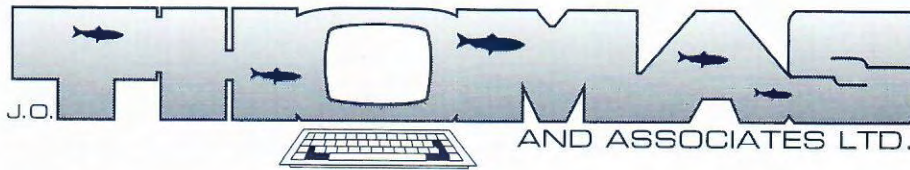


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1995 Skeena River Sport Fish Coho and Steelhead Catch and Release Study

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J.O. THOMAS AND ASSOCIATES
1995 Skeena River sport
fish coho and steelhead ca
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December 1995

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1.0 INTRODUCTION

Catch and release regulations are designed to offer flexibility in the management of sport fisheries. In the lower Skeena River (Figure 1), restrictions to the harvest of steelhead have been implemented to universally maximize the watershed's spawning escapement. Coho harvest restrictions are intended to specifically protect the escapement of fish migrating to upper river system spawning areas; these restrictions are lifted during the migration of lower river coho stocks. Catch and release fisheries are, however, of real concern to users of the Skeena River salmon resource for their unknown influence on fish health.

Primary concerns to the utility of this strategy relate to potential increases in mortality resulting from physiological damage caused by hooking injury or handling stress. Also, were anglers recognizing these restricted species correctly and complying with the regulation of releasing fish with the least possible harm?

This report investigated the means by which shoreline anglers played and landed coho and steelhead, as well as observing the method of release and ultimate physical condition of each fish. Video tape and written records of each observed catch encounter were kept. Angler observations were conducted in as unobtrusive a manner as possible to limit influencing how fish were played, handled and released.

2.0 METHODS

2.1 SURVEY DESIGN

Two study sites, representing distinct riverine environments, were selected for angler observations (Figure 2). The lower river site at Polymar Creek Bar was intended to yield observations on salmon exposed to transitions in water quality and chemistry immediately upstream of the estuary. The upriver study area surrounding Esker Bar was expected to contrast this tidal transition zone with that of a more typical freshwater environment. A total of 50 representatively angled coho and steelhead were to be observed, tagged and released.

In addition to assessing the effects of environment on released fish health, the study investigated the influence of gear, playing time, angler handling, hook location and injury extent to fish mortality. Coho and steelhead retrieved from anglers prior to their release were identified with a Floy type anchor tag and retained in a net pen to assess their recovery from angling affects. Two in-river net pen sites were maintained, with each situated proximate to the source angling site. Fish were held in the net pen for periods of 24 to 96 hours and released to the river following an appraisal of condition.

Records of seal or sea lion numbers and locations were also reported at both sites in an effort to assess the potential impact of these animals as predators on released salmon.

2.2 CATCH OBSERVATIONS

2.2.1 Schedule

The study operated from July 24 to September 3, 1995 corresponding with the period of non-retention for coho and steelhead. Sample observations originated from each site during weekday and weekend days. Given expected effort increases, all weekend days were sampled; weekday studies were structured to randomly rotate coverage over all available days.

Attempts to apportion observations equally between the Esker and Polymar Bar sites were modified inseason. Effort counts conducted by this study and the companion creel survey (Thomas, 1995) noted that Polymar Bar supported far larger numbers of anglers. Hourly catch success was also greater at Polymar Bar for the study species. This combination resulted in the study focusing on, and gathering a majority of catch observations from, the Polymar site.

Samples were acquired throughout the angling day, and involved morning and afternoon shifts.

2.2.2 Angling Observations

2.2.2.1 Angler Behavior

Angler conduct related to the playing, landing and handling of beached fish was observed by two or more surveyors. Surveyor priorities were designed to first position themselves to view fully the angling site and to do so in a covert manner. Second, surveyor's were required to respond quickly to fish landings and therefore could not be too far away from angling parties. Observations originated onshore, as well as from a boat situated in the river opposite either gravel bar. Covert positioning was difficult given the generally barren landscape of each site and need for precise observations related to fish being played, beached and unhooked.

Records of individual angler encounters with coho and steelhead were captured on video tape and supplemented by verbal and written commentary supplied by surveyors.

2.2.2.2 Data Recording

Anglers responding to a fish striking their lure triggered the reporting of a full suite of information encompassing the catching, landing and handling of the fish (Figure 3). Time records originated from hand held stop watches. The beaching of fish prompted the surveyor to observe the location and nature of hooking. In addition to details on the duration of fish play and landing, data on gear and the angler's background were acquired via interview. Information records were restricted to angler encounters with coho and steelhead, angler behavior to catching and releasing chinook and pink were not reported formally.

Landings involving coho and steelhead prompted surveyor staff to request anglers tendering their fish for biological sampling prior to fish release. Surveyor intercession required care to not influence: 1) angler behavior respecting the handling and unhooking of fish, and; 2) angler knowledge of species and therefore their decision respecting fish release.

Once beached, each coho and steelhead was appraised physically, noting the specific hook location and degree of associated tissue damage and bleeding. Observation records included information on fish vigor, subjectively gauged on a scale encompassing lethargic to active swimming. All fish were then placed in a hypolon brood stock capture bag, measured for nose to fork length and identified with a Floy type anchor tag. The brood stock bag was flooded and secured at a depth of 0.5 meters to a re - bar stake in the river allowing the fish time to acclimate to the initial confinement environment. The re - bar site was physically isolated away from angling or angler disturbance but selected to ensure maintenance of ambient river flow and temperature for the site. The bag was orientated parallel with the current to provide an optimum flow of water to the fish.

The complete species data record resulting from the interview and narrative notes included:

1. time played (± 1 second)
2. handling time partitioned between air and in water time (± 1 second)
3. method of landing; net, tailed with or without glove, beached
4. method of fish suppression at landing
5. water and air temperature
6. line test (lbs.)
7. lure type and size
8. hook type and size (barbed/unbarbed)
9. hook location on fish
10. degree of hook damage
11. degree and amount of bleeding
12. fish activity and health
13. fish survival/mortality at release
14. Floy tag number
15. angler residence and guided status

Angler cooperation to providing a coho or steelhead for the study was rewarded with the provision of an official program participant baseball hat. Separate hat types were provided for coho and steelhead.

2.2.3 Fish Holding Observations

2.2.3.1 Brood Stock Bag

Brood stock holding bags provided a vector to transfer fish from the angling site to the net pen confinement area. The black hypolon bags also retained fish in-river at the angling site prior to transport to the net pen. Mesh openings at each end of the cylindrical shaped bags allowed a constant flow of water to the fish. Temperature, flow and dissolved oxygen levels, as well as general fish health observations were recorded in and surrounding the bag. Sampled fish were retained in the bag at the catch site for periods up to 3 hours. The bags were anchored to rebar driven into the river bed. Bags were suspended in the river at depths of 0.5 to 1.0 meters.

2.2.3.2 Live Tank

The upper and lower Skeena River net pen sites were positioned some distance from Polymar and Esker Bar's. Bagged coho or steelhead were moved to these locations by jet propulsion boat. While onboard, the brood stock holding bag was cradled in a 0.6 x 0.6 x 2.0 meter live tank supplied with recirculating river water and compressed oxygen. Water temperature and dissolved oxygen levels were measured and maintained to match ambient river values. Jet boat travel times from the angling to net pen site ranged from 0.3 to 0.5 hours.

2.2.3.3 Net Pen

The net pens used in this study were designed to provide sanctuary for coho and steelhead exposed to catch and release trauma. The 1.2 x 1.2 x 2.5 meter metal frame and mesh construction pens were secured in remote side channels of the Skeena River. The metal core fence mesh was secured to the frame with wire strapping to secure the pen against bear, seal or sea lion predation. Padlocks provided security for access to the pen's gate. Water turbidity was high throughout the study, further masking the visibility of any coho or steelhead to terrestrial predators or raptors. Each pen was positioned to provide sufficient depth, flow and shade necessary for optimum fish health.

Fish transported to the pen in the hypolon bags were removed from the live well, checked for vitality and transferred to the pertinent catch area net pen. Data records involving water temperature, flow and dissolved oxygen were kept for each individual study specimen. Fish were observed for periods of 24 to 96 hours, noted to condition and released to the river to continue their migration. Fish dying in the net pen would be autopsied to establish the cause of death.

2.2.4 Analysis

The assessment of the catch and release strategy to fish health is based on an analysis of the individual or associated elements determined as contributing to mortality. Key causal elements investigated included handling time, hook size, hook location, degree of bleeding and angler experience.

Review and critique the practice of anglers handling beached fish and their methods for liberating fish in the context of the minimal harm release regulation.

3.0 RESULTS

The study observed angler behavior and fish handling at two Skeena River fishing sites between July 24 and September 3, 1995. A total of 22 steelhead and 44 coho catch and release events were observed and reported. Acquired sample sizes did not meet program objectives primarily as a result of low coho and steelhead catch per effort values. Small sample size precluded the use of multiple comparison tests.

