APPENDIX A

FISH HABITAT PHOTOGRAPHS

Photo 1
Round Lake - Edge of tailings can be seen in left side of photo.

Photo 2
Round Lake - Sedge stand located at edge of tailings.

Photo 3
Round Lake - Spruce forest community surrounding lake.

Photo 4
Round Lake - Ephemeral tributary and inlet to lake.

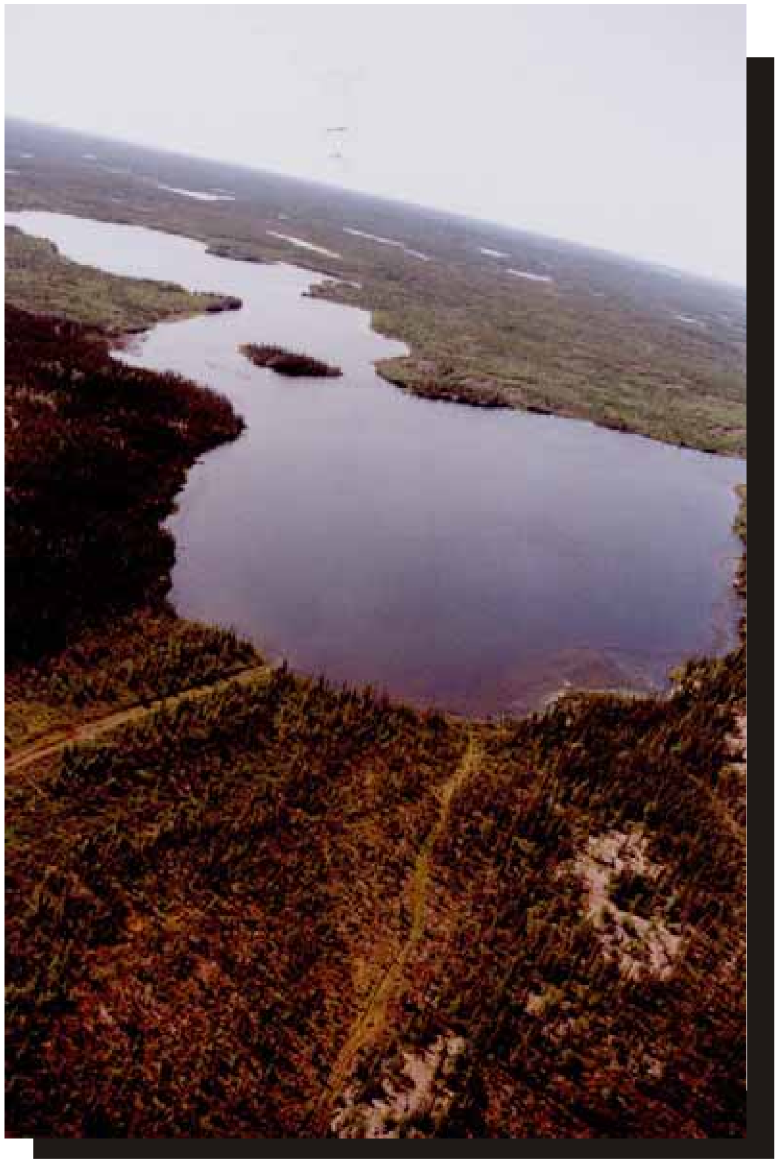


Photo 5
Winter Lake - View looking south. Winter roads are evident.

Photo 6
Winter Lake - View of sedge habitat along west side of lake in south basin.

Photo 7
Winter Lake - Stand of hardstem bulrush located on the east side of lake.

Photo 8
Winter Lake - Wetland located in southeast section of lake.

Photo 9
Winter Lake - Narrow secondary outlet channel in willow/birch forest.

Photo 10
Winter Lake - Wetland and lake outlet located at west end of lake. Osprey nest is visible near shore of Narrow lake.

Photo 11
Eclipse Lake - View of west basin.

Photo 12
Eclipse Lake - View looking west from end of east basin.

Photo 13
Eclipse Lake - View of rocky islands and submerged reefs within the west basin.

Photo 14
Eclipse Lake - View of steep shoreline, rocky islands, and submerged reefs in east basin.

Photo 15
Eclipse Lake - Entrance to east basin.

Photo 16
Eclipse Lake - View from west basin looking northeast along rocky shoreline.

Photo 17
Eclipse Lake - Shoreline in west basin wetland dominated by water sedge.

Photo 18
Eclipse Lake - Submerged boulders and emergent vegetation in east basin.

Photo 19
Eclipse Lake - View of shallow backwater behind small rock island in east basin.

Photo 20
Eclipse Lake - Steep shoreline and rock cliff at west end of east basin.

Photo 21
Eclipse Lake - Sparse forest vegetation.

Photo 22
Eclipse Lake - Outlet from Eclipse Lake in west basin.

Photo 23
Eclipse Lake - Eclipse Lake inlet in east basin.

Photo 24
Nicholas Lake - View looking south from north end of lake.

Photo 25
Nicholas Lake - View looking northeast from south end of lake.

Photo 26
Nicholas Lake - View looking east from west side of lake.

Photo 27
Nicholas Lake - Rocky shoal at north end of lake.

Photo 28
Nicholas Lake - Nicholas Lake Mining Camp.

Photo 29
Nicholas Lake - West of camp.

Photo 30
Nicholas Lake - Erratics along the steep hillside of lake.

Photo 31
Nicholas Lake - Rocky islands and emergent vegetation.

Photo 32
Nicholas Lake - View of small bog wetland and ephemeral tributary inlet to Nicholas Lake.

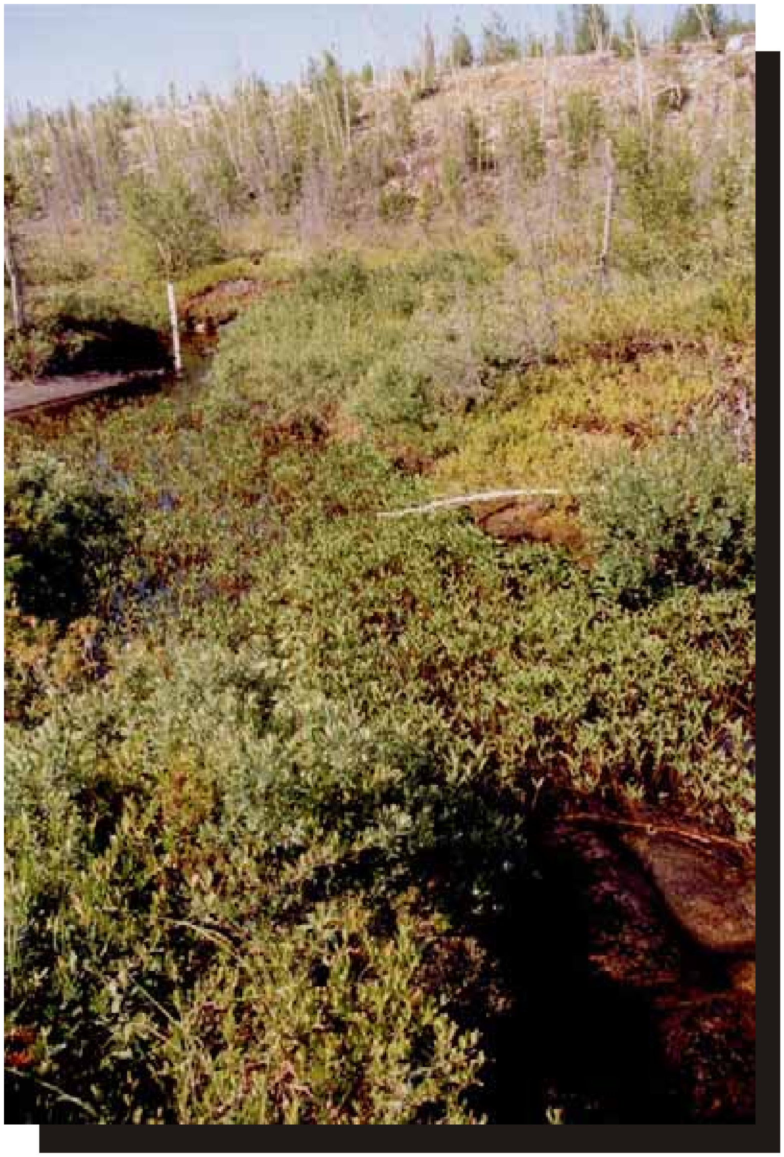


Photo 33
Nicholas Lake - Vegetated section of main outlet from lake.

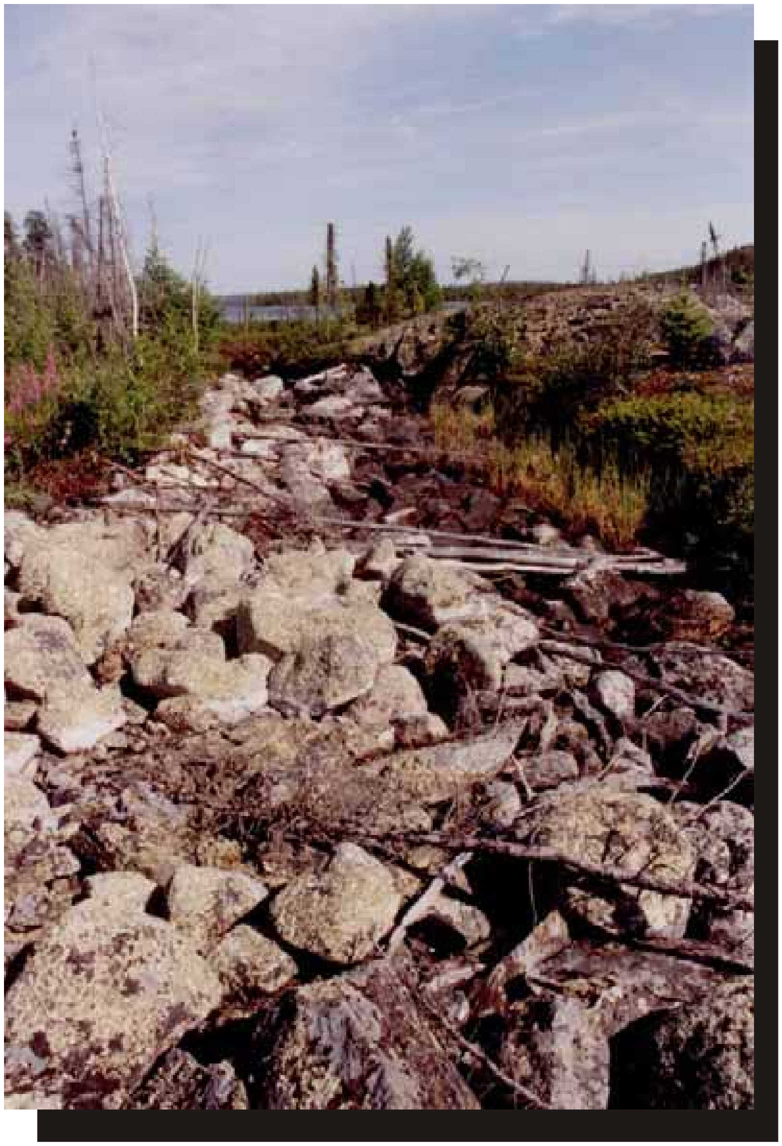


Photo 34
Nicholas Lake - Dry channel section of main outlet from lake.

Photo 35
Brien Lake - View looking south from north end of lake.

Photo 36
Brien Lake - View of south end of lake.

Photo 37
Brien Lake - View of steep cliffs along east side of lake.

Photo 38
Brien Lake - View of emergent vegetation and sedges located at south end of lake.

Photo 39
Brien Lake - Extensive wetland habitat at south end of lake.

Photo 40
Brien Lake - Southwest end of lake outlet meanders through a sedge wetland.

Photo 41
Brien Lake - Lake inlet located within an open sedge wetland.

Photo 42
Narrow Lake - View looking south from north end of lake.

Photo 43
Narrow Lake - Wetland at south end of lake.

Photo 44
Narrow Lake - View of north end of lake. Note Osprey nest on pole.

Photo 45
Narrow Lake - View of sedge dominated shoreline at south end of lake.

Photo 46
Narrow Lake - Beaver lodge and wetland located in northwest section of lake.

Photo 47
Narrow Lake - Wetland dominated by water sedge and water plantain.

APPENDIX B

IDENTIFICATION OF PLANTS

Appendix B. Identification of Plants

Common Name	Scientific/ Latin Name
Submerged and Floating	
Hard-Stem Bulrush	*Scirpus validus*
Burreed	*Sparganium* sp.
Yellow Water Lily	*Nuphar* sp.
Flatstem Pondweed	*Potamogeton zosteriformis*
Slender Leaved Pondweed	*Potamogeton pusillus*
Large-leafed Pondweed	*Potamogeton* sp.
Richardson's Pondweed	*Potamogeton richardsonii*
Water Plantain	*Alisma plantago-aquatica*
Water milfoil	*Myriophyllum* sp.
Bladderwort	*Utricularia* sp.
Water Crowfoot (water buttercup)	*Ranunculus aquatilis*
Water Smartweed	*Polygonum amphibium*
Northern Arrowhead (floating)	*Sagiataria cuneata*
Muskgrass	*Chara* sp.
Cattail	*Typha latifolia*
Beaked Sedge	*Carex utriculata*
Water Sedge	*Carex aquatalis*
Water Arum	*Calla palustis*
Shoreline Species	
Scouring Rush	*Equisetum hyemale*
Sphagnum moss	*Sphagnum* sp.
Fireweed	*Epilobium augustifolium*
Bog Laurel	*Kalmia polifolia*
Bog blueberry	*Vaccinium uligonosum*
Labrador tea	*Ledum groenlandicum*
Buckbean	*Menyanthes trifoliata*
Sweetgale	*Myrica gale*
Marestail	*Hippuris vulgaria*
Bog rosemary	*Andromeda polifolia*
Marsh cinquefoil	*Potentillia palustris*
Cotton grass	*Eriophorum viridi carinatum*
Trees	
Black Spruce	*Picea mariana*
Fir	*Abies* sp.
Paper Birch	*Betula papyrifera*
Dwarf Birch	*Betula* sp.
Alder	*Alnus crispa*
Jack Pine	*Pinus banksiana*
Willow	*Salix* sp.

APPENDIX C-1

MERISTICS FOR FISH COLLECTED BY GILLNET

Appendix C-1. Meristics for Fish Collected by Gillnet: Eclipse Lake

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age (years)	Tissue Sample	Comments
7/25/2004	Floating	1	Lake Trout	54.8	1800		M				
7/25/2004	Floating	2	Lake Trout	56.6	1950		M				
7/25/2004	Floating	3	Northern Pike	67.2	2150	F	M	X	6	X	Cleithra
7/25/2004	Floating	4	Lake Trout	55.3	1550	F	M				Ripe with roe
7/25/2004	Floating	5	Northern Pike	74.5	2660	F	M	X	7	X	Cleithra
7/25/2004	Floating	6	Lake Trout	55.6	1770	F	M	X	16	X	Pectoral Fin
7/25/2004	Floating	7	Lake Trout	49.8	1050	M	M				
7/25/2004	Floating	8	Northern Pike	52.7	980	F	M	X	4	X	Cleithra
7/25/2004	Floating	9	Whitefish	41.6	850	M	M	X	7	X	Pectoral Fin
7/25/2004	Floating	10	Whitefish	36.8	600	F		X	6	X	Pectoral Fin
7/25/2004	Floating	11	Whitefish	40.4	825	F	M	X	7	X	Pectoral Fin; ripe with roe
7/25/2004	Floating	12	Whitefish	36.5	540	M	M	X	5	X	Pectoral Fin
7/25/2004	Floating	13	Whitefish	34.6	465	M	M	X	6	X	Pectoral Fin
7/25/2004	Sinking	1	Lake Trout	75.5	6803	F	M	X	34	X	Pectoral Fin; ripe with roe
7/25/2004	Sinking	2	Lake Trout	54.4	1425	M	M	X	14	X	Pectoral Fin
7/25/2004	Sinking	3	Lake Trout	54.5	1650	F	M	X	12	X	Pectoral Fin
7/25/2004	Sinking	4	Lake Trout	48.8	1225	F	M	X	10	X	Pectoral Fin
7/25/2004	Sinking	5	Lake Trout	44.7	920	F	M	X	9	X	Pectoral Fin
7/25/2004	Sinking	6	Lake Trout	29.5	250	M	IM	X	7		Pectoral Fin
7/25/2004	Sinking	7	Burbot	41.4							3/4 digested
7/25/2004	Sinking	8	Lake cisco	12.8	19						Voucher specimen
7/25/2004	Sinking	9	Lake cisco	12.6	18						Voucher specimen
7/25/2004	Sinking	10	Lake cisco	12.6	18						Voucher specimen

Appendix C-1. Meristics for Fish Collected by Gillnet: Nicholas Lake

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age	Tissue Sample	Comments
7/28/2004	Floating	1	Burbot	63.4	1790		M				
7/28/2004	Floating	2	Northern Pike	55.5	920	F	M	X	4	X	Cleithra
7/28/2004	Floating	3	Northern Pike	53.8	1020	M	M	X	4	X	Cleithra
7/28/2004	Floating	4	Northern Pike	52.0	930	M	M	X	4	X	Cleithra
7/28/2004	Floating	5	Northern Pike	58.2	1320	M	M	X	4	X	Cleithra
7/28/2004	Floating	6	Northern Pike	50.2	840	M	M	X	5	X	Cleithra
7/28/2004	Floating	7	Northern Pike	59.2	1280	M	M				
7/28/2004	Floating	8	Lake Trout	50.8	1220	F	M				Ripe with roe
7/28/2004	Floating	9	Lake Trout	50.0	1400	F	M				Ripe with roe
7/28/2004	Floating	10	Lake Trout	56.4	1790	F	M				Ripe with roe
7/28/2004	Floating	11	Lake Trout	51.3	1560	M	M				
7/28/2004	Sinking	1	Lake Trout	52.8	1820	M	M	X	20	X	Pectoral Fin
7/28/2004	Sinking	2	Lake Trout	49.8	1260	M	M	X	16	X	Pectoral Fin
7/28/2004	Sinking	3	Lake Trout	50.5	1425	M	M	X	13	X	Pectoral Fin
7/28/2004	Sinking	4	Lake Trout	51.0	1530	F	M	X	24	X	Pectoral Fin
7/28/2004	Sinking	5	Lake Trout	19.1	60	M	IM		3		Whole fish taken
7/28/2004	Sinking	6	Lake Trout	58.4	1125	F	M				

Appendix C-1. Meristics for Fish Collected by Gillnet: Brien Lake

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age	Tissue Sample	Comments
7/30/2004	Floating	1	Northern Pike	46.9	725	F		X	3	X	Cleithra
7/30/2004	Floating	2	Northern Pike	49.1	710		IM	X	4	X	Cleithra
7/30/2004	Floating	3	Northern Pike	29.4	170		IM	X	2	X	Cleithra
7/30/2004	Floating	4	Northern Pike	29.0	155		IM	X	2	X	Cleithra
7/30/2004	Floating	5	Northern Pike	29.1	160		IM	X	2	X	Cleithra
7/30/2004	Floating	6	Northern Pike	16.5	40		IM				

Note: No fish collected in sinking gillnet

Appendix C-1. Meristics for Fish Collected by Gillnet: Narrow Lake

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age	Tissue Sample	Comments
8/2/2004	Floating	1	Northern Pike	66.8	2440	F	M	X	5	X	Cleithra
8/2/2004	Floating	2	Northern Pike	29.8	175		IM	X	2	X	Cleithra
8/2/2004	Floating	3	Northern Pike	69.5	2440	M	M				
8/2/2004	Floating	4	Northern Pike	59.4	1110	M	M				
8/2/2004	Floating	5	Northern Pike	58.2	1360	M	M				
8/2/2004	Floating	6	Northern Pike	44.2	520	F	M				
8/2/2004	Floating	7	Whitefish	42.2	980	F	M				
8/2/2004	Floating	8	Whitefish	35.2	540	M	M				
8/2/2004	Floating	9	Whitefish	28.2	280	F	M				
8/2/2004	Floating	10	Whitefish	28.6	300	M					
8/2/2004	Floating	11	Whitefish	30.0	300	F	M				
8/2/2004	Floating	12	Whitefish	26.4	230	F	M				
8/2/2004	Floating	13	Whitefish	31.4	380	M	M				
8/2/2004	Floating	14	Whitefish	22.6	145	M	M				
8/2/2004	Floating	15	Whitefish	24.9	180	M	M				
8/2/2004	Floating	16	Whitefish	24.6	195	F	M				
8/2/2004	Floating	17	Whitefish	21.3	130	F	M				
8/2/2004	Floating	18	Whitefish	22.0	120	M	M				
8/2/2004	Floating	19	Whitefish	22.1	130	M	M				
8/2/2004	Floating	20	Whitefish	25.5	200	M	M				
8/2/2004	Floating	21	Whitefish	23.2	150						
8/2/2004	Floating	22	Whitefish	23.6	500						
8/2/2004	Floating	23	Whitefish	23.6	170						
8/2/2004	Floating	24	Whitefish	23.0	150						
8/2/2004	Floating	25	Whitefish	22.0	125						
Note: 5 lake whitefish were thrown back from floating gillnet											
8/2/2004	Sinking	1	Northern Pike	59.2	1140	F	M	X	5	X	Cleithra
8/2/2004	Sinking	2	Northern Pike	58.6	1200	F	M	X	4	X	Cleithra
8/2/2004	Sinking	3	Northern Pike	62.6	1810	M	M	X	5	X	Cleithra
8/2/2004	Sinking	4	Whitefish	45.4	1240	M	M	X	17	X	Pectoral Fin
8/2/2004	Sinking	5	Whitefish	29.6	360	F	M	X	8	X	Pectoral Fin
8/2/2004	Sinking	6	Whitefish	35.5	520	M	M	X	11	X	Pectoral Fin
8/2/2004	Sinking	7	Whitefish	25.6	250		IM	X	5	X	Pectoral Fin
8/2/2004	Sinking	8	Whitefish	39.2	700	M	M	X	11	X	Pectoral Fin
8/2/2004	Sinking	9	Whitefish	22.5	150	M	M	X	3	X	Pectoral Fin
8/2/2004	Sinking	10	Whitefish	29.9	300		IM				
8/2/2004	Sinking	11	Whitefish	29.0	290	M	M				
8/2/2004	Sinking	12	Whitefish	34.9	540	M	M				
8/2/2004	Sinking	13	Whitefish	39.0	760	M	M				
8/2/2004	Sinking	14	Whitefish	34.6	600	M	M				
8/2/2004	Sinking	15	Whitefish	30.1	330	F	M				
8/2/2004	Sinking	16	Whitefish	31.0	370	F	M				
8/2/2004	Sinking	17	Whitefish	37.0	685	F	M				
8/2/2004	Sinking	18	Whitefish	33.3	450	M	M				
8/2/2004	Sinking	19	Whitefish	39.7	740	F	M				
8/2/2004	Sinking	20	Whitefish	35.6	620	F	M				
8/2/2004	Sinking	21	Whitefish	28.6	270	F	M				
8/2/2004	Sinking	22	Whitefish	30.6	380	M	M				
8/2/2004	Sinking	23	Whitefish	26.5	320	M	M				
8/2/2004	Sinking	24	Whitefish	30.6	330	F	M				
8/2/2004	Sinking	25	Whitefish	28.5	220	M	M				
8/2/2004	Sinking	26	Whitefish	27.9	285	F	M				
8/2/2004	Sinking	27	Whitefish	36.1	540	F	M				
8/2/2004	Sinking	28	Whitefish	31.9	380	F	M				
8/2/2004	Sinking	29	Whitefish	28.5	270	F	M				
8/2/2004	Sinking	30	Whitefish	28.3	265	M	M				
8/2/2004	Sinking	31	Whitefish	29.5	270	M	M				
8/2/2004	Sinking	32	Whitefish	27.1	230	M	M				
8/2/2004	Sinking	33	Whitefish	25.7	195	F	M				
8/2/2004	Sinking	34	Whitefish	29.7	340	M	M				
8/2/2004	Sinking	35	Whitefish	29.0	280	M	M				
8/2/2004	Sinking	36	Whitefish	28.5	275	F	M				
8/2/2004	Sinking	37	Whitefish	25.1	180	M	M				
8/2/2004	Sinking	38	Whitefish	28.9	265	F	M				
8/2/2004	Sinking	39	Whitefish	26.5	205	M	M				
8/2/2004	Sinking	40	Whitefish	24.5	175	M	M				
8/2/2004	Sinking	41	Whitefish	22.9	150	M	M				
8/2/2004	Sinking	42	Whitefish	23.7	160	M	M				
8/2/2004	Sinking	43	Whitefish	26.1	200	M	M				
8/2/2004	Sinking	44	Whitefish	19.7	100	F	M				
8/2/2004	Sinking	45	Whitefish	22.8	140						
8/2/2004	Sinking	46	Whitefish	20.6	120						
8/2/2004	Sinking	47	Whitefish	20.5	100						
8/2/2004	Sinking	48	Whitefish	22.6	130						
8/2/2004	Sinking	49	Whitefish	21.9	120						
8/2/2004	Sinking	50	Whitefish	14.4	40						

Note: 3 lake whitefish with missing heads were thrown back from sinking gillnet

APPENDIX C-2

MERISTICS FOR FISH COLLECTED BY MINNOW TRAP

Appendix C-2. Meristics for Fish Collected by Minnow Trap

Location	Fish Collected	Date DD/MM/YY	Trap Number	Sample No	Species	Length (cm)	Weight (g)	Age
Round Lake	No							
Winter Lake	No							
Eclipse Lake	No							
Nicholas Lake	No							
Brien Lake	No							
Narrow Lake	Yes	8-Feb-04	7	1	Northern Pike	6.2	2	0+
		8-Feb-04	10	2	Northern Pike	7	2	0+

Note:
10 minnow traps deployed along shoreline per lake

APPENDIX D-1

GILLNET CATCH AND CATCH-PER-UNIT-EFFORT

Appendix D-1. Gillnet Catch and Catch-per-Unit-Effort

Lake	Gillnet type	Date In	Time In	Date Out	Time Out	Total Set Time (hours)	Gillnet Catch and Catch-Per-Unit-Effort (CPUE)					Total Net Catch
							Northern Pike	Lake Trout	Lake Whitefish	Lake Cisco	Burbot	Catch
Round	Floating	18-Jul-04	17:45	19-Jul-04	10:57	17.2	0	0	0	0	0	0
							0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Sinking	18-Jul-04	17:20	19-Jul-04	10:45	17.42	0	0	0	0	0	0
							0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Winter	Floating	20-Jul-04	16:00	21-Jul-04	8:04	16.06	0	0	0	0	0	0
							0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Sinking	20-Jul-04	16:30	21-Jul-04	7:52	15.36	0	0	0	0	0	0
							0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Eclipse	Floating	24-Jul-04	18:30	25-Jul-04	9:36	15.1	3	5	5	0	0	13
							1.09	**1.82**	**1.82**	**0.00**	**0.00**	**4.72**
	Sinking	24-Jul-04	18:48	25-Jul-04	8:12	14.4	0	6	0	3	1	10
							0.00	**2.28**	**0.00**	**1.14**	**0.38**	**3.81**
Nicholas	Floating	27-Jul-04	19:14	28-Aug-04	9:10	13.93	6	4	0	0	1	11
							2.36	**1.57**	**0.00**	**0.00**	**0.39**	**4.33**
	Sinking	27-Jul-04	19:30	28-Aug-04	8:05	12.58	1	5	0	0	0	6
							0.44	**2.18**	**0.00**	**0.00**	**0.00**	**2.61**
Brien	Floating	29-Jul-04	17:23	30-Jul-04	8:14	14.85	6	0	0	0	0	6
							2.22	**0.00**	**0.00**	**0.00**	**0.00**	**2.22**
	Sinking	29-Jul-04	17:34	30-Jul-04	8:30	14.93	0	0	0	0	0	0
							0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Narrow	Floating	1-Aug-04	15:30	2-Aug-04	10:45	19.25	6	0	24	0	0	30
							1.71	**0.00**	**6.84**	**0.00**	**0.00**	**8.54**
	Sinking	1-Aug-04	15:45	2-Aug-04	8:40	16.91	3	0	50	0	0	53
							0.97	**0.00**	**16.21**	**0.00**	**0.00**	**17.18**
						Fish Totals:	25	20	79	3	2	**129**

Note:

Gillnet CPUE values (bolded) represent the number of fish captured per gillnetting unit (number of fish/100m^2 per 12 hr period).

