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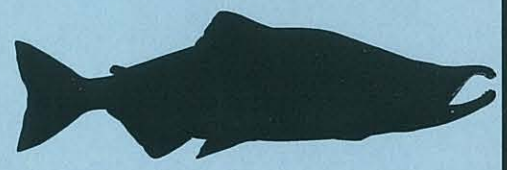
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VISUAL SURVEYS FOR COHO SPAWNERS UTILIZING SHUSWAP LAKE AND LOWER SHUSWAP RIVER TRIBUTARIES - 2001

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**VISUAL SURVEYS FOR COHO
SPAWNERS UTILIZING SHUSWAP LAKE
AND LOWER SHUSWAP RIVER
TRIBUTARIES - 2001**

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February, 2002



ACKNOWLEDGEMENTS

The author would like to thank the following persons for their contributions towards the completion of this project:

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- (g) Tappen Creek
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1.0 INTRODUCTION

In 2001, stream surveys of numerous tributaries to determine escapements of spawning coho, was completed by the Spallumcheen and Little Shuswap Indian Bands. This program marks a continuation from an initiative started in 2000. Each Band conducted identical projects, except for the streams surveyed, the results of which are summarized here into 1 report. The Spallumcheen Band crew surveyed tributaries to the Lower Shuswap River watershed, whereas the Little Shuswap Band crew surveyed tributaries to Shuswap Lake/Adams River watersheds. Paul Creek (at the confluence of the North and South Thompson watersheds) was surveyed by SNFC staff in concert with Kamloops Indian Band staff. Most of the streams surveyed have an extensive escapement history and associated database of information regarding salmon escapements. In recent years however, some of these streams have not been visited regularly to count spawning coho. As well, the methods and effort expended collecting this data are not well defined prior to the 1990's (FHIP 1991). Recent work in which methodology and effort has been more thoroughly detailed was completed to address the status of available coho escapement data for Thompson Basin streams since 1990 (Irvine et al 1999). Because of the status of historic records, the Spallumcheen and Little Shuswap Indian Bands, in close co-operation with the Department of Fisheries and Oceans (DFO), sought to maximize coho escapement information via thorough coverage of numerous small streams in the South Thompson drainage.

The specific objectives of this year's project were:

- (i) Visually survey South Thompson basin streams to provide escapement information, or at minimum, presence/absence information in these streams.
- (ii) Identify distributions of spawning coho within surveyed streams.
- (iii) Collect biological information such as genetic samples, spawning condition and length from all coho carcasses recovered during stream surveys.
- (iv) Recover any available tag and/or opercular punch information from recovered coho carcasses.
- (v) Make observations on stream conditions (including water level, temperature and turbidity).
- (vi) Provide stream survey training/experience and employment to Spallumcheen and Little Shuswap fisheries technicians.

2.0 STUDY AREA

Streams surveyed for coho spawners, with associated survey sections for each stream,

Table 1: Geographic information for Lower Shuswap River and Shuswap Lake Basin tributaries surveyed for coho spawners during the fall of 2001 (note, all distances estimated from 1:50,000 scale UTM maps).

Tributary Name	UTM (mouth)	Lat/Long (mouth)	Map (1:50,000)	No. of Sections	Section Distances (m)						Description of Survey Area		
					1	2	3	4	5	6		Total	
Shuswap Lake													
Scotch Creek	11.3248.56422	50° 55' 00"/119° 30' 00"	82L-14	10	see comments						4,500	500m sections from mouth to Scotch Creek bridge (9 sections)	
Ross Ck.	11.3426.56477	50° 58' 00"/119° 14' 00"	82L-14	2	200							200	Short section near start of canyon (about 1.8 km w/s)
Onyx Ck.	11.3397.56470	50° 57' 00"/119° 17' 00"	82L-14	2	600	400						1,000	Mouth to aprox 250 m upstream of Scotch Ck-Anglemont road crossing
Celista Ck.	11.3600.56734	51° 12' 00"/119° 00' 30"	82M-3	2	1,000	800						1,800	Mouth to walking bridge, walking bridge to mouth.
L. Seymour R.	11.3633.56778	51° 16' 00"/118° 57' 00"	82M-2	2	6,000	2,500						8,500	Falls at 14.6 km on 1000 FSR bridge, Bridge to mouth. Boat survey
McNomee Ck.	11.3643.56808	51° 15' 00"/118° 57' 00"	82M-7	6	0-5	.5-1	1-1.5	1.5-2	2-2.5L	2-2.5R		2,500	Mouth to 2.5 km (old logging road crossing) last section(s) is 2 channels
Tappen Ck.	11.3354.56270	50° 46' 00"/119° 20' 00"	82L-14	2	400	1,000						1,400	Mouth-Hwy, Hwy-Boulton (Tappen Ck?) road.
Canoe Ck.	11.3434.56247	50° 45' 00"/119° 13' 00"	82L-14	3	300	200	700					1,200	Mouth to area adjacent trailer park + (walked 700m further than last year)
Salmon River	11.3369.56184	50° 42' 00"/119° 18' 00"	82L-11/16	3	1,500	1,500	2,000					5,000	Fence - Salmon R. Rd. Salmon R. Rd - Johnson Rd. Johnson Rd. -Branchflower Rd.
Palmer Ck.				2	500	250						750	(1) Mouth to Salmon Rd. (2) Salmon Rd. to 5th Ave.
Wright Ck.	11.3434.56247	51° 08' 20"/118° 59' 15"	82 M-2	2	1,200	300						1,500	mouth to bridge, bridge to 1st set of beaver dams
Adams River													
Momich R./Cayenne Ck	11.3313.56896	51°20' 00"/119° 25' 00"	82M-6	3	200	1,200	600					2,000	Sections specified were: Momich mainstem at Cayenne Ck. to 3rd Lake. 3rd Lake to 800 m w/s of bridge w/s of 3rd Lake, and in Cayenne to Logjam.
Nikwikwaia (Gold) Ck.	11.3135.56462	50° 56' 00"/119° 39' 00"	82L-13	1	1,000							1,000	Mouth upstream to first major logjam
Hiuihill (Bear) Ck.	11.3150.56443	50° 55' 00"/119° 38' 00"	82L-13	3	150	412	350					912	Outflow of Adams River side channel to mouth of Hiuihill, mouth to Staff Gauge, Staff gauge to Hwy bridge.
Lower Shuswap River													
Johnston Ck	11.3552.56180	50° 42' 0" / 119° 3' 0"	82L-11	1	1,075							1,075	Mouth to Hwy 97 crossing
Blurton Ck	11.3551.56172	50° 41' 0" / 119° 3' 0"	82L-11	2	830							830	Mouth to bridge crossing HWY 97
Fortune Ck	11.3490.56007	50° 32' 0" / 119° 8' 0"	82L-11	2	1,700	500						2,200	Gun range road to Hwy 97 Bridge (park), Bridge to 500 m upstream.
Trinity Ck	11.3610.56003	50° 32' 0" / 118° 58' 0"	82L-11	1	160							160	Mouth to falls (beaver dam @ 160m, barrier, only walked to it rest of visita)
Ashton Ck	11.3567.56017	50° 33' 0" / 119° 01' 0"	82L-10/11	2	800							800	Mouth to Mable Lk Rd. crossing
Brash Ck	11.3562.56018	50° 33' 30" / 119° 02' 0"	82L-11	2	230							230	Mouth to Mable Lk Rd. crossing
Kingfisher Ck	11.3768.56080	50° 37' 0" / 118° 45' 0"	82L-10	2	2,195	2,362						4,557	Mouth-km 13.5 on rd paralleling west side of Ck., 13.5 km-2nd Bridge at 16 km.
Danforth Ck	11.3767.56173	50° 42' 0" / 118° 0' 45"	82L-10	3	1,455	4,200	1,003					6,658	Mouth-coral, coral-1st bridge crossing, 1st bridge-1st beaver dam w/s of bridge.
Noisey Ck	11.3831.56183	50° 42' 0" / 118° 39' 0"	82L-10	2	600	620						1,122	Mouth to falls (start of canyon), area split in half.
South Thompson River													
Paul Ck	11.2638.56199	50° 43' 0" / 120° 21' 0"	92I - 9	1	400							400	Mouth to 1st Beaver dam
											50,294		

including distances surveyed, are summarized in Table 1. With the exception of a few new additions in 2001, all the streams surveyed this year are the same as those surveyed last year, and for this reason, the reader is directed to Galesloot (2001) for a complete description of these streams and how they were accessed.

2.1 Lower Shuswap River Tributaries (Spallumcheen Indian Band)

Little Shuswap Band technicians surveyed 9 streams during the fall of 2001, 3 less than in 2000 (Fig. 1). Hunter, Falls and Cooke Creeks were not surveyed since accessible habitat was not suitable for coho spawning, nor were any coho observed in these streams in 2000.

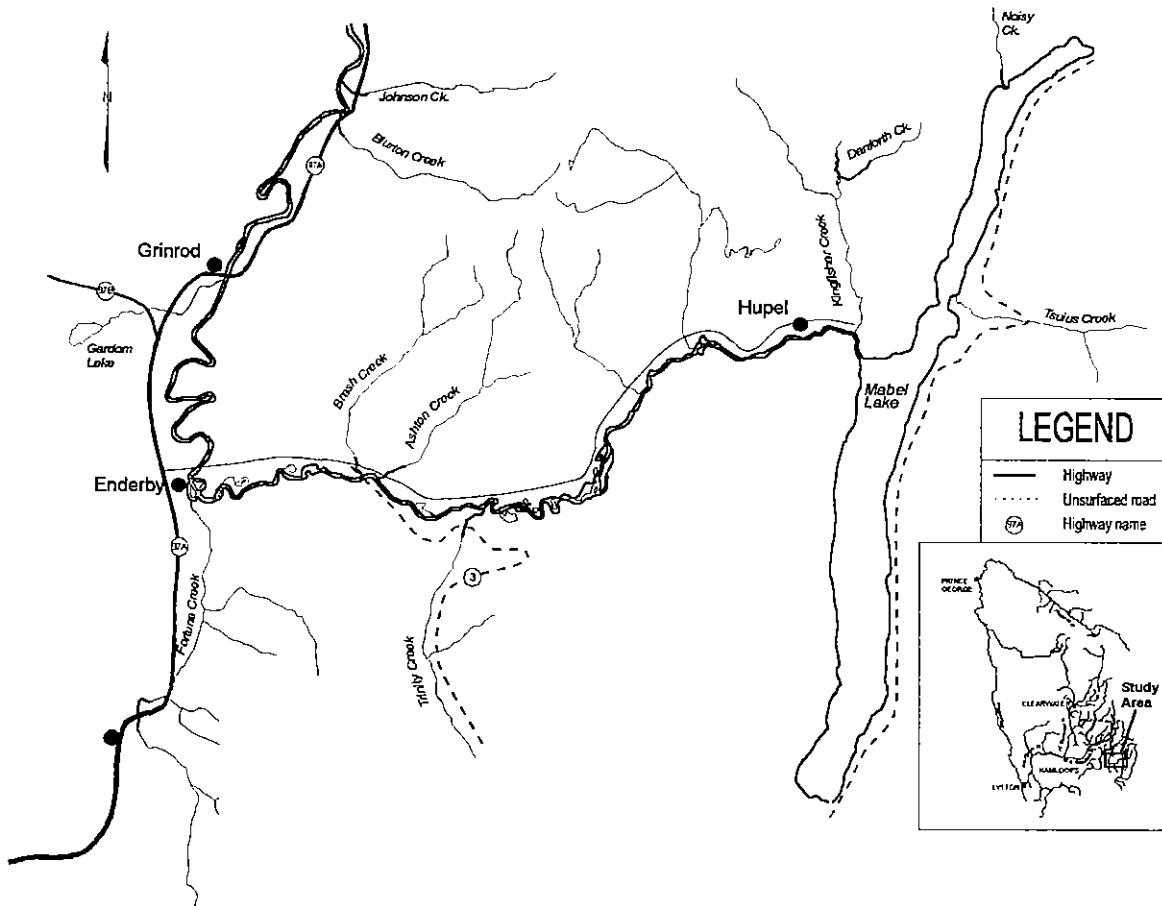


Figure 1: A map identifying the locations of tributaries surveyed in the Lower Shuswap River watershed by Spallumcheen fisheries technicians.

2.2 Shuswap Lake Tributary Surveys (Little Shuswap Indian Band)

Little Shuswap Band technicians surveyed 14 tributaries to Shuswap Lake this year, 1 more than last year. In fact, 2 new systems were added to the LSIB's crew schedule and one was dropped (Fig 2).

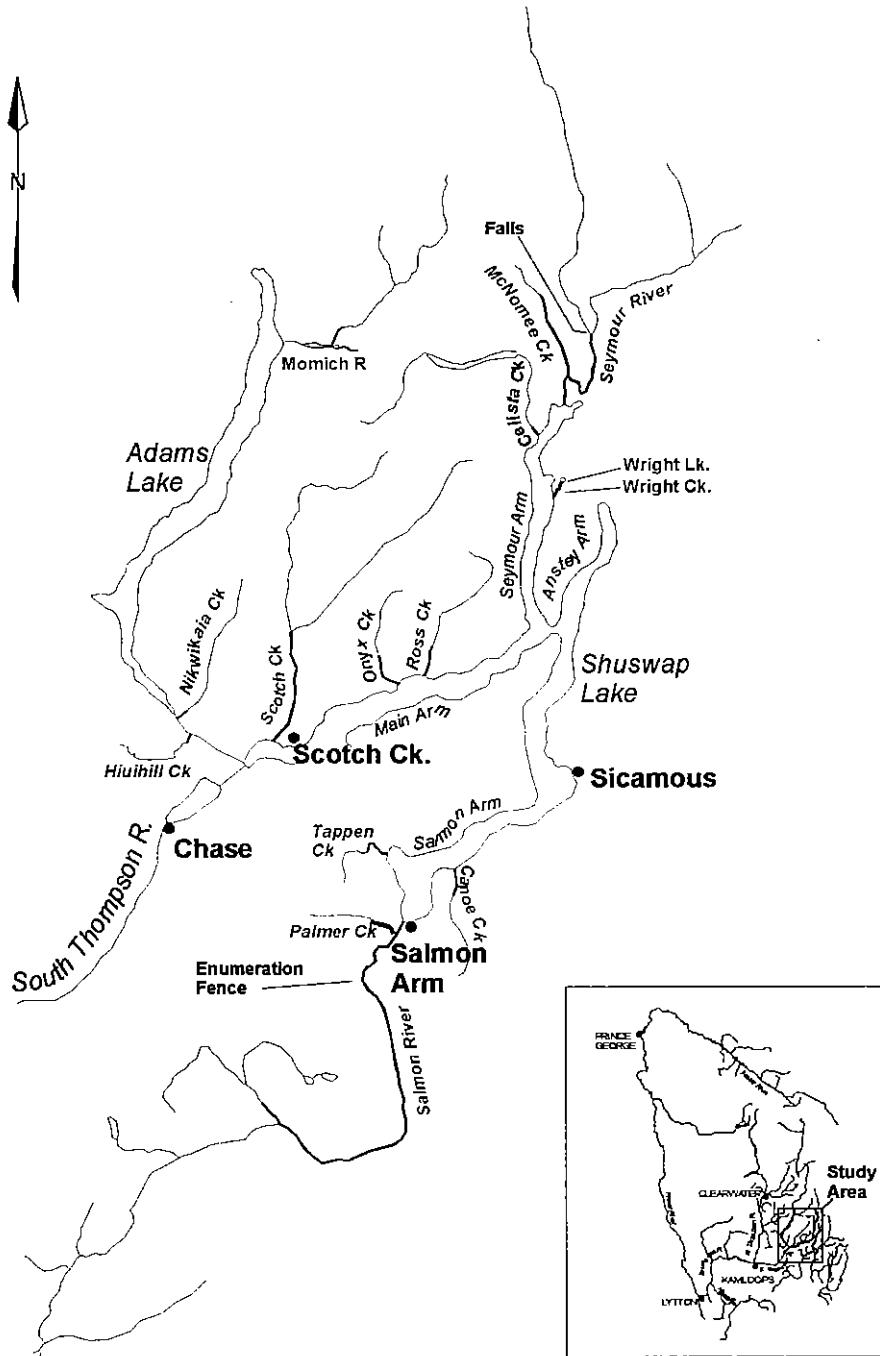


Figure 2: A map identifying the locations of tributaries surveyed around the Shuswap Lake watershed by Little Shuswap fisheries technicians.

Surveys of Ross Creek were discontinued this year since this system has little available habitat for spawning coho, nor is it historically considered a coho producing stream. New additions to the LSIB's schedule this year include the Momich/Cayenne Creek system and Wright Creek.

2.2.1 Momich/Cayenne System

Momich River and Cayenne Creek were surveyed last year by Adams Lake Indian Band technicians working on Sinmax Creek, but the LSIB stream survey crew was geographically much better situated to survey this system since the Momich River is easily and quickly accessed from the Seymour River via the Celista Creek road past Humamilt Lake. This year, the survey area was expanded from just the mainstem Momich between the 1st bridge crossing to 3rd (Little Momich) Lake and the Cayenne mainstem to the large logjam, to also include a 1.1 km section of the Momich mainstem that extended upstream from 3rd Lake. Originally, this new survey section extended about 700 m upstream of a 2nd bridge crossing (1st bridge upstream of 3rd Lake) but was later expanded to include a further 800 m upstream since coho were observed spawning in the expanded survey area and this area could be easily accessed from both north or south sides of the River. The southern access is preferred due to a much better road and because the creek is adjacent the road as opposed to a longer hike through the bush from the North Road.

2.2.1 Wright Creek

Wright Creek is a small system that flows approximately 3 km from Wright Lake into Seymour Arm of Shuswap Lake just south of Beach Bay. The system can be accessed by a bridge at approximately the 19 km marker of the FSR 1000 road crossing, which itself is accessed from the community of Seymour Arm. Wright Creek is adjacent FSR 1000 for most of its length upstream of the bridge crossing, and in fact, access to the upper creek can be achieved from the main road near the 17.5 km marker by hiking through the forest. A gate at km 15 of FSR 1000 is often closed during the fall, however, after having been unable to access Wright Creek on 1 survey, the survey crew approached Federated Coop. for a key to ensure regular access. Wright Creek was split into 2 survey sections, including section 1 downstream of the bridge crossing and section 2, which is upstream of the bridge crossing. Section 1 is 1.2 km long, with most of the available spawning habitat within, and just downstream of, a swamp adjacent the bridge. Section 2 extends

to the first set of Beaver Dams, which appeared to act as a migration barrier, after which, the stream becomes very swampy with little available gravel as it approaches the outlet of the lake. Surveys were conducted from downstream to upstream since the silt bottom within many areas of both survey sections rapidly increased turbidity to a point where visibility was severely impacted if surveys proceeded upstream to downstream. Access to the mouth of Wright Creek at Seymour Arm is made much easier and quicker via an old road, now a trail, originating at the 19 km marker (north side of Wright Creek) and paralleling the creek on a hillside, eventually leading to outhouses of a provincial marine park at the creek mouth.

2.2.2 Paul Creek

Surveys of Paul Creek were added to the program when it became apparent that coho were returning to this stream. Surveys were initiated by DFO, however, Kamloops Indian Band Staff assisted by SNFC staff completed surveys of this stream to facilitate a more regular survey schedule. Walks were conducted from the mouth of Paul Creek to the first of a series of beaver dams located about 400 m upstream of the mouth.

3.0 METHODS

Stream surveys began in the third week of October (Oct 15-19) for most systems although some did not get visited until later. Surveys were completed for all streams by December 21, although in many instances, spawning had ended prior to this date.

3.1 Stream Surveys

A complete description of survey methods is described in Galesloot (2001), however crews used a combination of the first page of Stream Inspection Logs (Ground Level A form) provided by DFO to summarize physical conditions during surveys and a separate form designed by the SNFC to summarize biological data (fish count and fish sample data) for the surveyed stream (Appendix 1).

3.1.1 Physical Sample Data

Ground Level A forms facilitated recording details pertaining to the stream name, location, observers conducting surveys, date of surveys, etc., as well as summarizing

water properties, sky conditions, precipitation and stream (fish) visibility. Some of the physical properties summarized in the Ground Level A form could be recorded in a quantitative manner, such as water level (from temporary staff gauges positioned in streams) and water temperature (hand held thermometer). Other information related to viewing conditions (sky condition, water clarity, stream visibility, etc.) were recorded in a qualitative manner (low, medium, high etc.). To assist summarizing and comparing qualitative data by showing average, maximum and minimum values, numerical values were assigned to qualitative records (Table 2).

