
**2011 TAHLTAN LAKE SOCKEYE
EGG – TAKE
CONTRACT NO. F1624-085400**

Prepared for:

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Acknowledgements

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1.0 INTRODUCTION

The 2011 Tahltan Lake Sockeye Egg Take marked the sixteenth year of Triton Environmental Consultants Ltd. (formerly ARC Environmental) participating in a joint Canadian/US Transboundary enhancement program of Stikine and Taku rivers sockeye salmon (*Oncorhynchus nerka*) since the project began in 1989. Transboundary rivers are defined in the Pacific Salmon Treaty (PST) as “rivers that rise in Canada and flows to the sea through the United States” (PSC 1991 – 2004 Article 1). Both the Stikine and Taku rivers produce sockeye salmon average annual run sizes of 186,000 and 233,000, respectively based on 10 year averages (Transboundary Technical Committee January, 2011). The enhancement program is designed to increase the total sockeye salmon production in both the Stikine and Taku rivers by 100,000 fish annually. Within the Transboundary rivers enhancement program, gametes are taken from donor stocks in the Stikine and Taku drainage and flown to Snettisham Hatchery in Alaska. There the eggs are incubated to the ponding stage and then replanted into the donor lakes or to barren sockeye lakes, or a combination of the two.

The Stikine River fisheries resource is of great importance to First Nations. As a result, Triton conducts the Tahltan Lake egg take project in conjunction with the Tahltan Fisheries Program. The Tahltan and Iskut First Nations have been harvesting Stikine River salmon for centuries for food, trade, and ceremonial purposes. Some of the band members have been active in the commercial fishery located near the mouth of the river and in the vicinity of Telegraph Creek. Band members have conducted fisheries work in cooperation with Department of Fisheries and Oceans (DFO) on the Stikine River for over three decades. The technical capability of the Tahltan Fisheries Program’s fisheries technicians provides the opportunity to conduct this project in an efficient and cost effective manner.

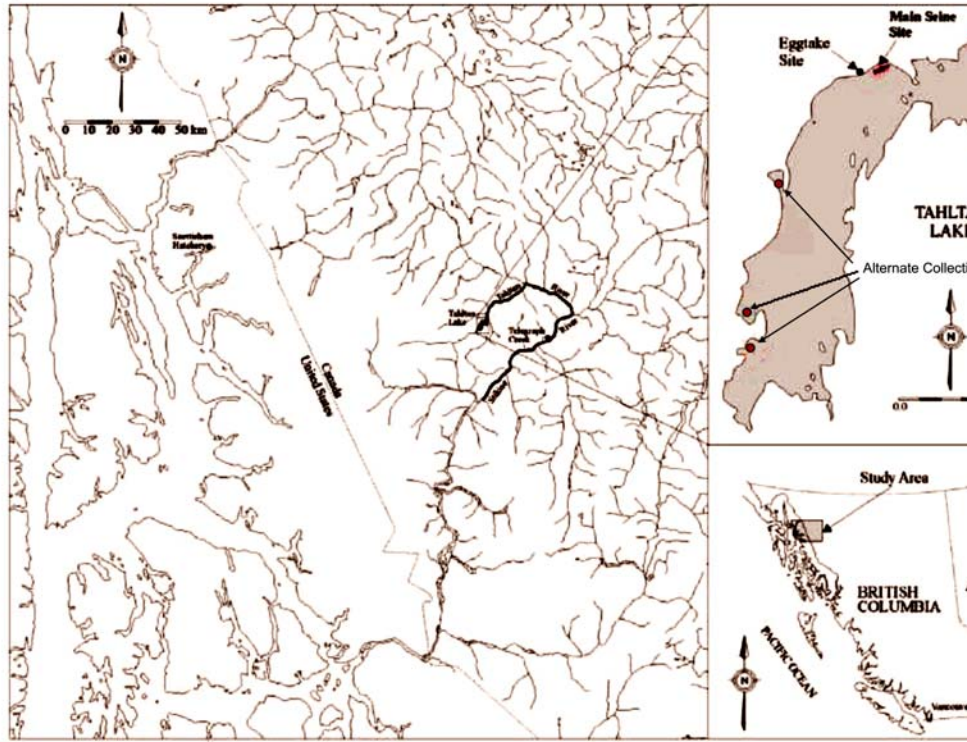
1.1 Location

Tahltan Lake is situated at the head of Johnny Tashoots Creek, a tributary to the upper Tahltan River (Figure 1). The Tahltan River in turn drains into the Stikine River. The Stikine River system drains an area of 51,200 km², of which 98% lies in northwest British Columbia, and 2% in southeast Alaska. The confluence of the Tahltan and Stikine rivers is approximately 25 km northeast and upstream of the town of Telegraph Creek. Telegraph Creek is accessible by road from Dease Lake, a town situated on the Highway 37 North. The Stikine River is navigable from Telegraph Creek to the Pacific Ocean.

1.2 The Tahltan Lake Sockeye

Tahltan Lake contributes significantly to the overall escapement of Stikine River sockeye. The aboriginal fishery at Telegraph Creek has annually harvested an average of 4,574 (1972 - 2009) sockeye. Catches in the Stikine River food fishery for the 2011 season included 6,893 sockeye, 515 large chinook and 232 jack chinook. The total escapement of sockeye into Tahltan Lake for the 2011 season was enumerated at 34,588.

Figure 1. Location of Tahltan Lake in the Stikine River system of northern British Columbia.



Sockeye salmon migrate up the Stikine River arriving at the lower river fishery near the U.S. - Canada border around the last week in June or first week in July. Migration up the Stikine River to Tahltan Lake takes approximately 14 days. Sockeye salmon begin to enter Tahltan Lake around mid-July and will hold in the lake for approximately 4-6 weeks until they mature sexually. Normally, the majority of spawning occurs from September 1 to September 30 with the peak around September 15.

Most of the spawning activity takes place in 1-3 m of water along a beach located on the north shore approximately 2 km from Johnny Tashoots Creek (the outlet of the lake) and immediately upstream of the lake outlet.

