Creek Pond 2 substrate dominated by fines, June 2016

Photograph 8: Fingers Creek looking downstream. Substrate was predominantly composed of large cobbles and boulders, with some gravel, September 2016.

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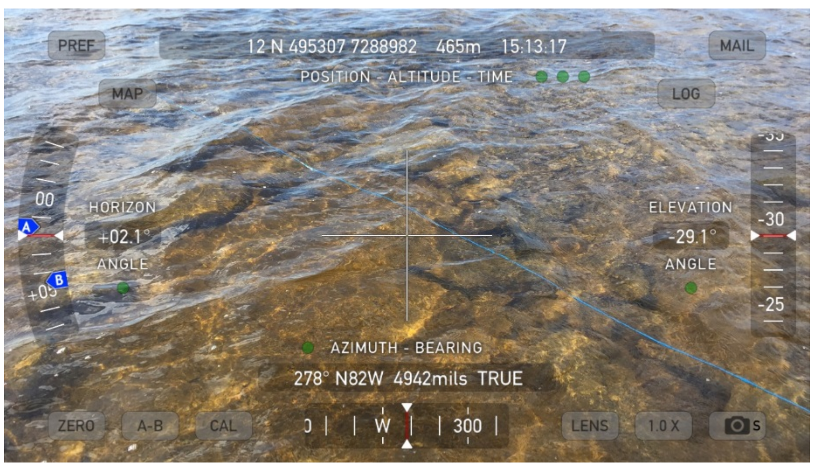
Photograph 10: *Fingers Creek riffle-run habitat, aquatic vegetation, September 2016*



Photograph 11: *Fingers Creek Pond larger substrate, dominated by bedrock and boulder, June 2016*

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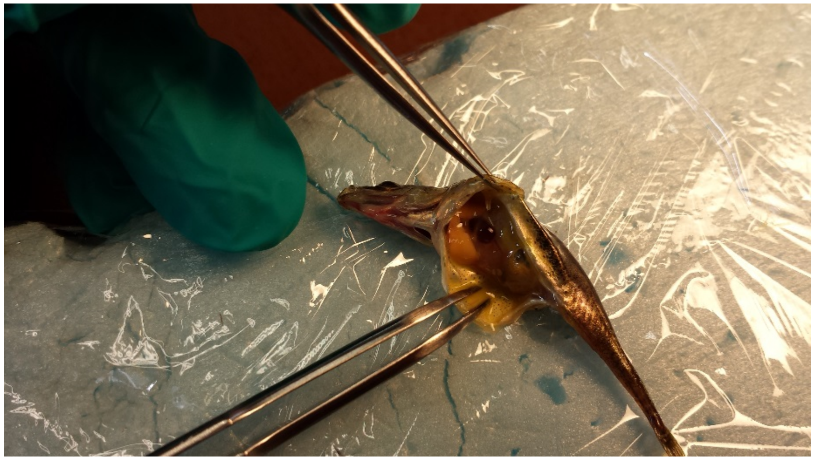
Photograph 32: External examination of a lethally-sampled Ninespine Stickleback captured in the Exposure Area, August 2016



Photograph 32: *Internal examination of a lethally-sampled Ninespine Stickleback captured in Reference Area 2, September 2016*

Photograph 33: *Processing of a non-lethally sampled Arctic Grayling young-of-the-year captured in Reference Area 1, September 2016*

APPENDIX B

Quality Assurance and Quality Control

B1 INTRODUCTION

Quality assurance and quality control (QA/QC) practices determine data integrity and were applied to all aspects of the Lupin Phase 5 EEM study from sample collection to data analysis, and reporting. Quality assurance encompasses management and technical practices designed to confirm that the data generated are of consistent high quality. Quality control is an aspect of QA that includes the procedures used to measure and evaluate data quality, and the corrective actions to apply when data quality objectives are not met.

This appendix describes QA/QC practices applied during this study, evaluates QC data, and describes the implications of QC results to the interpretation of study results.

B2 Quality Assurance

Quality assurance applicable to this study covers three areas of internal and external management: field work, laboratory analysis, and office operations.

B2.1 Field Work

Golder Associates Ltd. (Golder) field crews are trained to be proficient in standardized field sampling procedures, data recording, and equipment operations applicable to water and sediment quality sampling. Field work was completed according to approved specific work instructions and established Golder technical procedures. Specific work instructions are standardized forms that reference appropriate technical procedures and provide specific sampling instructions for the work to be undertaken, such as description of exact sampling locations, equipment needs and calibration requirements, sample handling and storage requirements, sample labelling and shipping protocols, and internal and laboratory contacts. The specific work instructions also provide specific guidelines for field record keeping and sample tracking. Technical procedures are consistent with information described in the relevant scientific literature (e.g., Environment Canada 1993; APHA 2012), and outline relevant general information regarding protocols for field sample collection and in situ field measurements.

Other key QA processes completed were as follows:

- A pre-field meeting with the field crew and the project/task manager before the field work to discuss the purpose of the field program, specify the roles of crew members, address questions regarding the specific work instructions, and discuss equipment needs, field logistics, and contingency plans.
- Recording of field data on standardized field data sheets and in a bound waterproof field notebook, according to established field record-keeping procedures. In addition, field crews checked in with task managers after each field program to provide an update on work completed.
- Calibrations of the in situ water quality multi meters at the beginning of each day to maintain accuracy of the field data; multi meters were only used if calibration was successful (i.e., calibration criteria ranges were met).
- Documentation and tracking of laboratory samples using chain-of-custody forms, with request for receipt of samples by the analytical laboratory. Field crews were responsible for managing the sample shipping to the analytical laboratory. Prior to sample shipping, field crews confirmed the following:
  - All required samples were collected and accounted for in the shipment.
  - Chain-of-custody and analytical request forms were completed and correct.

- Proper bottle labelling and documentation procedures were followed.

B2.2 Analytical Laboratory

A Canadian Association for Laboratory Accreditation Inc. (CALA) accredited analytical laboratory, ALS Canada Ltd. (ALS), was used for the analysis of water samples collected by Golder for this program. Under CALA's accreditation program, performance evaluation assessments are conducted for laboratory procedures, methods, and internal QC. As a result, there was high confidence that the analytical data reported by ALS were reliable.

B2.3 Office Operations

Relevant elements of office-based QA were:

- Using appropriately trained personnel for each data management, analysis, and reporting task.
- Using standardized data manipulation/summary tools, where required.
- Filing hard-copy and electronic data and project information according to standardized protocols.
- Using a data management system (i.e., EQuIS) to ensure an organized, consistent system of data storage, QC, and retrieval.
- Reviewing work products (e.g., tables, figures, result descriptions) at appropriate milestones.

B3 QUALITY CONTROL

B3.1 Field Control Procedures

Three types of QC samples were used in this program:

- **A trip blank** (water quality), which consist of deionized water provided in sampling bottles by the analytical laboratory. Trip blanks accompany the samples through all steps of collection and transportation. They are shipped, handled, stored, and treated the same as the collected samples, but are not opened in the field. Trip blanks are used to detect potential sample contamination due to ambient conditions, or that may have occurred during shipping and laboratory analysis.
- **A field blank** (water quality), which consist of deionized water provided by the analytical laboratory, which is transferred to sample bottles in the field, handled the same, and analyzed for the same constituents as the water samples collected during the field program (e.g., preserved, filtered). Field blanks are used to detect potential sample contamination during sample collection, handling, shipping, and analysis.
- **Duplicate samples** (water and sediment quality), which consist of additional samples collected at the same time and location as water and sediment samples collected during a field program, using the same sampling methods. They are used to check within-site variation, and the precision of field sampling methods and laboratory analysis.

The QC samples accounted for approximately 10 percent (%) of the total number of water and sediment samples submitted for analysis: 1 water travel blank, 1 water field blank, and 1 water duplicate for nine samples, and 2 sediment duplicates for 15 samples. All QC samples were submitted "blind" to ALS to test the validity of the analysis process, and were analyzed for the same set of parameters as the collected water and sediment samples.

B3.2 Office Quality Control Procedures

Relevant elements of office-based QC were:

- Saving unaltered laboratory files in the Lupin project folder so that they are accessible to the team as required
- Comparing sample field data entered into EQuIS against the data written on the datasheets.
- Checking the data uploaded into EQuIS against the raw data obtained from ALS.

B3.3 2016 Field and Laboratory Data Quality Procedures

Field-collected data, datasheets and the field notebook were reviewed for completeness and unexpected values. Upon receipt of water quality data from ALS, a series of standard checks were performed to screen for potential data quality issues (Sections B3.3.1 to B.3.3.7):

- verify that all parameters requested were analyzed
- screening of individual laboratory and field results
- review of detection limits (DLs)
- review of units
- review of any hold times exceedances
- check for contamination in blank samples
- comparison of duplicates
- comparison between total and dissolved values for a parameter
- review of internal laboratory QA/QC results

B.3.3.1 Parameter List

Sediment and water quality parameters were compared to chain-of-custody forms and quote.

B.3.3.2 Screening of Individual Laboratory and Field Results

Screening of individual laboratory and field results in 2016 were based on:

- Laboratory results were reviewed to confirm analysis of all required parameters.
- Field and laboratory data from the same water sample were reviewed to check that field and laboratory data were similar for expected parameters (i.e., pH, turbidity and conductivity); large discrepancies (i.e., one unit difference for pH and 20% relative percent difference [RPD] for conductivity) were further reviewed, along with records of calibration and concentrations of other relevant parameters within the sample, to assess the need to invalidate the laboratory or field result.

- Comparisons of calculated total dissolved solids (TDS) (i.e., based on major ions, alkalinity, and nitrate) and measured TDS within the same sample were reviewed and checks that TDS concentrations were lower than conductivity were completed.
- Laboratory results were visually checked for outliers.

B.3.3.3 Detection Limits

Analytical detection limits for all chemical analyses were specified with the laboratory in advance of the Lupin Phase 5 EEM program. The specified DLs and the actual DLs for individual samples were compared. Changes in DLs by the laboratory during the program could cause limitations when comparing results with different DLs. For example, if a laboratory increased the DL, parameter concentrations could be masked by the higher DL.

B.3.3.4 Units

The units reported by ALS were compared against the expected units, as coded into the database, for each parameter.

B.3.3.5 Hold Times

Hold times between sample collection and analysis for each parameter are specified by ALS, and are based on US EPA test methods. ALS reviews hold times for any exceedances and identifies any data that may be unreliable due to hold time exceedances.

B.3.3.6 Blank Samples (water)

Water quality concentrations in trip or field blanks were considered notable if they were greater than or equal to five times the corresponding DL. This threshold is based on the Practical Quantitation Limit defined by the United States Environmental Protection Agency and takes into account the potential for reduced accuracy when concentrations approach or are below DLs (US EPA 2000; AENV 2006). This criterion was not applied to pH, however, because DLs are not applicable to pH scale.

B.3.3.7 Duplicate Samples

Differences between concentrations measured in duplicate water and sediment samples were calculated as the RPD for each parameter. Before calculating the RPD, concentrations below the DL were replaced with the DL value in cases when only one of the concentrations for a given parameter was detectable. The RPD was calculated using the following formula:

RPD = (|difference in concentration between two of the duplicate samples| / mean concentration) x 100

The RPD value for a given parameter was notable if:

- it was greater than 20% and
- concentrations in one or both samples were greater than or equal to five times the DL.

The number of parameters with exceedances of the evaluation criteria was compared with the total number of parameters analyzed to evaluate analytical precision.

Within-site variability and field sampling precision of duplicate sample results were rated as:

- **Low and high**, respectively, if less than 10% of the parameters included in the duplicate sample analysis were notably different from one another
- **Moderate**, if 10% to 30% of the parameters included in the duplicate sample analysis were notably different from one another.
- **High and low**, respectively, if more than 30% of the parameters included in the duplicate sample analysis were notably different from one another.

B.3.3.8 Total versus Dissolved Parameter Concentrations (water)

The dissolved concentration of any parameter (e.g. organic carbon) should, by definition, be less than or equal to the associated total concentration. The data was considered valid when the dissolved concentration was greater than the total concentration but within 20% RPD, when both values were above the DL. If the reported dissolved concentration exceeded the reported total concentration with an RPD between both concentrations of 20% or more, and for more than 10% of the parameters, an uncertainty in the laboratory analysis or field collection protocols was indicated.

B.3.3.9 Internal Laboratory Quality Control

The following internal QC information was submitted by ALS reviewed by Golder for each sampling event:

- sample temperature and integrity of containers upon receipt
- data qualifiers
- quality control sample results (duplicates, method blanks, matrix spikes, laboratory control samples and control reference materials)
- comparison of internal duplicates to assess variability of analytical methods

Any issues that may have affected water quality results were discussed with ALS and internally to assess the validity of any result impacted.

B3.5 2016 Field and Laboratory Data Quality Results

B.3.5.1 Parameter List

Moisture content was not analyzed for sediment collected in one sample in the Exposure Area (SCP-4) because the sample container broke prior to analysis and the sediment was dry (Spira 2017, pers.comm).

Hardness, and major ions (i.e., calcium, magnesium, potassium, sodium) were not analyzed for the field and trip blanks, and for water samples collected in the Exposure Area (SCP-1, SCP-3, SCP-5) and Reference Area 1 (FL-1, FL-3, FL-5) because of an oversight by the laboratory (Spira 2017, pers.comm). When Golder was informed of the missing data, ALS had already disposed of the samples.

B.3.5.2 Screening of Individual Laboratory and Field Results

No individual field and laboratory results were invalidated or revised. Laboratory results for SCP-2 and FL-4 were outside of the expected range, but reflected field observations and were retained.

B.3.5.3 Method Detection Limits

Most parameters were analyzed by ALS using DLs equal to the requested DL (Tables B-1 and B-2). Higher DLs were used for water samples for hardness in the Reference Area 2 samples (1.3 mg/L compared to the requested 0.5 mg/L), and for total and dissolved organic carbon in three and two Exposure Area samples respectively (1 mg/L compared to the requested 0.5 mg/L). Sediment TOC DLs in all samples except SCP-1, SCP-2, FL-3 and FL-4 were raised from 0.05 to 0.075%. Particle size DLs were raised from 0.1 to 1.0% in all Reference Area samples but FL-2 and FL-3.

Even with the changes in detection limits the data were considered valid because concentrations of parameters affected by higher DLs were above the DL; if results were reported as less than the DL, there may have been issues with validity of the data.

B.3.5.4 Units

ALS reported the expected units for each parameter in 2016.

B.3.5.5 Hold Times

For water quality samples, hold time qualifiers were reported by ALS for pH, turbidity, nitrate and nitrite (all samples), DOC and TOC (FL-1, FL-3, FL-5, SCP-1, SCP-3, SCP-5, Field Blank, and Travel Blank; Appendix C), and conductivity, total alkalinity, TDS, TSS, sulphide and total cyanide (R2-1, R2-3, R2-5, and R2-5 duplicate; Appendix C).

- Hold time for pH is 15 minutes, and hold time for turbidity, nitrate and nitrite is two days. Due to the remote location of the Mine, these hold time exceedances are expected but are not expected to affect reliability of water quality results. Field pH was used to represent pH in the analyses of the Phase 5 EEM including in the calculation of Canadian Water Quality Guidelines that are pH-dependent.
- Hold times for turbidity, pH, conductivity, total alkalinity, TDS, TSS, sulphide and total cyanide in four samples (R2-1, R2-3, R2-5, and R2-5 duplicate) were exceeded because samples were not shipped to Edmonton by ALS Yellowknife in a timely manner (Spira 2017, pers. comm). Sample collection occurred on 3 September but ALS Edmonton did not receive the samples until 26 September. These results are considered questionable and were flagged in Appendix C.

For sediment samples, hold time qualifiers were reported by ALS for mercury in five samples (FL-4, FL-5, R2-1, R2-2, and R2-4). The hold time was exceeded because the samples were not shipped to Edmonton in a timely manner by ALS Yellowknife (Spira 2017, pers. comm). Sample collection occurred between 1 and 3 September but ALS Edmonton did not receive the samples until 26 September; however, these results are reliable because hold time was exceeded by a day.

B.3.5.6 Blank Samples

Concentrations of turbidity, boron, and iron were detected in the Field Blank, and a higher level of colour units were detected in the Field Blank than in the Reference 1 samples. Concentrations of sulphide, total ammonia, dissolved organic carbon, and boron were detected in the Trip Blank (Table B-1). The reported concentrations were within five times the detection limit, and thus the results were not considered notable.

B.3.5.7 Duplicate Samples

One duplicate water quality sample (at R2-5) and two duplicate sediment quality samples (at SCP-2 and FL-3) were collected during the Phase 5 EEM Study (Tables B-1 and B-2).

Less than 10% of the paired duplicate concentrations had a RPD of more than 20% when one or both parameter concentrations were above five times the DL. The site variability and field precision for the water and sediment quality datasets was rated as low and high, respectively.

B.3.5.8 Total versus Dissolved Parameters (water)

A dissolved parameter concentration was notably higher than the corresponding total parameter in one sample (R2-1). Dissolved organic carbon was higher than total organic carbon, with an RPD of 44%. Overall, the data were considered reliable because reported dissolved concentrations were higher than reported total concentrations in one samples for one parameter.

B.3.5.9 Internal Laboratory Quality Control

ALS's internal data quality reports were reviewed; no laboratory issues were identified that would have impacted data quality (see Appendix D).

B3.5 Overall Data Quality

The overall quality of the water quality data was determined to be high. Therefore, the results reported herein are determined to be reliable and meet the needs of the program.

B4 REFERENCES

B4.1 Literature

AENV (Alberta Environment). 2006. Guidelines for Quality Assurance and Quality Control in Surface Water Quality Programs in Alberta. Edmonton, AB, Canada. 67 pp. ISBN: 0-7785-5081-8 (Print Edition); 0-7785-5082-6 (On-line Edition).

APHA (American Public Health Association). 2012. Standard Methods for the Examination of Waste and Wastewater. 22nd Edition. Washington, DC, USA.

Environment Canada. 1993. Quality Assurance in Water Quality Monitoring. Ecosystem Sciences and Evaluation Directorate Conservation and Protection. Ottawa. ON, Canada.

Golder (Golder Associates Limited). 2016. Tundra Mine, NWT Remediation Environmental Monitoring Program: Water Quality: 2015 and Historical Results. Prepared for Public Works and Government Services Canada. February, 2016

US EPA (United Sates Environmental Protection Agency). 2000. EPA Quality Manual for Environmental Programs. CIO 2105-P-01-0 (formerly 5360 A1).

B4.1 Personal Communication

Spira J. 2017. Personal communication between ALS Canada Ltd and Golder Associates. 7 March 2017.

Table B-1: Water Quality Control Samples, Lupin Phase 5 EEM, 2016

Location	Units	ALS Detection Limit[a]	Field Sample	Duplicate	RPD[b] (%)	Blanks	
			R2-5	R2-5 Duplicate		Field Blank	Trip Blank
Sample Date			3-Sep-16	3-Sep-16		31-Aug-16	30-Aug-16
ALS Sample ID			L1834097-3	L1834097-4		L1823227-8	L1823227-4
Parameter							
Conventional Parameters							
Hardness (as $CaCO_3$)	mg/L	1.3	13.3	13.5	1	-	-
pH	-	0.1	6.5	6.5	0	5.2	5.2
Specific conductivity	µS/cm	2	37.7	38	1	<2	<2
Total alkalinity (as $CaCO_3$)	mg/L	2	4.2	4.5	-	<2	<2
Total dissolved solids	mg/L	10	18	14	-	<10	<10
Total dissolved solids (calculated)	mg/L	1	19.6	20.1	3	<1	<1
Total suspended solids	mg/L	3	<3	<3	-	<3	<3
Colour	TCU	2	5.5	5.8	-	18.8	8.8
Turbidity	NTU	0.1	0.48	0.52	8	0.12	<0.1
Major Ions							
Bicarbonate	mg/L	5	5.1	5.5	-	<5	<5
Calcium	mg/L	0.5	2.64	2.7	2	-	-
Carbonate	mg/L	5	<5	<5	-	<5	<5
Chloride	mg/L	0.5	<0.5	<0.5	-	<0.5	<0.5
Fluoride	mg/L	0.02	0.025	0.024	-	<0.02	<0.02
Hydroxide	mg/L	5	<5	<5	-	<5	<5
Magnesium	mg/L	0.1	1.61	1.65	2	-	-
Potassium	mg/L	0.5	0.55	0.57	-	-	-
Sodium	mg/L	1	1.1	1.1	-	-	-
Sulphate	mg/L	0.05	11.2	11.4	2	<0.05	<0.05
Sulphide	mg/L	0.0015	<0.0015	<0.0015	-	<0.0015	0.0016
Nutrients							
Total ammonia (as nitrogen)	mg-N/L	0.005	0.005	0.0102	-	<0.005	0.0176

Table B-1: Water Quality Control Samples, Lupin Phase 5 EEM, 2016

Location	Units	ALS Detection Limit[a]	Field Sample	Duplicate	RPD[b] (%)	Blanks	
			R2-5	R2-5 Duplicate		Field Blank	Trip Blank
Sample Date			3-Sep-16	3-Sep-16		31-Aug-16	30-Aug-16
ALS Sample ID			L1834097-3	L1834097-4		L1823227-8	L1823227-4
Parameter							
Nitrate (as nitrogen)	mg-N/L	0.006	<0.006	<0.006	-	<0.006	<0.006
Nitrite (as nitrogen)	mg-N/L	0.002	<0.002	<0.002	-	<0.002	<0.002
Nitrate + nitrite (as nitrogen)	mg-N/L	0.006	<0.006	<0.006	-	<0.006	<0.006
Total Kjeldahl nitrogen	mg-N/L	0.05	0.121	0.073	-	<0.05	<0.05
Total phosphorus	mg-P/L	0.001	0.007	0.0078	11	<0.001	<0.001
Dissolved phosphorus	mg-P/L	0.001	0.0022	0.0028	-	<0.001	<0.001
Organic Carbon							
Total organic carbon	mg/L	0.5	4.03	3.23	**22**	<0.5	<0.5
Dissolved organic carbon	mg/L	0.5	3.4	3.25	5	<0.5	1.05
Total Metals and Metalloids							
Aluminum	µg/L	0.3	15.7	37.7	**82**	<0.3	<0.3
Antimony	µg/L	0.02	<0.02	<0.02	-	<0.02	<0.02
Arsenic	µg/L	0.02	0.537	0.632	16	<0.02	<0.02
Barium	µg/L	0.05	3.33	3.92	16	<0.05	<0.05
Beryllium	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01
Bismuth	µg/L	0.01	<0.01	<0.01	-	<0.01	<0.01
Boron	µg/L	1	2.2	2.3	-	1.6	3.3
Cadmium	µg/L	0.005	0.0055	0.0073	-	<0.005	<0.005
Chromium	µg/L	0.06	<0.06	0.132	-	<0.06	<0.06
Cobalt	µg/L	0.01	0.297	0.361	19	<0.01	<0.01
Copper	µg/L	0.1	1.96	2.15	9	<0.1	<0.1
Iron	µg/L	1	52	99	**62**	1.1	<1
Lead	µg/L	0.01	<0.01	0.023	-	<0.01	<0.01
Lithium	µg/L	0.5	1.44	1.57	-	<0.5	<0.5

Table B-1: Water Quality Control Samples, Lupin Phase 5 EEM, 2016

Location	Units	ALS Detection Limit(a)	Field Sample	Duplicate	RPD(b) (%)	Blanks	
			R2-5	R2-5 Duplicate		Field Blank	Trip Blank
Sample Date			3-Sep-16	3-Sep-16		31-Aug-16	30-Aug-16
ALS Sample ID			L1834097-3	L1834097-4		L1823227-8	L1823227-4
Parameter							
Manganese	µg/L	0.05	3.25	4.32	**28**	<0.05	<0.05
Molybdenum	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05
Nickel	µg/L	0.06	6.61	6.94	5	<0.06	<0.06
Selenium	µg/L	0.04	<0.04	<0.04	-	<0.04	<0.04
Silicon	µg/L	50	383	455	17	<50	<50
Silver	µg/L	0.005	<0.005	<0.005	-	<0.005	<0.005
Strontium	µg/L	0.05	12.3	12.9	5	<0.05	<0.05
Sulphur	µg/L	500	3,890	3,960	2	<500	<500
Thallium	µg/L	0.005	<0.005	<0.005	-	<0.005	<0.005
Tin	µg/L	0.05	<0.05	<0.05	-	<0.05	<0.05
Titanium	µg/L	0.1	0.28	1.34	**131**	<0.1	<0.1
Uranium	µg/L	0.01	<0.01	0.013	-	<0.01	<0.01
Vanadium	µg/L	0.05	<0.05	0.114	-	<0.05	<0.05
Zinc	µg/L	0.8	1.01	1.38	-	<0.8	<0.8
Zirconium	µg/L	0.3	<0.3	<0.3	-	<0.3	<0.3
Other							
Total cyanide	mg/L	0.005	<0.005	<0.005	-	<0.005	<0.005
Radium-226	Bq/l	0.01	<0.01	<0.01	-	<0.01	<0.01

Bolded values indicate an RPD between field and duplicate samples equal to or higher than 20%, when one or both parameters were above five times the detection limit

Shaded values indicate analyte concentrations above detection limit in the field or trip blanks

(a) With the exception of hardness, detection limits matched Quote Q57526

(b) RPD between field and duplicate sample calculated only when one or both values is above five times the DL

$CaCO_3$ = calcium carbonate; µS/cm = microSiemens per centimetre; mg/L = milligrams per litre; µ/L = micrograms per litre; Bq/L = Becquerels per litre; NTU = nephelometric turbidity units; TCU = total color units; - = not analyzed; RPD = Relative Percent Difference

