JUVENILE COHO POPULATION ESTIMATES IN THE TELKWA RIVER PONDS MAY 1995

Prepared by

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for

DEPARTMENT OF FISHERIES AND OCEANS

RESOURCE RESTORATION SECTION

SALMONID ENHANCEMENT PROGRAM

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1.0 INTRODUCTION

The Department of Fisheries and Oceans (Resource Restoration Section) has undertaken a project to improve juvenile fish access into a series of ponds adjacent the Telkwa River. Two special "caged box inlet" structures (one with an outlet cage) were installed during the summer of 1993 at a location that has been routinely blocked by beavers in the past (Figure 1). An additional culvert was installed at the outlet of the upper pond. This upper culvert was protected by approximately 25 m of fencing above and below the culvert. As well, floating logs were placed at the top end of the culvert to inhibit beaver dam construction.

Additional enhancement work undertaken included the excavation of a channel connecting the upper and lower ponds (half with debris and half with rock placements) and the development of three channels connected to the upper pond collecting seepage water evident during preliminary surveys. Debris was placed in one of these channels (Channel 2). No cover was added to Channel 1 and existing natural cover was left in Channel 3.

During May and June 1995, Pacific Northern Gas Ltd. excavated additional channels at the top end of Channel 1 (Figure 1). A channel 140 m long by 4 m wide was developed from the gas pipeline crossing to the top end of Channel 1. A second channel 40 m long by 3.5 m wide was excavated from the road crossing of the pipeline across to the top end of Channel 1. This work was undertaken to intercept groundwater flows noted at these locations and to run these flows into the existing ponds. Debris was added to these sections. In total approximately 720 m^2 of potential overwintering channel was developed. This work was conducted after the 1995 population estimates to ensure that pipeline excavation work conducted at the Telkwa River site during March 1995 did not affect groundwater inflows into the coho ponds.

David Bustard and Associates conducted population estimates in the ponds to determine the abundance and distribution of fish. This report summarizes the results of the fish sampling program for 1995. Fish population estimates conducted prior to the development work and for the first year after the project completion are reported in Bustard (1993 and 1994) respectively.