2.0 OBJECTIVES

The 2011 program accomplished the following:

1. Captured sufficient brood stock (2216 females and 2216 males) to collect approximately 6.05 million eggs based on a fecundity of 2,730. The average percent survival to the 2-4 cell stage was 89.3%.
2. Graded fish for ripeness, killed and spawned fish in accordance with standard procedures acceptable to the Scientific Authority.
3. Conducted egg take procedures according to the approved hatchery technologies in order to reduce the incidences of infectious hematopoietic necrosis virus (IHNV) and *Renibacterium salmoninarum* (bacterial kidney disease, BKD).
4. Delivered fertilized, water hardened, surface disinfected eggs to the Snettisham Hatchery in Alaska.
5. Conducted disease sampling for IHNV and BKD by collecting ovarian fluid and kidney samples from 60 females from September 7th to 16th, 2011.
6. Collected otoliths, post orbital hypural length (POHL) and fork length (FL) measurements from 400 broodstock (200 males and 200 females) from August 29th to September 16th, 2011.
7. Maintained daily field notes recording:
 - number of males and females captured
 - number of females >1 day away from maturity that were held over
 - number released and number retained for spawning, by sex
 - pre-spawn holding mortality, by sex
 - numbers of fish spawned
 - water temperatures at spawning
 - spawn temperature during transport
 - all incidences of fish displaying obvious signs of disease (internal or external lesions, hemorrhaging, discolored ovarian fluid, bloating, etc.)

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3.0 METHODS

3.1 Mobilization and Project Logistics

Mobilization commenced on August 24th, 2011 with all materials being shipped from Terrace to Dease Lake via Bandstra Transportation Systems Ltd. then from Dease Lake to Tsayta Air in Telegraph Creek. Materials necessary for the egg take were then flown to Tahltan Lake via Tsayta Air beginning August 24th, 2011. Additional supplies were brought in during crew mobilization and egg flights. Tsayta Air (Cessna 185 and Beaver) provided services for the Tahltan Lake Egg Take. For the first egg take, IHNV free water and ice was obtained from Telegraph Creek. For subsequent egg takes, IHNV free water and ice were obtained from Snettisham Hatchery on the backhaul portion of the egg take flights.

Broodstock capture commenced on August 28, 2011 at both the main fishing site and at the weir collection site. Alternative fishing at the alternate collection site commenced on September 5th. The crew in camp consisted of eight Tahltan Fisheries staff, two Triton staff and one cook.

3.2 Fish Capture

Fish capture at the main beach site was accomplished using a 60m x 6m deep, 4cm mesh, adult beach seine set by an 18' aluminum boat powered by a 40 horsepower outboard motor. Captured fish were checked for ripeness. Ripe fish were placed into the 1.2 m x 1.2 m x 2.4 m vexar pens, while unripe fish were placed into the large net mesh holding pens to allow them to mature. The net mesh pens were anchored in the middle of the lake to avoid attracting bears and to give the fish sufficient depth to move freely. The females that were held over in net mesh pens remained in the holding pen until the next sorting day when they were re-graded for maturity. Overall fertilization rates appear to have remained high indicating that this short term holding was effective; however this activity requires a skilled sorting crew to ensure that fish are in fact close to maturity. All partially spawned females were released and all spent females were dispatched. Enough males were retained so as to exceed female numbers by approximately 10% when available. The extra males were retained in order to compensate for the rejection of any males exhibiting poor milt quality.

Tahltan Fisheries and Triton also provided a two-man alternative-fishing (angling) crew to supplement the seine crew efforts. Alternative fishing was conducted at the three "alternative collection sites" as shown in Figure 1. The southern site displayed in Figure 1 was where most alternative fishing took place. However, on days when fish capture at the southerly site was difficult (due either to high winds, lake-water turbidity, or low presence of female sockeye) the alternative fishing crew would sometimes attempt angling at the other two northern collection sites.

After fish were captured with the use of rods and reels and weighted treble hooks, they were placed into a large tote containing approximately 100 L of water, 50 mg/100L of

Aquacalm anesthetic, and a battery operated water aerator pump. Once approximately 12 females were captured, they were transported by boat to the egg-take site, and placed into a pen reserved for alternative-fishing.

3.3 Egg Takes

Egg takes were performed from Aug 29th to Sept 20th on a varying schedule, with days set aside for fish capture and sorting unripe females (egg takes were completed on the following dates: August 29th and 31st, September 2nd, 4th, 7th, 9th, 10th, 12th, 14th, 16th, 17th, 19th and 20th). Egg shipments and numbers of eggs shipped were coordinated with fish culture personnel at the Snettisham Hatchery to best utilize available space in the incubators.

All egg takes were performed in accordance with the accepted DFO sockeye culture procedures and guidelines outlined in the Alaska Sockeye Salmon Culture Manual (McDaniel *et al.* 1994).

Egg Stripping

Ripe females were selected from the net pens and dispatched with a club, then bled for at least 10 minutes by cutting the gills. Females were hung separately on a bleeding rack where they were washed with a 100 ppm solution of ovadine and then carefully dried with paper towel. Eggs were stripped into translucent plastic containers (one female per container). All hands, knives, waders, raingear, and equipment were disinfected with ovadine solution between the stripping of individual females. Any eggs that appeared water hardened, undeveloped, diseased, or came from females with discolored ovarian fluid were immediately rejected.

Fertilization

Males were retrieved from the net pens and dispatched with a club. The ventral body surface was disinfected with a 100 ppm ovadine solution and wiped dry with paper towel. A small volume of milt was expressed prior to fertilization to remove any residual iodophore solution from the vent. Milt was expressed directly into the egg container which was gently swirled to distribute the sperm evenly throughout the eggs. Milt from a second (Beta) male was added to ensure fertilization in the event that the first (Alpha) male was infertile. The mixture was gently swirled to ensure even distribution of sperm. To ensure a 1:1 ratio of males to females each male was used as an alpha male for one female and as a beta male for another female.