APPENDIX D-2

MINNOW TRAP CATCH AND CATCH-PER-UNIT-EFFORT

Appendix D-2. Minnow Trap Catch and Catch-per-Unit-Effort

Lake	Number of Traps	Date In	Time In	Date Out	Time Out	Total Set Time (hours)	Minnow Traps and Catch-Per-Unit-Effort (CPUE)					Total Catch
							Northern Pike	Lake Trout	Lake Whitefish	Lake Cisco	Burbot	
Round	10	18-Jul-04	17:53	19-Jul-04	8:40	14.78	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**
Winter	10	20-Jul-04	14:59	21-Jul-04	8:18	17.32	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**
Eclipse	10	24-Jul-04	17:30	25-Jul-04	11:10	17.70	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**
Nicholas	10	27-Jul-04	17:48	28-Jul-04	11:00	17.20	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**
Brien	10	29-Jul-04	16:47	30-Jul-04	9:30	16.71	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**
Narrow	10	1-Aug-04	14:47	2-Aug-04	11:00	21.22	2 **0.52**	0 **0.00**	0 **0.00**	0 **0.00**	0 **0.00**	2 **0.52**
						Fish Totals:	2	0	0	0	0	**2**

Note:

Minnow Trap CPUE values (bolded) represent the number of fish captured per number of minnow trap units (number of fish/number of traps).

APPENDIX E

FISH AGING RESULTS

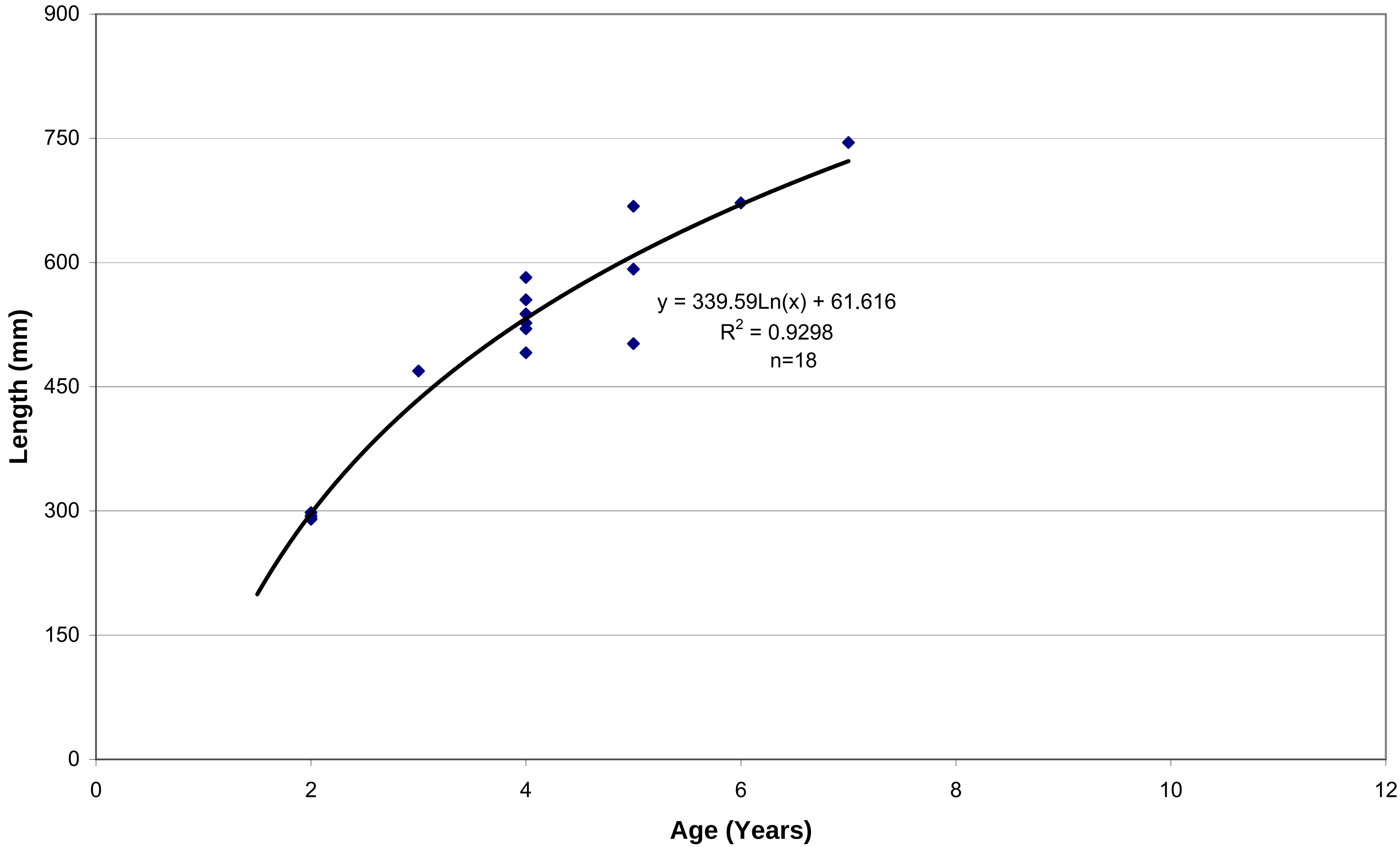
Appendix E: Fish Aging Results

Location	Sample Method	Species	Fish Sample #	Structure	Age
Eclipse Lake	Sinking gillnet	LT	1	Pectoral fin	34
Eclipse Lake	Sinking gillnet	LT	2	Pectoral fin	14
Eclipse Lake	Sinking gillnet	LT	3	Pectoral fin	12
Eclipse Lake	Sinking gillnet	LT	4	Pectoral fin	10
Eclipse Lake	Sinking gillnet	LT	5	Pectoral fin	9
Eclipse Lake	Sinking gillnet	LT	6	Pectoral fin	7
Eclipse Lake	Floating gillnet	WF	9	Pectoral fin	7
Eclipse Lake	Floating gillnet	WF	10	Pectoral fin	6
Eclipse Lake	Floating gillnet	WF	11	Pectoral fin	7
Eclipse Lake	Floating gillnet	WF	12	Pectoral fin	5
Eclipse Lake	Floating gillnet	WF	13	Pectoral fin	6
Eclipse Lake	Floating gillnet	LT	6	Pectoral fin	16
Eclipse Lake	Floating gillnet	NP	3	Cleithra	6
Eclipse Lake	Floating gillnet	NP	5	Cleithra	7
Eclipse Lake	Floating gillnet	NP	8	Cleithra	4
Nicholas Lake	Sinking gillnet	LT	1	Pectoral fin	20
Nicholas Lake	Sinking gillnet	LT	2	Pectoral fin	16
Nicholas Lake	Sinking gillnet	LT	3	Pectoral fin	13
Nicholas Lake	Sinking gillnet	LT	4	Pectoral fin	24
Nicholas Lake	Sinking gillnet	LT	5	Pectoral fin	3
Nicholas Lake	Floating gillnet	NP	2	Cleithra	4
Nicholas Lake	Floating gillnet	NP	3	Cleithra	4
Nicholas Lake	Floating gillnet	NP	4	Cleithra	4
Nicholas Lake	Floating gillnet	NP	5	Cleithra	4
Nicholas Lake	Floating gillnet	NP	6	Cleithra	5
Brien Lake	Floating gillnet	NP	1	Cleithra	3
Brien Lake	Floating gillnet	NP	2	Cleithra	4
Brien Lake	Floating gillnet	NP	3	Cleithra	2
Brien Lake	Floating gillnet	NP	4	Cleithra	2
Brien Lake	Floating gillnet	NP	5	Cleithra	2
Narrow Lake	Sinking gillnet	NP	1	Cleithra	5
Narrow Lake	Sinking gillnet	NP	2	Cleithra	4
Narrow Lake	Sinking gillnet	NP	3	Cleithra	5
Narrow Lake	Sinking gillnet	WF	4	Pectoral fin	17
Narrow Lake	Sinking gillnet	WF	5	Pectoral fin	8
Narrow Lake	Sinking gillnet	WF	6	Pectoral fin	11
Narrow Lake	Sinking gillnet	WF	7	Pectoral fin	5
Narrow Lake	Sinking gillnet	WF	8	Pectoral fin	11
Narrow Lake	Sinking gillnet	WF	9	Pectoral fin	3
Narrow Lake	Floating gillnet	NP	1	Cleithra	5
Narrow Lake	Floating gillnet	NP	2	Cleithra	2

APPENDIX F-1

LENGTH-AT-AGE REGRESSION FOR NORTHERN PIKE IN ALL LAKES SURVEYED

Appendix F-1. Length-At-Age Regression for Northern Pike in all Lakes Surveyed



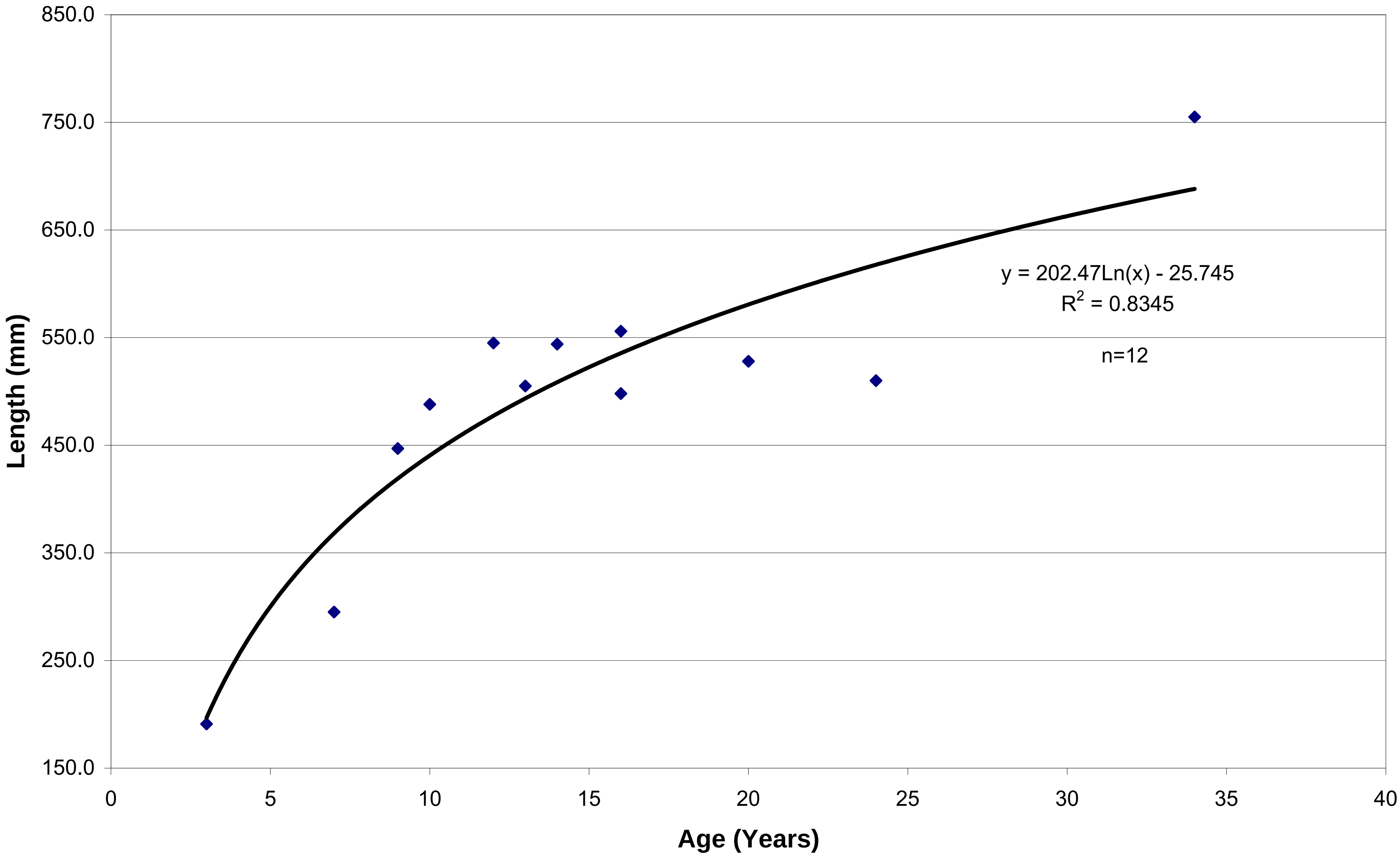
Length, Weight, Age Summary of Northern Pike for all Lakes

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Eclipse	Northern Pike	672	2150	6	F	M	Shallow
	Northern Pike	745	2660	7	F	M	Shallow
	Northern Pike	527	980	4	F	M	Shallow
Nicholas	Northern Pike	555.0	920	4	M	M	Shallow
	Northern Pike	538.0	1020	4	M	M	Shallow
	Northern Pike	520.0	930	4	M	M	Shallow
	Northern Pike	582.0	1320	4	M	M	Shallow
	Northern Pike	502.0	840	5	M	M	Shallow
	Northern Pike	592.0	1280		M	M	Shallow
Brien	Northern Pike	469.0	725	3	F	M	Shallow
	Northern Pike	491.0	710	4			Shallow
	Northern Pike	294.0	170	2			Shallow
	Northern Pike	290.0	155	2			Shallow
	Northern Pike	291.0	160	2			Shallow
	Northern Pike	165.0	40				Shallow
Narrow	Northern Pike	668.0	2440	5	F	M	Shallow
	Northern Pike	298.0	175	2		IM	Shallow
	Northern Pike	695.0	2440		M	M	Shallow
	Northern Pike	594.0	1110		M	M	Shallow
	Northern Pike	582.0	1360		M	M	Shallow
	Northern Pike	442.0	520		F	M	Shallow
	Northern Pike	592.0	1140	5	F	M	Sinking
	Northern Pike	586.0	1200	4	F	M	Sinking
	Northern Pike	626.0	1810	5	M	M	Sinking

APPENDIX F-2

LENGTH-AT-AGE REGRESSION FOR LAKE TROUT IN ALL LAKES SURVEYED

Appendix F-2. Length-At-Age Regression for Lake Trout in all Lakes Surveyed



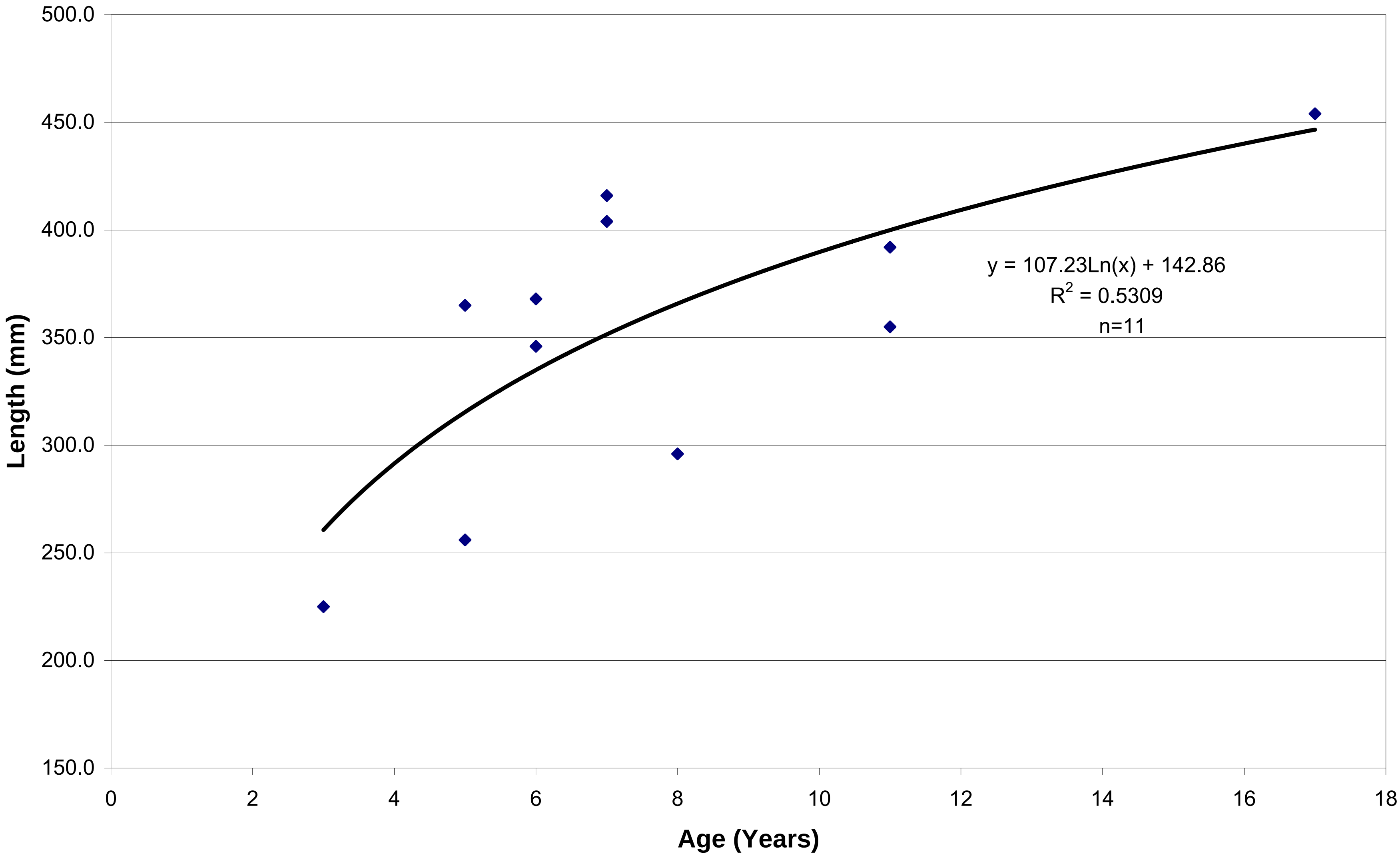
Length, Weight, Age Summary of Lake Trout in all Lakes

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Eclipse	Lake Trout	548.0	1800		M	M	Floating
	Lake Trout	566.0	1950		M	M	Floating
	Lake Trout	553.0	1550		M	M	Floating
	Lake Trout	556.0	1770	16	M	M	Floating
	Lake Trout	498.0	1050		M	M	Floating
	Lake Trout	755.0	6803	34	F	M	Deep
	Lake Trout	544.0	1425	14	M	M	Deep
	Lake Trout	545.0	1650	12	F	M	Deep
	Lake Trout	488.0	1225	10	F	M	Deep
	Lake Trout	447.0	920	9	F	M	Deep
	Lake Trout	295.0	250	7	M	IM	Deep
Nicholas	Lake Trout	508.0	1220		F	M	Floating
	Lake Trout	500.0	1400		F	M	Floating
	Lake Trout	564.0	1790		F	M	Floating
	Lake Trout	513.0	1560		M	M	Floating
	Lake Trout	528.0	1820	20	M	M	Deep
	Lake Trout	498.0	1260	16	M	M	Deep
	Lake Trout	505.0	1425	13	M	M	Deep
	Lake Trout	510.0	1530	24	F	M	Deep
	Lake Trout	191.0	60	3	M	IM	Deep
	Lake Trout	584.0	1125		F	M	Deep

APPENDIX F-3

LENGTH-AT-AGE REGRESSION FOR LAKE WHITEFISH IN ALL LAKES SURVEYED

Appendix F-3. Length-At-Age Regression for Whitefish in all Lakes Surveyed



Length, Weight, Age Summary of Whitefish in all Lakes

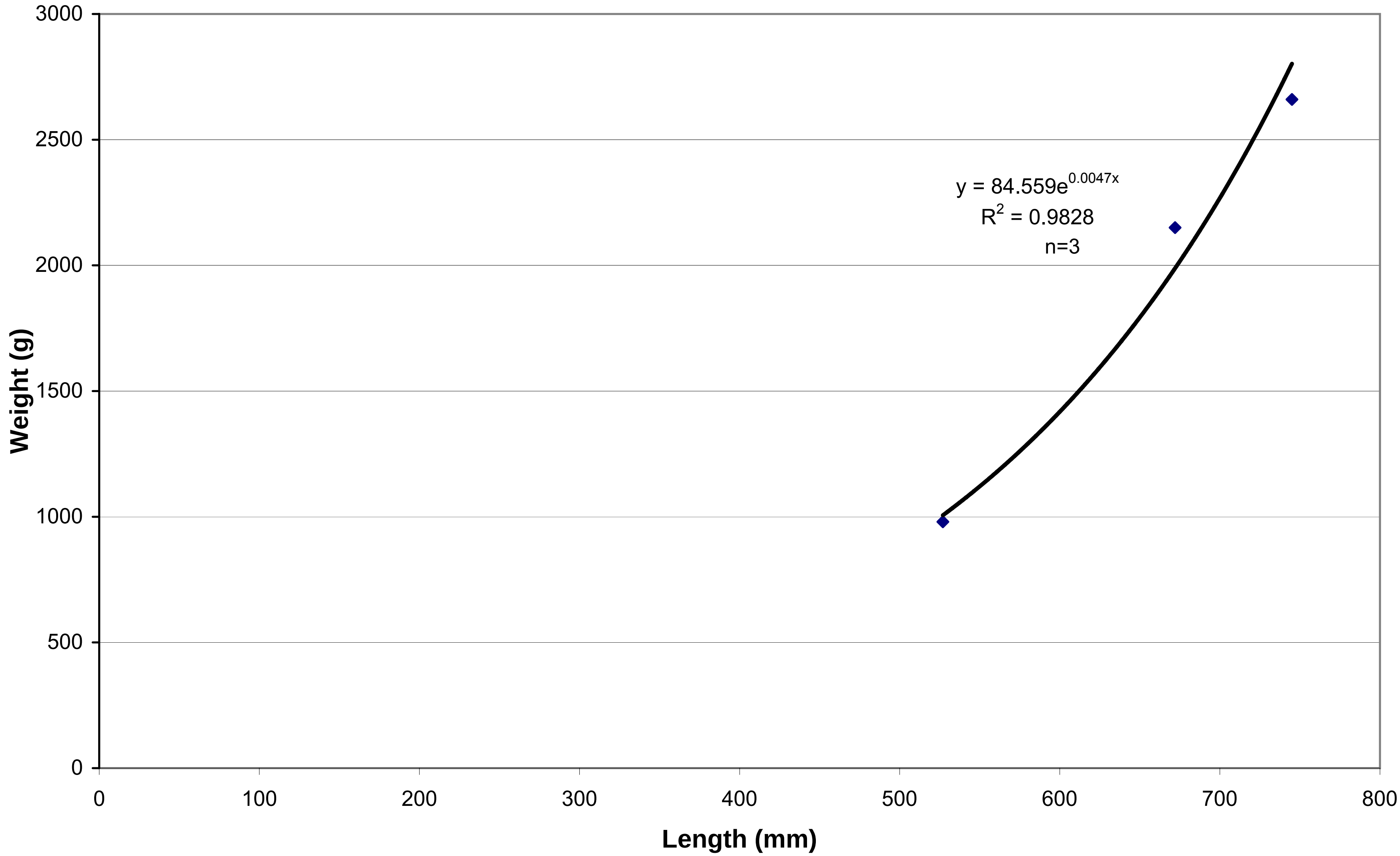
Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Eclipse	Whitefish	416.0	850	7	M	M	Floating
	Whitefish	368.0	600	6	F		Floating
	Whitefish	404.0	825	7	F	M	Floating
	Whitefish	365.0	540	5	M	M	Floating
	Whitefish	346.0	465	6	M	M	Floating
Narrow	Whitefish	422.0	980		F	M	Floating
	Whitefish	352.0	540		M	M	Floating
	Whitefish	282.0	280		F	M	Floating
	Whitefish	286.0	300		M		Floating
	Whitefish	300.0	300		F	M	Floating
	Whitefish	264.0	230		F	M	Floating
	Whitefish	314.0	380		M	M	Floating
	Whitefish	226.0	145		M	M	Floating
	Whitefish	249.0	180		M	M	Floating
	Whitefish	246.0	195		F	M	Floating
	Whitefish	213.0	130		F	M	Floating
	Whitefish	220.0	120		M	M	Floating
	Whitefish	221.0	130		M	M	Floating
	Whitefish	255.0	200		M	M	Floating
	Whitefish	232.0	150				Floating
	Whitefish	236.0	500				Floating
	Whitefish	236.0	170				Floating
	Whitefish	230.0	150				Floating
	Whitefish	220.0	125				Floating
	Whitefish	454.0	1240	17	M	M	Sinking
	Whitefish	296.0	360	8	F	M	Sinking
	Whitefish	355.0	520	11	M	M	Sinking
	Whitefish	256.0	250	5		IM	Sinking
	Whitefish	392.0	700	11	M	M	Sinking
	Whitefish	225.0	150	3	M	M	Sinking
	Whitefish	299.0	300			IM	Sinking
	Whitefish	290.0	290		M	M	Sinking
	Whitefish	349.0	540		M	M	Sinking
	Whitefish	390.0	760		M	M	Sinking
	Whitefish	346.0	600		M	M	Sinking
	Whitefish	301.0	330		F	M	Sinking
	Whitefish	310.0	370		F	M	Sinking
	Whitefish	370.0	685		F	M	Sinking
	Whitefish	333.0	450		M	M	Sinking
	Whitefish	397.0	740		F	M	Sinking
	Whitefish	356.0	620		F	M	Sinking
	Whitefish	286.0	270		F	M	Sinking
	Whitefish	306.0	380		M	M	Sinking
	Whitefish	265.0	320		M	M	Sinking
	Whitefish	306.0	330		F	M	Sinking
	Whitefish	285.0	220		M	M	Sinking
	Whitefish	279.0	285		F	M	Sinking

Whitefish	361.0	540	F	M	Sinking
Whitefish	319.0	380	F	M	Sinking
Whitefish	285.0	270	F	M	Sinking
Whitefish	283.0	265	M	M	Sinking
Whitefish	295.0	270	M	M	Sinking
Whitefish	271.0	230	M	M	Sinking
Whitefish	257.0	195	F	M	Sinking
Whitefish	297.0	340	M	M	Sinking
Whitefish	290.0	280	M	M	Sinking
Whitefish	285.0	275	F	M	Sinking
Whitefish	251.0	180	M	M	Sinking
Whitefish	289.0	265	F	M	Sinking
Whitefish	265.0	205	M	M	Sinking
Whitefish	245.0	175	M	M	Sinking
Whitefish	229.0	150	M	M	Sinking
Whitefish	237.0	160	M	M	Sinking
Whitefish	261.0	200	M	M	Sinking
Whitefish	197.0	100	F	M	Sinking
Whitefish	228.0	140			Sinking
Whitefish	206.0	120			Sinking
Whitefish	205.0	100			Sinking
Whitefish	226.0	130			Sinking
Whitefish	219.0	120			Sinking
Whitefish	144.0	40			Sinking