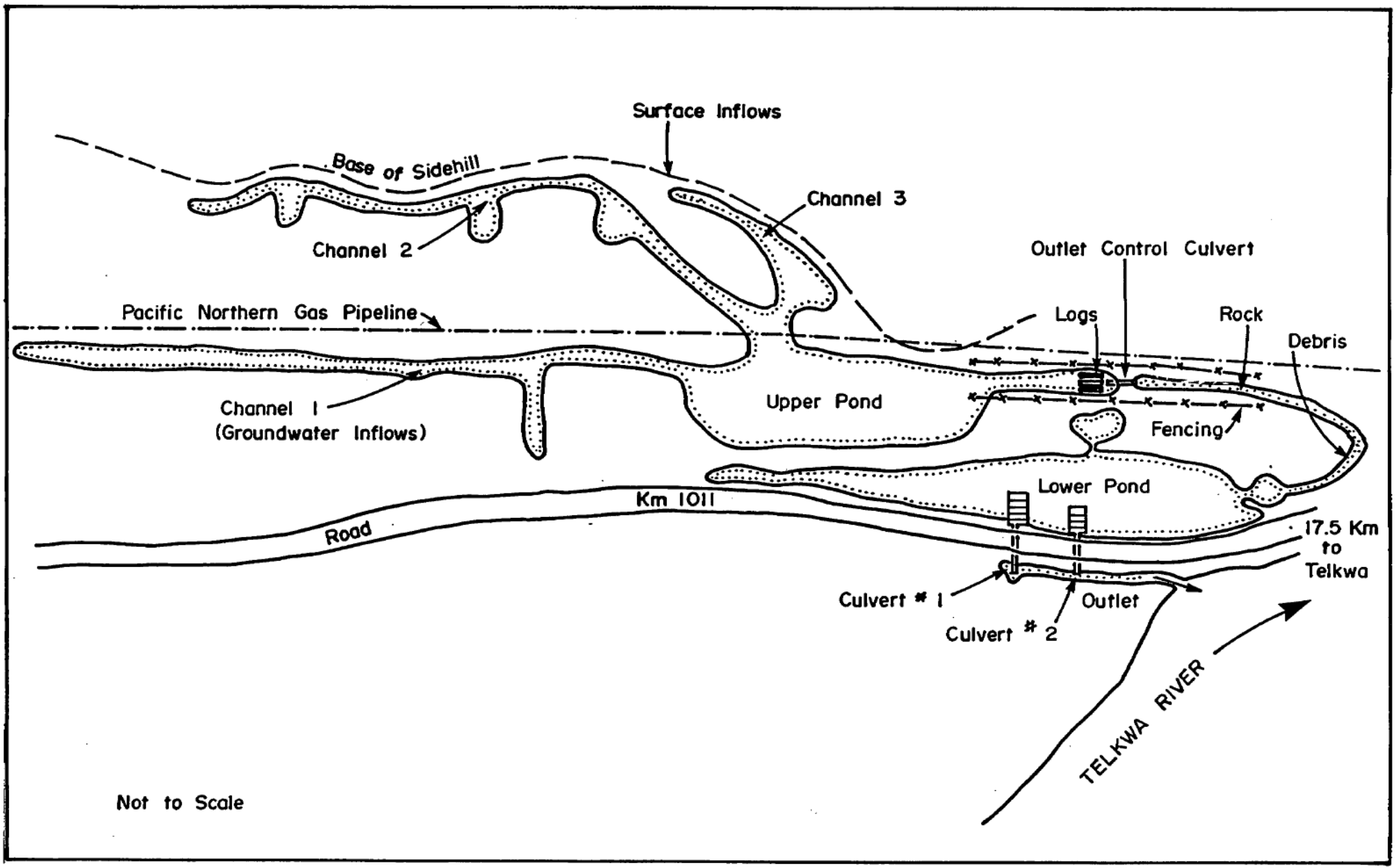

Figure 1. Approximate Configuration of Ponds at Km 11 on Telkwa River Forest Road, May 1994.

2.0 METHODS

Methods used were identical to those undertaken in 1994, except the surveys were conducted approximately 10 days earlier to ensure that the smolt migration had not already started. Mark-and-recapture estimates were conducted in the Telkwa ponds from May 5 to May 12, 1995 prior to the main period of smolt outmigration. The ponds were separated into seven sections (Figure 1) and 65 minnow traps baited with roe were set overnight throughout the ponds during the initial marking period as delineated in Table 1.

All fish captured during the May 5-6 surveys were marked with an upper caudal clip, measured to the nearest mm fork length, and released at the point of capture. A recapture was undertaken five days later. The same number of traps were used in each section for the recapture. All fish were measured and examined for marks prior to release.

Table 1. Location and Number of Minnow Traps Set in the Telkwa Ponds during May 1994.

LOCATION	NUMBER OF TRAPS[1]
Lower Pond	15
Connecting Creek - Debris	5
Connecting Creek - Rock	5
Upper Pond	10
Channel 1	10
Channel 2	10
Channel 3	10
TOTAL	**65**

Scales were retained from 52 coho ranging between 72 and 124 mm fork length. Five samples were retained from coho in each 5 mm size range.

Population estimates were conducted using the Chapman modification of the Petersen formula (Chapman 1951) and the 95% confidence intervals were calculated using the standard error of the estimate (Robson and Regier 1971). The estimates were separated by pond section and by coho less than or larger than 74 mm fork length.

[1] Note - the same numbers of traps were used in the recapture.

Visual observations suggested that many of the coho larger than this size were probably going to smolt in the near future.

The outlet of the culvert was blocked with a fine-mesh screen on the first day of the surveys to prevent fish movements in or out of the study area during the estimates. It should be noted that fish freely move between sections during the study, and although estimates were done by section, the combined estimate is probably more appropriate for estimating the total numbers of fish.