The milt-egg mixture was allowed to sit for approximately 30 seconds after which time IHNV free water was added to activate the sperm. After activation, the milt-egg mixture was allowed to stand for approximately 2 minutes before decanting excess water and commencing with surface disinfecting the eggs. The fertilized eggs were disinfected by adding a 100 ppm solution of ovadine to the cup, to the point of overflowing. Gentle swirling ensured that all eggs were in contact with the iodophore solution. The ovadine

solution was then decanted and refilled again with 100 ppm ovadine solution, repeating the rinsing procedure as necessary to remove excess sperm. The eggs were left in iodophore solution for 1 hour to allow for water hardening to occur. During this time, the iodophore solution was decanted and replaced if the colour of the solution lightened. The eggs were kept cool during the water hardening process by keeping the containers either in the shade or in coolers.

3.4 Egg Transport

The eggs were prepared for transport after fertilization and water hardening, in the following manner. First, the eggs, from a maximum of 24 females were drained from the ovadine solution, pooled together, and placed into large plastic bags. The large plastic bags with 2-3 L of IHNV free water added to suspend the eggs were placed in transport coolers on a solution of crushed ice and 2-3 L of 100 ppm ovadine solution. The bag was then tied off using a thick rubber-band to seal the bag completely and trap a pocket of air in the top of the bag which acted as a cushion. A thin layer of crushed ice was then added on top of the sealed bag and the cooler was closed and sealed for transport to the hatchery. Immediately prior to transport the ovadine and ice solution in the coolers was drained.

3.5 Disease Sampling

Sampling of kidney tissue and ovarian fluid, for BKD antigen and IHNV respectively, was carried out during egg takes. A total of 60 kidney (anterior and posterior) and ovarian samples were taken. Disease samples were sent with the egg shipments to Snettisham Hatchery where they were forwarded to the Juneau Fish Pathology Lab for analysis.

In addition to the above samples, otoliths and length data were collected from approximately 400 broodstock (200 males and 200 females). These samples were provided to DFO - Whitehorse.

3.6 Communication

A portable satellite phone and satellite based internet was present at the camp and used to communicate between field crews, Triton staff, DFO and Tsayta Air/Pacific Western Helicopters.

3.7 Demobilization

All materials were removed from the Tahltan Lake site by September 22nd and where required were flown to the Tsayta Air base in Telegraph Creek. Triton Environmental Equipment was transported to Terrace via Triton staff and vehicles.

All adult holding pens were moved to the open area on the ridge above the spawning grounds. Lumber, racks and tables were also moved to this area and stacked. The wood

frame spawning shed was left on the beach. Some egg transport coolers and an inventory of egg take supplies were stored in the storage shed at the camp (Appendix 2).

The following list outlines demobilization activities conducted during the project and to close down the cabin for the year:

- The weir was removed and appropriately stored.
- The shower, laundry and kitchen were cleaned and drained.
- The aluminum boats were pulled from the lake.
- Boat motors were racked, and had their fluids treated.
- Excess gasoline was treated and stored behind the fuel shed.
- Propane tanks were stored behind the fuel shed.
- No food was left in camp.
- All open food stuffs and garbage was burned.

4.0 RESULTS

The field portion of the 2011 Tahltan Lake sockeye egg-take was conducted from August 29th to September 20th, 2010. 2,216 females and 2,216 males were spawned during the egg-take (Table 1). In addition to these fish, 31 males and 96 females were rejected during the egg-takes based on the following criteria; spent gametes (12 males, 10 females), pen mortalities (19 males, 6 females), un-ripe (36 females), partially spawned (33 females), hemorrhaged (7 females), and water hardened eggs (4 females).

As per the 2011 DFO contract, all the un-ripe (green) females that were captured by both seining and alternative-fishing were held in holding pens until they became ripe for egg-harvest. Details of holding numbers are contained in Table 4.

The total number of females captured through both seine-netting and alternative fishing was 3018, of which 2533 were caught seining, and 485 through alternative fishing. The majority of the total fish captured by alternative fishing were caught at the most southern collection site (approximately 90% of the total number). Alternative fishing data is summarized in Appendix 2.

A total of 6.05 million eggs were harvested based on an estimated average fecundity of 2,730 eggs per female (Table 1). The eggs were collected over 13 egg take days, of which, 4 loads of eggs were delayed in shipment to the hatchery (delays occurred only on back-to-back egg take days so as to minimize the number of flights required to Snettisham Hatchery). The average percent survival to the 2-4 cell stage was 89.3% (Table 1), compared to 87.5% average percent survival to the 2-4 cell stage in 2010 (pers. comm. K.Steck: Snettisham Hatchery). Lake water temperature during the egg takes ranged from 10.3 – 13.5 °C and upon receipt at the hatchery average core egg temperature ranged from 3.2 to 7.9 °C (Table 1 and Figure 2).

A total of 60 ovarian fluid and kidney tissue samples were collected over the egg take project (Table 3). The Juneau Fish Pathology Laboratory is in the process of analyzing

the samples for IHNV and BKD antigen prevalence. The results were not available at the time this report was prepared.

Four hundred (400) broodstock (200 males and 200 females) were sampled for otoliths. Table 3 indicates the otolith numbers and boxes used. Post orbital hypural lengths (POHL) and Fork length (FL) were also measured to cross reference otolith samples. Mean (\pm SD) female (n=200) and male (n=200) length measurements were; 651.4 mm \pm 20.8 (FL), and 511.2 mm \pm 17.4 (POHL), and 683.0 mm \pm 22.3 (FL) and 520.0 mm \pm 19.2 (POHL), respectively (Appendix 1).

At Tahltan Lake, a total of 34,588 sockeye was enumerated through the weir which was decommissioned for the year on September 1, 2011. Of the total escapement, 51.2% of the return was female resulting in 12.5% of the female escapement used for broodstock (B. Waugh, DFO Whitehorse Personal Communication 2011).

5.0 COMMENT

The Tahltan Lake 2011 sockeye egg-take brood stock collection began on August 28th, 2011 and ended on September 18th, 2011 with the last egg take being completed on September 20th, 2011.

The Tahltan Lake egg-take project encountered very few problems. Pacific Western Helicopters transported the eggs on two occasions (Sept 10th and Sept 20th) as inclement weather forced the use of the helicopter.