3.1 CATCH AND RELEASE OBSERVATIONS

3.1.1 Angler Behavior

Angler compliance to releasing fish with the least possible harm was investigated and documented on film and report narratives. The large majority of angler encounters involving fish releases complied fully with the intent of this regulation. Most fish were walked to shallow water or the beach where the hook was removed or line cut and the fish liberated. Fish handling was minimal, liberation expedited and general fish health preserved. Steelhead garnered greater care than coho, as most anglers preferred to cut the line as opposed to physical removal of the hook as practiced on coho. Anglers preferred to pin coho (91%) and steelhead (73%) as a means of suppression to remove the hook.

Exceptions originate from two prime issues. The first relates to species recognition problems. Three sampled anglers (4.5%) were ignorant of differentiating between species. Without the intercession of program surveyors waiting to bag released fish, two coho and one steelhead would have been killed and retained during the closed period. Second, activities related to anglers obtaining pre - release photographs extended the exposure to air of fish. Prolonged air exposure (> one minute) can contribute to lactate and acid base disturbances (Milton & McDonald, 1994) and inhibit gill dependent gas exchange. Handling fish for photographs or peer display also resulted in fish being squeezed and dropped onto shore.

Surveyor presence and their interest to study fish releases was difficult to disguise from anglers. The exposed area and visibility of surveyor staff made it difficult to avoid people and hence possibly influence their handling of fish. As the study progressed and angler contact increased, anglers sought out survey personnel to both acquire a program hat and contribute fish to the study.

Attempts to film covertly were generally successful from inside a vehicle. Filming on the beach or aboard a boat were apparent to most anglers and undoubtedly influenced the manner of fish handling. Fish playing or landing time were not observed to be affected by filming. The interception of fish prior to their release required surveyors getting close to angling parties. Although every effort to remain unobtrusive was made, it was impossible to not impinge to some degree at this stage. The influence of surveyor activities on angler behavior to handling fish could not be quantified.

3.1.2 Playing and Handling Time

Coho playing time by anglers ranged from 1:05 to 6:14(minutes:seconds) minutes, averaging about 2:30 minutes in duration. Steelhead were played for more extended periods of time, ranging from 0:51 to 8:25 minutes and averaging about 4:00 minutes. Greater playing time for steelhead likely results from the greater size and strength of these fish (Figure IV a.). Figure IV b. displays this size relationship and playing time graphically for each species.

Handling times on the beach were similarly brief, universally reflecting angler concern to releasing fish quickly. Disparate playing times also likely yield a similarly exhausted fish and therefore liberation period. Coho handling times ranged from 0:02 to 5:05, while steelhead times ranged from 0:10 to 2:05. Both species averaged around 0:40 seconds from landing to release. Figure V lists the handling time of fish in the study.

Regarding mortality, the handling time registered for the coho and steelhead dying after release were each less than the average recorded for the species. The handling time for the dying coho and steelhead were 0:30 and 0:15 seconds respectively. The recorded playing times of each dying fish were similarly less than the average observed during the study; 1:45 and 3:45 respectively for the coho and steelhead.

Anglers were concerned to limit the playing and handling time of fish. Experienced anglers, recognizing their playing a steelhead, treated the fish differentially. Indeed, steelhead were beached as quickly as possible. Due to the relatively short playing times of coho and steelhead in this study, it is doubtful many were physically exhausted when landed. Exhaustion and the additive effect of sublethal stressors likely contribute to delayed mortality (Bouck and Ball, 1966; Kwak and Henry, 1995). Angler concerns to limit fish playing and handling were rewarded with active coho and steelhead at release.

3.1.3 Hooking Injuries

Two fish, one coho and one steelhead, were observed to die during the course of this study. In both cases the cause of death was determined to result from excessive blood loss. The fish shared similar hook sites and injuries. Each fish was hooked in the floor of the mouth, close to the base of the tongue. In the case of the coho, bleeding was pronounced and death rapid; the fish died in the holding bag onsite at Polymar Bar. The steelhead injuries were originally reported onsite the bar as severe but with less bleeding than that of the coho.

The steelhead died during the 24 hour holding trial. An autopsy of the steelhead observed a substantive blood clot inside the mouth.

A total of five other steelhead and coho were hooked in this same location but survived the holding trial.

Fish observed in the study were hooked in a variety of body locations, most involved the jaw and mouth:

	<u>COHO</u>	<u>STEELHEAD</u>
Jaw	23 (52%)	12 (55%)
Mouth	12 (27%)	7 (32%)
Eye	1 (2%)	1 (4%)
Operculum	6 (14%)	2 (9%)
Body	1 (2%)	0
Unknown	1 (2%)	0

The unknown coho hook location originated from a fish expelling the hook upon landing and the fish escaping appraisal of this program component.

Figure V details information pertaining to hook location and the degree of tissue damage and bleeding. Based on the scrutiny of hooked coho and steelhead, only 9 (20%) coho and 3 (14%) steelhead were prescribed as exhibiting moderate or greater tissue damage. Bleeding levels were similarly low as evidenced by the adjudication of only 4 (9%) coho and 4 (19%) steelhead expressing moderate or greater levels of blood loss. Hook size was not determined as a causal factor in the death of either fish. Significant blood loss was correlated to hooking sites in the inner mouth and eye. It should be noted that all hooks in the study except two were barbed. All hooks were single as opposed to barbed configuration.

Hook location was the key parameter contributing to the death of both the coho and steelhead. The base of the tongue is highly vascular and a hook entering this area can sever either the ventral aorta or pseudobranchial artery. Both fish died from a loss of blood originating from arterial blood vessel damage in and around the tongue's base.

3.2 SEAL AND SEA LION ACTIVITY

Seal and sea lion populations were observed in the Skeena River adjacent to both Polymar and Esker Bar's. No angler encounters with seal predation were observed or reported in interviews. Seal numbers in the river were small; concentrations were limited to three or fewer animals at a given site. Reduced numbers of seals at active angling sites suggest optimal escape opportunities for coho or steelhead. The coho and steelhead monitored in this program were retained for holding pen studies, and therefore not immediately liberated to contend with this predator. Observations on fish robustness following

angler playing however indicate all steelhead and 81% of the coho exhibited rapid swimming vigor. This information would suggest released fish having sufficient orientation to recognize predators and ability to avoid them.

4.0 RECOMMENDATIONS

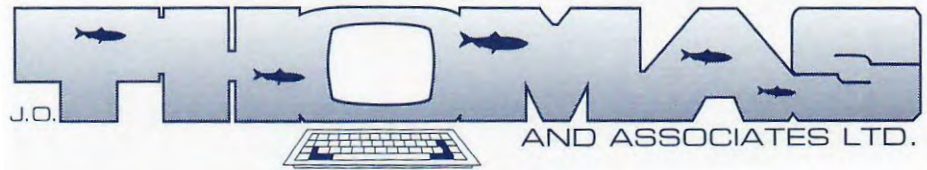
Anglers were observed to carefully handle fish destined for release. Substantive changes in angler conduct is not required on the basis of this study's observations. It would be valuable to emphasize the utility of minimizing fish handling time for photographs. Species identification education should be emphasized in any catch and release fishery, but especially where certain species are legal while others are restricted. A good species photographic reference guide should be amalgamated with the non - tidal sport fishing guide.

The limited mortalities associated with the catch and release of coho and steelhead in this study suggest that deployed gear is not contributing unduly to fish mortality. Certainly the adoption of barbless hooks could enhance hook retrieval, however, this was not identified specifically as contributing to the degree of tissue damage or bleeding.

Seal and sea lion populations should continue to be enumerated temporally and spatially in the Skeena River. Future population increases could prove detrimental to adult salmon migrants.