Table 2: Numerical conversions used to represent physical data which were recorded in a qualitative manner.

Category	Numerical Conversion					Comments
	1	2	3	4	5	
Bankfull Width (%)	<25	25-50	50-75	75-100	>100	
Gauge Height (m)	no conversion necessary					If Staff gauge installed.
Water Clarity (m)	0-0.25	0.25-0.50	0.5-1	1-3	>3	Option to take measurement exists, but not applied for this project.
Water Temperature (°C)	no conversion necessary					Hand held thermometer used.
Cloudiness (%)	no conversion necessary					
Brightness	dark	medium	bright	full		
Precipitation Type (snow/rain/none)	Not converted					
Precipitation Intensity (light/medium/heavy)	Not converted					
Fish Visibility	low	medium	high			

3.1.2 Conducting Live and Dead Counts

Crews worked 5 days a week and live and carcass counts were conducted once per week for most streams except for Kingfisher, Danforth, Blurton, Johnson and Noisey Creeks which were surveyed twice/week. Observations of live and dead coho were totaled by section and any coho carcasses encountered were sampled, sexed and cut in half to avoid a recount of the carcass on subsequent surveys.

3.1.3 Distribution of Spawning Coho

Weighted distributions of live coho observed within individual sections of each stream surveyed were determined by the equation:

$$(1) \quad D_{wi} = \left[\frac{\sum_{i=1}^n L_i}{n_i} \right] / \bar{L}_i * 100$$

Where:

- D_{wi} = Weighted distribution for section i (in percent)
 L_i = Live observations in section i
 \bar{L}_i = Mean of total live observations for the stream
 n_i = number of stream surveys conducted in section i.

3.1.4 Population Estimates

Area Under the Curve (AUC) described by Irvine et al (1993), was used to determine coho spawner estimates for the three streams. A 75% “viewer efficiency” adjustment was applied to all data. This viewer efficiency is commonly applied by DFO to all its coho survey data, simply indicating that on average, only 75% of the coho in a stream are counted during visual surveys (Pers. Com. R. Bailey). To calculate the coho population via the AUC method, the following information is required:

- 1) Periodic estimates of fish numbers within the targeted stream.
- 2) The residence time the spawning species in question spends in the survey area.

Periodic Counts

Visual counts compiled by the field crews during stream surveys provided periodic estimates of live coho within all surveyed streams. The total number of coho spawner days observed for each stream divided by the residence time of coho spawners resulted in an AUC estimate. The AUC methodology is expressed by the following equations (Irvine et. al. 1993).

$$(2) \quad AUC = 0.5 * \sum_{i=2}^n (t_i - t_{i-1}) * (p_i + p_{i-1})$$

where t_i is the number of days from the first survey day to the i th survey day
and p_i is the daily population for the system derived from stream counts.

The AUC population estimate is then calculated by the following equation:

$$(3) \quad \text{Population Estimate} = AUC \text{ Estimate Spawner Days/Residence time}$$

Residence Time

Rather than apply a redd or stream residence time to AUC generated estimates of total spawning days, “survey life residence times” were used. The survey life residence time represents the amount of time a spawning fish is available to viewing by an observer walking a stream. Survey life residence time is considered a more robust and realistic representation of residence time, since observers seldom see fish that are only spawning or only holding. Furthermore, fish that are holding are not always visible to the observer, whereas fish that are spawning are not always easily distinguished from fish which are close to spawning but have not yet actually begun to spawn. Survey life residence time bypasses the need to categorize fish observed during stream walks by their activity, rather, it merely requires one to provide a count of live fish.

One of the simplest ways to estimate survey life residence time is by dividing a known population of the target species for a stream into the estimated total number of spawning days for that species. This relationship is described the by the equation:

$$(4) \quad \text{Survey Life Residence Time} = \text{AUC Estimated Spawner Days/Fence Count}$$

The resultant survey life residence time is then applied to a number of streams that are geographically proximate to each other. Originally, it was anticipated that work completed on Sinmax Creek by the Adams Lake Band (Galesloot, 2002) would provide an estimate of survey life residence time that could be applied to data gathered during surveys for coho in tributaries to Shuswap Lake and possibly the Lower Shuswap River. Unfortunately, the available data from Sinmax Creek did not allow this to occur. In hindsight, the proximity of (as well as conditions in), Sinmax Creek relative to North Thompson River tributaries suggests Sinmax Creek survey life residence time may not be the most representative value for all Shuswap Basin streams. In the end, a survey life residence time estimate developed for Lemieux Creek (North Thompson River) was applied to Paul Creek AUC data, whereas the mean of survey life residence times calculated for Harris and Duteau Creeks (Bessette Creek – Middle Shuswap River) were applied to all other streams.

3.1.5 Biological Sampling

In addition to counting live and dead coho encountered during stream walks, carcasses

recovered during surveys were sampled. Sampling included examining female carcasses for spawning success (0%/50%/100% spawned), measuring fork length and POH length of all carcasses, examining the carcass for external marks (opercular punches) and/or tags, and collecting genetic samples (via opercular punch).

4.0 RESULTS

4.1 Physical Data

A complete record of physical data collected over the course of the surveys conducted on coho streams this past fall is presented in Appendix 2. Ranges as well as means of weekly/spot observations encountered over the course of this project are summarized in Table 3.

Comparison's between pooled averages for all streams to individual stream values provides some basis for judging conditions during individual stream surveys that may affect overall observer efficiency. Unfortunately, crew members did not always collect physical data for all streams during each survey, nor were all data parameters consistently collected on those surveys where physical data was recorded. This is shown by comparing the pooled average number of surveys per stream to that for individual streams. More consistent collection of physical data during each stream survey would increase the average number of surveys for each category and also result in a better data set. It is not valid to compare water level heights between streams since staff gauges were not calibrated with each other, but some interesting insights do become apparent by comparing other values between streams. For example, mean water temperatures were generally higher than the pooled average for lake fed systems such as Momich, Wright, and Celista Creek compared to non-lake fed systems such as Tappen, Trinity and Danforth Creek. Also, the pooled average of values for fish visibility provide a bench mark to which fish visibility within individual streams can be compared, providing further insight regarding observer efficiency.

4.2 Biological Data

4.2.1 Period of Spawning and Population Estimates

Coho were observed in 17 of the 24 streams surveyed. The highest individual counts of

Table 3: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River Watershed during the fall of 2001.

STREAM	WATER PROPERTIES													SKY CONDITION								FISH VISIBILITY						
	Level (m)				Temperature (°C)				Clarity (1=0.25m to 5>=3m)				Bankful width (1=0.25% to 5>=100%)				Cloudiness (%)				Brightness (1=dark to 4=full sun)				FISH VISIBILITY (1=low to 3=high)			
	Ave	Max	Min	n	Ave	Max	Min	n	Ave	Max	Min	n	Ave	Max	Min	n	Ave	Max	Min	n	Ave	Max	Min	n	Ave	Max	Min	n
Ashton Ck.	n/a	n/a	n/a	0	4.8	11.0	2.0	6	1.4	2	1	5	1.0	1	1	5	82	100	50	7	2.0	3	1	7	2.0	3	1	6
Blurton Ck.	0.18	0.26	0.15	8	2.6	4.0	1.0	11	2.6	4	2	13	1.1	2	1	13	90	100	50	13	2.2	3	2	13	2.1	3	1	13
Brash Ck.	0.09	0.14	0.05	5	4.7	7.0	2.0	6	2.2	4	1	6	1.3	2	1	7	79	100	50	7	2.4	4	2	7	2.4	3	2	7
Canoe Ck.	0.22	0.23	0.21	6	6.8	10.0	3.0	5	2.2	3	2	6	1.2	2	1	6	61	100	25	7	2.4	4	2	7	2.6	3	2	7
Celista Ck.	0.41	0.56	0.27	7	6.4	8.0	5.0	5	2.6	3	1	5	1.9	2	1	7	32	100	0	7	3.2	4	1	6	2.2	3	2	6
Danforth Ck.	n/a	n/a	n/a	0	2.8	5.0	1.0	14	3.1	4	2	14	1.5	2	1	15	92	100	25	16	2.0	3	1	16	2.0	3	1	15
Fortune Ck.	n/a	n/a	n/a	0	3.8	6.0	2.0	6	2.4	4	2	8	1.0	1	1	8	94	100	75	8	1.9	2	1	8	1.9	2	1	8
Gold Ck.	0.31	0.35	0.29	7	5.6	9.0	3.0	5	3.0	5	2	5	1.8	2	1	6	25	75	0	6	3.5	4	2	6	2.5	3	2	6
Hiuhill Ck.	0.44	0.56	0.41	8	5.8	8.5	2.0	6	2.6	3	2	5	1.6	2	1	5	25	75	0	7	3.6	4	2	7	2.8	3	2	6
Johnson Ck.	0.33	0.52	0.26	9	3.1	5.0	2.0	10	2.3	3	2	11	1.3	2	1	12	90	100	25	12	2.2	3	2	12	2.2	3	2	12
Kingfisher Ck.	0.30	0.41	0.22	4	2.9	5.0	1.0	8	2.9	4	2	9	1.6	2	1	10	83	10	25	10	2.3	3	2	10	2.3	3	1	10
McNomee Ck.	n/a	n/a	n/a	0	5.7	9.0	3.0	7	3.0	4	2	8	1.9	2	1	8	22	25	0	8	2.8	4	2	6	2.6	3	2	8
Momich/Cayenne	0.28	0.37	0.24	7	6.4	10.0	3.0	5	3.2	5	5	6	1.8	2	1	5	29	75	0	7	3.0	4	2	6	2.8	3	2	5
Noisy Ck.	0.47	0.54	0.42	10	2.6	5.0	1.0	11	2.1	4	1	9	1.3	2	1	11	100	100	100	13	1.8	2	1	13	1.9	3	1	12
Onyx Ck.	0.49	0.57	0.40	2	7.4	10.0	4.0	5	3.1	4	3	7	1.7	2	1	6	25	25	25	7	3.0	4	2	6	2.8	3	2	6
Palmer Ck.	0.15	0.27	0.10	7	6.7	10.0	1.5	5	2.4	3	2	5	1.1	2	1	7	64	100	25	7	2.1	3	2	7	2.5	3	2	6
Paul Ck.	n/a	n/a	n/a	0	n/a	n/a	n/a	0	n/a	n/a	n/a	0	n/a	n/a	n/a	0	n/a	n/a	n/a	0	n/a	n/a	n/a	0	n/a	n/a	n/a	0
Salmon R.	0.32	0.34	0.30	7	6.2	8.0	2.0	6	3.0	3	3	2	2.0	2	2	4	75	100	25	5	2.0	2	2	5	2.2	3	2	5
Scotch Ck.	0.54	0.66	0.48	6	6.5	9.0	4.0	4	3.5	4	3	4	1.5	2	1	4	40	75	0	34	1.5	2	1	4	3.0	3	3	5
Seymour R.	0.32	0.32	0.32	1	6.4	10.0	3.0	5	2.8	5	2	6	1.8	2	1	6	25	25	25	7	2.9	4	2	7	2.2	3	1	6
Tappen Ck.	0.35	0.35	0.34	5	4.7	8.0	3.0	3	2.3	3	2	6	1.4	2	1	7	64	100	25	7	2.0	2	2	7	2.0	2	2	7
Trinity Ck.	n/a	n/a	n/a	0	3.4	7.0	1.0	9	3.4	7	1	9	1.1	2	1	10	85	100	25	10	2.0	3	1	9	1.7	2	1	10
Wright Ck.	n/a	n/a	n/a	0	6.3	9.0	4.0	3	2.0	3	1	3	2.0	2	2	5	25	25	25	5	3.6	4	2	5	2.2	3	1	5
Mean:	0.33	0.40	0.28	4	5.1	7.9	2.4	6	2.6	4	2	7	1.5	2	1	7	59	78	27	9	2.5	3	2	8	2.3	3	2	7

coho occurred in McNomee and Danforth Creeks whereas a number of streams (Tappen, Onyx, and Kingfisher Creeks never had more than single fish observed in them on any one survey, or in some cases, never more than 1 coho in total (Fig. 3). Peak of spawning (interpreted as peak count) for most streams generally occurred within a 3 week period between Oct. 28 and Nov. 17, although there were exceptions (Table 4).

Table 4: Dates of peak counts of coho in tributaries to Shuswap Lake and the Lower Shuswap River during the fall of 2001.

Stream	Survey Week									
	Oct 14-20	Oct 21-27	Oct 28-Nov 3	Nov 4-10	Nov 11-17	Nov 18-24	Nov 25-Dec 1	Dec 2-8	Dec 9-10	Dec 11-18
Blurton		1st survey, fish seen	Peak Count		last fish seen			last survey		
Celista	1st survey		1st fish seen		Peak Count last fish seen		last survey			
Danforth	1st survey, fish seen			Peak Count				last fish seen	last survey	
Gold	1st survey		1st fish seen		last fish seen		last survey			
Hiuihill	1st survey		1st fish seen				Peak Count	last fish seen		last survey
Kingfisher	1st survey	1st fish seen					last fish seen			
McNomee	1st survey, fish seen		Peak Count				last fish seen			last survey
Momich - Cayenne	1st Survey	1st fish seen		Peak Count	last fish seen			last survey		
Noisey		1st survey, fish seen		Peak Count			last fish seen, last survey			
Onyx	1st survey		1st fish seen	last fish seen						
Paul				1st survey, fish seen, Peak Count		last fish seen		last survey		
Salmon	1st survey, fish seen			Peak Count		last fish seen		last survey		
Scotch	1st survey	1st fish seen				Peak count last fish seen		last survey		
Seymour	1st survey, fish seen, Peak Count						last fish seen	last survey		
Tappen	1st survey		1st fish seen, Peak Count, last fish seen				last survey			
Trinity	1st survey		1st fish seen		Peak Count		last fish seen			last survey
Wright	1st survey, fish seen		Peak Count			last fish seen		last survey		

For example, the most coho observed in the Seymour River was on the first day of surveys, similar to Hiuihill Creek where the peak count occurred on the second to last survey in which coho were observed. This may indicate some of these coho observed in these streams were migrating through the system and not necessarily spawning. Surveys generally started early enough for most systems, however, coho were seen on the first day of surveys for McNomee Creek, Seymour River, Salmon River, and Wright Creek,

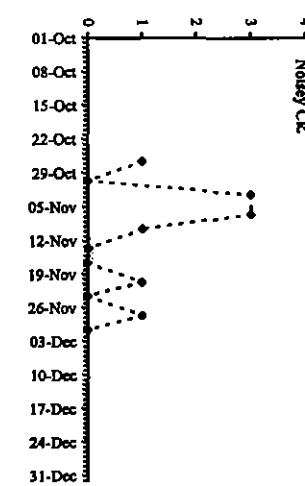
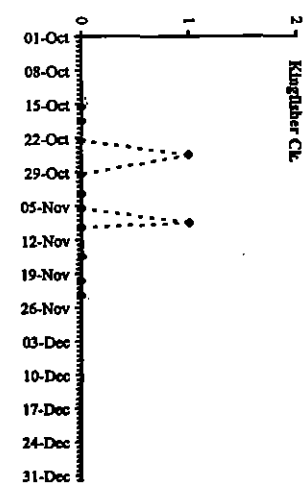
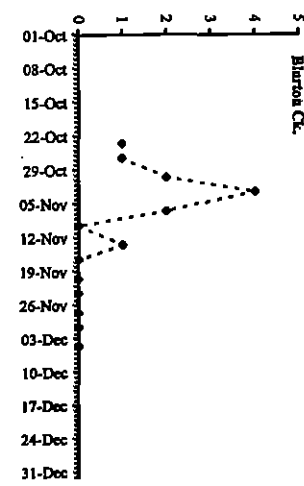
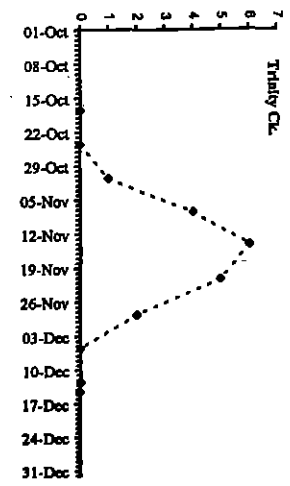
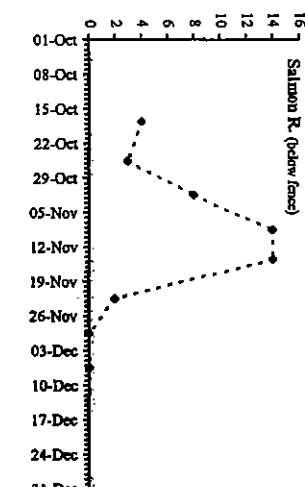
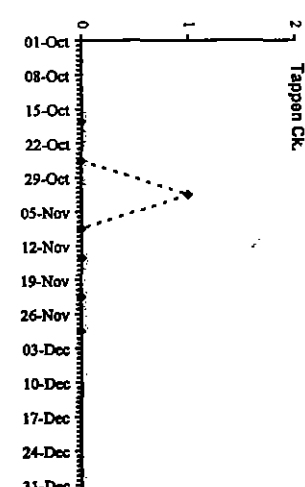
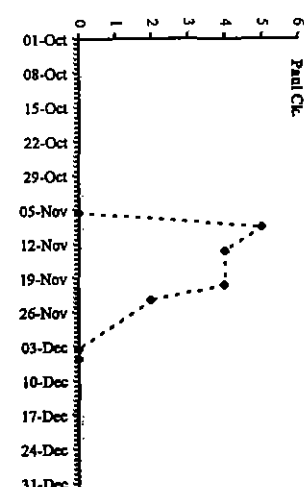
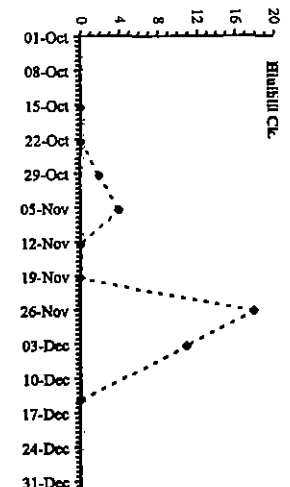
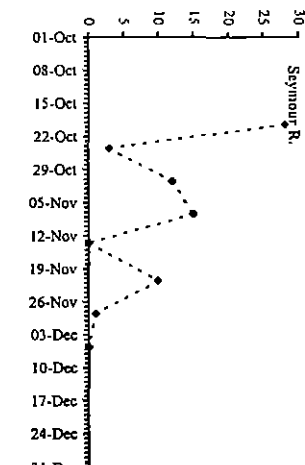
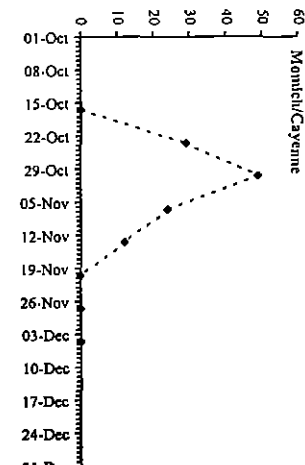
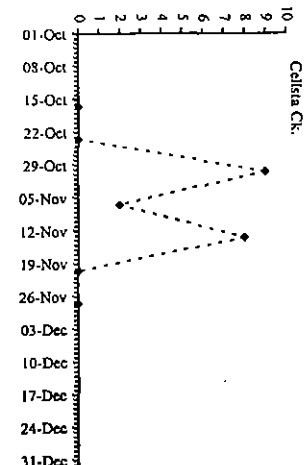
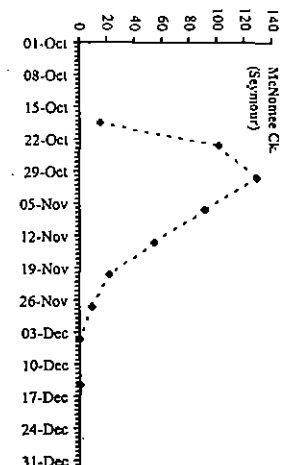
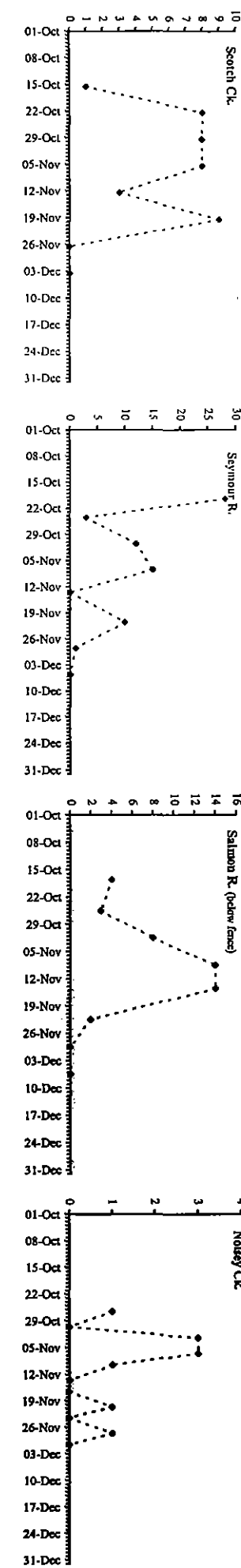
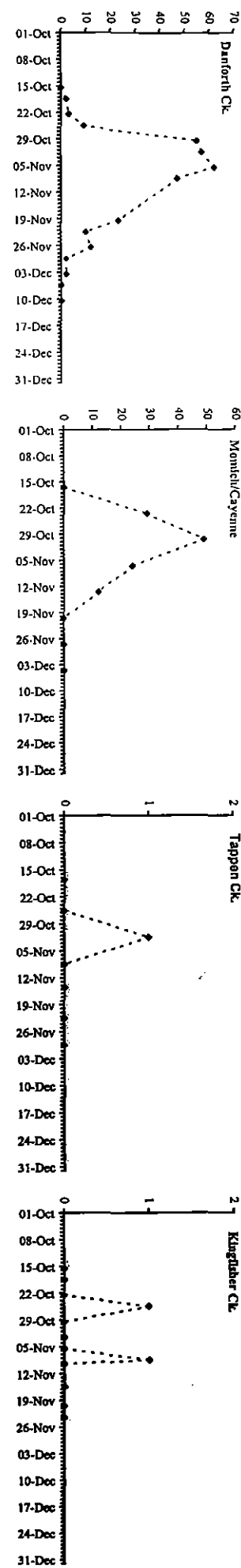
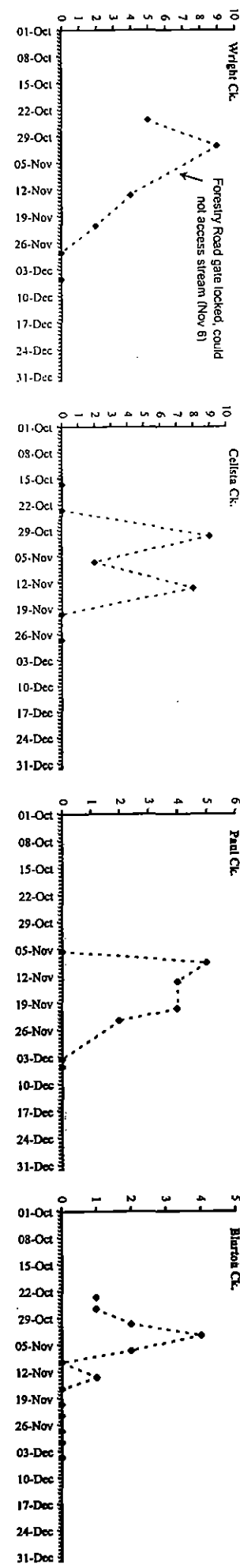
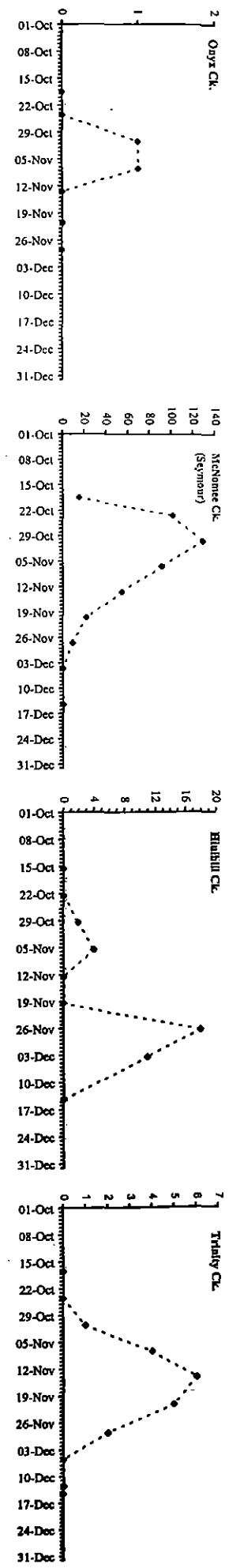