The floating and anchoring of the cages in deep water once again appeared to address some of the problems encountered in previous years with bears damaging and releasing broodstock. During the 2011 egg take project no damage to equipment or property due to bears occurred. To prevent pens from dislodging, two anchors were attached to each pen as opposed to one pre-2011, and this was successful in holding pens stable even in the high winds of September 9th.

During a windstorm on the evening of September 9th, the edges of the tarps covering two pens containing green females were blown up high enough to allow a significant number of females (162) to escape. Any such further incident was prevented by applying zap straps from the un-attached edges of the tarps to the pens.

The alternative fishing program was successfully able to supplement the seining efforts with more female sockeye salmon (see Appendix 2 - total females captured by alternative fishing = 485). There were four days (Sept 10-13th) on which alternative fishing could not operate as the required gear needed to continue was delayed due to roads being washed out near Bell 2. However, as seining was more successful this year in obtaining the required number of females, the lower number of females captured through alternative fishing (485 females in 10 days as opposed to 709 females in 13 days in 2010) was not a barrier to completing the project.

Significant factors which increased effectiveness of alternative fishing were calm, sunny weather and polarized sun-glasses – both of which improved visibility. The alternative fishing crew (two members) was significantly more successful on sunny calm days than on rainy or windy days (see Appendix 2). Polarized sun-glasses are highly recommended in improving a fisherman's ability to differentiate between male and female sockeye from the boat.

The recent US Canada Agreement on Transboundary enhanced stocks has linked harvest targets to production goals. This has resulted in an increased desire to maximize Stikine enhancement opportunities. Future programs will need to be flexible and communication, as done this year, important in making in-season adjustments to egg collection efforts. As done this year, prior to entering the field work a schedule of activities needs to be developed that includes milestone dates where the efforts can be re-assessed and if required changes to effort initiated. It is important that all involved are aware that changes may be taking place that could possibly result in additional efforts or extensions. Identification and adherence to communication schedules and protocols is of central importance for a more flexible/adaptable program. This will help in contingency planning.

As per request in the 2010 report, DFO provided new lumber for the construction of a much-needed new egg-take shelter. On September 9th, the egg-take crew spent the majority of the day constructing the new shelter.

The following is a list of recommendations for DFO to consider for next year:

- Consider constructing 4 to 6 vexar pens (size 8' x 4' x 4').
- Acquire new lumber for the structure at the spawning site as the shed platform needs to be replaced/repared (floor is sagging).

Table 1. 2011 Tahltan Lake sockeye egg take data summary.

Egg Take Number	Date	Number of Females Spawned	Number of Males Spawned	Average Fecundity (Estimate)	Milt Quality	Status when Shipped	Lake Water Temp. (°C)		Average Lake Water Temp. (°C)	Average Core Egg Temp. (°C) (3)	Survival %	
							Min.	Max.				
1	29-Aug	150	150	2,730	good	water hardened	13.0	14.0	13.5	7.6		
2	31-Aug	128	128	2,730	good	water hardened	12.0	13.5	12.8	7.4		
3	02-Sep	114	114	2,730	good	water hardened	12.0	12.0	12.0	6.7		
4	04-Sep	164	164	2,730	good	water hardened	12.0	13.0	12.5	6.4		
5	07-Sep	154	154	2,730	good	water hardened	11.5	12.0	11.8	7.9		
6 ²	09-Sep	176	176	2,730	good	water hardened	11.0	12.0	11.5	4.4		
7	10-Sep	190	190	2,730	good	water hardened	11.0	12.0	11.5	5.8		
8	12-Sep	220	220	2,730	good	water hardened	11.0	13.0	12.0	5.9		
9	14-Sep	220	220	2,730	good	water hardened	10.0	12.0	11.0	5.8		
10	16-Sep	220	220	2,730	good	water hardened	11.0	13.0	12.0	3.2		
11	17-Sep	176	176	2,730	good	water hardened	10.0	11.0	10.5	6.0		
12	19-Sep	176	176	2,730	good	water hardened	10.5	11.0	10.8	4.4		
13	20-Sep	128	128	2,730	good	water hardened	10.0	10.5	10.3	5.7		
Totals		2216	2216						11.7	5.9		

Note:

- (1) This value is the average percent survival to 2-4 cell based on the available information from Snettisham hatchery.
- (2) Shading indicates egg takes which were held over one night and shipped to the hatchery the next day:
Egg take No. 6 held over and shipped on Sept. 10, Egg-take No. 8 held take and shipped on Sept 13,
Egg take No. 10 held over and shipped on Sept. 17, Egg-take No. 12 held over and shipped on Sept 20.
- (3) Average core temperature is actually the average of range values from a given lot, hatchery water temperature ranged from and averaged 5.0°C..

Table 2. 2011 Tahltan Lake sockeye egg take sample record

Date	Samples taken			
	IHN	BKD	Female Otolith	Male Otolith
29-Aug	0	0	19	18
31-Aug	0	0	19	19
02-Sep	0	0	26	26
04-Sep	0	0	10	11
07-Sep	10	10	23	22
09-Sep	10	10	22	22
10-Sep	10	10	15	14
12-Sep	10	10	22	22
14-Sep	10	10	22	22
16-Sep	10	10	22	24
Total	60	60	200	200

Figure 2. Number of eggs collected, mean surface water temperature at Tahltan Lake, and mean core egg temperature during the 2011 sockeye egg take.