APPENDIX F-4

LENGTH-WEIGHT REGRESSION FOR NORTHERN PIKE IN ECLIPSE LAKE

Appendix F-4. Length-Weight Regression for Northern Pike in Eclipse Lake



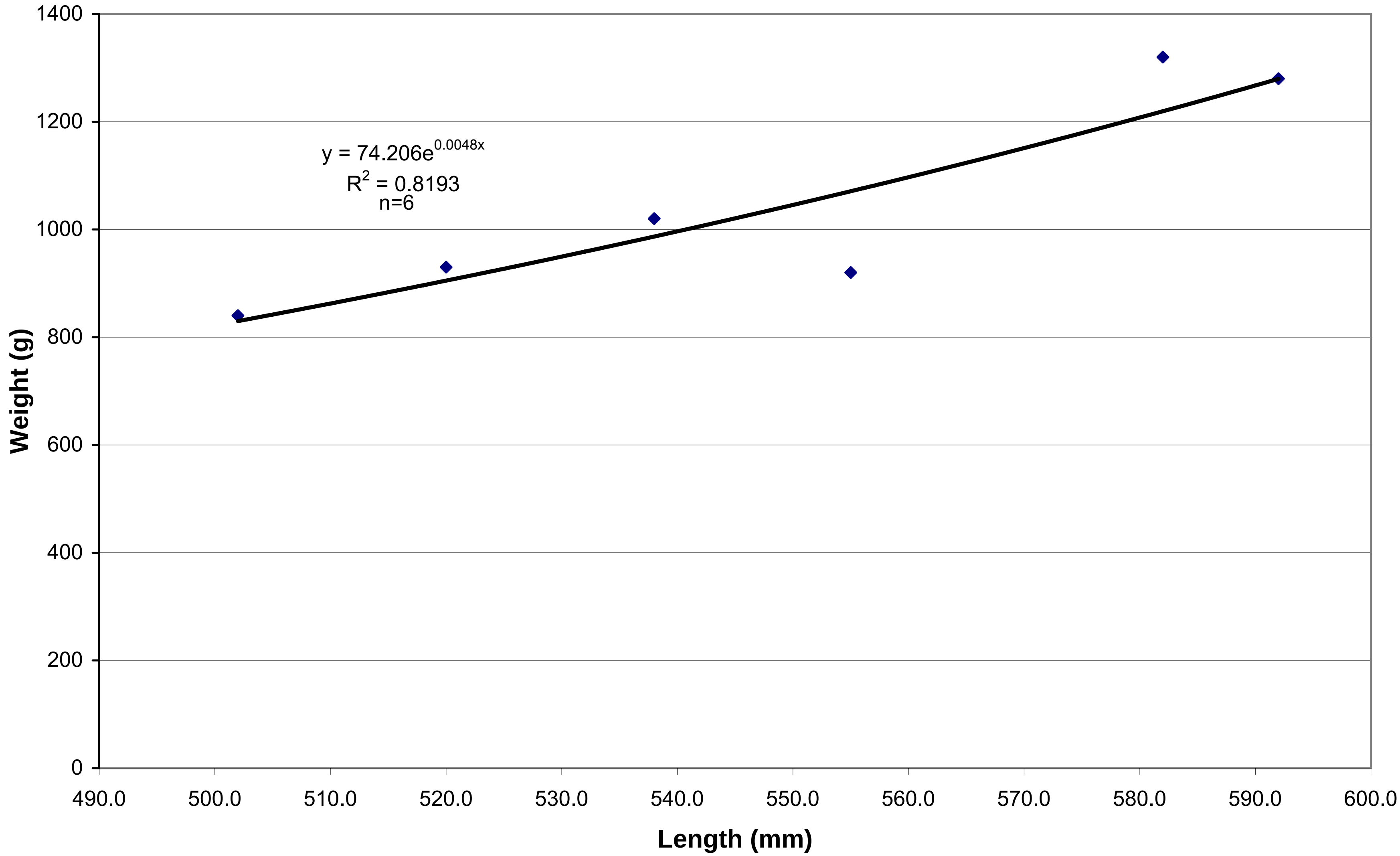
Length, Weight, Age Summary of Northern Pike in Eclipse Lake

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Eclipse	Northern Pike	672	2150	6	F	M	Shallow
	Northern Pike	745	2660	7	F	M	Shallow
	Northern Pike	527	980	4	F	M	Shallow

APPENDIX F-5

LENGTH-WEIGHT REGRESSION FOR NORTHERN PIKE IN NICHOLAS LAKE

Appendix F-5. Length-Weight Regression for Northern Pike in Nicholas Lake



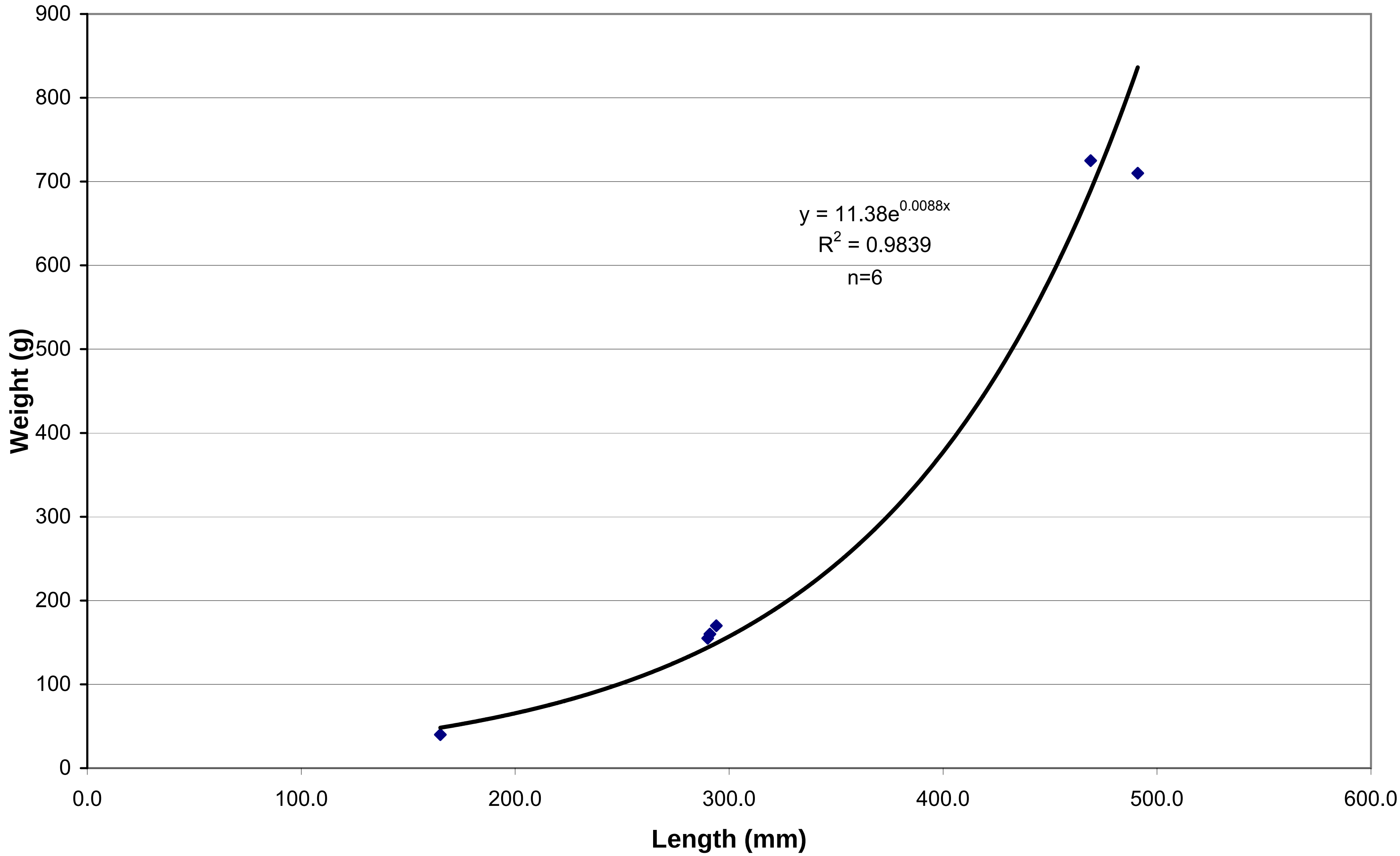
Length, Weight, Age Summary of Northern Pike in Nicholas Lake

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Nicholas	Northern Pike	555.0	920	4	M	M	Shallow
	Northern Pike	538.0	1020	4	M	M	Shallow
	Northern Pike	520.0	930	4	M	M	Shallow
	Northern Pike	582.0	1320	4	M	M	Shallow
	Northern Pike	502.0	840	5	M	M	Shallow
	Northern Pike	592.0	1280		M	M	Shallow

APPENDIX F-6

LENGTH-WEIGHT REGRESSION FOR NORTHERN PIKE IN BRIEN LAKE

Appendix F-6. Length-Weight Regression for Northern Pike in Brien Lake



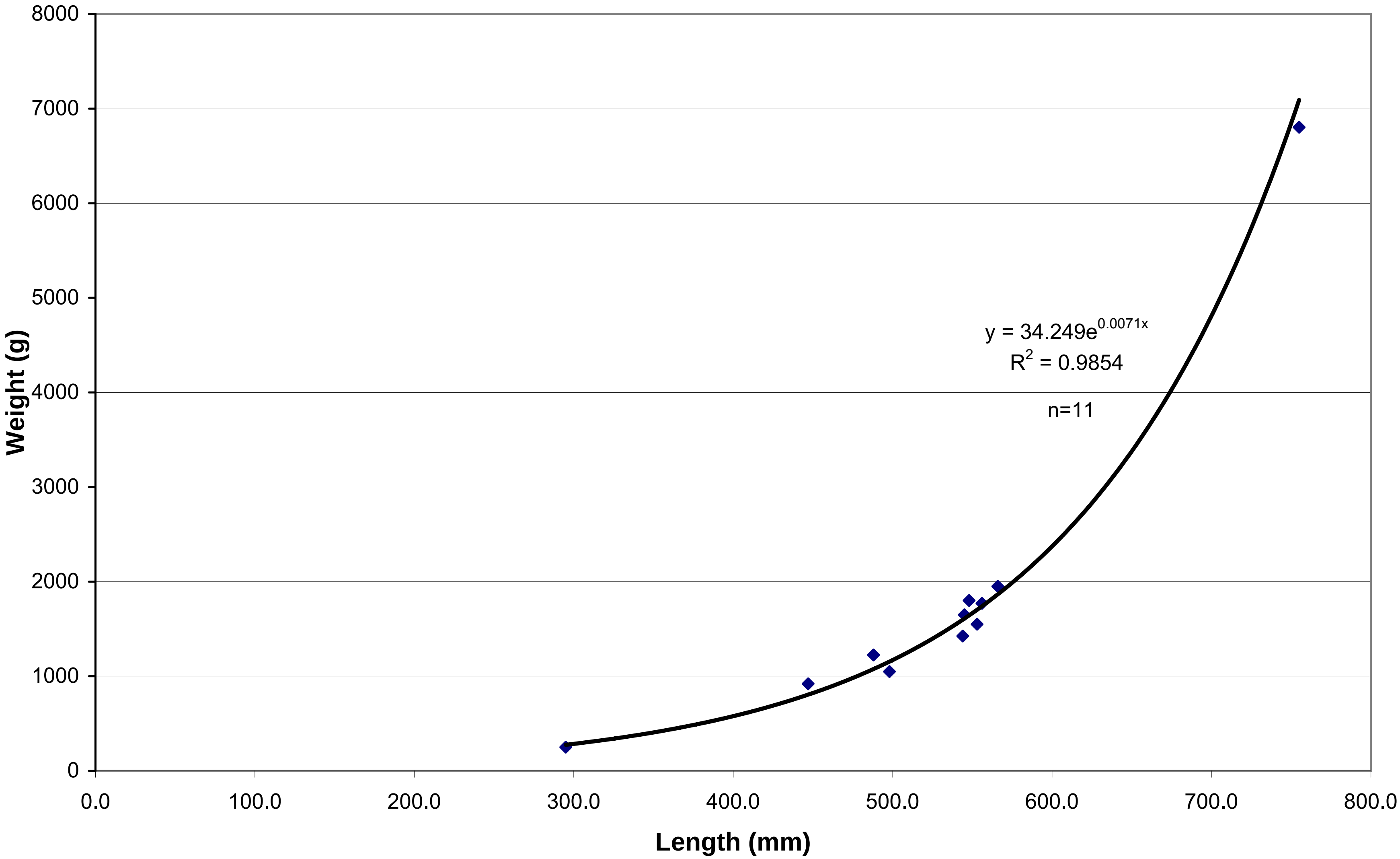
Length, Weight, Age Summary of Northern Pike in Brien Lake

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Brien	Northern Pike	469.0	725	3	F	M	Shallow
	Northern Pike	491.0	710	4			Shallow
	Northern Pike	294.0	170	2			Shallow
	Northern Pike	290.0	155	2			Shallow
	Northern Pike	291.0	160	2			Shallow
	Northern Pike	165.0	40				Shallow

APPENDIX F-7

LENGTH-WEIGHT REGRESSION FOR LAKE TROUT IN ECLIPSE LAKE

Appendix F-7. Length-Weight Regression for Lake Trout in Eclipse Lake



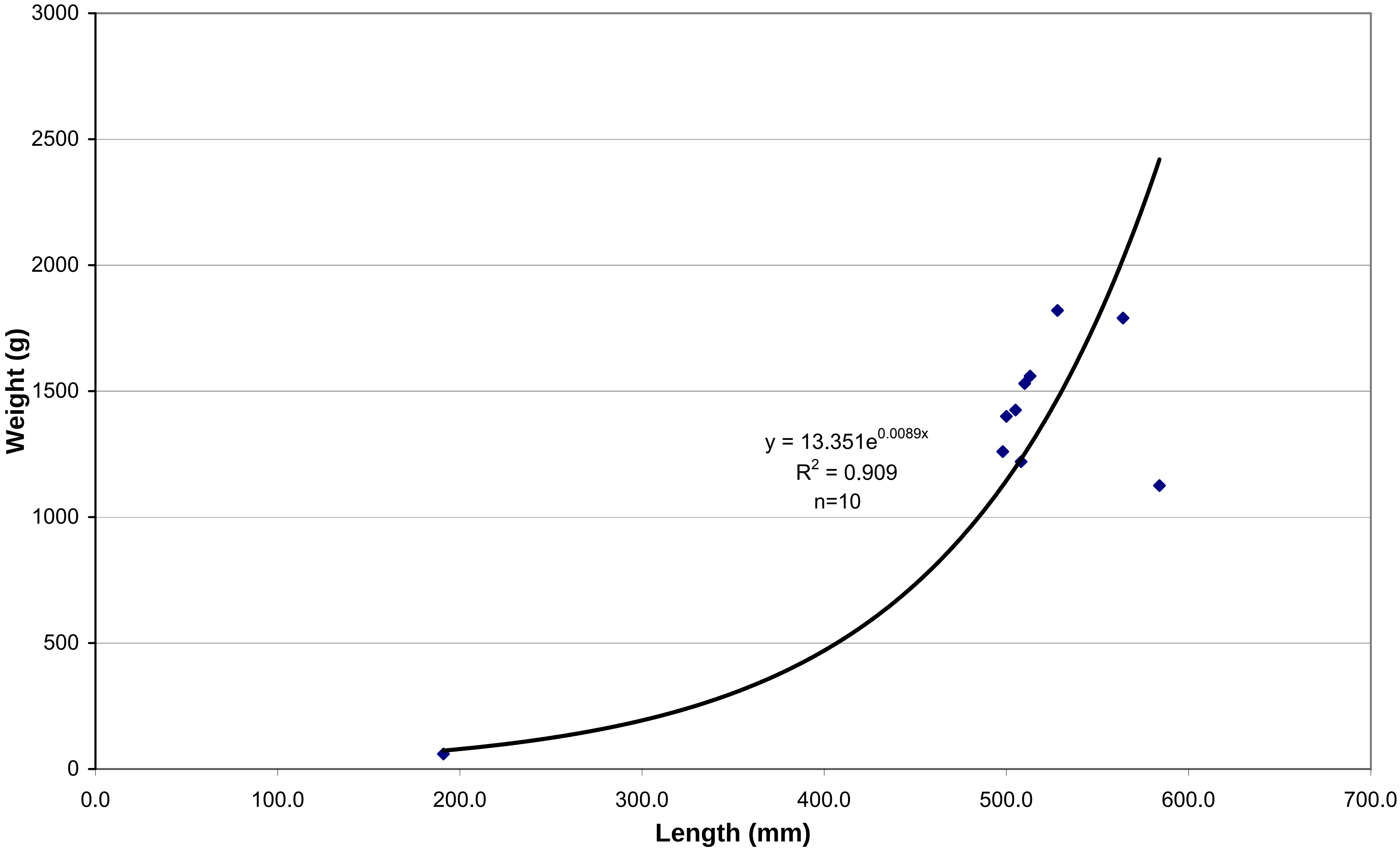
Length, Weight, Age Summary of Lake Trout in Eclipse Lake

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Eclipse	Lake Trout	548.0	1800		M	M	Floating
	Lake Trout	566.0	1950		M	M	Floating
	Lake Trout	553.0	1550		M	M	Floating
	Lake Trout	556.0	1770	16	M	M	Floating
	Lake Trout	498.0	1050		M	M	Floating
	Lake Trout	755.0	6803	34	F	M	Deep
	Lake Trout	544.0	1425	14	M	M	Deep
	Lake Trout	545.0	1650	12	F	M	Deep
	Lake Trout	488.0	1225	10	F	M	Deep
	Lake Trout	447.0	920	9	F	M	Deep
	Lake Trout	295.0	250	7	M	IM	Deep

APPENDIX F-8

LENGTH-WEIGHT REGRESSION FOR LAKE TROUT IN NICHOLAS LAKE

Appendix F-8. Length-Weight Regression for Lake Trout in Nicholas Lake



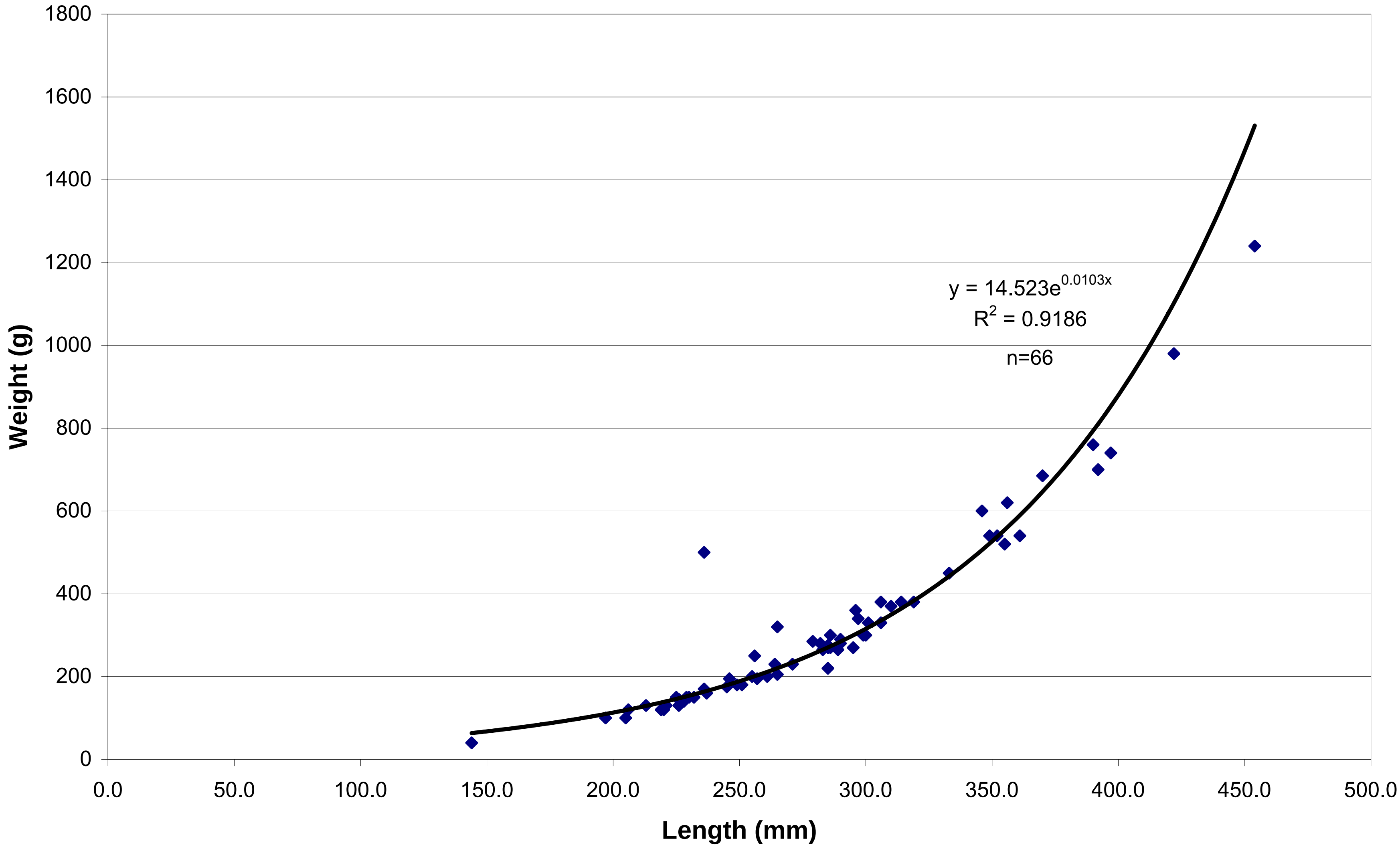
Length, Weight, Age Summary for Lake Trout in Nicholas Lake

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Nicholas	Lake Trout	508.0	1220		F	M	Floating
	Lake Trout	500.0	1400		F	M	Floating
	Lake Trout	564.0	1790		F	M	Floating
	Lake Trout	513.0	1560		M	M	Floating
	Lake Trout	528.0	1820	20	M	M	Deep
	Lake Trout	498.0	1260	16	M	M	Deep
	Lake Trout	505.0	1425	13	M	M	Deep
	Lake Trout	510.0	1530	24	F	M	Deep
	Lake Trout	191.0	60	3	M	IM	Deep
	Lake Trout	584.0	1125		F	M	Deep

APPENDIX F-9

LENGTH-WEIGHT REGRESSION FOR LAKE WHITEFISH IN NARROW LAKE

Appendix F-9. Length-Weight Regression for Lake Whitefish in Narrow Lake



Length, Weight, Age Summary of Lake Whitefish in Narrow Lake

Lakes	Species	Fork Length (mm)	Weight (g)	Age Sample	Sex	Maturity	Location
Narrow	Whitefish	422.0	980		F	M	Floating
	Whitefish	352.0	540		M	M	Floating
	Whitefish	282.0	280		F	M	Floating
	Whitefish	286.0	300		M		Floating
	Whitefish	300.0	300		F	M	Floating
	Whitefish	264.0	230		F	M	Floating
	Whitefish	314.0	380		M	M	Floating
	Whitefish	226.0	145		M	M	Floating
	Whitefish	249.0	180		M	M	Floating
	Whitefish	246.0	195		F	M	Floating
	Whitefish	213.0	130		F	M	Floating
	Whitefish	220.0	120		M	M	Floating
	Whitefish	221.0	130		M	M	Floating
	Whitefish	255.0	200		M	M	Floating
	Whitefish	232.0	150				Floating
	Whitefish	236.0	500				Floating
	Whitefish	236.0	170				Floating
	Whitefish	230.0	150				Floating
	Whitefish	220.0	125				Floating
	Whitefish	454.0	1240	17	M	M	Sinking
	Whitefish	296.0	360	8	F	M	Sinking
	Whitefish	355.0	520	11	M	M	Sinking
	Whitefish	256.0	250	5		IM	Sinking
	Whitefish	392.0	700	11	M	M	Sinking
	Whitefish	225.0	150	3	M	M	Sinking
	Whitefish	299.0	300			IM	Sinking
	Whitefish	290.0	290		M	M	Sinking
	Whitefish	349.0	540		M	M	Sinking
	Whitefish	390.0	760		M	M	Sinking
	Whitefish	346.0	600		M	M	Sinking
	Whitefish	301.0	330		F	M	Sinking
	Whitefish	310.0	370		F	M	Sinking
	Whitefish	370.0	685		F	M	Sinking
	Whitefish	333.0	450		M	M	Sinking
	Whitefish	397.0	740		F	M	Sinking
	Whitefish	356.0	620		F	M	Sinking
	Whitefish	286.0	270		F	M	Sinking
	Whitefish	306.0	380		M	M	Sinking
	Whitefish	265.0	320		M	M	Sinking
	Whitefish	306.0	330		F	M	Sinking
	Whitefish	285.0	220		M	M	Sinking
	Whitefish	279.0	285		F	M	Sinking
	Whitefish	361.0	540		F	M	Sinking
	Whitefish	319.0	380		F	M	Sinking
	Whitefish	285.0	270		F	M	Sinking
	Whitefish	283.0	265		M	M	Sinking
	Whitefish	295.0	270		M	M	Sinking

Whitefish	271.0	230		M	M	Sinking
Whitefish	257.0	195		F	M	Sinking
Whitefish	297.0	340		M	M	Sinking
Whitefish	290.0	280		M	M	Sinking
Whitefish	285.0	275		F	M	Sinking
Whitefish	251.0	180		M	M	Sinking
Whitefish	289.0	265		F	M	Sinking
Whitefish	265.0	205		M	M	Sinking
Whitefish	245.0	175		M	M	Sinking
Whitefish	229.0	150		M	M	Sinking
Whitefish	237.0	160		M	M	Sinking
Whitefish	261.0	200		M	M	Sinking
Whitefish	197.0	100		F	M	Sinking
Whitefish	228.0	140				Sinking
Whitefish	206.0	120				Sinking
Whitefish	205.0	100				Sinking
Whitefish	226.0	130				Sinking
Whitefish	219.0	120				Sinking
Whitefish	144.0	40				Sinking

APPENDIX G

ZOOPLANKTON LAB ANALYSIS AND SPECIES IDENTIFICATION DATA

Appendix G. Zooplankton Species List

Species/Group	Stage*	Comments
COELENTERATA		
Hydra		not counted-benthos
ROTIFERA		
Kellicottia longispina		
Keratella cochlearis		
Keratella quadrata		
Conochilus (colony)		
Asplanchna		
OLIGOCHAETA		
Enchytraeidae		not counted-benthos
Naïs		not counted-benthos
HIRUDINEA		not counted-benthos
EUBRANCHIOPODA		
Conchostraca		
Lyncaeus brachyurus		epibenthos-counted
CLADOCERA		
Daphnidae		
Ceriodaphnia dubia		
Daphnia longiremis	F	
Daphnia middendorffiana	F	
Daphnia rosea	M	
Daphnia rosea	F	
Bosminidae		
Bosmina longirostris	F	
Chydoridae		
Chydorus sphaericus	F	
Sididae		
Sida crystallina	F	
COPEPODA		
Calanoida	naup	
Diaptomidae		
Leptodiaptomus ashlandi	M	
Leptodiaptomus ashlandi	F	
Leptodiaptomus pribilofensis	M	
Leptodiaptomus pribilofensis	F	
Leptodiaptomus sicilis	M	
Leptodiaptomus sicilis	F	
Leptodiaptomus sp.	cop V	

Appendix G. Zooplankton Species List

Species/Group	Stage*	Comments
Leptodiaptomus sp.	cop I	
Heterocope septentrionalis	M	
Heterocope septentrionalis	F	
Heterocope septentrionalis	cop V	
Heterocope septentrionalis	cop IV	
Heterocope septentrionalis	cop III	
Heterocope septentrionalis	cop II	
Limnocalanus macrurus	M	
Limnocalanus macrurus	F	
Limnocalanus macrurus	cop V	
Limnocalanus macrurus	cop IV	
Limnocalanus macrurus	cop III	
Epischura nevadensis	M	
Epischura nevadensis	F	
<u>Cyclopoida</u>		
Cyclops bicuspidatus thomasi	M	
Cyclops bicuspidatus thomasi	F	
Cyclops scutifer	M	
Cyclops scutifer	F	
OSTRACODA		not counted-benthos
AMPHIPODA		
Hyalella azteca	A	epibenthos-counted
Anisogammarus sp.	A	epibenthos-counted
INSECTA		
Corixidae	N	epibenthos-counted
Gyrinus spp.	L	epibenthos-counted
Chaoborus spp.	L	epibenthos-counted
Chaoborus spp.	P	epibenthos-counted
<u>* Abbreviations</u>		
A = adult		
cop = copepodite (juvenile copepod)		
M = male		
F = female		
naup. = nauplius (larval copepod)		
N = nymph		
L = larva		
P = pupa		