Figure 3: Timing and magnitude of observations in tributaries surveyed in Shuswap Lake and the Lower Shuswap River watersheds in which coho were observed during the fall of 2001. Gold Creek is not shown.

indicating a need to initiate coho counts for these streams even earlier in future years. No coho were observed past the week of Dec. 2-8 for any of the streams, however, spawning was complete in most streams by the week of Nov. 25 – Dec. 1.

4.2.2 Spawner Distribution

Spawner distribution data was not always available for all streams. In some cases, only short lengths of the stream were surveyed, not warranting sectioning, whereas in the case of the Momich/Cayenne system, sections were not clearly identifiable from submitted field notes (Table 5).

Table 5: Within stream comparisons of frequency of observation (%) of live coho amongst surveyed sections of tributaries to the Lower Shuswap River and the Shuswap Lake Basins during the fall of 2001.

Stream	Distribution by Section (in %)										Comments	
	1	2	3	4	5	6	7	8	9	10		
Blurton	100											only 1 section
Celista	47	53										Section 1 is upstream most area.
Danforth	10	87	3									
Gold	100											Only 1 fish observed
Hiuihill	83	17	0									Section 1 = Adams R. side Ch.
Kingfisher	0	100										only 2 sections
McNomee	4	3	22	49	16	7						Section 5 & 6 are separate channels in km 2.0-2.5
Momich - Cayenne	100											Sections could not be verified from field notes.
Noisey	40	60										only 2 sections
Onyx	50	50										Only 1 fish observed in each section
Paul	100											Surveys only to first Beaver dam.
Salmon	80	14	6									Section 1 nearest to fence
Scotch	0	3	5	51	18	5	14	3	0	0		Section in 500 m increments from mouth to Hwy Bridge.
Seymour	61	39										Section 1 is upstream most area.
Tappen	0	100										Only 1 fish observed.
Trinity	100											All coho located d/s of Beaver dam
Wright	70	30										Small trib entering section 2 not surveyed

Coho observed in the Seymour River in the most downstream section (2) may have been destined for McNomee Creek as the section break was at the confluence of McNomee Creek. Similarly, most coho were observed in section 1 of Hiuihill Creek (a side channel to the Adams River), however, this channel normally only has an outlet into the Adams River as the inlet is dry by fall. For this project, section 1 is considered part of Hiuihill Creek since surface flow for this area originates from Hiuihill Creek, although it is likely

there is ground water influence from the mainstem. This year, the channel was flowing through the duration of the survey period, possibly due to changes in the morphology at the inlet of the channel after spring freshet since water levels in all streams were generally lower during the fall of 2001 compared to 2000. It can't be confirmed if coho sighted in this section remained in the area or moved back into the Adams River mainstem, although most fish appeared to be spawning.

There are also a number of streams where the distribution of coho spawners was limited by the presence of beaver dams, including Trinity, Danforth, Wright and Paul Creek. In some of these streams, the beaver dams formed an obvious barrier, which could not be bypassed, whereas in other streams, high water events may allow circumvention of the beaver dam although there is no data to confirm if this did occur in 2001.

Similar to 2000, some of the best distribution data from this year's work is from McNomee Creek. Almost 50% of the coho observations were in section 4 (km 1.5 – 2.0) whereas section 5 and 6 (right and left channels in km 2.0-2.5) accounted for 23% of the observations. Given this was the upstream most section surveyed within McNomee Creek (about ¼ of the accessible habitat in this system), it is likely more coho were distributed upstream of the survey area, and therefore the survey area would only represent a partial estimate.

4.2.3 Population Estimates

Apart from the intrinsic problems in obtaining accurate live counts of any fish species due to factors such as individual variability in observer efficiency and variable viewing conditions that effect observer efficiency (weather, available cover, stream morphology, water level, etc.), there are 3 primary factors that could substantially alter the presented estimates including:

- 1) There is a limited understanding of variation in survey life residence time annually within streams or within year variation between individual streams.
- 2) Area coverage during surveys was not complete for all streams, consequently, there is potential that some spawning habitat within selected streams was not viewed.
- 3) Time coverage was incomplete. In some streams, coho were observed on the first day of surveys, or spawners were still present after the last survey was completed.

A mean survey life residence time of 10.2 days was applied to Shuswap Basin data, and 12.12 days was applied to Paul Creek data, both values based upon in season estimates calculated for index streams relative to survey areas (Table 6).

Table 6: Survey life residence time estimates derived for various coho spawning streams within British Columbia (adapted from Simpson et al. 2001).

Stream	Region	Mean Survey Life (days)	Reference
Sinmax Creek	Adams Lake	1.65	M. Galesloot (2002)
Salmon River (Langley)	Lower Fraser	7.1	R. Semple, unpubl. Data (1999)
Lemieux Cr.	Thompson	9.0	R. Bailey unpubl. Data (1998)
Adams R.	Thompson	10.0	Whelen et al. (1983)
Bessette Creek ⁽¹⁾	Shuswap R.	10.2	Allan (unpubl. data 2001)
Lemieux Cr.	Thompson	11.2	R. Bailey unpubl. Data (1999)
Lemieux Cr. ⁽¹⁾	Thompson	12.1	G. Tisdale unpubl. data (2001)
Coldwater R.	Thompson	12.5	Whelen et al. (1983)
Eagle R.	Thompson	12.5	Whelen et al. (1983)
French Cr.	Str. Of Georgia	12.9	Irvine, Unpubl. Data (1987, 1988)
Salmon River (Salmon Arm)	Thompson	15.0	Whelen et al. (1983)
Big Qualicum	Str. Of Georgia	33.0	Fraser et al. (1993)

(1) Survey life based upon data that has been adjusted for 75% observer efficiency.

Maximum and minimum AUC estimates were based on the range of observed residence times shown for Thompson Basin streams in Table 6, excluding Sinmax Creek where the calculated value did not provide a believable residence time. The best estimate is based upon data for the region. All AUC estimates of spawning days were multiplied by 1.3333 representing a 75% observer efficiency factor commonly applied to visual surveys by DFO. This step was included to remain consistent with DFO practice. For streams in which coho were observed on the first survey, a zero count was arbitrarily assigned to a date preceding the first survey date by the average time between survey periods for that stream, normally 7 days, although this value was 3 days for some streams (Table 7).

The largest escapement estimates were calculated for McNomee Creek followed by Danforth Creek and then the Momich/Cayenne system. Of these systems, the most potential for a substantially larger number of coho spawners than presented is in McNomee Creek simply because only ¼ of the accessible habitat within this stream was surveyed. Conversely, very little habitat capable of supporting spawning coho in either Danforth Creek or the Momich/Cayenne system existed outside of the survey areas for these streams.

Coho escapement estimates were higher in 2001 than in 2000 for most of the streams

Table 7: Coho escapement estimates using various survey life residence times for tributaries to the Lower Shuswap River and Shuswap Lake basins during the fall of 2001.

Stream	Total Spawner Days		Survey Life Residence Time	Escapement Estimate (based upon adjusted Spawner days)	Comments
	Undadjusted	Adjusted (75% observer efficiency applied)			
Blurton Creek	36.5	48.7	9.00 10.18 15.00	5 5 3	Below highway bridge
Celista Creek	127.5	170.0	9.00 10.18 15.00	19 17 11	Entire accessible area surveyed.
Danforth Creek	1,186.0	1,581.3	9.00 10.18 15.00	176 155 105	Mouth to approximately 1.0 km upstream of km 16 access road bridge.
Gold (Nikwikaia) Creek	6.5	8.7	9.00 10.18 15.00	1 1 1	
Hiuihill Creek	264.0	352.0	9.00 10.18 15.00	39 35 23	Entire accessible area surveyed.
Kingfisher Creek	14.0	18.7	9.00 10.18 15.00	2 2 1	
McNomee Creek	2,773.5	3,697.9	9.00 10.18 15.00	411 363 247	Incomplete survey period, spawners observed (6) on first day of surveys. Only 1/4 of entire accessible length surveyed. Possible escapement could be expanded by 4?
Momich Cayenne System	863.0	1,150.6	9.00 10.18 15.00	128 113 77	Momich River upstream of Little Momich (3rd) Lake could be extended about 500 m in future years.
Onyx Creek	12.5	16.7	9.00 10.18 15.00	2 2 1	
Noisey Creek	39.0	52.0	9.00 10.18 15.00	6 5 3	Surveys into December had to be discontinued as snow not cleared from access road.
Paul Creek	84.5	112.7	9.00 12.18 15.00	13 9 8	Used North Thompson survey life residence time calculated for Louis Creek (Pers. Com. G. Tisdale - 2001)
Salmon River (downstream of fence)	321.0	428.0	9.00 10.18 15.00	48 42 29	Only for selected area downstream of fence. Available data suggests survey area includes most of the available spawning habitat downstream of fence.
Scotch Creek	254.0	338.7	9.00 10.18 15.00	38 33 23	Survey from mouth of Scotch Creek to Hwy Bridge.
Seymour River	446.5	595.3	9.00 10.18 15.00	66 58 40	Entire accessible area surveyed by boat. Survey incomplete as coho in river prior to first survey. Possible some coho hold
Tappen Creek	6.5	8.7	9.00 10.18 15.00	1 1 1	Survey area extended to Boulton road bridge crossing.
Trinity Creek	123.5	164.7	9.00 10.18 15.00	18 16 11	Surveys limited to area downstream of major Beaver Dam that block access to coho migration ~160 upstream of the stream mouth.
Wright Creek	188.0	250.7	9.00 10.18 15.00	28 25 17	Surveys incomplete, could start earlier. Unable to access stream for 1 survey during peak of spawning as road closed.

Notes: Maximum Estimate (top) based upon 1998 Lemieux Creek (North Thompson) residence data (Table 6).
 Best Estimate (middle) based upon mean residence data for Duteau and Harris Cks (Bessette Ck - 2001) except for Paul Ck where Lemieux Ck (N. Thompson) 2001 data is applied (Table 6).
 Minimum Estimate (bottom) based upon 1983 Salmon River (Shuswap Lake) residence data (Table 6).

surveyed, and as indicated earlier, coho were generally more prevalent this year as they were observed in a number of systems where no coho were observed in 2000. Still, an

increase in the number of coho was not consistently observed amongst all the streams surveyed in 2001. For example, no coho were observed in Johnson Creek this year, although coho were observed in this system in 2000 (Galeslout 2001). Fewer coho were also observed in Tappen and Kingfisher Creeks in 2001, although the difference between this year's and last year's estimate for Tappen Creek (1 fish) may only be due to viewer efficiency.

4.2.3.1 Survey Schedule related to Escapement Estimates

The frequency of the stream survey schedule (walking a stream once per week compared to twice per week) appears to have minimal impact upon the final escapement estimate calculation. Four tributaries to the Lower Shuswap River, including Danforth Creek, Kingfisher Creek, Johnson Creek, Noisy Creek and Blurton Creek were walked twice per week, whereas all other streams were generally walked once per week. Excluding data from one the of surveys during the week for Danforth Creek does not change the shape of the observation curve and results in approximately a 15% increase in the estimated spawner days, and subsequently, about a 12% increase in the final escapement estimate (Fig 4).

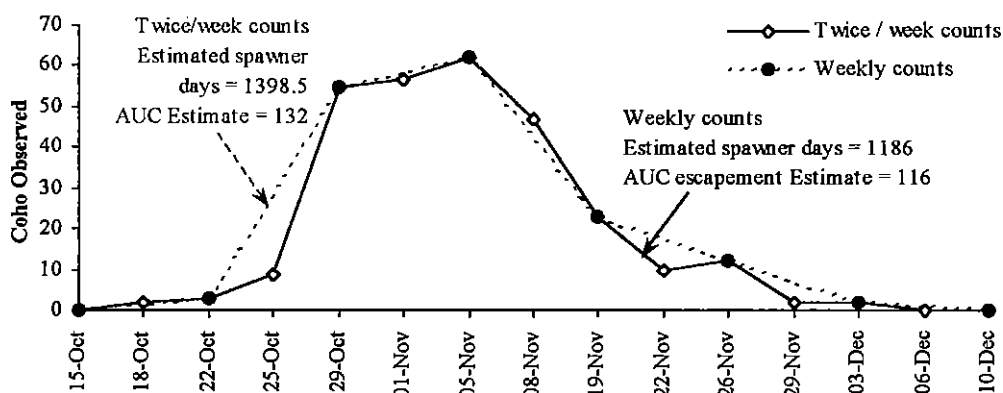


Figure 4: Comparing the effect of conducting 2 surveys a week to that of conducting 1 survey a week on population estimates for Danforth Creek coho.

4.2.4 Biological Sampling

Few carcasses were recovered over the course of the program, and not all carcasses recovered could be measured since often, all that remained was a partial carcass after

scavengers were through with it. A total of 68 carcasses were recovered from 12 streams, but length data is only available from 9 streams, over 80% of which comes from carcasses recovered from the Danforth, McNomee and Momich/Cayenne systems. Mean fork length for all carcasses recovered was 59.7 cm, ranging from 38.0 to 77.0 cm (Table 8). Post orbital hypural lengths ranged from 34.0 to 62.0 cm, with an average POH length equalling 48.1 cm. On average, male coho were almost 5 cm larger (FL) than female coho.

Table 8: Length information from coho carcasses recovered during stream surveys of Lower Shuswap and Shuswap Lake tributaries during the fall/winter of 2001.

STREAM	FORK LENGTH (cm)				POH LENGTH (cm)				n	% of TOTAL
	Mean	Max	Min	S.D	Mean	Max	Min	S.D		
<i>Males</i>										
Blurton Ck	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0%
Danforth Ck	59.3	67.0	38.0	11.2	46.7	52.0	34.0	6.6	6	25.0%
McNomee Ck	66.8	77.0	48.0	8.2	52.0	62.0	38.0	6.6	9	37.5%
Momich Sys.	57.8	68.0	41.5	14.3	46.2	53.5	34.0	10.6	3	12.5%
Onyx Ck	62.0	62.0	62.0	n/a	48.0	48.0	48.0	n/a	1	4.2%
Salmon R.	61.0	61.0	61.0	n/a	50.0	50.0	50.0	n/a	1	4.2%
Scotch Ck	64.0	64.0	64.0	n/a	50.0	50.0	50.0	n/a	1	4.2%
Seymour R.	70.0	70.0	70.0	n/a	55.5	55.5	55.5	n/a	1	4.2%
Trinity Ck	53.5	59.5	47.5	8.5	46.5	51.5	35.5	11.3	2	8.3%
Pooled	62.3	77.0	38.0	9.7	49.0	62.0	34.0	7.1	24	100%
<i>Females</i>										
Blurton Ck	55.0	63.0	48.0	7.5	44.0	49.4	39.2	5.1	3	9.4%
Danforth Ck	59.2	67.0	51.0	6.1	48.4	58.0	41.0	6.8	5	15.6%
McNomee Ck	57.8	65.0	52.0	4.5	52.0	62.0	38.0	6.6	9	28.1%
Momich Sys.	57.1	64.0	48.0	4.6	47.1	52.5	38.5	4.2	14	43.8%
Onyx Ck	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0%
Salmon R.	67.0	67.0	67.0	n/a	52.0	52.0	52.0	n/a	1	3.1%
Scotch Ck	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0%
Seymour R.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0%
Trinity Ck	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0.0%
Pooled	57.8	67.0	48.0	5.1	47.4	58.0	38.5	4.6	32	100%
<i>Pooled</i>										
Blurton Ck	55.0	63.0	48.0	7.5	44.0	49.4	39.2	5.1	3	5.4%
Danforth Ck	59.3	67.0	38.0	8.8	47.5	58.0	34.0	6.4	11	19.6%
McNomee Ck	62.3	77.0	48.0	7.9	49.9	62.0	38.0	5.7	18	32.1%
Momich Sys.	57.2	68.0	41.5	6.5	47.0	53.5	34.0	5.4	17	30.4%
Onyx Ck	62.0	62.0	62.0	n/a	48.0	48.0	48.0	n/a	1	1.8%
Salmon R.	64.0	67.0	61.0	4.2	51.0	52.0	50.0	1.4	2	3.6%
Scotch Ck	64.0	64.0	64.0	n/a	50.0	50.0	50.0	n/a	1	1.8%
Seymour R.	70.0	70.0	70.0	n/a	55.5	55.5	55.5	n/a	1	1.8%
Trinity Ck	53.5	59.5	47.5	8.5	46.5	51.5	35.5	11.3	2	3.6%
POOLED:	59.7	77.0	38.0	7.7	48.1	62.0	34.0	5.8	56	100%

Of the 35 female carcasses recovered, less than 6% (2 fish) had not completely spawned, and the spawning success of another 11% (4 fish) could not be determined due to the condition of the carcass (Table 9).