Water temperatures and dissolved oxygen levels (YSI Dissolved Oxygen Meter) were measured at 0.5 m depth intervals in each of the ponded sections. As well measurements of TDS (total dissolved solids) were recorded. This report also summarizes dissolved oxygen and temperature measurements conducted during February and March 1995 as part of a construction monitoring program for Pacific Northern Gas during their pipeline replacement project located just upstream from the ponds.

3.0 RESULTS

3.1 Access

The early May sampling was undertaken during a period of rapidly rising streamflows in the Telkwa River. Observations during May indicated that the peak flows in the Telkwa occurred during the recapture sample period (May 11 and 12) This coincided with a week of very hot temperatures in the study area.

There was no access difficulty for fry moving from the mainstem Telkwa River to the culverts at these flows. It was noted that Culvert #2 (60 cm diameter without screening on the outlet) was still blocked by a beaver dam midway through the culvert and appeared to be impassable to fish. The wire "box" inlets on both culverts apppear to be effective in deterring beavers from blocking the inlets to the culverts. The outlet mesh on the smaller Culvert #1 (40 cm diameter) was intact, and it is assumed this is the main entrance and exit route for fish using the ponds. This culvert was entirely submerged. A small beaver dam had been constructed on the short outlet stream below the culverts but was cleared by forest company road crews during late April.

Newly-emerged coho fry (30-35 mm fork length range) were observed in the stream channel immediately below the culvert on May 5, the first day of observations. Fry and yearling-sized fish continued to be observed at this location throughout May and into early

June[2]. These fish are too small to be captured in minnow traps (<45 mm) and do not appear in the fish sampling results. Several of these smaller fry were noted in the ponds above the culvert during May and June indicating that they are able to move through the culvert and into the site.

No beaver dams were evident in the channel between the upper and lower ponds. Water was flowing over the culvert (estimate 1-2 cfs) at this location similar to 1994. The culvert itself may have been placed too low in the creek. There was evidence of fresh beaver cuttings throughout the channels, particularly along Channels 1 and 2 and in the upper pond.

3.2 Water Quality

The results of the dissolved oxygen and water temperature sampling are presented in Appendix 1. Water temperatures in the pond areas during early May were 8-13°C compared to 5.5°C in the mainstem Telkwa River. Water temperatures in Section 5 (Channel 1) during February and March surveys were in the 3-4°C range, indicating a strong groundwater influence compared to the other sites. The upper end of Channel 1 was ice-free in mid-February, but developed ice cover during a cold period in late February. Ice cover on other sections of the ponds ranged from 25 to 100 cm thick during the early March period.

Measurements conducted at the top end of Channel 2 (Section 6) during March indicated that dissolved oxygen levels were less than 1 ppm (Appendix 1) and unsuitable for overwintering fish. Measurements conducted during March 1994 also indicated low dissolved oxygen levels in Channel 3 during the winter period (Bustard 1994).

Observations during May suggest that considerable mixing occurs in the channels due to wind action after the ice is off the ponds. Dissolved oxygen levels in the ponds were in the 6-10 ppm range during the May surveys (Appendix 1), similar to levels measured in 1993 and 1994 (Bustard 1993 and 1994). Conditions were suitable throughout the entire series of ponds for fish rearing during the early May surveys and trapping indicated that all of the channels were being utilized by coho in May[3].

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[2] This site was observed at least weekly during May and early June while conducting other fisheries work in the general area.

[3] We suspect that pockets of low dissolved oxygen may be present in some sections of Channel 2 during early May based on trap mortalities (3 coho) at one site.

3.3 Fish Sampling

Juvenile coho were present in all sections of the ponds. In total 657 juvenile coho were captured during the sampling (Table 2). This compares to 765 captured in 1994 for approximately the same effort. Small numbers of rainbow trout parr (4), Dolly Varden (1), mountain whitefish (1) and peamouth chub (1) were also captured, mainly in the creek section between the upper and lower ponds.