Location		Narrow Lake					Brien Lake					Round Lake					Winter Lake					Eclipse Lake					Nicholas Lake				
Replicate		1	2	3			1	2	3			1	2	3			1	2	3			1	2	3			1	2	3		
Sample Number		041207	041208	041209	Mean	%	041210	041211	041212	Mean	%	041213	041214	041215	Mean	%	041216	041217	041218	Mean	%	041219	041220	041221	Mean	%	041222	041223	041224	Mean	%
Depth			11					10					1.5					6					23					19.67			
Volume			0.8					0.73					0.11					0.44					1.68					1.44			
Comments												Hit bottom	Hit bottom	Hit bottom			Hit bottom	benthos	benthos												
Species/group	Stage																														
ROTIFERA																															
Kellicottia longispina		1850	1200	850	1300.00	10.13	1780	2360	2880	2340.00	46.65				0.00	0.00	300	1000	1670	990.00	28.33	3100	3900	3550	3516.67	61.19	150	380	560	363.33	19.16
Keratella cochlearis					0.00	0.00	10			3.33	0.07	5		1	2.00	0.27		10	10	6.67	0.19				0.00	0.00				0.00	0.00
Keratella quadrata					0.00	0.00				0.00	0.00		2	1	1.00	0.14				0.00	0.00				0.00	0.00				0.00	0.00
Conochilus sp.	colony	20	15	15	16.67	0.13				0.00	0.00	510	50	142	234.00	31.75		7	20	9.00	0.26	90	140	55	95.00	1.65				0.00	0.00
Asplanchna sp.					0.00	0.00				0.00	0.00	25	33	64	40.67	5.52				0.00	0.00	30	40	40	36.67	0.64				0.00	0.00
EUBRANCHIOPODA																															
Lyncaeus brachyurus	A				0.00	0.00				0.00	0.00				0.00	0.00	2	2	1	1.67	0.05				0.00	0.00				0.00	0.00
CLADOCERA																															
Holopedium gibberum	F				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	112	170	135	139.00	2.42				0.00	0.00
Sida crystallina	F	40	60	40	46.67	0.36				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00
Ceriodaphnia dubia	F	1	15	5	7.00	0.05				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00
Daphnia longiremis	F				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	12	5	7	8.00	0.14				0.00	0.00
Daphnia middendorffiana	F	2	5		2.33	0.02	250	200	150	200.00	3.99	95	110	58	87.67	11.90	2760	680	1240	1560.00	44.64				0.00	0.00	4	5	4	4.33	0.23
Daphnia rosea	M	300	1300	600	733.33	5.72				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00
Daphnia rosea	F	800	2050	1650	1500.00	11.69				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00
Bosmina longirostris	F	1400	3200	2150	2250.00	17.54				0.00	0.00				0.00	0.00				0.00	0.00	31	160	230	140.33	2.44				0.00	0.00
Chydorus sphaericus	F		10	5	5.00	0.04				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00
Polyphemus pediculus	F				0.00	0.00				0.00	0.00	2			0.67	0.09				0.00	0.00				0.00	0.00				0.00	0.00
COPEPODA																															
Calanoida																															
Leptodiaptomus pribilofensis	M				0.00	0.00	320	80	230	210.00	4.19	210	34	53	99.00	13.43	230	24	90	114.67	3.28				0.00	0.00				0.00	0.00
Leptodiaptomus pribilofensis	F				0.00	0.00	360	170	210	246.67	4.92	155	44	82	93.67	12.71	300	41	80	140.33	4.02				0.00	0.00				0.00	0.00
Leptodiaptomus ashlandi	M				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	1	5	7	4.33	0.08				0.00	0.00
Leptodiaptomus ashlandi	F				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	2	7	4	4.33	0.08				0.00	0.00
Leptodiaptomus sicilis	M				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	12	8	9	9.67	0.17				0.00	0.00
Leptodiaptomus sicilis	F				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	7	15	7	9.67	0.17				0.00	0.00
Leptodiaptomus sp.	V	450	950	700	700.00	5.46	660	560	610	610.00	12.16	95	29	45	56.33	7.64	330	42	80	150.67	4.31	6	11	25	14.00	0.24				0.00	0.00
Leptodiaptomus sp.	IV	3200	6300	5150	4883.33	38.07	700	380	570	550.00	10.97	25	14	22	20.33	2.76	300	38	160	166.00	4.75	300	880	720	633.33	11.02				0.00	0.00
Leptodiaptomus sp.	III		5		1.67	0.01	170	80	110	120.00	2.39	5	2	7	4.67	0.63	50	3	40	31.00	0.89	11	90	45	48.67	0.85				0.00	0.00
Leptodiaptomus sp.	II				0.00	0.00	340	160	170	223.33	4.45	30	12	12	18.00	2.44		1		0.33	0.01	10	50	25	28.33	0.49				0.00	0.00
Leptodiaptomus sp.	I				0.00	0.00	290	130	190	203.33	4.05	20	12	18	16.67	2.26	10		10	6.67	0.19	40	90	45	58.33	1.01				0.00	0.00
Heterocope septentrionalis	M				0.00	0.00	16	18	18	17.33	0.35				0.00	0.00	25	5	12	14.00	0.40				0.00	0.00	160	190	180	176.67	9.32
Heterocope septentrionalis	F				0.00	0.00	19	21	35	25.00	0.50			1	0.33	0.05	32	6	22	20.00	0.57				0.00	0.00	170	130	270	190.00	10.02
Heterocope septentrionalis	V				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	1	50	130	60.33	3.18
Heterocope septentrionalis	IV				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	1	3	2	2.00	0.03				0.00	0.00
Heterocope septentrionalis	III				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	1	4	1	2.00	0.03				0.00	0.00
Heterocope septentrionalis	II				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00		1	1	0.67	0.01				0.00	0.00
Limnocalanus macrurus	M				0.00	0.00	1			0.33	0.01				0.00	0.00				0.00	0.00	42	70	40	50.67	0.88	350	390	710	483.33	25.49
Limnocalanus macrurus	F				0.00	0.00	1			0.33	0.01				0.00	0.00				0.00	0.00	47	60	50	52.33	0.91	500	490	770	586.67	30.94
Limnocalanus macrurus	V				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	44	49	55	49.33	0.86	1	2		1.00	0.05
Limnocalanus macrurus	IV				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	14	7	35	18.67	0.32				0.00	0.00
Limnocalanus macrurus	III				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	2	2	5	3.00	0.05				0.00	0.00
Epischura nevadensis	M			1	0.33	0.00				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	1			0.33	0.02
Epischura nevadensis	F	1	1	1	1.00	0.01				0.00	0.00				0.00	0.00				0.00	0.00	1			0.33	0.01			2	0.67	0.04
Unidentified Calanoida	nauplius				0.00	0.00	250	20	120	130.00	2.59	10	11	31	17.33	2.35	20	1	20	13.67	0.39	1	10	15	8.67	0.15				0.00	0.00
Cyclopoida																															
Cyclops bicuspidatus thomasi	M				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	7	70	70	49.00	0.85				0.00	0.00
Cyclops bicuspidatus thomasi	F				0.00	0.00				0.00	0.00				0.00	0.00				0.00	0.00	62	100	100	87.33	1.52				0.00	0.00
Cyclops scutifer	M		5		1.67	0.01				0.00	0.00				0.00	0.00				0.00	0.00	5	4	20	9.67	0.17				0.00	0.00
Cyclops scutifer	F	7	20	7	11.33	0.09	41	49	68	52.67	1.05	1			0.33	0.05	1			0.33	0.01	4	8	35	15.67	0.27	5	3	6	4.67	0.25
Cyclops sp.	copepodite	900	1550	1650	1366.67	10.65	70		90	53.33	1.06	20	8	4	10.67	1.45	70	14	80	54.67	1.56	460	900	595	651.67	11.34	2	2	70	24.67	1.30
AMPHIPODA																															
Hyalella azteca	A				0.00	0.00				0.00	0.00	1			0.33	0.05				0.00	0.00				0.00	0.00				0.00	0.00
Anisogammarus sp.	A				0.00	0.00				0.00	0.00	1			0.33	0.05			1	0.33	0.01				0.00	0.00				0.00	0.00
INSECTA																															
Corixidae	N				0.00	0.00				0.00	0.00				0.00	0.00	2	1		1.00	0.03				0.00	0.00				0.00	0.00
Gyrinus spp.	L				0.00	0.00				0.00	0.00				0.00	0.00	2	1		1.00	0.03				0.00	0.00				0.00	0.00
Chaoborus spp.	L				0.00	0.00	38	19	32	29.67	0.59	40	20	39	33.00	4.48	530	39	68	212.33	6.08				0.00	0.00				0.00	0.00
Chaoborus spp.	P				0.00	0.00		1		0.33	0.01				0.00	0.00	2			0.67	0.02				0.00	0.00				0.00	0.00
Total Numbers		8971	16686	12824	12827.00	100.00	5316	4248	5483	5015.67	100.00	1250	381	580	737.00	100.00	4966	1915	3604	3495.00	100.00	4455	6859	5928	5747.33	100.00	1344	1642	2702	1896.00	100.00

APPENDIX H

BENTHIC INVERTEBRATE LAB ANALYSIS AND SPECIES IDENTIFICATION DATA

Appendix H. Benthic Invertebrates Taxanomic Analysis

Lake	Brien Lake Deep			Brien Lake Shallow			Narrow Lake Deep			Narrow Lake Shallow			Winter Lake Deep			Winter Lake Shallow			Round Lake Deep			Round Lake Shallow			Eclipse Lake Outlet			Eclipse Lake Inlet			Winter Lake Outlet			Winter Lake Inlet			Eclipse Lake Shallow			Eclipse Lake Deep			Nicholas Lake Deep			Nicholas Lake Shallow		
Sample Number	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3
Sample Depth	9	9	9	1	1	1	12	12	12	1	1	1	6	6	6	1	1	1	1.3	1.3	1.3	1	1	1													1	1	1	10	10	10	8	8	8	1	1	1
Ephemeroptera																																																
Ameletus sp																1				1	1																											
Baetis sp						1															1					1				1		1	1										3	1		1		
Caenis sp												1							6	4	6	1	2	1																								
Tricorythodes sp						1																																									1	
Plecoptera																																																
Capnia sp													1																																			
Podmosta																																		1	4													
Odonata																																																
Aeshna multicolor																			2	1																												
Cordulia sp																																														1		
Enallagma boreale																																	1															
Trichoptera P																																														1		
Clostoeca sp																									1	1	1						1															
Molanna sp																								1																								
Mystacides sp																							1				2		1	1																	1	
Coleoptera																																																
Gyrinus sp L													1																																			
Hydaticus sp L						1																											1															
Diptera Unid L																													1						1													
Ceratopogonidae																																																
Bezzia sp								1		1	1					3	1	1											1	2		1	2				1		3							2	4	3
Mallochohelia sp				1		2																															4									2		1
Chaoborinae																																																
Chaoborus sp	1																																															
Chironomidae																																																
Chironomidae Pupae						1		1	1	1						1	2	3	5	3	5			1			1						1	1			1	2			1			1			3	1
Chironomidae Unid Larvae J/D				2	1					1					1	4	2	4	7	4	23	6	4		15	5	6	1		1	1	2	2	2	2	1		3		1	2		2	2		1	14	10
Cardiocladius sp																																											2	1		1	1	
Chironomus sp	7	8	5			1	1	1					24	12	2	13	7	5	8	1	5	5	5	4																								
Corynoneura sp																																	1	4	4													
Cricotopus sp		1																											2	1		1	3				3		2		3		2	3		1	4	2
Cryptochironomus sp				1															2																													
Dicrotendipes sp																			5	3	7	3	4	1				1		1	4	3	4	2	2	1												2
Euryhapsis sp																																													2			
Glyptotendipes sp																																	1															
Heterotrissocladius sp																									44	38	65																					
Micropsectra sp									1			1													382	388	451				11	13	21				2	2	2		1		1	3			3	8
Microtendipes sp																										1							9															7
Monodiamesa sp																																											1					
Pagastiella sp						2																																	1							1		
Paracladius sp																																									1							
Phaenopsectra sp																									14	15	21				4	2	4								1			4				1
Polypedilum (Pentapedilum) sp	1	1	1									1																																				
Polypedilum (Polypedilum) sp			3	2	2					2		3															1																					
Procladius sp	1		4	1	2	4					1							2	4	9	1	2	8	9	8							2		1	1			2	1		2		1	2		3	2	1
Psectrocladius sp									1																							3	2															
Rheotanytarsus sp																												1				3	2				1	1					1					
Stempelinella sp																										1	5					1																
Tanytarsus sp				3	2	9					2	1	11	6	4	13	12	18	28	10	45	7	5	3										4	7													
Thienemanniella sp																																							1									
Thienemannimyia sp											1	1		1		1	1	1	4	3	4				15	9	25	2	1	1		3	2		1		2										2	1
Culicidae A																									1																							
Simulidae																																																
Simulium sp																											2			1		1	2		1													
Hemiptera																																																
Corixidae Unid J																			1	1																												
Homoptera Unid (terr)										1																																						
Aphididae																																								1								
Arachnida																																																
Aranaea								1																				2																				
Hydracarina Unid J/D																					1																		1									
Arrenurus sp																																1																
Sperchon sp																											1																					
Oribatei (terr)																																3																
Amphipoda																																																
Gammarus lacustris																																		1														
Hyalella azteca				1	7	1				21	22	26				2	6	5	8	16	6	16	29	17	7	4	2				7	8	9				26	15	23	73	61	26	77	77	33	9	17	17
Conchostraca																																																
Lynceus brachyurus													3	2																																		
Copepoda																																																
Calanoida	5	1	3																																		1				1	10	4		14		1	
Cyclopoida										1	1	5											1	1								1	1				1										1	
Harpacticoida											1																																					

Lake	Brien Lake Deep			Brien Lake Shallow			Narrow Lake Deep			Narrow Lake Shallow			Winter Lake Deep			Winter Lake Shallow			Round Lake Deep			Round Lake Shallow			Eclipse Lake Outlet			Eclipse Lake Inlet			Winter Lake Outlet			Winter Lake Inlet			Eclipse Lake Shallow			Eclipse Lake Deep			Nicholas Lake Deep			Nicholas Lake Shallow		
Sample Number	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3	1/3	2/3	3/3
Cladocera																																																
Alona sp											1															2	2																					
Ceriodaphnia sp											2	1										1															3										1	
Daphnia sp	1	1	3						1		6	2		1						1																												
Eurycercus (Bullatifrons) sp																											2																					
Holopedium gibberum																																								2		3						
Ilyocryptus sordidus																																																1
Sida crystalina										1		2				1							1																									
Isopoda																																																
Porcellio sp (terr)																																		1														
Mysidaceae, dam																																								1	2			1				
Ostracoda																																																
Candona sp													3								1				10	7	15	1	1	4				7	9												1	
Cypria sp																									4		2			1				1	2													
Hirudinea Unid J																																1																
Helobdella stagnalis											1					2											1				2	28	9															
Glosiphonia complanata																																																
Oligochaeta																																																
Enchytraeidae												2				5	2	2																										1				3
Lumbriculidae																																																
Lumbriculus variegatus				2						1	1	1				2							1	1							1		1	5			1	1	1				2					
Naididae																																																
Chaetogaster sp												1														1																		1				
Nais sp						1				1	1	2				1		1																														
Pristina forelli										1	1																						2															
Slavinia appendiculata										4		2																																				
Uncinais uncinata																									4	2	1					1					1											
Vejdovskeyella comata																									4		1																					
Tubificidae Unid j																																								1	1			2				
Bivalvia																																																
Pisidium sp	5	15	13	2		3	1	11	18	6	8	6				2	3	3	6	27	6	2		4	5	8	28	11	3	5	9	17	48				2	2		26	27	8	38	43	12	2	4	1
Sphaerium sp					2											4	2	5	2	30	26	2	3	2		4	6	1		1		2	3											1				
Gastropoda																																																
Armiger crista																																	2															
Heliosoma trivolvis																				1											2	3	6															
Lymnaea stagnalis																								1																								1
Physella gyrina																													1																			
Valvata sincera				1		1				4	1	1				1	1	1			1					1		2	3	1	6	5	21				3		1							2	1	1
Nematoda				1							1					3	1	3							1		1	1	2			2	1							3			4			3	1	4

Note:

All inlet, outlets and inshore samples taken with Ekman sampler; approximate area of 0.023 m^2.

All offshore samples taken with Ponar sampler; approximate area of 0.023 m^2.

APPENDIX I

METALS IN FISH TISSUES LAB ANALYSIS DATA

ALS Environmental

RECEIVED
OCT 0 1 2004

CHEMICAL ANALYSIS REPORT

Date:	September 28, 2004
ALS File No.	U7721
Report On:	1740082.005 Tissue Analysis
Report To:	**EBA Engineering Consultants Ltd.** Fifth Floor, Suite 500 1100 Melville Street Vancouver, BC V6E 4A6
Attention:	**Mr. Richard Couture**
Received:	September 3, 2004

ALS ENVIRONMENTAL
per:

Natasha Markovic-Mirovic, B.Sc. - Project Chemist
Scott P. Hoekstra, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Eclipse LT1 Mus/Liv	Eclipse LT2 Mus/Liv	Eclipse LT3 Mus/Liv	Eclipse LT4 Mus/Liv	Eclipse LT5 Mus/Liv
Sample Date		04-07-25	04-07-25	04-07-25	04-07-25	04-07-25
ALS ID		*1*	*2*	*3*	*4*	*5*
Physical Tests						
Moisture	%	76.3	80.5	79.6	79.4	79.4
Total Metals						
Arsenic	T-As	2.02	0.406	0.279	0.390	0.436
Cadmium	T-Cd	0.0169	0.0312	0.0217	0.0077	0.0124
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	0.876	6.30	9.26	1.71	3.24
Lead	T-Pb	0.118	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	4.09	0.375	0.250	0.292	0.186
Nickel	T-Ni	0.085	0.119	0.116	0.065	0.063
Selenium	T-Se	1.20	0.67	0.44	0.40	0.52
Silver	T-Ag	<0.0060	0.0312	0.0565	0.0130	0.0161
Zinc	T-Zn	12.0	18.7	12.5	9.90	11.6

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Eclipse WF9 Mus/Liv	Eclipse WF10 Mus/Liv	Eclipse WF11 Mus/Liv	Eclipse WF12 Mus/Liv	Eclipse WF13 Mus/Liv
Sample Date		04-07-25	04-07-25	04-07-25	04-07-25	04-07-25
ALS ID		*6*	*7*	*8*	*9*	*10*
Physical Tests						
Moisture	%	78.8	80.1	76.7	79.0	78.6
Total Metals						
Arsenic	T-As	0.427	0.827	0.731	0.811	1.16
Cadmium	T-Cd	0.0099	0.0085	0.0113	0.0085	<0.0060
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	3.14	1.05	3.32	2.29	1.59
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.134	0.0810	0.103	0.0889	0.0949
Nickel	T-Ni	0.121	0.086	0.061	0.065	0.116
Selenium	T-Se	0.69	0.54	0.67	0.56	0.47
Silver	T-Ag	0.0194	<0.0060	0.0125	<0.0060	0.0063
Zinc	T-Zn	14.6	10.9	18.8	13.9	10.4

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Eclipse NP3 Mus/Liv	Eclipse NP5 Mus/Liv	Eclipse NP8 Mus/Liv	Eclipse C5 Whole Fish	Nicholas LT1 Mus/Liv
Sample Date		04-07-25	04-07-25	04-07-25	04-07-25	04-07-29
ALS ID		*11*	*12*	*13*	*14*	*15*
Physical Tests						
Moisture	%	78.0	80.1	79.1	81.3	77.9
Total Metals						
Arsenic	T-As	0.673	1.24	0.337	0.218	0.449
Cadmium	T-Cd	0.0130	0.0324	0.0102	0.0071	0.0398
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	8.75	7.95	5.11	0.631	6.57
Lead	T-Pb	<0.020	<0.020	<0.020	0.026	<0.020
Mercury	T-Hg	0.568	0.747	0.216	0.0630	0.352
Nickel	T-Ni	0.069	0.125	0.096	0.030	0.287
Selenium	T-Se	0.67	0.45	0.64	0.29	0.82
Silver	T-Ag	0.0840	0.109	0.0398	<0.0060	0.0506
Zinc	T-Zn	20.1	15.4	21.7	50.2	16.5

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Nicholas LT2 Mus/Liv	Nicholas LT3 Mus/Liv	Nicholas LT4 Mus/Liv	Nicholas LT5 Mus/Liv	Nicholas NP2 Mus/Liv
Sample Date		04-07-29	04-07-29	04-07-29	04-07-29	04-07-29
ALS ID		*16*	*17*	*18*	*19*	*20*
Physical Tests						
Moisture	%	77.6	78.1	76.5	80.9	79.6
Total Metals						
Arsenic	T-As	0.271	0.465	0.440	0.473	0.354
Cadmium	T-Cd	0.165	0.0364	0.0262	0.0074	0.0297
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	12.1	5.73	4.97	1.36	33.5
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.255	0.344	0.262	0.138	0.445
Nickel	T-Ni	0.117	0.118	0.276	0.107	0.084
Selenium	T-Se	1.16	1.40	0.53	0.27	0.84
Silver	T-Ag	0.0834	0.0407	0.0620	0.0118	0.319
Zinc	T-Zn	18.0	18.7	14.5	9.81	25.7

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Nicholas NP3 Mus/Liv	Nicholas NP4 Mus/Liv	Nicholas NP5 Mus/Liv	Nicholas NP6 Mus/Liv	Brien NP1 Mus/Liv
Sample Date		04-07-29	04-07-29	04-07-29	04-07-29	04-07-30
ALS ID		*21*	*22*	*23*	*24*	*25*
Physical Tests						
Moisture	%	78.6	79.2	78.4	79.2	79.5
Total Metals						
Arsenic	T-As	0.217	0.308	0.365	0.350	0.115
Cadmium	T-Cd	0.0192	0.0180	0.0082	0.0280	0.0132
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	10.5	9.54	21.6	14.1	54.3
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.248	0.305	0.308	0.354	0.272
Nickel	T-Ni	0.126	0.300	0.271	0.824	0.139
Selenium	T-Se	0.64	0.60	0.78	0.60	0.57
Silver	T-Ag	0.113	0.101	0.239	0.198	0.214
Zinc	T-Zn	26.1	20.5	23.2	21.7	38.8

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Brien NP2 Mus/Liv	Brien NP3 Mus/Liv	Brien NP4 Mus/Liv	Brien NP5 Mus/Liv	Narrow WF-4 Mus/Liv
Sample Date		04-07-30	04-07-30	04-07-30	04-07-30	04-08-01
ALS ID		*26*	*27*	*28*	*29*	*30*
Physical Tests						
Moisture	%	81.3	75.6	80.5	80.3	78.7
Total Metals						
Arsenic	T-As	0.162	0.152	0.213	0.161	0.265
Cadmium	T-Cd	0.0085	0.0078	<0.0060	0.0064	<0.0060
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	13.4	15.7	3.29	15.0	1.69
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.367	0.166	0.201	0.160	0.300
Nickel	T-Ni	0.137	0.176	0.098	0.151	0.141
Selenium	T-Se	0.35	0.29	<0.20	0.29	0.47
Silver	T-Ag	0.128	0.103	0.0288	0.107	0.0060
Zinc	T-Zn	29.9	11.9	8.94	16.0	10.7

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Narrow WF-5 Mus/Liv	Narrow WF-6 Mus/Liv	Narrow WF-7 Mus/Liv	Narrow WF-8 Mus/Liv	Narrow NP1 - SH Mus/Liv
Sample Date		04-08-01	04-08-01	04-08-01	04-08-01	04-08-01
ALS ID		*31*	*32*	*33*	*34*	*35*
Physical Tests						
Moisture	%	78.9	81.1	80.8	80.5	75.8
Total Metals						
Arsenic	T-As	0.164	0.226	0.193	0.215	0.230
Cadmium	T-Cd	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	1.17	0.959	0.688	2.26	3.04
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.197	0.234	0.253	0.439	0.804
Nickel	T-Ni	0.131	0.265	0.304	0.229	0.041
Selenium	T-Se	0.26	<0.20	<0.20	0.38	0.50
Silver	T-Ag	<0.0060	0.0066	<0.0060	0.0098	0.0161
Zinc	T-Zn	10.0	8.92	9.56	10.3	19.4

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

RESULTS OF ANALYSIS - Tissue

Sample ID		Narrow NP2 - DP Mus/Liv	Narrow NP2 - SH Mus/Liv	Narrow NP3 - DP Mus/Liv	Narrow NP1 - DP Mus/Liv
Sample Date		04-08-01	04-08-01	04-08-01	04-08-01
ALS ID		*36*	*37*	*38*	*39*
Physical Tests					
Moisture	%	79.0	78.8	75.2	81.1
Total Metals					
Arsenic	T-As	0.152	0.089	0.172	0.178
Cadmium	T-Cd	<0.0060	<0.0060	0.0152	0.0376
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	5.13	4.82	6.33	4.47
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.965	0.290	0.967	1.32
Nickel	T-Ni	0.067	0.088	0.114	0.253
Selenium	T-Se	0.48	0.27	0.86	0.63
Silver	T-Ag	0.0271	0.0141	0.0261	0.0357
Zinc	T-Zn	23.8	13.1	46.8	47.4

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

Appendix 1 - QUALITY CONTROL - Replicates

Tissue		Eclipse LT1 Mus/Liv 04-07-25	Eclipse LT1 Mus/Liv QC # 404454	Eclipse C5 Whole Fish 04-07-25	Eclipse C5 Whole Fish QC # 404455
Total Metals					
Arsenic	T-As	2.02	1.85	0.218	0.212
Cadmium	T-Cd	0.0169	0.0224	0.0071	0.0081
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	0.876	0.951	0.631	0.635
Lead	T-Pb	0.118	<0.020	0.026	0.026
Mercury	T-Hg	4.09	3.98	0.0630	0.0643
Nickel	T-Ni	0.085	0.085	0.030	0.038
Selenium	T-Se	1.20	1.42	0.29	0.29
Silver	T-Ag	<0.0060	<0.0060	<0.0060	<0.0060
Zinc	T-Zn	12.0	14.6	50.2	48.9

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

File No. U7721

Appendix 1 - QUALITY CONTROL - Replicates

Tissue		Brien NP3 Mus/Liv 04-07-30	Brien NP3 Mus/Liv QC # 404456	Narrow NP1 - SH Mus/Liv 04-08-01	Narrow NP1 - SH Mus/Liv QC # 404457
Total Metals					
Arsenic	T-As	0.152	0.149	0.230	0.237
Cadmium	T-Cd	0.0078	0.0064	<0.0060	<0.0060
Chromium	T-Cr	<0.10	<0.10	<0.10	<0.10
Copper	T-Cu	15.7	13.5	3.04	3.21
Lead	T-Pb	<0.020	<0.020	<0.020	<0.020
Mercury	T-Hg	0.166	0.187	0.804	0.754
Nickel	T-Ni	0.176	0.176	0.041	0.045
Selenium	T-Se	0.29	0.26	0.50	0.55
Silver	T-Ag	0.103	0.0796	0.0161	0.0158
Zinc	T-Zn	11.9	11.8	19.4	20.6

Metals results expressed as milligrams per wet kilogram except where noted.
< = Less than the detection limit indicated.

Appendix 2 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Tissue

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample:	14 days
Reference:	Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

Metals in Vegetation and Animal Tissue

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. Tissue samples are homogenized either mechanically or manually prior to digestion. The hotplate digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000 series), inductively coupled plasma - mass spectrometry (EPA Method 6020), and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Recommended Holding Time:

Sample/Extract:	2 years (Mercury = 28 days)
Reference:	Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

Results contained within this report relate only to the samples as submitted.