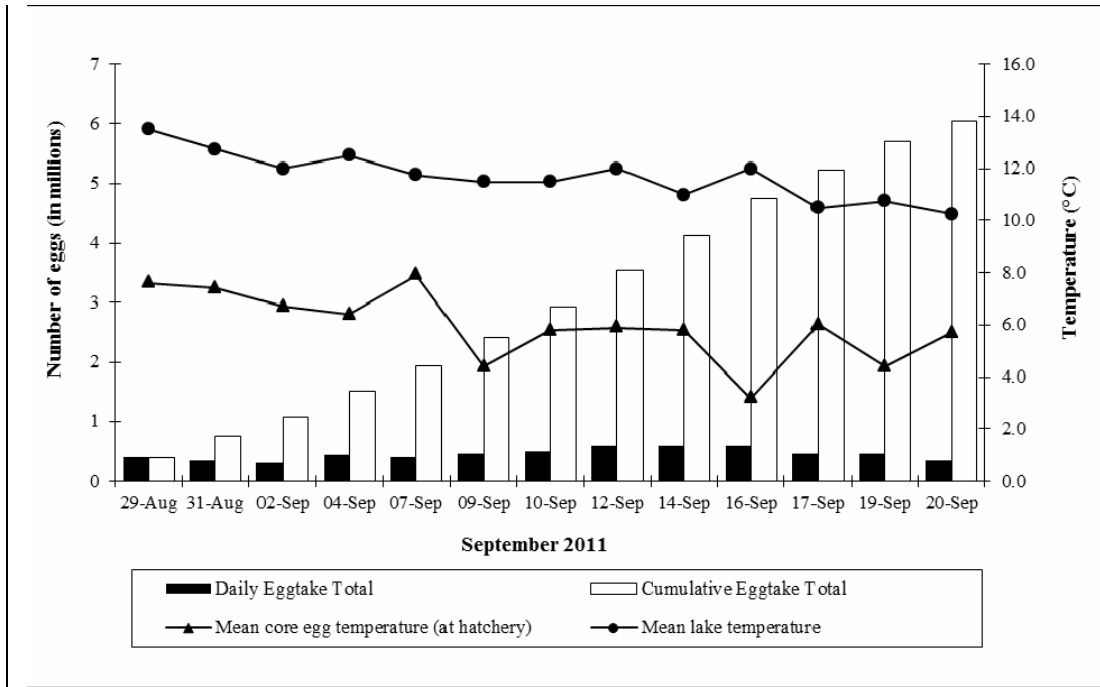


Table 3. 2011 Tahltan Lake sockeye egg take otolith sample collection summary

Otolith Sampling Information	Sampling Dates (2011)									
	29-Aug	31-Aug	02-Sep	04-Sep	07-Sep	09-Sep	10-Sep	12-		
Females Sampled	19	19	26	10	23	22	15	2		
Males Sampled	18	19	26	11	22	22	14	2		
Cumulative Females Sampled	19	38	64	74	97	119	134	1		
Cumulative Males Sampled	18	37	63	74	96	118	132	1		
Female Otolith Numbers	1-19 Box 1	38 -56 Box 1	76 - 100 Box 1, 1 Box 2	28 - 37 Box 2	49 - 71 Box 2	94 - 100 Box 2, 1 - 15 Box 3	38 - 52 Box 3	67 - 8		
Male Otolith Numbers	20 - 37 Box 1	57 - 75 Box 1	2 - 27 Box 2	38 - 48 Box 2	72 - 93 Box 2	16 - 37 Box 3	53 - 66 Box 3	89 - Box 3 3101		

**note: 1 otolith in female vial 79, 83, 88, and 99 of box 1
1 otolith in male vial 498 and 499**

Table 4. 2011 Females holding numbers

Date placed in pen	Pen #	Females	Date sorted	Ripe	Green	Mortalities	Partials	Escaped	Comments
28-Aug	10	79	30-Aug	36	42	1	0	0	42 females placed into #13
30-Aug	11	132	01-Sep	29	99	0	0	4	99 females placed into #11
30-Aug	13	42	01-Sep	26	15	1	0	0	15 females placed into #11,
01-Sep	10	180	03-Sep	63	112	1	2	2	112 females placed into #8
01-Sep	11	119	03-Sep	51	65	1	1	1	65 females placed into #8
03-Sep	13	153	05-Sep	44	101	2	0	6	101 females added to #12
03-Sep	8	181	05-Sep	65	115	0	1	0	115 females added to #12
05-Sep	11	155	08-Sep	61	92	2	0	0	13 females added to #4
05-Sep	12	216	08-Sep	61	153	0	0	2	29 females added to #4
Sep 5 to 8	10	166	08-Sep	94	51	7	12	2	51 females placed into pen #8
08-Sep	8	296	11-Sep	87	173	2	0	34*	173 females added to #10
08-Sep	13	161	11-Sep	17	15	1	0	128*	15 females added to #10
Sep 8 to 9	10	50	11-Sep	30	16	0	4	0	16 females added to #10
11-Sep	11	263	13-Sep	100	159	0	2	2	159 females added to #8
11-Sep	10	187	13-Sep	61	124	2	0	0	124 females added to #8
13-Sep	13	119	15-Sep	40	77	1	1	0	77 females added to #12
13-Sep	8	287	15-Sep	107	172	4	4	0	172 females added to #12
Sep 14 to 15	10	119	15-Sep	60	41	2	16	0	41 females added to #12
15-Sep	11	85	18-Sep	36	45	4	0	0	45 females added to #8
15-Sep	12	274	18-Sep	105	159	4	4	2	159 females added to #8
Sep 15 to 17	10	142	18-Sep	90	48	0	4	0	48 females added to #8
18-Sep	8	252	20-Sep						252 Green Females released due to meeting quota
Total				1263	1791	35	51	183	

Total of 1791 greens captured and held over (including all fish caught alternative fishing, and not counting re-sorted greens), 1267 of which became ripe and were used in egg takes.