Coho smolts were feeding actively throughout the ponds, particularly in the lower ponds. Smolts were noted schooling near the culvert exits throughout May.

The CPUE of coho was similar in all sections (4.5-7.5 coho/trap) except in Channel 1 section where the CPUE was 2.7 coho per trap. This channel did not have any cover added during construction, and is the main source of groundwater inflows. The CPUE was slightly lower than in 1994 (Table 2).

Table 2. Summary of Fish Captured in Minnow Traps in Sections 1 to 7 of the Telkwa River Ponds, May 1994 and 1995.

SECTION	NUMBER OF TRAPS	COHO		COHO CPUE[4]	
		1994	1995	1994	1995
Lower Pond	30	160	180	5.3	6.0
Creek-Debris	10	102	74	10.2	7.4
Creek-Rock	10	61	55	6.1	5.5
Upper Pond	20	99	92	5.0	4.6
Channel 1	20	98	54	4.9	2.7
Channel 2[5]	20	115	92	5.8	4.6
Channel 3	20[6]	130	110	7.2	5.5
TOTAL	130	765	657	6.0	5.1

[4] CPUE refers to catch of coho per trap.

[5] 3 coho mortalities in one trap in this channel.

[6] 18 traps were used in this section in 1994.

Juvenile coho fork lengths ranged from 58-152 mm. The mean fork length of coho <75 mm was 70.2 mm while coho larger than 74 mm averaged 96.6 mm. This compares to 66.3 mm and 100.6 mm respectively for coho captured in 1994.

Although scales were taken for age analysis, this information was not available at the time of this report preparation. Length-age relationships for coho in these ponds may be quite variable depending upon time of entry into the ponds during the previous year.

Table 3 summarizes the results of the population estimates by section and size. The total population estimate for all coho in all sections was 1845 fish (95% confidence intervals of 1450-2241).

Table 3. Juvenile Coho Population Estimates in the Telkwa River Ponds, May 1994.

SECTION	SIZE CLASS (mm)	M[7]	C[8]	R[9]	N[10]	95% CI[11]
LOWER POND	>74	57	110	14	428	252-604
CREEK-DEBRIS	>74	31	36	3	295	31-559
CREEK-ROCK	>74	14	29	1	224	71-519
UPPER POND	>74	49	39	13	142	89-194
CHANNEL 1	>74	33	18	5	107	39-174
CHANNEL 2	>74	38	41	13	116	75-157
CHANNEL 3	>74	40	62	7	322	130-513
ALL SITES	>74	262	335	56	1549	1223-1875
ALL SITES	<75	23	32	0	791	761-2343
TOTAL	All	285	367	56	1845	1450-2241

[7] M refers to the number of coho initially marked.

[8] C refers to the total number of coho recaptured.

[9] R refers to the number of recaptured coho with marks.

[10] N refers to the estimated population.

[11] CI refers to confidence intervals.

Of this, 1549 (84%) were 75 mm or larger coho and it is assumed many of these fish will be leaving the ponds as smolts within a month of the sampling. A more detailed breakdown of the estimates by section is presented in Appendix 1. Juvenile coho estimates for smaller-sized coho were unreliable due to the poor recovery of marks.

Coho smolts were captured in all sections of the pond. It is expected that the estimates by section are skewed by fish moving between sections. In particular, fish that were marked in the creek section may have dropped into the lower pond, leading to a low estimate in this section and an unrealistically high estimate in the creek itself. Schools of coho smolts were observed in the lower ponds through until at least late May.

The total estimated population of coho in the ponds compared to previous sample results is presented in Table 4. The results indicate that approximately 800 fewer coho smolts were present in the ponds compared to the previous year. These estimates were well above the 222 smolts estimated in 1993 prior to pond development.

Table 4. Juvenile Coho Population Estimates in the Telkwa River Ponds, May 1993-95.