Table B-2: Sediment Quality Duplicate Samples, Lupin Phase 5 EEM, 2016

Station	Units	ALS Detection Limit[a]	Field Sample	Duplicate	RPD[b] (%)	Field Sample	Duplicate	RPD[b] (%)
			SCP-2	SCP-2		FL-3	FL-3	
Date			**27-Aug-16**	**27-Aug-16**		**26-Aug-16**	**26-Aug-16**	
ALS Sample ID			**L1823284-4**	**L1823284-6**		**L1823284-3**	**L1823284-7**	
Parameter								
Particle Size and Moisture								
Moisture content	%	0.5	18.2	13.4	**30**	28.7	16.2	**56**
Texture	-	-	<1	<1	-	<1	<1	-
Sand (0.05-2mm)	%	0.1	89.5	88.4	1	82.7	87.8	6
Silt (0.002-0.05 mm)	%	0.1	10.3	11.5	11	17.1	12	**35**
Clay (<0.002 mm)	%	0.1	0.21	0.12	-	0.15	0.22	-
Organic Carbon								
Total organic carbon	%	0.05 to 0.075[c]	0.397	0.48	19	0.652	0.645	1
Total Metals and Metalloids								
Aluminum	mg/kg	50	4,880	5,570	13	6,080	6,050	0
Antimony	mg/kg	0.1	<0.1	<0.1	-	<0.1	<0.1	-
Arsenic	mg/kg	0.1	4.46	4.98	11	4.15	3.01	**32**
Barium	mg/kg	0.5	23.4	28.7	20	39	43.2	10
Beryllium	mg/kg	0.1	0.13	0.13	-	0.12	0.13	-
Bismuth	mg/kg	0.2	<0.2	<0.2	-	<0.2	<0.2	-
Boron	mg/kg	5	<5	<5	-	<5	<5	-
Cadmium	mg/kg	0.02	0.022	0.033	-	0.043	0.043	-
Calcium	mg/kg	100	920	840	9	1,000	930	7
Chromium	mg/kg	0.5	15	18.1	19	19.3	19.7	2
Cobalt	mg/kg	0.1	3.62	4.16	14	4.15	4.59	10
Copper	mg/kg	0.5	7.15	8	11	7.77	6.69	15
Iron	mg/kg	50	6,250	7,210	14	6,840	6,830	0
Lead	mg/kg	0.5	1.63	1.55	-	1.44	1.41	-
Lithium	mg/kg	0.5	10.3	11.7	13	13	13.5	4

Table B-2: Sediment Quality Duplicate Samples, Lupin Phase 5 EEM, 2016

Station	Units	ALS Detection Limit[a]	Field Sample	Duplicate	RPD[b] (%)	Field Sample	Duplicate	RPD[b] (%)
			SCP-2	SCP-2		FL-3	FL-3	
Date			27-Aug-16	27-Aug-16		26-Aug-16	26-Aug-16	
ALS Sample ID			L1823284-4	L1823284-6		L1823284-3	L1823284-7	
Parameter								
Magnesium	mg/kg	20	2,490	3,050	20	3,230	3,110	4
Manganese	mg/kg	1	68.9	82.7	18	83.1	79.1	5
Mercury	mg/kg	0.005	<0.005	<0.005	-	0.0057	<0.005	-
Molybdenum	mg/kg	0.1	0.2	0.25	-	0.21	0.16	-
Nickel	mg/kg	0.5	10.9	12.2	11	12.8	13.5	5
Potassium	mg/kg	50	801	1,090	**31**	1,340	1,400	4
Selenium	mg/kg	0.2	<0.2	<0.2	-	<0.2	<0.2	-
Silver	mg/kg	0.1	<0.1	<0.1	-	<0.1	<0.1	-
Sodium	mg/kg	100	<100	<100	-	<100	<100	-
Strontium	mg/kg	0.5	4.41	3.84	14	4.66	4.43	5
Sulfur	mg/kg	100	170	190	-	270	210	-
Thallium	mg/kg	0.05	<0.05	0.066	-	0.075	0.079	-
Tin	mg/kg	2	<2	<2	-	<2	<2	-
Titanium	mg/kg	1	299	316	6	329	358	8
Uranium	mg/kg	0.05	0.707	0.607	15	0.622	0.64	3
Vanadium	mg/kg	0.2	13.4	15.6	15	16.4	16.2	1
Zinc	mg/kg	2	18.6	24.8	**29**	22.4	22.8	2

Bolded values indicate an RPD between field and duplicate samples equal to or higher than 20%, when one or both parameters were above five times the detection limit

(a) With the exception of TOC in the duplicate samples, detection limits matched Quote Q57526

(b) RPD between field and duplicate sample calculated only when one or both values is above five times the DL

% = percent; mg/kg = milligrams per kilogram;< - less than; - = not analyzed; RPD = Relative Percent Difference

APPENDIX C

Supporting Environmental Data

Table C-1: Water Quality Data, Lupin Phase 5 EEM, 2016

Location	Units	ALS Detection Limit[(a)]	CWQG[(b)]	Exposure Area			Reference Area 1			Reference Area 2		
				SCP-1	SCP-3	SCP-5	FL-1	FL-3	FL-5	R2-1	R2-3	R2-5
Sample Date				31-Aug-16	31-Aug-16	31-Aug-16	30-Aug-16	30-Aug-16	30-Aug-16	2-Sep-16	3-Sep-16	3-Sep-16
ALS Sample ID				L1823227-5	L1823227-6	L1823227-7	L1823227-1	L1823227-2	L1823227-3	L1834097-1	L1834097-2	L1834097-3
Parameter												
Conventional Parameters												
Temperature (field)	°C	-	-	7.4	7.9	10.4	10.0	12.3	9.8	10.8	10.2	8.3
Dissolved oxygen (field)	mg/L	-	6.5 and 9.5[(d)]	11	11	11	10	10	10	11	10	11
Hardness (as $CaCO_3$)	mg/L	1.3	-	-	-	-	-	-	-	*5.1*	*12.8*	*13.3*
pH (field)	-	-	6.5 - 9.0	**5.3**	**5.7**	**5.9**	**6.4**	6.5	**6.3**	**6.4**	**6.0**	**5.9**
Specific conductivity (lab)	µS/cm	2	-	128	136	126	15.6	16.1	14.9	14.3	36.4	37.7
Specific conductivity (field)	µS/cm	-	-	117	128	124	14	15	14	14	37	36
Total alkalinity (as $CaCO_3$)	mg/L	2	-	2	2.8	2.7	3.8	5.8	3.2	2.7	3.4	4.2
Total dissolved solids	mg/L	10	-	86	88	85	11	11	<10	<10	18	18
Total dissolved solids (calculated)	mg/L	1	-	63.2	68.1	63.4	7.2	8.4	6.8	6.3	19.4	19.6
Total suspended solids	mg/L	3	-	<3	<3	<3	<3	<3	<3	<3	<3	<3
Colour	TCU	2	-	22.1	19.8	34.4	2.4	10.7	5.1	4.9	13.5	5.5
Turbidity (lab)	NTU	0.1	-	0.49	0.55	1.02	0.34	0.39	0.31	0.55	0.92	0.48
Turbidity (field)[(c)]	NTU	-	-	0.40	0.50	0.50	0.40	0.30	0.30	0.50	1.90	0.90
Major Ions												
Bicarbonate	mg/L	5	-	<5	<5	<5	<5	7.1	<5	<5	<5	5.1
Calcium	mg/L	0.5	-	-	-	-	-	-	-	0.95	2.54	2.64
Carbonate	mg/L	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	mg/L	0.5	ST = 640 / LT= 120	2.74	3.57	3.65	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoride	mg/L	0.02	0.12	0.02	0.03	0.02	<0.02	<0.02	<0.02	0.02	0.02	0.03
Hydroxide	mg/L	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium	mg/L	0.1	-	-	-	-	-	-	-	0.65	1.57	1.61
Potassium	mg/L	0.5	-	-	-	-	-	-	-	<0.5	0.55	0.55
Sodium	mg/L	1	-	-	-	-	-	-	-	<1	1.1	1.1
Sulphate	mg/L	0.05	-	39.4	41.2	37.5	2.37	2.35	2.28	3.08	11.6	11.2
Sulphide	mg/L	0.0015	-	0.0022	<0.0015	0.0021	<0.0015	<0.0015	<0.0015	<0.0015	0.0061	<0.0015
Nutrients												
Total ammonia (as nitrogen)	mg-N/L	0.005	22.3[(e)]	0.0106	0.0163	0.0071	<0.005	<0.005	<0.005	<0.005	0.0121	0.005
Nitrate (as nitrogen)	mg-N/L	0.006	ST = 124 / LT = 3	0.0332	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Nitrite (as nitrogen)	mg-N/L	0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nitrate + nitrite (as nitrogen)	mg-N/L	0.006	-	0.0332	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Total Kjeldahl nitrogen	mg-N/L	0.05	-	0.108	0.219	0.341	0.109	<0.05	0.092	<0.05	0.228	0.121
Total phosphorus	mg-P/L	0.001	-	0.0039	0.0047	0.0126	0.0037	0.004	0.0044	0.0051	0.0098	0.007
Dissolved phosphorus	mg-P/L	0.001	-	0.003	0.0023	0.0028	0.0017	0.002	0.0015	0.0044	0.0037	0.0022
Organic Carbon												
Total organic carbon	mg/L	0.5 to 1	-	*4.9*	*5.1*	*7*	2.92	2.71	2.77	3.26	4.49	4.03
Dissolved organic carbon	mg/L	0.5 to 1	-	*4.9*	4.95	*6.4*	2.75	2.64	2.81	5.08	3.93	3.4
Total Metals and Metalloids												
Aluminum	µg/L	0.3	5 - 100[(f)]	**68.9**	**45.2**	**52.2**	**5.17**	6.04	**5.11**	**34.5**	**30.6**	**15.7**
Antimony	µg/L	0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	µg/L	0.02	5	2.07	2.24	2.78	1.23	1.27	1.28	0.677	0.896	0.537
Barium	µg/L	0.05	-	12.3	9.89	8.66	1.53	1.55	1.48	2.31	4.88	3.33
Beryllium	µg/L	0.01	-	0.054	0.027	0.021	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Bismuth	µg/L	0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table C-1: Water Quality Data, Lupin Phase 5 EEM, 2016

Location	Units	ALS Detection Limit[(a)]	CWQG[(b)]	Exposure Area			Reference Area 1			Reference Area 2		
				SCP-1	SCP-3	SCP-5	FL-1	FL-3	FL-5	R2-1	R2-3	R2-5
Sample Date				**31-Aug-16**	**31-Aug-16**	**31-Aug-16**	**30-Aug-16**	**30-Aug-16**	**30-Aug-16**	**2-Sep-16**	**3-Sep-16**	**3-Sep-16**
ALS Sample ID				**L1823227-5**	**L1823227-6**	**L1823227-7**	**L1823227-1**	**L1823227-2**	**L1823227-3**	**L1834097-1**	**L1834097-2**	**L1834097-3**
Parameter												
Boron	µg/L	1	-	11.4	10.8	9	5.2	4.6	4.9	6.1	5.3	2.2
Cadmium	µg/L	0.005	ST = 0.11 - 1.1 / LT = 0.04-0.09[(g)]	0.042	0.026	0.025	<0.005	<0.005	<0.005	<0.005	0.0086	0.0055
Chromium	µg/L	0.06	-	0.207	0.183	0.251	<0.06	<0.06	<0.06	0.135	0.11	<0.06
Cobalt	µg/L	0.01	-	4.81	1.9	1.13	0.039	0.047	0.039	0.161	0.688	0.297
Copper	µg/L	0.1	2[(h)]	**3.28**	**3.22**	**3.10**	0.40	0.40	0.40	0.94	**2.36**	1.96
Iron	µg/L	1	300	226	190	216	18.3	24.9	18.1	152	168	52
Lead	µg/L	0.01	1[(i)]	0.013	0.014	0.015	<0.01	<0.01	<0.01	0.014	0.028	<0.01
Lithium	µg/L	0.5	-	8.68	8.4	7.46	0.67	0.58	0.72	1.03	1.72	1.44
Manganese	µg/L	0.05	-	76.5	33.7	20.3	2.92	3.66	3.16	6.05	8.91	3.25
Molybdenum	µg/L	0.05	73	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	µg/L	0.06	25[(j)]	**41.5**	**27.8**	18.9	0.41	0.44	0.42	1.99	8.27	6.61
Selenium	µg/L	0.04	1	<0.04	<0.04	0.041	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silicon	µg/L	50	-	2,350	1,710	1,600	87	85	79	164	243	383
Silver	µg/L	0.005	0.25	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium	µg/L	0.05	-	41.8	43.3	41.9	5.34	5.26	5.39	5.62	13.2	12.3
Sulphur	µg/L	500	-	15,300	15,600	14,100	1,050	1,090	1,030	1,090	4,130	3,890
Thallium	µg/L	0.005	0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin	µg/L	0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	µg/L	0.1	-	0.42	0.37	0.49	<0.1	<0.1	<0.1	1.64	0.48	0.28
Uranium	µg/L	0.01	ST = 33 / LT= 15	0.029	0.023	0.018	<0.01	<0.01	<0.01	<0.01	0.017	<0.01
Vanadium	µg/L	0.05	-	0.104	0.08	0.15	<0.05	<0.05	<0.05	0.153	0.106	<0.05
Zinc	µg/L	0.8	30	**30.1**	19.7	13.7	<0.8	<0.8	2.73	<0.8	1.65	1.01
Zirconium	µg/L	0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Other												
Total cyanide	mg/L	0.005	0.005[(k)]	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	Bq/l	0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Comparison between parameter concentrations was done with the value at half the detection limit when required.

The average hardness measured at Reference Area 2 (10.4 mg/L $CaCO_3$) was used to calculate hardness-dependent guidelines at Reference Area 1; the average 2005 to 2010 hardness from the Exposure Area (53.2 mg/L CaCO3)to calculate hardness-dependent guidelines at the Exposure Area in 2016 due to missing hardness data at those stations.

Bolded values indicate parameter concentration exceeded the applicable CWQG.

Shaded cells indicate Exposure Area was at least two times greater than the average Reference Areas concentration.

Underlined values reflect results from samples with hold time exceedances.

Italized values indicate detection limit was raised to 1.3 mg/L (hardness) or 1 mg/L (total and dissolved organic carbon).

(a) With the exception of hardness in the Reference Area 2 samples, and total and dissolved organic in the Exposure Area samples, detection limits matched mimimum detection limits provided by ALS

(b) Source: Canadian Council of Ministers for the Environment (1999).

(c) Field turbidity value is the average of three turbidity readings.

(d) Lowest acceptable dissolved oxygen guidelines for cold water biota are 9.5 mg/L for early life stages and 6.5 mg/L for other life stages.

(e) Ammonia (as nitrogen) CWQG is dependent on temperature and pH. The minimum guideline value of 22.3 mg/L was calculated with the field-measured pH og 6.5 and temperature of 12.3°C

(f) CWQG for aluminum is pH dependent: 0.100 mg/L at pH ≥ 6.5; and 0.005 mg/L if pH <6.5.

(g) CWQG for cadmium is dependent on water hardness: ST = 1.1 µg/L at water hardness of 53.2 mg CaCO3/L (Exposure Area); ST = 0.21 µg/L at water hardness of 10.4 mg $CaCO_3$/L (Reference Areal 2); ST = 0.11, 0.26 and 0.27 at water hardnesses of 5.1, 12.8 and 13.3 mg $CaCO_3$/L (Reference Area 2) ;LT = 0.09 µg/L at water hardness of 53.2 mg CaCO3/L (Exposure Area); LT = 0.04 µg/L at water hardness between 0 and 17 mg $CaCO_3$/L (Reference Areas).

(h) CWQG for copper is dependent on water hardness: 2 µg/L at water hardness between 0 and 82 mg $CaCO_3$/L.

(i) CWQG for lead is dependent on water hardness: 1 µg/L at water hardness between 0 and 60 mg $CaCO_3$/L.

(j) CWQG for nickel is dependent on water hardness: 25 µg/L at water hardness between 0 and 60 mg $CaCO_3$/L.

(k) CWQG is for free cyanide.

$CaCO_3$ = calcium carbonate; µS/cm = microSiemens per centimetre; mg/L = milligrams per litre; µ/L = micrograms per litre; Bq/L = Becquerels per litre; NTU = nephelometric turbidity units; TCU = total color units; - = not applicable or not analyzed; ST = Short Term; LT = Long Term; CWQG = Canadian water quality guideline for the protection of aquatic life.

Table C-2: Sediment Quality Data, Lupin Phase 5 EEM, 2016

Station	Units (dry wt.)	Detection Limit	ISQG[a]	PEL[a]	Exposure Area					Reference Area 1					Reference Area 2				
					SCP-1	SCP-2	SCP-3	SCP-4	SCP-5	FL-1	FL-2	FL-3	FL-4	FL-5	R2-1	R2-2	R2-3	R2-4	R2-5
Date					25-Aug-16	27-Aug-16	31-Aug-16	27-Aug-16	27-Aug-16	1-Sep-16	26-Aug-16	26-Aug-16	1-Sep-16	1-Sep-16	2-Sep-16	2-Sep-16	3-Sep-16	2-Sep-16	3-Sep-16
Lab Sample ID					L1823284-1	L1823284-4	L1823284-8	L1823284-9	L1823284-5	L1834108-1	L1823284-2	L1823284-3	L1834108-2	L1834108-3	L1834108-4	L1834108-5	L1834108-6	L1834108-7	L1834108-8
Parameter																			
Particle Size and Moisture																			
Moisture content	%	0.5	-	-	58.8	18.2	55.6	-	63.0	38.3	30.0	28.7	86.7	13.9	19.7	63.8	30.5	26.5	42.0
Sand (0.05-2mm)	%	0.1 to 1	-	-	67.0	89.5	92.0	49.4	0.2	*93.1*	71.0	82.7	*64.0*	*96.8*	*99.6*	*82.7*	*74.9*	*99.4*	*97.3*
Silt (0.002-0.05 mm)	%	0.1 to 1	-	-	31.8	10.3	7.5	49.6	97.1	*6.9*	28.6	17.1	*35.3*	*3.1*	*-1.0*	*17.2*	*24.6*	*-1.0*	*2.6*
Clay (<0.002 mm)	%	0.1 to 1	-	-	1.2	0.2	0.5	1.0	2.8	*-1.0*	0.5	0.2	*-1.0*	*-1.0*	*-1.0*	*-1.0*	*-1.0*	*-1.0*	*-1.0*
Organic and Inorganic Carbon																			
Total organic carbon	%	0.05 to 0.075	-	-	2.91	0.40	*1.69*	*1.43*	*2.44*	*0.59*	*0.24*	*0.65*	5.00	*0.30*	*0.26*	*1.21*	*0.59*	*0.34*	*0.65*
Total Metals and Metalloids																			
Aluminum	mg/kg	50	-	-	6,070	4,880	6,020	8,550	15,600	4,520	5,870	6,080	9,730	6,060	3,990	7,760	3,540	3,500	4,740
Antimony	mg/kg	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	mg/kg	0.1	5.9	17	**51.2**	4.46	**74.7**	**42.4**	**77.6**	**19.5**	2.34	4.15	**239**	4.82	5.42	**5.93**	5.51	5.18	5.03
Barium	mg/kg	0.5	-	-	39.9	23.4	29.8	37.4	62.4	29.1	33.7	39	53.2	38	22.8	37.6	16.8	18.3	33
Beryllium	mg/kg	0.1	-	-	0.36	0.13	0.3	0.29	0.39	0.12	0.11	0.12	0.43	0.14	0.11	0.19	0.1	0.1	0.14
Bismuth	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Boron	mg/kg	5	-	-	<5	<5	<5	<5	<5	<5	<5	<5	8.8	<5	<5	<5	<5	<5	<5
Cadmium	mg/kg	0.02	0.6	3.5	0.249	0.022	0.139	0.078	0.068	0.032	0.027	0.043	0.157	0.025	<0.02	0.051	0.039	<0.02	0.028
Calcium	mg/kg	100	-	-	1,590	920	1,230	1,470	1,930	450	1,260	1,000	1,540	800	620	1,360	1,220	530	660
Chromium	mg/kg	0.5	37	90	17.1	15	16.5	29.2	**55.9**	18.6	20.3	19.3	27.5	25.8	12.4	26.2	11.2	10.2	16.8
Cobalt	mg/kg	0.1	-	-	39.4	3.62	24.4	15.5	23.5	7.07	4.12	4.15	15.4	4.68	3.2	4.97	4.53	3.21	4.94
Copper	mg/kg	0.5	36	197	22.4	7.15	18.8	15.2	26.4	6.21	7.16	7.77	32.5	5.92	3.25	13	7.7	2.78	8
Iron	mg/kg	50	-	-	9,220	6,250	12,200	13,100	24,100	9,370	7,940	6,840	46,900	9,000	6,280	11,500	5,930	5,510	7,680
Lead	mg/kg	0.5	35	91	2.08	1.63	2.18	2.08	3.18	1.75	1.64	1.44	4.41	1.47	1.36	2.07	1.81	0.97	1.18
Lithium	mg/kg	0.5	-	-	11	10.3	12.3	17.8	26.4	10.8	12.8	13	13.7	17.2	11.3	19.2	9.84	9.94	13.3
Magnesium	mg/kg	20	-	-	2,560	2,490	2,720	4,500	8,060	2,610	3,520	3,230	3,070	3,840	2,200	4,540	1,950	1,930	2,700
Manganese	mg/kg	1	-	-	206	68.9	190	143	332	226	101	83.1	286	98.1	66.4	116	86	62.3	84.9
Mercury	mg/kg	0.005	0.17	0.49	0.0151	<0.005	0.0149	0.0104	0.0229	<0.005	<0.005	0.0057	0.0238	<0.005	<0.005	0.0076	<0.005	<0.005	0.0051
Molybdenum	mg/kg	0.1	-	-	0.58	0.2	0.73	0.57	1.22	0.21	0.17	0.21	2.05	0.21	0.1	0.27	0.18	0.16	0.14
Nickel	mg/kg	0.5	-	-	70.9	10.9	41.2	38.1	47.1	13.5	11.9	12.8	29	15.2	11.8	17.6	12.2	9.77	18.4
Potassium	mg/kg	50	-	-	845	801	716	1,210	2,110	983	1,350	1,340	1,230	1,490	883	1,070	494	684	1,260
Selenium	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.24	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silver	mg/kg	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium	mg/kg	100	-	-	<100	<100	<100	110	180	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100

Table C-2: Sediment Quality Data, Lupin Phase 5 EEM, 2016

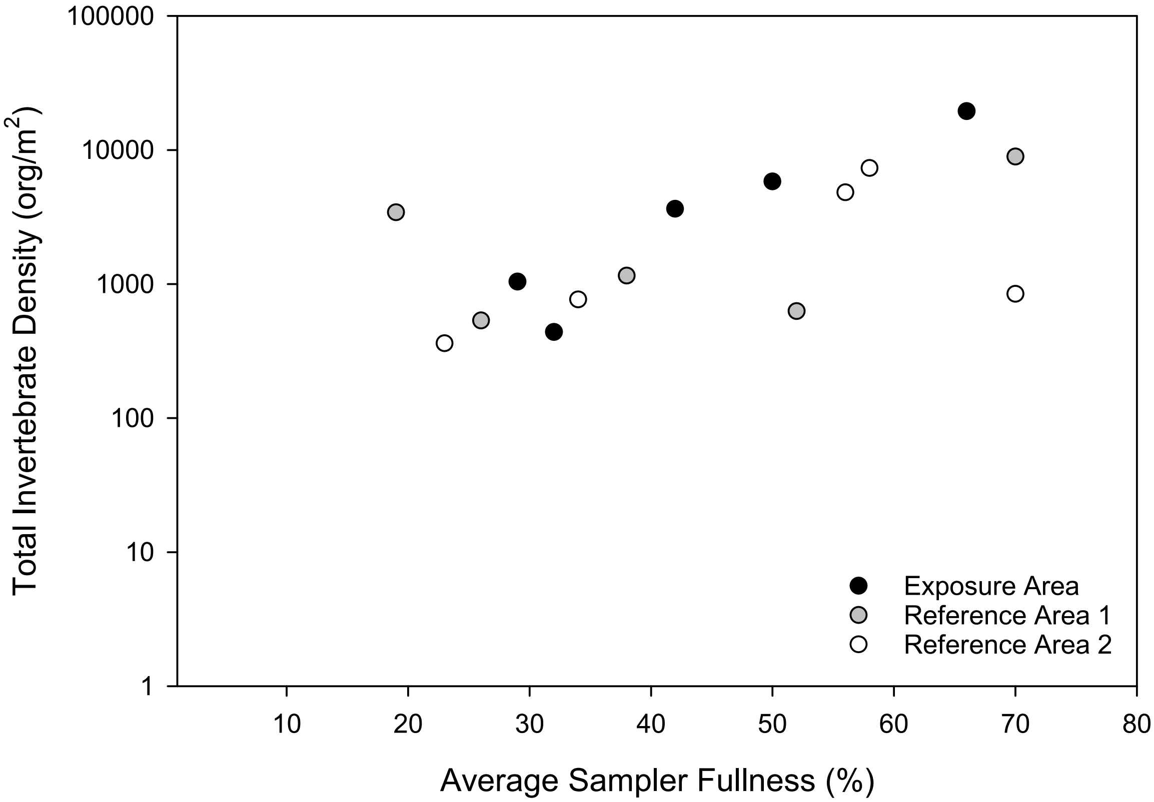
Station	Units (dry wt.)	Detection Limit	ISQG[(a)]	PEL[(a)]	Exposure Area					Reference Area 1					Reference Area 2				
					SCP-1	SCP-2	SCP-3	SCP-4	SCP-5	FL-1	FL-2	FL-3	FL-4	FL-5	R2-1	R2-2	R2-3	R2-4	R2-5
Date					25-Aug-16	27-Aug-16	31-Aug-16	27-Aug-16	27-Aug-16	1-Sep-16	26-Aug-16	26-Aug-16	1-Sep-16	1-Sep-16	2-Sep-16	2-Sep-16	3-Sep-16	2-Sep-16	3-Sep-16
Lab Sample ID					L1823284-1	L1823284-4	L1823284-8	L1823284-9	L1823284-5	L1834108-1	L1823284-2	L1823284-3	L1834108-2	L1834108-3	L1834108-4	L1834108-5	L1834108-6	L1834108-7	L1834108-8
Parameter																			
Strontium	mg/kg	0.5	-	-	7.92	4.41	6.05	7.22	9.37	3.37	4.7	4.66	9.29	3.8	3.72	6.24	4.85	3.29	3.94
Sulphur	mg/kg	100	-	-	1,750	170	1,380	990	550	100	<100	270	1,280	<100	<100	260	120	<100	<100
Thallium	mg/kg	0.05	-	-	0.078	<0.05	0.06	0.076	0.13	0.05	0.068	0.075	0.072	0.063	<0.05	0.065	<0.05	<0.05	0.052
Tin	mg/kg	2	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	5.8	<2	<2	<2	<2	<2
Titanium	mg/kg	1	-	-	293	299	280	468	701	300	362	329	313	377	278	422	261	233	308
Uranium	mg/kg	0.05	-	-	0.906	0.707	0.665	0.657	0.774	0.423	0.635	0.622	1.22	0.499	0.595	0.625	0.828	0.335	0.401
Vanadium	mg/kg	0.2	-	-	15.8	13.4	16.4	23.7	39.6	13.5	16.9	16.4	38.6	17.7	12.1	24.7	10.3	10.1	14.3
Zinc	mg/kg	2	123	315	111	18.6	68.3	64.7	80.3	20.6	31.8	22.4	66.9	22.7	16.8	28.9	14.8	14.9	22.5

(a) Canadian Interim Sediment Quality Guidelines (ISQG) for the protection of aquatic life and Probable Effect Levels (PELs) (CCME 2001).
% = percent; mg/kg = milligrams per kilogram; < = less than; - = not applicable or not analyzed; ISQG = Interim Sediment Quality Guideline; PEL = Probable Effect Level.
Notes:
When parameter concentrations were below the detection limit, values were set to half the detection limit for comparisons between stations or areas.
Bolded values identify concentrations above the ISQG.
Shaded values identify concentrations above the PEL.
Italicized values indicate that detection limit was raised to 1% (particle size) or 0.075 % (total organic carbon).