Table 9: Spawning success of female coho carcasses recovered from streams entering the Lower Shuswap River and Shuswap Lake during the fall/winter of 2001.

Category	Males	Females				Unknown Sex	Total Carcasses
		unk	0%	50%	100%		
No. Recovered	29	4	1	1	29	4	68
% spawned	n/a	11.4%	2.9%	2.9%	82.9%	n/a	n/a
% of total recovered	42.6%	5.9%	1.5%	1.5%	42.6%	5.9%	100%

Only one carcass was recovered that appeared to be marked at the Siska Fishwheel (located in the Fraser Canyon), however, there was no tag on this fish (Table 10).

Table 10: Information pertaining to marked coho carcasses recovered from streams entering the Lower Shuswap River and Shuswap Lake during the fall/winter of 2001.

Date	Stream	Section	Sex	Spawn Condition	Tag Information		Opercular Punch			Length (cm)	
					Colour	No.	Location	No.	shape	FL	POH
05-Nov	Danforth	1	m	n/a	n/a	n/a	n/a	1	round	38.0	34.0

5.0 SUMMARY

5.1 Success of this year's work

This year's project was very successful in providing coho spawner information for a number of small Shuswap Basin tributaries. Coho were observed in almost 70% (17 or 24) of the streams surveyed this year, a marked improvement from 2001 when coho were found in less than half (12 of 25) of the streams surveyed. Furthermore, there was a 200% increase in the estimated total spawner days, and a 170% increase in the estimated number of coho observed in 2001 compared to 2000 (Table 1).

Table 11: A comparison in observed coho abundances between 2000 and 2001 for tributaries to Shuswap Lake and the Lower Shuswap River.

Category	2001	2000	Difference		
			No.	% Increase	Expansion
Spawner Days	8995	2916	6079	208%	3.1
Estimate Coho	876	324	552	170%	2.7

McNomee Creek, Danforth Creek and the Momich/Cayenne system continue to be very productive coho streams, although Wright Creek, a new addition to this year's survey schedule, also appears to be a productive coho system, given its small size. The increased abundance in coho, while a very positive indicator towards the recovery of

coho in the Thompson Basin, was not a consistent observation for all streams as fewer fish were seen in Kingfisher Creek, and no fish were observed in Johnson Creek in 2001 compared to 2000.

5.2 Wright Creek as a coho producing stream related to overall coho abundance

There is also substantial evidence to suggest more coho were present than indicated by the available data. For example, only ¼ of the habitat accessible to spawning coho in McNomee Creek was surveyed since upstream areas of this stream are difficult to access, although this is a consistent point between years for this system. However, amongst the streams surveyed this year, Wright Creek was a pleasant surprise in that the 25 coho spawners (approx. 3% of total count) estimated for this stream are likely substantially fewer than suggested by this year's estimate, despite full surveys of 1.5 km of spawning habitat available in the mainstem of this system. There are numerous reasons for this suggestion. First and foremost is that surveys in Wright Creek began later than for other streams, and only the most downstream section was walked on the first survey. Had surveys began earlier, more coho may have been observed on the first survey, not only resulting in a longer spawning period and therefore a larger estimate, but also possibly shifting the suggested peak of spawning. Also, single coho on redds, and evidence of earlier spawning were apparent on the first survey of Wright Creek, which did not include data from section 2 since surveys of this area did not begin until the 2nd visit to the stream. There is also a small tributary that enters Wright Creek in section 2, which has suitable spawning gravels in it although this tributary was never thoroughly explored. Finally, a locked gate prevented access to the system on the week following when the peak number of coho was counted in the stream. Considering these points, Wright Creek may have contributed a much larger proportion of this year's total estimate. Fortunately, the importance of Wright Creek appears to be recognized by DFO as efforts have been made to re-establish habitat at the bridge crossing this system. It is recommended that annual assessments of coho spawners into Wright Creek become a priority.

5.3 Interpretation of escapement estimates

An important aspect of data obtained from visual surveys relates to how escapement estimates are interpreted. Specifically, less emphasis should be placed on the escapement estimate itself compared to the trend they represent. In other terms, is the overall abundance of coho within a stream or region increasing, decreasing, or remaining stable?

Escapement estimates presented in this text are influenced by a number of parameters that will affect their eventual value, not the least of which is variation in residence time between streams and the area of the stream surveyed. In many cases, areas surveyed are limited by access, and/or the amount of time that can be spent walking a single stream that may support a limited number of coho in the first place. Far more important is the consistency in collecting the information, not only on an annual basis, but also in the manner in which a stream is walked during each survey as well as between years. For example, proper identification of stream sections ensures repeatability from survey to survey, and year to year, and consistent collection of stream conditions could form the basis to a better understanding of variations in observer efficiency by stream, rather than application of a “one size fits” all observer efficiency factor as is presently being practiced. The danger in applying a simple expansion factor to all data is this practice may over represent the contribution of coho from one stream compared to another if conditions pertaining to observer efficiency are substantially different between streams.

In fact, accepting the concept that the presented population estimates simply reflect an index of abundance, rather than a hard value contradicts the concept of applying any sort of observer efficiency to the data since it is the trend in abundance within individual streams that is important. AUC estimates of total spawner days are relatively robust, and apparently vary little in size regardless of whether the stream is visited once or twice per week as long as methods in collecting information remain consistent. Increasing the frequency of surveys will make estimates more discreet, and likely enable recovery of more carcasses for sample purposes as well as facilitate collection of more data pertaining to physical conditions of the stream being surveyed, but less manipulation of the raw data is probably a much more prudent and conservative approach to comparing annual abundances of coho for a region. In fact, it may be more valid to compare annual estimates of total spawner days rather than use estimated coho escapements when the data is based upon visual survey information since the escapement figure relies upon the application of residence time estimates derived from a small data set that may or may not be representative for a larger group of streams. It is recognized however, that expressing abundance in terms of spawner days does not lend itself to comparisons with other streams or regions where more accurate escapement data may exist.

5.4 Physical data to account for seasonal variation in observer efficiency

If observer efficiency expansion factors must be applied, DFO’s Ground Level A form of

their Stream Inspection Log may provide future options in developing a more realistic approach to addressing the issue of observer efficiency as it relates to AUC generated estimates of coho abundance. This year, a simple conversion of qualitative data to a quantitative value allowed for some basic comparisons in physical information collected from individual streams to a regional average. For example, the differences in the sum of the converted qualitative data, or even just the "stream visibility" criteria, for individual streams from that of the regional average could possibly provide an index. This index could then be used to adjust annual observer efficiency factors for a given stream that are sensitive to actual conditions within that stream compared to others within the region. Further exploration into this matter is warranted.

5.5 Data Quality

The quality of data collected this year is good, and has improved over last year, however, there is room for continued improvement. Specifically, more effort could be made in measurement of stream sections. This year, some sections were not measured, and distances had to be approximated from 1:50,000 maps. Related to this is the need to ensure all crew members are familiar with stream sections to ensure consistency in reporting observations between sections from survey to survey. This problem was most apparent for the Momich/Cayenne system where data from the various sections had to be pooled since individual sections, although surveyed weekly, could not be clearly delineated. Part of this confusion is related to the fact that completely new crews were employed to conduct surveys this year, and also, there were no adequate maps which clearly identify sections for streams being surveyed.

Collection of physical information must also be consistently collected during every survey, and all parameters within the Ground Level A form must be consistently entered. This is particularly important if we wish to follow through with the development of observer efficiency expansion factors that are representative of individual stream conditions.

Finally, effort must be made to walk upstream of some areas where beaver dams that appear to be barriers exist, to ensure such blockages are in fact barriers. It is not necessary to walk such sections regularly, since time constraints and logistics may prevent expending such effort on every survey. Checking for the presence/absence of coho upstream of beaver dams after high water events would be prudent since this will

determine if we were able to bypass these types of barriers due to such events. This knowledge would aid in planning future surveys, or other projects, particularly in relation to habitat rehabilitation work.

5.6 Future of the coho survey program

The future of the coho survey program may be in jeopardy since the majority (about 70%) of the funding for this project is not stable. Sources accessed to sponsor this year's work, the Habitat Restoration and Salmon Enhancement Program (HRSEP) and Fisheries Renewal British Columbian (FsRBC) were terminated this past year. This loss of funding is unfortunate, as the project has provided good data for value (approximate cost is \$2,100/stream). Thompson coho abundance appears to have turned the corner and is responding to conservation efforts and increasing ocean survival, however, it is important to continue monitoring this abundance on the spawning grounds. Continued monitoring will ensure a good database exists from which increasing trends can be verified. It will also ensure potential impacts from future fishing pressure do not go unnoticed. Such fishing pressure may arise as new fisheries open (like selective mark fisheries and/or by catch from commercial fisheries on other species) as coho abundance increases. Lack of proper escapement monitoring played a role in the original coho crisis, and may again play a role if important decisions regarding the management of these species are not be made in a timely manner due to a lack of information or funding.

6.0 REFERENCES

- Allan, D. Stock Assessment Technician, StAD, DFO, Kamloops. Personal Com.
- Bailey, R. Stock Assessment Biologist, StAD, DFO, Kamloops. Personal Com.
- Fish Habitat and Information Program (FHIPP). 1991. Stream summary catalogue. Sub district 29J, Clearwater. Dept. of Fish. & Oceans. Van. B.C.
- Fish Habitat and Information Program (FHIPP). 1990. Stream summary catalogue. Sub district 29K, Salmon Arm. Dept. of Fish. & Oceans. Van. B.C.
- Galesloot, M.M. 2002. 2001 Sinmax Creek-Upper Adams tributary coho enumeration program. Prep. for the Adams Lake Indian Band and FsRBC. Prep. by the Shuswap Nation Fisheries Commission, Kamloops, B.C. 26 pp.
- Galesloot, M.M. 2001. Visual surveys for coho spawners utilizing Shuswap Lake and Lower Shuswap River tributaries – 2000. Prep. for the Little Shuswap (Chase, B.C.) and Spallumcheen Indian (Enderby, B.C.) Bands, the Thompson Basin Fisheries Council and the Aboriginal Fisheries Sector, DFO, Kamloops, B.C. 29pp.
- Irvine, J.R., K. Wilson, B. Rosenberger, and R. Cook. 1999. Stock assessment of Thompson River and Upper Fraser coho salmon. Can. Stock Assess. Secretariat Res. Doc. 99/28.
- Irvine, J. R., J.F.T. Morris, and L.M. Cobb. 1993. Area-under the curve salmon escapement estimation manual. Can. Tech. Rep. fish. Aquat. Sci. 1932. 84 p.
- Simpson, K, R. Semple, D. Dobson, J. Irvine, S. Lehmann and S. Baillie. 2001. Status in 1999 of coho stocks adjacent to the Strait of Georgia. Can. Stock Assess. Secretariat Res. Doc. 2001/158. 87 pp.
- Tisdale, G. Principle, Tisdale Environmental Consultants, Kamloops. Personal Com.

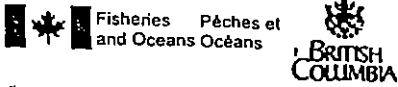
7.0 APPENDICES

Appendix 1:

Pre-formatted field notebook forms used to document stream survey results

including:

- (a) Stream Inspection Log – Ground Level A
- (b) Field Dataform 2 – Stream Survey Summary



Stream Inspection Log - Ground Level (A)

X.XX Solid box indicates required completion
(1.00) INSPECTION DETAILS

1.01 Ref. Code

Stream name	Y	Y	Y	Y	M	M	D	D	Obs1 init.	SIL#
-------------	---	---	---	---	---	---	---	---	------------	------

1.02 Stream Name: _____

1.04 Watershed Code: _____

1.07 Participants _____

1.08 Observer 1: _____

1.09 Observer 2: _____

1.10 Affiliation: _____

1.11 Stock Assess. Contact: _____

1.12 Stock Assess. Agency: _____

1.13 Primary Purpose: _____

1.14 Target Species: _____

1.15 Number of stream segments included in this inspection: _____

1.16 Primary Inspection Mode: Bank walk Stream walk Snorkel Boat

1.17 Mode as per Narrative: yes no (explain in Comments Section)

1.03 Statistical Area: _____

1.05 Time Start _____ **1.06** Time Stop _____

1.18 Water Properties: less than 25% 25-50% 50-75%
 75-100% more than 100%

or 1.20 Gauge height _____ m or 1.21 Discharge _____ m³/s 1.22 Water temp _____ °C

1.23 Water Clarity: 0-0.25m 0.25-0.5m 0.5m-1m 1m - 3m
 3m-5m or to bottom Or specify: _____ m

1.24 Sky Condition: 1.25 %Cloudy 0% 25% 50% 75% 100%
1.26 Brightness: full bright medium dark

1.27 Precipitation: 1.28 Type rain snow none 1.30 Air temp _____ °C
1.29 Intensity: light med. heavy

1.31 Stream Visibility: low medium high

2001-SIL-GLC-01-A

←----- cut here -----→
Punch Holes here
FIELD DATAFORM 2 - Stream Survey Summary

Stream System: _____ Page _____ of _____ Pages _____

Observer: _____ Water Level _____

Date: _____ Water Temperature _____

PART A - Stream Survey Information

Section No.	Total Live	Carcasses Recovered				Spawning Success (fem.)			Comments
		Males	Jacks	Females	Total	100%	50%	0%	

PART B Carcass Recovery Information

Section	Tag (colour/letter/No.)	Sex (m/f/j)	# of Oper. Punch	Punch Shape	% Spawn (females)	FL (cm)	POHL (cm)	Scale Bk #.	Grid #s	Carc. Cond.

Note:

- (1) Indicate all live and carcass information in Part A-Stream Survey Information - note spawning success refers to carcasses only
- (2) Sample all carcasses recovered and also show any tags recovered in Part B Carcass Recovery Information
- (3) Totals in spawning success category must equal total females in Carcasses Recovered category
- (4) Total carcasses in Part A-Stream Survey Information include all tagged carcasses listed in Part B-Tag Recovery Information
- (5) Carc. Condition: 1-3 where 1 = fresh (red gills), 2 = old (firm but white gills), 3 = rotten.

Appendix 2:

Physical data collected during coho surveys of tributaries to the Lower Shuswap River and Shuswap Lake watersheds during the fall/winter of 2001.

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Canoe Creek								Seymour River									
	Water Properties				Sky Condition		Precip.		Fish Viability (1=low/2=medium/3=high)	Water Properties				Sky Condition		Precip.		Fish Viability (1=low/2=medium/3=high)
	% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=bright/2=medium/1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)		% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=bright/2=medium/1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	
15-Oct																		
16-Oct																		
17-Oct	1	0.23	2	n/a	25	4	none	n/a	2									
18-Oct																		
19-Oct										2	n/a	6	10.0	25.00	2	rain	light	3
20-Oct																		
21-Oct																		
22-Oct																		
23-Oct																		
24-Oct										2	n/a	2	n/a	25.00	4	none	n/a	1
25-Oct	1	0.23	2	10.0	25	2	none	n/a	2									
26-Oct																		
27-Oct																		
28-Oct																		
29-Oct																		
30-Oct																		
31-Oct										2	n/a	2	n/a	25.00	2	none	med	2
1-Nov	1			9.0	100	2	none	n/a	2									
2-Nov																		
3-Nov																		
4-Nov																		
5-Nov																		
6-Nov																		
7-Nov										1	n/a		8.0	25.00	2	n/a	n/a	3
8-Nov	2	0.21	3	8.0	25	3	none	n/a	3									
9-Nov																		
10-Nov																		
11-Nov																		
12-Nov																		
13-Nov																		
14-Nov	1	0.23	2	n/a	100	2	none	n/a	3	2	n/a	3	7.0	25.00	2	rain	light	2
15-Nov																		
16-Nov																		
17-Nov																		
18-Nov																		
19-Nov																		
20-Nov																		
21-Nov										2	n/a	2	4.0	25.00	4	none	n/a	
22-Nov	1	0.22	2	4.0	100	2	none	n/a	3									
23-Nov																		
24-Nov																		
25-Nov																		
26-Nov																		
27-Nov																		
28-Nov										n/a	n/a	3	3.0	25.00	4	none	n/a	2
29-Nov	n/a	0.22	2	3.0	50	2	snow	med	3									
30-Nov																		
1-Dec																		
2-Dec																		
3-Dec																		
4-Dec																		
5-Dec										n/a	0.32	n/a	n/a	n/a	n/a	n/a	n/a	
6-Dec																		
7-Dec																		
8-Dec																		
9-Dec																		
10-Dec																		
11-Dec																		
12-Dec																		
13-Dec																		
14-Dec																		
15-Dec																		
Mean:	1.2	0.22	2.2	6.8	61	2.4			2.6	1.8	0.32	2.8	6.4	25	2.9			2.2
Max:	2	0.23	3	10.0	100	4			3	2	0.32	6	10.0	25	4			3
Min:	1	0.21	2	3.0	25	2			2	1	0.32	2	3.0	25	2			1
S.D.:	0.4	0.01	0.4	3.1	38	0.8			0.6	0.4	n/a	1.2	2.9	0	1.1			0.8
n	6	6	6	6	7	7	7	7	7	6	1	6	5	7	7	8	8	6

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Salmon River									Ross Creek									
	Water Properties				Sky Condition		Precip.			Fish Visibility (1=low/2=medium/3=high)	Water Properties				Sky Condition		Precip.		
	% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0-25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness 4=full/3=bright/2=medium/1=dull	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility		% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0-25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness 4=full/3=bright/2=medium/1=dull	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility
15-Oct																			
16-Oct																			
17-Oct	2	0.30	n/a	n/a	100	2	none	n/a	2										
18-Oct																			
19-Oct																			
20-Oct																			
21-Oct																			
22-Oct																			
23-Oct																			
24-Oct																			
25-Oct	n/a	0.31	3	8.0	50	2	rain	light	2	1.00	n/a	1.00	n/a	25	4	none	n/a	2	
26-Oct																			
27-Oct																			
28-Oct																			
29-Oct																			
30-Oct																			
31-Oct																			
1-Nov	n/a	0.32	n/a	8.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2-Nov																			
3-Nov																			
4-Nov																			
5-Nov																			
6-Nov																			
7-Nov																			
8-Nov	n/a	0.31	3	7.0	25	2	none	n/a	3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9-Nov																			
10-Nov																			
11-Nov																			
12-Nov																			
13-Nov																			
14-Nov	2	0.34	n/a	7.0	100	2	none	n/a	2	n/a	n/a	5-1	n/a	25	4	none	n/a	2	
15-Nov																			
16-Nov																			
17-Nov																			
18-Nov																			
19-Nov																			
20-Nov																			
21-Nov																			
22-Nov	2	0.32	n/a	5.0	100	2	none	n/a	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
23-Nov																			
24-Nov																			
25-Nov																			
26-Nov																			
27-Nov																			
28-Nov																			
29-Nov	2	0.32	n/a	2.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
30-Nov																			
1-Dec																			
2-Dec																			
3-Dec																			
4-Dec																			
5-Dec																			
6-Dec	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7-Dec																			
8-Dec																			
9-Dec																			
10-Dec																			
11-Dec																			
12-Dec																			
13-Dec																			
14-Dec																			
15-Dec																			
Mean:	2.0	0.32	3.0	6.2	75	2.0			2.2	1	n/a	1	n/a	25	4.0				2.0
Max:	2	0.34	3	8.0	100	2			3	1	0.00	1	0.0	25	4				2
Min:	2	0.30	3	2.0	25	2			2	1	0.00	1	0.0	25	4				2
S.D.:	0.0	0.01	0.0	2.3	35	0.0			0.4	n/a	n/a	n/a	n/a	0	0.0				0.0
n	4	7	2	6	5	5	6	8	6	1	0	1	0	2	2	6	6	2	2