	COHO JUVENILE ESTIMATES	
	>74 mm (95% CI)	TOTAL
1993	222 (179-263)	1186
1994	2304 (1777-2832)	2640
1995	1549 (1223-1875)	1845

4.0 CONCLUSIONS AND RECOMMENDATIONS

The "caged box inlet" in conjunction with a wire cage on the outlet of a submerged culvert continues to provide an effective means of providing juvenile fish access into the Telkwa ponds without being blocked by beavers. As well, no dams were constructed at the outlet of the upper pond where fencing and a log debris placement were located at the outlet control culvert.

Water quality conditions were suitable for juvenile coho rearing throughout the complex during the mid-May period. However, measurements conducted during mid-March indicate dissolved oxygen levels are unsuitable in some sections of the ponds during the late winter.

The mark-and-recapture estimate conducted during May 1995 indicated approximately 1550 coho smolts were present in the pond complex at this time. This represents a seven-fold increase from the 1993 estimates but a 35% decline from the 1994 estimates.

The lower numbers of coho juveniles captured in the ponds suggest that the pond is capable of higher smolt production than observed in 1995 and that the ponds may be under-recruited. This may reflect a poor abundance of coho fry in the Telkwa watershed during the spring of 1994. Alternatively, the outlet to the ponds enters the Telkwa River in a rather fast-flowing section of the river and newly-emerged fry may have difficulty locating this very small stream during high flow conditions.

The following recommendations may improve juvenile coho production in the Telkwa River ponds:

1.) Consideration should be given to improving the likelihood of coho fry finding the outlet stream to the ponds by creating an area of slack water in the mainstem Telkwa River at the confluence. This could be achieved by some careful boulder placements to create an eddy at the entrance area of the creek into the Telkwa River itself.

2.) The poor water quality conditions that occur in Channels 2 and 3 might be improved by developing a channel connecting Channel 1 to the top end of Channel 2. This would encourage the movement of some of the groundwater inflows occurring in Channel 1 through areas in Channel 2 that have low dissolved oxygen levels during the late winter.

5.0 LITERATURE CITED

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Appendix 1. Summary of Disolved Oxygen and Water Temperatures in Telkwa Ponds During February–May 1995.

file = oxygen

STATION	DEPTH	FEBRUARY 26		MARCH 5		MARCH 17		MAY 5	
	(m)	DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP
		ppm	(C)	ppm	(C)	ppm	(C)	ppm	(C)
Section 1	0	8.7	0.5	9.2	0.1	13.0	0.0	9.5	13.0
	0.5	8.5	0.6	8.8	0.1	10.8	1.0	10.0	12.0
	1.0	8.5	1.0	6.5	1.0	8.8	1.9	10.0	11.0
	1.5	6.1	1.0	4.0	1.5	8.0	2.0	9.5	9.5
	2.0							10.4	9.0
	ICE = 80 cm			ICE = 100 cm		ICE = 40 cm		TDS = 120 ppm	
Section 4	0	7.0	2.0	7.2	1.8	8.5	1.9	8.0	12.0
	0.5	6.8	3.0	6.9	2.0	8.3	2.0	7.6	8.5
	1.0	6.6	3.0	6.8	2.5	8.3	2.1	7.5	8.0
	1.5	6.6	3.0	6.8	2.9	8.1	2.2	5.8	8.0
	2.0								
	2.5								
				ICE = 70 cm		ICE = 25 cm		TDS = 121 ppm	
Section 5	0			7.7	2.5	8.7	3.0	7.0	9.2
	0.5	7.5	4.0	7.7	3.5	<6	4.0		
				ICE = 15 cm		ICE = 10 cm		TDS = 136 ppm	
Section 6	0	–		1.2	1.0	0.1	1.5	7.6	13.2
	0.5			0.8	0.8	0.1	3.0	9.2	11.5
	1.0			0.1	2.9	0.5	3.0		
				ICE = 70 cm		ICE = 100 cm		TDS = 200 ppm	
Section 7	0							7.8	11.5
	0.5							8.4	8.2
								TDS = 142 ppm	
Telkwa River	0	13	0.1	12.9	0.1			11.8	5.5
								TDS = 37 ppm	
Creek outlet								10.1	11
								TDS = 118 ppm	