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End of Report

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CLIENT: EBA Engineering Consultants Ltd
ADDRESS: 4376 Boban Drive
CITY: Nanaimo PROV.: BC POSTAL CODE: V9T 6A7
CONTACT: Chris Zamora SAMPLER: Chris Zamora
TELEPHONE: (250) 756-2256 FAX: (250) 756-2686
PROJECT NAME/NO.: Tyhee Gold 1740082.005
P.O. NO.:
QUOTE NO.: ALSEVQ04-156
DATE SUBMITTED: August 24/2004 ALS CONTACT: Natasha M

ALS Environmental
1988 Triumph Street
Vancouver, BC Canada V5L 1K5
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FAX: 604-253-6700

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Calgary, AB Canada T2G 5N6
TEL: 403-214-5431, 1-866-722-6231
FAX: 403-214-5430

www.alsenviro.com

ANALYSIS REQUESTED

FOR LAB USE ONLY

LAB USE ONLY	SAMPLE IDENTIFICATION	Y	M	D	TIME	MATRIX	Total Metals Analysis	Sample Grinding	Acid Digestion	Moisture Content	NOTES
–	Eclipse LT1 muscle / liver tissue	04	07	25	___:___ AM/PM		✓	✓	✓	✓	
	Eclipse LT2 muscle / liver tissue	"	"	"	___:___ AM/PM		✓	✓	✓	✓	
	Eclipse LT3 muscle / liver tissue	"	"	"	___:___ AM/PM		✓	✓	✓	✓	
	Eclipse LT4 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse LT5 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
–	Eclipse WF9 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse WF10 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse WF11 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse WF12 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse WF13 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
–	Eclipse NP3 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse NP5 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse NP8 muscle / liver tissue				___:___ AM/PM		✓	✓	✓	✓	
	Eclipse CS whole fish tissue	↓	↓	↓	___:___ AM/PM		✓	✓	✓	✓	
					___:___ AM/PM		✓	✓	✓	✓	
					___:___ AM/PM						

TURN AROUND REQUIRED:

☐ ROUTINE (7 - 10 WORKING DAYS)
☐ RUSH (SPECIFY DATE): ________ (SURCHARGES MAY APPLY)

SPECIAL INSTRUCTIONS (BILLING DETAILS, QC REPORTING, ETC.):

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
	DATE TIME		DATE TIME
	DATE TIME		DATE TIME

FOR LAB USE ONLY

COOLER SEAL INTACT UPON RECEIPT? ☐ YES ☐ NO ☒ N/A

SAMPLE TEMPERATURE UPON RECEIPT: 5 °C
FROZEN? ☐ YES ☒ NO

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CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CLIENT: EBA Engineering Consultants Ltd.
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P.O. NO.: QUOTE NO.: ALSEVQ 04-156
DATE SUBMITTED: August 24 / 2004 ALS CONTACT: Natasha M

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FAX: 403-214-5430

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ANALYSIS REQUESTED

LAB USE ONLY	SAMPLE IDENTIFICATION	Y	M	D	TIME	MATRIX	Total Metals Analysis	Sample Grinding	Acid Digestion	Moisture Content	NOTES
	Nicholas LT1 muscle / Liver	04	07	29	: AM PM		✓	✓	✓	✓	
	Nicholas LT2 muscle / Liver	↓	↓	↓	: AM PM		↓	↓	↓	↓	
	Nicholas LT3 muscle / Liver				: AM PM						
	Nicholas LT4 muscle / Liver				: AM PM						
	Nicholas LT5 whole fish				: AM PM						
	Nicholas NP2 muscle / Liver				: AM PM						
	Nicholas NP3 muscle / Liver				: AM PM						
	Nicholas NP4 muscle / Liver				: AM PM						
	Nicholas NP5 muscle / Liver				: AM PM						
	Nicholas NP6 muscle / Liver				: AM PM						
					: AM PM						
	Brien NP1 muscle / Liver	04	07	30	: AM PM						
	Brien NP2 muscle / Liver	↓	↓	↓	: AM PM						
	Brien NP3 muscle / Liver				: AM PM						
	Brien NP4 muscle / Liver				: AM PM						
	Brien NP5 muscle / Liver				: AM PM		↓	↓	↓	↓	

TURN AROUND REQUIRED:
☐ ROUTINE (7 - 10 WORKING DAYS)
☐ RUSH (SPECIFY DATE): ______ (SURCHARGES MAY APPLY)
SPECIAL INSTRUCTIONS (BILLING DETAILS, QC REPORTING, ETC.):

RELINQUISHED BY:	DATE / TIME	RECEIVED BY: BC	DATE / TIME
RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME

FOR LAB USE ONLY

COOLER SEAL INTACT UPON RECEIPT? ☐ YES ☐ NO ☐ N/A

SAMPLE TEMPERATURE UPON RECEIPT: ____ °C
FROZEN? ☐ YES ☐ NO

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TSSP02.04.03

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CLIENT: EBA Engineering Consultants Ltd
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PROJECT NAME/NO.: Tyhee Gold 1740082.005
P.O. NO.: QUOTE NO.: ALSEYQ04-156
DATE SUBMITTED: August 24/2004 ALS CONTACT: Natasha M.

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ANALYSIS REQUESTED

FOR LAB USE ONLY

LAB USE ONLY	SAMPLE IDENTIFICATION	DATE / TIME COLLECTED Y	M	D	TIME	MATRIX	Total Metals Analysis	Sample Grinding	Acid Digestion	Moisture Content	NOTES
	Narrow WF-4 Muscle / Liver	04	08	01	: AM PM		✓	✓	✓	✓	
	Narrow WF-5 Muscle only				: AM PM		✓	✓	✓	✓	
	Narrow WF-6 Muscle only				: AM PM		✓	✓	✓	✓	
	Narrow WF-7 Muscle only				: AM PM		✓	✓	✓	✓	
	Narrow WF-8 Muscle / Liver				: AM PM		✓	✓	✓	✓	
					: AM PM		✓	✓	✓	✓	
	Narrow NP1 Muscle / Liver SH				: AM PM		✓	✓	✓	✓	
	Narrow NP2 Muscle / Liver DP				: AM PM		✓	✓	✓	✓	
	Narrow NP2 Muscle / Liver SH				: AM PM		✓	✓	✓	✓	
	Narrow NP3 Muscle / Liver DP				: AM PM		✓	✓	✓	✓	
	Narrow NP1 Muscle / Liver DP				: AM PM		✓	✓	✓	✓	
					: AM PM						
					: AM PM						
					: AM PM						
					: AM PM						
					: AM PM						

TURN AROUND REQUIRED:
☐ ROUTINE (7 - 10 WORKING DAYS)
☐ RUSH (SPECIFY DATE): ______ (SURCHARGES MAY APPLY)
SPECIAL INSTRUCTIONS (BILLING DETAILS, QC REPORTING, ETC.):

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
	DATE / TIME	[illegible]	DATE [illegible] / TIME [illegible]
	DATE / TIME		DATE / TIME

FOR LAB USE ONLY
COOLER SEAL INTACT UPON RECEIPT? ☐ YES ☐ NO ☐ N/A X
SAMPLE TEMPERATURE UPON RECEIPT: 5 °C
FROZEN? ☐ YES ☐ NO X

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APPENDIX J

LAKE SEDIMENT LAB ANALYSIS DATA

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CHEMICAL ANALYSIS REPORT

Date: September 28, 2004

ALS File No. U7776

Report On: 1740082.005 Soil Analysis

Report To: **EBA Engineering Consultants Ltd.**
Fifth Floor, Suite 500
1100 Melville Street
Vancouver, BC
V6E 4A6

Attention: **Mr. Richard Couture**

Received: September 3, 2004

ALS ENVIRONMENTAL
per:

Natasha Markovic-Mirovic, B.Sc. - Project Chemist
Scott P. Hoekstra, B.Sc. - Project Chemist

REMARKS

Please note that Nutrients and Particle Size analyses have been sub-contracted to Pacific Soil Analytical in Richmond. Pacific Soil Analysis report is attached at the back of this report.

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID			Round Lake	Winter Lake	Eclipse Lake	Nicholas Lake	Brien Lake
ALS ID			*1*	*2*	*3*	*4*	*5*
Physical Tests							
Moisture	%		93.4	93.0	68.7	91.7	92.9
pH			8.04	7.51	7.02	6.60	6.51
Nutrients							
Available Phosphorus		P	6.8	7.6	82.0	53.0	111
Total Nitrogen		N	1.42	1.42	0.180	2.09	1.35
Total Metals							
Antimony	T-Sb		<10	<10	<10	<10	<10
Arsenic	T-As		33.8	9.2	14.9	8.8	28.5
Barium	T-Ba		81.7	126	120	78.8	160
Beryllium	T-Be		0.60	0.57	0.87	0.72	1.10
Cadmium	T-Cd		0.52	<0.50	<0.50	<0.50	0.55
Chromium	T-Cr		38.6	38.9	54.8	41.3	51.8
Cobalt	T-Co		40.3	19.8	23.9	5.6	45.6
Copper	T-Cu		184	54.3	47.9	53.9	84.6
Lead	T-Pb		37	<30	<30	<30	<30
Mercury	T-Hg		0.844	0.0659	0.0154	0.0810	0.133
Molybdenum	T-Mo		<4.0	<4.0	<4.0	<4.0	<4.0
Nickel	T-Ni		210	89.2	73.7	35.2	81.5
Phosphorus	T-P		563	437	1370	1270	3580
Selenium	T-Se		<2.0	<2.0	<2.0	<2.0	<2.0
Silver	T-Ag		<2.0	<2.0	<2.0	<2.0	<2.0
Thallium	T-Tl		<1.0	<1.0	<1.0	<1.0	<1.0
Tin	T-Sn		<5.0	<5.0	<5.0	<5.0	<5.0
Vanadium	T-V		32.1	33.4	49.1	25.9	53.9
Zinc	T-Zn		251	97.4	122	86.0	157
Organic Parameters							
Total Organic Carbon		C	21.9	19.4	2.74	13.4	19.4
Particle Size							
Gravel	(>2.00mm)	(%)	N/A	N/A	<0.10	N/A	N/A
Sand	(2.00mm - 0.063mm)	(%)	N/A	N/A	2.30	N/A	N/A
Silt	(0.063mm - 4um)	(%)	N/A	N/A	47.8	N/A	N/A
Clay	(<4um)	(%)	N/A	N/A	49.9	N/A	N/A

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
N/A = Data was not available due to the high organic content of the sample.

File No. U7776

RESULTS OF ANALYSIS - Sediment/Soil

Sample ID			Narrow Lake
ALS ID			*6*
Physical Tests			
Moisture	%		89.4
pH			7.34
Nutrients			
Available Phosphorus		P	50.0
Total Nitrogen		N	1.26
Total Metals			
Antimony	T-Sb		<10
Arsenic	T-As		18.0
Barium	T-Ba		224
Beryllium	T-Be		1.03
Cadmium	T-Cd		<0.50
Chromium	T-Cr		58.5
Cobalt	T-Co		34.2
Copper	T-Cu		63.4
Lead	T-Pb		<30
Mercury	T-Hg		0.102
Molybdenum	T-Mo		<4.0
Nickel	T-Ni		116
Phosphorus	T-P		1380
Selenium	T-Se		<2.0
Silver	T-Ag		<2.0
Thallium	T-Tl		<1.0
Tin	T-Sn		<5.0
Vanadium	T-V		58.3
Zinc	T-Zn		174
Organic Parameters			
Total Organic Carbon		C	9.36
Particle Size			
Gravel	(>2.00mm)	(%)	<0.10
Sand	(2.00mm - 0.063mm)	(%)	6.40
Silt	(0.063mm - 4um)	(%)	30.5
Clay	(<4um)	(%)	63.1

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
N/A = Data was not available due to the high organic content of the sample.

File No. U7776

Appendix 1 - QUALITY CONTROL - Replicates

Sediment/Soil		Eclipse Lake	Eclipse Lake QC # 404754
Physical Tests			
Moisture %		68.7	67.5
Organic Parameters			
Total Organic Carbon	C	2.74	2.46

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.
N/A = Data was not available due to the high organic content of the sample.

Appendix 2 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:

Sample:	14 days
Reference:	Puget

For more detail see ALS Environmental "Collection & Sampling Guide"

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Total Nitrogen in Sediment/Soil

This analysis is carried out in accordance with methods described in Methods of Soil Analysis Part 2, Soil Science Society of America (1982). Total Nitrogen is determined colourimetrically on a semi-micro Kjeldahl digest.

Note: Total Nitrogen analysis is subcontracted.

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption/fluorescence spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Appendix 2 - METHODOLOGY - Continued

Recommended Holding Time:
Sample: 6 months (Hg = 28 days)
Extract: 6 months (Hg = 28 days, Sb & Sn = 7 days)
Reference: BCMELP
For more detail see ALS Environmental "Collection & Sampling Guide"

Total Carbon, Total Organic Carbon and Inorganic Carbon in
Sediment/Soil
This analysis is carried out in accordance with U.S. EPA Method 9060A (Publ. # SW-846 3rd ed., Washington, DC 20460). Total Carbon is determined by high temperature oxidation of carbon to carbon dioxide which is then measured by means of a nondispersive infrared analyzer. Inorganic Carbon is determined by reaction with phosphoric acid to convert all carbonates to carbon dioxide which is also measured by means of a nondispersive infrared analyzer. Total Organic Carbon is determined as the difference between Total and Inorganic Carbons.

Recommended Holding Time:
Sample: 14 days
Reference: Puget
For more detail see ASL "Collection & Sampling Guide"

Particle Size Distribution in Sediment/Soil

This analysis is carried out using a method adapted for Fisheries and Environment Canada, Ottawa, described in Walton, 1978. The procedure involves oven-drying and sample pre-treatment to remove organics, prior to using standard sieves for the sand and silt fractions and the pipette method for the clay fraction.

Note: Particle Size analysis is subcontracted.

Results contained within this report relate only to the samples as submitted.

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

PACIFIC SOIL ANALYSIS
A L S

Attention **N. Markovic-Mirovic** **Date** **Sept 25, 2004**

Sample	GRAVEL >2mm %	SAND <2mm %	SILT <63microns %	CLAY <4microns %	Total Nitrogen %	Available P ppm
U 7776 - 1		Too Organic			1.42	6.8
2		Too Organic			1.42	7.6
3		2.3	47.8	49.9	0.18	82.0
4		Too Organic			2.09	53.0
5		Too Organic			1.35	111.0
6		6.4	30.5	63.1	1.26	50.0

Results are reported as % on a weight basis. Particle size is determined by the pipette method. Sedimentation times are determined by using the Tanner and Jackson Nomograph I. Sand content is determined by wet sieving. Manual of Soil Sampling and Methods of Analysis, I978 , J. A. McKeague, Canadian Society of Soil Science.

CHAIN OF COUSTODY / ANALYTICAL REQUEST FORM

CLIENT: EBA Engineering Naniamo
ADDRESS: 1-4376 Boban Dr
CITY: Nanaimo PROV.: BC POSTAL CODE: V9T 6A7
CONTACT: Chris Zammura SAMPLER: Chris Zammora
TELEPHONE: 1-250-756-2256 FAX: 1-250-756-2286
PROJECT NAME/NO.: 1740082.005
P.O. NO.: QUOTE NO.:
DATE SUBMITTED: 02/09/04 ALS CONTACT: Natasha M

ALS Environmental

1988 Triumph Street
Vancouver, BC Canada V5L 1K5
TEL: 604-253-4188, 1-800-665-0243
FAX: 604-253-6700

#2 - 21 Highfield Circle SE
Calgary, AB Canada T2G 5N6
TEL: 403-214-5431, 1-866-722-6231
FAX: 403-214-5430

www.alsenviro.com

ANALYSIS REQUESTED

PAGE ____ OF ____

FOR LAB USE ONLY

LAB USE ONLY	SAMPLE IDENTIFICATION	DATE / TIME COLLECTED Y	M	D	TIME	MATRIX	Sediment analysis												NOTES
	Warrow lake 1 of 3				: AM PM														
	Warrow Lake 2 of 3				: AM PM														
	Warrow Lake 3 of 3				: AM PM														
					: AM PM														
					: AM PM														
					: AM PM														
					: AM PM														
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					: AM PM														

TURN AROUND REQUIRED:

☐ ROUTINE (7 - 10 WORKING DAYS)

☐ RUSH (SPECIFY DATE): ____________ (SURCHARGES MAY APPLY)

SPECIAL INSTRUCTIONS (BILLING DETAILS, QC REPORTING, ETC.):
phone Chris Zamora to confirm sediment analysis

RELINQUISHED BY:	DATE 02/09/05 TIME 4:30pm	RECEIVED BY:	DATE 09/03/04 TIME 10:50
RELINQUISHED BY:	DATE TIME	RECEIVED BY:	DATE TIME

FOR LAB USE ONLY

COOLER SEAL INTACT UPON RECEIPT? ☐ YES ☐ NO ☒ N/A

SAMPLE TEMPERATURE UPON RECEIPT: 19 °C

FROZEN? ☐ YES ☒ NO

REPORT COPY

SEE WHITE PAPER CO. FC SOURCE VERSION GL TSSP02.04.

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CLIENT: EBA Engineering Nanaimo
ADDRESS: 1-4376 Boban Dr
CITY: Nanaimo PROV.: BC POSTAL CODE: V9T 6A7
CONTACT: Chris Zammora SAMPLER: Chris Zammora
TELEPHONE: 1-250-756-2256 FAX: 1-250-756-2286
PROJECT NAME/NO.: 1740082.005
P.O. NO.: QUOTE NO.:
DATE SUBMITTED: 02/09/04 ALS CONTACT: Natasha M

ALS Environmental

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FAX: 604-253-6700

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Calgary, AB Canada T2G 5N6
TEL: 403-214-5431, 1-866-722-6231
FAX: 403-214-5430

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ANALYSIS REQUESTED

PAGE ____ OF ____

Sediment Sample only

FOR LAB USE ONLY

LAB USE ONLY	SAMPLE IDENTIFICATION	Y	M	D	TIME	MATRIX	Sediment Sample only												NOTES
	Round Lake 1 of 3				: AM PM	Sediment													
	Round Lake 2 of 3				: AM PM														
	Round Lake 3 of 3				: AM PM														
	Winter Lake 1 of 3				: AM PM														
	Winter Lake 2 of 3				: AM PM														
	Winter Lake 3 of 3				: AM PM														
	Eclipse Lake 1 of 3				: AM PM														
	Eclipse Lake 2 of 3				: AM PM														
	Eclipse Lake 3 of 3				: AM PM														
	Nicholas Lake 1 of 3				: AM PM														
	Nicholas Lake 2 of 3				: AM PM														
	Nicholas Lake 3 of 3				: AM PM														
	Brien Lake 1 of 3				: AM PM														
	Brien Lake 2 of 3				: AM PM														
	Brien Lake 3 of 3				: AM PM														
					: AM PM														

TURN AROUND REQUIRED:
☐ ROUTINE (7 - 10 WORKING DAYS)
☐ RUSH (SPECIFY DATE): ____________ (SURCHARGES MAY APPLY)
SPECIAL INSTRUCTIONS (BILLING DETAILS, QC REPORTING, ETC.):
* phone Chris Zamora to confirm sediment analysis

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
F Ford	DATE 02/09/05 TIME 4:00pm	M.02	DATE 09/03/04 TIME 13:30
RELINQUISHED BY:	DATE TIME	RECEIVED BY:	DATE TIME

FOR LAB USE ONLY

COOLER SEAL INTACT UPON RECEIPT? ☐ YES ☐ NO ☒ N/A

SAMPLE TEMPERATURE UPON RECEIPT: 14 °C
FROZEN? ☐ YES ☒ NO

REPORT COPY

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TSSP02.04.03

APPENDIX K

LAKE WATER QUALITY DATA

Appendix K. Lake Water Quality Data

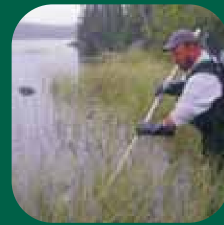
Lake Name:	**Round Lake**	**Surface Area (ha^2):**	11	
Sample Date:	18/07/2004	**Sample Depth:**	1.5 m (bottom)	
		Seechi Depth:	1.5 m (bottom)	
Sample Depths (m)	Water Temperatures (degrees C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH
surface	17.4	7.52	55.2	7.43
1				
1.5 m (bottom)				
Inlet	n/a	n/a	n/a	n/a
Outlet	n/a	n/a	n/a	n/a
Lake Name:	**Winter Lake**	**Surface Area (ha^2):**	69.2	
Sample Date:	19/07/2004	**Sample Depth:**	5.9 m	
		Secchi Depth:	3.0 m	
Sample Depths (m)	Water Temperatures (degrees C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH
surface	19.6	7.15	206.9	7.03
1	19.6	7.37	206.8	
2	19.2	7.34	205.1	
3	18.9	7.27	203.5	
4	18.6	6.35	203.1	
**5	14.6	5.2	187	
Inlet Stream	16.4	3.52	217.2	6.71
Outlet Stream	16	n/a	n/a	n/a
Lake Name:	**Eclipse Lake**	**Surface Area (ha^2):**	258	
Sample Date:	24/07/2004	**Recorded Depth:**	28 m	
		Secchi Depth:	7.07 m	
Sample Depths (m)	Water Temperatures (degrees C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH
Main Lake Body				
surface	20.1	8.52	51.1	7.03
1	19.7	8.66	49.4	
2	18.9	8.97	48	
3	18.6	9.27	48.1	
4	18.1	9.58	47.4	
5	17.4	9.84	46.3	
** 6	11.6	12.62	39.7	
7	9.9	11.98	37.4	
8	9.4	11.67	36.5	
9	7.6	10.19	35.5	
10	6.9	10.16	35.1	
11			34.7	
12	6.3	9.66	34.5	
13	6	9.6	34.4	
14	5.8	9.52	34.3	
15	5.7	9.57	34.3	
16	5.6	9.53	34.2	
17	5.5	9.54	34.1	
18	5.3	9.32	34.1	
19	5.2	9.46	33.8	
20	4.8	9.41	33.9	
21	4.8	9.25	33.9	

22	4.7	9.01	33.9	
23	4.6	9.03	33.9	
24	4.6	9.15	33.8	
25	4.5	9	33.8	
26	4.5	9.1	33.9	
27	4.4	9.04	33.9	
28	4.4	9.22	33.9	
East Channel				
surface	19.1	8.33	52.7	6.91
1	18.7	8.59	51	
2	18.5	8.21	50.8	
3	18.3	8.54	50.3	
4	17.8	7.71	49.6	
**5	14.5	9.04	45	
6	10.6	10.12	40.9	
7	8.7	9.54	38.8	
8	7.6	8.54	37.8	
9	6.7	8.87	37.1	
10	6.1	7.71	36.4	
11	5.7	8.97	36.2	
12	5.4	9.13	35.9	
13	5.2	9.03	37.3	
14	5.1	8.72	38.8	
15	5	8.58	39.7	
16	5	0.73	46.1	
17	5	0.56	47.2	
18	5	0.4	46.9	
19	5	0.34	43.8	
20	5	0.31	43.8	
Inlet Stream	18.6	5.74	51.5	6.58
Outlet Stream	22	8.03	52	6.82
Lake Name:	**Nicholas Lake**	**Surface Area (ha^2):**	96.3	
Sample Date:	27/07/2004	**Sample Depth:**	29 m	
		Secchi Depth:	5.94 m	
Sample Depths (m)	Water Temperatures (degrees C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH
surface	19.5	8.46	61.9	7.04
1	18.2	8.89	61.8	
2	17.6	8.73	61.4	
3	17.3	8.83	61.4	
4	17.2	8.84	61.5	
5	17	8.93	61.5	
6	16.2	9.38	60.9	
**7	9.6	10.4	60.2	
8	9.9	11.54	60.2	
9	7	10	60.1	
10	6.6	9.53	60.3	
11	6.2	9.28	60.2	
12	5.8	8.83	60.2	
13	5.8	9.13	60.2	
14	5.4	8.57	60.1	
15	4.9	8.47	60.3	
16	4.8	8.35	60.3	
17	5.5	8.88	60.6	
18	5.3	8.84	60.5	
19	5.6	9.94	60.6	

20	4.7	7.43	60.5	
21	4.5	7.31	60.6	
22	4.5	7.08	60.6	
23	4.5	6.93	60.6	
24	4.5	6.89	60.7	
25	4.4	4.92	60.7	
26	4.4	4.88	60.7	
27	4.4	5.04	60.7	
28	4.4	5.46	60.7	
Inlet Stream	23	n/a	n/a	n/a
Outlet Stream	20	n/a	n/a	n/a
Lake Name:	**Brien Lake**	**Surface Area (ha^2):**	24.2	
Sample Date:	29/07/2004	**Sample Depth**	9 m	
		Secchi Depth:	3.67 m	
Sample Depths (m)	Water Temperatures (degrees C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH
surface	18.6	8.12	75.4	7.03
1	18.6	8.1	75.3	
2	18.6	8.05	75.2	
3	18.5	8.03	75.1	
4	18.5	8.13	70.6	
**5	10.1	6.03	59.1	
6	7.2	2.75	55.9	
7	6.9	0.55	61.2	
8	6.7	0.1	68.1	
9	6.8	0.02	0	
Inlet Stream	n/a	n/a	n/a	n/a
Outlet Stream	n/a	n/a	n/a	n/a
Lake Name:	**Narrow Lake**	**Surface Area (ha^2):**	24.9	
Sample Date:	31/07/2004	**Sample Depth**	12.0 m	
		Secchi Depth:	3.10 m	
Sample Depths (m)	Water Temperatures (degrees C)	Dissolved Oxygen (mg/L)	Specific Conductivity (µs/cm)	pH
surface	16.2	8.54	133.3	7.03
1	16.2	8.52	133.5	
2	16.2	8.14	133.3	
3	16.2	8.52	133.4	
4	16	8.42	133.3	
5	15.9	8.35	133.1	
6	15.8	5.24	131.7	
**7	8.5	6.99	105.6	
8	7.4	5.7	101.5	
9	6.2	5.12	100.2	
10	6.1	3.37	99.8	
11	5.8	0.14	101	
12	5.8	0.07	107.2	
Inlet Stream	n/a	n/a	n/a	n/a
Outlet Stream	n/a	n/a	n/a	n/a

Note:
** Depth indicates thermocline
Specific conductivity is reported as conductivity at 25 degrees Celsius (25 C).

Tyhee NWT Corp



YELLOWKNIFE GOLD PROJECT

2005 FISHERIES AND AQUATIC RESOURCES REPORT

May 2006

CREATING AND DELIVERING BETTER SOLUTIONS

eba

Tyhee NWT Corp

2005 FISHERIES AND AQUATIC RESOURCES REPORT
YELLOWKNIFE GOLD PROJECT

1740180.004

May 2006

EBA Engineering Consultants Ltd.
p. 604.685.0275 • f. 604.684.6241 • Oceanic Plaza, 9th Floor
1066 West Hastings Street • Vancouver, British Columbia V6E 3X2 • CANADA

EXECUTIVE SUMMARY

Introduction and Background

The Yellowknife Gold Project, operated by Tyhee NWT Corp, is an advanced gold exploration project located approximately 85 km north of Yellowknife, NT. Baseline aquatic and fisheries studies began in 2004 and continued in 2005 to support future regulatory applications and to address the interests of the Department of Fisheries and Oceans (DFO).

In the summer of 2004, EBA Engineering Consultants Ltd (EBA) completed a comprehensive baseline investigation of six lakes in the Project area. Lakes that were investigated included: Round Lake, Winter Lake, Narrow Lake, Brien Lake, Eclipse Lake and Nicholas Lake to document existing fisheries and aquatic resource parameters. In the spring and summer of 2005, EBA completed a more focussed study of fish presence, fish habitat and bathymetry of Winter Lake and Narrow Lake specifically, as well as fish presence and fish habitat at four locations along a proposed access road between Nicholas Lake portal and the YGP.

The objectives of the 2005 fisheries and aquatic resources study were:

- To address specific questions raised by DFO personnel during the scoping sessions.
- To further document existing fish and fish habitat conditions in Winter and Narrow lakes.
- Conduct fish presence/absence and habitat surveys at four stream crossing locations along the proposed route of an access road between the Nicholas Lake and the YGP.
- Provide information for evaluating and mitigating potential mine related impacts due to the proposed YGP.
- Provide a sound basis for developing and implementing future environmental management strategies and for future aquatic effects monitoring during mine construction, operations and site decommissioning phases of the Project.

In response to DFO's review of the Project Description Report (PDR) submission, the 2005 field program was modified to address specific issues raised. Fisheries and aquatic resources investigations undertaken during the spring portion of the 2005 field study focused on potential fish migration between Winter and Narrow lakes. Fish species presence, relative abundance, distribution and species composition (inlet and outlet trapping); fish biological characteristics (length, weight, age); fish habitat characterization in the stream connecting the lakes; and, fish tissue metals analyses were also conducted. In addition, a habitat survey and electro-fishing for fish presence was conducted at four stream crossing locations along the proposed route of the access road.

Investigations undertaken during the summer of the 2005 field study focused on fish species presence, habitat characterization and utilization of Winter and Narrow lakes. Fish species relative abundance, distribution and species composition (gillnetting and minnow trapping); fish biological characteristics (length, weight, age); fish habitat (characterization of habitat attributes); fish tissue metals analysis; lake bathymetry; water quality analyses and an underwater survey (snorkel and video) in Winter Lake were conducted.

Fish Species Composition, Relative Abundance, Distribution and Age

During the spring 2005 fish migration survey, fish traps were installed in the Winter Lake outlet / Narrow Lake inlet stream, resulting in the collection of four juvenile Northern Pike and five Slimy Sculpin in the Narrow Lake inlet trap (fish migrating upstream from Narrow Lake) over seven days of fishing effort. No fish were caught in the Winter Lake outlet trap, however an incidental observation of an adult (~40 cm long) Northern Pike was made upstream near the entrance to the Winter Lake outlet trap.

During the summer 2005 lake survey, gillnet sets were successful in the collection of fish from both Winter and Narrow lakes. However, it should be noted that although the fishing effort undertaken in Winter Lake was more intensive (than in Narrow Lake) Northern Pike was the only species collected in Winter Lake, with a total of 10 juvenile pike being captured. All of the pike from Winter Lake were determined to be less than three years of age. No fish were captured in the Winter Lake minnow traps.