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Palmer Creek									Tappen Creek									
	Water Properties				Sky Condition			Precip.		Fish Visibility (1=low/2=medium/3=high)	Water Properties				Sky Condition			Precip.	
	% Bankfull Width 1= <25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=right/2=medium/1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	% Bankfull Width 1= <25/2=25-50/3=50-75 4=75-100/5=>100		Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=right/2=medium/1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)	
15-Oct																			
16-Oct																			
17-Oct	1	0.11	n/a	10.0	75	2	none	n/a	3.00	1.00	n/a	3	n/a	75	2.00	n/a	n/a	2	
18-Oct																			
19-Oct																			
20-Oct																			
21-Oct																			
22-Oct																			
23-Oct																			
24-Oct																			
25-Oct	1	0.10	3	10.0	25	2	rain	light	3.00	2.00	n/a	2	n/a	25	2.00	rain	light	2	
26-Oct																			
27-Oct																			
28-Oct																			
29-Oct																			
30-Oct																			
31-Oct																			
1-Nov	1	0.10	2	7.0	75	2	none	n/a	2.00	1.00	0.35	n/a	n/a	75	2.00	none	n/a	2	
2-Nov																			
3-Nov																			
4-Nov																			
5-Nov																			
6-Nov																			
7-Nov																			
8-Nov	1	0.11	2	n/a	25	3	n/a	n/a	n/a	2.00	0.34	3	8.0	25	2.00	none	n/a	2	
9-Nov																			
10-Nov																			
11-Nov																			
12-Nov																			
13-Nov																			
14-Nov	1	0.27	n/a	n/a	100	2	none	n/a	2.00	1.00	0.35	2	n/a	100	2.00	none	n/a	2	
15-Nov																			
16-Nov																			
17-Nov																			
18-Nov																			
19-Nov																			
20-Nov																			
21-Nov																			
22-Nov	1	0.13	2	8.0	100	2	none	n/a	2.00	1.00	0.35	2	3.0	100	2.00	none	n/a	2	
23-Nov																			
24-Nov																			
25-Nov																			
26-Nov																			
27-Nov																			
28-Nov																			
29-Nov	2	0.22	3	1.5	50	2	snow	med	3.00	2.00	0.35	2	3.0	50	2.00	snow	med	2	
30-Nov																			
1-Dec																			
2-Dec																			
3-Dec																			
4-Dec																			
5-Dec																			
6-Dec																			
7-Dec																			
8-Dec																			
9-Dec																			
10-Dec																			
11-Dec																			
12-Dec																			
13-Dec																			
14-Dec																			
15-Dec																			
Mean:	1.1	0.15	2.4	6.7	64	2.1			2.6	1.4	0.35	2.9	4.7	64	2.0			2	
Max:	2	0.27	3	10.0	100	3			3	2	0.35	3	8.0	100	2			2	
Min:	1	0.10	2	1.5	25	2			2	1	0.34	2	3.0	25	2			2	
S.D.:	0.4	0.07	0.6	3.6	32	0.4			0.6	0.5	0.00	0.6	2.9	32	0.0			0	
n	7	7	6	6	7	7	7	7	6	7	6	6	3	7	7	7	7	7	

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	McNamee Creek									Celista Creek								
	Water Properties				Sky Condition		Precip.			Water Properties				Sky Condition		Precip.		
	% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=high/2=medium/1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)	% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=high/2=medium/1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)
15-Oct																		
16-Oct																		
17-Oct																		
18-Oct	1	n/a	4	9.00	25	2	rain	light	3.00									
19-Oct																		
20-Oct																		
21-Oct																		
22-Oct																		
23-Oct	2	n/a	2	n/a	25	n/a	rain	light	3.00	2	0.56	1.00	n/a	25		rain	light	n/a
24-Oct																		
25-Oct																		
26-Oct																		
27-Oct																		
28-Oct																		
29-Oct																		
30-Oct	2	n/a	3	7.00	25	2	rain	bright	2.00	2	0.34	3.00	8.00	25	2	rain	light	2
31-Oct																		
1-Nov																		
2-Nov																		
3-Nov																		
4-Nov																		
5-Nov																		
6-Nov	2	n/a	3	8.00	0	3	none	n/a	3.00	2	0.36	n/a	6.00	0	3	none	n/a	3
7-Nov																		
8-Nov																		
9-Nov																		
10-Nov																		
11-Nov																		
12-Nov																		
13-Nov	2	n/a	3	5.00	25	2	rain	light	2.00	2	0.34	3.00	6.00	25	4	none	n/a	2
14-Nov																		
15-Nov																		
16-Nov																		
17-Nov																		
18-Nov																		
19-Nov																		
20-Nov	2	n/a	3	4.00	25	4	none	n/a	2.00	2	0.53	n/a	5.00	25	4	none	n/a	2
21-Nov																		
22-Nov																		
23-Nov																		
24-Nov																		
25-Nov																		
26-Nov																		
27-Nov	2	n/a	3	4.00	25	n/a	snow	light	3.00	2	0.45	3.00	6.00	25	4	none	n/a	2
28-Nov																		
29-Nov																		
30-Nov																		
1-Dec																		
2-Dec																		
3-Dec																		
4-Dec	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a									
5-Dec																		
6-Dec																		
7-Dec																		
8-Dec																		
9-Dec																		
10-Dec																		
11-Dec																		
12-Dec																		
13-Dec	2	n/a	3	3.00	25	4	none	n/a	3.00									
14-Dec																		
15-Dec																		
Mean:	1.9	n/a	3.0	6.7	21.9	2.8			2.6	1.9	0.41	2.6	6.4	32	3.2			2.2
Max:	2	n/a	4	9.0	25	4			3	2	0.68	3	8.0	100	4			3
Min:	1	n/a	2	3.0	0	2			2	1	0.27	1	6.0	0	2			2
S.D.:	0.4	n/a	0.6	2.3	8.8	1.0			0.6	0.4	0.11	0.9	1.6	31	1.0			0.4
n	8	0	6	7	6	6	9	9	6	7	7	6	6	7	6	7	7	6

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Hiuihill Creek									Gold Creek								
	Water Properties				Sky Condition		Precip.			Water Properties				Sky Condition		Precip.		
	% Bankfull Width N1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=bright/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)	% Bankfull Width N1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=full/3=bright/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)
15-Oct		0.41		8.5	0	4	none	n/a	3									
16-Oct																		
17-Oct																		
18-Oct																		
19-Oct																		
20-Oct																		
21-Oct																		
22-Oct	1	0.43	2	n/a	75	2	none	n/a	2	1	0.31	2	n/a	75	2	none	n/a	2
23-Oct																		
24-Oct																		
25-Oct																		
26-Oct																		
27-Oct																		
28-Oct																		
29-Oct	1	0.41	2	8.0	25	4	n/a	n/a	3	2	0.29	n/a	9.0	25	4	n/a	n/a	3
30-Oct																		
31-Oct																		
1-Nov																		
2-Nov																		
3-Nov																		
4-Nov																		
5-Nov	n/a	0.42	n/a	7.0	0	4	n/a	n/a	n/a	2	0.31	2	6.0	0	4	none	n/a	2
6-Nov																		
7-Nov																		
8-Nov																		
9-Nov																		
10-Nov																		
11-Nov																		
12-Nov	n/a	0.42	n/a	6.0	25	3	none	n/a	3	2	0.30	3	6.0	25	3	none	n/a	2
13-Nov																		
14-Nov																		
15-Nov																		
16-Nov																		
17-Nov																		
18-Nov																		
19-Nov	n/a	0.58	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.35	n/a	3.0	n/a	n/a	n/a	n/a	n/a
20-Nov																		
21-Nov																		
22-Nov																		
23-Nov																		
24-Nov																		
25-Nov																		
26-Nov	2	0.44	3	3.0	25	4	none	n/a	3	2	0.32	3	4.0	25	4	none	n/a	3
27-Nov																		
28-Nov																		
29-Nov																		
30-Nov																		
1-Dec																		
2-Dec																		
3-Dec	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a									
4-Dec																		
5-Dec																		
6-Dec																		
7-Dec																		
8-Dec																		
9-Dec																		
10-Dec																		
11-Dec																		
12-Dec																		
13-Dec																		
14-Dec	2	0.41	3	2.0	25	4	none	n/a	3									
15-Dec																		
Mean:	1.8	0.44	2.8	5.8	25	3.8			2.8	1.8	0.31	3.0	5.8	25	3.6			2.6
Max:	2	0.58	3	6.6	75	4			3	2	0.35	5	9.0	75	4			3
Min:	1	0.41	2	2.0	0	2			2	1	0.29	2	3.0	0	2.0			2.0
S.D.:	0.5	0.05	0.6	2.7	25	0.8			0.4	0.4	0.02	1.2	2.3	27.4	0.8			0.5
n	5	8	5	6	7	7	9	9	6	8	7	5	5	8	8	7	7	8

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Trinity Creek									Ashton Creek											
	Water Properties				Sky Condition		Precip.			Fish Visibility (1=low/2=medium/3=high)	Water Properties				Sky Condition		Precip.				
	% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=51-100/4=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=100/3=high/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)			% Bankfull Width 1=<25/2=25-50/3=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=51-100/4=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=100/3=high/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)		Fish Visibility (1=low/2=medium/3=high)	
15-Oct																					
16-Oct																					
17-Oct	1	n/a	4	7.0	75	3	none	n/a	2	n/a	n/a	n/a	11.0	100	2	none	n/a		2		
18-Oct																					
19-Oct																					
20-Oct																					
21-Oct																					
22-Oct																					
23-Oct																					
24-Oct	2	n/a	4	4.0	25	3	none	n/a	2	n/a	n/a	n/a	5.0	50	2	none	n/a		n/a		
25-Oct																					
26-Oct																					
27-Oct																					
28-Oct																					
29-Oct																					
30-Oct																					
31-Oct	1	n/a	2	2.0	75	1	none	n/a	1	1	n/a	1	3.0	50	3	none	n/a		3		
1-Nov																					
2-Nov																					
3-Nov																					
4-Nov																					
5-Nov																					
6-Nov																					
7-Nov	1	n/a	1	3.0	75	2	none	n/a	2	1	n/a	1	2.0	100	2	none	n/a		2		
8-Nov																					
9-Nov																					
10-Nov																					
11-Nov																					
12-Nov																					
13-Nov																					
14-Nov	1	n/a	2	3.0	100	2	none	n/a	2	1	n/a	1	3.0	100	2	none	mod		2		
15-Nov																					
16-Nov																					
17-Nov																					
18-Nov																					
19-Nov																					
20-Nov																					
21-Nov	1	n/a	n/a	3.0	100	2	none	n/a	2	1	n/a	2	4.0	75	2	none	n/a		2		
22-Nov																					
23-Nov																					
24-Nov																					
25-Nov																					
26-Nov																					
27-Nov																					
28-Nov	1	n/a	2	1.0	100	1	none	n/a	1	1	n/a	2	n/a	100	1	none	n/a		1		
29-Nov																					
30-Nov																					
1-Dec																					
2-Dec																					
3-Dec																					
4-Dec																					
5-Dec	1	n/a	2	n/a	100	2	none	n/a	2												
6-Dec																					
7-Dec																					
8-Dec																					
9-Dec																					
10-Dec																					
11-Dec																					
12-Dec	1	n/a	2	5.0	100	n/a	snow	med	2												
13-Dec																					
14-Dec	1	n/a	2	3.0	100	2	snow	med	1												
15-Dec																					
Mean:	1.1	n/a	2.3	3.4	85	2.0			1.7	1.0	n/a	1.4	4.8	82	2.0					2.0	
Max:	2	n/a	4	7.0	100	3			2	1	n/a	2	11.0	100	3					3	
Min:	1	n/a	1	1.0	25	1			1	1	n/a	1	2.0	50	1					1	
S.D.:	0.3	n/a	1.0	1.7	24	0.7			0.5	0.0	n/a	0.5	3.3	24	0.6					0.6	
n	10	0	9	9	10	9	10	10	10	6	0	5	6	7	7	7	7	7	7	6	

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Fortune Creek								Brash Creek									
	Water Properties				Sky Condition		Precip.		Water Properties				Sky Condition		Precip.			
	% Bankfull Width (1=<25/2=25-50/3=50-75 4=75-100/5=>100)	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (1=full=2=medium/3=medium/4=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)	% Bankfull Width (1=<25/2=25-50/3=50-75 4=75-100/5=>100)	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (1=full=2=medium/3=medium/4=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)
15-Oct	1	n/a	4	n/a	100	2	rain	light	3									
16-Oct																		
17-Oct																		
18-Oct																		
19-Oct																		
20-Oct																		
21-Oct																		
22-Oct																		
23-Oct	1	n/a	3	n/a	100	2	none	n/a	2									
24-Oct																		
25-Oct																		
26-Oct																		
27-Oct																		
28-Oct																		
29-Oct																		
30-Oct																		
31-Oct																		
1-Nov																		
2-Nov																		
3-Nov																		
4-Nov																		
5-Nov																		
6-Nov																		
7-Nov																		
8-Nov																		
9-Nov	1	n/a	2	4.0	75	2	none	n/a	2									
10-Nov																		
11-Nov																		
12-Nov																		
13-Nov																		
14-Nov																		
15-Nov																		
16-Nov																		
17-Nov																		
18-Nov																		
19-Nov																		
20-Nov																		
21-Nov	1	n/a	2	5.0	75	2	none	n/a	2									
22-Nov																		
23-Nov																		
24-Nov																		
25-Nov																		
26-Nov																		
27-Nov																		
28-Nov	1	n/a	2	3.0	100	1	snow	light	1	1	0.14	2	n/a	100	2	none	n/a	2
29-Nov																		
30-Nov																		
1-Dec																		
2-Dec																		
3-Dec																		
4-Dec																		
5-Dec	1	n/a	2	2.0	100	2	snow	light	2									
6-Dec																		
7-Dec																		
8-Dec																		
9-Dec																		
10-Dec																		
11-Dec	1	n/a	2	6.0	100	2	snow	light	2									
12-Dec																		
13-Dec	1	n/a	2	3.0	100	2	snow	light	2									
14-Dec																		
15-Dec																		
Mean:	1.0	n/a	2.4	3.8	94	1.9			1.9	1.3	0.09	2.2	4.7	79	2.4			2.4
Max:	1	n/a	4	6.0	100	2			2	2	0.14	4	7.0	100	4			3
Min:	1	n/a	2	2.0	75	1			1	1	0.05	1	2.0	60	2			2
S.D.:	0.0	n/a	0.7	1.5	12	0.4			0.4	0.5	0.04	1.0	1.9	22	0.8			0.8
n	8	0	8	6	8	8	8	8	8	7	5	6	6	7	7	7	7	7

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Kingfisher Creek										Danforth Creek									
	Water Properties				Sky Condition		Precip.		Fish Visibility (1=low/2=medium/3=high)	Water Properties				Sky Condition		Precip.		Fish Visibility (1=low/2=medium/3=high)		
	% Bankfull Width (1=<25/2=25-50/3=50-75 4=75-100/5=>100)	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (1=full/2=medium/3=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)		% Bankfull Width (1=<25/2=25-50/3=50-75 4=75-100/5=>100)	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=50-75/4=75-100/5=>100	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (1=full/2=medium/3=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)			
15-Oct	1	n/a	4	5.0	25	3	none	n/a	3	1	n/a	4	5.00	25	3	none	n/a	3		
16-Oct																				
17-Oct																				
18-Oct																				
19-Oct																				
20-Oct																				
21-Oct																				
22-Oct	2	n/a	4	n/a	100	2	none	n/a	3	2	n/a	3	n/a	100	2	rain	med	1		
23-Oct																				
24-Oct																				
25-Oct	2	n/a	4	1.0	75	3	none	n/a	3	2	n/a	3	1.00	100	2	none	n/a	3		
26-Oct																				
27-Oct																				
28-Oct																				
29-Oct	1	n/a	3	2.0	100	2	none	n/a	3	1	n/a	4	1.00	100	2	none	n/a	2		
30-Oct																				
31-Oct																				
1-Nov	1	n/a	3	n/a	100	2	none	n/a	2	1	0.23	2	1.00	100	2	none	n/a	2		
2-Nov																				
3-Nov																				
4-Nov																				
5-Nov	1	0.24	2	2.0	25	3	none	n/a	3	1	0.20	4	3.00	75	2	none	n/a	2		
6-Nov																				
7-Nov																				
8-Nov	2	0.22	n/a	4.0	100	2	none	n/a	2	1	0.17	4	3.00	100	2	none	n/a	2		
9-Nov																				
10-Nov																				
11-Nov																				
12-Nov																				
13-Nov																				
14-Nov																				
15-Nov	2	0.41	2	4.0	100	2	none	n/a	1	2	0.43	2	4.00	100	1	none	n/a	1		
16-Nov																				
17-Nov																				
18-Nov																				
19-Nov	2	0.34	2	2.0	100	2	rain	light	1	2	0.30	2	2.00	100	2	rain	light	1		
20-Nov																				
21-Nov																				
22-Nov	2	n/a	2	3.0	100	2	none	n/a	2	2	0.28	3	3.00	100	2	none	n/a	2		
23-Nov																				
24-Nov																				
25-Nov																				
26-Nov																				
27-Nov																				
28-Nov																				
29-Nov																				
30-Nov																				
1-Dec																				
2-Dec																				
3-Dec																				
4-Dec																				
5-Dec																				
6-Dec																				
7-Dec																				
8-Dec																				
9-Dec																				
10-Dec																				
11-Dec																				
12-Dec																				
13-Dec																				
14-Dec																				
15-Dec																				
Mean:	1.8	0.30	2.9	2.9	83	2.3			2.3	1.6	n/a	3.1	2.6	82	2.0			2.0		
Max:	2	0.41	4	5.0	100	3			3	2	n/a	4	5.0	100	3			3		
Min:	1	0.22	2	1.0	25	2			1	1	n/a	2	1.0	25	1			1		
S.D.:	0.6	0.09	0.9	1.4	31	0.6			0.8	0.6	n/a	0.8	1.5	20	0.6			0.7		
n	10	4	9	8	10	10			10	16	10	14	14	18	16			16		

Appendix 2: Physical data collected during coho surveys of the Shuswap Lake and Lower Shuswap River watersheds during the fall of 2001.