5.0 REFERENCES

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FIGURES

FIGURE I

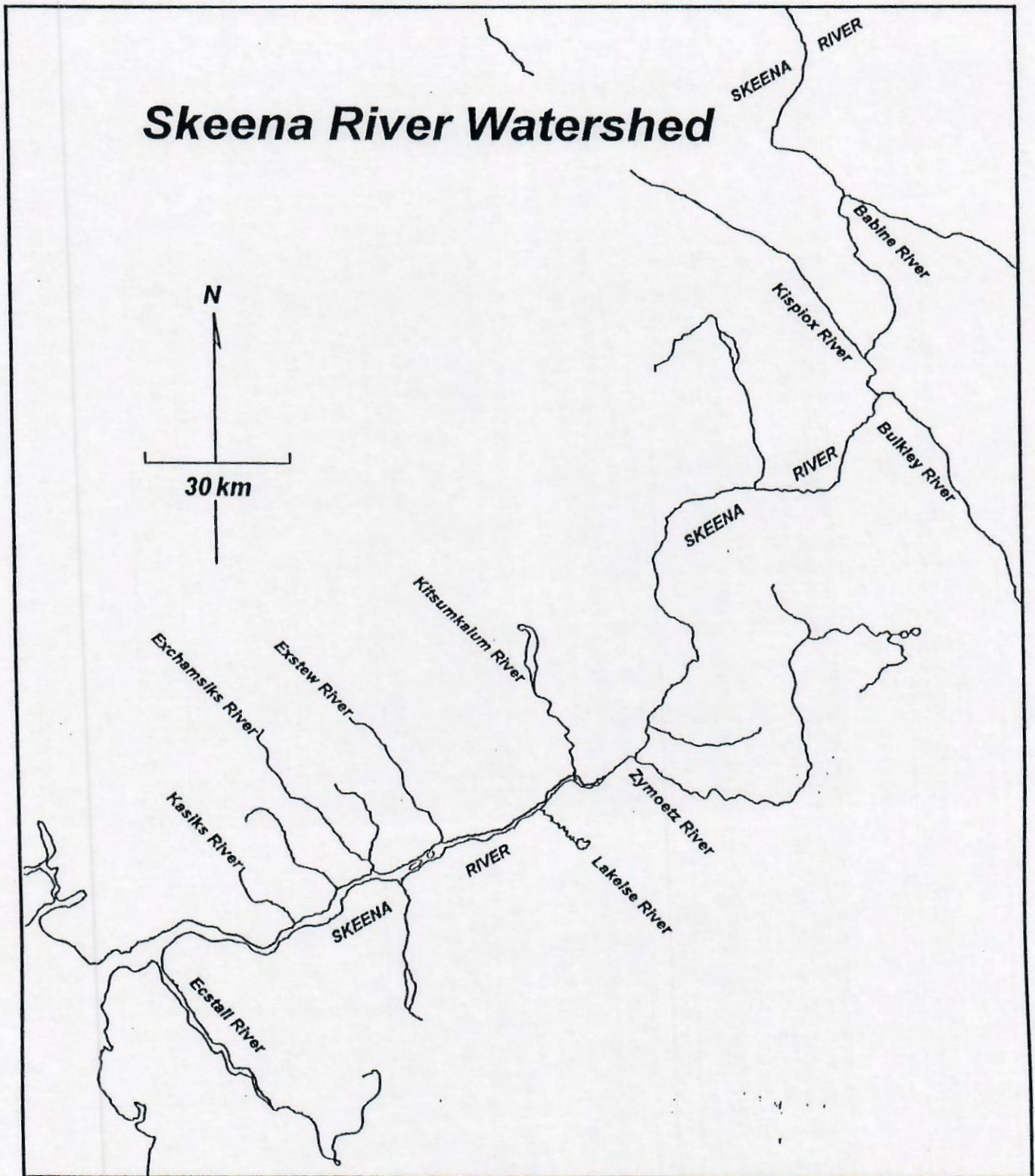


Figure 1.- Skeena River watershed.

FIGURE II

Enlarged View of 1995 Survey Area and Zones

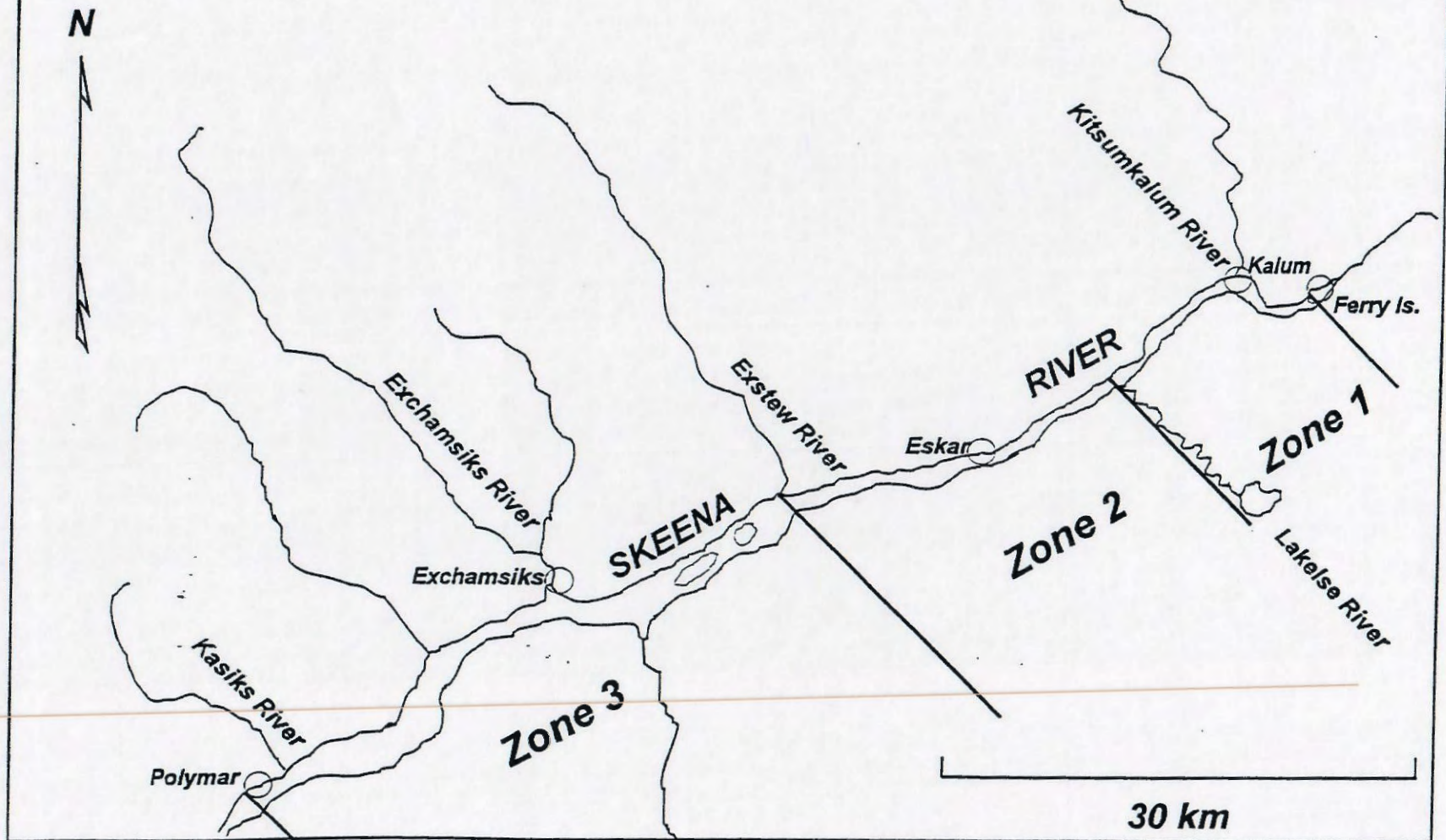


Figure 2. 1995 lower Skeena river sport fishery survey area, zones, and access points.

FIGURE III

1995 Skeena River Catch and Release Study

Date Zone Location _____

SPECIES Coho Sthd Time Played min sec Handling Time min sec

Method of Landing (check one) Net Tailed Tailed Beached
Glove Without Glove

Method of Suppression (check one) Pinned Opercular Elevated
Compression Caudal Peduncle

Water Temp (°C) Air Temp (°C) Line Test (lbs)

Lure Type: _____ Lure Size:

Hook Type: _____ Hook Size:

Hook _____ Degree of Hook Damage Minimal 1 —————> 5 Severe

Location: _____ Amount of Bleeding Minimal 1 —————> 5 Severe

Additional Injuries or Behaviour (apnea): _____

Condition (check one) Active or Lethargic

Liberation (check one) Revival or No Revival

Speed of Escape Slow 1 —————> 5 Fast

Floy Tag #

Angler Residence Local Other Guided Unguided

Angler Experience Novice 1 —————> 5 Expert

FIGURE IVa

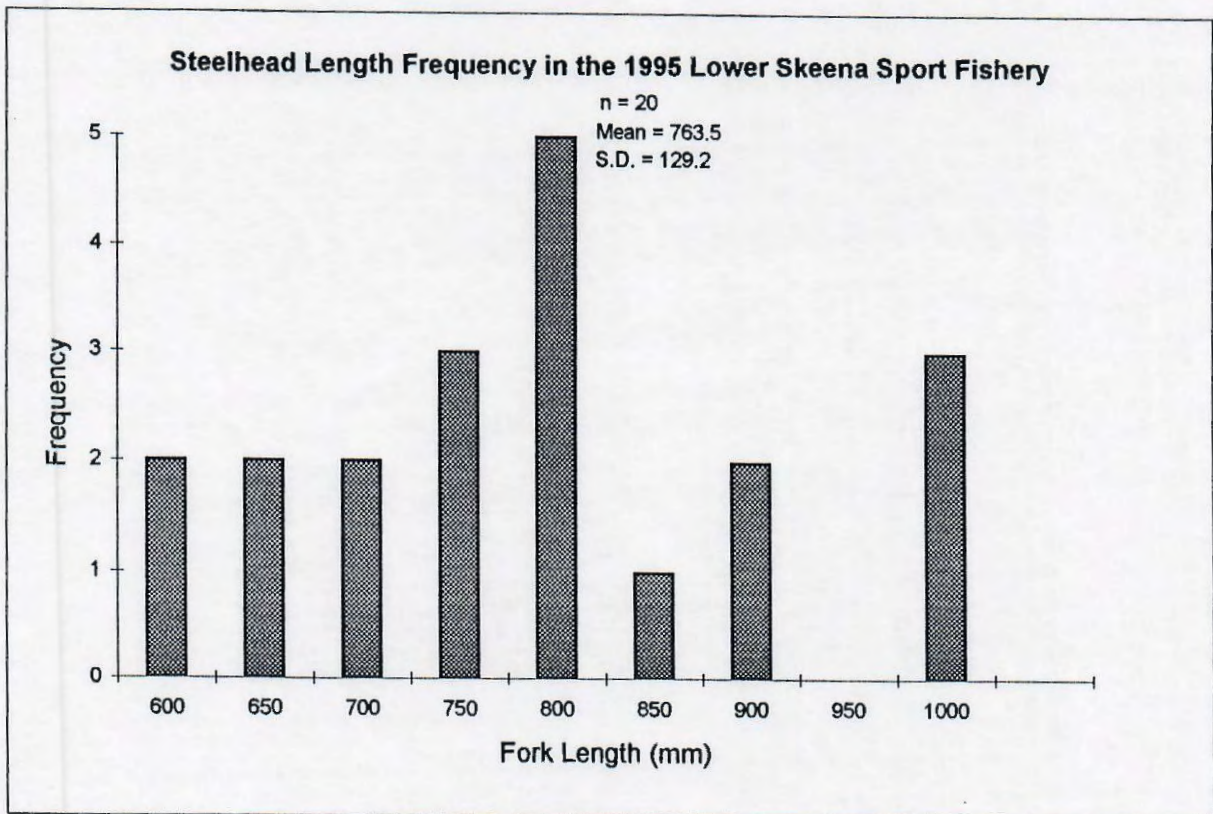
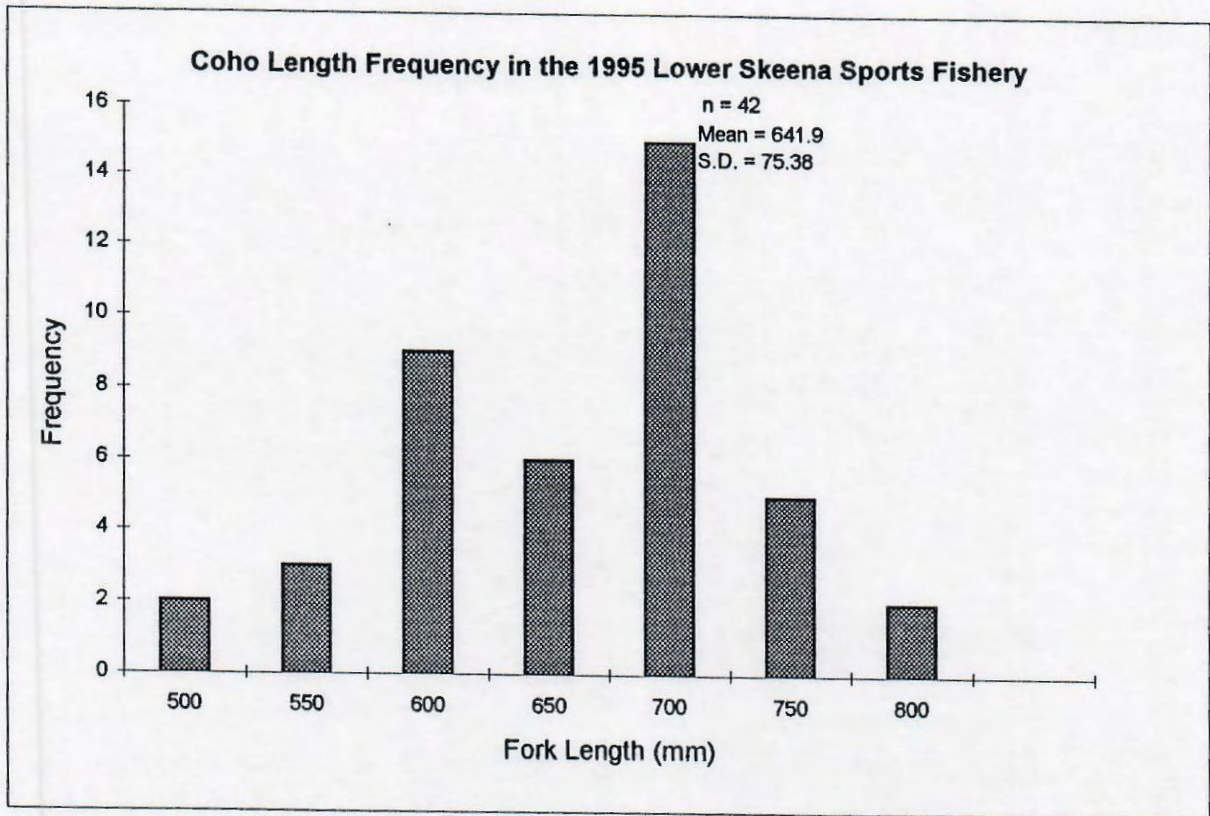
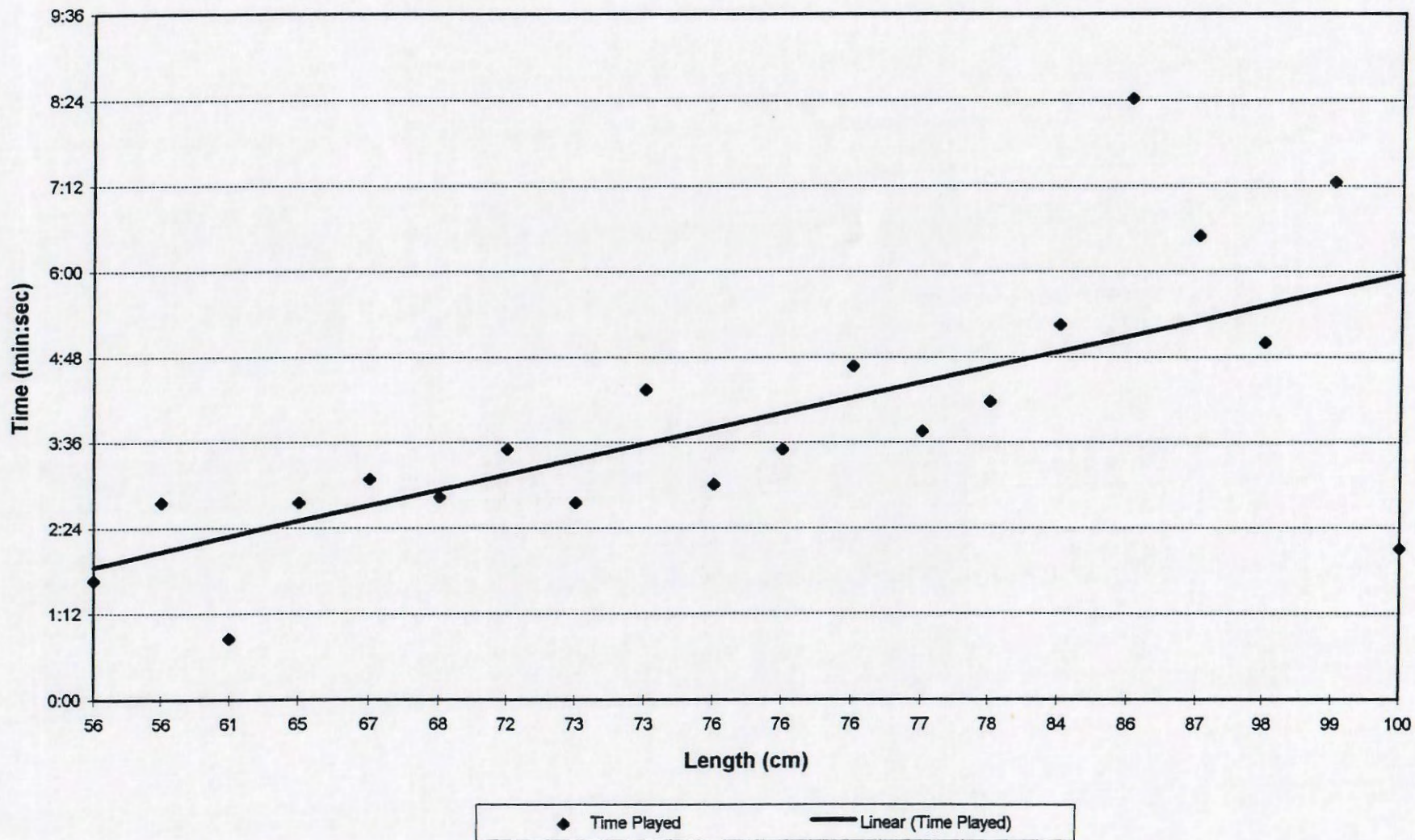