Lake Whitefish was the most abundant species present in Narrow Lake with a total of 96 whitefish being captured. . A sub sample of the whitefish collected from Narrow Lake ranged in age from four to nineteen years. Ten Northern Pike were also captured and ranged in age from under four to twelve years. No fish were captured in the Narrow Lake minnow traps.

Lake Habitat

The bathymetric survey of Winter Lake determined that the majority of this lake is shallower than 2 m and the maximum depth of 6 m occurs in a limited area of the northern basin. Winter Lake fish habitat is limited largely due to its shallow morphology. Limited fish presence (Northern Pike only) and habitat utilization in Winter Lake was confirmed through an extensive fishing effort. An underwater survey (snorkel/video) was also completed in Winter Lake. Results of this survey confirmed that bottom substrates in the lake are dominated by organics and silt, with cobbles and boulders at sporadic locations along the shoreline. Emergent and submergent vegetation occur in localized near-shore locations. Significantly, no fish or clams or any signs of these biota were observed on any of the twelve underwater transects surveyed in Winter Lake. Overall, the 2005 investigations have confirmed that Winter Lake provides poor habitat conditions for aquatic life.

The bathymetric survey of Narrow Lake indicated a maximum depth of 13 m located in a deep hole in the southwest basin of the lake. Another deep hole of 10 m was located in the northeast basin. Narrow Lake is characterized by an elongated shape, with two deeper basins and extensive wetland vegetation at the primary inlet and outlets located at the extreme ends of the lake basins. Rocky bottom substrates were identified within the southern portion of the lake, and the bottom substrate in most of Narrow Lake consists of fine organic material and silt. Narrow Lake was confirmed to support a considerable population of Lake Whitefish and a small population of Northern Pike.

Fish Tissue Metals

During the summer survey, samples of liver and muscle tissue were collected from fish in Narrow and Winter lakes. Mercury levels recorded in Narrow Lake fish were higher than those found in Winter Lake fish, this was due to the greater size and age of the fish present in Narrow Lake. In both liver and muscle tissue from Northern Pike and Lake Whitefish collected from Narrow Lake, mercury levels above the Health and Welfare Canada restrictive consumption level of 0.5 ppm were detected. Zinc was commonly present in muscle and liver tissue of fish tested from both lakes. No other metal of concern was present in any of the muscle samples.

In liver samples, copper, selenium and silver were commonly present in most samples. Arsenic, cadmium, chromium, lead, and nickel levels in fish livers from both lakes were generally found to be at values below detection limits. For whole fish samples taken from the Narrow Lake outlet stream during the spring survey, metals analysis indicates detectable levels of zinc, mercury and copper.

All metal concentrations for fish liver and muscle tissue were below US Environmental Protection Agency (US EPA 2006) metal concentrations in fish tissue for human health risk (0.02 ppm of arsenic, 1.4 ppm of cadmium, 4.1 ppm of chromium, 5.4 ppm of copper, 410 ppm of iron, 6.8 ppm of selenium, 6.8 ppm of silver, and 410 ppm of zinc).

Water Quality

High summer water temperatures throughout the water column in Winter Lake result in reduced rearing conditions for cool water fish. This lake is too shallow to allow full summer temperature stratification and the development of a thermocline, below which cooler water typically exists. The generally shallow morphology of Winter Lake results in annual freezing of the entire depth of the southern basin and other shallow areas during the winter and winterkill (through oxygen depletion) of aquatic life present in this lake.

Narrow Lake has an elongated shape with two deeper basins. The morphology of the lake results in summer and winter stratification of water temperatures. Narrow Lake developed a thermocline from 6 to 8 m, below which water temperatures dropped to a low of 4.7°C. The morphology of Narrow Lake also provides suitable rearing and over wintering conditions for fish.

DO concentrations during the summer test period (August) ranged from 8-9 mg/L in the surface layer of both lakes but dropped at the thermocline to a low of 0.02 mg/L at 11 m depth in Narrow Lake.

Proposed Access Road – Nicholas Lake to Ormsby

No fish were captured or observed at the stream crossings along the proposed access road during two fishing efforts (June 3rd and August 10th, 2005). It was concluded that these small streams are not likely to be fish-bearing.

Potential fish habitat was variable at the four crossing locations. Sites 1 and 2 consist of defined, slow-flowing channels (with the exception of where the existing winter road has resulted in a segment of diffuse unconfined flow at Site 1). The stream at Site 3 drains a small lake and had minimal, unconfined flow at the time of the survey. The stream at Site 4 consists of a wide, braided channel near its confluence with Giauque Lake. Overland flow within the riparian zone was observed during the spring survey. This flow had resulted from ice build- up within the channel in the lower portion of the stream.

Water temperatures were measured at each of the stream crossings during spring fieldwork between May 29 and June 3, 2005. Consistent with previous sampling completed at the Winter Lake outlet stream and the Narrow Lake inlet stream, water temperatures increased rapidly at Sites 1 and 2 but only marginally at Sites 3 and 4 during the short sampling period.

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APPENDICES

1.0 INTRODUCTION

In 2005, Tyhee NWT Corp. (Tyhee) retained EBA Engineering Consultants Ltd. (EBA) to continue investigations of the aquatic and fisheries resources within the Yellowknife Gold Project (Project) area, Northwest Territories (NWT).

The main objectives of the 2005 fisheries and aquatic resources studies were to:

- To address specific questions raised by DFO personnel during the scoping sessions.
- To further document existing fish and fish habitat conditions in Winter and Narrow lakes.
- Conduct fish presence/absence and habitat surveys at four stream crossing locations along the proposed route of an access road between the Nicholas Lake and the YGP.
- Provide information for evaluating and mitigating potential mine related impacts due to the proposed YGP.
- Provide a sound basis for developing and implementing future environmental management strategies and for future aquatic effects monitoring during mine construction, operations and site decommissioning phases of the Project.

The general study area for the 2005 field program is shown in Figure 1. The study area included Narrow and Winter lakes and the proposed road corridor between the Nicholas Lake Portal and Ormsby Portal (Figure 2).

2.0 BACKGROUND

Tyhee owns two, advanced exploration projects located in the Canadian Shield approximately 85 km north of Yellowknife, Northwest Territories. The Ormsby Deposit lies approximately 2 kms south of the historic Discovery Mine and 11 kms south of Nicholas Lake. The exploration and development of these mineral properties requires the completion of a baseline assessment of environmental resources of the area in order to support future regulatory applications.

3.0 INVESTIGATION SCOPE AND OBJECTIVES

The general purpose of the 2005 fisheries and aquatic resources investigations were to enhance baseline information collected during the summer of 2004 regarding the existing fish and fish habitat conditions within the Project study area and to address the interests of the Department of Fisheries and Oceans (DFO).

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The scope of work for the 2005 Fisheries Program comprised the following elements:

An Evaluation of Fish Populations - Lakes and Streams

- Fish Populations and/or Relative Abundance, Distribution and Species Composition
- Fish Biological Characteristics
- Fish Liver and Muscle Tissue Metals

An Evaluation of Fish Habitat - Lakes and Streams

- Fish Habitat Characteristics and Values (spawning, rearing, foraging, over-wintering)
- Bathymetry (Lakes only)
- Underwater Survey of Winter Lake (Snorkel and Video)
- Water Quality - Lakes and Streams (Temperature, Dissolved Oxygen, Specific Conductance, pH)

An Evaluation of Water Quality - Lakes and Streams

- Temperature
- Dissolved Oxygen
- Specific Conductivity
- pH
- Turbidity

4.0 SAMPLING METHODOLOGY

The Spring and Summer 2005 fisheries program components were conducted from May 24th to June 3rd, and August 4th to 13th, respectively. Mr. Richard Couture (R.P.Bio.), of EBA developed the respective work plans and provided supervision. The field crew was comprised of Nigel Cavanagh (R.P.Bio.), and Tim Abercrombie (M.Sc.) of EBA. Ricky Drygeese of the Yellowknives Dene First Nation provided field assistance during the Spring session and Noel Doctor of the Yellowknives Déné First Nation provided field assistance during the Summer session.

The following sections discuss the methodologies employed for the assessment of fisheries and aquatic resources, during the 2005 fisheries program.

4.1 FISH POPULATIONS

Several fish capture techniques were employed to determine fish population characteristics within lakes and streams. The techniques employed in the lakes are presented in Section 4.1.1 while those employed in the streams are presented in Section 4.1.2.

4.1.1 Lakes

4.1.1.1 Gillnetting

Methods to collect large size-classes of fish from Winter and Narrow lakes used two types of experimental monofilament gillnet gangs (floating and sinking). Gillnets were positioned near-shore, perpendicular to the shoreline at the surface (floating) or on the bottom (sinking). Four nets (two sinking and two floating) were deployed in Winter Lake on August 5th and relocated for a second fishing effort on August 6th. Two nets (one sinking and one floating) were deployed in Narrow Lake on August 7th only. Gillnet deployment locations within each lake are shown in Figures 3 and 4. A single experimental net comprised six sequential panels, each 25 m in length and each consisting of a different mesh size (25 mm, 76 mm, 51 mm, 89 mm, 38 mm and 64 mm). Gillnets were deployed using a 4.2 m (14') aluminium boat powered by a 9.5 hp outboard engine. Nets were strategically placed on each lake by considering the lakes morphology and shoreline habitat characteristics. Once deployed in late afternoon, gillnets were left to fish overnight.

Catch rates were summarized using a fishing effort of 12 hrs/net/unit catch area of 100 m^2 (i.e. 12 x 100 m^2 = Catch per Unit Effort or CPUE). Additional data recorded at each net site included the set and pull date and time, orientation, water depth, weather and GPS location using a Trimble Pathfinder Pro XRS TS-C1 data logger and Pro XRS receiver.

4.1.1.2 Minnow Traps

Standard Gee-type minnow traps (accepted by DFO) were used to collect smaller-class fish within littoral areas and small shallow embayment. Twelve minnow traps baited with sardines were set to fish overnight in each lake. The traps were set in Winter Lake on August 5th and reset for a second fishing effort on August 6th. The traps were set in Narrow Lake on August 8th only. Traps were placed in dense emergent reed beds, undercut shorelines and adjacent to fallen trees, and left over night to fish. Dimensions of the Gee-traps used were 0.4 m length x 0.2 m diameter with an aperture of 0.02 m. Data recorded included date, set/haul times, location and contents. Figures 7 and 8 identify trap locations.

4.1.1.3 Electrofishing in Shoreline Habitats

Shoreline electrofishing in Winter Lake was conducted on August 10th. Electrofishing was conducted using a battery-powered Smith-Root POW-15B backpack unit in select boulder fields and sedge patches (Photograph 1 – Appendix A) along the shoreline of Winter Lake. This method was used to assess species distribution at all sample sites. After electrofishing, the unit was turned off, and the electrofisher settings and effort (in seconds) was recorded

4.1.2 Streams

4.1.2.1 Outlet and Inlet Traps – Winter Lake Outlet /Narrow Lake Inlet

During the Spring survey, fish traps were installed at the outlet of Winter Lake and the inlet of Narrow Lake to determine movements (both upstream and downstream) of fish species during the ice break-up / freshet period. Northern Pike (*Esox lucius*), Slimy Sculpin (*Cottus cognatus*) and Arctic Grayling (*Thymallus arcticus)* were the targeted species in the stream sampling program.

Prior to trap deployment, a reconnaissance of the Winter Lake outlet / Narrow Lake inlet stream was conducted on May 24th to assess the most suitable location to install each trap and to evaluate site-specific conditions to custom build the traps. Sites located approximately 25 m and 50 m, downstream of the lake outlet were selected for the Winter Lake outlet trap (Photograph 2 – Appendix A) and the Narrow Lake inlet trap (Photograph 3 – Appendix A), respectively. The outlet trap location was selected due to ideal channel characteristics comprising a fast flowing riffle of a relatively consistent depth and width. The Narrow Lake inlet trap was selected due to ideal channel characteristics, whereby the braided flow pattern downstream of the trap had constricted to a single channel at this location, thereby forcing fish swimming upstream to arrive at the entrance to the trap.

The Winter Lake outlet trap consisted of a plywood box measuring 0.9 m x 0.6 m x 0.6 m. A flume measuring 1.7 m long by 0.3 m wide forced flow into the upstream side of the box. Water entering the box exited the box via mesh-covered windows located in the rear compartment of the box. A plywood baffle with a small fish opening separated the forward 1/3 of the trap from the rear 2/3 (Photograph 2 – Appendix A). The principle of the trap was that water hits the upper portion of the baffle, then flows underneath the baffle to the calmer rear compartment. Once fish enter the trap, they follow the water flow through the fish-opening in the baffle and remain in the calmer and darker rear compartment. The mesh-openings in the rear compartment ensure adequate oxygen supply.

The Narrow Lake inlet trap consisted of a mesh-covered, wood-framed box measuring 1.0 m x 0.6 x 0.6 m. A circular opening measuring 0.3 m in diameter was located on the downstream side of the trap. An open-ended mesh cone measuring 0.5 m long extended up-flow from the opening into the center of the trap (Photograph 3 – Appendix A). The principle of the trap was that fish swimming up-stream enter through the mesh cone and into the trap. Once inside the trap, the homogeneous characteristics of the trap camouflage the suspended position of the end of the mesh cone, thereby disguising the escape route.

Both traps were constructed on May 25th, installed on May 26th, and removed on June 3rd. The timing of the trap installation was critical to coincide with ice break-up on Winter and Narrow lakes. It is during this period when fish migration is most likely. The traps were monitored twice daily to check for fish captures.

4.1.2.2 Electrofishing - Proposed Access Road (Nicholas Lake to Ormsby) Stream Crossing Sites

The electrofishing of the proposed access road stream crossing locations was conducted on two occasions (June 3rd and August 10th). Electrofishing was conducted using a battery-powered Smith-Root POW-15B backpack unit along a 60 m section of stream, starting 30 m downstream of the projected road crossing point. This method was used to assess species distribution and population size at sample sites. After electrofishing, the unit was turned off and electrofisher settings and effort (in seconds) were recorded**.** The electrofishing areas are shown on Figure 2.

4.1.3 Biological Characteristics

All fish species collected were counted and identified to species using Scott and Crossman (1973). Biological data collection included total length, fork length (measured between the tip of the head to the fork of the tail fin) (mm), weight (g), sex, maturity, visible parasites and lesions. A sub-sample, representing existing fish population age classes from each sample location, was determined by submitting pectoral fin clips from Lake Whitefish and cleithra (jaw bone) from Northern Pike, all of which were preserved by drying. Aging structures were submitted to North South Consultants Inc. in Winnipeg, Manitoba, for age analysis.

4.1.4 Metals in Liver and Muscle Tissue

Selected fish specimens from sample sites were retained for the determination of metals content in dorsal muscle and liver tissues. Dorsal muscle tissue and liver tissue were removed and subsequently preserved by freezing in individually labelled sample containers. Occasionally a whole fish was submitted for analysis, due either to the small size of fish specimens or the lack of sufficient tissue mass for individual tissue analysis. Tissue samples were kept frozen from the time of collection, until the time of submission for analysis.

Maxxam Analytics of Burnaby, British Columbia analyzed liver and muscle tissue samples, using procedures consistent with the requirements of the appropriate regulatory agencies (i.e. CAEAL certified). A brief outline of the method follows:

The analysis of moisture in tissue was carried out gravimetrically, by drying the sample at 103 °C for a minimum of six hours. For tissue metals analysis, samples were homogenized either mechanically or manually prior to digestion. The hotplate digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Instrumental analysis was by atomic absorption spectrophotometry (EPA Method 7000 series), inductively coupled plasma – mass spectrometry (EPA Method 6020), and /or inductively coupled plasma – optical emission spectrophotometry (EPA Method 6010B). The digested portion was analyzed by atomic emission mass spectrophotometry (ICPMS), to achieve the required detection limit for each element (arsenic, cadmium, copper, lead, zinc, silver, tellurium and mercury).

4.2 FISH HABITAT

4.2.1 Lakes

4.2.1.1 Lake Bathymetry

Bathymetric mapping of Winter Lake was completed on August 7th and on Narrow Lake on August 8th using a Trimble Pathfinder Pro XRS TS-C1 Global Positional System (GPS) data logger and Trimble Pro XRS receiver. Lake depths were recorded using a MarineTek

SEAMAX depth sounder in combination with the Trimble data logger. An aluminium boat was used to traverse transects across and around the lake where GPS and corresponding depth data were collected. The data were then formatted using ARC/INFO to produce hard copies of lake bathymetric maps as shown in Figures 5 and 6.

4.2.1.2 Shoreline Habitat Survey

Littoral zone fish habitat surveys were conducted at Winter and Narrow lakes in accordance with the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures (Lake Surveys) (RIC, 1998). Fish habitat characteristics, as well as survey sampling points were recorded directly onto field maps. GPS locations were recorded to assist with the delineation of habitat features. Field data were formatted using ARC/INFO to produce habitat feature maps as shown in Figures 3 and 4. The size of the polygons (m^2) depicted on the maps is inferred rather than actual and is based on information collected in the field. Photographs included on the figures and compiled in Appendix A (Photographs 4-11) document shoreline attributes, aquatic vegetation types, and wildlife features.

4.2.1.3 Underwater Survey-Winter Lake

During 2005, to address the Department of Fisheries and Oceans (DFO) interests in the fish habitat values of Winter Lake, an underwater survey was conducted. The Winter Lake snorkel survey consisted of 12-50 m long transects, positioned at various locations around the lake, as shown in Figure 7. Transects were traversed by swimming from offshore and working towards the shore. Observations were recorded on waterproof paper and an underwater video camera was used to document the substrates, flora and any fauna present.

4.2.1.4 Lake Water Quality

Physical water quality parameters in Winter and Narrow lakes were assessed by measuring water temperature, dissolved oxygen, specific conductivity, and pH using a YSI Multi-Function Meter. Water quality profiles were taken at deep points within each lake, beginning at the surface and descending at 1.0 m depth intervals. The locations of water quality sample sites within each lake are indicated in Figures 7 and 8. Water transparency was measured to the nearest 0.1 m using a 20 cm diameter Secchi disk.

4.2.2 Streams

4.2.2.1 Stream Habitat Survey

Fish habitat characterization for four small streams crossing the proposed access road was carried out as per the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures (Stream Surveys)* (RIC, 1998). Basic habitat unit types such as pool, riffle, run, cascade, etc., were identified and noted within each stream study location. Stream channel morphology was defined using percent habitat within each sampling site (referred to as a Station); measurements or estimates of wetted width, depth, slope and substrate composition were assessed. In addition, the composition of cover provided by overstream vegetation (OSV), undercut banks (UCB), instream large woody debris (LWD), pools and boulders were visually estimated. Riparian vegetation community structure was noted as part of the field assessment.

Each of the four stream crossing sites was assessed using a subset of stations. This involved sub-sampling the stream at 10 m intervals along a 60 m segment of each stream in the vicinity of the proposed access road stream crossing locations. The segment comprised 30 m upstream and 30 m downstream of the projected road crossing point. The furthest downstream stations were designated Station 1 with Station 7 as the most upstream stations. Each Stations 4 was presumed to be the location at which the road crossings would likely occur. Proposed access road stream crossings were accessed by helicopter. In the case of the Winter Lake outlet stream, sub-sampling was undertaken at variable interval lengths (dependent on changes in stream morphology) along the entire length of the stream (165 m).

4.2.2.2 Stream Water Quality

The physical properties of the water measured in the streams included water temperature, dissolved oxygen, specific conductance, and pH. These properties were measured at each sample station using a calibrated YSI Multi-Function Meter.

4.3 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Strict quality assurance/quality control procedures were adhered to during field sampling. All sampling methodologies followed accepted professional standards and practices.

4.3.1 Field Procedures

QA/QC procedures for the Fisheries Program were employed to maintain a high degree of data quality. The following is a list of the main procedures adapted from Environment Canada (1993).

- All personnel involved in field procedures were qualified for the tasks and work undertaken, and were supervised by a qualified Professional Biologist (R.P. Bio.);
- All sampling was consistent throughout the program;
- All samples were collected following the most appropriate method and sample quality was maintained to the highest standard;
- Sampling equipment was the most appropriate for the particular habitat, and was in good working order;
- All samples were labelled appropriately with the site reference, date collected, and sample type;
- All samples were appropriately preserved where necessary;

- Field personnel maintained detailed field notes for future reference; and
- Field personnel followed appropriate safety guidelines for conducting fieldwork and ensured all samples were shipped in the appropriate containers following the appropriate shipping guideline.

4.4 EMERGENCY RESPONSE

All personnel operating equipment such as boats, electrofishers, deploying nets, fish dissection, etc., have appropriate academic and professional experience with the use of such equipment. Mr. Cavanagh and Mr. Abercrombie hold valid Level 1 Emergency First Aid tickets. All crew members kept bear spray in their possession while in the field away from camp and were familiar with local natural hazards in the project area.

5.0 RESULTS

5.1 FISH POPULATIONS

Fish population parameters evaluated within lakes sampled during the 2005 summer survey included fish species composition, abundance, and distribution. Fish species composition data and biological information are summarized in Table 1. Meristics for fish collected by gillnet in Winter and Narrow lakes are included in Appendix B. No fish were collected in the minnow traps in either lake. The trap set times are shown in Appendix C. Fish catch-per-unit-effort (CPUE) data are quantified and presented in Table 2. Fish collected by gillnet were limited to a small number of juvenile Northern Pike (*Esox lucius*) in Winter Lake. In Narrow Lake, Lake Whitefish (*Coregonus clupeaformis*) and Northern Pike were captured, while juvenile Northern Pike and Slimy Sculpin (*Cottus cognatus*) were captured in the inlet and outlet traps.

5.1.1 Fish Habitat Requirements

The following section summarizes the habitat requirements for the three principle fish species captured in the 2005 field program. The information presented is referenced from Scott and Crossman (1973) and the review of habitat stability reports produced by the U.S. Department of the Interior, fish and Wildlife Service for Northern Pike (1982).

5.1.1.1 Northern Pike

In northern lakes, Northern Pike spawn shortly after ice-out in May and June (EBA 2001). Preferred water temperatures during spawning range from 4.4 ºC to 11.1 ºC with eggs hatching 12 to 14 days after fertilization. Mature pike migrate into tributaries or flooded marshes and wetlands or along sedge dominated shorelines in water depths less than 0.2 m. The eggs are highly adhesive and are laid within stands of sedges and between hummocks of vegetation (Scott and Crossman 1973).

Northern Pike are opportunistic carnivores, primarily preying upon other fish, however, they are also known to feed on amphibians, aquatic birds, muskrats and mice. Pike prefer clear, warm, slow, meandering rivers or quiet lakes with dense vegetation cover. Favorable foraging and rearing habitat of young pike are areas dominated by submergent and emergent plants with 40% to 90 % cover (Casselman and Lewis 1996).

5.1.1.2 Lake Whitefish

Lake Whitefish are bottom feeders, preying largely on mayfly larvae, chironomids, mollusks, small fish, and the eggs of other fish such as lake trout. Foraging activity is typically concentrated along rocky substrates at the base of prominent drop-offs. Predators of Lake Whitefish include lake trout and Northern Pike, while the eggs are commonly foraged upon by burbot and sculpins (Scott and Crossman 1973).

Lake Whitefish typically spawn in the fall between late September and October. During spawning, eggs are distributed over small cobble/gravel lake shoals or at river mouths. Preferred shoals have depth ranges from 3.5 m to 10 m, and are located in areas exposed to good water circulation. Ideal spawning locations are not influenced by lake water level fluctuations in which eggs may become exposed to the air or freeze over winter. Optimal shoal gradients required for the cleaning of substrate and aeration of eggs is approximately 10-25º (EBA 2001; Golder 1997). Spawning is carried out when water temperatures reach 4.5ºC (40ºF). The dispersal of eggs varies in number from 2,400 to 10,000 and is dependent on the size of the fish. The development of the embryos occurs over a period of 140 days.

5.1.1.3 Slimy Sculpin

Slimy Sculpin are spring spawners. They prefer angular gravel, cobble, boulders and/or submergent tree roots to attach egg mass. Sculpins prefer moderate to swift water flows over riffles, clear water and stable banks with minimal erosion. Slimy Sculpin rear and overwinter in deep pools with gravel and/or cobble for refuge. Slimy Sculpin favour undercut banks, clear water and stable banks with minimal erosion. Suitable dissolved oxygen levels are important for overwinter survival (Scott and Crossman 1973).

Slimy Sculpin typically do not exhibit significant seasonal migrations. All life stages are generally present in a stream. The presence of large numbers of sculpin of all age-classes in a stream is considered strong evidence of winter flows of consistently sufficient water quality and quantity to support fish.

5.1.2 Relative Abundance, Distribution and Species Composition

This section discusses fish species composition, abundance, and distribution within the Winter Lake outlet - Narrow Lake inlet stream and Winter and Narrow lakes sampled during the 2005 spring and summer surveys. Fish species composition data and biological information are summarized in Table 1. Meristics for fish collected by gillnet in Winter Lake and Narrow Lake are included in Appendix B. Fish catch-per-unit-effort (CPUE) is quantified in Table 2. Fish species collected by gillnet were limited to Northern Pike, and Lake Whitefish. Fish species collected by stream traps include Slimy Sculpin and juvenile Northern Pike.

5.1.2.1 Winter Lake Outlet - Narrow Lake Inlet Stream

The Winter Lake outlet trap captured no fish during the spring sampling period (Appendix D). However, on May 29th, an adult Northern Pike (~ 40 cm long) was observed swimming into the inlet flume of the trap and then exiting immediately. Efforts to capture this fish in the stream channel were unsuccessful.

The Narrow Lake inlet trap yielded nine (9) fish in total. Four (4) immature Northern Pike and five Slimy Sculpin (see Table 1 for details). Photograph 12 shows two juvenile Northern Pike and one Slimy Sculpin. All fish were caught between May 30th and June 3rd, 2005.

5.1.2.2 Winter Lake

In Winter Lake, Northern Pike (juveniles) was the only fish species captured, representing 100% (10 individuals). Fishing effort on Winter Lake involved the deployment of two floating and two sinking gillnets over two days (August 6 and 7). The floating gillnet sets captured two of the juvenile pike, while the sinking gillnets captured the other eight pike. Baited minnow traps set in Winter Lake did not result in the capture of any fish.

5.1.2.3 Narrow Lake

In Narrow Lake, Lake Whitefish were the most common fish species captured by gillnet representing 90.5% (96 individuals) of all fish collected. The floating gillnet set captured 32 Lake Whitefish, while the sinking gillnet set captured 64 lake whitefish. The remaining 10.8% of fish collected (10 individuals) in Narrow Lake consisted of Northern Pike, one captured by floating gillnet and nine by sinking gillnet. Baited minnow traps set in Narrow Lake did not result in the capture of any fish. minnow traps did not capture any fish.

5.1.2.4 Proposed Access Road (Nicholas Lake to Ormsby) Stream Crossing Sites

Figure 2, shows the stream crossing locations along the proposed Nicholas Lake to Ormsby access road. At Site 1, no fish were observed and no fish were captured after an electrofishing effort of 217 seconds. At Site 2 during a fishing effort of 202 seconds, no fish were caught or observed. At Site 3 during a fishing effort of 125 seconds, no fish were caught or observed. At Site 4 during fishing effort of 198 seconds, no fish were caught or observed. Photographs 13-16 depict the conditions at each of the sites.

5.1.3 Biological Characteristics

This section discusses the biological characteristics of fish collected in Winter and Narrow lakes in the summer of 2005 (Table 1). Meristics for fish collected by gillnet in Winter and Narrow lakes are included in Appendix B. The following section discusses the biological characteristics of the fish collected from each water body. Appendix E presents the fish age data

5.1.3.1 Winter Lake Outlet Stream

In the Winter Lake outlet stream, all fish captured were migrating upstream from Narrow Lake (Narrow Lake inlet trap). The 4 Northern Pike captured ranged in size from 10.6 to 13.6 cm (total length) and weighed 5.0 to 12.0 grams. The 9 Slimy Sculpins captured ranged in size from 6.0 to 7.6 cm and weighed 2.0 to 4.0 grams.

5.1.3.2 Winter Lake

Length measurements for the 10 juvenile Northern Pike captured in Winter Lake ranged from 15.5 cm to 55.4 cm. Weights ranged between 22 g to 1,293 g, and ages ranged from age-1+ year class to age 3+ year class. Eight of the juvenile pike collected in Winter Lake were captured in the sinking gillnets positioned in the deeper areas of the lake in the northern basin, while 2 were captured in the floating gillnets. Stomach contents of two Northern Pike dissected from the Winter Lake catch consisted solely of invertebrates (aquatic insects). No evidence of fish consumption was found in the stomach contents of the dissected pike.