Date	Noisy Creek									Momich Creek									
	Water Properties				Sky Condition		Precip.			Fish Visibility (1=low/2=medium/3=high)	Water Properties				Sky Condition		Precip.		
	% Bankfull Width (1=<25/2=25-50/3=50-75 4=75-100/5=>100)	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=5-14/4=1-3/5=0-3	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (1=dark/2=medium/3=medium/ 4=light/5=bright/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)			% Bankfull Width (1=<25/2=25-50/3=50-75 4=75-100/5=>100)	Gauge Height (m)	Water Clarity (m) 1=0- 25/2=25-50/3=5-14/4=1-3/5=0-3	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (1=dark/2=medium/3=medium/ 4=light/5=bright/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)
15-Oct	n/a	n/a	n/a	5.00	100		none	n/a	3										
16-Oct										1	0.26	2	10.0	75	2	n/a	n/a	3	
17-Oct																			
18-Oct																			
19-Oct																			
20-Oct																			
21-Oct																			
22-Oct																			
23-Oct										2	0.26	5	n/a	25	3	rain	light	3	
24-Oct																			
25-Oct																			
26-Oct	2	n/a	n/a	2.00	100	1	none	n/a	1										
27-Oct																			
28-Oct																			
29-Oct																			
30-Oct	1	0.42	4	2.00	100	2	rain	light	2	2	0.24	3	7.0	25	4	none	n/a	2	
31-Oct																			
1-Nov																			
2-Nov	1	0.48	2	2.00	100	2	none	n/a	2										
3-Nov																			
4-Nov																			
5-Nov																			
6-Nov	1	0.45	2	1.00	100	2	none	n/a	2	n/a	0.25	n/a	7.0	0	2	none	n/a	n/a	
7-Nov																			
8-Nov																			
9-Nov	1	0.42	2	3.00	100	2	none	n/a	2										
10-Nov																			
11-Nov																			
12-Nov																			
13-Nov	1	0.44	2	3.00	100	1	rain	med	1	2	0.26	3	5.0	25	3	none	n/a	3	
14-Nov																			
15-Nov																			
16-Nov	2	0.54	2	5.00	100	2	none	n/a	2										
17-Nov																			
18-Nov																			
19-Nov																			
20-Nov	2	0.51	2	3.00	100	2	rain	light	2	n/a	0.37	n/a	n/a	25	n/a	n/a	n/a	n/a	
21-Nov																			
22-Nov																			
23-Nov	1	0.49	1	n/a	100	1	rain	light	2										
24-Nov																			
25-Nov																			
26-Nov																			
27-Nov	1	0.48	n/a	2.00	100	2	none	n/a	2	2	0.32	3	3.0	25	4	snow	light	3	
28-Nov																			
29-Nov																			
30-Nov	1	0.44	2	1.00	100	2	none	n/a	2										
1-Dec																			
2-Dec																			
3-Dec																			
4-Dec	n/a	n/a	n/a	n/a	100	2	snow	heavy	n/a										
5-Dec																			
6-Dec																			
7-Dec																			
8-Dec																			
9-Dec																			
10-Dec																			
11-Dec																			
12-Dec																			
13-Dec																			
14-Dec																			
15-Dec																			
Mean:	1.3	0.47	2.1	2.6	100	1.8			1.8	1.8	0.28	3.2	6.4	28	3			2.8	
Max:	2	0.64	4	5.0	100	2			3	2	0.37	5	10.0	75	4			3	
Min:	1	0.42	1	1.0	100	1			1	1	0.24	2	3.0	0	2			2	
S.D.:	0.6	0.04	0.8	1.4	0	0.4			0.6	0.4	0.05	1.1	2.6	22	0.9			0.4	
n	11	10	9	11	13	13	13	13	12	6	7	6	6	7	8	7	7	6	

Appendix 2: Physical data collected during col Lower Shuswap River watershed:

Date	Wright Creek								
	Water Properties				Sky Condition		Precip.		
	% Bankfull Width 1=<32/25=50/2=50-75 4=75-100/5=>100	Gauge Height (m)	Water Clarity (m) 1=0-25/2= 25-50/3= 51/4=1-35/5>3	Water Temp (°C)	Cloudiness % (0/25/50/75/100)	Brightness (4=10/3=high/2=medium/ 1=dark)	Type (rain/snow/none)	Intensity (light/medium/heavy)	Fish Visibility (1=low/2=medium/3=high)
15-Oct									
16-Oct									
17-Oct									
18-Oct									
19-Oct									
20-Oct									
21-Oct									
22-Oct									
23-Oct									
24-Oct	2	n/a	2	n/a	25	2	rain	light	2
25-Oct									
26-Oct									
27-Oct									
28-Oct									
29-Oct									
30-Oct									
31-Oct	2	n/a	1	9.0	25	4	none	n/a	1
1-Nov									
2-Nov									
3-Nov									
4-Nov									
5-Nov									
6-Nov									
7-Nov	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8-Nov									
9-Nov									
10-Nov									
11-Nov									
12-Nov									
13-Nov									
14-Nov	2	n/a	n/a	n/a	25	4	none	n/a	2
15-Nov									
16-Nov									
17-Nov									
18-Nov									
19-Nov									
20-Nov									
21-Nov	2	n/a	3	6.0	25	4	none	n/a	3
22-Nov									
23-Nov									
24-Nov									
25-Nov									
26-Nov									
27-Nov									
28-Nov	2	n/a	n/a	4.0	25	4	none	n/a	3
29-Nov									
30-Nov									
1-Dec									
2-Dec									
3-Dec									
4-Dec									
5-Dec	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
6-Dec									
7-Dec									
8-Dec									
9-Dec									
10-Dec									
11-Dec									
12-Dec									
13-Dec									
14-Dec									
15-Dec									
Mean:	2.0	n/a	2.0	6.3	25	3.6			2.2
Max:	2	n/a	3	9.0	25	4			3
Min:	2	n/a	1	4.0	25	2			1
S.D.:	0.0	n/a	1.0	2.5	0	0.9			0.8
n	5	0	3	3	6	6	7	7	6

Appendix 3:

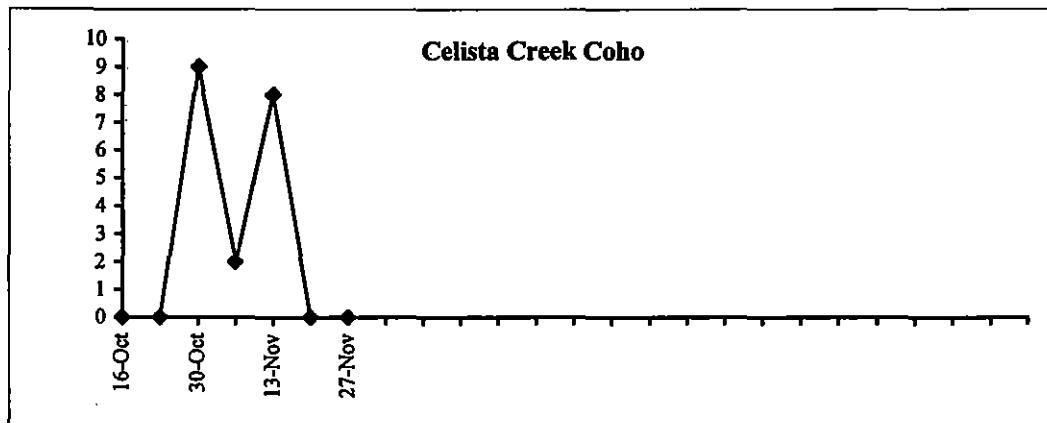
Area under the curve estimates of coho salmon enumerated during the fall of 2001
in:

- (a) Canoe Creek
- (b) Celist Creek
- (c) Gold (Nikwikaiwa) Creek
- (d) Hiuihill Creek
- (e) McNomee Creek
- (f) Momich/Cayenne System
- (g) Onyx Creek
- (h) Palmer Creek
- (i) Ross Creek
- (j) Salmon River
- (k) Scotch Creek
- (l) Seymour River
- (m) Tappen Creek
- (n) Wright Creek
- (o) Ashton Creek
- (p) Blurton Creek
- (q) Brash Creek
- (r) Danforth Creek
- (s) Fortune Creek
- (t) Johnson Creek
- (u) Kingfisher Creek
- (v) Noisey Creek
- (w) Trinity Creek
- (x) Paul Creek

Appendix 3b: Area under the curve estimate of coho salmon enumerated in Celista Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
16-Oct	0	0	0
23-Oct	7	0	0
30-Oct	14	9	31.5
06-Nov	20	2	33
13-Nov	27	8	35
20-Nov	34	0	28
27-Nov	41	0	0
			0
			0
			0

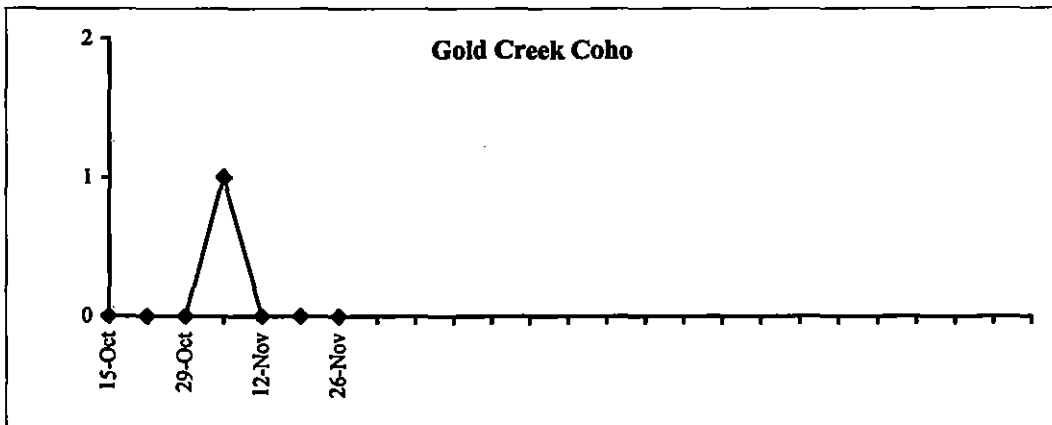
total spawner days **127.5**
 Estimate if residence time = 7 days **18**
 Estimate if residence time = 10 days **13**
 Estimate if residence time = 14 days **9**



Appendix 3c: Area under the curve estimate of coho salmon enumerated in Gold Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
15-Oct	0	0	0
22-Oct	7	0	0
29-Oct	14	0	0
05-Nov	20	1	3
12-Nov	27	0	3.5
19-Nov	34	0	0
26-Nov	41	0	0

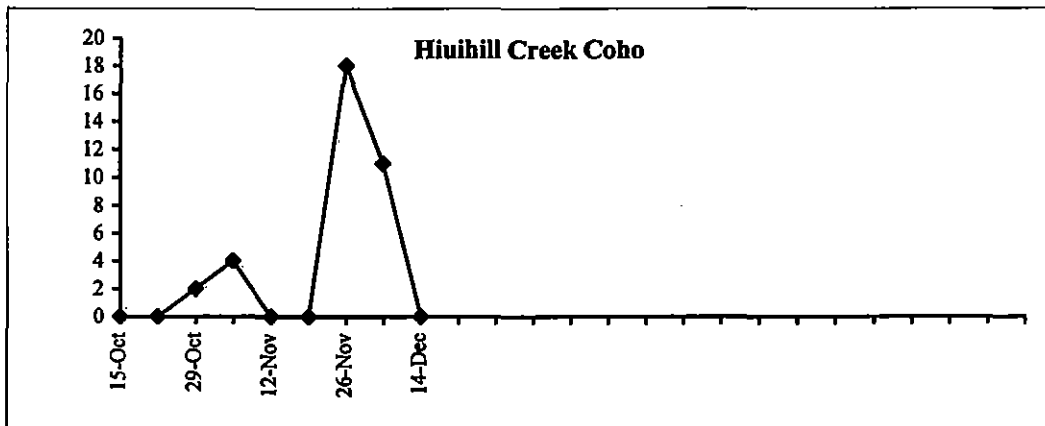
total spawner days **6.5**
 Estimate if residence time = 7 days **1**
 Estimate if residence time = 10 days **1**
 Estimate if residence time = 14 days **0**



Appendix 3d: Area under the curve estimate of coho salmon enumerated in Hiuihill Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
15-Oct	0	0	0
22-Oct	7	0	0
29-Oct	14	2	7
05-Nov	20	4	18
12-Nov	27	0	14
19-Nov	34	0	0
26-Nov	41	18	63
03-Dec	48	11	101.5
14-Dec	59	0	60.5
			0

total spawner days 264
Estimate if residence time = 7 days 38
Estimate if residence time = 10 days 26
Estimate if residence time = 14 days 19

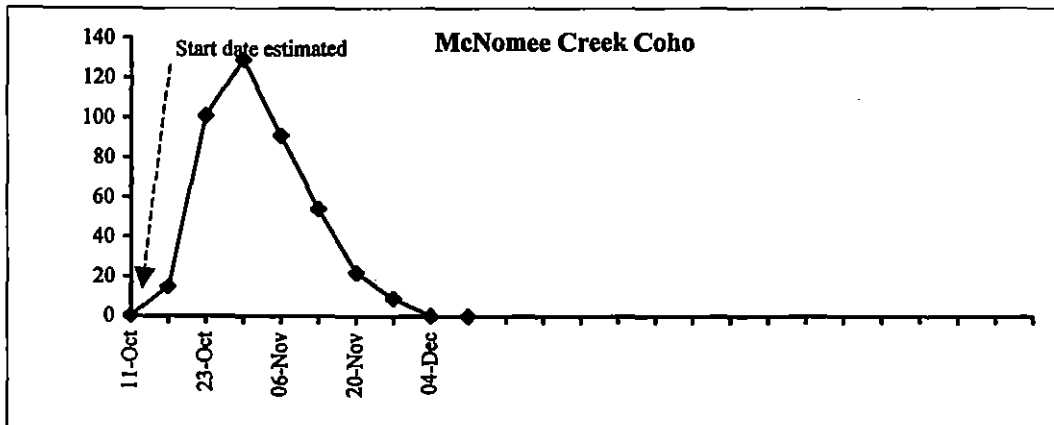


Appendix 3e: Area under the curve estimate of coho salmon enumerated in McNamee Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
11-Oct	0	0	52.5
18-Oct	7	15	52.5
23-Oct	12	101	290
30-Oct	19	129	805
06-Nov	25	91	660
13-Nov	32	54	507.5
20-Nov	39	22	266
27-Nov	46	9	108.5
04-Dec	53	0	31.5
13-Dec	62	0	0

Note: Start date estimated

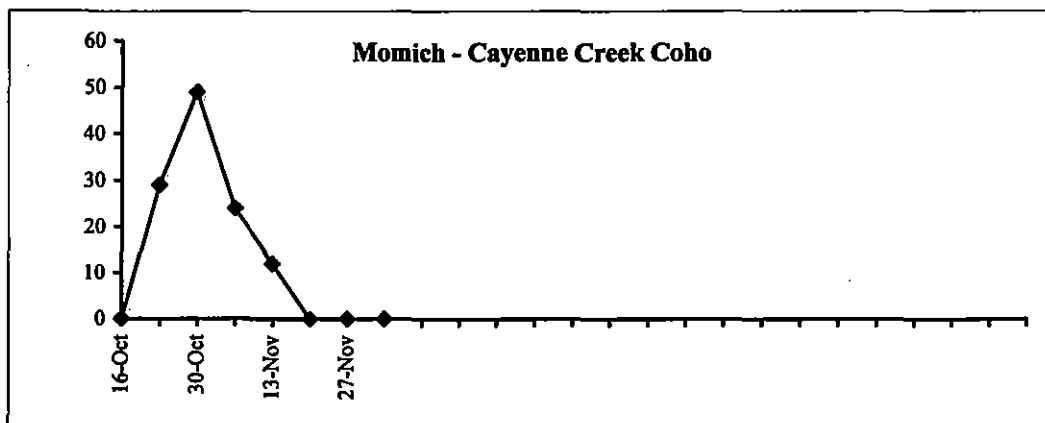
total spawner days	2773.5
Estimate if residence time = 7 days	396
Estimate if residence time = 10 days	277
Estimate if residence time = 14 days	198



Appendix 3f: Area under the curve estimate of coho salmon enumerated in Momich/Cayenne System during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
16-Oct	0	0	101.5
23-Oct	7	29	101.5
30-Oct	14	49	273
06-Nov	20	24	219
13-Nov	27	12	126
20-Nov	34	0	42
27-Nov	41	0	0
04-Dec	48	0	0

total spawner days **863**
 Estimate if residence time = 7 days **123**
 Estimate if residence time = 10 days **86**
 Estimate if residence time = 14 days **62**

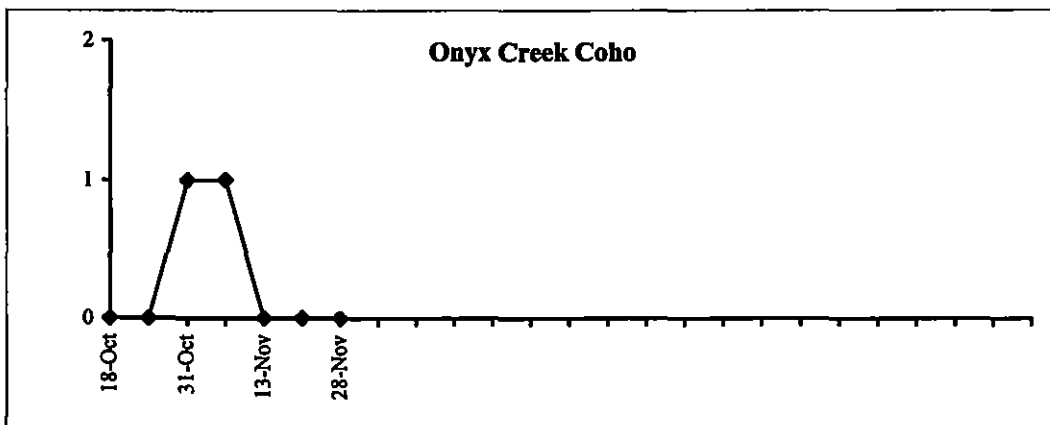


Appendix 3g:

Area under the curve estimate of coho salmon enumerated in Onyx Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
18-Oct	0	0	0
24-Oct	6	0	0
31-Oct	13	1	3.5
07-Nov	19	1	6
13-Nov	25	0	3
21-Nov	33	0	0
28-Nov	40	0	0

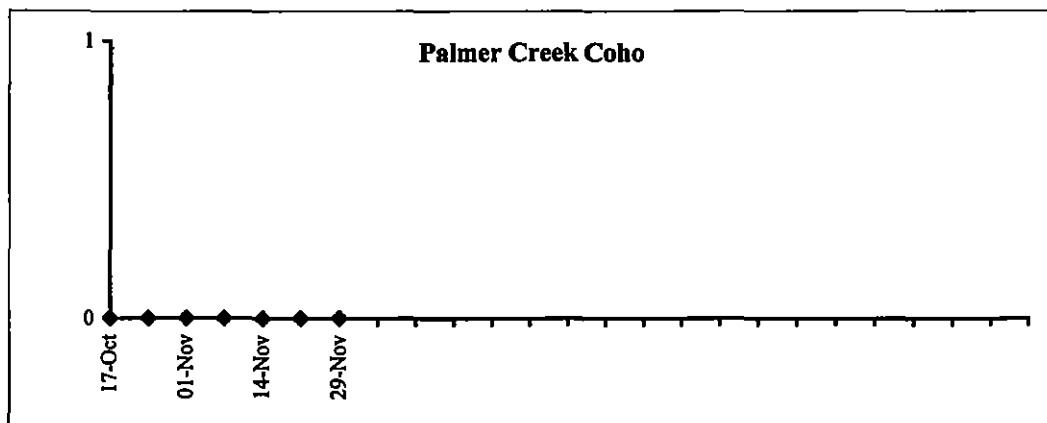
total spawner days 12.5
Estimate if residence time = 7 days 2
Estimate if residence time = 10 days 1
Estimate if residence time = 14 days 1



Appendix 3h: Area under the curve estimate of coho salmon enumerated in Palmer Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
17-Oct	0	0	0
25-Oct	8	0	0
01-Nov	14	0	0
08-Nov	21	0	0
14-Nov	27	0	0
22-Nov	35	0	0
29-Nov	42	0	0

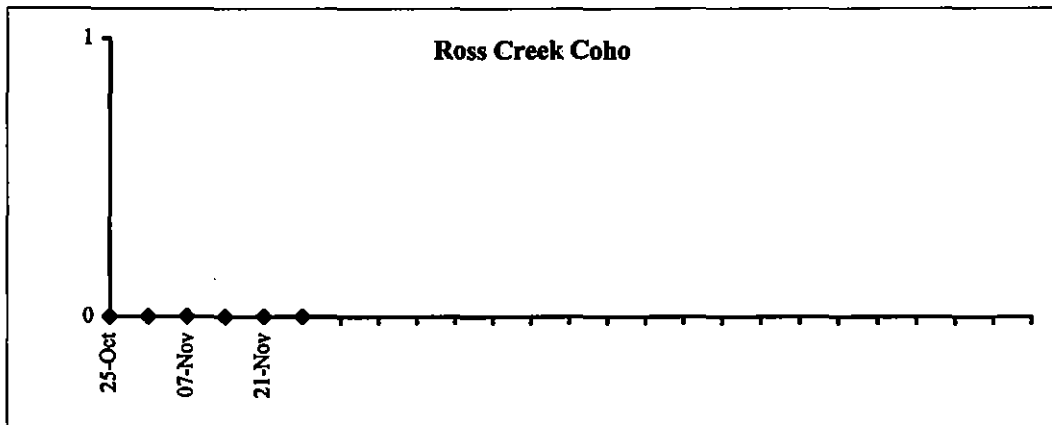
total spawner days 0
 Estimate if residence time = 7 days 0
 Estimate if residence time = 10 days 0
 Estimate if residence time = 14 days 0



Appendix 3i: Area under the curve estimate of coho salmon enumerated in Ross Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
25-Oct	0	0	0
01-Nov	6	0	0
07-Nov	12	0	0
13-Nov	18	0	0
21-Nov	26	0	0
28-Nov	33	0	0

total spawner days 0
 Estimate if residence time = 7 days 0
 Estimate if residence time = 10 days 0
 Estimate if residence time = 14 days 0

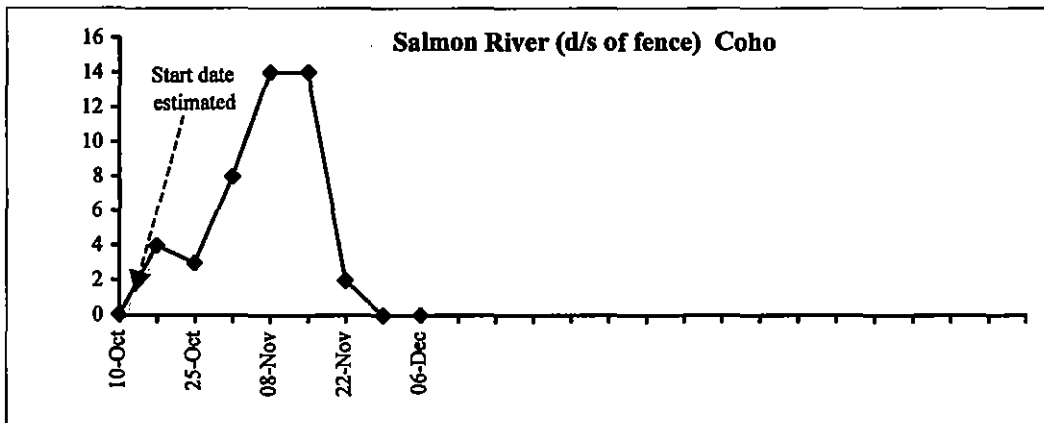


Appendix 3j: Area under the curve estimate of coho salmon enumerated in Salmon River during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
10-Oct	0	0	14
17-Oct	7	4	14
25-Oct	15	3	28
01-Nov	21	8	33
08-Nov	28	14	77
14-Nov	34	14	84
22-Nov	42	2	64
29-Nov	49	0	7
06-Dec	56	0	0