FIGURE IVb

1995 Skeena River Catch and Release Study
Comparison of Steelhead Size and Time Played



1995 Skeena River Catch and Release Study
 Comparison of Coho Size and Time Played

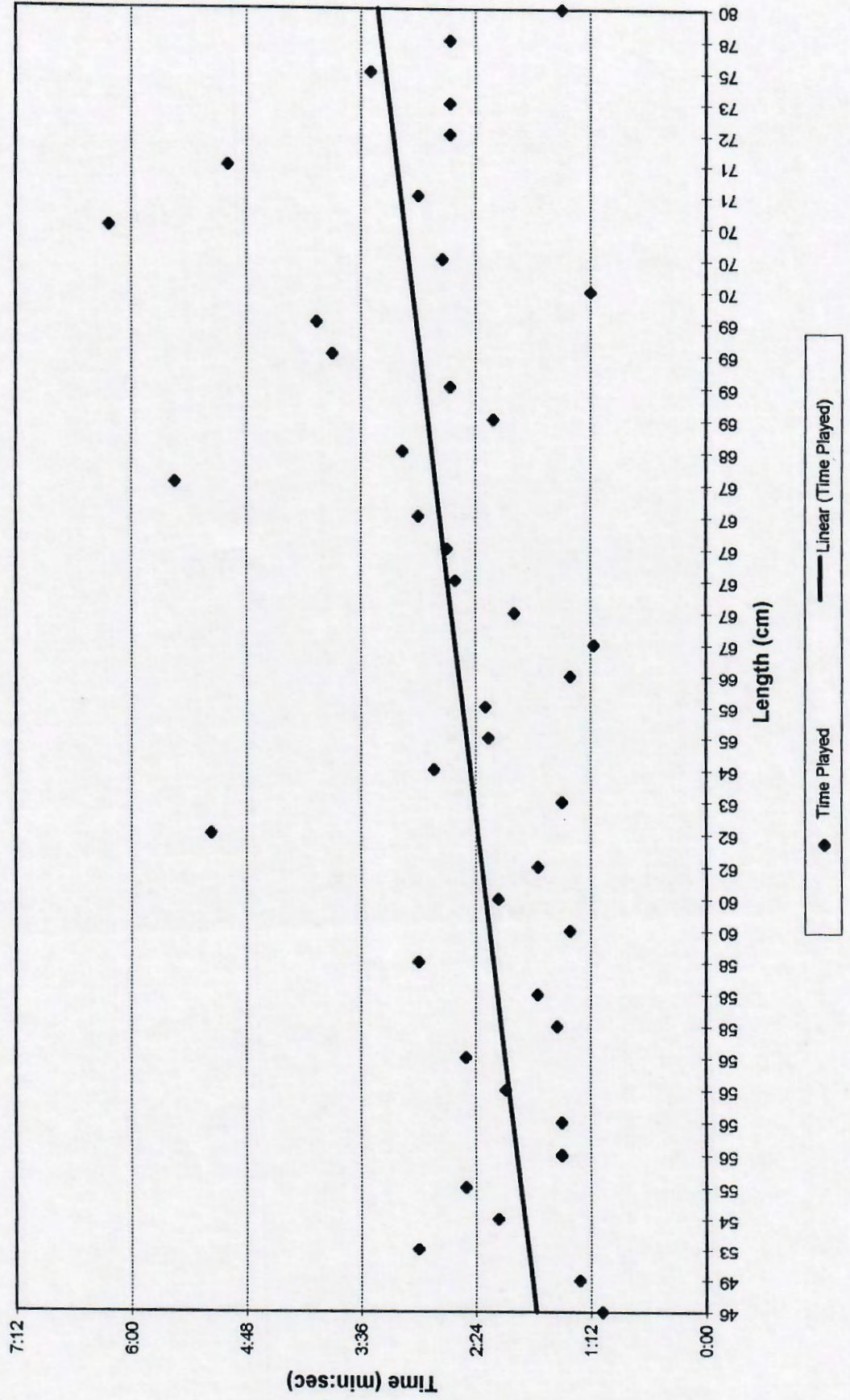


FIGURE V

1995 Skeena River Catch and Release Study
Method of Suppression

Species	Method of Suppression	Count	Percentage
coho	elevated caudal peduncal	2	4.5%
	other	2	4.5%
	pinned	40	90.9%
	<i>Total coho</i>	44	100.0%
steelhead	elevated caudal peduncal	1	4.5%
	other	5	22.7%
	pinned	16	72.7%
	<i>Total steelhead</i>	22	100.0%
<i>Total Species</i>		66	

**1995 Skeena River Catch and Release Study
Time Played and Handled**

Species	Liberation	Count	Time Played (min:sec)			Time Handled (min:sec)		
			Average	Minimum	Maximum	Average	Minimum	Maximum
coho	No Revival	1	1:45	1:45	1:45	0:30	0:30	0:30
	Revival	42	2:37	1:05	6:14	0:43	0:02	5:05
	Unknown	1	2:18	2:18	2:18	0:05	0:05	0:05
steelhead	No Revival	1	3:45	3:45	3:45	0:15	0:15	0:15
	Revival	19	4:04	0:51	8:25	0:41	0:10	2:05
	Unknown	2	3:27	1:40	5:15	0:50	0:45	0:55

**1995 Skeena River Catch and Release Study
Degree of Hook Damage and Hook Location**

Species	Degree of Damage (min 1 => max 5)	Hook Location	Count	Percentage
coho	1	lower jaw	5	
		upper jaw	5	
		roof of mouth	4	
		floor of mouth	2	
		operculum	1	
		unknown	1	
		<i>Total</i>	<u>18</u>	41%
		2	upper jaw	5
	floor of mouth		4	
	lower jaw		3	
	operculum		3	
	roof of mouth		2	
	<i>Total</i>		<u>17</u>	39%
	3	upper jaw	4	
		operculum	2	
lower jaw		1		
eye		1		
body snag		1		
<i>Total</i>		<u>9</u>	20%	
<i>Total coho</i>			<u>44</u>	<u>100%</u>
steelhead	1	upper jaw	6	
		lower jaw	3	
		floor of mouth	2	
		roof of mouth	1	
		<i>Total</i>	<u>12</u>	55%
	2	floor of mouth	3	
		upper jaw	2	
		lower jaw	1	
		operculum	1	
		<i>Total</i>	<u>7</u>	32%
	3	operculum	1	
		<i>Total</i>	<u>1</u>	5%
	4	floor of mouth	1	
eye		1		
<i>Total</i>		<u>2</u>	9%	
<i>Total steelhead</i>			<u>22</u>	<u>100%</u>

1995 Skeena River Catch and Release Study
Amount of Bleeding and Hook Location

Species	Amount of Bleeding (min 1 => max 5)	Hook Location	Count	Percentage	
coho	1	upper jaw	10		
		lower jaw	7		
		roof of mouth	5		
		floor of mouth	4		
		operculum	3		
		unknown	1		
		body snag	1		
		<i>Total</i>	<u>31</u>	70%	
	2	upper jaw	4		
		eye	1		
		floor of mouth	1		
		lower jaw	1		
		roof of mouth	1		
		operculum	<u>1</u>		
	<i>Total</i>	<u>9</u>	20%		
3	operculum	2			
	lower jaw	<u>1</u>			
	<i>Total</i>	<u>3</u>	7%		
5	floor of mouth	<u>1</u>			
	<i>Total</i>	<u>1</u>	2%		
<i>Total coho</i>			<u>44</u>	<u>100%</u>	
steelhead	1	upper jaw	6		
		floor of mouth	4		
		lower jaw	4		
		roof of mouth	<u>1</u>		
		<i>Total</i>	<u>15</u>	68%	
	2	operculum	2		
		upper jaw	<u>1</u>		
		<i>Total</i>	<u>3</u>	14%	
	3	eye	1		
		floor of mouth	1		
		upper jaw	<u>1</u>		
		<i>Total</i>	<u>3</u>	14%	
	4	floor of mouth	<u>1</u>		
		<i>Total</i>	<u>1</u>	5%	
	<i>Total steelhead</i>			<u>22</u>	<u>100%</u>

**1995 Skeena River Catch and Release Study
Species and Hook Location**

Species	Hook Location	Count	Percentage
coho			
	upper jaw	14	32%
	lower jaw	9	20%
	roof of mouth	6	14%
	operculum	6	14%
	floor of mouth	6	14%
	unknown	1	2%
	eye	1	2%
	body snag	1	2%
	<i>Total coho</i>	<u>44</u>	<u>100%</u>
steelhead			
	upper jaw	8	36%
	floor of mouth	6	27%
	lower jaw	4	18%
	operculum	2	9%
	roof of mouth	1	5%
	eye	1	5%
	<i>Total steelhead</i>	<u>22</u>	<u>100%</u>
	<i>Total Species</i>	<u><u>66</u></u>	