APPENDIX D

Benthic Invertebrate Community Survey Data

Figure D-1: Relationship Between Average Sampler Fullness and Total Invertebrate Density



org/m^2 = organisms per square metre.

Table D-1: Benthic Invertebrate Abundance Data in Ekman Grabs Collected from the Exposure and Reference Areas, 2016

Major Taxonomic Group	Family	Sub-family	Tribe	Area	SCP				SCP-5					FL				FL-5					R2				R2-5				
				Station	SCP-1	SCP-2	SCP-3	SCP-4	SCP-5-1	SCP-5-2	SCP-5-3	SCP-5-4	SCP-5-5	FL-1	FL-2	FL-3	FL-4	FL-5-1	FL-5-2	FL-5-3	FL-5-4	FL-5-5	R2-1	R2-2	R2-3	R2-4	R2-5-1	R2-5-2	R2-5-3	R2-5-4	R2-5-5
				Units	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample
				Sampling Date	25-Aug-16	27-Aug-16	31-Aug-16	31-Aug-16	27-Aug-16					01-Sep-16	26-Aug-16	26-Aug-16	01-Sep-16	01-Sep-16					02-Sep-16	02-Sep-16	03-Sep-16	02-Sep-16	03-Sep-16				
				Genus/Species	Composite	Composite	Composite	Composite	Discrete	Discrete	Discrete	Discrete	Discrete	Composite	Composite	Composite	Composite	Discrete	Discrete	Discrete	Discrete	Discrete	Composite	Composite	Composite	Composite	Discrete	Discrete	Discrete	Discrete	Discrete
Microturbellaria (i/d)	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	2	0	0
Nematoda[a]	-	-	-	-	24	5	8	8	2	0	1	1	4	1	4	5	4	0	1	2	1	1	6	1	4	16	7	1	6	2	1
Oligochaeta	Enchytraeidae	-	-	-	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	Lumbriculidae	-	-	-	12	2	12	3	14	5	11	11	12	4	0	0	18	0	0	0	0	0	0	0	0	0	0	1	1	0	0
	Naididae	Naidinae	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Naididae	Tubificinae	-	-	1	0	8	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Pisidiidae	-	-	(i/d)	0	0	0	0	0	0	0	0	0	95	0	0	351	3	0	0	0	0	0	0	0	0	0	0	0	0	0
				Sphaerium	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	1	0	0	0	0	0	0	0
				Pisidium	0	0	0	0	0	0	0	0	0	68	0	0	252	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acari - Hydracarina	Aturidae	-	-	*Aturus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Arrenuridae	-	-	*Arrenurus*	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lebertiidae	-	-	*Lebertia*	0	1	0	0	0	0	0	0	0	6	2	0	1	0	0	0	0	0	1	2	1	1	0	0	0	0	0
	Pionidae	-	-	*Piona*	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda - Calanoida	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Copepoda - Cyclopoida	Cyclopidae	-	-	-	8	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Ostracoda	-	-	-	-	40	2	112	97	1	2	4	1	2	17	10	4	0	0	0	0	0	0	0	6	188	8	0	0	0	0	0
Cladocera	Daphnidae	-	-	*Simocephalus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
	Macrothricidae	-	-	-	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Leptoceridae	-	-	*Oecetis*	1	1	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	4	0	0	0	0	0	0
				Mystacides	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	1	1	0	0	4	0	0	0	0	0	0
	Phryganeidae	-	-	*Agrypnia*	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diptera	Chironomidae	-	-	(pupa)	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Tanypodinae	Pentaneurini	*Ablabesmyia*	25	0	0	0	0	0	0	0	0	2	4	3	15	0	0	1	0	0	0	0	0	0	0	0	0	0	0
				Thienemannimyia group	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0
			Procladiini	*Procladius*	64	3	284	72	3	2	3	3	2	12	51	5	109	0	0	0	1	0	0	0	17	34	1	0	2	0	2
		Diamesinae	Diamesini	*Potthastia longimanus* group	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
		Prodiamesinae	-	*Monodiamesa*	0	0	0	0	0	0	0	0	0	12	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
		Orthocladiinae	-	(i/d)	0	0	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
			Orthocladiini	*Cricotopus / Orthocladius*	0	1	136	8	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	12	1	2	2	0	1
				Heterotrissocladius	0	1	4	0	0	0	0	0	0	6	4	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
				Parakiefferiella	8	3	0	0	0	0	0	0	0	0	14	8	0	0	0	0	0	0	0	0	16	16	0	0	0	1	0
				Psectrocladius	220	2	36	1	1	0	2	1	1	23	4	1	90	1	0	2	0	0	0	0	0	20	0	1	1	0	0
				Zalutschia	0	6	0	0	0	0	0	0	0	0	1	4	0	1	0	6	0	2	0	2	0	4	0	1	3	0	0
		Chironominae	Chironomini	(i/d)	0	0	8	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
				Chironomus	1	0	112	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Cladopelma	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
				Cryptochironomus	3	1	0	1	0	0	0	0	0	0	1	1	6	0	0	0	0	0	2	0	14	0	0	0	0	0	0
				Cryptotendipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
				Demicryptochironomus	0	2	0	10	0	1	0	0	1	1	0	3	0	0	0	0	0	0	3	1	4	0	0	0	0	1	0

Table D-1: Benthic Invertebrate Abundance Data in Ekman Grabs Collected from the Exposure and Reference Areas, 2016

Major Taxonomic Group	Family	Sub-family	Tribe	Area	SCP				SCP-5					FL				FL-5					R2				R2-5				
				Station	SCP-1	SCP-2	SCP-3	SCP-4	SCP-5-1	SCP-5-2	SCP-5-3	SCP-5-4	SCP-5-5	FL-1	FL-2	FL-3	FL-4	FL-5-1	FL-5-2	FL-5-3	FL-5-4	FL-5-5	R2-1	R2-2	R2-3	R2-4	R2-5-1	R2-5-2	R2-5-3	R2-5-4	R2-5-5
				Units	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample	no./ sample
				Sampling Date	25-Aug-16	27-Aug-16	31-Aug-16	31-Aug-16	27-Aug-16					01-Sep-16	26-Aug-16	26-Aug-16	01-Sep-16	01-Sep-16					02-Sep-16	02-Sep-16	03-Sep-16	02-Sep-16	03-Sep-16				
				Genus/Species	Composite	Composite	Composite	Composite	Discrete	Discrete	Discrete	Discrete	Discrete	Composite	Composite	Composite	Composite	Discrete	Discrete	Discrete	Discrete	Discrete	Composite	Composite	Composite	Composite	Discrete	Discrete	Discrete	Discrete	Discrete
				Dicrotendipes	15	0	220	7	0	0	0	0	1	23	18	9	11	0	2	10	2	2	0	2	14	234	0	1	2	0	0
				Glyptotendipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	44	0	0	0	0	0
				Microtendipes	0	0	8	0	0	0	0	0	0	1	0	0	27	0	1	0	0	0	0	1	84	3	0	0	0	0	0
				Pagastiella	0	0	0	0	0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Paracladopelma	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Paratendipes	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Polypedilum	1	0	8	0	0	0	0	0	0	9	0	0	8	0	0	0	0	0	0	0	2	4	0	1	0	0	1
				Sergentia	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Stictochironomus	85	1	136	47	0	0	1	1	0	44	1	1	93	0	0	3	0	0	53	7	1	79	1	0	1	2	0
			Pseudochironomini	*Pseudochironomus*	29	1	16	2	8	3	6	7	4	0	0	1	0	0	0	0	0	0	0	9	435	54	5	2	1	1	0
			Tanytarsini	*Cladotanytarsus*	48	5	644	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	1	0	0	0	0	0	0
				Constempellina	0	0	8	8	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Corynocera	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Micropsectra	0	0	0	0	0	0	0	0	0	47	3	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0
				Paratanytarsus	2	15	88	5	0	1	0	1	0	1	10	18	12	1	0	15	3	2	0	3	13	18	4	4	11	2	0
				Tanytarsus	104	2	368	105	1	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	37	12	1	0	3	2	2
	Ceratopogonidae	Ceratopogoninae	-	*Bezzia*	0	0	12	17	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
				Ceratopogon	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Probezzia	0	1	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
		Dasyheleinae	-	*Dasyhelea*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	1	0
	Empididae	-	-	*Chelifera / Metachela*	0	1	0	0	0	0	0	0	0	17	3	2	2	0	1	5	3	0	18	2	4	0	4	4	8	1	0
	Muscidae	-	-	*Limnophora*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Simuliidae - adult	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Tipulidae	-	-	*Tipula*	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Terrestrial	-	-	-	-	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
				Total Abundance	**725**	**57**	**2265**	**438**	**31**	**15**	**29**	**26**	**28**	**399**	**139**	**67**	**1046**	**6**	**5**	**46**	**13**	**9**	**95**	**45**	**854**	**584**	**24**	**21**	**50**	**14**	**7**

Notes:

Benthic invertebrate samples were collected with a standard Ekman grab with a bottom sampling area of 0.0232 m^2. Composite samples consist of five individual Ekman grabs, sieved individually and placed into a single sample jar to form the composite sample. Samples were sieved through a 500 µm mesh in the field.

Gray shading indicates taxa that were removed from analyses because they are non-benthic (e.g., planktonic or terrestrial) organisms, or pupa/larval stages.

no./sample = number of organisms per sample; SCP = Seep Creek Pond; FL = Fingers Lake; R2 = Reference Lake 2; Aug = August; Sep = September; - = not applicable; (i/d) = immature or damaged specimen identified to the lowest level possible; m^2 = square metre; µm = micrometre.

(a) Nematoda were removed from analysis because the samples were sieved through a 500 µm mesh sieve, which results in unreliable estimates of nematode abundances (EC 2012).

Table D-2: Benthic Invertebrate Taxonomy Quality Control Data for Re-Sorted Samples, 2016

Sample	Number in Original Sort	Number in QA/QC Re-Sort	Percent Missed	Sorting Efficiency (%)
FL-1	399	12	2.9	97.1
R2-2	45	1	2.2	97.8
SCP-5-3	29	0	0.0	100.0
Average				**98.3**

Note: Sorting Efficiency (%) = [1-(number in QA/QC re-sort / (number in original sort + number in QA/QC re-sort))] × 100

QA/QC = quality assurance and quality control; FL = Fingers Lake; R2 = Reference Area 2; SCP = Seep Creek Pond.

Table D-3: Subsampling Factors for Benthic Invertebrate Samples, 2016

Area	Waterbody	Station	Subsampled Fraction	Amount Sorted
Exposure Area	Seep Creek Pond 1	SCP-1	Fine	1/4
	Seep Creek Pond 2	SCP-3	Fine	1/8
		SCP-4	Fine	1/4
Reference Area 1	Fingers Lake	FL-4	Fine	1/4
Reference Area 2	Unnamed Pond	R2-4	Fine	1/2
	Unnamed Creek Pond	R2-3	Fine	1/4

SCP = Seep Creek Pond; FL = Fingers Lake; R2 = Reference Area 2.

Table D-4: Precision and Accuracy Estimates for Subsampled Fine Fractions of the Benthic Invertebrate Sample Collected at Station FL-4, 2016

Sample	Subsample Number	Number of Invertebrates	Predicted Total Number of Intertebrates	Predicted Total - Expected Total	Accuracy[a] / % Difference from Total
FL-4	1	121	484	1	0.2
	2	125	500	17	3.5
	3	119	476	-7	-1.4
	4	118	472	-11	-2.3
Total in Subsamples (Fine)		483	-	-	-
Total in Remaining Sample (Coarse)		562	-	-	-
Total in Sample (Coarse + Fine)		1045	-	-	-
Mean Absolute Subsampling Error (%)					1.9
Minimum % Error					0.2
Maximum % Error					3.5
Range in Precision[b]: 0.8% to 5.6%					

(a) Accuracy is the degree of agreement between an observed value and the true value (US EPA 1990). Accuracy = % Error = ((Predicted Total - Total in Sample) / Total in Sample) x 100%.

(b) Precision is the degree of variation among individual subsamples (US EPA 1990). Precision = (1 - (subsample A / subsample B)) x 100%.

FL = Fingers Lake.

Table D-5: Benthic Invertebrate Abundances in the Subsampled Sample Collected at Station FL-4, 2016

Major Taxonomic Group	Family	Sub-family	Tribe	Area	FL						
				Station	**FL-4**						
				Units	no./sample	no./sample	no./sample	no./sample	no./sample	no./sample	no./sample
				Sampling Date	01-Sep-16	01-Sep-16	01-Sep-16	01-Sep-16	01-Sep-16	01-Sep-16	01-Sep-16
				Fraction	Coarse	Fine[(a)]	Fine[(a)]	Fine[(a)]	Fine[(a)]	Coarse + Fine	Coarse + Fine
				Sample ID	C	F1	F2	F3	F4	Actual Total[(b)]	Predicted Total[(c)]
				Genus/Species							
Nematoda[(d)]	-	-	-	-	0	1	0	0	0	1	4
Oligochaeta	Lumbriculidae	-	-	-	6	3	3	2	1	15	18
Bivalvia	Pisidiidae	-	-	(i/d)	111	60	56	58	63	348	351
			-	*Sphaerium*	8	0	0	0	0	8	8
			-	*Pisidium*	252	0	0	0	0	252	252
Acari - Hydracarina	Lebertiidae	-	-	*Lebertia*	1	0	0	0	0	1	1
Copepoda - Cyclopoida	Cyclopidae	-	-	-	0	1	2	4	3	10	4
Ostracoda	-	-	-	-	0	0	2	1	1	4	0
Cladocera	Chydoridae	-	-	-	0	0	1	0	0	1	0
Trichoptera	Leptoceridae	-	-	*Oecetis*	1	0	0	0	0	1	1
		-	-	*Mystacides*	1	0	0	1	0	2	1
Diptera	Chironomidae	Tanypodinae	Pentaneurini	*Ablabesmyia*	3	3	1	2	1	10	15
				Thienemannimyia group	3	0	3	0	1	7	3
			Procladiini	*Procladius*	69	10	12	9	8	108	109
		Orthocladiinae	Orthocladiini	*Heterotanytarsus*	0	0	0	1	0	1	0
				Psectrocladius	10	20	21	17	16	84	90
		Chironominae	Chironomini	(i/d)	1	0	0	0	0	1	1
				Chironomus	1	0	0	0	0	1	1
				Cladopelma	0	0	1	3	1	5	0
				Cryptochironomus	2	1	0	0	0	3	6
				Dicrotendipes	3	2	1	4	3	13	11
				Microtendipes	7	5	4	1	5	22	27
				Pagastiella	0	1	0	0	0	1	4
				Polypedilum	0	2	4	2	4	12	8
				Sergenta	0	0	1	0	1	2	0
				Stictochironomus	65	7	6	9	5	92	93
			Tanytarsini	*Constempellina*	0	3	0	2	1	6	12
				Corynocera	11	0	2	1	1	15	11
				Micropsectra	0	0	1	0	0	1	0
				Paratanytarsus	4	2	2	1	2	11	12
				Tanytarsus	1	0	2	1	1	5	1
	Empididae	-	-	*Chelifera / Metachela*	2	0	0	0	0	2	2
Total Abundance					**562**	**121**	**125**	**119**	**118**	**1045**	**1046**

Benthic invertebrate samples were collected with a standard Ekman grab with a bottom sampling area of 0.0232 m^2. Composite samples consist of five individual Ekman grabs, sieved individually and placed into a single sample jar to form the composite sample. Samples were sieved through a 500 µm mesh in the field.

Gray shading indicates taxa that were removed from analyses because they are non-benthic (e.g., planktonic or terrestrial) organisms, or pupa/larval stages.

a) Each of the fine fraction subsamples represents one quarter (1/4) of the total fine fraction of the sample.

b) The actual total abundance represents the sum of the coarse fraction plus each of the four fine fractions (i.e., C+F1+F2+F3+F4).

c) The predicted total abundance represents the sum of the coarse fraction plus the first fine fraction (F1) multiplied by four (i.e., C+(F1*4)).

d) Nematoda were removed from analysis because the samples were sieved through a 500 µm mesh sieve, which results in unreliable estimates of nematode abundances (EC 2012).

no./sample = number of organisms per sample; FL = Fingers Lake; Sep = September; F = fine; C = coarse; - = not applicable; (i/d) = immature or damaged specimen identified to the lowest level possible; m2 = square metres; µm = micrometre.

Table D-6: Sampling Details for the Benthic Invertebrate Community Survey, 2016

Area	Waterbody	Station	Sampling Device	Mesh Size (µm)	Sample Type	No. of Grabs	Depths (m)	Sampler Fullness (%)	No. of Bottles per Sample
Exposure Area (EXP)	Seep Creek Pond 1	SCP-1	Ekman	500	Composite	5	0.5, 0.5, 0.5, 0.5, 0.5	60, 60, 30, 40, 60	2
		SCP-2	Ekman	500	Composite	5	0.40, 0.45, 0.40, 0.45, 0.40	20, 40, 30, 40, 30	4
	Seep Creek Pond 2	SCP-3	Ekman	500	Composite	5	0.4, 0.4, 0.4, 0.4, 0.4	60, 80, 50, 80, 60	4
		SCP-4	Ekman	500	Composite	5	0.25, 0.25, 0.30, 0.35, 0.30	40, 40, 60, 20, 50	2
		SCP-5	Ekman	500	Discrete	5	0.35, 0.35, 0.35, 0.35, 0.35	30, 30, 30, 25, 30	1, 1, 1, 1, 1
Reference Area 1 (REF1)	Fingers Lake	FL-1	Ekman	500	Composite	5	2.0, 2.0, 2.0, 2.0, 2.0	20, 20, 20, 15, 20	1
		FL-2	Ekman	500	Composite	5	1.0, 1.0, 1.0, 1.0, 1.0	40, 10, 50, 60, 30	3
		FL-3	Ekman	500	Composite	5	0.70, 0.60, 0.60, 0.60, 0.70	40, 10, 20, 30, 30	3
		FL-4	Ekman	500	Composite	5	2.0, 2.0, 2.0, 2.0, 2.0	70, 70, 70, 70, 70	1
		FL-5	Ponar	500	Discrete	5	0.9, 0.9, 0.9, 0.9, 0.9	60, 50, 70, 40, 40	2, 1, 2, 1, 1
Reference Area 2 (REF2)	Unnamed Pond	R2-1	Ekman	500	Composite	5	0.20, 0.20, 0.20, 0.20, 0.20	40, 30, 40, 20, 40	2
		R2-2	Ekman	500	Composite	5	0.4, 0.4, 0.4, 0.4, 0.4	40, 20, 20, 15, 20	3
		R2-4	Ekman	500	Composite	5	0.4, 0.4, 0.4, 0.4, 0.4	40, 50, 40, 80, 80	1
	Unnamed Creek Pond	R2-3	Ekman	500	Composite	5	0.4, 0.4, 0.4, 0.4, 0.4	60, 50, 60, 60, 50	4
		R2-5	Ekman	500	Discrete	5	0.4, 0.4, 0.4, 0.4, 0.4	70, 50, 80, 60, 90	1, 1, 1, 1, 1

Table D-7: Power Analysis Results for Benthic Invertebrate Effects Analyses, 2016

Variable	Power for a sample size of 5	
	Increase	Decrease
Total Density	0.58	0.20
(outlier removed)	0.94	0.37
Chironomidae Density	0.36	0.17
(outlier removed)	0.90	0.40
Family Level Richness	0.83	0.83
Family Level SDI	0.88	0.88
Family Level SEI	0.72	0.72
BCI[(a)]	0.95	0.78
BCI[(b)]	0.90	0.90
Lowest Taxonomic Level Richness	0.95	0.95

(a) Bray-Curtis Index calculated at the family level using the standard EEM method using Reference Area medians (EC 2012).

(b) Bray-Curtis Index calculated at the family level using the pairwise comparison method (Huebert et al. 2011).

SDI = Simpson's Diversity Index; SEI = Simpson's Evenness Index; BCI = Bray-Curtis Index.

Note: Power was calculated separately for detecting increases and decreases for variables where a 2SD difference was beyond the range of the variable (i.e., 0 or 1). In those cases, the effect size was based on the upper or lower limit of the variable.

Table D-8: Family Level Benthic Invertebrate Density and Proportion, 2016

Major Taxon	Area / Station / Family	SCP-1 org/m²	SCP-1 %	SCP-2 org/m²	SCP-2 %	SCP-3 org/m²	SCP-3 %	SCP-4 org/m²	SCP-4 %	SPC-5 org/m²	SPC-5 %	SCP Density (org/m²) Mean	SCP Density (org/m²) SE	SCP Proportion (%) Mean	SCP Proportion (%) SE
Microturbellaria (i/d)		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Oligochaeta	Enchytraeidae	0	0.0	0	0.0	69	0.4	0	0.0	0	0.0	14	14	0.07	0.07
Oligochaeta	Lumbriculidae	103	1.8	17	3.9	103	0.5	26	0.7	456	43.8	141	81	10.15	8.44
Oligochaeta	Naididae	9	0.1	0	0.0	69	0.4	26	0.7	0	0.0	21	13	0.24	0.13
Bivalvia	Pisidiidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Acari - Hydracarina	Aturidae	0	0.0	0	0.0	0	0.0	9	0.2	0	0.0	2	2	0.05	0.05
Acari - Hydracarina	Arrenuridae	0	0.0	0	0.0	34	0.2	0	0.0	0	0.0	7	7	0.04	0.04
Acari - Hydracarina	Lebertiidae	0	0.0	9	2.0	0	0.0	0	0.0	0	0.0	2	2	0.39	0.39
Acari - Hydracarina	Pionidae	0	0.0	0	0.0	34	0.2	0	0.0	0	0.0	7	7	0.04	0.04
Ostracoda	-	344	5.9	17	3.9	964	5.0	835	23.0	86	8.3	450	193	9.21	3.52
Trichoptera	Leptoceridae	9	0.1	9	2.0	103	0.5	0	0.0	0	0.0	24	20	0.53	0.37
Trichoptera	Phryganeidae	0	0.0	0	0.0	17	0.1	0	0.0	0	0.0	3	3	0.02	0.02
Diptera	Chironomidae	5,365	92.0	370	84.3	17,911	92.2	2,523	69.4	465	44.6	5,327	3,274	76.51	8.98
Diptera	Ceratopogonidae	0	0.0	9	2.0	103	0.5	215	5.9	17	1.7	69	41	2.01	1.04
Diptera	Empididae	0	0.0	9	2.0	0	0.0	0	0.0	0	0.0	2	2	0.39	0.39
Diptera	Muscidae	0	0.0	0	0.0	0	0.0	0	0.0	9	0.8	2	2	0.17	0.17
Diptera	Tipulidae	0	0.0	0	0.0	26	0.1	0	0.0	9	0.8	7	5	0.19	0.16
	Total Density	**5,830**	**-**	**439**	**-**	**19,435**	**-**	**3,634**	**-**	**1,042**	**-**	**6,076**	**-**	**100**	**-**

Major Taxon	Area / Station / Family	FL-1 org/m²	FL-1 %	FL-2 org/m²	FL-2 %	FL-3 org/m²	FL-3 %	FL-4 org/m²	FL-4 %	FL-5 org/m²	FL-5 %	FL Density (org/m²) Mean	FL Density (org/m²) SE	FL Proportion (%) Mean	FL Proportion (%) SE
Microturbellaria (i/d)		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Oligochaeta	Enchytraeidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Oligochaeta	Lumbriculidae	34	1.0	0	0.0	0	0.0	155	1.7	0	0.0	38	30	0.55	0.35
Oligochaeta	Naididae	17	0.5	0	0.0	0	0.0	0	0.0	0	0.0	3	3	0.10	0.10
Bivalvia	Pisidiidae	1,404	41.0	0	0.0	0	0.0	5,261	58.9	26	4.1	1,338	1,017	20.79	12.25
Acari - Hydracarina	Aturidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Acari - Hydracarina	Arrenuridae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Acari - Hydracarina	Lebertiidae	52	1.5	17	1.5	0	0.0	9	0.1	0	0.0	16	10	0.62	0.36
Acari - Hydracarina	Pionidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Ostracoda	-	146	4.3	86	7.5	34	6.5	0	0.0	0	0.0	53	28	3.64	1.57
Trichoptera	Leptoceridae	17	0.5	9	0.7	0	0.0	17	0.2	17	2.7	12	3	0.84	0.49
Trichoptera	Phryganeidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Diptera	Chironomidae	1,602	46.7	1,016	88.1	482	90.3	3,479	38.9	508	80.8	1,417	554	68.97	10.86
Diptera	Ceratopogonidae	9	0.3	0	0.0	0	0.0	0	0.0	0	0.0	2	2	0.05	0.05
Diptera	Empididae	146	4.3	26	2.2	17	3.2	17	0.2	78	12.3	57	25	4.45	2.08
Diptera	Muscidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Diptera	Tipulidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
	Total Density	**3,427**	**-**	**1,154**	**-**	**534**	**-**	**8,938**	**-**	**629**	**-**	**2,936**	**-**	**100**	**-**