5.1.3.3 Narrow Lake

Length measurements obtained for the 96 Lake Whitefish captured in Narrow Lake ranged from 16.0 cm to 50.0 cm. Weights ranged between 16 g and 1,350 g and ages ranged from age-4+ year class to age 19+ year class of age. Of the 96 Lake Whitefish collected in Narrow Lake, 64 were captured by the sinking gillnets positioned in the deeper area of the lake (water depth of ~12 m).

Length measurements obtained for the 10 Northern Pike captured in Narrow Lake ranged from 20.9 cm to 76.0 cm. Weights ranged between 47 g and 3,000 g, and ages ranged from age-4+ year class to age 12+ year class. Of the 10 Northern Pike collected in Narrow Lake, nine were captured by the sinking gillnets positioned in the deeper areas of the lake. The stomach contents of a single Northern Pike that was dissected from the Narrow Lake (NP3) catch consisted of a 30.5 cm long whitefish.

5.1.4 Metals in Liver and Muscle Tissue

This section presents the results of analysis for tissue samples obtained from fish collected during the 2005 spring and summer surveys. Tissue metal levels for fish species sampled from Narrow and Winter lakes, and the Winter Lake outlet stream, are presented in Tables 3a-c. Appendix F presents the lab analysis data for metals in fish tissues.

As would be anticipated, older fish were observed to contain higher levels of metals than younger specimens. In both lakes sampled, levels for most metals including cadmium, chromium, lead, nickel, silver or zinc were low, and in many cases, were below detection limits.

All metal concentrations for fish liver and muscle tissue were below US Environmental Protection Agency (US EPA 2006) metal concentrations in fish tissue for human health risk

(0.02 ppm of arsenic, 1.4 ppm of cadmium, 4.1 ppm of chromium, 5.4 ppm of copper, 410 ppm of iron, 6.8 ppm of selenium, 6.8 ppm of silver, and 410 ppm of zinc).

5.1.4.1 Winter Lake Outlet Stream

In the Winter Lake Outlet Stream all fish captured leaving Narrow Lake (Narrow Lake inlet trap) were submitted whole (due to their small size) to Maxxam Analytics for metals analysis. All fish contained mercury levels well below the Health and Welfare Canada restrictive consumption level of 0.5 ppm. The mean mercury level for Slimy Sculpin was 0.132 ppm, while the level in juvenile Northern Pike was 0.115 ppm. The mean zinc level for Slimy Sculpin was 25.2 ppm while for Northern Pike it was 41.4 ppm. The mean copper level for Slimy Sculpin was 1.820 ppm while for Northern Pike it was 1.825 ppm. Cadmium and lead were detected marginally above the analytical detection limit in two Slimy Sculpin; otherwise these metals were below the detection limit in all other fish.

5.1.4.2 Winter Lake

Muscle tissue from the juvenile Northern Pike captured in Winter Lake only recorded detectable levels of zinc, chromium and mercury. Mean zinc levels were 10.8 ppm, while mean mercury levels were 0.34 ppm and mean chromium was 1.0 ppm. Most of these fish were aged at 3+ years.

Liver tissue from the juvenile Northern Pike in Winter Lake recorded detectable levels of zinc, copper, mercury, silver, selenium and chromium. Mean zinc levels were 37.56 ppm, mean mercury levels were 0.14 ppm and mean copper was 23.56 ppm. Mean levels of chromium, selenium and silver were 1.0 ppm, 1.03 ppm, and 0.7 ppm, respectively.

5.1.4.3 Narrow Lake

Muscle tissue from Northern Pike in Narrow Lake recorded detectable levels of zinc and mercury. Trace levels of lead, copper and arsenic were also detected. Mean zinc levels were 9.14 ppm, while mean mercury levels were 0.98 ppm. Tissues from three out of four Northern Pike analyzed from Narrow Lake exceeded the restrictive consumption level 0.5 ppm for mercury. Both lead and arsenic were detected in only two of the large fish sampled (specimens - NP1 and NP5). Copper was detected in one fish (NP1). These fish were aged between 4+ and 12+ years.

Liver tissue from Northern Pike in Narrow Lake recorded detectable levels of zinc, silver, selenium, copper and mercury in all fish sampled. Mean zinc levels were 81.50 ppm, mean silver levels were 0.10 ppm, mean selenium was 1.18 ppm, mean mercury was 0.92 ppm, and mean copper was 9.2 ppm.

Muscle tissue from Lake Whitefish in Narrow Lake recorded detectable levels of zinc and mercury in all fish, while chromium was detected in 5 of the 9 fish sampled. Copper and selenium were both only detected in one (1) fish (specimen - WF51). Mean zinc levels were 15.16 ppm, while mean mercury levels were 0.59 ppm, exceeding the restrictive consumption level for mercury of 0.5 ppm. Mean chromium was 1.0 ppm. Copper and selenium levels in specimen - WF51 were relatively high at 8.5 ppm and 3.1 ppm respectively. These fish were aged between 4+ and 19+ years.

Liver tissue from Lake Whitefish in Narrow Lake recorded detectable levels of zinc, selenium, mercury and copper in most fish sampled, while silver, chromium, cadmium and arsenic were detected in fewer fish. Mean zinc levels were 25.38 ppm, mean selenium levels were 1.56 ppm, mean mercury levels were 0.82 ppm and mean copper was 7.20 ppm. Mean levels of silver, chromium, cadmium and arsenic were 0.11 ppm, 1.00 ppm, and 0.08 ppm, and 0.35 ppm, respectively.

5.2 FISH HABITAT

This section presents the results of fish habitat surveys conducted during field studies undertaken on Winter and Narrow lakes in the spring and summer of 2005 at Winter and Narrow lakes. (Appendices G and H). A summary of lake biophysical features including morphology, shoreline characteristics, fish habitat, vegetation, bathymetry and substrate follows and are presented in Figures 3 and 4. Lake bathymetry maps for Winter and Narrow lakes are presented in Figures 5 and 6.

5.2.1 Winter Lake Outlet Stream

The habitat assessment of Winter Lake outlet stream was conducted on May 29th (Appendix G). The south flowing watercourse measures 165 m in length. The elevation at the outlet is approximately 279 m, while the elevation at the inlet to Narrow Lake is approximately 277 m.

Moving downstream, the first 50 m of the stream had a well-defined channel consisting of glides, riffles and small pools. The substrate consisted of gravel and organic sediments with the occasional boulder. The average wetted width of this reach was 3.0 m with an average depth of 35 cm. The minimal vegetation cover along the stream consisted predominantly of overhanging root wads. The minor instream vegetation in this reach consists of sedges and grass. Riparian vegetation of birch, (*Betula* sp.) willow (*Salix* sp.) and Labrador tea (*Ledum groenlandicum*) provide moderate canopy for leaf and insect drop.

From 50 m downstream of the outlet to the inlet of Narrow Lake, the stream becomes braided with no defined channel. Much of the flow path at the time of the assessment was among the riparian vegetation and over the winter road access. The riparian vegetation from 50 to 100 m downstream of the outlet primarily consists of Birch and Willow. The riparian vegetation near Narrow Lake is predominantly Willow. As the stream approaches Narrow Lake, the floodplain (total wetted width) widens to 10 m to 25 m. The stream bottom substrate consisted predominantly of organic fines.

5.2.2 Winter Lake

An assessment of shoreline habitat features for Winter Lake was completed during the summer sampling survey. Winter Lake habitat features are presented in Figure 3 and illustrated in Photos 4-8.

Winter Lake is located approximately 0.8 km southwest of the YGP Camp (Figure 1). Winter Lake is approximately 1.74 km in length and 620 m in width and is characterized by two shallow basins. The lake has a total surface area of 69.2 ha. The inlet to Winter Lake drains from Round Lake, while the outlet from the lake drains to the west into Narrow Lake.

5.2.2.1 Shoreline Habitat

The vegetation cover surrounding Winter Lake consists of black spruce (*Picea mariana*), dwarf birch (*Betula* sp.) and willow. Shoreline vegetation consists of buckbean, (*Menyanthes trifoliata*), sweetgale (*Myrica gale*), scouring rush (*Equisetum hyemale*) and floating mats of water sedge (*Carex aquatalis*) and beaked sedge (*Carex utriculata*). Winter Lake was observed to have a diverse community of aquatic macrophytes. The shallow littoral zone of the lake includes yellow water lily (*Nuphar lutea*), large-leaved pondweed (*Potamogeton epihydrus*), water smartweed (*Polygonum amphibium*) and hard-stem bulrush (*Scirpus validus*). The deeper littoral zone (>1.0 m) supports submergent stands of water milfoil (*Myriophyllum* spp.), Richardson's pondweed (*Potamogeton richardsonii*), and muskgrass (*Chara* spp.). Several small shrub wetlands connect to the shoreline along the south basin.

5.2.2.2 Bathymetry

The bathymetric survey of Winter Lake indicated a maximum lake depth of 6.0 m located in the north basin. Bathymetric data confirmed that the south basin is very shallow and does not exceed 2.0 m in depth (Figure 5). Bottom substrates in the north basin consisted of bedrock and coarse material along the shoreline, and fine organic sediments in the offshore areas of the lake. The substrate in the shallow southern basin consisted predominantly of fine organic material and silt.

5.2.2.3 Underwater Survey - Winter Lake

Twelve snorkel transects, approximately fifty metres in length were surveyed and in most cases were perpendicular to the shoreline (Figure 7, Appendix H). While effort was made to select transects with varying habitat types, most transects had similar habitats. Generally, from 50 m from shore to 10-15 m from shore, the substrate consisted of 100% soft organic silt. From 10-15 m to shore, substrates generally consisted of either gravels, cobble or boulders and various submergent and emergent vegetation were present close to shorelines.

The soft organic material on the lake bottom often emitted gas bubbles having a strong odour of ammonia and hydrogen sulphide when disturbed. The levels of ammonia were being caused by ammonification of large quantities of coproprel or "loon ooze" at or near the bottom of the lake. In some places the loon ooze is up to two metres deep and is a common feature in lakes in the region. Ammonification is the production of ammonia from organic nitrogenous compounds through decomposition of dead material and the metabolism in living organisms (Cole 1983). Coproprel is a term used to describe a mixture of humus material, fine plant fragments, algae remains, grains of quartz and mica, diatom frustules, exoskeleton fragments from aquatic arthropods, and spore and pollen relics (Cole

1983). The free hydrogen sulphide was being liberated by the anoxic organic sediments characteristic of the area.

A video record of the snorkel survey was taken and is included with this report as a DVD. However, unfortunately the video provides limited visual information due to the shallow turbid water and the presence of fine organic substrates that were easily suspended.

Significantly, no fish or clams or any signs of these biota were observed on any of the twelve underwater transects surveyed in Winter Lake.

5.2.3 Narrow Lake

An assessment of shoreline habitat features for Narrow Lake was completed during the summer sampling survey. Narrow Lake habitat features are presented in Figure 4 and illustrated in Photos 9-11.

Narrow Lake is located approximately 2.2 km southwest of the YGP Camp (Figure 1). The lake, consisting of two basins, is approximately 1.4 km in length and 200 m in width. Narrow Lake has a surface area of 24.9 ha. The inlet to Narrow Lake is connected to Winter Lake. The principal outlet from Narrow Lake is located at the southeast end of the lake and drains south into a small un-named lake approximately 100 m to the southwest.

5.2.3.1 Shoreline Habitat

The vegetation cover surrounding Narrow Lake consists of black spruce, paper birch (*Betula papyrifera*), jack pine (*Pinus banksiana*), and willow. Shoreline vegetation includes dwarf birch, sweetgale, and willow. Several wetlands exist along the edge of Narrow Lake. The complexity of wetlands observed along the margins of the lake includes open fens dominated by water sedge; fen/swamps dominated by dead spruce and birch and water plantain (*Alisma plantago-aquatica*); and fen/bogs dominated by dwarf birch, sphagnum moss and Labrador tea. Shallow littoral plants include yellow water lily, scouring rush, and burreed (*Sparganium* sp.), while deeper littoral plants include water smartweed and water milfoil.

5.2.3.2 Bathymetry

The bathymetric survey of Narrow Lake indicated a maximum depth of 13 m located in the southwest basin of the lake (Figure 6). This depth was recorded in a deep hole with a relatively steep gradient. Another deep hole of 10 m was identified in the northeast basin. While rocky bottom substrates were identified within the southern portion of the lake, the bottom substrate within the majority of Narrow Lake consists of fine organic material and silt.

5.2.4 Proposed Access Road Stream Crossing Sites

The habitat assessments of the streams along the proposed access route were conducted on May 27th, 2005. The assessment sites were designated as stream Sites 1 through 4 and are depicted in Figure 2. Stream sites 1 and 2 were located on inlet streams to Eclipse Lake. The existing winter road crosses these streams at the most likely location of the proposed access road. Stream Site 3 was located on an inlet stream to an un-named lake, while stream Site 4 was located on an inlet stream to Giauque Lake (see Photos 13-16).

5.2.4.1 Stream Site 1

This north-flowing watercourse is the outlet of a small, un-named lake. The upstream stations were within a well-defined channel consisting of riffles and small pools. The substrate consisted of organics with some silt. The average wetted width of this reach was 7.0 m with an average depth of 42 cm. Cover amounted to approximately 50%, which consisted of instream vegetation such as sedge grass (*Carex* sp.), and willow (*Salix* sp.). Riparian vegetation was predominantly willow (*Salix* sp.), tamarack (*Larix laricina*) and spruce (*Picea mariana*) and provided moderate canopy for leaf and insect drop.

Downstream of this reach, the channel turned westward along the alignment of the proposed access route for approximately 30 m, where it then turned north and flowed toward Eclipse Lake (Photograph 13). The linear reach along the proposed access route had a wetted width of 5 m and a depth of 25-30 cm. There was substantially reduced cover within this reach that is provided entirely by instream vegetation consisting of sedge and willow. The reach downstream of the winter road consisted of braided channels with a wetted width of 12 m. Instream vegetation consisted of sedge and willow and provides approximately 75% cover.

5.2.4.2 Stream Site 2

This north-flowing watercourse is the outlet of a small, un-named lake. All stations were located within a well-defined channel consisting of riffles, glides and pools. The substrate consisted of organics with some silt. The wetted width ranged from 2.4 m within the riffle sections to as much as 10.5 m at the largest pool. The depth ranged from 17 cm in riffle areas to 45 cm in one of the pools. Cover varied from as little as 20% to as much as 70% and consisted of instream vegetation and some woody debris. Riparian vegetation consisted predominantly of willow, tamarack and spruce and provided moderate canopy for leaf and insect drop. Photograph 14 depicts stream Site 2 at the crossing point of the existing winter road.

5.2.4.3 Stream Site 3

This southeast-flowing watercourse is the outlet of a small, un-named lake. All stations were located within a poorly defined channel. The upstream stations were located on a flat plateau, while the downstream stations were located on a significant slope (8 degrees). The upstream stations consisted of braided channels and pools with organic substrate. The wetted width ranged from 4.3 to 13.8 m and the depth ranged from 10 to 30 cm. The cover ranged from 60 to 90 % and was provided by instream vegetation comprising sedge and willow. The sparse riparian vegetation consisted of spruce and Labrador tea. The downstream stations consisted of braided, shallow riffles. The wetted width ranged from

3.9 to 6.9 m and the depth ranged from 9 to 12 cm. The cover ranged from 60 to 90% and was provided by instream vegetation comprising sedge and willow. The sparse riparian vegetation consisted primarily of birch. The substrate consisted of organics. Cover varied from 50% to 60% and consisted of instream sedge (Photograph 15).

5.2.4.4 Stream Site 4

This east-flowing watercourse is the outlet of a small, un-named lake. All stations were located within an undefined, highly braided channel near the inlet to Giauque Lake. A significant amount of ice and snow remained at this location at the time of the survey, thereby making it difficult to determine the true channel. Much of the flow within the assessed section of the stream was above the stream bank and among the riparian vegetation. The wetted width ranged from 13.1 to 40 m and the depth ranged from 15 to 26 cm. The cover ranged from 40 to 90% and was provided by cobble and instream vegetation comprising willow. The riparian vegetation consisted of spruce, willow, birch and Labrador tea and provided good canopy for leaf and insect drop (Photograph 16).

5.3 WATER QUALITY

Physical water quality parameters measured during the spring and summer 2005 field studies for Winter and Narrow lakes, the Winter Lake outlet – Narrow Lake inlet stream and the four stream crossing sites along the proposed access road, are summarized in the following section. Water quality parameters recored include water temperature, dissolved oxygen, specific conductivity, and pH. The sample locations are shown in Figures 7 and 8. The physical water quality data collected for Winter and Narrow lakes and dissolved oxygen and temperature profiles for Narrow Lake and Winter Lake are presented in Appendix I.

5.3.1 Winter Lake Outlet – Narrow Lake Inlet Stream

Physical water quality parameters were recorded during the spring sampling period in the Winter Lake outlet - Narrow Lake inlet stream. Measurements were taken daily between May 28 and June 3, 2006, while the fish traps were in place. Stream water temperatures ranged from 6.3 °C on May 28 to 10.4 °C on June 3. Specific conductivity and pH were constant at around 200 µS/cm and pH=7.0, respectively.

5.3.2 Winter Lake

During the summer sampling session, physical water quality parameters were measured at two locations in Winter Lake, one location in the deep area near the north end of the lake and one location in the more shallow southern area of the lake (See Figure 7 for sampling locations).

At the north end of Winter Lake, water temperatures ranged from 15.8°C at 1 m to 15.2°C at a depth of 6 m. Dissolved oxygen (DO) ranged from a high of 8.98 mg/L at a depth of 1 m to 7.94 mg/L at a depth of 6 m. Water column temperature and DO profiles for Winter Lake are provided in Appendix I. Specific conductivity was recorded at

196.0 µS/cm at 1 m and 194.5 µS/cm at 6 m. Secchi depth was recorded at 2.0 m. Due to the generally shallow nature of Winter Lake, no thermocline was observed in the water column of this lake.

5.3.3 Narrow Lake

Physical water quality parameters were measured in two locations in Narrow Lake, one location in the deep portion in the northeast portion of the lake and one location in the deep portion at the southwest end of the lake (See Figure 8 for sampling locations).

At the northeast sampling location on the lake (Station 1) water temperature ranged from 15.8°C at 1 m to 4.7°C at a depth of 11 m. DO ranged from 8.78 mg/L at 1 m to 0.02 mg/L at 11 m depth. Water column temperature and DO profiles for Narrow Lake are provided in Appendix I. Specific conductivity was recorded at 134.0 µS/cm at 1 m and 95.5 µS/cm at 11 m depth. Secchi depth was recorded at 3.66 m. At the time of the study, the thermocline in this basin of Narrow Lake was located at a depth of 6 m (Appendix I).

At the southwest sampling location on the lake (Station 2) water temperature ranged from 15.7 °C at 1 m depth to 9.5 °C at a depth of 9 m. DO ranged from 8.67 mg/L at 1 m to 1.1 mg/L at a depth of 9 m. Specific conductivity was recorded at 133.8 µS/cm at 1 m and 132.4 µS/cm at 9 m depth. Secchi depth was recorded at 3.47 m. The thermocline depth in this basin of Narrow Lake was located at a depth of 7 m (Appendix I).

5.3.4 Proposed Access Road Stream Crossing Sites

Physical water quality parameters were measured at all four locations along the proposed access road on May 27 and June 3, 2006 (Appendix I).

At Site 1, water temperatures ranged between 3.1 °C and 4.9 °C on May 27, while on June 3 at the same location temperatures ranged between 7.25 °C and 7.35 °C. Dissolved oxygen values on May 27 ranged from 8.38 mg/L to 9.7 mg/L, while conductivity ranged from 0.01 µS/cm and 0.04 µS/cm.

At Site 2, water temperatures ranged between 6.7 °C and 7.1 °C on May 27, while on June 3 at the same location temperatures ranged between 12.4 °C and 12.5 °C. Dissolved oxygen values on June 3 ranged from 6.55 mg/L to 6.77 mg/L, while conductivity ranged from 0.04 µS/cm for all stations on May 27.

At Site 3, water temperatures were between 4.3 °C and 6.4 °C on May 27, while on June 3 at the same location temperatures were between 5.0 °C and 6.9 °C. Dissolved oxygen values on June 3 ranged from 5.53 mg/L to 10.04 mg/L, for all stations on May 27. pH was also recorded at Site 3 and ranged from 5.54 to 5.97.

At Site 4, temperatures were between 0.5 °C and 1.0 °C on May 27, while on June 3 at the same location temperatures were between 1.8 °C and 2.4 °C. Dissolved oxygen values on June 3 ranged from 12.9 mg/L to 13.1 mg/L, while conductivity ranged from 0.00 µS/cm and 0.02 µS/cm on May 27.

6.0 DISCUSSION AND CONCLUSIONS

6.1 FISH PRESENCE AND MIGRATION

Limited fish presence was confirmed in Winter Lake during the 2005 field survey. There exist a number of limiting factors in terms of the capacity of Winter lake to sustain fish populations. This is evidenced by the difference in the age and size demographics between Winter Lake and Narrow Lake Northern Pike populations. In Winter Lake, all fish caught were less than age 3+ years, however compared to the pike from Narrow Lake, Winter Lake pike were very large for their age. Narrow Lake sustains a population of Northern Pike that exhibits varying age classes (one age 12+ fish was caught).

The only potential path of fish migration into Winter Lake is from Narrow Lake via the Winter Lake outlet stream. During spring freshet, this stream is highly braided, shallow and generally ice-covered toward its confluence with Narrow Lake. These factors likely act as barriers to migration for larger size classes of fish. However juvenile Northern Pike are small enough to navigate the small braided and diffuse channels.

The Narrow Lake inlet trap installed in the spring confirmed that juvenile Northern Pike are able to migrate from Narrow Lake to Winter Lake at that time**.** Once the young pike access Winter Lake, the warm water and invertebrate food sources in this lake during summer appear to enable the young fish to grow rapidly. However, once the pike reach a certain size, they require larger prey items such as forage fish to sustain growth and they must either migrate back to Narrow Lake, if possible (i.e., during freshest when there is sufficient water) or perhaps perish as "Winterkill" due to the low dissolved oxygen concentrations present throughout the winter period.

6.2 WINTER LAKE

Due to the naturally shallow nature of most of Winter Lake and particularly the southern basin, most of the lake is expected to freeze to or near the lake bottom during most winters. In shallow lakes DO levels are typically lower, and DO levels in the water column reduce as winter progresses often resulting in low DO levels lethal to most fish species. Lakes shallower than approximately 4 metres depth, typically consume water column DO before spring and hence what is known as "Winterkill" occurs (Welch 2000).

While Winter Lake does provide shallow vegetated bays that may be suitable for the seasonal spawning and rearing of Northern Pike, the lake lacks the course substrates and deep-water habitat complexity preferred by other species of fish occurring in the YGP study area.

The assessment of the seasonal fish population in Winter Lake resulted in the capture of only a limited number (10) of juvenile Northern Pike. Stomach contents of two of the juvenile pike dissected from the Winter Lake catch consisted solely of invertebrates (aquatic insects). No evidence of fish consumption was found in the stomach contents of the dissected pike, providing further confirmation of the limited seasonal utilization by fish of the aquatic habitat present in Winter Lake.

Winter Lake also continues to be impacted by runoff from Round Lake that has been previously impacted by historic tailings deposits from the former Discovery Mine and discharges from the INAC clay pit treatment system.

Overall, the 2005 investigations have confirmed that Winter Lake provides poor habitat conditions for aquatic life.

6.3 NARROW LAKE

The assessment of the Narrow Lake fish population resulted in the capture of a large number of Lake Whitefish and several Northern Pike. The margins of Narrow Lake provide adequate emergent and submergent vegetation suitable for Northern Pike. Based on the considerable number of Lake Whitefish captured in Narrow Lake and their excellent condition, whitefish are thriving and the lake provides suitable habitat for the rearing, spawning, and overwintering of this species.

However the lake appears to lack rocky shoals and submerged reefs that provide necessary spawning and rearing habitat for lake trout, cisco and arctic grayling**.**

6.4 STREAM CROSSINGS ALONG PROPOSED ACCESS ROAD

No fish were captured or observed at the stream crossings along the proposed access road during two electrofishing campaigns conducted on June 3rd and August 10th, 2005. On this basis, it is likely that these streams are not fish-bearing.

Potential fish habitat conditions varied at the four proposed access road stream crossing locations. Sites 1 and 2 consist of defined, slow flowing channels (with the exception of where the existing winter road alignment has resulted in a segment of a diffuse unconfined flow at Site 1). The stream at Site 3 drains a small lake and had minimal, unconfined flow at the time of the survey. The upper portion of the stream was located on a plateau while the lower portion drops at a relatively steep gradient to its confluence with an un-named lake. The stream at Site 4 consists of a wide, braided channel near its confluence with Giauque Lake. Overland flow within the riparian zone was observed during the spring survey. This flow had resulted from ice build-up within the channel in the lower portion of the stream.

7.0 CLOSURE

EBA is pleased to present Tyhee NWT Corp. with this 2005 Fisheries and Aquatic Resources report for the Yellowknife Gold Project. We hope everything is found to be satisfactory. If there are questions or if EBA can be of further assistance, please do not hesitate to contact us.

Respectfully submitted,
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REFERENCES

Casselman, J.M. and Lewis, C.A. 1996. Habitat Requirements of Northern Pike (*Esox lucius*). Canadian Journal of Aquatic Sciences, 53: pp161-174.

Cole, G.A. 1983. Textbook of Limnology. Third Edition. The C.V. Mosby Company. Toronto, Ontario.

Department of Fisheries and Oceans (DFO) and B.C. Ministry of Environment (MOE), 1989. Fish Habitat Inventory and Information Program – Stream Survey Field Guide. Vancouver, British Columbia, p.33.

EBA Engineering Consultants Ltd., 2002. Fisheries Studies (2001), DeBeers Canada Exploration - Gahcho Kue. FINAL REPORT. July 2002.

EBA Engineering Consultants Ltd. 2005. Yellowknife Gold Project, Project Description Report. Prepared by EBA Engineering Consultants Ltd. for Tyhee NWT Corp., Yellowknife, NWT. March 2005.

Environment Canada, 2002. Canadian Environmental Quality Guidelines. Summary Table. December 2003. 12 pp.

Environment Canada, 1993. Guidelines for Monitoring Benthos in Freshwater Environments. Consultant report prepared for Environment Canada, North Vancouver, B.C. 81 pp.

Environment Canada, 1998. Pulp and Paper EEM Technical Guidance Document. Ottawa. pp. 649 – 666.

Golder, 1997. Bathymetric Maps of the North and South Basin of Gahcho Kue (Kennedy Lake).

Hale, Starling and Jasper, 1979. Investigation of Mercury Contamination in Giauque Lake, NWT. DIAND Unpublished Report. Yellowknife, NWT.

Health and Welfare Canada, 2002. Canadian Food Inspection Agency, Food Safety Facts on Mercury and Fish Consumption. May 2002.

Inskip, P.D. 1982. Habitat Suitability Index Models: Northern Pike. Fish and Wildlife Services, US Department of the Interior. FWS/OBS-82/10.17. pp.29.

Marshall, T.R. 1996. A Hierarchical Approach to Assessing Habitat Suitability and Yield Potential of Lake Trout. Canadian Journal of Aquatic Science Vol. 53: pp 332-341.

Merritt, R.W. and Cummins. 1989. An Introduction to the Aquatic Insects. 2nd ed. Kendall/Hunt Publishing Company, Iowa, p. 722.

Moore, J.W., Sutherland, D.J. Wheeler, S.J. and Beaubien, V.A.. 1978. The Effects of Abandoned Metal Mines on Aquatic Ecosystems in the Northwest Territories I. Discovery Mine. Northwest Region, Environmental Protection Service, Fisheries and Environment Canada. Report EPS 5-NW-78-7. June 1978.

Norecol Environmental Consulting Ltd., 1990. Environmental Update Report for the Nicholas Lake Project, Northwest Territories. Prepared for Athabaska Gold Resources Ltd.

North Slave Métis Alliance. 1998. Discovery Mine Tailings Remediation. Initial Reconnaissance Survey. April 1998.