TELKWA PONDS POPULATION ESTIMATES – SECTIONS 1 AND 2

file = TELPOP95

SECTION 1 > 75 mm Lower Pond

# OF COHO MARKED MAY 5/6, 1994	57
# OF COHO CAUGHT MAY 11/12, 1994	110
# OF MARKED COHO RECAPTURED MAY 11/12	14

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{6438.00}{15} = 428.2$$

SE = 0.044097 0.209993 89.92 X 1.96 = 176.2 Is 95% conf N = 604.4 – 252.0

SECTION 2 > 75 mm Creek with Debris

# OF COHO MARKED MAY 5/6, 1994	31
# OF COHO CAUGHT MAY 11/12, 1994	36
# OF MARKED COHO RECAPTURED MAY 11/12	3

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{1184.00}{4} = 295.0$$

SE = 0.208397 0.456506 134.67 X 1.96 = 264.0 Is 95% conf N = 559.0 – 31.0

TELKWA PONDS POPULATION ESTIMATES – SECTIONS 3 AND 4

SECTION 3 > 75 mm Creek with rock

# OF COHO MARKED MAY 5/6, 1994	14
# OF COHO CAUGHT MAY 11/12, 1994	29
# OF MARKED COHO RECAPTURED MAY 11/12	1

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{450.00}{2} = 224.0$$

SE =	0.452296	0.672530	150.65 X 1.96 =	295.3	Is 95% conf N =	519.3 –	−71.3

SECTION 4 > 75 mm Upper Pond

# OF COHO MARKED MAY 5/6, 1994	49
# OF COHO CAUGHT MAY 11/12, 1994	39
# OF MARKED COHO RECAPTURED MAY 11/12	13

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{2000.00}{14} = 141.9$$

SE =	0.035482	0.188367	26.72 X 1.96 =	52.4	Is 95% conf N =	194.2 –	89.5

TELKWA PONDS POPULATION ESTIMATES – SECTIONS 5 and 6

SECTION 5 > 75 mm Channel 1

# OF COHO MARKED MAY 5/6, 1994	33
# OF COHO CAUGHT MAY 11/12, 1994	18
# OF MARKED COHO RECAPTURED MAY 11/12	5

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{646.00}{6} = 106.7$$

SE = 0.104066 0.322592 34.41 X 1.96 = 67.4 Is 95% conf N = 174.1 – 39.2

SECTION 6 > 75 mm Channel 2

# OF COHO MARKED MAY 5/6, 1994	38
# OF COHO CAUGHT MAY 11/12, 1994	41
# OF MARKED COHO RECAPTURED MAY 11/12	13

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{1638.00}{14} = 116.0$$

SE = 0.032651 0.180695 20.96 X 1.96 = 41.1 Is 95% conf N = 157.1 – 74.9

TELKWA PONDS POPULATION ESTIMATES – SECTION 7 AND COMBINED

SECTION 7 > 75 mm Channel 3

# OF COHO MARKED MAY 5/6, 1994	40
# OF COHO CAUGHT MAY 11/12, 1994	62
# OF MARKED COHO RECAPTURED MAY 11/12	7

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{2583.00}{8} = 321.9$$

SE = 0.092052 0.303401 97.66 X 1.96 = 191.4 Is 95% conf N = 513.3 – 130.5

ALL SITES COMBINED > 75 mm

# OF COHO MARKED MAY 5/6, 1994	262
# OF COHO CAUGHT MAY 11/12, 1994	335
# OF MARKED COHO RECAPTURED MAY 11/12	56

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{88368.00}{57} = 1549.3$$

SE = 0.011503 0.107252 166.17 X 1.96 = 325.7 Is 95% conf N = 1875.0 – 1223.6

TELKWA POND POPULATION ESTIMATES – ALL SITES COMBINED < 75 mm

ALL SITES COMBINED < 75 mm