Major Taxon	Area / Station / Family	R2-1 org/m²	R2-1 %	R2-2 org/m²	R2-2 %	R2-3 org/m²	R2-3 %	R2-4 org/m²	R2-4 %	R2-5 org/m²	R2-5 %	R2 Density (org/m²) Mean	R2 Density (org/m²) SE	R2 Proportion (%) Mean	R2 Proportion (%) SE
Microturbellaria (i/d)		0	0.0	0	0.0	0	0.0	69	1.4	17	2.0	17	13	0.69	0.44
Oligochaeta	Enchytraeidae	0	0.0	0	0.0	0	0.0	0	0.0	17	2.0	3	3	0.41	0.41
Oligochaeta	Lumbriculidae	0	0.0	0	0.0	0	0.0	0	0.0	17	2.0	3	3	0.41	0.41
Oligochaeta	Naididae	9	1.1	0	0.0	0	0.0	0	0.0	0	0.0	2	2	0.22	0.22
Bivalvia	Pisidiidae	0	0.0	9	2.4	0	0.0	0	0.0	0	0.0	2	2	0.48	0.48
Acari - Hydracarina	Aturidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Acari - Hydracarina	Arrenuridae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Acari - Hydracarina	Lebertiidae	9	1.1	17	4.8	9	0.1	9	0.2	0	0.0	9	3	1.24	0.90
Acari - Hydracarina	Pionidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Ostracoda	-	0	0.0	52	14.3	1,619	22.1	69	1.4	0	0.0	348	318	7.57	4.52
Trichoptera	Leptoceridae	0	0.0	9	2.4	69	0.9	0	0.0	0	0.0	16	13	0.66	0.47
Trichoptera	Phryganeidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
Diptera	Chironomidae	594	77.5	258	71.4	5,580	76.2	4,633	96.1	611	72.4	2,335	1,143	78.74	4.48
Diptera	Ceratopogonidae	0	0.0	0	0.0	0	0.0	43	0.9	34	4.1	16	10	0.99	0.79
Diptera	Empididae	155	20.2	17	4.8	34	0.5	0	0.0	146	17.3	71	33	8.56	4.28
Diptera	Muscidae	0	0.0	0	0.0	9	0.1	0	0.0	0	0.0	2	2	0.02	0.02
Diptera	Tipulidae	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0.00	0.00
	Total Density	**766**	**-**	**362**	**-**	**7,319**	**-**	**4,822**	**-**	**844**	**-**	**2,823**	**-**	**100**	**-**

APPENDIX E

Fish Survey Data

Figure E-1: Gonad Weight Plotted against Body Weight (A), Carcass Weight (B), and Length (C) for Male Ninespine Stickleback, 2016

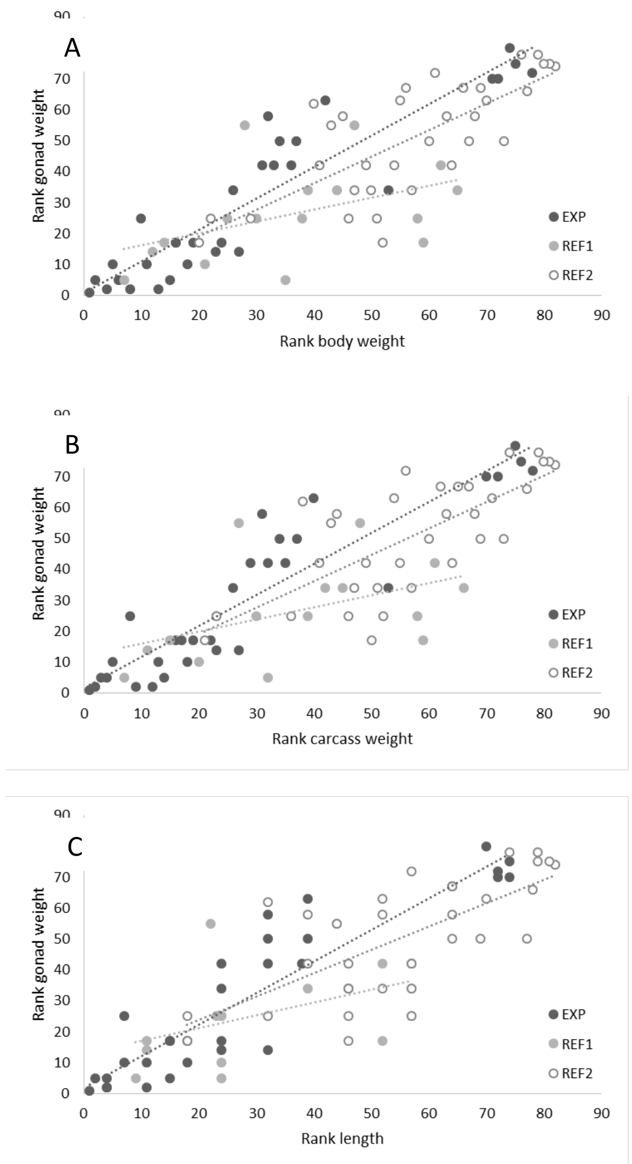
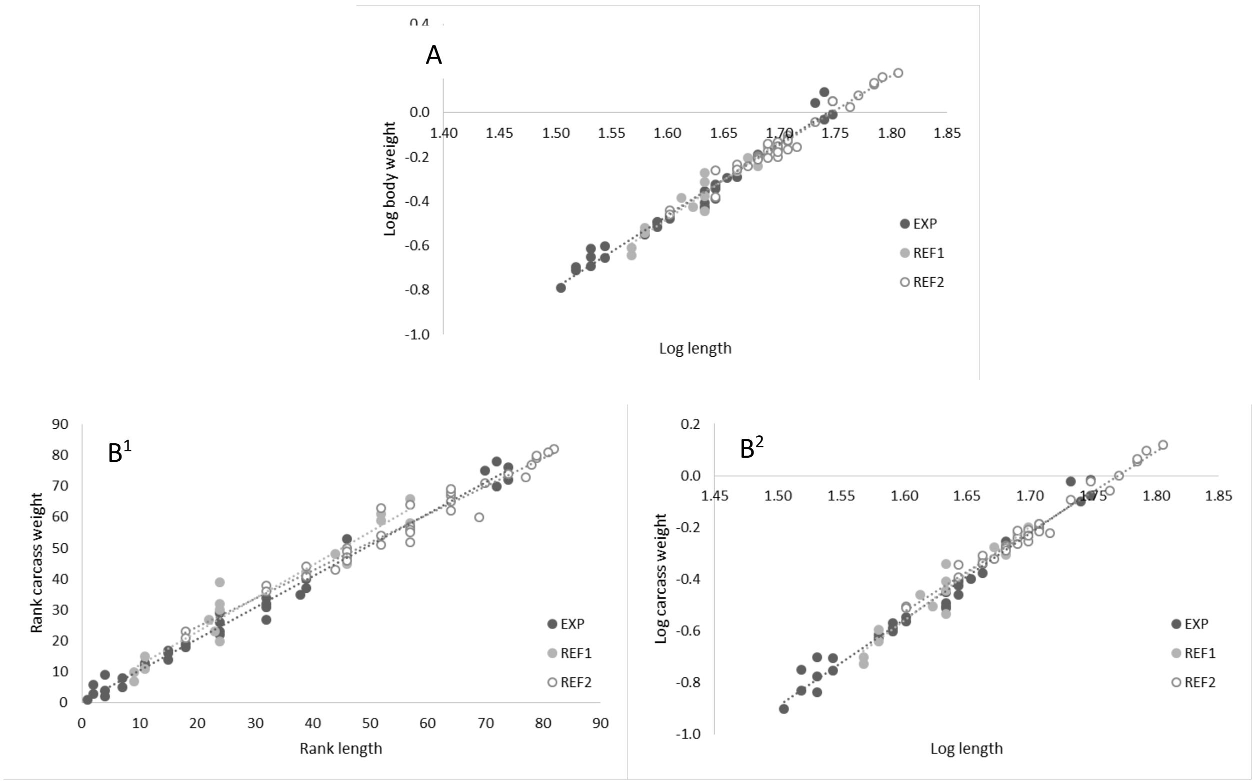
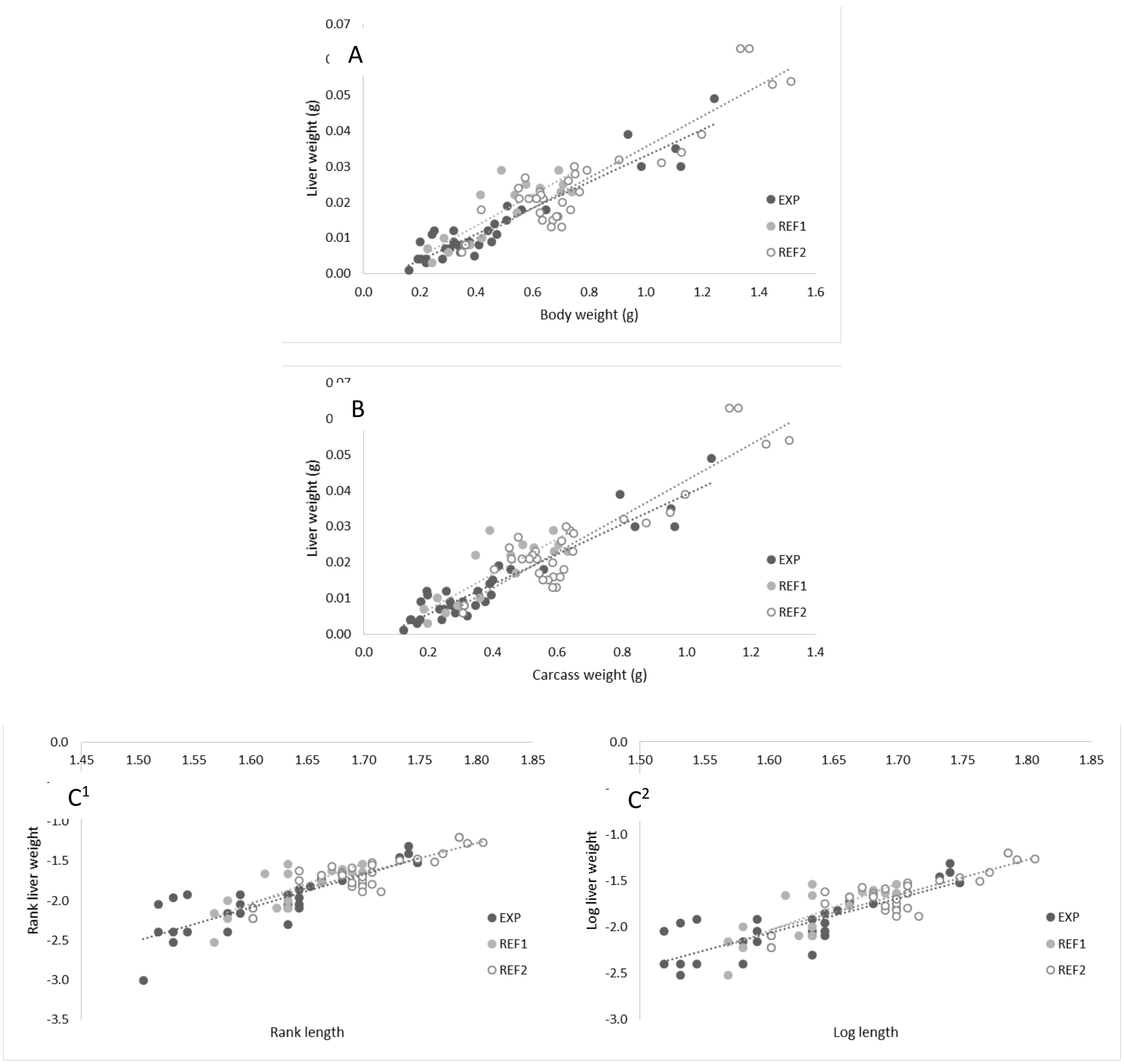


Figure E-2: Body Weight (A) and Carcass Weight (B) Plotted against Length for Male Ninespine Stickleback, 2016



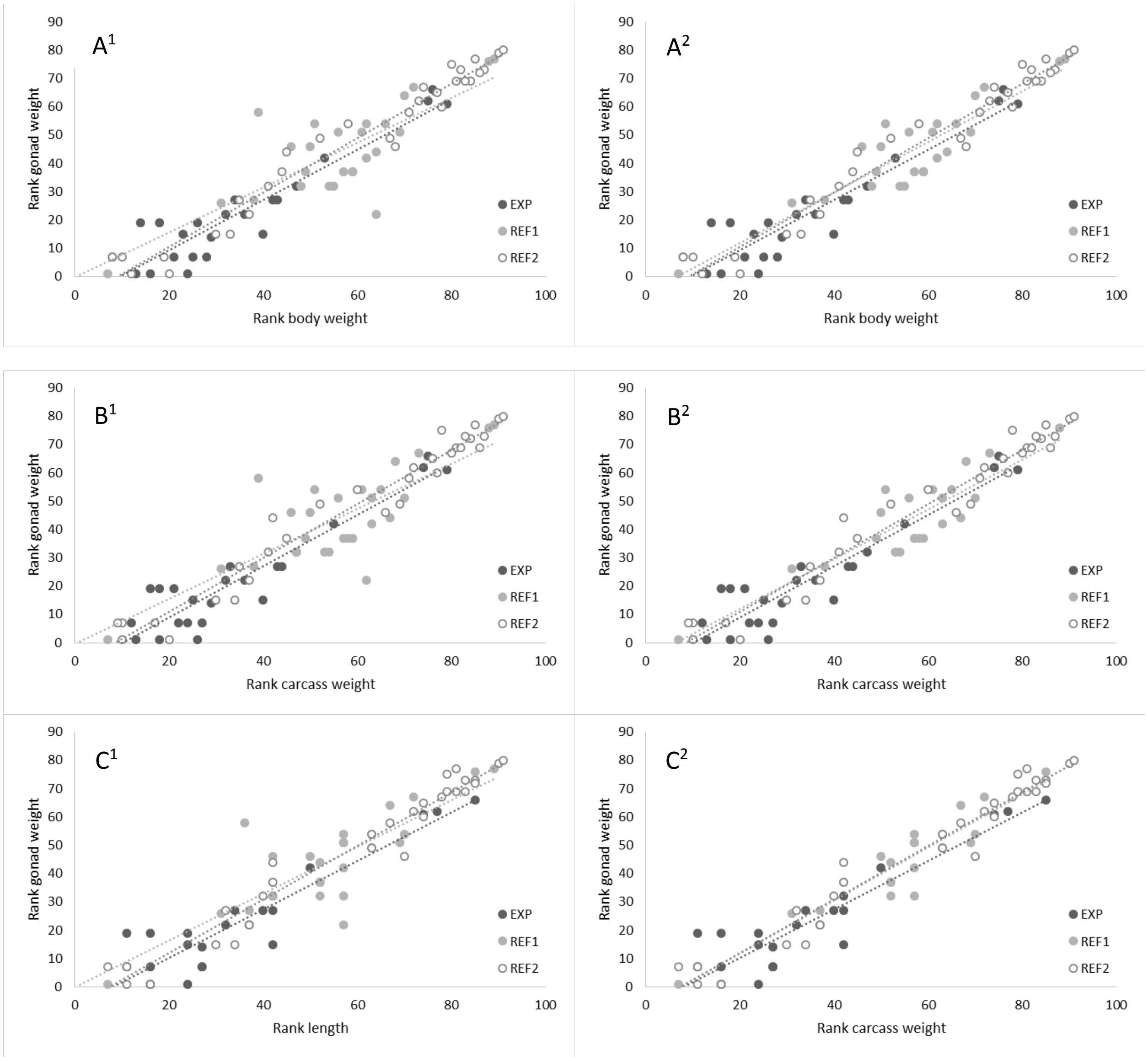
1) Plot includes statistical outliers.
2) Plot omits statistical outliers.

Figure E-3: Liver Weight Plotted against Body Weight (A), Carcass Weight (B), and Length (C) for Male Ninespine Stickleback, 2016



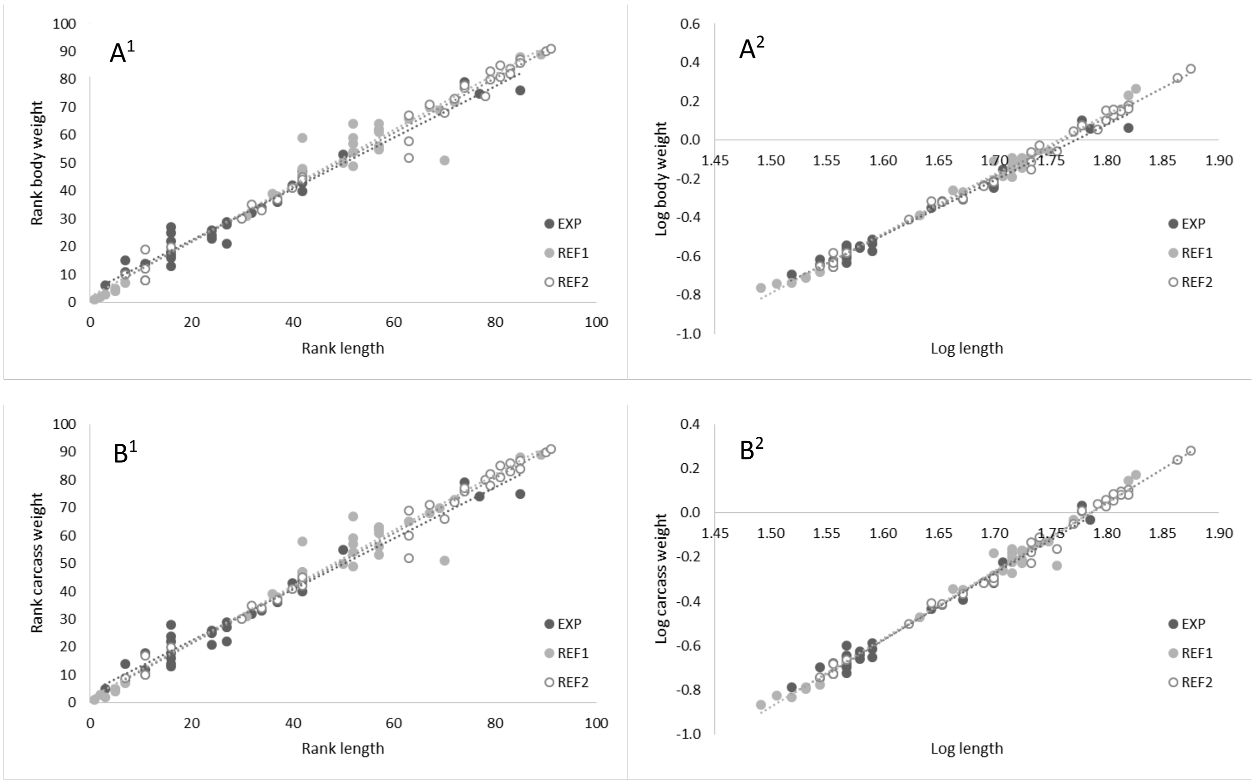
1) Plot includes statistical outliers.
2) Plot omits statistical outliers.

Figure E-4: Gonad Weight Plotted against Body Weight (A), Carcass Weight (B), and Length (C) for Female Ninespine Stickleback, 2016



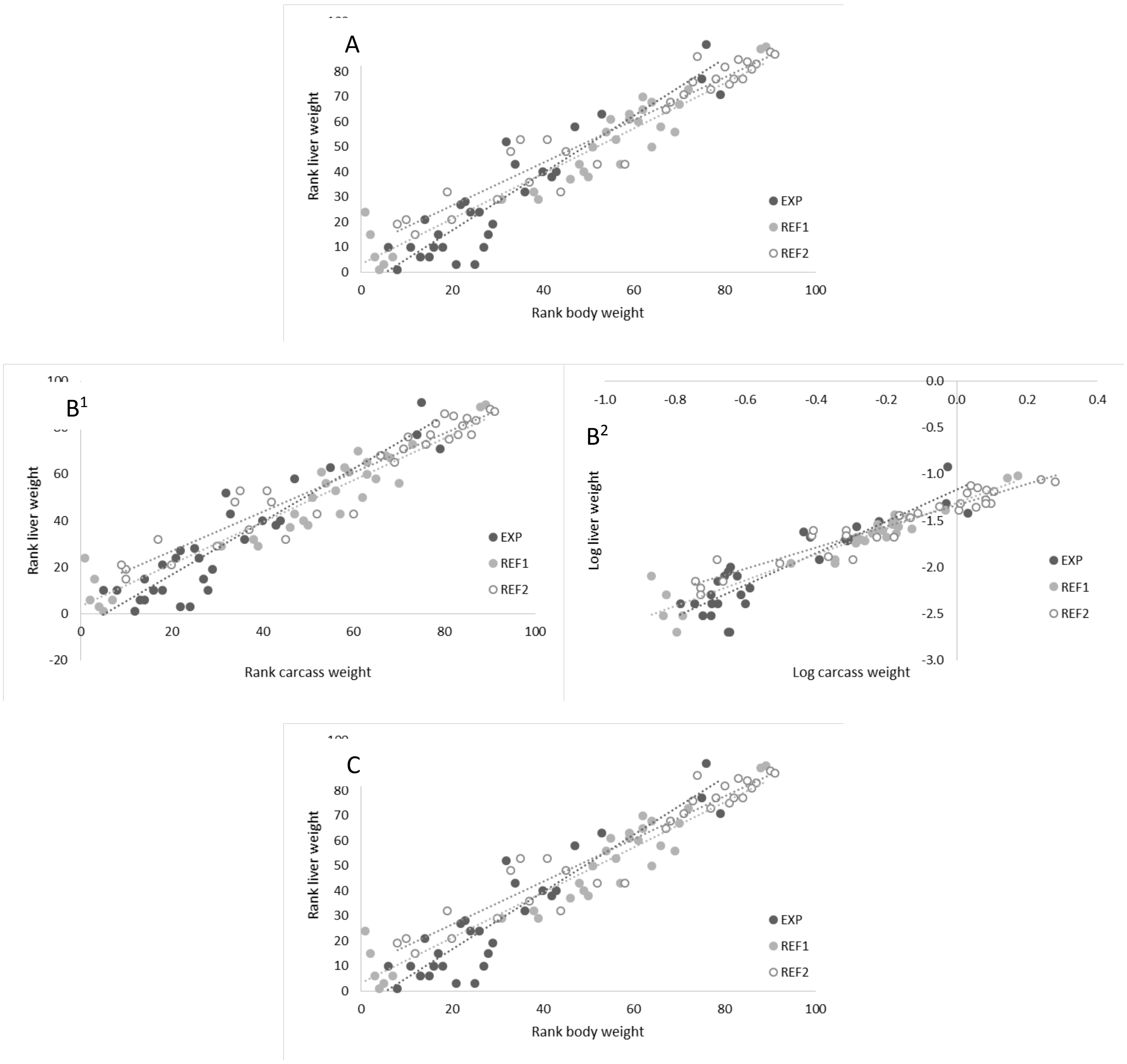
1) Plot includes statistical outliers.
2) Plot omits statistical outliers.

Figure E-5: Body Weight (A) and Carcass Weight (B) Plotted against Length for Female Ninespine Stickleback, 2016



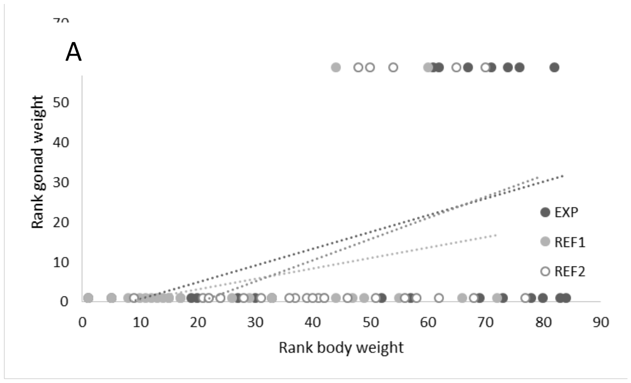
1) Plot includes statistical outliers.
2) Plot omits statistical outliers.

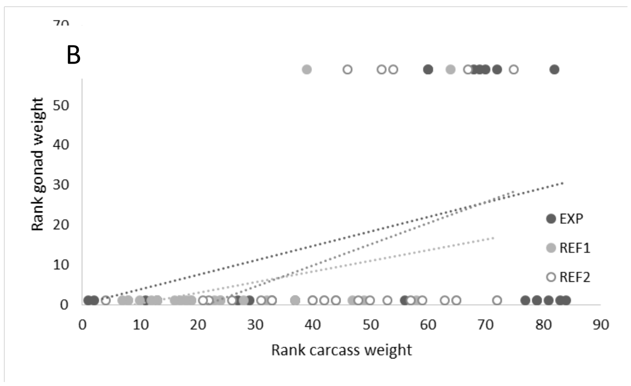
Figure E-6: Liver Weight Plotted against Body Weight (A), Carcass Weight (B), and Length (C) for Female Ninespine Stickleback, 2016



1) Plot includes statistical outliers.
2) Plot omits statistical outliers.