North Slave Métis Holdings Ltd. and Gartner Lee Limited. 2002. Discovery Mine, Northwest Territories, 2001 Environmental Monitoring Program. Prepared for Public Works and Government Services Canada

Pennak, R.W. 1978. Freshwater Invertebrates of the United States. 2nd ed. J. Wiley and Sons, N.Y., p. 803.

Platts, W.S., Megahan, W.F. and Wayne, G. 1983. Method for Evaluation Stream, Riparian, and Biotic Conditions. Gen. Tech. Rep. INT-138. Ogden, U T: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 70 p.

Resource Inventory Committee (RIC), 1998. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. RIC, BC ministry of Environment, Lands and Parks, April 1998.

Scott, W.B., and E.J. Crossman. 1973. Freshwater Fishes of Canada. Fisheries

Research Board of Canada Bulletin 184, Ottawa.

U.S. Department of the Interior, Fish and Wildlife Services, 1982. Habitat Suitability Index Models: Northern Pike. Biological Services Program and Division of Ecological Services. FWS/OBS-82/10.17. 40 pp.

U.S. Department of the Interior, Fish and Wildlife Services, 1984. Habitat Suitability Index Models: Lake Trout (Exclusive of the Great Lakes). Biological Services Program and Division of Ecological Services. FWS/OBS-82/10.82. 12 pp.

U.S. Department of the Interior, Fish and Wildlife Services, 1985. Habitat Suitability Index Models and Instream Flow Suitability Curves: Arctic Grayling Riverine Populations. Biological Services Program and Division of Ecological Services. Biological Report 82 (10.110). 34 pp.

US Environmental Protection Agency (EPA) Region III Risk Based Concentrations for Human Health Risk, updated 4/7/2006 (http://www.epa.gov/).

Welch, H. E. 2000. Oxygen in Lakes North of the Treeline: A Review. Northwater Consultants. Winnipeg, Manitoba.

Wetzel, R.G. 2001. Limnology; Lake and River Ecosystems 3rd ed. Academic Press, New York. pp.1006

TABLES

TABLE 1 - FISH SPECIES COMPOSITION AND BIOLOGICAL DATA

Table 1. Fish Species Composition and Biological Data

Species	Data		Stream between Winter and Narrow Lakes - Winter Lake Outlet Trap (Spring 2005)*	Stream between Winter and Narrow Lakes - Narrow Lake Inlet Trap (Spring 2005)	Winter Lake Gill Nets (Summer 2005)	Narrow Lake Gill Nets (Summer 2005)
Northern Pike	Length Data	**Number of fish sampled**	-	4	10	10
		Mean Total Length (cm)	-	11.80	36.79	50.72
		Mean Fork Length (cm)	-	11.70	35.42	48.24
		Maximum Fork Length (cm)	-	13.60	54	72.20
		Minimum Fork Length (cm)	-	9.80	14.6	19.70
		Standard Deviation fork	-	1.77	15.90	19.04
	Weight Data	**Number of fish sampled**	-	4	10	10
		Mean Weight (g)	-	7.80	620.9	1186.70
		Maximum Weight (g)	-	12.00	1293	3000.00
		Minimum Weight (g)	-	5.00	22	47.00
		Standard Deviation	-	3.10	588.49	1014.18
	Age Data	**Number of fish sampled**	-	-	5	5
		Mean Age	-	-	2.6	7.8
		Maximum Age	-	-	3	12
		Minimum Age	-	-	1	4
		Standard Deviation	-	-	0.89	2.95
Lake Whitefish	Length Data	**Number of fish sampled**	-	-	-	96
		Mean Total Length (cm)	-	-	-	28.06
		Mean Fork Length (cm)				24.87
		Maximum Fork Length (cm)	-	-	-	45.20
		Minimum Fork Length (cm)	-	-	-	14.40
		Standard Deviation fork	-	-	-	6.74
	Weight Data	**Number of fish sampled**	-	-	-	96
		Mean Weight (g)	-	-	-	232.07
		Maximum Weight (g)	-	-	-	1350.00
		Minimum Weight (g)	-	-	-	36.00
		Standard Deviation	-	-	-	220.18
	Age Data	**Number of fish sampled**	-	-	-	9
		Mean Age	-	-	-	9.55
		Maximum Age	-	-	-	19
		Minimum Age	-	-	-	4
		Standard Deviation	-	-	-	5.22
Slimy Sculpin	Length Data	**Number of fish sampled**	-	5	-	-
		Mean Total Length (cm)	-	6.80	-	-
		Maximum Length (cm)	-	7.60	-	-
		Minimum Length (cm)	-	6.00	-	-
		Standard Deviation	-	0.73	-	-
	Weight Data	**Number of fish sampled**	-	5	-	-
		Mean Weight (g)	-	2.80	-	-
		Maximum Weight (g)	-	4.00	-	-
		Minimum Weight (g)	-	2.00	-	-
		Standard Deviation	-	0.84	-	-
	Age Data	**Number of fish sampled**	-	-	-	-
		Mean Age	-	-	-	-
		Maximum Age	-	-	-	-
		Minimum Age	-	-	-	-
		Standard Deviation	-	-	-	-

Note:
The Winter Lake outlet trap was designed to capture fish migrating downflow from Winter Lake toward Narrow Lake
The Narrow Lake inlet trap was designed to capture fish migrating upflow from Narrow Lake toward Winter Lake
*No fish were captured in the Winter Lake outlet trap however a mature Northern Pike was observed at the entrance to the trap

TABLE 2 - GILLNET CATCH-PER-UNIT-EFFORT

Table 2. Gillnet Catch-per-Unit-Effort									
Lake	Gillnet type	Date In	Time In	Date Out	Time Out	Total Set Time (hours)	Gillnet Catch and Catch-Per-Unit-Effort (CPUE)		Total Net Catch
							Northern Pike	Lake Whitefish	
Winter	Sinking 1	5-Aug-05	14:30	6-Aug-04	9:14	18.75	0 **0.00**	0 **0.00**	0 **0.00**
	Floating 1	5-Aug-05	15:36	6-Aug-04	10:00	18.40	0 **0.00**	0 **0.00**	0 **0.00**
	Sinking 2	5-Aug-05	16:00	6-Aug-04	10:54	18.90	2 **0.58**	0 **0.00**	2 **0.58**
	Floating 2	5-Aug-05	16:45	6-Aug-04	11:35	18.83	1 **0.29**	0 **0.00**	1 **0.29**
	Sinking 1	6-Aug-05	9:36	7-Aug-05	9:00	11.40	3 **1.44**	0 **0.00**	3 **1.44**
	Floating 1	6-Aug-05	10:24	7-Aug-05	9:30	11.10	1 **0.49**	0 **0.00**	1 **0.49**
	Sinking 2	6-Aug-05	11:12	7-Aug-05	9:40	10.46	3 **1.57**	0 **0.00**	3 **1.57**
	Floating 2	6-Aug-05	11:46	7-Aug-05	9:55	10.15	0 **0.00**	0 **0.00**	0 **0.00**
Narrow	Sinking	7-Aug-05	16:00	8-Aug-05	10:45	18.75	9 **2.63**	51 **14.91**	60 **17.54**
	Floating	7-Aug-05	15:45	8-Aug-05	9:45	18.00	1 **0.30**	45 **13.71**	46 **14.01**
						Fish Totals:	20	96	116

Note:

Gillnet CPUE values (bolded) represent the number of fish captured per gillnetting unit (number of fish/100m^2 per 12 hr period).

TABLE 3A - METALS IN FISH MUSCLE TISSUE - SUMMER 2005

Table 3a. Metals in Fish Muscle Tissue - Summer 2005												
			Metal Parameter									
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
	Detection Limit (DL)		0.20	0.05	1.00	0.50	0.10	0.05	0.80	0.50	0.05	1.00
Winter Lake	Code											
Northern Pike	Winter Lake - NP1		<	<	1.00	<	<	0.38	<	<	<	11.70
n=5	Winter Lake - NP2		<	<	1.00	<	<	0.39	<	<	<	10.60
	Winter Lake - NP3		<	<	<	<	<	0.14	<	<	<	10.40
	Winter Lake - NP6		<	<	1.00	<	<	0.39	<	<	<	9.00
	Winter Lake - NP9		<	<	1.00	<	<	0.42	<	<	<	12.30
		Mean	n/a	n/a	1.00	n/a	n/a	0.34	n/a	n/a	n/a	10.80
Narrow Lake	Code											
Northern Pike	N.L - NP1		0.20	<	<	1.10	0.20	1.28	<	<	<	7.00
n =5	N.L - NP3		<	<	<	<	<	0.82	<	<	<	10.50
	N.L - NP4		<	<	<	<	<	0.92	<	<	<	9.00
	N.L - NP5		0.30	<	<	<	0.10	1.51	<	<	<	11.20
	N.L - NP6		<	<	<	<	<	0.38	<	<	<	8.00
		Mean	0.25	n/a	n/a	1.10	0.15	0.98	n/a	n/a	n/a	9.14
Lake Whitefish	N.L - WF8		<	<	<	<	<	0.23	<	<	<	10.60
n =9	N.L - WF9		<	<	1.00	<	<	0.24	<	<	<	12.90
	N.L - WF46		<	<	1.00	<	<	1.18	<	<	<	7.00
	N.L - WF47		<	<	1.00	<	<	0.20	<	<	<	33.00
	N.L - WF48		<	<	<	<	<	0.37	<	<	<	15.60
	N.L - WF49		<	<	1.00	<	<	0.18	<	<	<	13.00
	N.L - WF50		<	<	<	<	<	0.22	<	<	<	10.70
	N.L - WF51		<	<	<	8.50	<	2.34	<	3.10	<	25.60
	N.L - WF52		<	<	1.00	<	<	0.36	<	<	<	8.00
		Mean	n/a	n/a	1.00	8.50	n/a	0.59	n/a	3.10	n/a	15.16

Note:

All concentrations in mg/kg (wet)

<= Less than the dectection limit indicated

Indicates individuals that exceed Health and Welfare Canada restrictive consumption levles for mercury (0.5 ppm or mg/kg)

TABLE 3B - METALS IN FISH LIVER TISSUE - SUMMER 2005

Table 3b. Metals in Fish Liver Tissue - Summer 2005												
			Metal Parameter									
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
	Detection Limit (DL)		0.20	0.05	1.00	0.50	0.10	0.05	0.80	0.50	0.05	1.00
Winter Lake	Code											
Northern Pike	Winter Lake - NP1		<	<	<	37.40	<	0.13	<	1.10	0.09	39.20
n=5	Winter Lake - NP2		<	<	<	21.40	<	0.13	<	1.00	0.05	31.90
	Winter Lake - NP3		<	<	1.00	5.30	<	0.15	<	<	<	41.40
	Winter Lake - NP6		<	<	<	23.20	<	0.15	<	1.00	<	36.20
	Winter Lake - NP9		<	<	<	30.50	<	0.14	<	1.00	<	39.10
		Mean	n/a	n/a	1.00	23.56	n/a	0.14	n/a	1.03	0.07	37.56
Narrow Lake	Code											
Northern Pike	N.L - NP1		<	<	<	6.50	<	1.19	<	1.50	0.05	72.40
n =5	N.L - NP3		<	<	<	7.20	<	0.58	<	1.00	0.11	45.70
	N.L - NP4		<	<	<	8.70	<	0.62	<	1.10	0.05	66.70
	N.L - NP5		<	<	<	13.40	<	1.89	<	1.40	0.10	152.00
	N.L - NP6		<	<	<	10.20	<	0.30	<	0.90	0.18	70.70
		Mean	n/a	n/a	n/a	9.20	n/a	0.92	n/a	1.18	0.10	81.50
Lake Whitefish	N.L - WF8		<	<	1.00	4.50	<	0.50	<	1.50	<	31.00
n =9	N.L - WF9		<	<	1.00	7.40	<	0.50	<	1.70	0.08	29.20
	N.L - WF46		<	<	<	4.10	<	2.60	<	1.40	<	23.30
	N.L - WF47		<	<	<	6.20	<	0.78	<	1.70	0.06	22.30
	N.L - WF48		0.40	<	<	14.80	<	0.76	<	1.20	0.18	28.90
	N.L - WF49		<	0.05	<	8.80	<	0.57	<	1.90	<	27.40
	N.L - WF50		<	<	1.00	4.50	<	0.58	<	1.90	<	27.60
	N.L - WF51		0.30	<	<	<	<	0.39	<	<	<	7.00
	N.L - WF52		<	0.10	<	7.30	<	0.67	<	1.20	<	31.70
		Mean	0.35	0.08	1.00	7.20	n/a	0.82	n/a	1.56	0.11	25.38

Note:

All concentrations in mg/kg (wet)

<= Less than the dectection limit indicated

Indicates individuals that exceed Health and Welfare Canada restrictive consumption levles for mercury (0.5 ppm or mg/kg)

TABLE 3C - METALS IN WHOLE FISH - NARROW LAKE INLET TRAP, SPRING 2005

Table 3c. Metals in Whole Fish - Narrow Lake Inlet Trap, Spring 2005											
		Metal Parameter									
		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
	Detection Limit	0.20	0.05	1.00	0.50	0.10	0.05	0.80	0.50	0.05	1.00
Narrow Lake Outlet	Code										
Slimy Sculpin	SS1	<	<	<	2.2	<	0.14	<	<	<	23.8
n =5	SS2	<	<	<	1	<	0.19	<	<	<	28.9
	SS3	<	0.07	<	2	<	0.09	<	<	<	20.2
	SS4	<	<	<	1.6	0.10	0.13	<	<	<	22.2
	SS5	<	<	<	2.3	<	0.11	<	<	<	30.7
	Mean	n/a	n/a	n/a	1.820	n/a	0.132	n/a	n/a	n/a	25.2
Northern Pike	NP1	<	<	<	0.7	<	0.08	<	<	<	36.6
n =4	NP2	<	<	<	2.4	<	0.15	<	<	<	50.3
	NP3	<	<	<	2.8	<	0.14	<	<	<	42.3
	NP4	<	<	<	1.4	<	0.09	<	<	<	36.4
	Mean	<	n/a	n/a	1.825	n/a	0.115	n/a	n/a	n/a	41.4

Note:

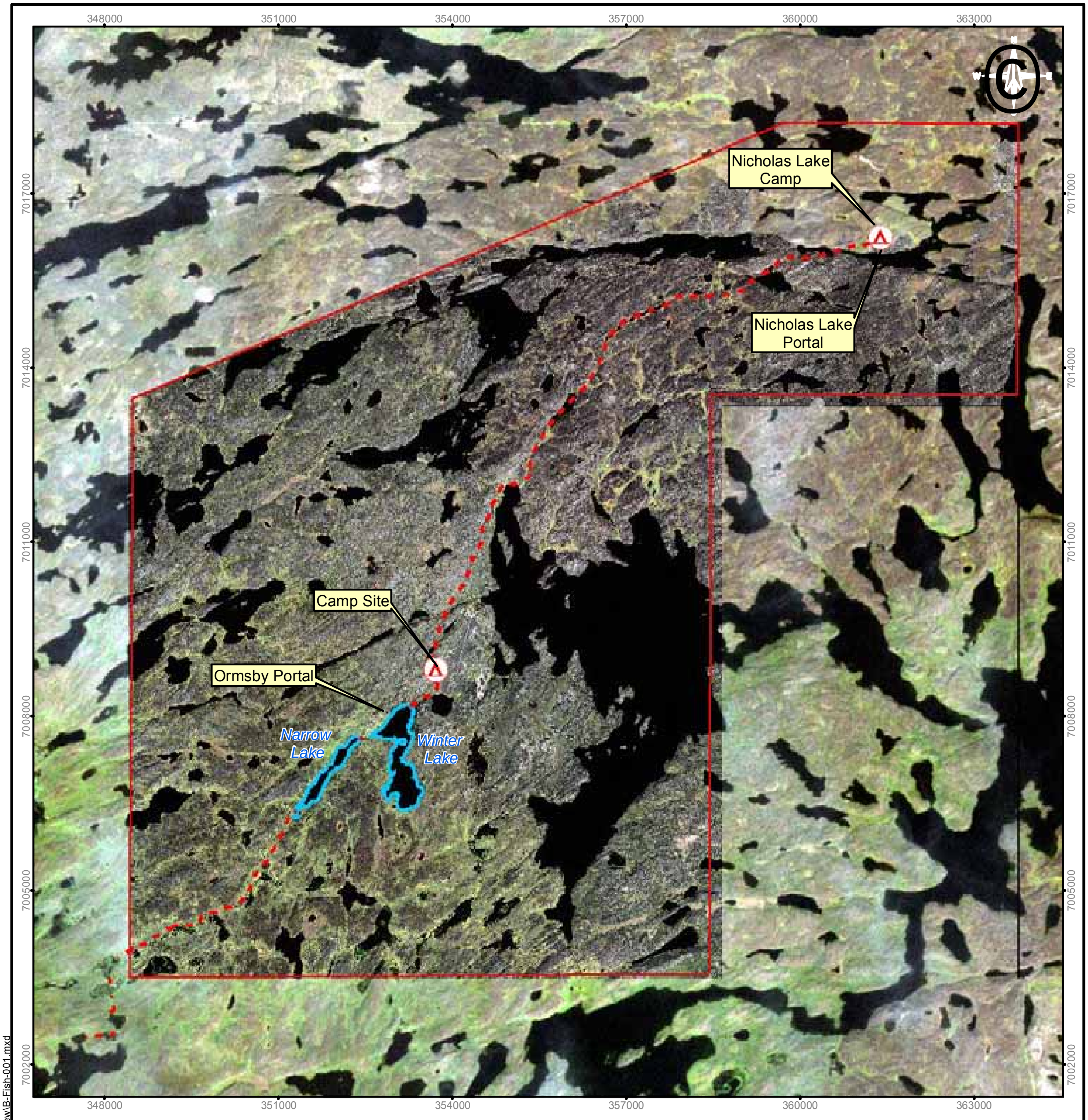
All concentrations in mg/kg (wet)

<= Less than the dectection limit

All samples are whole fish

Indicates individuals that exceed Health and Welfare Canada restrictive consumption levles for mercury (0.5 ppm or mg/kg)

FIGURES



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LEGEND

- Study Area
- t Camps
- Winter Road
- Lakes Sampled (2005)

Base data sources:

Imagery Source: IKONOS (July 27th and August 2nd 2004. Landsat TM (August 11th 2001)
Water Features: Extracted from IKONOS imagery

YELLOWKNIFE GOLD PROJECT

Fisheries and Aquatic Resources Spring and Summer 2005 Study Area and Site Location

PROJECTION: UTM Zone 12
DATUM: NAD83

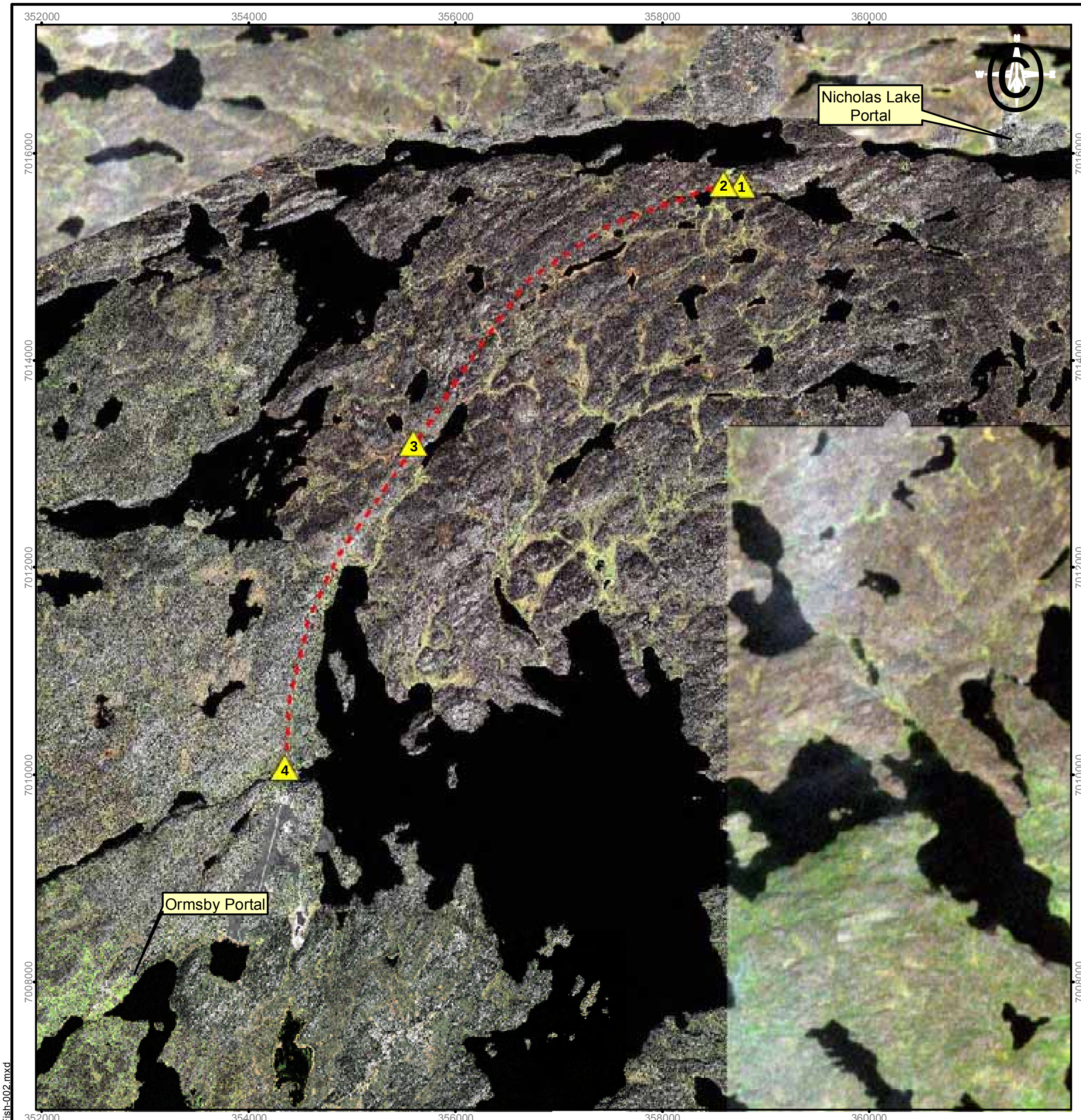
Scale: 1:96,007

2 1 0 2
Kilometres

Tyhee Development Corp
EBA Engineering Consultants Ltd.

FILE No: B-Fish-001
DATE: April, 2006
JOB NO: 1740180
REVISION NO: 2
OFFICE: EBA-VANC
DRAWN: TJS
CHECK: TA

Figure 1



LEGEND

1 Stream Crossing

Access Road

Note:

Route selection was based upon very preliminary reconnaissance by EBA and through consultation with Tyhee staff

Base data sources:

Imagery Source: IKONOS (July 27th and August 2nd 2004. Landsat TM (August 11th 2001)
Water Features: Extracted from IKONOS imagery

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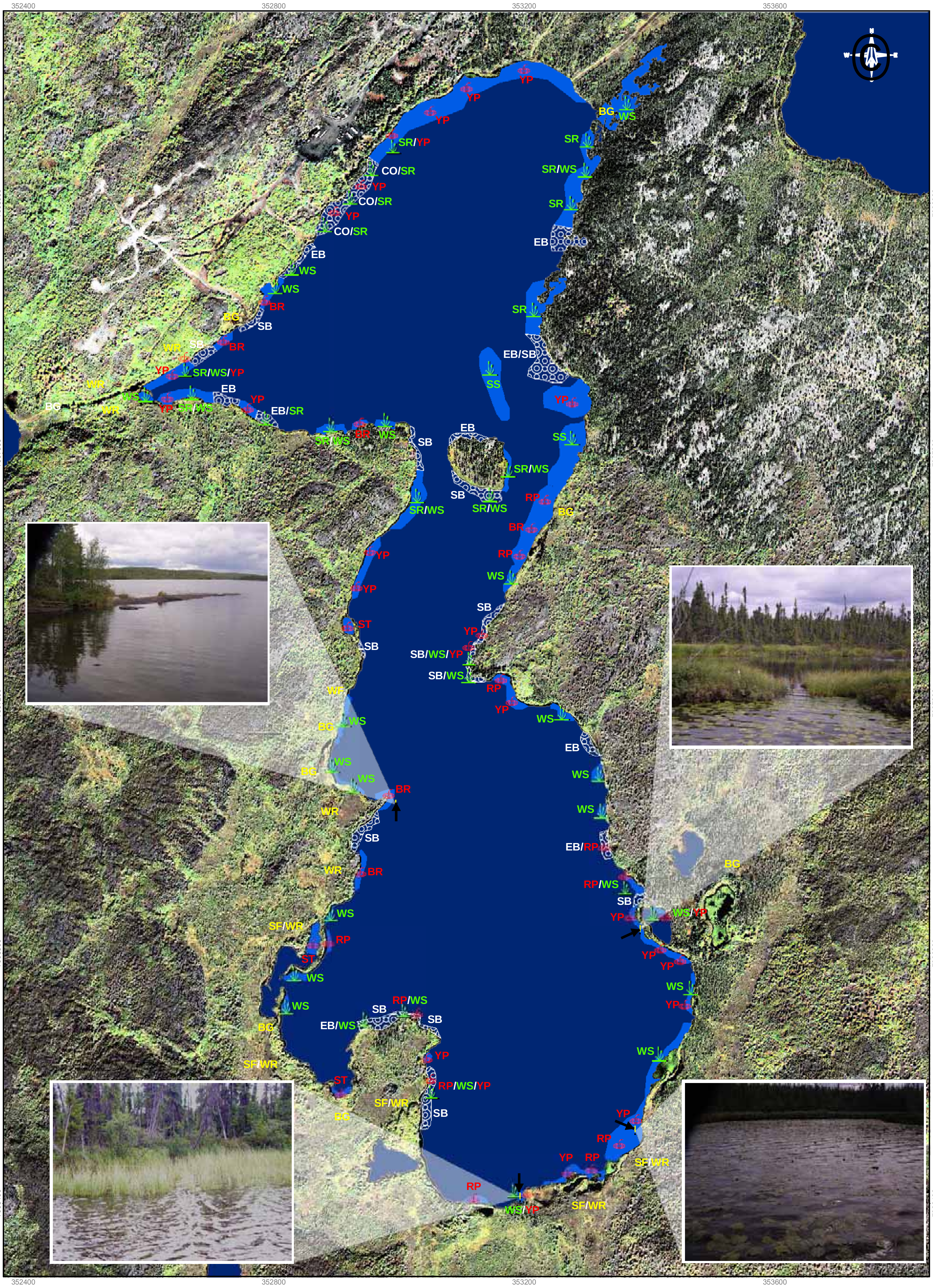
YELLOWKNIFE GOLD PROJECT

Fisheries and Aquatic Resources Spring and Summer 2005 Proposed Access Road Stream Crossings Locations

PROJECTION: UTM Zone 12		DATUM: NAD83	Tyhee Development Corp
Scale: 1:54,000 (0.5 0.25 0 0.5 1 Kilometres)			EBA Engineering Consultants Ltd. eba
FILE No: B-Fish-002			DATE: April 19, 2006
JOB NO: 1740180	REVISION NO: 4		Figure 2
OFFICE: EBA-VANC	DRAWN: TJS	CHECK: TA	



LEGEND

- Photo
- Rock Feature
- Emergent Vegetation
- Submergent Vegetation
- Picture Angle

Emergent Vegetation		Habitat Type	
BG	Bog Wetland	BG	Bog Wetland
SF	Sedge Fen	SF	Sedge Fen
SR	Scouring Rush	WR	Willow (Salix) Riparian
SS	Soft Stemmed		
WS	Water Sedge		
Submergent Vegetation		**Feature**	
BR	Burreed	CO	Cobbles
RP	Richardson's Pondweed	EB	Emergent Boulders
ST	Submerged Trees	SB	Shallow Boulders
YP	Yellow Water Lily		

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Base data sources:
Imagery Source: IKONOS (July 27th and August 2nd 2004. Landsat TM (August 11th 2001)
Water Features: Extracted from IKONOS imagery

YELLOWKNIFE GOLD PROJECT

Fisheries and Aquatic Resources Spring and Summer 2005 Winter Lake Habitat Features

PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:6,000 (50 25 0 50 100 150 Metres)	
FILE No: B-Fish-003	DATE: April, 2006
JOB NO: 1740180	REVISION NO: 4
OFFICE: EBA-VANCOUVER	DRAWN: TJS / CHECK: TA

Tyhee Development Corp

EBA Engineering Consultants Ltd.

Figure 3

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