1995 Skeena River Catch and Release Study
Speed of Escape and Hook Location

Species	Speed of Escape (0 = unknown, slow 1 => 5 fast)	Hook Location	Count	Percentage
coho	0	floor of mouth	1	
		lower jaw	1	
		operculum	2	
		<i>Total</i>	<u>4</u>	9%
	2	floor of mouth	1	
		roof of mouth	2	
		unknown	1	
		<i>Total</i>	<u>4</u>	9%
	3	lower jaw	1	
		upper jaw	1	
		<i>Total</i>	<u>2</u>	5%
	4	lower jaw	2	
		roof of mouth	1	
		upper jaw	5	
		<i>Total</i>	<u>8</u>	18%
	5	body snag	1	
		eye	1	
		floor of mouth	4	
		lower jaw	5	
		operculum	4	
		roof of mouth	3	
		upper jaw	8	
		<i>Total</i>	<u>26</u>	59%
	<i>Total coho</i>		<u>44</u>	<u>100%</u>

1995 Skeena River Catch and Release Study
Speed of Escape and Hook Location

Species	Speed of Escape (0 = unknown, slow 1 => 5 fast)	Hook Location	Count	Percentage
steelhead	0	floor of mouth	2	14%
		lower jaw	1	
		<i>Total</i>	3	
	3	eye	1	23%
		operculum	1	
		upper jaw	3	
		<i>Total</i>	5	
	4	floor of mouth	1	14%
		lower jaw	1	
		upper jaw	1	
		<i>Total</i>	3	
	5	floor of mouth	3	50%
		lower jaw	2	
		operculum	1	
		roof of mouth	1	
upper jaw		4		
<i>Total</i>		11		
<i>Total steelhead</i>		22	100%	

1995 Skeena River Catch and Release Study Angler Experience and Time Played

Species	Angler Experience (0=unknown, novice 1 => expert 5)	Count	Time Played (min:sec)		
			Average	Minimum	Maximum
coho	1	7	2:20	1:10	3:30
	2	10	2:11	1:12	3:00
	3	12	3:03	1:30	5:33
	4	12	2:41	1:05	6:14
	5	3	2:21	1:30	3:00
	<i>Total coho</i>	<hr/>	44		
steelhead	0	3	2:52	0:51	5:00
	2	2	3:30	3:05	3:56
	3	7	4:12	2:06	6:30
	4	7	3:54	1:40	7:15
	5	3	5:13	3:30	8:25
	<i>Total steelhead</i>	<hr/>	22		

1995 Skeena River Catch and Release Study
Degree of Hook Damage and Hook Size

Species	Degree of Damage (min 1 => max 5)	Hook Size	Count	Percentage
steelhead	1	2	1	
		3	1	
		4	2	
		5	5	
		6	2	
		8	1	
		<i>Total</i>		<u>12</u>
	2	2	1	
		4	3	
		5	3	
		<i>Total</i>		<u>7</u>
	3	5	1	
		<i>Total</i>		<u>1</u>
	4	5	2	
		<i>Total</i>		<u>2</u>
<i>Total steelhead</i>			<u>22</u>	<u>100%</u>

1995 Skeena River Catch and Release Study
Condition and Time Played

Species	Condition	Count	Time Played (min:sec)		
			Average	Minimum	Maximum
coho	Active	42	2:28	1:05	5:33
	Lethargic	1	4:04	4:04	4:04
	Unknown	1	6:14	6:14	6:14
steelhead	Active	18	4:04	1:40	8:25
	Unknown	4	3:39	0:51	6:02

1995 Skeena River Catch and Release Study
Degree of Hook Damage from Barbed / Non-barbed Hook

Species	Degree of Damage (min 1 => max 5)	Hook Type	Count	Percentage	
coho	1	barbed	<u>18</u>	41%	
		<i>Total</i>	18		
	2	barbed	16	39%	
		non-barbed	<u>1</u>		
		<i>Total</i>	17		
	3	barbed	8	20%	
		non-barbed	<u>1</u>		
		<i>Total</i>	9		
	<i>Total coho</i>			<u>44</u>	<u>100%</u>
	steelhead	1	barbed	<u>12</u>	55%
<i>Total</i>			12		
2		barbed	<u>7</u>	32%	
		<i>Total</i>	7		
3		barbed	<u>1</u>	5%	
		<i>Total</i>	1		
4		barbed	<u>2</u>	9%	
		<i>Total</i>	2		
<i>Total steelhead</i>			<u>22</u>	<u>100%</u>	

1995 Skeena River Catch and Release Study
Degree of Hook Damage from Single / Treble Hook

Species	Degree of Damage (min 1 => max 5)	Hook Type	Count	Percentage	
coho	1	single	<u>18</u>	41%	
		Total	18		
	2	single	<u>17</u>	39%	
		Total	17		
	3	single	<u>9</u>	20%	
		Total	9		
	<i>Total coho</i>			<u>44</u>	<u>100%</u>
	steelhead	1	single	<u>12</u>	55%
			Total	12	
		2	single	<u>7</u>	32%
Total			7		
3		single	<u>1</u>	5%	
		Total	1		
4		single	<u>2</u>	9%	
		Total	2		
<i>Total steelhead</i>			<u>22</u>	<u>100%</u>	

1995 Skeena River Catch and Release Study
Degree of Hook Damage from Stainless / Metal Hook

Species	Degree of Damage (min 1 => max 5)	Hook Type	Count	Percentage
coho	1	metal	4	41%
		stainless	10	
		unknown	4	
		<i>Total</i>	<u>18</u>	
	2	metal	1	39%
		stainless	12	
		unknown	4	
		<i>Total</i>	<u>17</u>	
	3	metal	2	20%
		stainless	6	
		unknown	1	
		<i>Total</i>	<u>9</u>	
<i>Total coho</i>			<u>44</u>	<u>100%</u>
steelhead	1	stainless	10	55%
		unknown	2	
		<i>Total</i>	<u>12</u>	
	2	stainless	5	32%
		unknown	2	
		<i>Total</i>	<u>7</u>	
	3	stainless	1	5%
		<i>Total</i>	<u>1</u>	
	4	metal	1	9%
		stainless	1	
		<i>Total</i>	<u>2</u>	
	<i>Total steelhead</i>			<u>22</u>

**1995 Skeena River Catch and Release Study
Floy Tag Listing**

Floy Tag #	Species	Floy Tag #	Species
C01558	coho	C05140	steelhead
C01563	coho	C05141	coho
C05101	coho	C05143	coho
C05105	coho	C05146	steelhead
C05106	coho	C05147	steelhead
C05107	coho	C05148	steelhead
C05108	coho	C05149	coho
C05109	coho	C05150	steelhead
C05110	steelhead	C05151	coho
C05111	steelhead	C05152	coho
C05112	steelhead	C05154	coho
C05113	steelhead	C05155	coho
C05114	coho	C05156	coho
C05115	coho	C05157	coho
C05116	coho	C05159	coho
C05117	coho	C05160	coho
C05118	steelhead	C05161	coho
C05119	coho	C05162	coho
C05120	coho	C05164	coho
C05122	coho	C05165	coho
C05123	steelhead	C05166	coho
C05124	coho	C05167	coho
C05125	steelhead	C05168	steelhead
C05126	steelhead	C05169	coho
C05127	steelhead	C05170	coho
C05128	coho	C05175	steelhead
C05129	coho		
C05130	coho		
C05131	steelhead		
C05132	steelhead		
C05134	steelhead		
C05135	steelhead		
C05136	coho		
C05137	coho		

1995 Skeena River Catch and Release Study
Degree of Hook Damage and Hook Size

Species	Degree of Damage (min 1 => max 5)	Hook Size	Count	Percentage
coho	1	1	1	
		3	1	
		4	8	
		5	2	
		6	4	
		7	2	
		<i>Total</i>	18	41%
		2	1	2
	2		2	
	3		1	
	4		8	
	5		2	
	6		1	
	7		1	
	<i>Total</i>		17	39%
	3	2	1	
		3	1	
		4	2	
		5	2	
		6	3	
		<i>Total</i>	9	20%
	<i>Total coho</i>		44	100%