Figure E-7: Gonad Weight Plotted against Body Weight (A), Carcass Weight (B), and Length (C) for Juvenile Ninespine Stickleback, 2016





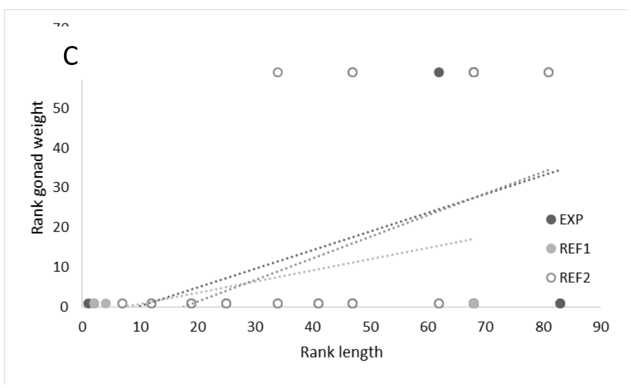
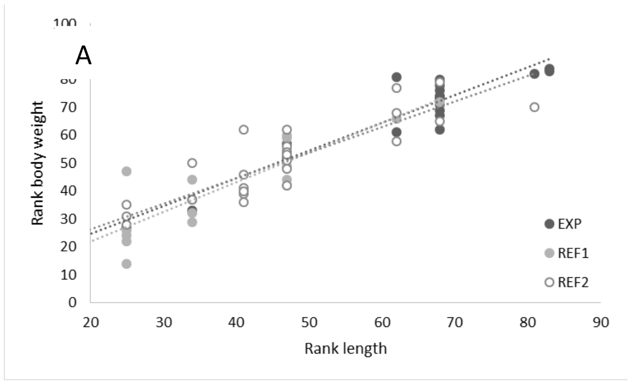


Figure E-8: Body Weight (A) and Carcass Weight (B) Plotted against Length for Juvenile Ninespine Stickleback, 2016



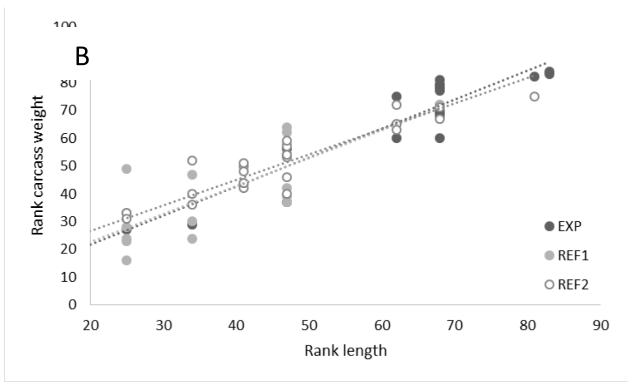
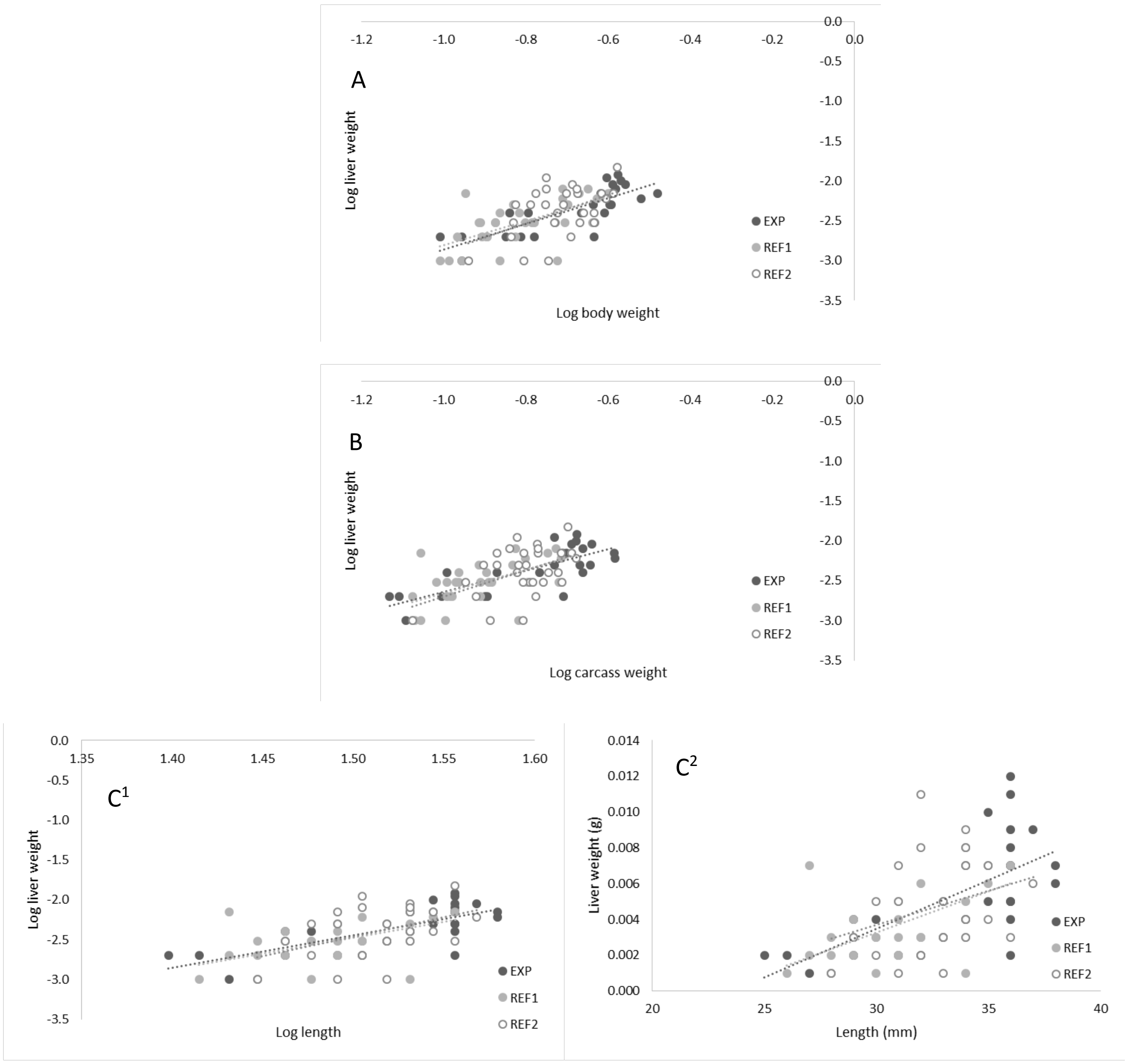


Figure E-9: Liver Weight Plotted against Body Weight (A), Carcass Weight (B), and Length (C) for Juvenile Ninespine Stickleback, 2016



1) Plot includes statistical outliers.
2) Plot omits statistical outliers.

Figure E-10: Body Weight Plotted against Length for Young-of-the-Year (A), Juvenile (B) and All (C) Arctic Grayling, 2016

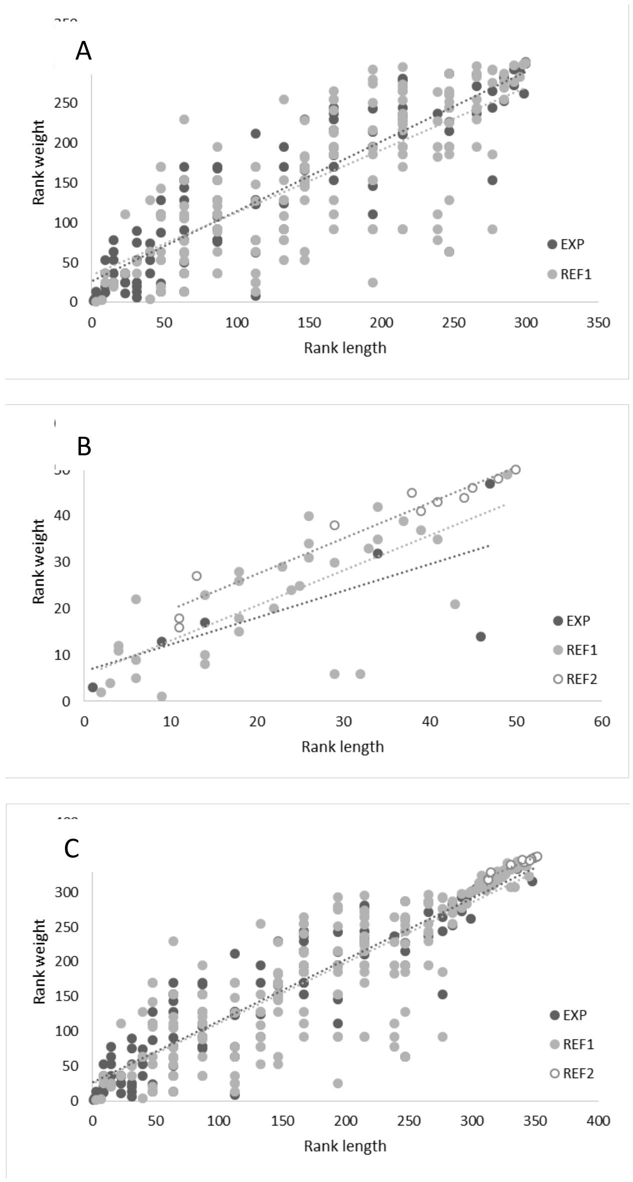


Table E1: Lethal Survey - Fish Health Data, Exposure Area 2016

Fish Identification #	Species	Effort Number	Capture Date	Capture Time	Sacrifice Time	Sacrifice Method	Total Length (mm)	Weight (g)	Carcass Weight (g)	Age Structure	Age (y)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudobranchs	Fins	Vent	External Parasites	Sex	Life Stage	Maturity Code (a)	Liver Score	Liver Wt. (g)	Spleen Score	Gall Bladder	Gall bladder (% Fullness)	Whole Gonad Wt. (g)	Stomach Contents (% Fullness)	Mesenteric Fat (%)	Internal Parasites	Kidney Score	Gonad	Stomach	Otolith	Comments
LU16FEXPNNST1	NNST	16EXPSN1	25-Aug-16	12:30	16:34	BTH	29	0.142	0.099	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	Normal	0	0.001	50	None	None	Normal	X	X	X	
LU16FEXPNNST2	NNST	16EXPSN1	25-Aug-16	12:30	17:03	BTH	26	0.111	0.078	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FEXPNNST3	NNST	16EXPSN2	25-Aug-16	13:35	17:25	BTH	34	0.203	0.145	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.004	Normal	-	-	0.003	100	None	None	Normal	X	X	X	
LU16FEXPNNST4	NNST	16EXPSN2	25-Aug-16	13:35	17:40	BTH	34	0.223	0.167	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.003	Normal	-	-	0.004	25	<50	None	Normal	X		X	Gonads are tan in color and appear flattened
LU16FEXPNNST5	NNST	16EXPSN2	25-Aug-16	13:35	17:58	BTH	32	0.166	0.128	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.002	Normal	-	-	0.001	30	None	None	Normal	X		X	
LU16FEXPNNST6	NNST	16EXPSN2	25-Aug-16	13:35	19:01	BTH	35	0.228	0.180	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.004	Normal	Normal	100	0.001	0	<50	None	Normal	X		X	
LU16FEXPNNST7	NNST	16EXPSN2	25-Aug-16	13:35	19:17	BTH	32	0.162	0.125	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	11	Normal	0.001	Normal	Normal	100	0.002	25	<50	None	Normal	X		X	
LU16FEXPNNST8	NNST	16EXPSN2	25-Aug-16	13:35	19:32	BTH	27	0.111	0.081	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.001	Normal	-	-	-	25	None	None	Normal	X		X	Bend in caudal peduncal
LU16FEXPNNST9	NNST	16EXPSN2	25-Aug-16	13:35	19:46	BTH	31	0.154	0.126	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	Normal	25	0.001	50	None	None	Normal	X	X	X	
LU16FEXPNNST10	NNST	16EXPEF1	27-Aug-16	10:00	15:49	BTH	46	0.559	0.456	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.018	Normal	-	-	0.016	25	None	None	Normal	X		X	
LU16FEXPNNST11	NNST	16EXPEF1	27-Aug-16	10:00	16:05	BTH	35	0.251	0.197	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	0X	Normal	0.012	Normal	-	-	0.008	50	None	None	Normal	X	X	X	
LU16FEXPNNST12	NNST	16EXPEF1	27-Aug-16	10:00	16:18	BTH	36	0.249	0.186	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.011	Normal	Normal	100	0.002	50	None	None	Normal	X	X	X	
LU16FEXPNNST13	NNST	16EXPEF1	27-Aug-16	10:00	16:36	BTH	36	0.266	0.211	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.012	Normal	-	-	0.001	100	None	None	Normal	X	X	X	
LU16FEXPNNST14	NNST	16EXPSN5	27-Aug-16	11:40	16:52	BTH	25	0.098	0.074	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.002	Normal	Normal	100	0.001	50	None	None	Normal	X	X	X	
LU16FEXPNNST16	NNST	16EXPSN7	27-Aug-16	12:00	17:05	BTH	30	0.161	0.135	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.004	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FEXPNNST18	NNST	16EXPSN7	27-Aug-16	12:00	17:47	BTH	33	0.195	0.148	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	11	Normal	0.004	Normal	Normal	100	0.004	50	None	None	Normal	X		X	
LU16FEXPNNST19	NNST	16EXPSN7	27-Aug-16	12:00	18:01	BTH	39	0.307	0.259	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.006	Normal	Normal	100	0.004	10	None	None	Normal	X	X	X	
LU16FEXPNNST20	NNST	16EXPSN7	27-Aug-16	12:00	18:56	BTH	38	0.279	0.228	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.010	Normal	Normal	100	0.005	25	None	None	Normal	X		X	
LU16FEXPNNST21	NNST	16EXPSN7	27-Aug-16	12:00	19:15	BTH	36	0.262	0.218	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.008	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FEXPNNST31	NNST	16EXPEF2	28-Aug-16	11:15	13:40	BTH	66	1.157	0.940	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Fatty	0.120	Normal	-	-	0.030	0	None	None	Normal	X		X	
LU16FEXPNNST32	NNST	16EXPEF2	28-Aug-16	11:15	14:02	BTH	34	0.209	0.147	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.017	Normal	Normal	100	0.001	0	None	None	Normal	X		X	
LU16FEXPNNST33	NNST	16EXPEF2	28-Aug-16	11:15	14:22	BTH	37	0.248	0.210	-	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	27	Normal	0.004	Normal	-	-	0.002	0	None	None	Normal	X			
LU16FEXPNNST34	NNST	16EXPEF2	28-Aug-16	11:15	14:39	BTH	36	0.256	0.199	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.007	Normal	-	-	0.002	0	None	None	Normal	X		X	
LU16FEXPNNST35	NNST	16EXPEF2	28-Aug-16	11:15	14:56	BTH	33	0.202	0.178	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.009	Normal	-	-	0.001	0	None	None	Normal	X		X	
LU16FEXPNNST37	NNST	16EXPSN8	28-Aug-16	11:15	15:30	BTH	35	0.270	0.210	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.010	Normal	-	-	-	75	None	None	Normal		X	X	Gonad dried out before weighed
LU16FEXPNNST38	NNST	16EXPSN8	28-Aug-16	11:15	16:01	BTH	37	0.274	0.224	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.009	Normal	Normal	50	0.001	50	None	None	Normal	X	X	X	
LU16FEXPNNST39	NNST	16EXPSN8	28-Aug-16	11:15	16:15	BTH	44	0.455	0.377	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.009	Normal	-	-	0.013	25	None	None	Normal	X		X	
LU16FEXPNNST40	NNST	16EXPSN8	28-Aug-16	11:15	16:29	BTH	40	0.333	0.273	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.008	Normal	-	-	0.005	10	None	None	Normal	X		X	
LU16FEXPNNST41	NNST	16EXPEF2	28-Aug-16	11:15	13:40	BTH	46	0.511	0.419	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.019	Normal	-	-	0.011	25	None	None	Normal	X		X	
LU16FEXPNNST42	NNST	16EXPEF2	28-Aug-16	11:15	13:58	BTH	36	0.241	0.210	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	0X	Normal	0.007	Normal	-	-	0.006	0	None	None	Normal	X		X	
LU16FEXPNNST43	NNST	16EXPEF2	28-Aug-16	11:15	14:10	BTH	37	0.233	0.190	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.003	Normal	-	-	0.002	25	None	None	Normal	X		X	
LU16FEXPNNST44	NNST	16EXPEF2	28-Aug-16	11:15	14:23	BTH	37	0.288	0.251	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.004	Normal	-	-	0.001	25	<50	None	Normal	X		X	
LU16FEXPNNST45	NNST	16EXPEF2	28-Aug-16	11:15	14:37	BTH	35	0.222	0.176	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.004	Normal	Normal	50	0.005	75	None	None	Normal	X	X	X	
LU16FEXPNNST46	NNST	16EXPEF2	28-Aug-16	11:15	14:50	BTH	35	0.243	0.201	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.003	Normal	-	-	0.001	0	None	None	Normal	X		X	
LU16FEXPNNST47	NNST	16EXPSN8	28-Aug-16	11:15	15:04	BTH	44	0.411	0.347	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.008	Normal	Normal	100	0.006	50	None	None	Normal	X	X	X	
LU16FEXPNNST48	NNST	16EXPSN8	28-Aug-16	11:15	15:23	BTH	37	0.250	0.201	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.005	Normal	-	-	0.001	75	<50	None	Normal	X	X	X	
LU16FEXPNNST49	NNST	16EXPSN8	28-Aug-16	11:15	15:34	BTH	47	0.492	0.407	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.012	Normal	Normal	100	0.007	50	None	None	Normal	X	X	X	
LU16FEXPNNST50	NNST	16EXPSN8	28-Aug-16	11:15	16:01	BTH	38	0.284	0.219	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.008	Normal	-	-	0.006	50	None	1	Normal	X		X	Three cycts in stomach
LU16FEXPNNST51	NNST	16EXPSN8	28-Aug-16	11:15	16:16	BTH	44	0.473	0.395	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Normal	0.011	Normal	-	-	0.011	50	None	None	Normal	X	X	X	
LU16FEXPNNST52	NNST	16EXPSN8	28-Aug-16	11:15	16:27	BTH	34	0.216	0.171	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.004	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FEXPNNST53	NNST	16EXPSN8	28-Aug-16	11:15	16:38	BTH	39	0.321	0.257	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Normal	0.012	Normal	Normal	100	0.007	75	None	None	Normal	X	X	X	
LU16FEXPNNST54	NNST	16EXPSN8	28-Aug-16	11:15	16:49	BTH	36	0.222	0.188	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.001	Normal	Normal	100	0.003	0	None	None	Normal	X		X	
LU16FEXPNNST55	NNST	16EXPSN8	28-Aug-16	11:15	17:00	BTH	36	0.258	0.205	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	U	J	11	Normal	0.009	Normal	Normal	50	0.002	75	None	None	Normal	X	X	X	
LU16FEXPNNST56	NNST	16EXPSN8	28-Aug-16	11:15	17:12	BTH	34	0.243	0.198	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	0X	Fatty	0.011	Normal	-	-	0.003	50	None	None	Normal	X	X	X	
LU16FEXPNNST57	NNST	16EXPSN8	28-Aug-16	11:15	17:24	BTH	39	0.267	0.224	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.002	Normal	Normal	100	0.003	25	None	None	Normal	X		X	
LU16FEXPNNST58	NNST	16EXPSN8	28-Aug-16	11:15	17:36	BTH	39	0.293	0.244	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.005	Normal	-	-	0.003	25	None	None	Normal	X		X	
LU16FEXPNNST59	NNST	16EXPSN8	28-Aug-16	11:15	17:50	BTH	35	0.231	0.186	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	-	-	0.002	25	<50	None	Normal	X		X	
LU16FEXPNNST61	NNST	16EXPSN8	28-Aug-16	11:15	16:42	BTH	29	0.145	0.102	Otolith	1	None	Normal	Mild aberrasions	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.004	Normal	Normal	100	0.001	30	<50	None	Normal	X		X	Left side, skin pale above lateral line
LU16FEXPNNST62	NNST	16EXPSN8	28-Aug-16	11:15	16:55	BTH	38	0.332	0.260	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Moderate erosion	Normal	None	U	J	0X	Normal	0.007	Normal	Normal	100	0.001	50	None	None	Normal	X	X	X	Hemmorrhaging at base of fin
LU16FEXPNNST63	NNST	16EXPSN8	28-Aug-16	11:15	17:13	BTH	36	0.256	0.215	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	Normal	100	-	0	None	None	Normal	X		X	Gonad observed but lost when transitioning to vile
LU16FEXPNNST64	NNST	16EXPSN8	28-Aug-16	11:15	17:27	BTH	33	0.202	0.164	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.004	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FEXPNNST65	NNST	16EXPSN8	28-Aug-16	11:15	17:40	BTH	37	0.277	0.229	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.009	Normal	-	-	0.002	50	None	None	Normal	X	X	X	
LU16FEXPNNST66	NNST	16EXPMT1	31-Aug-16	11:30	13:53	BTH	48	0.648	0.558	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.018	Normal	Normal	50	0.009	0	<50	None	Normal	X		X	
LU16FEXPNNST67	NNST	16EXPSN11	31-Aug-16	10:30	14:05	BTH	54	1.105	0.953	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.035	Normal	Normal	-	0.030	10	<50	None	Normal	X		X	
LU16FEXPNNST68	NNST	16EXPSN14	31-Aug-16	10:50	14:18	BTH	56	0.984	0.840	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.030	Normal	Normal	0	0.019	25	<50	None	Normal	X		X	
LU16FEXPNNST69	NNST	16EXPSN14	31-Aug-16	10:50	14:32	BTH	61	1.140	0.934	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.048	Normal	Normal	-	0.025	50	<50	None	Normal	X	X	X	
LU16FEXPNNST70	NNST	16EXPSN13	31-Aug-16	10:40	14:45	BTH	38	0.280	0.238	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	F	A	17	Normal	0.008	Normal	-	-	0.002	10	None	None	Normal	X		X	
LU16FEXPNNST71	NNST	16EXPSN13	31-Aug-16	10:40	15:00	BTH	43	0.393	0.321	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.005	Normal	Normal	100	0.009	25	None	None	Normal	X		X	
LU16FEXPNNST72	NNST	16EXPSN13	31-Aug-16	10:40	15:15	BTH	36	0.241	0.195	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.007	Normal	Normal	50	0.002	10	None	None	Normal	X		X	
LU16FEXPNNST73	NNST	16EXPSN13	31-Aug-16	10:40	15:27	BTH	43	0.442	0.354	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.012	Normal	Normal	100	0.010	100	<50	None	Normal	X	X	X	
LU16FEXPNNST74	NNST	16EXPSN13	31-Aug-16	10:40	15:41	BTH	45	0.507	0.400	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.015	Normal	Normal	100	0.010	50	<50	None	Normal	X	X	X	
LU16FEXPNNST75	NNST	16EXPSN13	31-Aug-16	10:40	15:56	BTH	36	0.232	0.196	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	-	-	0.002	25	None	None	Normal	X		X	
LU16FEXPNNST76	NNST	16EXPSN13	31-Aug-16	10:40	16:28	BTH	43	0.375	0.308	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.009	Normal	-	-	0.007	75	None	None	Normal	X	X	X	
LU16FEXPNNST77	NNST	16EXPSN13	31-Aug-16	10:40	16:55	BTH	38	0.290	0.236	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.007	Normal	-	-	0.003	10	None	None	Normal	X		X	
LU16FEXPNNST78	NNST	16EXPSN13	31-Aug-16	10:40	17:06	BTH	39	0.321	0.269	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.009	Normal	Normal	50	0.007	25	None	None	Normal	X		X	
LU16FEXPNNST79	NNST	16EXPSN13	31-Aug-16	10:40	17:16	BTH	39	0.306	0.249	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.007	Normal	Normal	100	0.004	50	None	None	Normal	X	X	X	
LU16FEXPNNST80	NNST	16EXPSN13	31-Aug-16	10:40	17:27	BTH	39	0.286	0.229	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	A	0X	Normal	0.007	Normal	Normal	100	0.004	50	None	None	Normal	X	X	X	
LU16FEXPNNST81	NNST	16EXPSN15	31-Aug-16	10:55	16:51	BTH	50	0.591	0.502	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.020	Normal	Normal	100	0.009	25	<50	None	Normal	X		X	
LU16FEXPNNST82	NNST	16EXPSN15	31-Aug-16	10:55	17:02	BTH	43	0.374	0.312	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.008	Normal	-	-	0.006	100	None	None	Normal	X	X	X	
LU16FEXPNNST83	NNST	16EXPSN15	31-Aug-16	10:55	17:15	BTH	40	0.344	0.284	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.006	Normal	Normal	100	0.007	50	None	None	Normal	X	X	X	
LU16FEXPNNST84	NNST	16EXPSN15	31-Aug-16	10:55	17:27	BTH	38	0.302	0.261	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.006	Normal	-	-	0.001	10	None	None	Normal	X		X	
LU16FEXPNNST85	NNST	16EXPSN15	31-Aug-16	10:55	17:38	BTH	44	0.464	0.391	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.014	Normal	Normal	100	0.010	10	<50	None	Normal	X		X	
LU16FEXPNNST86	NNST	16EXPSN15	31-Aug-16	10:55	17:50	BTH	36	0.254	0.228	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	Normal	100	0.001	0	<50	None	Normal	X		X	
LU16FEXPNNST87	NNST	16EXPSN15	31-Aug-16	10:55	18:49	BTH	36	0.246	0.218	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.004	Normal	Normal	100	0.001	25	<50	None	Normal	X		X	
LU16FEXPNNST88	NNST	16EXPSN15	31-Aug-16	10:55	19:00	BTH	38	0.282	0.242	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.004	Normal	-	-	0.005	100	None	None	Normal	X	X	X	
LU16FEXPNNST91	NNST	16EXPSN13	31-Aug-16	10:40	17:38	BTH	37	0.253	0.202	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.004	Normal	Normal	100	0.006	10	None	None	Normal	X		X	
LU16FEXPNNST92	NNST	16EXPSN15	31-Aug-16	10:55	17:50	BTH	36	0.242	0.199	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	A	0X	Normal	0.004	Normal	-	-	0.003	0	None	None	Normal	X		X	
LU16FEXPNNST93	NNST	16EXPSN15	31-Aug-16	10:55	18:53	BTH	37	0.283	0.227	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.002	Normal	Normal	100	0.003	50	None	None	Normal	X	X	X	
LU16FEXPNNST95	NNST	16EXPSN2	1-Sep-16	14:15	18:57	BTH	55	0.936	0.794	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Fatty	0.039	Normal	Normal	50	0.019	25	<50	None	Normal	X		X	
LU16FEXPNNST96	NNST	16EXPSN2	1-Sep-16	14:15	19:08	BTH	56	1.125	0.963	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.030	Normal	-	-	0.022	10	<50	None	Normal	X		X	
LU16FEXPNNST97	NNST	16EXPSN2	1-Sep-16	14:15	19:17	BTH	51	0.705	0.600	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.031	Normal	Normal	100	0.012	50	<50	None	Normal	X	X	X	
LU16FEXPNNST99	NNST	16EXPEF4	1-Sep-16	14:45	19:33	BTH	60	1.264	1.076	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Fatty	0.038	Normal	Normal	100	0.023	75	<50	None	Normal	X	X	X	
LU16FEXPNNST102	NNST	16EXPMT2	1-Sep-16	14:15	19:07	BTH	55	1.242	1.078	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.049	Normal	Normal	100	0.020	0	<50	None	Normal	X		X	
LU16FEXPNNST106	NNST	16EXPEF4	1-Sep-16	14:45	19:35	BTH	50	0.620	0.519	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.027	Normal	Normal	100	0.010	10	<50	None	Normal	X		X	
LU16FEXPNNST107	NNST	16EXPEF5	6-Sep-16	12:45	19:01	BTH	50	0.565	0.483	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.020	Normal	Normal	100	0.005	10	<50	None	Normal	X		X	
LU16FEXPNNST108	NNST	16EXPEF5	6-Sep-16	12:45	19:12	BTH	44	0.447	0.368	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.024	Normal	Normal	100	0.007	0	<50	None	Normal	X		X	
LU16FEXPNNST109	NNST	16EXPEF5	6-Sep-16	12:35	19:02	BTH	49	0.583	0.488	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.019	Normal	Normal	100	0.009	25	None	None	Normal	X		X	
LU16FEXPNNST110	NNST	16EXPEF5	6-Sep-16	12:35	19:12	BTH	45	0.482	0.384	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.021	Normal	Normal	100	0.009	25	<50	None	Normal	X		X	