Note: Start date estimated

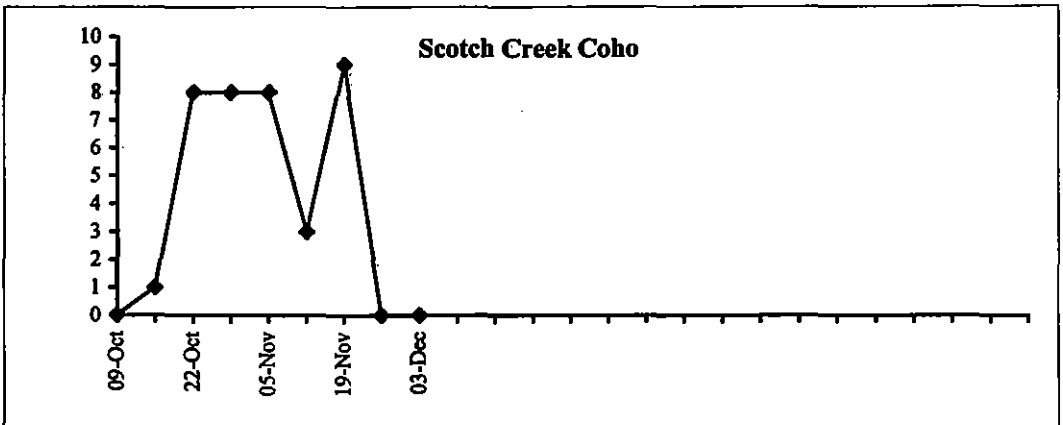
total spawner days	321
Estimate if residence time = 7 days	46
Estimate if residence time = 10 days	32
Estimate if residence time = 14 days	23



Appendix 3k: Area under the curve estimate of coho salmon enumerated in Scotch Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
09-Oct	0	0	3
15-Oct	6	1	3
22-Oct	13	8	31.5
29-Oct	20	8	56
05-Nov	26	8	48
11-Nov	32	3	33
19-Nov	40	9	48
26-Nov	47	0	31.5
03-Dec	54	0	0

total spawner days **254**
 Estimate if residence time = 7 days **36**
 Estimate if residence time = 10 days **25**
 Estimate if residence time = 14 days **18**

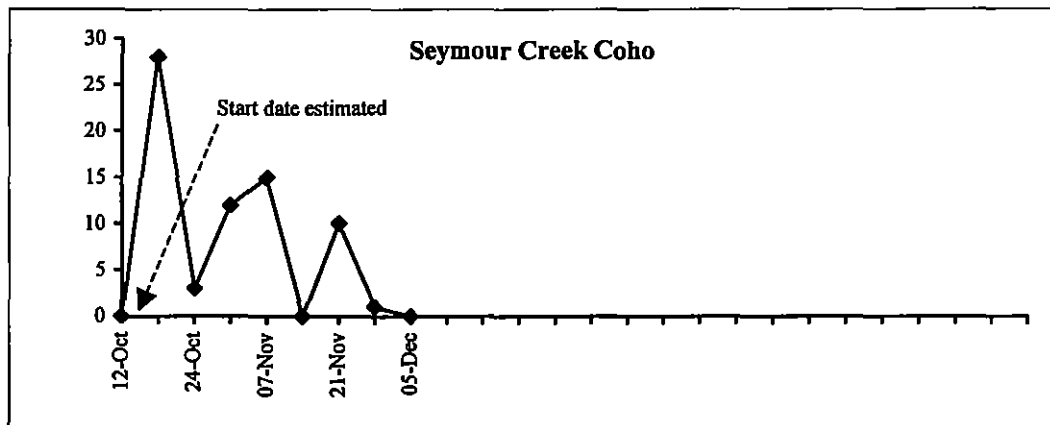


Appendix 3I: Area under the curve estimate of coho salmon enumerated in Seymour River during the fall of 2000.

a Date	b Day	c Fish Counts walk	d Spawning Days
12-Oct	0	0	10.5
19-Oct	7	28	98
24-Oct	12	3	77.5
31-Oct	19	12	52.5
07-Nov	25	15	81
13-Nov	31	0	45
21-Nov	39	10	40
28-Nov	46	1	38.5
05-Dec	53	0	3.5

Note: Start date estimated

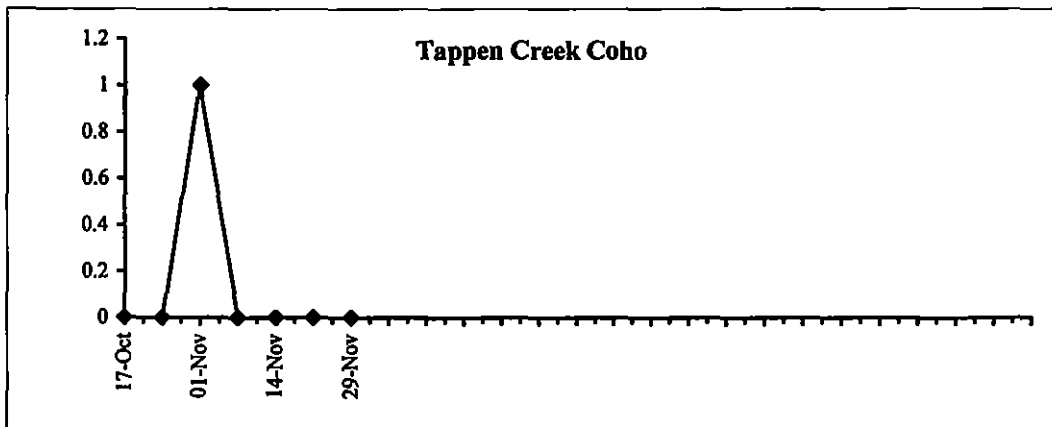
total spawner days	446.5
Estimate if residence time = 7 days	64
Estimate if residence time = 10 days	45
Estimate if residence time = 14 days	32



Appendix 3m: Area under the curve estimate of coho salmon enumerated in Tappen Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
17-Oct	0	0	0
25-Oct	8	0	0
01-Nov	14	1	3
08-Nov	21	0	3.5
14-Nov	27	0	0
22-Nov	35	0	0
29-Nov	42	0	0

total spawner days **6.5**
 Estimate if residence time = 7 days **1**
 Estimate if residence time = 10 days **1**
 Estimate if residence time = 14 days **0**

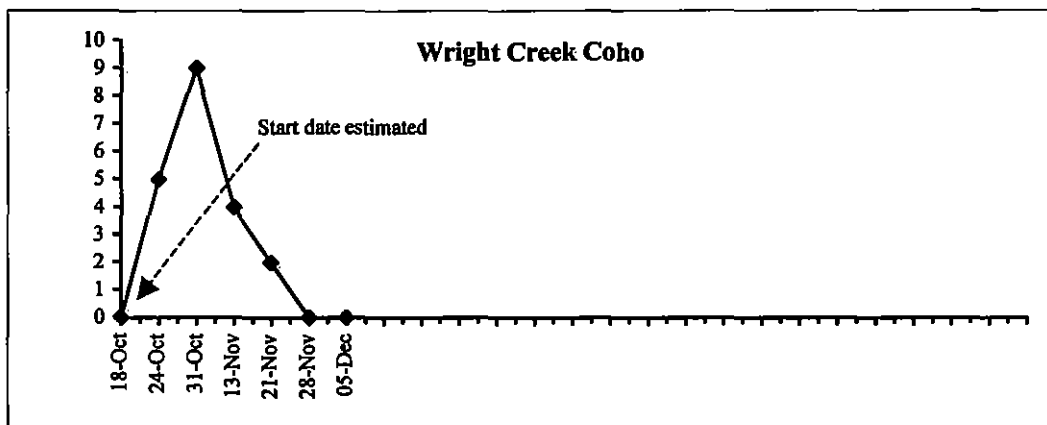


Appendix 3n: Area under the curve estimate of coho salmon enumerated in Wright Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
18-Oct	0	0	15
24-Oct	6	5	15
31-Oct	13	9	49
13-Nov	25	4	78
21-Nov	33	2	24
28-Nov	40	0	7
05-Dec	47	0	0

Note: Start date estimated

total spawner days	188
Estimate if residence time = 7 days	27
Estimate if residence time = 10 days	19
Estimate if residence time = 14 days	13



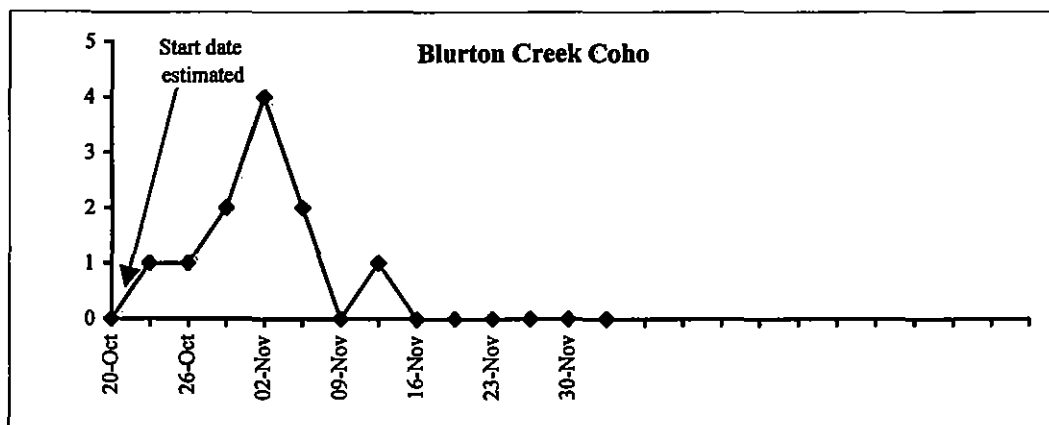
Appendix 3p

Area under the curve estimate of coho salmon enumerated in Blurton Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
20-Oct	0	0	1.5
23-Oct	3	1	1.5
26-Oct	6	1	3
30-Oct	10	2	6
02-Nov	12	4	6
06-Nov	16	2	12
09-Nov	19	0	3
13-Nov	23	1	2
16-Nov	26	0	1.5
20-Nov	30	0	0
23-Nov	33	0	0
27-Nov	37	0	0
30-Nov	40	0	0
04-Dec	44	0	0

Start date estimated

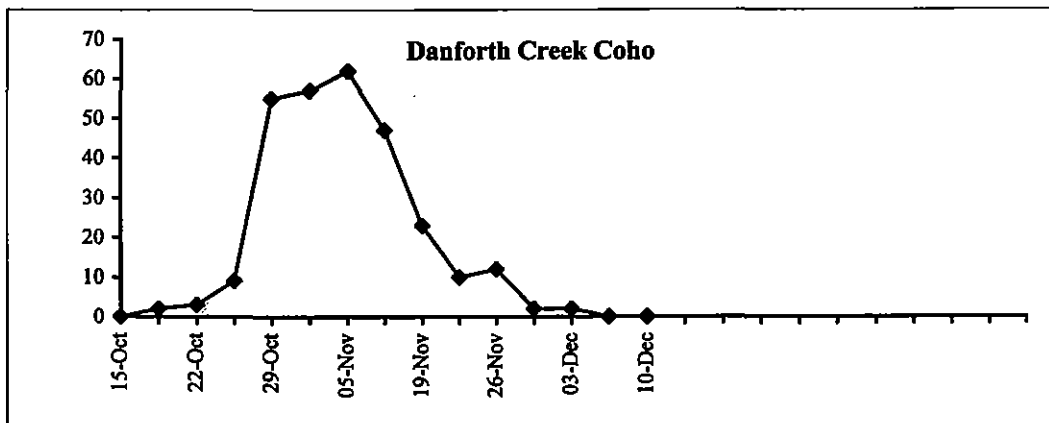
total spawner days	36.5
Estimate if residence time = 7 days	5
Estimate if residence time = 10 days	4
Estimate if residence time = 14 days	3



Appendix 3r: Area under the curve estimate of coho salmon enumerated in Danforth Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
15-Oct	0	0	3
18-Oct	3	2	3
22-Oct	7	3	10
25-Oct	10	9	18
29-Oct	14	55	128
01-Nov	16	57	112
05-Nov	20	62	238
08-Nov	23	47	163.5
19-Nov	34	23	385
22-Nov	37	10	49.5
26-Nov	41	12	44
29-Nov	44	2	21
03-Dec	48	2	8
06-Dec	51	0	3
10-Dec	55	0	0

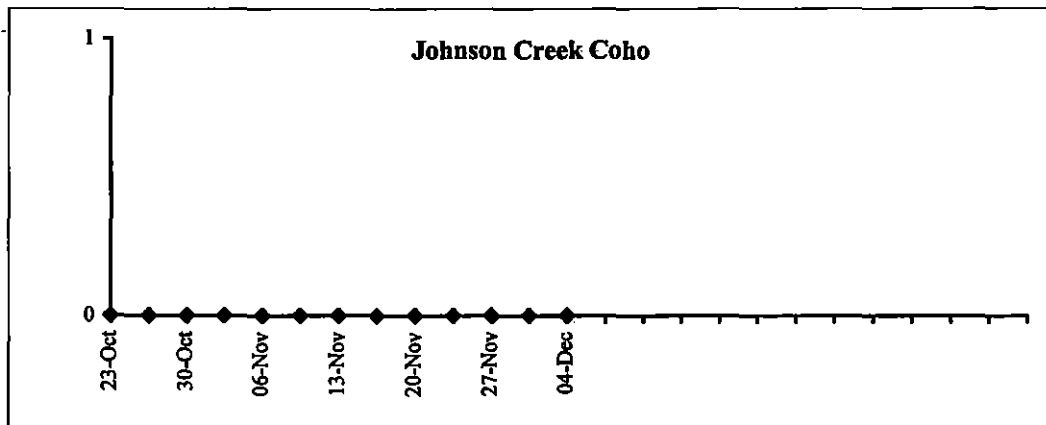
total spawner days **1186**
 Estimate if residence time = 7 days **169**
 Estimate if residence time = 10 days **119**
 Estimate if residence time = 14 days **85**



Appendix 3t: Area under the curve estimate of coho salmon enumerated in Johnson Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
23-Oct	0	0	0
26-Oct	3	0	0
30-Oct	7	0	0
02-Nov	9	0	0
06-Nov	13	0	0
09-Nov	16	0	0
13-Nov	20	0	0
16-Nov	23	0	0
20-Nov	27	0	0
23-Nov	30	0	0
27-Nov	34	0	0
30-Nov	37	0	0
04-Dec	41	0	0

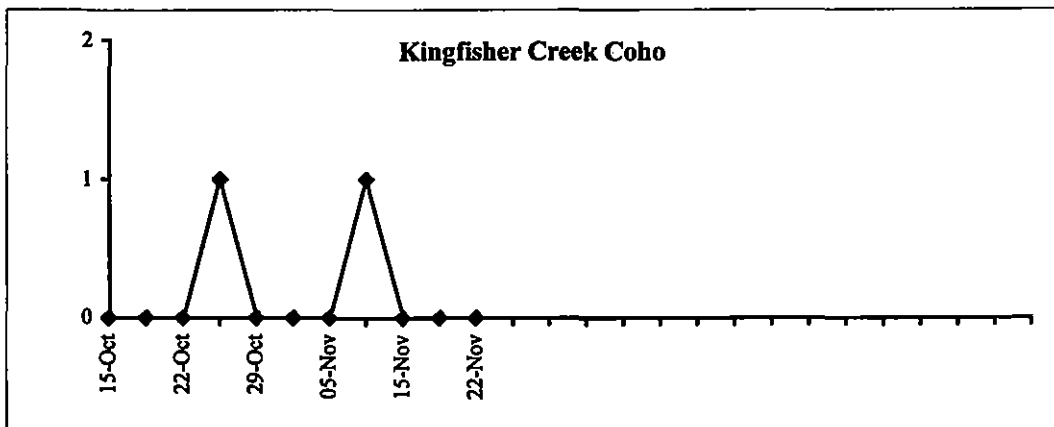
total spawner days 0
 Estimate if residence time = 7 days 0
 Estimate if residence time = 10 days 0
 Estimate if residence time = 14 days 0



Appendix 3u: Area under the curve estimate of coho salmon enumerated in Kingfisher Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
15-Oct	0	0	0
18-Oct	3	0	0
22-Oct	7	0	0
25-Oct	10	1	1.5
29-Oct	14	0	2
01-Nov	16	0	0
05-Nov	20	0	0
08-Nov	23	1	1.5
15-Nov	30	0	3.5
19-Nov	34	0	0
22-Nov	37	0	0

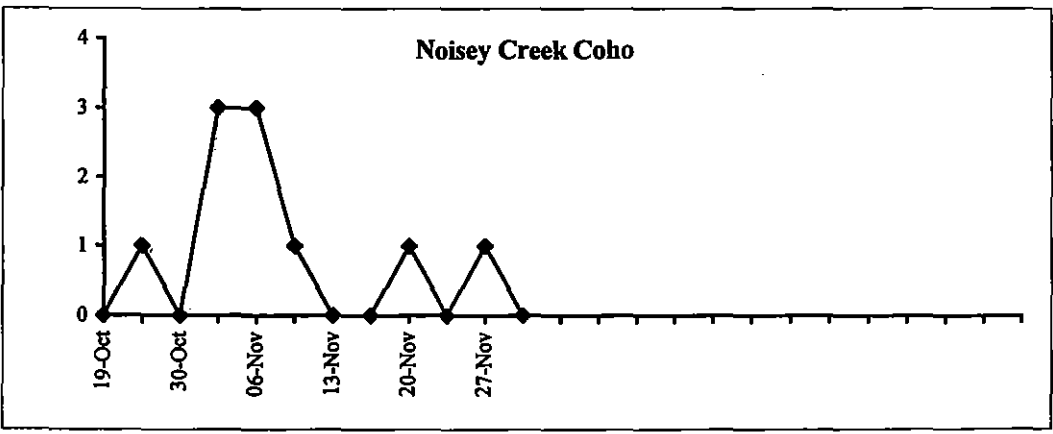
total spawner days 8.5
Estimate if residence time = 7 days 1
Estimate if residence time = 10 days 1
Estimate if residence time = 14 days 1



Appendix 3v: Area under the curve estimate of coho salmon enumerated in Noisey Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
19-Oct	0	0	3.5
26-Oct	7	1	3.5
30-Oct	11	0	2
02-Nov	13	3	3
06-Nov	17	3	12
09-Nov	20	1	6
13-Nov	24	0	2
16-Nov	27	0	0
20-Nov	31	1	2
23-Nov	34	0	1.5
27-Nov	38	1	2
30-Nov	41	0	1.5

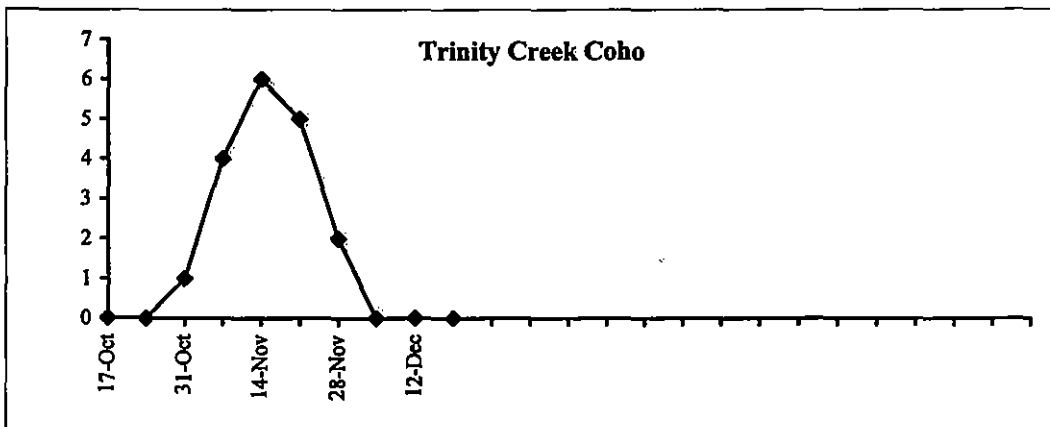
total spawner days **39**
 Estimate if residence time = 7 days **6**
 Estimate if residence time = 10 days **4**
 Estimate if residence time = 14 days **3**