*note: Sept 9th was the date of the severe windstorm which compromised the pens

@note: grey colored bars represent alternative-fishing pens

Table 5: 2011 Alternative Fishing Female Captures		
Date	Females Captured	Weather / Comments
Aug-29	0	
Aug-30	0	
Aug-31	0	
Sep-01	0	
Sep-02	0	
Sep-03	0	
Sep-04	0	
Sep-05	26	Commencement - Raining
Sep-06	28	Raining
Sep-07	64	Sunny and calm
Sep-08	57	Raining
Sep-09	41	Raining
Sep-10	0	No gear due to Road Washout
Sep-11	0	No gear due to Road Washout
Sep-12	0	No gear due to Road Washout
Sep-13	0	No gear due to Road Washout
Sep-14	58	Rain and Wind
Sep-15	70	Sunny with moderate wind
Sep-16	88	Sunny and calm
Sep-17	53	Variably Windy – last day
Sep-18	0	
Sep-19	0	
Sep-20	0	
Total	485	

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6.0 APPENDICES

Appendix 1. 2011 Tahltan Lake sockeye egg take: otolith sampling and length measurement data

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
29-Aug	1	1	663	515	F
29-Aug	2	1	675	520	F
29-Aug	3	1	660	515	F
29-Aug	4	1	655	510	F
29-Aug	5	1	680	530	F
29-Aug	6	1	675	525	F
29-Aug	7	1	650	505	F
29-Aug	8	1	640	510	F
29-Aug	9	1	670	505	F
29-Aug	10	1	640	495	F
29-Aug	11	1	675	530	F
29-Aug	12	1	665	525	F
29-Aug	13	1	660	520	F
29-Aug	14	1	635	520	F
29-Aug	15	1	660	510	F
29-Aug	16	1	645	535	F
29-Aug	17	1	645	510	F
29-Aug	18	1	645	510	F
29-Aug	19	1	685	535	F
29-Aug	20	1	685	505	M
29-Aug	21	1	720	545	M
29-Aug	22	1	681	531	M
29-Aug	23	1	711	539	M
29-Aug	24	1	672	520	M
29-Aug	25	1	700	519	M
29-Aug	26	1	702	534	M
29-Aug	27	1	712	530	M
29-Aug	28	1	699	520	M
29-Aug	29	1	700	540	M
29-Aug	30	1	680	520	M
29-Aug	31	1	655	490	M
29-Aug	32	1	640	500	M
29-Aug	33	1	711	535	M
29-Aug	34	1	664	501	M
29-Aug	35	1	615	471	M
29-Aug	36	1	620	472	M
29-Aug	37	1	680	490	M
31-Aug	38	1	655	593	F
31-Aug	39	1	685	532	F

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
31-Aug	40	1	650	481	F
31-Aug	41	1	690	530	F
31-Aug	42	1	659	510	F
31-Aug	43	1	657	510	F
31-Aug	44	1	649	522	F
31-Aug	45	1	661	519	F
31-Aug	46	1	665	522	F
31-Aug	47	1	661	508	F
31-Aug	48	1	643	504	F
31-Aug	49	1	629	510	F
31-Aug	50	1	600	480	F
31-Aug	51	1	585	462	F
31-Aug	52	1	630	492	F
31-Aug	53	1	635	481	F
31-Aug	54	1	635	509	F
31-Aug	55	1	627	505	F
31-Aug	56	1	660	500	F
31-Aug	57	1	675	530	M
31-Aug	58	1	681	540	M
31-Aug	59	1	680	525	M
31-Aug	60	1	671	522	M
31-Aug	61	1	724	560	M
31-Aug	62	1	622	480	M
31-Aug	63	1	690	524	M
31-Aug	gt	1	675	520	M
31-Aug	65	1	715	540	M
31-Aug	66	1	701	542	M
31-Aug	67	1	720	540	M
31-Aug	68	1	699	525	M
31-Aug	69	1	709	531	M
31-Aug	70	1	709	532	M
31-Aug	71	1	710	548	M
31-Aug	72	1	620	471	M
31-Aug	73	1	702	525	M
31-Aug	74	1	618	470	M
31-Aug	75	1	650	504	M
02-Sep	76	1	652	505	F
02-Sep	77	1	635	499	F
02-Sep	78	1	644	502	F
02-Sep	79	1	665	512	F
02-Sep	80	1	655	520	F
02-Sep	81	1	657	510	F
02-Sep	82	1	609	471	F
02-Sep	83	1	682	541	F
02-Sep	84	1	605	480	F
02-Sep	85	1	670	524	F

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
02-Sep	86	1	665	521	F
02-Sep	87	1	675	532	F
02-Sep	88	1	595	464	F
02-Sep	89	1	672	534	F
02-Sep	90	1	660	519	F
02-Sep	91	1	663	514	F
02-Sep	92	1	599	480	F
02-Sep	93	1	671	519	F
02-Sep	94	1	650	500	F
02-Sep	95	1	606	480	F
02-Sep	96	1	655	522	F
02-Sep	97	1	650	494	F
02-Sep	98	1	667	520	F
02-Sep	99	1	671	522	F
02-Sep	100	1	655	524	F
02-Sep	1	2	605	480	F
02-Sep	2	2	690	525	M
02-Sep	3	2	681	532	M
02-Sep	4	2	682	523	M
02-Sep	5	2	630	481	M
02-Sep	6	2	657	492	M
02-Sep	7	2	670	510	M
02-Sep	8	2	682	510	M
02-Sep	9	2	685	519	M
02-Sep	10	2	690	502	M
02-Sep	11	2	679	520	M
02-Sep	12	2	679	519	M
02-Sep	13	2	720	540	M
02-Sep	14	2	682	520	M
02-Sep	15	2	705	530	M
02-Sep	16	2	690	520	M
02-Sep	17	2	671	510	M
02-Sep	18	2	716	562	M
02-Sep	19	2	690	520	M
02-Sep	20	2	681	510	M
02-Sep	21	2	680	500	M
02-Sep	22	2	679	480	M
02-Sep	23	2	700	530	M
02-Sep	24	2	680	620	M
02-Sep	25	2	690	520	M
02-Sep	26	2	680	522	M
02-Sep	27	2	691	540	M
04-Sep	28	2	660	530	F
04-Sep	29	2	655	520	F
04-Sep	30	2	645	515	F
04-Sep	31	2	669	530	F