# OF COHO MARKED MAY 5/6, 1994	23
# OF COHO CAUGHT MAY 11/12, 1994	32
# OF MARKED COHO RECAPTURED MAY 11/12	0

$$N = \frac{(M+1)(C+1)}{R+1}$$

$$N = \frac{792.00}{1} = 791.0$$

SE = 1.002532 1.001265 792.00 X 1.96 = 1552.3 Is 95% conf N = 2343.3 – −761.3

TELKWA COHO PONDS

file = len95

DATE	LENGTH	MARK Section 1	MARK Section 2	MARK Section 3	MARK Section 4	MARK Section 5	MARK Section 6	MARK Section 7	RECAPS Section 1	RECAPS Section 2	RECAPS Section 3	RECAPS Section 4	RECAPS Section 5	RECAPS Section 6	RECAPS Section 7
May 6		67	62	65	73	65	58	73	67	62	67	72	72	68	66
		70	68	67	75	76	72	73	71	68	70	73	80	68	68
		70	74	68	78	76	74	74	72	70	73	75	90	69	68
		72	75	68	78	78	76	74	72	75	73	75	92	70	72
		77	75	70	78	80	77	76	73	77	74	75	93	71	72
		79	78	71	79	83	78	77	73	80	75	78	94	73	72
		80	79	74	80	83	80	79	74	86	78	80	95	75	73
		82	80	75	80	85	80	79	75	86	78	80	95	75	74
		83	80	75	80	85	82	80	77	89	81	82	97	76	75
		85	80	82	82	85	83	80	77	91	83	84	98	76	76
		89	82	85	83	87	84	80	77	92	91	84	102	79	76
		90	83	87	85	87	84	81	78	92	92	88	102	80	78
		90	83	88	85	88	85	82	78	93	93	90	104	80	78
		90	85	94	85	88	85	82	78	96	94	90	106	81	78
		92	90	95	85	90	86	83	78	100	94	91	109	82	79
		92	90	100	86	90	86	83	79	100	99	93	110	82	80
		95	90	102	88	91	87	85	79	102	102	93	115	83	81
		97	91	102	89	93	88	85	80	102	104	93		84	82
		97	92	115	90	93	89	86	80	103	106	93		85	82
		98	94		90	95	90	86	80	103	107	97		86	82
		99	94		92	97	90	86	81	103	107	97		87	82
		99	97		93	97	91	87	82	104	108	98		87	82
		100	97		93	98	91	88	82	104	109	98		88	83
		100	99		93	98	92	90	82	107	109	101		88	83
		102	100		96	100	92	90	85	109	110	102		89	85
		103	100		96	101	92	91	85	110	110	102		90	85
		105	102		97	103	92	93	85	111	111	102		92	85
		105	105		97	105	93	93	86	112	114	103		93	86
		105	107		98	110	93	93	86	112	115	104		93	86
		106	118		99	110	97	99	87	112	118	105		95	86
		107	120		100	113	98	100	88	113	119	105		96	87
		107	122		100	113	98	101	88	113	124	106		96	87
		107	127		100	120	102	101	88	114		106		97	90
		108			100		102	102	88	114		109		97	90
		108			100		105	105	89	114		110		98	90
		110			101		107	107	89	116		110		100	90
		110			102		108	110	90	121		112		101	90
		110			102		110	112	90			114		101	90
		110			103		110		90			118		102	92
		111			104		110		90					102	92
		112			107		112		92					103	92
		112			109		115		92					105	92
		112			110		116		92					112	92
		115			113				92					116	93
		115			116				92					118	93
		115			117				92						93
		115			120				92						94
		116			121				92						94
		117			122				92						95
		117							92						96
		118							93						97
		119							94						97
		120							95						97
		120							95						100
		122							95						100
		122							96						100
		123							97						101
		124							97						102
		124							97						102
		125							98						102
		136							98						103