Appendix 3w: Area under the curve estimate of coho salmon enumerated in Trinity Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
17-Oct	0	0	0
24-Oct	7	0	0
31-Oct	14	1	3.5
07-Nov	20	4	15
14-Nov	27	6	35
21-Nov	34	5	38.5
28-Nov	41	2	24.5
05-Dec	48	0	7
12-Dec	55	0	0
14-Dec	57	0	0

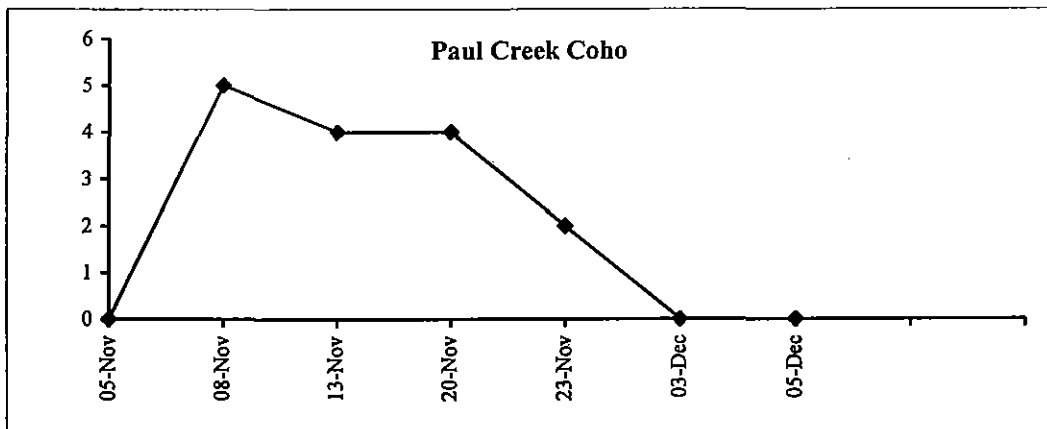
total spawner days 123.5
Estimate if residence time = 7 days 18
Estimate if residence time = 10 days 12
Estimate if residence time = 14 days 9



Appendix 3x: Area under the curve estimate of coho salmon enumerated in Paul Creek during the fall of 2001.

a Date	b Day	c Fish Counts walk	d Spawning Days
05-Nov		0	7.5
08-Nov		3	7.5
13-Nov		8	22.5
20-Nov		15	28
23-Nov		18	9
03-Dec		28	10
05-Dec		30	0

total spawner days 84.5
 Estimate if residence time = 7 days 12
 Estimate if residence time = 10 days 8
 Estimate if residence time = 14 days 6



Appendix 4:

Distributions of spawning coho by stream sections during the fall of 2001 in:

- (a) Seymour River
- (b) McNamee Creek
- (c) Salmon River
- (d) Danforth Creek
- (e) Kingfisher Creek
- (f) Momich/Cayenne System
- (g) Tappen Creek
- (h) Gold Creek
- (i) Hiuihill Creek
- (j) Scotch Creek
- (k) Celista Creek
- (l) Wright Creek
- (m) Onyx Creek
- (n) Blurton Creek
- (o) Trinity Creek
- (p) Noisy Creek

Appendix 4: Distributions of spawning chinook by stream section observed during the fall of 2000 in:

(a) Seymour River

Section	19-Oct	24-Oct	31-Oct	07-Nov	14-Nov	21-Nov	28-Nov	05-Dec										Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	12	0	7	13	0	10	0	0										42	5.3	60.9%	60.9%	Bridge to falls
2	16	3	5	2	0	0	1	0										27	3.4	39.1%	39.1%	Bridge to Mouth
TOTAL	28	3	12	15	0	10	1	0										69	8.6	100.0%	100.0%	

(b) McNamee Creek

Section	18-Oct	23-Oct	30-Oct	06-Nov	13-Nov	20-Nov	27-Nov	04-Dec	13-Dec									Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	2	2	2	1	4	3	1	0	0									15	1.7	3.6%	3.6%	0-.5 km
2	1	0	6	4	0	2	0	0	0									13	1.4	3.1%	3.1%	.5-1 km
3	3	19	18	27	8	12	4	0	0									91	10.1	21.6%	21.6%	1-1.5 km
4	6	62	74	39	15	5	4	0	0									205	22.8	48.7%	48.7%	1.5-2
5	1	11	29	18	10	0	0	0	0									69	7.7	16.4%	16.4%	2-2.5 Left Channel
6	2	7	0	2	17	0	0	0	0									28	3.1	6.7%	6.7%	2-2.5 Right Channel
TOTAL	15	101	129	91	54	22	9	0	0									421	46.8	100.0%	100.0%	

(c) Salmon River

Section	17-Oct	25-Oct	01-Nov	08-Nov	14-Nov	22-Nov	29-Nov	06-Dec										Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	4	1	8	12	15	2	0	0										42	5.3	80.8%	80.8%	Fence to Salmon R. Rd.
2	0	1	0	0	6	0	0	0										7	0.9	13.5%	13.5%	Salmon R. Rd. to Johnson Rd.
3	0	1	0	2	0	0	0	0										3	0.4	5.8%	5.8%	Johnson Rd. to Branchflower Rd.
TOTAL	4	3	8	14	21	2	0	0										52	6.5	100.0%	100.0%	

Appendix 4: Distributions of spawning chinook by stream section observed during the fall of 2000 in:

(g) Tappen Creek

Section	17-Oct	25-Oct	01-Nov	08-Nov	15-Nov	22-Nov	29-Nov											Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	1	0	0	0	0											1	0.1	100.0%	100.0%	Mouth to Trans Canada Highway T.C Highway to Boulton Road
2	0	0	0	0	0	0	0											0	0.0	0.0%	0.0%	
TOTAL	0	0	1	0	0	0	0											1	0.1	100.0%	100.0%	

(H) Gold Creek

Section	15-Oct	22-Oct	29-Oct	05-Nov	12-Nov	19-Nov	26-Nov											Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	1	0	0	0	0											1	0.1	100.0%	100.0%	Mouth to 1st major log jam
TOTAL	0	0	1															1	0.1	100.0%	100.0%	

(I) Hlulhlll Creek

Section	15-Oct	22-Oct	29-Oct	05-Nov	12-Nov	19-Nov	26-Nov	03-Dec	14-Dec									Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	0	0	0	0	18	11	0									29	3.2	82.9%	82.9%	Outflow of Adams River side channel to mouth
2	0	0	2	4	0	0	0	0	0									6	0.7	17.1%	17.1%	Mouth to staff guage
3	0	0	0	0	0	0	0	0	0									0	0.0	0.0%	0.0%	staff guage to Hwy bridge
TOTAL	0	0	2	4	0	0	18	11	0									35	3.9	100.0%	100.0%	

Appendix 4: Distributions of spawning chinook by stream section observed during the fall of 2000 in:

(J) Scotch Creek

Section	15-Oct	22-Oct	29-Oct	05-Nov	12-Nov	19-Nov	26-Nov	03-Dec												Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	0	0			0	0												0	0.0	0.0%	0.0%	0-0.5 km mark
2	0	1	0	0			0	0												1	0.2	2.7%	3.1%	0.5-1 km mark
3	0	2	0	0	0		0	0												2	0.3	5.4%	5.4%	1-1.5 km mark
4	1	3	3	5		7	0	0												19	2.7	51.4%	51.1%	1.5-2 km mark
5	0	1	2	2		2	0	0												7	1.0	18.9%	18.8%	2-2.5 km mark
6	0	0	1	0	1		0	0												2	0.3	5.4%	5.4%	2.5-3 km mark
7	0	0	2	1	2		0	0												5	0.7	13.5%	13.5%	3-3.5 km mark
8	0	1	0	0	0		0	0												1	0.1	2.7%	2.7%	3.5-4 km mark
9	0	0	0	0	0		0	0												0	0.0	0.0%	0.0%	4-4.5 km mark
10	0	0	0	0	0		0	0												0	0.0	0.0%	0.0%	4.5-bridge
TOTAL	1	8	8	8	3	9	0	0												37	5.3	100.0%	100.0%	

(K) Cellista Creek

Section	16-Oct	23-Oct	30-Nov	06-Nov	13-Nov	20-Nov	27-Nov													Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	5	0	4	0	0													9	1.3	47.4%	47.4%	walking bridge to falls
2	0	0	4	2	4	0	0													10	1.4	52.6%	52.6%	Mouth to walking bridge
TOTAL	0	0	9	2	8	0	0													19	2.7	100.0%	100.0%	

Appendix 4: Distributions of spawning chinook by stream section observed during the fall of 2000 in:

(L) Wright Creek

Section	24-Oct	31-Oct	07-Nov	14-Nov	21-Nov	28-Nov	05-Dec											Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	5	6		3	0	0	0											14	2.3	70.0%	70.0%	Mouth to bridge
2	0	3		1	2	0	0											6	1.0	30.0%	30.0%	Bridge to 1st beaver dams
TOTAL	5	9	0	4	2	0	0											20	3.3	100.0%	100.0%	

(M) Onyx Creek

Section	18-Oct	24-Oct	31-Oct	07-Nov	14-Nov	21-Nov	28-Nov											Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	1	0	0	0												1	0.2	50.0%	53.8%	?
2	0	0	0	1	0	0	0											1	0.1	50.0%	46.2%	?
TOTAL	0	0	1	1	0	0	0											2	0.3	100.0%	100.0%	

(N) Blurton Creek during

Section	23-Oct	28-Oct	30-Oct	02-Nov	06-Nov	09-Nov	13-Nov	16-Nov	20-Nov	23-Nov	27-Nov	30-Nov	04-Dec					Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	1	1	2	4	2	0	1	0	0	0	0	0	0					11	0.8	100%	100%	Mouth to highway bridge
TOTAL	1	1	2	4	2	0	1	0	0	0	0	0	0					11	0.8	100%	100%	

Appendix 4: Distributions of spawning chinook by stream section observed during the fall of 2000 in:

(O) Trinity Creek during

Section	17-Oct	24-Oct	31-Oct	07-Nov	14-Nov	21-Nov	28-Nov	05-Dec	12-Dec	14-Dec							Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	0	1	4	6	5	2	0	0	0							18	1.8	100%	100%	Mouth to beaver dam (160m upstream - barrier)
TOTAL	0	0	1	4	6	5	2	0	0	0							18	1.8	100%	100%	

(P) Noisy Creek

Section	19-Oct	26-Oct	30-Oct	02-Nov	06-Nov	09-Nov	13-Nov	16-Nov	20-Nov	23-Nov	27-Nov	30-Nov	04-Dec				Total Observations	Mean Observations per Survey	Unweighted % of Observations	Weighted % of Observations	Comments
1	0	1	0	1	0	1	0	0	0	0	1	0	0				4	0.3	40.0%	33.9%	Mouth to half way point (approx 600 m)
2			0	2	3	0	0	0	1	0	0	0	0				6	0.6	60.0%	66.1%	Half way to Falls
TOTAL	0	1	0	3	3	1	0	0	1	0	1	0	0				10	0.9	100.0%	100.0%	

Appendix 5:

Information collected from coho carcasses recovered during surveys of tributaries to Shuswap Lake and the Lower Shuswap River Basins during the fall of 2001.

Appendix 5: Information collected from coho carcasses recovered during surveys of tributaries to Shuswap Lake and Lower Shuswap River basins during the fall of 2001.

Stream	Section	Date	Sex	Genetic Sample (y/n)	Carcass Condition	Spawn Success	Scale		Length (cm)		Opercular Punches			Tags			Comments
							Book	No	POH	FL	No.	Shape	Area	No.	Colour	Type	
Danforth	1	05-Nov	m		n/a	n/a			34	38	1	cir					
Danforth	2	05-Nov	m		1	n/a			46.0	56.0							
Danforth	2	05-Nov	f		2	100			58.0	67.0							
Danforth	1	05-Nov	f		1	100			43.0	57.0							
Danforth	1	08-Nov	m		2	n/a			48.0	64.0							
Danforth	1	08-Nov	f		2	100			49.0	63.0							
Danforth	3	08-Nov	f		3	n/a			n/a	n/a						Bear scavenged	
Danforth	3	08-Nov	n/a		n/a	n/a			n/a	n/a						Bear scavenged	
Danforth	1	26-Nov	f		2	100			51.0	58.0							
Danforth	1	26-Nov	m		3	n/a			52.0	65.0							
Danforth	2	26-Nov	f		2	100			41.0	51.0							
Danforth	2	26-Nov	m		n/a	n/a			n/a	n/a						scavenged	
Danforth	2	26-Nov	m		3	n/a			49.0	67.0							
Danforth	2	29-Nov	m		1	n/a			51.0	66.0							
Blurton	1	09-Nov	f		2	100			49.4	63.0							
Blurton	1	09-Nov	f		2	100			43.5	54.0							
Blurton	n/a	16-Nov	f		2	100			39.2	48.0							
Blurton	1	20-Nov	m		2	n/a			n/a	n/a						no head	
Blurton	1	27-Nov	n/a		n/a	n/a			n/a	n/a						only half a carcass	
Trinity	1	14-Nov	m		2	n/a			35.5	47.5							
Trinity	1	05-Dec	m		2	n/a			51.5	59.5							
Trinity	1	05-Dec	m		3	n/a			n/a	n/a						could not take measurements	
Scotch	1-1.5	12-Nov	m		1	n/a			50.0	64.0							
Momich/Cayen	1	23-Oct	f		1	100			49.5	58.5							
Momich/Cayen	2	06-Nov	m		1	n/a			34.0	41.5							
Momich/Cayen	2	06-Nov	f		2	100			45.0	54.0							
Momich/Cayen	2	06-Nov	m		2	n/a			53.5	68.0							
Momich/Cayen	2	06-Nov	f		3	100			46.5	58.0							
Momich/Cayen	2	13-Nov	f		3	0			48.0	59.0							
Momich/Cayen	2	13-Nov	m		3	n/a			51.0	64.0							
Momich/Cayen	2	13-Nov	f		2	100			44.0	54.0							
Momich/Cayen	2	13-Nov	f		2	100			46.5	56.0							
Momich/Cayen	1	13-Nov	f	n	2	100			49.5	61.0							
Momich/Cayen	1	13-Nov	f	y	2	100			49.5	60.0							

Appendix 5: Information collected from coho carcasses recovered during surveys of tributaries to Shuswap Lake and Lower Shuswap River basins during the fall of 2001.

Stream	Section	Date	Sex	Genetic Sample (y/n)	Carcass Condition	Spawn Success	Scale		Length (cm)		Opercular Punches			Tags			Comments
							Book	No	POH	FL	No.	Shape	Area	No.	Colour	Type	
Momich/Cayen	1	13-Nov	f	y	1	100			39.5	48.0							
Momich/Cayen	1	13-Nov	f	y	2	n/a			51.0	61.0							% spawn unknown
Momich/Cayen	1	13-Nov	f	y	2	100			52.5	64.0							
Momich/Cayen	1	13-Nov	f	y	2	100			38.5	49.0							
Momich/Cayen	2	13-Nov	f		2	100			52.0	60.0							
Momich/Cayen	1	23-Oct	f		1	100			48.0	57.0							
Celista	n/a	13-Nov	n/a		n/a	n/a			n/a	n/a							scavenged no head just tail
McNomee	.5-1	06-Nov	m		1	n/a			51.0	68.0							
McNomee	1.5-2	06-Nov	f		1	100			48.0	60.0							
McNomee	2.5-3	13-Nov	f		1	50			43.0	54.5							
McNomee	2-2.5	13-Nov	m		1	n/a			52.0	68.0							
McNomee	2-2.5	13-Nov	m		1	n/a			50.0	64.0							
McNomee	1-1.5	13-Nov	m		2	n/a			53.0	68.0							
McNomee	1-1.5	13-Nov	f		2	100			42.0	52.0							
McNomee	1-1.5	13-Nov	f		1	100			51.5	63.0							
McNomee	1-1.5	13-Nov	f		1	100			49.5	59.0							
McNomee	1.5-2	13-Nov	m		3	n/a			38.0	48.0							partially scavenged
McNomee	.5-1	20-Nov	m		1	n/a			59.0	77.0							
McNomee	2-2.5	20-Nov	m		1	n/a			52.0	68.0							
McNomee	2-2.5	20-Nov	f		2	100			50.0	59.0							
McNomee	0-5	04-Dec	f		2	100			46.0	54.0							
McNomee	.5-1	04-Dec	m		1	n/a			62.0	75.0							
McNomee	.5-1	04-Dec	m		n/a	n/a			51.0	65.0							
McNomee	.5-1	04-Dec	m		n/a	n/a			n/a	n/a							scavenged
McNomee	1-1.5	04-Dec	f		n/a	100			54.0	65.0							
McNomee	1-1.5	04-Dec	f		n/a	n/a			n/a	n/a							scavenged
McNomee	1-1.5	04-Dec	m		n/a	n/a			n/a	n/a							scavenged
McNomee	1-1.5	04-Dec	f		n/a	n/a			n/a	n/a							scavenged
McNomee	1.5-2	04-Dec	f		2	100			46.0	54.0							
Seymour R.	abo. Bri.	21-Nov	m		2	n/a			55.5	70.0							
Wright	bel. Bri.	21-Nov	n/a		n/a	n/a			n/a	n/a							carcass unknown
Onyx	2	07-Nov	m		1	n/a			48.0	62.0							
Salmon R.	1	22-Nov	f		2	100			52.0	67.0							section = fence to Salmon Valley Rd.
Salmon R.	1	29-Nov	m		1	n/a			50.0	61.0							

Appendix 6:

Summary of survey lives for coho reported in the literature and unpublished 2001 estimates (adapted from Simpson et al 2001).

Appendix 6:

Summary of survey lives for coho reported in the literature and from unpublished estimates (adapted from Simpson et al. 2000).

Stream	Region	Survey Life Estimates (SL)				Reference
		1	2	3	Mean	
Salmon River (Langley)	Lower Fraser	7.4	6.8		7.1	R. Semple, unpubl. Data (1999)
Lake Cowichan tribs.	Str. Of Georgia	8.2			8.2	S. Baille, unpubl. Data
Trent R.	Str. Of Georgia	7.1	9.6		8.4	J. Irvine, unpubl. Data (1987, 1988)
Deer Cr.	Washington	9.2			9.2	van den Berghe and Gross (1986)
Adams R.	Thompson	10.0			10.0	Whelen et al. (1983)
Harris Cr.	Washington	10.0			10.0	Flint (1984)
Lemieux Cr.	Thompson	9.0	11.2		10.1	R. Bailey unpubl. Data (1998, 1999)
Spring Cr.	Oregon	11.5			11.5	Willis (1954)
Chase	Str. Of Georgia	16.0	10.4	8.9	11.8	Manske & Schwarz (2000), J. Irvine et al. (1992)
Balck Cr.	Str. Of Georgia	15.1	9.6		12.4	J. Irvine, unpubl. Data (1987, 1988)
Coldwater R.	Thompson	12.5			12.5	Whelen et al. (1983)
Eagle R.	Thompson	12.5			12.5	Whelen et al. (1983)
French Cr.	Str. Of Georgia	13.3	12.5		12.9	Irvine, Unpubl. Data (1987, 1988)
Shaw	Str. Of Georgia	12.9			12.9	S. Baille, unpubl. Data
Keogh R.	Johnstone Str.	13.0			13.0	Jonhston et al. (1986)
Flynn Cr.	Oregon	13.1			13.1	Koski (1966)
Little Qualicum	Str. Of Georgia	13.3			13.3	Jonhston et al. (1987)
Deer Cr.	Oregon	13.7			13.7	Koski (1966)
Kirby	Juan de Fuca Str.	13.0	13.5	15.6	14.0	S. Baille, unpubl. Data (1997-1999)
Salmon River (Salmon Arm)	Thompson	15.0			15.0	Whelen et al. (1983)
Bella Coola trib.	Central Coast	20.0			20.0	Finnegan, unpubl. Data
Lachmach	North Coast	18.0	25.0		21.5	Finnegan, unpubl. Data
Little Bear Cr.	Washington	24.0			24.0	Flint and Zillges (1980)
Big Qualicum	Str. Of Georgia	33.0			33.0	Fraser et al. (1993)