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
04-Sep	32	2	643	508	F
04-Sep	33	2	622	475	F
04-Sep	34	2	642	507	F
04-Sep	35	2	661	520	F
04-Sep	36	2	636	504	F
04-Sep	37	2	639	518	F
04-Sep	38	2	692	521	M
04-Sep	39	2	681	490	M
04-Sep	40	2	678	510	M
04-Sep	41	2	641	472	M
04-Sep	42	2	703	525	M
04-Sep	43	2	702	531	M
04-Sep	44	2	680	532	M
04-Sep	45	2	675	510	M
04-Sep	46	2	692	532	M
04-Sep	47	2	700	529	M
04-Sep	48	2	695	509	M
07-Sep	49	2	666	525	F
07-Sep	50	2	657	512	F
07-Sep	51	2	654	517	F
07-Sep	52	2	667	514	F
07-Sep	53	2	637	502	F
07-Sep	54	2	681	530	F
07-Sep	55	2	630	504	F
07-Sep	56	2	642	503	F
07-Sep	57	2	620	481	F
07-Sep	58	2	653	502	F
07-Sep	59	2	671	543	F
07-Sep	60	2	615	487	F
07-Sep	61	2	672	530	F
07-Sep	62	2	650	520	F
07-Sep	63	2	649	510	F
07-Sep	64	2	646	512	F
07-Sep	65	2	650	520	F
07-Sep	66	2	631	522	F
07-Sep	67	2	650	511	F
07-Sep	68	2	665	530	F
07-Sep	69	2	645	524	F
07-Sep	70	2	660	535	F
07-Sep	71	2	681	531	F
07-Sep	72	2	692	530	M
07-Sep	73	2	675	510	M
07-Sep	74	2	670	522	M
07-Sep	75	2	671	520	M
07-Sep	76	2	673	533	M
07-Sep	77	2	684	515	M

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
07-Sep	78	2	703	522	M
07-Sep	79	2	670	510	M
07-Sep	80	2	710	522	M
07-Sep	81	2	680	515	M
07-Sep	82	2	703	545	M
07-Sep	83	2	705	549	M
07-Sep	84	2	692	520	M
07-Sep	85	2	690	519	M
07-Sep	86	2	691	525	M
07-Sep	87	2	692	520	M
07-Sep	88	2	713	535	M
07-Sep	89	2	690	523	M
07-Sep	90	2	654	510	M
07-Sep	91	2	660	520	M
07-Sep	92	2	681	522	M
07-Sep	93	2	705	545	M
09-Sep	94	2	666	520	F
09-Sep	95	2	660	500	F
09-Sep	96	2	670	520	F
09-Sep	97	2	641	501	F
09-Sep	98	2	666	530	F
09-Sep	99	2	660	510	F
09-Sep	100	2	670	515	F
09-Sep	1	3	695	535	F
09-Sep	2	3	655	507	F
09-Sep	3	3	636	505	F
09-Sep	4	3	667	510	F
09-Sep	5	3	668	520	F
09-Sep	6	3	685	535	F
09-Sep	7	3	645	520	F
09-Sep	8	3	655	529	F
09-Sep	9	3	700	530	F
09-Sep	10	3	652	501	F
09-Sep	11	3	649	510	F
09-Sep	12	3	662	504	F
09-Sep	13	3	621	490	F
09-Sep	14	3	636	502	F
09-Sep	15	3	645	490	F
09-Sep	16	3	650	495	M
09-Sep	17	3	660	490	M
09-Sep	18	3	682	510	M
09-Sep	19	3	651	495	M
09-Sep	20	3	675	521	M
09-Sep	21	3	653	503	M
09-Sep	22	3	685	535	M
09-Sep	23	3	655	495	M

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
09-Sep	24	3	682	521	M
09-Sep	25	3	665	510	M
09-Sep	26	3	671	520	M
09-Sep	27	3	722	538	M
09-Sep	28	3	705	548	M
09-Sep	29	3	669	492	M
09-Sep	30	3	660	503	M
09-Sep	31	3	665	508	M
09-Sep	32	3	669	518	M
09-Sep	33	3	690	522	M
09-Sep	34	3	699	528	M
09-Sep	35	3	691	532	M
09-Sep	36	3	672	510	M
09-Sep	37	3	705	535	M
10-Sep	38	3	635	490	F
10-Sep	39	3	675	542	F
10-Sep	40	3	657	513	F
10-Sep	41	3	656	520	F
10-Sep	42	3	654	503	F
10-Sep	43	3	672	541	F
10-Sep	44	3	692	540	F
10-Sep	45	3	623	480	F
10-Sep	46	3	620	481	F
10-Sep	47	3	622	483	F
10-Sep	48	3	639	490	F
10-Sep	49	3	672	531	F
10-Sep	50	3	650	502	F
10-Sep	51	3	643	510	F
10-Sep	52	3	650	491	F
10-Sep	53	3	703	531	M
10-Sep	54	3	710	531	M
10-Sep	55	3	662	498	M
10-Sep	56	3	681	509	M
10-Sep	57	3	671	512	M
10-Sep	58	3	683	519	M
10-Sep	59	3	672	510	M
10-Sep	60	3	681	532	M
10-Sep	61	3	680	538	M
10-Sep	62	3	680	522	M
10-Sep	63	3	671	525	M
10-Sep	64	3	669	522	M
10-Sep	65	3	661	520	M
10-Sep	66	3	691	530	M
12-Sep	67	3	625	505	F
12-Sep	68	3	645	500	F
12-Sep	69	3	680	515	F

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
12-Sep	70	3	650	510	F
12-Sep	71	3	695	530	F
12-Sep	72	3	665	510	F
12-Sep	73	3	655	520	F
12-Sep	74	3	635	495	F
12-Sep	75	3	635	505	F
12-Sep	76	3	625	485	F
12-Sep	77	3	675	525	F
12-Sep	78	3	635	495	F
12-Sep	79	3	635	500	F
12-Sep	80	3	695	535	F
12-Sep	81	3	655	530	F
12-Sep	82	3	685	535	F
12-Sep	83	3	665	535	F
12-Sep	84	3	640	510	F
12-Sep	85	3	665	520	F
12-Sep	86	3	660	520	F
12-Sep	87	3	670	525	F
12-Sep	88	3	650	510	F
12-Sep	89	3	675	520	M
12-Sep	90	3	700	515	M
12-Sep	91	3	715	535	M
12-Sep	92	3	680	515	M
12-Sep	93	3	685	530	M
12-Sep	94	3	655	500	M
12-Sep	95	3	680	530	M
12-Sep	96	3	685	530	M
12-Sep	97	3	695	520	M
12-Sep	98	3	650	495	M
12-Sep	99	3	705	545	M
12-Sep	100	3	720	555	M
12-Sep	401	4	665	520	M
12-Sep	402	4	675	505	M
12-Sep	403	4	675	515	M
12-Sep	404	4	690	535	M
12-Sep	405	4	690	540	M
12-Sep	406	4	680	520	M
12-Sep	407	4	710	535	M
12-Sep	408	4	695	525	M
12-Sep	409	4	660	505	M
12-Sep	410	4	710	540	M
14-Sep	411	4	665	505	F
14-Sep	412	4	625	505	F
14-Sep	413	4	650	505	F
14-Sep	414	4	655	510	F
14-Sep	415	4	655	530	F