# of traps	15	5	5	10	10	10	10
coho/trap	4.20	7.00	4.20	5.10	3.50	4.50	4.00
<75 mm	4	3	7	1	1	3	4
>74 mm	58	31	13	49	33	41	35
# of fish	63	35	21	51	35	45	40
Mean fl	100.1	86.3	75.4	91.2	87.5	87.6	83.7

1 mort
108

3 morts
116
97
102

# of traps	15	5	5	10	10	10
coho/trap	7.80	7.80	6.80	4.10	1.90	4.70
<75 mm	7	3	5	2	1	6
>74 mm	110	36	29	39	18	41
# of fish	117	39	34	41	19	47
Mean fl	96.7	93.7	90.8	90.0	87.1	84.9

# of traps	10
coho/trap	7.00
<75 mm	8
>74 mm	62
# of fish	70
Mean fl	86.4

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JUVENILE SAMPLING AT MORICE PONDS - MAY 15-17/95

KM 29 PONDS

Sampling was conducted at the Morice River Ponds at Km 29 on the Morice River Road on May 15 and 16th, 1995. A total of 60 minnow traps baited with roe were set overnight. This included 29 traps in the lower pond, 30 traps in the connecting channel and upper pond, and a single trap between the road and the wood sill blocked by a beaver dam.

DFO modified the inlet creek into this pond during the summer of 1994 so that flows entered the top pond and flowed through the entire complex. A beaver dam (0.5) m high is present in the wooden sill at the pond outlet restricting juvenile access into the ponds. It is not known how long this dam has been in place. A beaver was observed in the ponds during the sampling. Water levels in the ponds are high due to the dam, and the total wetted area behind the dams is quite extensive at the time of the surveys.

A single 70 mm coho was captured above the beaver dam in the 59 traps. It is still not clear whether there was restricted fish access into the ponds during 1994/95 due to the beaver dam or if the ponds develop unsuitable water quality conditions during the late summer or winter period.

Nine coho juveniles (55-90 mm fork length) were captured in the single trap set between the road culvert and the beaver dam. Numerous newly-emerged fry were observed holding below the road culvert indicating that there was no restriction to coho fry movements downstream from the road. Observations indicated that larger coho (similar to size of fish noted above) were able to ascend past a 6-10 cm drop at the lip of the top end of the culvert, but small newly-emerged fry could not - velocity barrier?

The beaver dam was lowered on May 16 and again on May 17 to help coho juveniles access the pond complex. The beaver re-built the dam overnight. Any efforts to lower the dam have to be done slowly to ensure that a wash-out does not occur at the road culvert.

Table 1. Water Quality Measurements in Morice River Ponds, May 15, 1995.

DEPTH	OLD POND @ OUTLET		NEW CHANNEL (MID-SECTION)	
	DO (ppm)	TEMP (°C)	DO (ppm)	TEMP (°C)
Surface	9.5	17	9.2	16.5
0.5 m	10	11	9.5	10
1.0 m			10.5	7.5

KM 48 PONDS - MORICE

Sampling was conducted at three location near Km 48 on the Morice West Road on May 16 and 17th, 1995.

5 traps were set overnight in a pond at **Km 48.4** (east side of road). Temperature 15°C. No fish captured.

5 traps were set in a pond at **Km 48.2** (east side of road). Temperature 15°C. No fish captured.

5 traps were set in the vicinity of the road crossing and upright culvert placement at **Km 47.9.**

A single coho (58 mm) was captured on the upper side of the road in 4 traps.

A total of 59 coho and a single rainbow (65mm) were captured in one trap located just below the road culvert. Coho ranged in size from 53-88 mm. Newly-emerged coho fry were noted below the culvert but were not captured in traps. Newly-emerged coho were also noted below the culvert at **Km 47.6.**

The coho at **47.9 km** appear to be trying to get upstream but are unable to get through the culvert. The culvert is totally full and must have a blockage preventing upstream juvenile movements.

Based on the May 16-17 observations, this site looks like a good candidate area for coho rearing development. However improvements would have to be made at the road crossing to enable access into any developments above the road. A larger and better installed culvert is needed. This should include beaver-proofing.