Re	Date (dd/mm/yy)	Location	Species	Played (mm:ss:00)	Handling (mm:ss:00)	Lure Size	Hook barbed/non barbed	Hook single /treble	Hook Location	Hook Site	Hook Damage	Bleeding
1	28/07/95	Lower Austrian Corner	steelhead	2:06:00	0:10:00	large	barbed	single	roof of mouth internal (right side)	roof of mouth	1	1
2	30/07/95	Polymar Bar (bottom)	coho	1:19:00	0:30:00	large	barbed	single	right roof of mouth	roof of mouth	1	1
3	31/07/95	Polymar Bar (bottom)	coho	2:10:00	0:12:00	medium	barbed	single	fish expelled hook before shore	unknown	1	1
4	31/07/95	Polymar Bar (lower)	coho	1:12:00	1:10:00	medium	barbed	single	right tongue internal	floor of mout	2	5
5	08/08/95	Polymar Bar	coho	4:04:00	0:05:00	medium	barbed	single	left cheek	operculum	2	1
6	08/08/95	Polymar Bar	steelhead	4:10:00	0:20:00	unknown	barbed	single	centre of lower jaw	floor of mout	2	1
7	08/08/95	Polymar Bar	coho	2:18:00	0:05:00	medium	barbed	single	lower gum	lower jaw	1	1
8	08/08/95	Polymar Bar	coho	3:54:00	0:02:00	medium	barbed	single	left cheek	operculum	2	2
9	08/08/95	Polymar Bar	coho	1:05:00	0:15:00	medium	barbed	single	right cheek	operculum	3	3
10	09/08/95	Polymar Bar	steelhead	5:00:00	2:00:00	medium	barbed	single	mouth	floor of mout	1	1
11	09/08/95	Polymar Bar (bottom)	steelhead	2:45:00	0:38:00	medium	barbed	single	upper jaw internal	upper jaw	1	1
12	09/08/95	Polymar Bar	steelhead	0:51:00	0:43:00	medium	barbed	single	upper jaw internal	upper jaw	1	1
13	09/08/95	Polymar Bar	coho	6:14:00	0:23:00	medium	barbed	single	right side of mouth	upper jaw	1	1
14	09/08/95	Polymar Bar	coho	3:00:00	2:13:00	small	barbed	single	roof of mouth internal	roof of mouth	1	1
15	10/08/95	Polymar Bar	coho	1:33:00	0:10:00	medium	barbed	single	upper right cheek internal	operculum	1	1
16	11/08/95	Polymar Bar	coho	5:00:00	2:18:00	large	barbed	single	side of mouth	upper jaw	1	1
17	12/08/95	Polymar Bar	steelhead	3:00:00	0:30:00	medium	barbed	single	right upper maxillary	upper jaw	2	2
18	12/08/95	Polymar Bar	coho	1:25:00	0:34:00	medium	barbed	single	left upper maxillary	upper jaw	2	1
19	13/08/95	Polymar Bar	steelhead	4:20:00	0:56:00	medium	barbed	single	left lower jaw	lower jaw	1	1
20	13/08/95	Polymar Bar	coho	2:45:00	0:15:00	medium	barbed	single	bottom centre palate	floor of mout	1	1
21	13/08/95	Polymar Bar	coho	5:33:00	0:19:00	medium	barbed	single	left cheek extenal	operculum	2	1
22	13/08/95	Polymar	steelhead	7:15:00	0:25:00	medium	barbed	single	right maxillary	upper jaw	1	1
23	15/09/95	Esker Bar	steelhead	6:02:00	0:25:00	large	barbed	single	right lower jaw	lower jaw	1	1
24	15/08/95	Esker Bar	steelhead	3:56:00	0:38:00	medium	barbed	single	left side maxillary	upper jaw	1	1
25	18/08/95	Polymar Bar	coho	2:37:00	0:05:00	medium	barbed	single	lower lip	lower jaw	1	1
26	18/08/95	Polymar Bar	coho	2:42:00	0:46:00	medium	barbed	single	lower left maxillary	upper jaw	1	1
27	18/08/95	Polymar Bar	coho	2:45:00	0:50:00	medium	barbed	single	bottom right lip	lower jaw	2	2
28	18/08/95	Polymar Bar	steelhead	3:45:00	0:15:00	medium	barbed	single	lower mouth internal (possibly tongue)	floor of mout	4	4
30	19/08/95	Esker Bar	steelhead	5:15:00	0:55:00	medium	barbed	single	left side corner of mouth	lower jaw	2	1
31	20/08/95	Polymar Bar	coho	1:30:00	5:05:00	medium	barbed	single	bottom left jaw	lower jaw	1	1
32	20/08/95	Polymar Bar	steelhead	3:30:00	0:45:00	medium	barbed	single	left maxillary internal	upper jaw	1	1
33	20/08/95	Polymar Bar	steelhead	1:40:00	0:45:00	medium	barbed	single	lower jaw centre, internal	floor of mout	1	3
34	20/08/95	Polymar Bar	coho	2:16:00	0:45:00	medium	barbed	single	right lower lip	lower jaw	1	1
35	20/08/95	Polymar	steelhead	8:25:00	0:45:00	medium	barbed	single	left cheek above maxillary internal	upper jaw	2	3
36	20/08/95	Polymar Bar	coho	1:30:00	0:45:00	medium	barbed	single	left top maxillary internal	upper jaw	3	2
37	20/08/95	Polymar Bar	coho	1:30:00	0:45:00	medium	barbed	single	left top maxillary internal	upper jaw	2	1
38	21/08/95	Polymar	coho	2:40:00	0:20:00	medium	barbed	single	left bottom jaw	lower jaw	2	1
39	21/08/95	Polymar Bar	coho	2:30:00	0:16:00	medium	barbed	single	left upper cheek external	operculum	3	3

40	21/08/95	Polymar	steelhead	2:45:00	0:30:00	medium	barbed	single	upper right cheek internal	operculum	2	2
41	22/08/95	Polymar	steelhead	2:45:00	0:30:00	large	barbed	single	upper left through eye, internal	eye	4	3
42	22/08/95	Polymar	steelhead	4:40:00	0:35:00	large	barbed	single	right bottom jaw just missing tongue	floor of mout	2	1
43	22/08/95	Polymar	coho	3:00:00	0:45:00	large	barbed	single	lower left jaw inner	floor of mout	2	1
44	22/08/95	Polymar	steelhead	3:30:00	0:15:00	unknown	barbed	single	lower left internal	floor of mout	2	1
45	22/08/95	Polymar Bar	coho	1:25:00	0:15:00	medium	barbed	single	left lower jaw	lower jaw	3	1
46	22/08/95	Polymar Bar	coho	3:00:00	0:15:00	medium	barbed	single	left upper maxillary internal	upper jaw	2	1
47	26/08/95	Polymar Bar (lower)	coho	3:00:00	2:00:00	medium	barbed	single	right lower jaw	lower jaw	2	3
48	26/08/95	Polymar Bar	coho	1:30:00	0:20:00	medium	barbed	single	right bottom jaw	lower jaw	1	1
49	26/08/95	Polymar Bar	coho	2:50:00	0:40:00	medium	barbed	single	middle bottom jaw	floor of mout	1	1
50	26/08/95	Polymar Bar	coho	2:05:00	0:50:00	medium	barbed	single	top left nostril	roof of mouth	2	1
51	27/08/95	Polymar Bar	coho	2:00:00	0:30:00	medium	barbed	single	right side, corner of mouth internal	upper jaw	3	2
52	27/08/95	Polymar Bar	coho	2:40:00	0:20:00	medium	barbed	single	top left through eye, internal	eye	3	2
53	27/08/95	Polymar Bar	coho	5:10:00	0:55:00	medium	barbed	single	bottom left of tail	body snag	3	1
54	27/08/95	Polymar Bar	coho	2:10:00	0:40:00	small	barbed	single	right internal	floor of mout	2	1
55	28/08/95	Polymar Bar	coho	2:35:00	0:50:00	medium	non-barbed	single	right maxillary internal	upper jaw	3	1
56	28/08/95	Polymar Bar	coho	1:10:00	0:50:00	large	non-barbed	single	upper left lip, internal, through gum	upper jaw	2	1
57	29/08/95	Polymar Bar	coho	2:30:00	0:30:00	medium	barbed	single	top front mouth internal	roof of mouth	1	1
58	29/08/95	Polymar Bar	steelhead	6:30:00	2:05:00	medium	barbed	single	top right jaw internal	upper jaw	1	1
59	29/08/95	Polymar Bar	coho	2:13:00	0:30:00	medium	barbed	single	upper right jaw internal	upper jaw	1	1
60	29/08/95	Polymar Bar	coho	2:40:00	0:30:00	medium	barbed	single	upper left jaw internal	upper jaw	3	2
61	29/08/95	Polymar Bar	coho	3:30:00	0:25:00	medium	barbed	single	upper right jaw internal	upper jaw	1	1
62	29/08/95	Polymar Bar	coho	2:40:00	0:25:00	medium	barbed	single	upper left back corner internal	roof of mouth	1	1
63	01/09/95	Polymar Bar	coho	1:45:00	0:30:00	medium	barbed	single	right lower near tongue	floor of mout	2	2
64	01/09/95	Polymar Bar	coho	1:45:00	0:15:00	medium	barbed	single	right maxillary	upper jaw	2	2
65	02/09/95	Polymar (lower bar)	coho	3:10:00	0:50:00	medium	barbed	single	left top roof of mouth internal	roof of mouth	2	2
66	03/09/95	Polymar Bar	steelhead	3:05:00	0:55:00	medium	barbed	single	left upper jaw below eye internal	operculum	3	2