(a) Maturity codes can be found in Section 6, Table 6.2-3

NNST = Ninespine Stickleback; mm = millimeters; g = grams; y = years; BTH = blow to the head; "-" = not collected;

Sex: U = Unknown; M = Male; F = Female

Life Stage: A = Adult; J = Juvenile

Fish Identification #	Species	Effort Number	Capture Date	Capture Time	Sacrifice Time	Sacrifice Method	Total Length (mm)	Weight (g)	Carcass Weight (g)	Age Structure	Age (Length Frequency)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudobranchs	Fins	Vent	External Parasites	Sex	Life Stage	Maturity Code (a)	Liver Score	Liver Weight (g)	Spleen Score	Gall Bladder	Gall bladder (% Fullness)	Gonad Weight (g)	Stomach Contents (% Fullness)	Mesenteric Fat (%)	Internal Parasites	Kidney Score	Gonad	Stomach	Otolith	Comments
LU16FREF1NNST2001	NNST	16REF1EF1	26-Aug-16	12:45	15:51	BTH	34	0.195	0.150	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.008	Normal	Normal	100	0.002	100	None	None	Normal	X	X	X	
LU16FREF1NNST2002	NNST	16REF1MT1	29-Aug-16	9:45	14:34	BTH	53	0.797	0.677	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.028	Normal	-	-	0.016	0	None	None	Normal	X		X	
LU16FREF1NNST2003	NNST	16REF1MT1	29-Aug-16	9:45	14:49	BTH	52	0.757	0.630	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.021	Normal	Normal	100	0.011	75	<50	None	Normal	X	X	X	
LU16FREF1NNST2004	NNST	16REF1SN2	29-Aug-16	10:15	15:03	BTH	35	0.236	0.193	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.006	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2005	NNST	16REF1SN2	29-Aug-16	10:15	15:15	BTH	32	0.195	0.158	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.006	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2006	NNST	16REF1SN2	29-Aug-16	10:15	15:28	BTH	34	0.225	0.188	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.008	Normal	Normal	100	-	25	None	None	Normal			X	Gonads lost during transition to vile
LU16FREF1NNST2007	NNST	16REF1SN2	29-Aug-16	10:15	15:40	BTH	36	0.252	0.205	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.007	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FREF1NNST2008	NNST	16REF1SN2	29-Aug-16	10:15	15:55	BTH	34	0.230	0.191	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.003	Normal	-	-	0.002	25	None	None	Normal	X		X	
LU16FREF1NNST2009	NNST	16REF1SN2	29-Aug-16	10:15	16:09	BTH	34	0.195	0.164	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.001	Normal	Normal	25	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2010	NNST	16REF1SN2	29-Aug-16	10:15	16:22	BTH	32	0.182	0.150	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.005	Normal	Normal	100	0.001	0	None	None	Normal	X		X	
LU16FREF1NNST2011	NNST	16REF1MT1	29-Aug-16	9:45	14:34	BTH	59	1.096	0.930	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.041	Normal	Normal	100	0.031	25	None	None	Normal	X		X	
LU16FREF1NNST2012	NNST	16REF1SN1	29-Aug-16	10:15	14:51	BTH	37	0.245	0.199	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.003	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FREF1NNST2013	NNST	16REF1SN1	29-Aug-16	10:15	15:02	BTH	34	0.189	0.152	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.001	Normal	Normal	100	0.001	0	None	2	Normal	X		X	Six cycts observed in stomach
LU16FREF1NNST2014	NNST	16REF1SN1	29-Aug-16	10:15	15:15	BTH	34	0.196	0.160	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Fatty	0.002	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2015	NNST	16REF1SN1	29-Aug-16	10:15	15:27	BTH	35	0.208	0.167	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.003	Normal	Normal	100	0.002	25	None	None	Normal	X		X	
LU16FREF1NNST2016	NNST	16REF1SN1	29-Aug-16	10:15	16:03	BTH	30	0.137	0.101	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.001	Normal	-	-	0.001	75	None	None	Normal	X	X	X	
LU16FREF1NNST2017	NNST	16REF1SN1	29-Aug-16	10:15	16:17	BTH	32	0.164	0.129	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.003	Normal	-	-	-	25	None	None	Normal	X		X	
LU16FREF1NNST2018	NNST	16REF1SN1	29-Aug-16	10:15	16:30	BTH	33	0.184	0.147	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Fatty	0.003	Normal	Normal	100	0.001	0	None	None	Normal	X		X	
LU16FREF1NNST2019	NNST	16REF1SN1	29-Aug-16	10:15	16:43	BTH	32	0.158	0.123	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.003	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2020	NNST	16REF1SN1	29-Aug-16	10:15	16:54	BTH	28	0.111	0.088	Otolith	1	None	Normal	Normal	Normal	Short	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.001	Normal	Normal	50	0.001	0	None	3	Normal	X		X	Opercula shortened on right side; very small liver; multiple cycts in stomach and body cavity
LU16FREF1NNST2021	NNST	16REF1SN2	29-Aug-16	10:15	16:45	BTH	31	0.153	0.127	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.004	Normal	Normal	100	0.001	25	None	None	Normal	X		X	One gonad lost when transitioning to vile
LU16FREF1NNST2022	NNST	16REF1SN2	29-Aug-16	10:15	16:58	BTH	31	0.173	0.136	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.008	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FREF1NNST2023	NNST	16REF1SN2	29-Aug-16	10:15	17:11	BTH	31	0.148	0.122	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	-	-	0.001	100	None	None	Normal	X	X	X	
LU16FREF1NNST2024	NNST	16REF1SN2	29-Aug-16	10:15	17:25	BTH	27	0.113	0.088	Otolith	1	None	Normal	Normal	Normal	Short	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.007	Normal	-	-	0.001	100	None	None	Normal	X	X	X	Opercula shortened on right side
LU16FREF1NNST2025	NNST	16REF1SN2	29-Aug-16	10:15	17:39	BTH	31	0.150	0.123	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	Normal	25	0.001	75	None	None	Normal	X	X	X	
LU16FREF1NNST2026	NNST	16REF1SN2	29-Aug-16	10:15	17:53	BTH	29	0.127	0.105	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	Normal	100	0.001	75	None	None	Normal	X	X	X	
LU16FREF1NNST2027	NNST	16REF1SN2	29-Aug-16	10:15	18:53	BTH	28	0.124	0.102	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	11	Normal	0.002	Normal	Normal	50	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2028	NNST	16REF1SN2	29-Aug-16	10:15	19:06	BTH	28	0.122	0.096	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.003	Normal	Normal	100	0.001	100	None	None	Normal	X	X	X	
LU16FREF1NNST2029	NNST	16REF1SN2	29-Aug-16	10:15	19:19	BTH	27	0.108	0.084	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	Normal	100	-	25	None	None	Normal	X		X	
LU16FREF1NNST2031	NNST	16REF1SN1	29-Aug-16	10:15	17:07	BTH	29	0.137	0.109	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.004	Normal	Normal	50	0.001	50	None	None	Normal	X	X	X	
LU16FREF1NNST2032	NNST	16REF1SN1	29-Aug-16	10:15	17:21	BTH	31	0.128	0.104	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Fatty	0.002	Normal	Normal	100	0.001	25	None	None	Normal	X		X	Proximal end of thymus is transparent
LU16FREF1NNST2033	NNST	16REF1SN1	29-Aug-16	10:15	17:34	BTH	28	0.103	0.084	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.001	Normal	Normal	50	-	25	None	None	Normal	X		X	Only one gonad transferred to vile
LU16FREF1NNST2034	NNST	16REF1SN1	29-Aug-16	10:15	17:48	BTH	29	0.123	0.102	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	27	Fatty	0.003	Normal	Normal	100	0.001	25	None	None	Normal	X		X	Only one gonad transferred to vile
LU16FREF1NNST2035	NNST	16REF1SN1	29-Aug-16	10:15	18:59	BTH	29	0.134	0.109	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.003	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FREF1NNST2036	NNST	16REF1SN1	29-Aug-16	10:15	19:12	BTH	26	0.098	0.085	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.001	Normal	-	-	0.001	50	None	None	Normal	X		X	
LU16FREF1NNST2038	NNST	16REF1MT2	30-Aug-16	10:00	15:36	BTH	53	0.811	0.672	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.023	Normal	Normal	100	0.007	100	None	None	Normal	X	X	X	
LU16FREF1NNST2039	NNST	16REF1MT2	30-Aug-16	10:00	15:47	BTH	55	0.881	0.731	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.035	Normal	Normal	100	0.027	25	<50	None	Normal	X		X	
LU16FREF1NNST2040	NNST	16REF1SN3	30-Aug-16	10:30	14:45	BTH	47	0.541	0.451	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.012	Normal	-	-	0.009	100	<50	None	Normal	X	X	X	
LU16FREF1NNST2041	NNST	16REF1SN5	30-Aug-16	10:00	15:32	BTH	31	0.197	0.160	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.003	Normal	Normal	100	0.001	75	<50	None	Normal	X	X	X	
LU16FREF1NNST2043	NNST	16REF1MT2	30-Aug-16	10:00	15:44	BTH	53	0.716	0.595	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.029	Normal	Normal	100	0.010	25	<50	None	Normal	X		X	
LU16FREF1NNST2044	NNST	16REF1MT2	30-Aug-16	10:00	15:57	BTH	50	0.740	0.633	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.023	Enlarged	-	-	0.009	50	<50	None	Normal	X	X	X	
LU16FREF1NNST2045	NNST	16REF1MT2	30-Aug-16	10:00	16:09	BTH	53	0.804	0.677	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Moderate erosion	Normal	None	F	A	17	Normal	0.034	Normal	Normal	100	0.012	25	<50	None	Normal	X		X	Some blood observed on right pectoral fin
LU16FREF1NNST2046	NNST	16REF1MT2	30-Aug-16	10:00	16:21	BTH	50	0.782	0.656	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.031	Normal	Normal	100	0.011	10	None	None	Normal	X		X	Bend in caudal peduncle
LU16FREF1NNST2047	NNST	16REF1MT2	30-Aug-16	10:00	15:58	BTH	52	0.811	0.690	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.036	Normal	-	-	0.013	70	<50	None	Normal	X	X	X	
LU16FREF1NNST2050	NNST	16REF1MT2	30-Aug-16	10:00	16:09	BTH	49	0.700	0.591	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Normal	0.023	Normal	Normal	100	0.007	25	<50	None	Normal	X		X	
LU16FREF1NNST2051	NNST	16REF1MT2	30-Aug-16	10:00	16:21	BTH	47	0.626	0.527	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.024	Normal	-	-	0.012	25	<50	None	Normal	X		X	
LU16FREF1NNST2052	NNST	16REF1MT2	30-Aug-16	10:00	16:50	BTH	54	0.840	0.682	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Fatty	0.027	Normal	Normal	100	0.018	25	<50	None	Normal	X			
LU16FREF1NNST2053	NNST	16REF1MT2	30-Aug-16	10:00	17:01	BTH	57	0.702	0.576	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.023	Normal	-	-	0.018	25	<50	None	Normal	X		X	
LU16FREF1NNST2054	NNST	16REF1MT2	30-Aug-16	11:10	17:26	BTH	49	0.708	0.604	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Normal	0.025	Normal	Normal	100	0.010	10	<50	None	Normal	X		X	
LU16FREF1NNST2056	NNST	16REF1SN10	30-Aug-16	11:10	17:39	BTH	30	0.166	0.131	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Pale	Normal	Normal	None	U	J	11	Normal	0.003	Normal	Normal	100	0.001	25	<50	1	Normal	X		X	Pseudobranchsand gills pale; two cycts in stomach
LU16FREF1NNST2057	NNST	16REF1SN10	30-Aug-16	10:00	17:18	BTH	30	0.134	0.107	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Fatty	0.003	Normal	Normal	100	0.001	50	None	None	Normal	X	X	X	
LU16FREF1NNST2060	NNST	16REF1MT2	30-Aug-16	11:10	17:29	BTH	52	0.782	0.658	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.029	Normal	Normal	0	0.011	10	<50	None	Normal	X		X	
LU16FREF1NNST2061	NNST	16REF1SN10	04-Sep-16	11:30	14:59	BTH	34	0.214	0.179	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	0X	Normal	0.007	Normal	Normal	100	0.001	25	None	None	Normal	X		X	
LU16FREF1NNST2062	NNST	16REF1MT4	04-Sep-16	11:30	15:09	BTH	56	0.880	0.745	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.026	Normal	Normal	0	0.016	30	<50	None	Normal	X		X	
LU16FREF1NNST2063	NNST	16REF1MT4	04-Sep-16	11:00	15:21	BTH	52	0.715	0.599	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.026	Normal	-	-	0.010	75	<50	None	Normal	X	X	X	
LU16FREF1NNST2064	NNST	16REF1EF3	04-Sep-16	11:00	16:00	BTH	66	1.707	1.394	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.091	Normal	Normal	50	0.041	25	<50	None	Normal	X		X	
LU16FREF1NNST2069	NNST	16REF1EF3	04-Sep-16	11:30	15:10	BTH	33	0.362	0.165	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.002	Normal	Normal	100	0.007	0	<50	None	Normal	X		X	Caudal fin is missing, appears to be an old injury that has been healed over
LU16FREF1NNST2072	NNST	16REF1MT4	04-Sep-16	11:30	15:21	BTH	53	0.739	0.615	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.025	Normal	Normal	100	0.016	0	<50	None	Normal	X		X	
LU16FREF1NNST2073	NNST	16REF1MT4	04-Sep-16	11:00	16:09	BTH	43	0.410	0.338	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.011	Normal	-	-	0.008	25	None	None	Normal	X		X	
LU16FREF1NNST2080	NNST	16REF1EF3	04-Sep-16	11:00	16:44	BTH	38	0.287	0.229	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.010	Normal	Normal	50	0.006	75	None	None	Normal	X	X	X	
LU16FREF1NNST2084	NNST	16REF1EF3	04-Sep-16	11:00	17:01	BTH	38	0.303	0.253	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.006	Normal	-	-	0.007	25	None	None	Normal	X		X	
LU16FREF1NNST2086	NNST	16REF1EF3	05-Sep-16	11:30	15:43	BTH	21	-	-	Otolith	0	None	Normal	Normal	Normal	Normal	Normal	Normal	Severe erosion	Normal	None	U	YOY	0X	-	-	-	-	-	-	-	-	-	-				
LU16FREF1NNST2100	NNST	16REF1EF4	05-Sep-16	11:30	15:53	BTH	43	0.489	0.391	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.029	Normal	Normal	25	0.004	70	<50	None	Normal	X	X	X	
LU16FREF1NNST2104	NNST	16REF1EF4	05-Sep-16	11:30	16:09	BTH	43	0.361	0.292	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Fatty	0.008	Normal	-	-	0.005	0	None	None	Blood observed	X		X	
LU16FREF1NNST2105	NNST	16REF1EF4	05-Sep-16	11:30	16:19	BTH	42	0.377	0.312	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.008	Normal	-	-	0.008	75	<50	None	Normal	X	X	X	
LU16FREF1NNST2106	NNST	16REF1EF4	05-Sep-16	11:30	16:32	BTH	37	0.227	0.187	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.007	Normal	-	-	0.004	75	None	None	Normal	X	X	X	
LU16FREF1NNST2111	NNST	16REF1EF4	05-Sep-16	11:30	16:02	BTH	46	0.544	0.472	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.017	Normal	-	-	0.009	0	<50	None	Normal			X	
LU16FREF1NNST2115	NNST	16REF1EF4	05-Sep-16	11:30	16:46	BTH	34	0.201	0.147	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.005	Normal	-	-	0.001	10	None	None	Normal			X	
LU16FREF1NNST2116	NNST	16REF1MT4	08-Sep-16	12:45	16:19	BTH	53	0.804	0.665	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.037	Normal	Normal	100	0.018	0	<50	None	Normal	X		X	
LU16FREF1NNST2117	NNST	16REF1EF5	08-Sep-16	12:00	16:29	BTH	48	0.576	0.493	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.025	Normal	-	-	0.009	30	<50	None	Normal	X		X	
LU16FREF1NNST2118	NNST	16REF1EF5	08-Sep-16	12:00	16:38	BTH	51	0.652	0.548	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.019	Normal	Normal	100	0.014	0	<50	None	Normal	X		X	
LU16FREF1NNST2119	NNST	16REF1EF5	08-Sep-16	12:00	16:48	BTH	52	0.643	0.533	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.020	Normal	-	-	0.011	0	None	None	Normal	X		X	
LU16FREF1NNST2121	NNST	16REF1EF5	08-Sep-16	12:00	16:17	BTH	50	0.692	0.589	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.029	Normal	Normal	100	0.008	10	<50	None	Normal	X		X	
LU16FREF1NNST2122	NNST	16REF1EF5	08-Sep-16	12:00	16:26	BTH	46	0.549	0.452	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	F	A	17	Normal	0.011	Normal	-	-	0.019	50	<50	None	Normal	X	X	X	
LU16FREF1NNST2123	NNST	16REF1EF5	08-Sep-16	12:00	16:35	BTH	50	0.616	0.516	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.018	Normal	Normal	100	0.014	0	<50	None	Normal	X		X	
LU16FREF1NNST2124	NNST	16REF1EF5	08-Sep-16	12:00	16:43	BTH	50	0.623	0.519	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.021	Normal	Normal	100	0.010	75	<50	None	Normal	X	X	X	
LU16FREF1NNST2126	NNST	16REF1EF5	08-Sep-16	12:00	16:59	BTH	43	0.536	0.455	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.022	Normal	-	-	0.008	25	<50	None	Normal	X		X	
LU16FREF1NNST2133	NNST	16REF1EF5	08-Sep-16	12:00	17:13	BTH	43	0.420	0.360	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Severe erosion	Normal	None	M	A	27	Normal	0.010	Normal	Normal	50	0.008	0	None	None	Normal	X		X	Left pectoral fin missing
LU16FREF1NNST2135	NNST	16REF1EF5	08-Sep-16	12:00	17:31	BTH	41	0.414	0.347	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.022	Normal	-	-	0.012	10	None	None	Normal	X		X	
LU16FREF1NNST2138	NNST	16REF1MT5	10-Sep-16	11:40	16:16	BTH	67	1.843	1.488	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.097	Normal	Normal	100	0.043	100	<50	None	Normal	X	X	X	
LU16FREF1NNST2142	NNST	16REF1EF5	08-Sep-16	12:00	17:36	BTH	38	0.469	0.400	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.007	Normal	-	-	0.007	25	None	None	Normal	X		X	

(a) Maturity codes can be found in Section 6, Table 6.2-3

NNST = Ninespine Stickleback; mm = millimeters; g = grams; y = years; BTH = blow to the head; "-" = not collected;