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
14-Sep	416	4	665	520	F
14-Sep	417	4	640	510	F
14-Sep	418	4	630	505	F
14-Sep	419	4	640	515	F
14-Sep	420	4	635	510	F
14-Sep	421	4	610	495	F
14-Sep	422	4	630	520	F
14-Sep	423	4	650	505	F
14-Sep	424	4	675	520	F
14-Sep	425	4	625	505	F
14-Sep	426	4	645	505	F
14-Sep	427	4	635	495	F
14-Sep	428	4	660	510	F
14-Sep	429	4	625	505	F
14-Sep	430	4	660	520	F
14-Sep	431	4	665	515	F
14-Sep	432	4	650	500	F
14-Sep	433	4	671	503	M
14-Sep	434	4	702	530	M
14-Sep	435	4	720	570	M
14-Sep	436	4	661	510	M
14-Sep	437	4	691	522	M
14-Sep	438	4	700	520	M
14-Sep	439	4	635	542	M
14-Sep	440	4	710	542	M
14-Sep	441	4	700	520	M
14-Sep	442	4	699	503	M
14-Sep	443	4	672	530	M
14-Sep	444	4	710	531	M
14-Sep	445	4	695	532	M
14-Sep	446	4	709	541	M
14-Sep	447	4	702	520	M
14-Sep	448	4	660	511	M
14-Sep	449	4	690	510	M
14-Sep	450	4	681	522	M
14-Sep	451	4	715	541	M
14-Sep	452	4	671	506	M
14-Sep	453	4	682	520	M
14-Sep	454	4	720	541	M
16-Sep	455	4	651	500	F
16-Sep	456	4	642	489	F
16-Sep	457	4	663	513	F
16-Sep	458	4	670	510	F
16-Sep	459	4	642	501	F
16-Sep	460	4	671	528	F
16-Sep	461	4	640	492	F

Date 2011	Otolith		FL mm	POHL mm	Sex
	No.	Box No.			
16-Sep	462	4	645	504	F
16-Sep	463	4	640	500	F
16-Sep	464	4	652	510	F
16-Sep	465	4	601	470	F
16-Sep	466	4	652	520	F
16-Sep	467	4	620	485	F
16-Sep	468	4	650	510	F
16-Sep	469	4	651	519	F
16-Sep	470	4	681	530	F
16-Sep	471	4	645	510	F
16-Sep	472	4	638	480	F
16-Sep	473	4	641	500	F
16-Sep	474	4	622	491	F
16-Sep	475	4	655	510	F
16-Sep	476	4	701	550	F
16-Sep	477	4	685	510	M
16-Sep	478	4	680	530	M
16-Sep	479	4	651	500	M
16-Sep	480	4	632	500	M
16-Sep	481	4	695	531	M
16-Sep	482	4	680	520	M
16-Sep	483	4	660	509	M
16-Sep	484	4	605	467	M
16-Sep	485	4	680	520	M
16-Sep	486	4	671	519	M
16-Sep	487	4	711	542	M
16-Sep	488	4	703	532	M
16-Sep	489	4	669	489	M
16-Sep	490	4	682	501	M
16-Sep	491	4	675	511	M
16-Sep	492	4	652	485	M
16-Sep	493	4	704	530	M
16-Sep	494	4	690	520	M
16-Sep	495	4	691	531	M
16-Sep	496	4	682	500	M
16-Sep	497	4	691	510	M
16-Sep	498	4	705	525	M
16-Sep	499	4	700	531	M
16-Sep	500	4	681	520	M

Appendix 2. 2011 Inventory.

Qty	Item
2	boxes of egg cups (box - 250 cups)
1.5	boxes of egg cup lids (box - 500 lids)
2	boxes of paper towel rolls (box - 24 rolls)
1	castrator (property of ARC Environmental Ltd)
200	castrator bands
2	ducksback paper refill
3	field book cover
2	water jugs for IHN free water
20	egg transport cooler
2	field thermometer
3	jugs for ovadine
1	egg strainer
100	egg transport bag
1.5 box	ovarian fluid pipette
500	whirl pack
13	transport form
1 box	test tube
4 boxes + 2.5 jugs	ovadine (4 jugs)
1	otolith knife
1	measuring tape
2	1:100 ovadine measuring cup
2	measuring tape
more bonkers needed	assorted bonkers, tailers and basins
7	rolls of vexar assorted lengths
1	first aid kit
50	zak knives
6.5	boxes of cotton gloves (11 pairs per box)
7	pkg of zap straps
5	bear spray
15	pounds of U - nails
10	pounds of assorted nails
5	box of J - cloths
1	assorted gear for IHN and BKD sampling
6	assorted tarps
0	seine net (ARC Environmental Ltd.)
1	small seine net (origin unknown)
1	case of motor oil for outboard mix
7	basins for ovadine baths
3	scrub brushes
1	wooden push broom
6	new markers
1	zodiac repair kit
1	JB weld kit
10	spools of net mending twine
10	life jackets
1	assorted pots and pans
2	Float and rope for anchoring system
2	boat gas tanks
1	plastic jerry can
5	litres of 2-cycle engine oil
3 sets old, 1 set new	pairs of waders (size 9 (2) and 10 (1))
25	egg baskets
2 coolers	muslin
7.5	rolls duct tape
60	garbage bags
2	staple guns
1	pkg of staples
2	tubes of shoe goo
1	roll of hay-wire
6	1 L propane cans
need more for 2012	Burlap Sand Bags (unfilled)
6	anchors for net pens