Re	Date (dd/mm/yy)	Location	Species	Played (mm:ss:00)	Handling (mm:ss:00)	Lure Size	Hook barbed/non barbed	Hook single /treble	Hook Location	Hook Site	Hook Damage	Bleeding
2	30/07/95	Polymar Bar (bottom)	coho	1:19:00	0:30:00	large	barbed	single	right roof of mouth	roof of mouth	1	1
3	31/07/95	Polymar Bar (bottom)	coho	2:10:00	0:12:00	medium	barbed	single	fish expelled hook before shore	unknown	1	1
4	31/07/95	Polymar Bar (lower)	coho	1:12:00	1:10:00	medium	barbed	single	right tongue internal	floor of mout	2	5
5	08/08/95	Polymar Bar	coho	4:04:00	0:05:00	medium	barbed	single	left cheek	operculum	2	1
7	08/08/95	Polymar Bar	coho	2:18:00	0:05:00	medium	barbed	single	lower gum	lower jaw	1	1
8	08/08/95	Polymar Bar	coho	3:54:00	0:02:00	medium	barbed	single	left cheek	operculum	2	2
9	08/08/95	Polymar Bar	coho	1:05:00	0:15:00	medium	barbed	single	right cheek	operculum	3	3
13	09/08/95	Polymar Bar	coho	6:14:00	0:23:00	medium	barbed	single	right side of mouth	upper jaw	1	1
14	09/08/95	Polymar Bar	coho	3:00:00	2:13:00	small	barbed	single	roof of mouth internal	roof of mouth	1	1
15	10/08/95	Polymar Bar	coho	1:33:00	0:10:00	medium	barbed	single	upper right cheek internal	operculum	1	1
16	11/08/95	Polymar Bar	coho	5:00:00	2:18:00	large	barbed	single	side of mouth	upper jaw	1	1
18	12/08/95	Polymar Bar	coho	1:25:00	0:34:00	medium	barbed	single	left upper maxillary	upper jaw	2	1
20	13/08/95	Polymar Bar	coho	2:45:00	0:15:00	medium	barbed	single	bottom centre palatte	floor of mout	1	1
21	13/08/95	Polymar Bar	coho	5:33:00	0:19:00	medium	barbed	single	left cheek extenal	operculum	2	1
25	18/08/95	Polymar Bar	coho	2:37:00	0:05:00	medium	barbed	single	lower lip	lower jaw	1	1
26	18/08/95	Polymar Bar	coho	2:42:00	0:46:00	medium	barbed	single	lower left maxillary	upper jaw	1	1
27	18/08/95	Polymar Bar	coho	2:45:00	0:50:00	medium	barbed	single	bottom right lip	lower jaw	2	2
31	20/08/95	Polymar Bar	coho	1:30:00	5:05:00	medium	barbed	single	bottom left jaw	lower jaw	1	1
34	20/08/95	Polymar Bar	coho	2:16:00	0:45:00	medium	barbed	single	right lower lip	lower jaw	1	1
36	20/08/95	Polymar Bar	coho	1:30:00	0:45:00	medium	barbed	single	left top maxillary internal	upper jaw	3	2
37	20/08/95	Polymar Bar	coho	1:30:00	0:45:00	medium	barbed	single	left top maxillary internal	upper jaw	2	1
38	21/08/95	Polymar	coho	2:40:00	0:20:00	medium	barbed	single	left bottom jaw	lower jaw	2	1
39	21/08/95	Polymar Bar	coho	2:30:00	0:16:00	medium	barbed	single	left upper cheek external	operculum	3	3
43	22/08/95	Polymar	coho	3:00:00	0:45:00	large	barbed	single	lower left jaw inner	floor of mout	2	1
45	22/08/95	Polymar Bar	coho	1:25:00	0:15:00	medium	barbed	single	left lower jaw	lower jaw	3	1
46	22/08/95	Polymar Bar	coho	3:00:00	0:15:00	medium	barbed	single	left upper maxillary internal	upper jaw	2	1
47	26/08/95	Polymar Bar (lower)	coho	3:00:00	2:00:00	medium	barbed	single	right lower jaw	lower jaw	2	3
48	26/08/95	Polymar Bar	coho	1:30:00	0:20:00	medium	barbed	single	right bottom jaw	lower jaw	1	1
49	26/08/95	Polymar Bar	coho	2:50:00	0:40:00	medium	barbed	single	middle bottom jaw	floor of mout	1	1
50	26/08/95	Polymar Bar	coho	2:05:00	0:50:00	medium	barbed	single	top left nostril	roof of mouth	2	1
51	27/08/95	Polymar Bar	coho	2:00:00	0:30:00	medium	barbed	single	right side, corner of mouth internal	upper jaw	3	2
52	27/08/95	Polymar Bar	coho	2:40:00	0:20:00	medium	barbed	single	top left through eye, internal	eye	3	2
53	27/08/95	Polymar Bar	coho	5:10:00	0:55:00	medium	barbed	single	bottom left of tail	body snag	3	1
54	27/08/95	Polymar Bar	coho	2:10:00	0:40:00	small	barbed	single	right internal	floor of mout	2	1
55	28/08/95	Polymar Bar	coho	2:35:00	0:50:00	medium	non-barbed	single	right maxillary internal	upper jaw	3	1
56	28/08/95	Polymar Bar	coho	1:10:00	0:50:00	large	non-barbed	single	upper left lip, internal, through gum	upper jaw	2	1
57	29/08/95	Polymar Bar	coho	2:30:00	0:30:00	medium	barbed	single	top front mouth internal	roof of mouth	1	1
59	29/08/95	Polymar Bar	coho	2:13:00	0:30:00	medium	barbed	single	upper right jaw internal	upper jaw	1	1
60	29/08/95	Polymar Bar	coho	2:40:00	0:30:00	medium	barbed	single	upper left jaw internal	upper jaw	3	2
61	29/08/95	Polymar Bar	coho	3:30:00	0:25:00	medium	barbed	single	upper right jaw internal	upper jaw	1	1
62	29/08/95	Polymar Bar	coho	2:40:00	0:25:00	medium	barbed	single	upper left back corner internal	roof of mouth	1	1
63	01/09/95	Polymar Bar	coho	1:45:00	0:30:00	medium	barbed	single	right lower near tongue	floor of mout	2	2
64	01/09/95	Polymar Bar	coho	1:45:00	0:15:00	medium	barbed	single	right maxillary	upper jaw	2	2
65	02/09/95	Polymar (lower bar)	coho	3:10:00	0:50:00	medium	barbed	single	left top roof of mouth internal	roof of mouth	2	2

Re	Date (dd/mm/yy)	Location	Species	Played (mm:ss:00)	Handling (mm:ss:00)	Lure Size	Hook barbed/non barbed	Hook single /treble	Hook Location	Hook Site	Hook Damage	Bleeding
1	28/07/95	Lower Austrian Corner	steelhead	2:06:00	0:10:00	large	barbed	single	roof of mouth internal (right side)	roof of mouth	1	1
6	08/08/95	Polymar Bar	steelhead	4:10:00	0:20:00	unknown	barbed	single	centre of lower jaw	floor of mout	2	1
10	09/08/95	Polymar Bar	steelhead	5:00:00	2:00:00	medium	barbed	single	mouth	floor of mout	1	1
11	09/08/95	Polymar Bar (bottom)	steelhead	2:45:00	0:38:00	medium	barbed	single	upper jaw internal	upper jaw	1	1
12	09/08/95	Polymar Bar	steelhead	0:51:00	0:43:00	medium	barbed	single	upper jaw internal	upper jaw	1	1
17	12/08/95	Polymar Bar	steelhead	3:00:00	0:30:00	medium	barbed	single	right upper maxillary	upper jaw	2	2
19	13/08/95	Polymar Bar	steelhead	4:20:00	0:56:00	medium	barbed	single	left lower jaw	lower jaw	1	1
22	13/08/95	Polymar	steelhead	7:15:00	0:25:00	medium	barbed	single	right maxillary	upper jaw	1	1
23	15/09/95	Esker Bar	steelhead	6:02:00	0:25:00	large	barbed	single	right lower jaw	lower jaw	1	1
24	15/08/95	Esker Bar	steelhead	3:56:00	0:38:00	medium	barbed	single	left side maxillary	upper jaw	1	1
28	18/08/95	Polymar Bar	steelhead	3:45:00	0:15:00	medium	barbed	single	lower mouth internal (possibly tongue)	floor of mout	4	4
30	19/08/95	Esker Bar	steelhead	5:15:00	0:55:00	medium	barbed	single	left side corner of mouth	lower jaw	2	1
32	20/08/95	Polymar Bar	steelhead	3:30:00	0:45:00	medium	barbed	single	left maxillary internal	upper jaw	1	1
33	20/08/95	Polymar Bar	steelhead	1:40:00	0:45:00	medium	barbed	single	lower jaw centre, internal	floor of mout	1	3
35	20/08/95	Polymar	steelhead	8:25:00	0:45:00	medium	barbed	single	left cheek above maxillary internal	upper jaw	2	3
40	21/08/95	Polymar	steelhead	2:45:00	0:30:00	medium	barbed	single	upper right cheek internal	operculum	2	2
41	22/08/95	Polymar	steelhead	2:45:00	0:30:00	large	barbed	single	upper left through eye, internal	eye	4	3
42	22/08/95	Polymar	steelhead	4:40:00	0:35:00	large	barbed	single	right bottom jaw just missing tongue	floor of mout	2	1
44	22/08/95	Polymar	steelhead	3:30:00	0:15:00	unknown	barbed	single	lower left internal	floor of mout	2	1
58	29/08/95	Polymar Bar	steelhead	6:30:00	2:05:00	medium	barbed	single	top right jaw internal	upper jaw	1	1
66	03/09/95	Polymar Bar	steelhead	3:05:00	0:55:00	medium	barbed	single	left upper jaw below eye internal	operculum	3	2