Sex: U = Unknown; M = Male; F = Female

Life Stage: A = Adult; J = Juvenile

Table E3: Lethal Survey - Fish Health Data, Reference Area 2 2016

Fish Identification #	Species	Effort Number	Capture Date	Capture Time	Sacrifice Time	Sacrifice Method	Total Length (mm)	Weight (g)	Carcass Weight (g)	Age Structure	Age (Length Frequency)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudobranchs	Fins	Vent	External Parasites	Sex	Life Stage	Maturity Code (a)	Liver Score	Liver Weight (g)	Spleen Score	Gall Bladder	Gall bladder (% Fullness)	Gonad Weight (g)	Stomach Contents (% Fullness)	Mesenteric Fat (%)	Internal Parasites	Kidney Score	Gonad	Stomach	Otolith	Comments
LU16FREF2NNST5001	NNST	16REF2EF1	2-Sep-16	9:30	13:16	BTH	44	0.549	0.452	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Normal	0.024	Normal	Normal	100	0.014	0	None	None	Normal	X		X	
LU16FREF2NNST5002	NNST	16REF2EF1	2-Sep-16	9:30	13:30	BTH	35	0.242	0.193	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	U	J	0X	Normal	0.007	Normal	-	-	0.001	75	None	None	Normal	X	X	X	
LU16FREF2NNST5003	NNST	16REF2EF1	2-Sep-16	9:30	13:43	BTH	36	0.233	0.194	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.003	Normal	-	-	0.002	25	None	None	Normal	X		X	
LU16FREF2NNST5004	NNST	16REF2EF1	2-Sep-16	9:30	13:55	BTH	31	0.168	0.135	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	U	J	0X	Fatty	0.007	Normal	-	-	-	10	None	None	Normal	X		X	
LU16FREF2NNST5005	NNST	16REF2EF1	2-Sep-16	9:30	14:05	BTH	45	0.481	0.387	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.022	Normal	-	-	0.005	25	<50	None	Normal	X		X	Gonads appear small for body size
LU16FREF2NNST5006	NNST	16REF2EF1	2-Sep-16	9:30	14:32	BTH	30	0.150	0.125	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FREF2NNST5007	NNST	16REF2EF1	2-Sep-16	9:30	14:45	BTH	44	0.417	0.404	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.018	Enlarged	-	-	0.008	0	None	None	Normal	X	X	X	
LU16FREF2NNST5008	NNST	16REF2EF1	2-Sep-16	9:30	15:01	BTH	32	0.178	0.151	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.011	Normal	-	-	0.001	50	None	None	Normal	X	X	X	
LU16FREF2NNST5009	NNST	16REF2EF2	2-Sep-16	11:30	15:17	BTH	31	0.163	0.135	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	-	-	0.001	0	None	None	Normal	X		X	
LU16FREF2NNST5010	NNST	16REF2EF2	2-Sep-16	11:30	15:32	BTH	33	0.177	0.152	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.005	Normal	-	-	0.001	25	<50	None	Normal	X		X	
LU16FREF2NNST5011	NNST	16REF2EF2	2-Sep-16	11:30	15:50	BTH	37	0.263	0.217	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.007	Normal	-	-	0.002	0	None	None	Normal	X		X	
LU16FREF2NNST5012	NNST	16REF2EF2	2-Sep-16	11:30	16:02	BTH	30	0.146	0.120	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.002	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FREF2NNST5013	NNST	16REF2EF2	2-Sep-16	11:30	16:14	BTH	28	0.115	0.084	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	U	J	0X	Normal	0.001	Normal	-	-	0.001	25	None	None	Normal	X		X	
LU16FREF2NNST5014	NNST	16REF2EF2	2-Sep-16	11:30	16:28	BTH	34	0.215	0.175	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	0X	Fatty	0.003	Normal	Normal	100	0.001	25	<50	None	Normal	X		X	
LU16FREF2NNST5015	NNST	16REF2EF2	2-Sep-16	11:30	16:41	BTH	34	0.212	0.170	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.007	Normal	Normal	100	0.002	0	None	None	Normal	X		X	
LU16FREF2NNST5016	NNST	16REF2EF2	2-Sep-16	11:30	17:29	BTH	66	1.503	1.274	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.065	Normal	Normal	100	0.037	0	<50	None	Normal	X		X	
LU16FREF2NNST5017	NNST	16REF2EF2	2-Sep-16	11:30	17:42	BTH	33	0.187	0.162	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.003	Normal	Normal	100	0.001	0	None	None	Normal	X		X	
LU16FREF2NNST5018	NNST	16REF2EF2	2-Sep-16	11:30	17:55	BTH	33	0.180	0.156	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.001	Normal	Normal	100	0.001	0	None	None	Normal	X		X	
LU16FREF2NNST5019	NNST	16REF2EF3	3-Sep-16	9:30	14:38	BTH	64	1.514	1.319	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.054	Normal	Normal	100	0.021	25	<50	None	Normal	X		X	
LU16FREF2NNST5020	NNST	16REF2EF3	3-Sep-16	9:30	14:53	BTH	36	0.222	0.187	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.006	Normal	Normal	100	0.003	0	None	None	Normal	X		X	
LU16FREF2NNST5021	NNST	16REF2EF3	3-Sep-16	9:30	15:04	BTH	34	0.199	0.157	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.007	Normal	Normal	100	0.002	10	<50	None	Normal	X		X	
LU16FREF2NNST5022	NNST	16REF2EF3	3-Sep-16	9:30	15:18	BTH	33	0.196	0.159	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.005	Normal	Normal	100	0.001	0	None	None	Normal	X		X	
LU16FREF2NNST5023	NNST	16REF2EF3	3-Sep-16	9:30	15:31	BTH	36	0.232	0.187	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.005	Normal	-	-	0.002	25	None	None	Normal	X		X	
LU16FREF2NNST5024	NNST	16REF2EF3	3-Sep-16	9:30	16:02	BTH	66	1.447	1.207	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.053	Normal	-	-	0.036	25	<50	None	Normal	X		X	Body cavity full of blood, but heart intact
LU16FREF2NNST5025	NNST	16REF2EF4	3-Sep-16	11:30	16:18	BTH	34	0.189	0.151	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.004	Normal	-	-	0.001	25	None	None	Normal	X		X	One gonad lost when transferring to vile
LU16FREF2NNST5026	NNST	16REF2EF4	3-Sep-16	11:30	16:31	BTH	37	0.248	0.210	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.006	Normal	-	-	0.002	75	None	None	Normal	X	X	X	
LU16FREF2NNST5027	NNST	16REF2EF4	3-Sep-16	11:30	16:43	BTH	34	0.206	0.169	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.009	Normal	Normal	0	0.001	10	None	None	Normal	X			
LU16FREF2NNST5028	NNST	16REF2EF4	3-Sep-16	11:30	16:59	BTH	35	0.219	0.190	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.004	Normal	-	-	0.001	25	<50	None	Normal	X		X	Gonads different lengths
LU16FREF2NNST5029	NNST	16REF2EF4	3-Sep-16	11:30	17:13	BTH	35	0.224	0.181	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.007	Normal	Normal	100	0.003	25	None	None	Normal	X		X	
LU16FREF2NNST5030	NNST	16REF2EF4	3-Sep-16	11:30	17:33	BTH	34	0.211	0.170	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	0X	Normal	0.008	Normal	-	-	-	25	None	None	Normal	X		X	
LU16FREF2NNST5031	NNST	16REF2EF4	3-Sep-16	11:30	17:43	BTH	31	0.157	0.130	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	21	Normal	0.001	Normal	Normal	100	0.001	0	None	None	Normal	X			
LU16FREF2NNST5032	NNST	16REF2MT2	5-Sep-16	9:45	14:32	BTH	48	0.637	0.536	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.021	Normal	Normal	100	0.007	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5033	NNST	16REF2MT2	5-Sep-16	9:45	14:45	BTH	54	0.773	0.664	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.021	Normal	Normal	100	0.018	25	<50	None	Normal	X		X	
LU16FREF2NNST5035	NNST	16REF2MT2	5-Sep-16	9:45	14:45	BTH	56	1.126	0.950	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.034	Normal	Normal	100	0.023	75	<50	None	Normal	X	X	X	
LU16FREF2NNST5036	NNST	16REF2MT2	5-Sep-16	9:45	14:59	BTH	50	0.689	0.587	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.016	Normal	Normal	100	0.009	25	<50	None	Normal	X		X	
LU16FREF2NNST5040	NNST	16REF2MT3	5-Sep-16	15:40	17:07	BTH	55	0.936	0.776	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.038	Small	Normal	25	0.019	100	<50	None	Normal	X	X	X	Spleen appears smaller than normal
LU16FREF2NNST5041	NNST	16REF2MT3	5-Sep-16	15:40	17:19	BTH	64	1.342	1.134	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.044	Enlarged	-	-	0.033	30	<50	None	Normal	X		X	
LU16FREF2NNST5042	NNST	16REF2MT3	5-Sep-16	15:40	17:30	BTH	62	1.448	1.246	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Fatty	0.053	Enlarged	Normal	100	0.022	0	<50	None	Normal	X		X	
LU16FREF2NNST5047	NNST	16REF2MT3	6-Sep-16	15:45	17:12	BTH	52	0.702	0.598	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.013	Normal	Normal	100	0.011	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5048	NNST	16REF2MT3	6-Sep-16	15:45	17:23	BTH	59	1.109	0.893	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.045	Normal	-	-	0.025	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5049	NNST	16REF2MT3	6-Sep-16	15:45	17:32	BTH	46	0.586	0.490	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.021	Normal	Normal	100	0.013	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5053	NNST	16REF2MT4	7-Sep-16	13:35	16:40	BTH	60	1.194	1.014	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.041	Normal	-	-	0.028	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5054	NNST	16REF2MT4	7-Sep-16	13:35	16:52	BTH	51	0.792	0.638	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Fatty	0.029	Normal	-	-	0.018	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5055	NNST	16REF2MT4	7-Sep-16	13:35	17:10	BTH	50	0.735	0.620	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Fatty	0.018	Normal	-	-	0.010	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5056	NNST	16REF2MT4	7-Sep-16	13:35	17:20	BTH	47	0.573	0.478	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	M	A	27	Normal	0.027	Normal	Normal	100	0.012	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5057	NNST	16REF2MT5	7-Sep-16	12:50	17:30	BTH	49	0.670	0.572	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.015	Normal	Normal	100	0.016	75	<50	None	Normal	X	X	X	
LU16FREF2NNST5058	NNST	16REF2MT5	7-Sep-16	12:50	17:39	BTH	48	0.627	0.533	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.023	Normal	Normal	100	0.010	25	<50	None	Normal	X		X	
LU16FREF2NNST5059	NNST	16REF2MT5	7-Sep-16	12:50	17:49	BTH	51	0.767	0.649	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.023	Normal	Normal	100	0.013	75	<50	None	Normal	X	X	X	
LU16FREF2NNST5060	NNST	16REF2MT5	7-Sep-16	12:50	19:04	BTH	50	0.705	0.586	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.020	Normal	Normal	100	0.020	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5061	NNST	16REF2MT4	7-Sep-16	13:35	16:39	BTH	48	0.628	0.524	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.022	Normal	Normal	25	0.009	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5062	NNST	16REF2MT4	7-Sep-16	13:35	16:52	BTH	73	2.088	1.731	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.088	Normal	-	-	0.067	25	<50	2	Normal	X		X	Multiple opaque structures in gonads; two cysts on outside of stomach
LU16FREF2NNST5063	NNST	16REF2MT4	7-Sep-16	13:35	17:09	BTH	49	0.725	0.613	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.026	Pale	-	-	0.013	50	<50	None	Normal	X	X	X	Spleen small and pale
LU16FREF2NNST5064	NNST	16REF2MT4	7-Sep-16	13:35	17:19	BTH	62	1.139	1.098	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.076	Normal	Normal	25	0.031	0	<50	None	Normal	X		X	
LU16FREF2NNST5065	NNST	16REF2MT5	7-Sep-16	12:50	17:30	BTH	65	1.430	1.249	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.048	Normal	Normal	100	0.033	10	<50	None	Normal	X		X	
LU16FREF2NNST5066	NNST	16REF2MT5	7-Sep-16	12:50	17:40	BTH	63	1.424	1.146	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.071	Enlarged	-	-	0.033	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5067	NNST	16REF2MT5	7-Sep-16	12:50	17:49	BTH	60	1.195	1.026	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.048	Normal	-	-	0.022	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5069	NNST	16REF2MT5	7-Sep-16	12:50	19:04	BTH	48	0.613	0.513	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.021	Normal	Normal	100	0.008	25	<50	None	Normal	X		X	
LU16FREF2NNST5072	NNST	16REF2EF5	7-Sep-16	14:45	19:20	BTH	49	0.577	0.484	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.025	Normal	Normal	25	0.010	25	<50	None	Normal	X		X	
LU16FREF2NNST5073	NNST	16REF2EF5	7-Sep-16	14:45	19:32	BTH	46	0.553	0.459	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.021	Normal	-	-	0.010	25	None	None	Normal	X		X	
LU16FREF2NNST5074	NNST	16REF2EF5	7-Sep-16	14:45	19:44	BTH	44	0.483	0.391	Otolith	2	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	F	A	17	Normal	0.025	Normal	-	-	0.009	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5075A	NNST	16REF2EF5	7-Sep-16	14:45	19:54	BTH	40	0.362	0.312	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.008	Normal	-	-	0.008	100	None	None	Normal	X	X	X	
LU16FREF2NNST5075	NNST	16REF2EF5	7-Sep-16	14:45	19:14	BTH	75	2.334	1.905	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.083	Normal	Normal	100	0.072	75	<50	None	Normal	X	X	X	
LU16FREF2NNST5076	NNST	16REF2EF5	7-Sep-16	14:45	19:29	BTH	47	0.498	0.432	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.013	Normal	Normal	100	0.007	75	<50	None	Normal	X	X	X	
LU16FREF2NNST5077	NNST	16REF2EF5	7-Sep-16	14:45	19:38	BTH	42	0.390	0.315	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.011	Normal	-	-	0.005	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5078	NNST	16REF2EF5	7-Sep-16	14:45	19:47	BTH	50	0.612	0.485	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.022	Normal	-	-	0.013	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5079	NNST	16REF2MT4	7-Sep-16	13:35	19:58	BTH	49	0.626	0.545	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.017	Normal	-	-	0.009	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5082	NNST	16REF2MT6	8-Sep-16	14:30	19:01	BTH	50	0.633	0.556	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.015	Normal	Normal	50	0.008	0	None	None	Normal	X		X	
LU16FREF2NNST5083	NNST	16REF2MT6	8-Sep-16	14:30	19:12	BTH	54	0.869	0.739	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.034	Normal	Normal	50	0.015	0	<50	None	Normal	X		X	
LU16FREF2NNST5084	NNST	16REF2MT6	8-Sep-16	14:30	19:21	BTH	63	1.268	1.067	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.063	Normal	Normal	0	0.040	0	<50	None	Normal	X		X	
LU16FREF2NNST5085	NNST	16REF2MT6	8-Sep-16	14:30	19:33	BTH	51	0.747	0.628	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.030	Normal	Normal	25	0.018	0	<50	None	Normal	X		X	
LU16FREF2NNST5086	NNST	16REF2MT6	8-Sep-16	14:30	19:07	BTH	54	0.905	0.806	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.032	Normal	Normal	100	0.016	25	<50	None	Normal	X		X	
LU16FREF2NNST5087	NNST	16REF2MT6	8-Sep-16	14:30	19:17	BTH	50	0.607	0.508	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.012	Normal	Normal	100	0.011	25	<50	None	Normal	X		X	
LU16FREF2NNST5088	NNST	16REF2MT6	8-Sep-16	14:30	19:25	BTH	61	1.336	1.132	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.063	Normal	Normal	100	0.023	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5089	NNST	16REF2MT6	8-Sep-16	14:30	19:35	BTH	65	1.402	1.206	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.048	Normal	Normal	100	0.037	0	<50	None	Normal	X		X	
LU16FREF2NNST5091	NNST	16REF2MT6	8-Sep-16	14:30	19:43	BTH	51	0.684	0.608	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.016	Normal	-	-	0.018	10	<50	None	Normal	X		X	
LU16FREF2NNST5092	NNST	16REF2MT6	8-Sep-16	14:30	19:53	BTH	51	0.751	0.650	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.028	Normal	-	-	0.011	0	<50	None	Normal	X		X	
LU16FREF2NNST5093	NNST	16REF2MT7	9-Sep-16	10:45	15:59	BTH	58	1.057	0.876	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.031	Normal	-	-	0.011	0	None	None	Normal	X			
LU16FREF2NNST5094	NNST	16REF2MT7	9-Sep-16	10:45	16:00	BTH	59	1.199	0.997	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.039	Normal	-	-	0.017	25	<50	None	Normal	X		X	
LU16FREF2NNST5095	NNST	16REF2MT6	8-Sep-16	14:30	19:48	BTH	50	0.666	0.585	Otolith	2	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.013	Normal	-	-	0.010	25	<50	None	Normal	X		X	
LU16FREF2NNST5096	NNST	16REF2MT6	8-Sep-16	14:30	19:57	BTH	61	1.366	1.161	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.063	Normal	Normal	100	0.022	25	<50	None	Normal	X		X	
LU16FREF2NNST5098	NNST	16REF2EF6	9-Sep-16	10:25	16:25	BTH	57	0.874	0.687	Otolith	3	None	Normal	Normal	Normal	Mild shortening	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.036	Normal	Normal	100	0.014	50	<50	None	Normal	X	X	X	
LU16FREF2NNST5099	NNST	16REF2EF6	9-Sep-16	10:25	16:45	BTH	33	0.232	0.165	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	0X	Normal	0.003	Normal	-	-	-	25	<50	None	Normal	X		X	
LU16FREF2NNST5100	NNST	16REF2EF6	9-Sep-16	10:25	17:11	BTH	35	0.259	0.205	Otolith	1	None	Normal	Normal	Normal	Normal	Pale	Normal	Normal	Normal	None	U	J	11	Normal	0.007	Normal	Normal	25	0.001	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5101	NNST	16REF2EF6	9-Sep-16	10:25	16:34	BTH	36	0.261	0.209	Otolith	1	None	Normal	Mild aberrasions	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.012	Normal	-	-	0.003	50	None	None	Normal	X	X	X	
LU16FREF2NNST5102	NNST	16REF2EF6	9-Sep-16	10:25	17:03	BTH	36	0.265	0.201	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.015	Normal	-	-	-	50	None	None	Normal	X	X	X	
LU16FREF2NNST5103	NNST	16REF2EF6	9-Sep-16	10:25	17:27	BTH	32	0.204	0.168	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.002	Normal	-	-	0.002	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5104	NNST	16REF2EF6	9-Sep-16	10:25	17:25	BTH	34	0.232	0.180	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.004	Normal	Normal	50	0.001	100	<50	None	Normal	X	X	X	
LU16FREF2NNST5105	NNST	16REF2EF6	9-Sep-16	10:25	17:37	BTH	29	0.148	0.113	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.003	Normal	-	-	0.001	100	None	None	Normal	X	X	X	Chironomid in stomach
LU16FREF2NNST5106	NNST	16REF2EF6	9-Sep-16	10:25	17:37	BTH	32	0.178	0.145	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	11	Normal	0.008	Normal	-	-	-	25	None	None	Normal	X		X	
LU16FREF2NNST5107	NNST	16REF2FN1	10-Sep-16	10:20	16:35	BTH	39	0.331	0.251	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	A	21	Normal	0.012	Pale	Normal	100	0.003	50	<50	None	Normal	X	X	X	Spleen is a pale, pink colour
LU16FREF2NNST5108	NNST	16REF2FN1	10-Sep-16	10:20	16:42	BTH	40	0.348	0.307	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	M	A	27	Normal	0.006	Normal	-	-	0.007	39	<50	None	Normal	X		X	
LU16FREF2NNST5110	NNST	16REF2FN1	10-Sep-16	10:20	17:01	BTH	33	0.186	0.156	Otolith	1	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	U	J	0X	Normal	0.003	Normal	-	-	0.001	25	<50	None	Normal	X		X	
LU16FREF2NNST5114	NNST	16REF2FN1	11-Sep-16	10:00	13:20	BTH	64	1.442	1.213	Otolith	4	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.068	Normal	Normal	100	0.043	0	<50	None	Normal	X		X	
LU16FREF2NNST5115	NNST	16REF2FN1	11-Sep-16	10:00	13:30	BTH	54	0.703	0.594	Otolith	3	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	F	A	17	Normal	0.021	Normal	Normal	100	0.015	70	<50	None	Normal	X	X	X	

(a) Maturity codes can be found in Section 6, Table 6.2-3

NNST = Ninespine Stickleback; mm = millimeters; g = grams; y = years; BTH = blow to the head; "-" = not collected;

Sex: U = Unknown; M = Male; F = Female

Life Stage: A = Adult; J = Juvenile

Table E-4: Non-Lethal Survey - Fish Health Data, Exposure Area 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FEXPARGR1000	ARGR	16EXPEF001	27-Aug-16	66	71	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1001	ARGR	16EXPEF001	27-Aug-16	65	71	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1002	ARGR	16EXPEF001	27-Aug-16	73	78	3.970	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1003	ARGR	16EXPEF001	27-Aug-16	63	67	0.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1004	ARGR	16EXPEF001	27-Aug-16	148	158	18.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1005	ARGR	16EXPEF001	27-Aug-16	73	80	4.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1006	ARGR	16EXPEF001	27-Aug-16	74	80	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1007	ARGR	16EXPEF001	27-Aug-16	73	77	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1008	ARGR	16EXPEF001	27-Aug-16	64	70	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1009	ARGR	16EXPEF001	27-Aug-16	68	73	1.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1010	ARGR	16EXPEF001	27-Aug-16	64	70	1.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1011	ARGR	16EXPEF001	27-Aug-16	63	68	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1012	ARGR	16EXPEF001	27-Aug-16	67	72	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1013	ARGR	16EXPEF001	27-Aug-16	67	73	1.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1014	ARGR	16EXPSN05	27-Aug-16	75	82	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1015	ARGR	16EXPSN007	27-Aug-16	62	68	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1016	ARGR	16EXPEF002	28-Aug-16	62	67	0.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1017	ARGR	16EXPSN03	31-Aug-16	70	76	3.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1018	ARGR	16EXPEF003	1-Sep-16	59	65	1.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1019	ARGR	16EXPEF003	1-Sep-16	62	67	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1020	ARGR	16EXPEF003	1-Sep-16	69	76	3.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1021	ARGR	16EXPEF003	1-Sep-16	73	79	3.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1022	ARGR	16EXPEF003	1-Sep-16	63	68	1.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1023	ARGR	16EXPEF003	1-Sep-16	68	74	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1024	ARGR	16EXPEF003	1-Sep-16	61	67	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1025	ARGR	16EXPEF003	1-Sep-16	52	55	1.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1026	ARGR	16EXPEF003	1-Sep-16	61	66	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1027	ARGR	16EXPEF003	1-Sep-16	63	69	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1028	ARGR	16EXPEF003	1-Sep-16	65	72	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1029	ARGR	16EXPEF003	1-Sep-16	57	63	1.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1030	ARGR	16EXPEF003	1-Sep-16	69	75	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1031	ARGR	16EXPEF003	1-Sep-16	73	80	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1032	ARGR	16EXPEF003	1-Sep-16	66	72	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Moderate erosion	Normal	None	X		Caudal fin appears to be clipped, old and healed over
LU16FEXPARGR1033	ARGR	16EXPEF003	1-Sep-16	71	76	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1034	ARGR	16EXPEF003	1-Sep-16	66	72	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1035	ARGR	16EXPEF003	1-Sep-16	70	76	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1036	ARGR	16EXPEF003	1-Sep-16	62	67	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1037	ARGR	16EXPEF003	1-Sep-16	66	71	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	X		
LU16FEXPARGR1038	ARGR	16EXPEF003	1-Sep-16	68	73	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1039	ARGR	16EXPEF003	1-Sep-16	66	73	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1040	ARGR	16EXPEF003	1-Sep-16	67	73	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1041	ARGR	16EXPEF003	1-Sep-16	61	66	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1042	ARGR	16EXPEF003	1-Sep-16	58	61	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1043	ARGR	16EXPEF003	1-Sep-16	61	66	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1044	ARGR	16EXPEF003	1-Sep-16	67	72	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1045	ARGR	16EXPEF003	1-Sep-16	75	82	3.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1046	ARGR	16EXPEF003	1-Sep-16	54	59	1.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1047	ARGR	16EXPEF003	1-Sep-16	66	72	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1048	ARGR	16EXPEF003	1-Sep-16	59	65	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1049	ARGR	16EXPEF003	1-Sep-16	62	68	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1050	ARGR	16EXPEF003	1-Sep-16	64	69	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1051	ARGR	16EXPEF004	1-Sep-16	70	75	3.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1052	ARGR	16EXPEF004	1-Sep-16	65	71	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1053	ARGR	16EXPEF004	1-Sep-16	70	76	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1054	ARGR	16EXPEF004	1-Sep-16	66	71	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1055	ARGR	16EXPEF004	1-Sep-16	78	84	4.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1056	ARGR	16EXPEF004	1-Sep-16	62	66	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1057	ARGR	16EXPEF004	1-Sep-16	60	64	1.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1058	ARGR	16EXPEF004	1-Sep-16	63	67	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1059	ARGR	16EXPEF004	1-Sep-16	60	65	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1060	ARGR	16EXPEF004	1-Sep-16	65	70	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1061	ARGR	16EXPEF004	1-Sep-16	70	76	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1062	ARGR	16EXPEF004	1-Sep-16	70	77	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1063	ARGR	16EXPEF004	1-Sep-16	67	71	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1064	ARGR	16EXPEF004	1-Sep-16	60	66	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1065	ARGR	16EXPEF004	1-Sep-16	67	74	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1066	ARGR	16EXPEF004	1-Sep-16	120	130	18.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1067	ARGR	16EXPEF004	1-Sep-16	76	83	4.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1068	ARGR	16EXPEF004	1-Sep-16	82	90	5.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1069	ARGR	16EXPEF004	1-Sep-16	70	76	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1070	ARGR	16EXPEF004	1-Sep-16	135	147	24.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

Table E-4: Non-Lethal Survey - Fish Health Data, Exposure Area 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FEXPARGR1071	ARGR	16EXPEF004	1-Sep-16	176	182	37.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1072	ARGR	16EXPEF004	1-Sep-16	70	76	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1073	ARGR	16EXPEF004	1-Sep-16	67	75	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	X		Caudal fin frayed
LU16FEXPARGR1074	ARGR	16EXPEF004	1-Sep-16	70	76	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1075	ARGR	16EXPEF004	1-Sep-16	71	78	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1076	ARGR	16EXPEF004	1-Sep-16	65	70	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1077	ARGR	16EXPEF004	1-Sep-16	71	77	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1078	ARGR	16EXPEF004	1-Sep-16	66	72	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1079	ARGR	16EXPEF004	1-Sep-16	74	81	3.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1080	ARGR	16EXPEF004	1-Sep-16	70	77	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1081	ARGR	16EXPEF004	1-Sep-16	68	74	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1082	ARGR	16EXPEF004	1-Sep-16	62	66	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1083	ARGR	16EXPEF004	1-Sep-16	67	72	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1084	ARGR	16EXPEF004	1-Sep-16	66	73	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1085	ARGR	16EXPEF004	1-Sep-16	71	78	3.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1086	ARGR	16EXPEF004	1-Sep-16	66	72	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1087	ARGR	16EXPEF004	1-Sep-16	65	71	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1088	ARGR	16EXPMT002	1-Sep-16	67	73	2.285	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1089	ARGR	16EXPMT002	1-Sep-16	77	84	3.777	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1090	ARGR	16EXPMT002	1-Sep-16	61	67	1.714	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1091	ARGR	16EXPMT002	1-Sep-16	66	71	2.131	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1092	ARGR	16EXPMT002	1-Sep-16	70	77	2.721	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	
LU16FEXPARGR1093	ARGR	16EXPMT002	1-Sep-16	62	68	1.658	None	Normal	Mild aberrations	Normal	Normal	Normal	Normal	Normal	Normal	None		X	Red line running laterally on belly
LU16FEXPARGR1094	ARGR	16EXPEF005	6-Sep-16	68	75	2.804	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1095	ARGR	16EXPEF005	6-Sep-16	70	77	3.469	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1096	ARGR	16EXPEF005	6-Sep-16	64	70	1.964	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1097	ARGR	16EXPEF005	6-Sep-16	70	77	3.165	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1098	ARGR	16EXPEF005	6-Sep-16	72	80	3.263	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1099	ARGR	16EXPEF005	6-Sep-16	63	69	2.220	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1100	ARGR	16EXPEF005	6-Sep-16	73	80	3.198	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1101	ARGR	16EXPEF005	6-Sep-16	73	81	3.759	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1102	ARGR	16EXPEF005	6-Sep-16	63	70	2.423	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1103	ARGR	16EXPEF005	6-Sep-16	66	73	3.155	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1104	ARGR	16EXPEF005	6-Sep-16	61	72	2.556	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1105	ARGR	16EXPEF005	6-Sep-16	64	71	2.709	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1106	ARGR	16EXPEF005	6-Sep-16	75	82	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1107	ARGR	16EXPEF005	6-Sep-16	71	78	3.344	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1108	ARGR	16EXPEF005	6-Sep-16	81	88	3.653	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1109	ARGR	16EXPEF005	6-Sep-16	69	76	3.050	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1110	ARGR	16EXPEF005	6-Sep-16	70	78	3.912	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1111	ARGR	16EXPEF005	6-Sep-16	61	68	2.482	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1112	ARGR	16EXPEF005	6-Sep-16	66	73	2.633	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1113	ARGR	16EXPEF005	6-Sep-16	62	69	2.318	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1114	ARGR	16EXPEF005	6-Sep-16	107	109	12.928	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	X		
LU16FEXPARGR1115	ARGR	16EXPEF005	6-Sep-16	123	136	19.915	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1116	ARGR	16EXPEF005	6-Sep-16	61	67	2.012	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1117	ARGR	16EXPEF005	6-Sep-16	67	73	2.635	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1118	ARGR	16EXPEF005	6-Sep-16	66	74	2.635	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1119	ARGR	16EXPEF005	6-Sep-16	62	68	2.379	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1120	ARGR	16EXPEF005	6-Sep-16	68	75	2.896	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1121	ARGR	16EXPEF005	6-Sep-16	59	65	1.742	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1122	ARGR	16EXPEF005	6-Sep-16	77	83	3.980	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1123	ARGR	16EXPEF005	6-Sep-16	77	85	4.131	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1124	ARGR	16EXPEF005	6-Sep-16	67	75	2.723	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1125	ARGR	16EXPEF005	6-Sep-16	66	71	2.488	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1126	ARGR	16EXPEF005	6-Sep-16	68	75	2.799	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1127	ARGR	16EXPEF005	6-Sep-16	70	78	3.114	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1128	ARGR	16EXPEF005	6-Sep-16	57	63	1.697	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1129	ARGR	16EXPEF005	6-Sep-16	66	72	2.382	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1130	ARGR	16EXPEF005	6-Sep-16	66	73	2.679	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1131	ARGR	16EXPEF005	6-Sep-16	70	76	2.986	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1132	ARGR	16EXPEF005	6-Sep-16	66	72	2.874	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1133	ARGR	16EXPEF005	6-Sep-16	82	90	4.905	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1134	ARGR	16EXPEF005	6-Sep-16	75	81	4.045	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FEXPARGR1135	ARGR	16EXPEF005	6-Sep-16	74	83	3.578	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

ARGR = Arctic Grayling; mm = millimeters; g = grams; y = years; "-" = not collected;

Table E-5: Non-Lethal Survey - Fish Health Data, Reference Area 1 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FREF1ARGR3001	ARGR	16REF1EF001	26-Aug-16	65	70	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3002	ARGR	16REF1EF001	26-Aug-16	126	136	15.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3003	ARGR	16REF1EF001	26-Aug-16	52	57	-	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3004	ARGR	16REF1EF001	26-Aug-16	72	76	1.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3005	ARGR	16REF1EF001	26-Aug-16	121	130	11.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3006	ARGR	16REF1EF001	26-Aug-16	77	81	1.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3007	ARGR	16REF1EF001	26-Aug-16	56	61	1.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3008	ARGR	16REF1EF001	26-Aug-16	66	73	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3009	ARGR	16REF1EF001	26-Aug-16	69	76	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3010	ARGR	16REF1EF001	26-Aug-16	66	71	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3011	ARGR	16REF1EF001	26-Aug-16	73	78	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3012	ARGR	16REF1EF001	26-Aug-16	118	129	14.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3013	ARGR	16REF1EF001	26-Aug-16	73	77	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3014	ARGR	16REF1EF001	26-Aug-16	67	70	1.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3015	ARGR	16REF1EF001	26-Aug-16	77	80	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3016	ARGR	16REF1EF001	26-Aug-16	132	143	26.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3017	ARGR	16REF1EF001	26-Aug-16	132	145	15.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3018	ARGR	16REF1EF001	26-Aug-16	67	72	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3019	ARGR	16REF1EF001	26-Aug-16	132	144	15.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3020	ARGR	16REF1EF001	26-Aug-16	69	75	1.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3021	ARGR	16REF1EF001	26-Aug-16	137	153	20.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3022	ARGR	16REF1EF001	26-Aug-16	72	76	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3023	ARGR	16REF1EF001	26-Aug-16	73	80	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3024	ARGR	16REF1EF001	26-Aug-16	70	76	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3025	ARGR	16REF1EF001	26-Aug-16	69	75	1.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3026	ARGR	16REF1EF001	26-Aug-16	75	80	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3027	ARGR	16REF1EF001	26-Aug-16	68	75	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3028	ARGR	16REF1EF001	26-Aug-16	59	64	1.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3029	ARGR	16REF1EF001	26-Aug-16	67	72	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3030	ARGR	16REF1EF001	26-Aug-16	68	72	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3031	ARGR	16REF1EF001	26-Aug-16	74	78	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3032	ARGR	16REF1EF001	26-Aug-16	74	78	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3033	ARGR	16REF1EF001	26-Aug-16	77	82	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3034	ARGR	16REF1EF001	26-Aug-16	74	79	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3035	ARGR	16REF1EF001	26-Aug-16	71	77	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3036	ARGR	16REF1EF001	26-Aug-16	69	75	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3037	ARGR	16REF1EF001	26-Aug-16	64	68	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3038	ARGR	16REF1EF001	26-Aug-16	71	76	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3039	ARGR	16REF1EF001	26-Aug-16	68	71	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3040	ARGR	16REF1EF001	26-Aug-16	75	80	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3041	ARGR	16REF1EF001	26-Aug-16	72	77	4.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3042	ARGR	16REF1EF001	26-Aug-16	69	74	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3043	ARGR	16REF1EF001	26-Aug-16	69	74	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		Internal parasite suspected
LU16FREF1ARGR3044	ARGR	16REF1EF001	26-Aug-16	76	81	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3045	ARGR	16REF1EF001	26-Aug-16	67	73	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3046	ARGR	16REF1EF001	26-Aug-16	70	75	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3047	ARGR	16REF1EF001	26-Aug-16	68	74	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3048	ARGR	16REF1EF001	26-Aug-16	67	72	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3049	ARGR	16REF1EF001	26-Aug-16	67	73	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3050	ARGR	16REF1EF001	26-Aug-16	73	79	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3051	ARGR	16REF1EF001	26-Aug-16	68	73	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3052	ARGR	16REF1EF001	26-Aug-16	72	77	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3053	ARGR	16REF1EF001	26-Aug-16	65	71	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3054	ARGR	16REF1EF001	26-Aug-16	71	76	3.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3055	ARGR	16REF1EF001	26-Aug-16	68	74	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3056	ARGR	16REF1EF001	26-Aug-16	74	80	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3057	ARGR	16REF1EF001	26-Aug-16	73	78	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3058	ARGR	16REF1EF001	26-Aug-16	67	73	1.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3059	ARGR	16REF1EF001	26-Aug-16	68	73	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3060	ARGR	16REF1EF001	26-Aug-16	71	77	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3061	ARGR	16REF1EF001	26-Aug-16	66	71	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3062	ARGR	16REF1EF001	26-Aug-16	65	70	1.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3069	ARGR	16REF1MT001	29-Aug-16	74	83	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3070	ARGR	16REF1MT001	29-Aug-16	123	136	20.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3071	ARGR	16REF1EF002	29-Aug-16	70	76	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3072	ARGR	16REF1EF002	29-Aug-16	128	138	20.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

Golder Associates

Table E-5: Non-Lethal Survey - Fish Health Data, Reference Area 1 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FREF1ARGR3073	ARGR	16REF1EF002	29-Aug-16	67	76	3.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3074	ARGR	16REF1EF002	29-Aug-16	73	80	4.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3076	ARGR	16REF1EF002	29-Aug-16	67	71	3.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3077	ARGR	16REF1EF002	29-Aug-16	60	65	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3078	ARGR	16REF1EF002	29-Aug-16	64	70	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3075	ARGR	16REF1EF002	29-Aug-16	72	78	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3079	ARGR	16REF1EF002	29-Aug-16	65	71	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3080	ARGR	16REF1EF002	29-Aug-16	126	138	19.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3081	ARGR	16REF1EF002	29-Aug-16	67	72	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3082	ARGR	16REF1EF002	29-Aug-16	60	65	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3083	ARGR	16REF1EF002	29-Aug-16	72	78	3.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3084	ARGR	16REF1EF002	29-Aug-16	74	81	3.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3085	ARGR	16REF1EF002	29-Aug-16	64	71	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3086	ARGR	16REF1EF002	29-Aug-16	61	67	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3087	ARGR	16REF1EF002	29-Aug-16	69	75	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3088	ARGR	16REF1EF002	29-Aug-16	68	76	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3089	ARGR	16REF1EF002	29-Aug-16	69	76	3.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3090	ARGR	16REF1EF002	29-Aug-16	75	81	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3091	ARGR	16REF1EF002	29-Aug-16	134	147	25.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3092	ARGR	16REF1EF002	29-Aug-16	73	81	3.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3093	ARGR	16REF1EF002	29-Aug-16	66	72	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3094	ARGR	16REF1EF002	29-Aug-16	118	129	15.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3095	ARGR	16REF1EF002	29-Aug-16	75	80	3.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3096	ARGR	16REF1EF002	29-Aug-16	133	146	24.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3097	ARGR	16REF1EF002	29-Aug-16	70	76	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3098	ARGR	16REF1EF002	29-Aug-16	115	127	15.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3099	ARGR	16REF1EF002	29-Aug-16	131	143	22.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3108	ARGR	16REF1EF003	4-Sep-16	62	68	2.175	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3109	ARGR	16REF1EF003	4-Sep-16	69	78	3.204	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3110	ARGR	16REF1EF003	4-Sep-16	71	77	3.035	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3111	ARGR	16REF1EF003	4-Sep-16	70	75	2.789	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3112	ARGR	16REF1EF003	4-Sep-16	66	72	2.425	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3113	ARGR	16REF1EF003	4-Sep-16	76	82	4.189	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3114	ARGR	16REF1EF003	4-Sep-16	75	82	3.841	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3115	ARGR	16REF1EF003	4-Sep-16	68	75	2.977	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3116	ARGR	16REF1EF003	4-Sep-16	127	138	21.089	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3117	ARGR	16REF1EF003	4-Sep-16	128	136	15.875	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3118	ARGR	16REF1EF003	4-Sep-16	63	71	2.397	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3119	ARGR	16REF1EF003	4-Sep-16	73	83	3.726	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3120	ARGR	16REF1EF003	4-Sep-16	121	129	20.506	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3121	ARGR	16REF1EF003	4-Sep-16	131	144	22.145	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3122	ARGR	16REF1MT003	4-Sep-16	75	81	3.468	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3063	ARGR	16REF1EF003	4-Sep-16	130	141	20.780	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3064	ARGR	16REF1EF003	4-Sep-16	74	80	3.654	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3065	ARGR	16REF1EF003	4-Sep-16	64	70	2.702	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3066	ARGR	16REF1EF003	4-Sep-16	124	138	21.314	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3067	ARGR	16REF1EF003	4-Sep-16	68	76	3.164	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3068	ARGR	16REF1EF003	4-Sep-16	71	80	3.561	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3100	ARGR	16REF1EF003	4-Sep-16	67	75	2.720	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3101	ARGR	16REF1EF003	4-Sep-16	68	76	3.420	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3102	ARGR	16REF1EF003	4-Sep-16	66	73	2.697	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3103	ARGR	16REF1EF003	4-Sep-16	73	79	3.266	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3104	ARGR	16REF1EF003	4-Sep-16	70	77	3.560	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3105	ARGR	16REF1EF003	4-Sep-16	65	71	2.189	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3106	ARGR	16REF1EF003	4-Sep-16	63	71	2.618	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3107	ARGR	16REF1EF003	4-Sep-16	137	151	25.457	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3123	ARGR	16REF1EF004	5-Sep-16	215	234	101.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3124	ARGR	16REF1EF004	5-Sep-16	72	78	4.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3125	ARGR	16REF1EF004	5-Sep-16	63	70	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3126	ARGR	16REF1EF004	5-Sep-16	70	77	3.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3127	ARGR	16REF1EF004	5-Sep-16	67	74	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3128	ARGR	16REF1EF004	5-Sep-16	68	74	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3129	ARGR	16REF1EF004	5-Sep-16	67	74	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3130	ARGR	16REF1EF004	5-Sep-16	74	80	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3131	ARGR	16REF1EF004	5-Sep-16	136	147	28.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3132	ARGR	16REF1EF004	5-Sep-16	80	86	4.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

Table E-5: Non-Lethal Survey - Fish Health Data, Reference Area 1 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FREF1ARGR3133	ARGR	16REF1EF004	5-Sep-16	68	77	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3134	ARGR	16REF1EF004	5-Sep-16	76	83	3.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3135	ARGR	16REF1EF004	5-Sep-16	70	78	3.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3136	ARGR	16REF1EF004	5-Sep-16	68	76	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3137	ARGR	16REF1EF004	5-Sep-16	67	74	3.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3138	ARGR	16REF1EF004	5-Sep-16	69	76	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3139	ARGR	16REF1EF004	5-Sep-16	105	115	12.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3140	ARGR	16REF1EF004	5-Sep-16	61	66	1.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3141	ARGR	16REF1EF004	5-Sep-16	71	77	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3142	ARGR	16REF1EF004	5-Sep-16	70	78	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3143	ARGR	16REF1EF004	5-Sep-16	65	72	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3144	ARGR	16REF1EF004	5-Sep-16	63	69	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3145	ARGR	16REF1EF004	5-Sep-16	73	80	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3146	ARGR	16REF1EF004	5-Sep-16	74	81	4.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3147	ARGR	16REF1EF004	5-Sep-16	70	77	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3148	ARGR	16REF1EF004	5-Sep-16	62	70	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3149	ARGR	16REF1EF004	5-Sep-16	70	78	3.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3150	ARGR	16REF1EF004	5-Sep-16	76	83	4.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3151	ARGR	16REF1EF004	5-Sep-16	66	72	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3152	ARGR	16REF1EF004	5-Sep-16	63	70	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3153	ARGR	16REF1EF004	5-Sep-16	66	73	2.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3154	ARGR	16REF1EF004	5-Sep-16	70	76	2.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3155	ARGR	16REF1EF004	5-Sep-16	71	78	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3156	ARGR	16REF1EF004	5-Sep-16	115	127	16.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3157	ARGR	16REF1EF004	5-Sep-16	68	77	2.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3158	ARGR	16REF1EF004	5-Sep-16	140	152	25.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3159	ARGR	16REF1EF004	5-Sep-16	130	143	25.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3160	ARGR	16REF1EF004	5-Sep-16	109	117	13.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3161	ARGR	16REF1EF004	5-Sep-16	127	140	21.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3162	ARGR	16REF1EF004	5-Sep-16	69	75	2.790	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3163	ARGR	16REF1EF004	5-Sep-16	65	71	2.211	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3164	ARGR	16REF1EF005	8-Sep-16	66	72	2.618	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3165	ARGR	16REF1EF005	8-Sep-16	71	78	3.203	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3166	ARGR	16REF1EF005	8-Sep-16	73	79	3.684	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3167	ARGR	16REF1EF005	8-Sep-16	68	75	2.933	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3168	ARGR	16REF1EF005	8-Sep-16	70	77	3.920	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3169	ARGR	16REF1EF005	8-Sep-16	67	74	2.566	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3170	ARGR	16REF1EF005	8-Sep-16	76	81	4.380	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3171	ARGR	16REF1EF005	8-Sep-16	71	78	3.582	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3172	ARGR	16REF1EF005	8-Sep-16	66	71	2.516	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3173	ARGR	16REF1EF005	8-Sep-16	68	75	2.796	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3174	ARGR	16REF1EF005	8-Sep-16	66	73	2.758	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3175	ARGR	16REF1EF005	8-Sep-16	72	80	3.254	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3176	ARGR	16REF1EF005	8-Sep-16	65	72	2.583	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3177	ARGR	16REF1EF005	8-Sep-16	64	71	2.519	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3178	ARGR	16REF1EF005	8-Sep-16	65	70	2.556	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3179	ARGR	16REF1EF005	8-Sep-16	68	75	2.840	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3180	ARGR	16REF1EF005	8-Sep-16	68	75	3.289	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3181	ARGR	16REF1EF005	8-Sep-16	71	78	3.778	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3182	ARGR	16REF1EF005	8-Sep-16	71	78	3.748	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3183	ARGR	16REF1EF005	8-Sep-16	73	80	3.603	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3184	ARGR	16REF1EF005	8-Sep-16	70	77	3.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3185	ARGR	16REF1EF005	8-Sep-16	77	85	4.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3186	ARGR	16REF1EF005	8-Sep-16	67	74	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3187	ARGR	16REF1EF005	8-Sep-16	128	142	21.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3188	ARGR	16REF1EF005	8-Sep-16	71	78	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3189	ARGR	16REF1EF005	8-Sep-16	128	139	20.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3190	ARGR	16REF1EF005	8-Sep-16	73	81	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3191	ARGR	16REF1EF005	8-Sep-16	82	90	5.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3192	ARGR	16REF1EF005	8-Sep-16	62	69	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3193	ARGR	16REF1EF005	8-Sep-16	62	70	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3194	ARGR	16REF1EF005	8-Sep-16	61	67	2.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3195	ARGR	16REF1EF005	8-Sep-16	73	80	3.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3196	ARGR	16REF1EF005	8-Sep-16	72	79	3.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3197	ARGR	16REF1EF005	8-Sep-16	77	84	4.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3198	ARGR	16REF1EF005	8-Sep-16	68	75	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

Table E-5: Non-Lethal Survey - Fish Health Data, Reference Area 1 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FREF1ARGR3199	ARGR	16REF1EF005	8-Sep-16	75	84	3.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3200	ARGR	16REF1EF005	8-Sep-16	70	76	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3201	ARGR	16REF1EF005	8-Sep-16	132	148	25.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3202	ARGR	16REF1EF005	8-Sep-16	75	83	3.600	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3203	ARGR	16REF1EF005	8-Sep-16	65	72	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3204	ARGR	16REF1EF005	8-Sep-16	65	72	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3205	ARGR	16REF1EF005	8-Sep-16	66	73	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	X		Misshapen caudal fin
LU16FREF1ARGR3206	ARGR	16REF1EF005	8-Sep-16	66	73	2.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3207	ARGR	16REF1EF005	8-Sep-16	66	72	2.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3208	ARGR	16REF1EF005	8-Sep-16	73	80	3.650	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	Burnt by electrofisher, scarificed for otiliths
LU16FREF1ARGR3209	ARGR	16REF1EF005	8-Sep-16	71	79	2.961	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None		X	Burnt by electrofisher, scarificed for otiliths
LU16FREF1ARGR3211	ARGR	16REF1EF006	9-Sep-16	72	78	3.400	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3212	ARGR	16REF1EF006	9-Sep-16	64	70	2.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3213	ARGR	16REF1EF006	9-Sep-16	59	66	2.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3214	ARGR	16REF1EF006	9-Sep-16	75	82	4.200	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3215	ARGR	16REF1EF006	9-Sep-16	73	81	4.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3216	ARGR	16REF1EF006	9-Sep-16	63	69	2.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3217	ARGR	16REF1MT005	10-Sep-16	76	82	3.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3218	ARGR	16REF1MT005	10-Sep-16	62	69	1.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3219	ARGR	16REF1MT005	10-Sep-16	72	79	2.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF1ARGR3220	ARGR	16REF1MT005	10-Sep-16	62	69	1.500	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

ARGR = Arctic Grayling; mm = millimeters; g = grams; y = years; "-" = not collected

Table E-6: Non-Lethal Survey - Fish Health Data, Reference Area 2 2016

Fish Identification #	Species	Effort Number	Date	Fork Length (mm)	Total Length (mm)	Weight (g)	Body Deformities	Eyes	Skin	Thymus	Opercula	Gills	Pseudo-branchs	Fins	Vent	External Parasites	Scales Collected	Otolith Collected	Comments
LU16FREF2ARGR6001	ARGR	16REF2EF001	2-Sep-16	196	212	87.800	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6002	ARGR	16REF2EF001	2-Sep-16	270	294	-	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6003	ARGR	16REF2EF001	2-Sep-16	234	253	166.000	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6004	ARGR	16REF2EF003	3-Sep-16	139	152	29.573	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6005	ARGR	16REF2EF004	3-Sep-16	138	151	28.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6006	ARGR	16REF2EF004	3-Sep-16	121	131	20.100	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6007	ARGR	16REF2EF004	3-Sep-16	131	131	19.900	None	Normal	Normal	Normal	Normal	Normal	Normal	Light erosion	Normal	None	X		Caudal fin appears to be clipped, old and healed over
LU16FREF2ARGR6008	ARGR	16REF2EF004	3-Sep-16	124	133	21.300	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6009	ARGR	16REF2EF004	3-Sep-16	137	149	30.700	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6010	ARGR	16REF2EF006	9-Sep-16	132	144	25.576	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6011	ARGR	16REF2EF006	9-Sep-16	146	157	30.765	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		
LU16FREF2ARGR6012	ARGR	16REF2EF006	9-Sep-16	143	154	29.807	None	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	None	X		

ARGR = Arctic Grayling; mm = millimeters; g = grams; y = years; "-" = not collected

Table E-7: By-Catch Fish Data 2016

Area Caught	Common Name	Latin Name	Fork Length (mm)	Total Length (mm)	Weight (g)
Exposure Area	Arctic Char	*Salvelinus alpinus*	79.0	83.0	3.900
Exposure Area	Arctic Char	*Salvelinus alpinus*	103.0	109.0	102.080
Exposure Area	Burbot	*Lota lota*	-	304.0	-
Reference Area 1	Arctic Char	*Salvelinus alpinus*	238.0	263.0	96.100
Reference Area 1	Arctic Char	*Salvelinus alpinus*	215.0	230.0	91.700
Reference Area 1	Burbot	*Lota lota*	-	92.0	1.200
Reference Area 1	Burbot	*Lota lota*	-	53.0	1.000
Reference Area 1	Burbot	*Lota lota*	-	66.0	1.000
Reference Area 1	Burbot	*Lota lota*	-	55.0	1.100
Reference Area 1	Burbot	*Lota lota*	-	60.0	1.000
Reference Area 1	Burbot	*Lota lota*	-	57.0	0.800
Reference Area 1	Burbot	*Lota lota*	-	58.0	0.600
Reference Area 1	Burbot	*Lota lota*	-	48.0	0.300
Reference Area 1	Burbot	*Lota lota*	-	55.0	0.400
Reference Area 1	Burbot	*Lota lota*	-	54.0	0.800
Reference Area 1	Burbot	*Lota lota*	-	58.0	1.300
Reference Area 1	Burbot	*Lota lota*	-	48.0	0.800
Reference Area 1	Burbot	*Lota lota*	-	57.0	1.100
Reference Area 1	Burbot	*Lota lota*	-	62.0	1.300
Reference Area 1	Burbot	*Lota lota*	-	62.0	1.635
Reference Area 1	Burbot	*Lota lota*	-	88.0	5.100
Reference Area 1	Burbot	*Lota lota*	-	66.0	2.100
Reference Area 1	Burbot	*Lota lota*	-	70.0	2.200
Reference Area 1	Burbot	*Lota lota*	-	55.0	0.800
Reference Area 1	Burbot	*Lota lota*	-	78.0	3.100
Reference Area 1	Burbot	*Lota lota*	-	70.0	2.200
Reference Area 1	Burbot	*Lota lota*	-	60.0	1.900
Reference Area 1	Burbot	*Lota lota*	-	75.0	3.300
Reference Area 1	Burbot	*Lota lota*	-	68.0	2.294
Reference Area 1	Burbot	*Lota lota*	-	72.0	2.034
Reference Area 1	Burbot	*Lota lota*	-	58.0	1.200
Reference Area 1	Burbot	*Lota lota*	-	64.0	1.700
Reference Area 1	Burbot	*Lota lota*	-	70.0	2.000
Reference Area 1	Burbot	*Lota lota*	-	81.0	2.400
Reference Area 1	Burbot	*Lota lota*	-	104.0	4.000
Reference Area 1	Burbot	*Lota lota*	-	52.0	1.200
Reference Area 1	Burbot	*Lota lota*	-	63.0	1.500
Reference Area 1	Burbot	*Lota lota*	-	64.0	1.400

Table E-7: By-Catch Fish Data 2016

Area Caught	Common Name	Latin Name	Fork Length (mm)	Total Length (mm)	Weight (g)
Reference Area 1	Burbot	*Lota lota*	-	52.0	1.100
Reference Area 1	Burbot	*Lota lota*	-	64.0	1.365
Reference Area 1	Burbot	*Lota lota*	-	64.0	1.608
Reference Area 1	Burbot	*Lota lota*	-	61.0	1.480
Reference Area 1	Burbot	*Lota lota*	-	56.0	1.292
Reference Area 1	Burbot	*Lota lota*	-	63.0	1.485
Reference Area 1	Burbot	*Lota lota*	-	66.0	1.186
Reference Area 1	Burbot	*Lota lota*	-	70.0	2.490
Reference Area 1	Burbot	*Lota lota*	-	78.0	3.400
Reference Area 1	Burbot	*Lota lota*	-	67.0	1.800
Reference Area 1	Burbot	*Lota lota*	-	60.0	1.200
Reference Area 1	Burbot	*Lota lota*	-	68.0	0.800
Reference Area 1	Burbot	*Lota lota*	-	70.0	1.000
Reference Area 1	Burbot	*Lota lota*	-	57.0	1.200
Reference Area 1	Burbot	*Lota lota*	-	66.0	1.700
Reference Area 1	Burbot	*Lota lota*	-	77.0	2.900
Reference Area 1	Lake Trout	*Salvelinus namaycush*	68.0	73.0	2.000
Reference Area 1	Lake Trout	*Salvelinus namaycush*	64.0	70.0	1.800
Reference Area 1	Lake Trout	*Salvelinus namaycush*	67.0	73.0	3.000
Reference Area 1	Lake Trout	*Salvelinus namaycush*	65.0	71.0	1.400
Reference Area 1	Lake Trout	*Salvelinus namaycush*	52.0	54.0	1.200
Reference Area 1	Round Whitefish	*Prosopium cylindraceum*	111.0	123.0	11.400
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	38.0	0.200
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	57.0	1.600
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	45.0	0.885
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	57.0	2.100
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	70.0	3.200
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	93.0	8.300
Reference Area 1	Slimy Sculpin	*Cottus cognatus*	-	72.0	3.000
Reference Area 2	Arctic Char	*Salvelinus alpinus*	107.0	115.0	13.300
Reference Area 2	Arctic Char	*Salvelinus alpinus*	139.0	150.0	29.310
Reference Area 2	Arctic Char	*Salvelinus alpinus*	126.0	135.0	18.823
Reference Area 2	Arctic Char	*Salvelinus alpinus*	155.0	167.0	48.827
Reference Area 2	Arctic Char	*Salvelinus alpinus*	124.0	133.0	21.000
Reference Area 2	Arctic Char	*Salvelinus alpinus*	159.0	172.0	41.900
Reference Area 2	Arctic Char	*Salvelinus alpinus*	196.0	210.0	77.600
Reference Area 2	Arctic Char	*Salvelinus alpinus*	124.0	134.0	17.800
Reference Area 2	Arctic Char	*Salvelinus alpinus*	144.0	153.0	31.500

Table E-7: By-Catch Fish Data 2016

Area Caught	Common Name	Latin Name	Fork Length (mm)	Total Length (mm)	Weight (g)
Reference Area 2	Arctic Char	*Salvelinus alpinus*	128.0	139.0	20.250
Reference Area 2	Arctic Char	*Salvelinus alpinus*	133.0	143.0	26.099
Reference Area 2	Arctic Char	*Salvelinus alpinus*	134.0	146.0	26.610
Reference Area 2	Burbot	*Lota lota*	-	16.0	-
Reference Area 2	Burbot	*Lota lota*	-	255.0	-
Reference Area 2	Burbot	*Lota lota*	-	76.0	2.800
Reference Area 2	Burbot	*Lota lota*	-	66.0	1.700
Reference Area 2	Burbot	*Lota lota*	-	72.0	2.200
Reference Area 2	Burbot	*Lota lota*	-	77.0	2.500
Reference Area 2	Burbot	*Lota lota*	-	-	-
Reference Area 2	Burbot	*Lota lota*	-	65.0	1.339
Reference Area 2	Burbot	*Lota lota*	-	182.0	39.654
Reference Area 2	Burbot	*Lota lota*	-	4468.0	>200
Reference Area 2	Burbot	*Lota lota*	-	298.0	96.000
Reference Area 2	Burbot	*Lota lota*	-	300.0	135.000
Reference Area 2	Burbot	*Lota lota*	-	277.0	120.000
Reference Area 2	Lake Trout	*Salvelinus namaycush*	340.0	355.0	>200
Reference Area 2	Lake Trout	*Salvelinus namaycush*	400.0	410.0	-
Reference Area 2	Lake Trout	*Salvelinus namaycush*	310.0	320.0	-
Reference Area 2	Lake Trout	*Salvelinus namaycush*	210.0	220.0	-
Reference Area 2	Lake Trout	*Salvelinus namaycush*	180.0	199.0	73.300
Reference Area 2	Lake Trout	*Salvelinus namaycush*	247.0	274.0	>200
Reference Area 2	Lake Trout	*Salvelinus namaycush*	213.0	233.0	109.000
Reference Area 2	Lake Trout	*Salvelinus namaycush*	199.0	220.0	112.500
Reference Area 2	Lake Trout	*Salvelinus namaycush*	158.0	175.0	38.600
Reference Area 2	Lake Trout	*Salvelinus namaycush*	160.0	177.0	45.100
Reference Area 2	Lake Trout	*Salvelinus namaycush*	189.0	209.0	56.600
Reference Area 2	Lake Trout	*Salvelinus namaycush*	114.0	125.0	12.300
Reference Area 2	Round Whitefish	*Prosopium cylindraceum*	72.0	80.0	2.300
Reference Area 2	Round Whitefish	*Prosopium cylindraceum*	74.0	81.0	3.100
Reference Area 2	Slimy Sculpin	*Cottus cognatus*	-	76.0	4.120
Reference Area 2	Slimy Sculpin	*Cottus cognatus*	-	92.0	8.921
Reference Area 2	Slimy Sculpin	*Cottus cognatus*	-	70.0	3.009
Reference Area 2	Slimy Sculpin	*Cottus cognatus*	-	89.0	6.919
Reference Area 2	Slimy Sculpin	*Cottus cognatus*	-	80.0	5.180

mm = millimeters; g = grams

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