Distribution, Timing and Numbers of Steelhead Returning to the Skeena Watershed in 1995

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ABSTRACT

Fishwheels operated by the Kitselas Band Office were used to catch and apply radio tags to 100 steelhead near Kitselas from mid-July to late September 1995. One additional steelhead was radio tagged below the fishwheels using angling. Fixed-station receivers, aircraft, boat and truck surveys were used to track fish as they moved up-river toward overwintering and spawning areas. Mark rates for steelhead were obtained from counting fences on the Sustut and Babine rivers, and Toboggan Creek; from examining fish caught by the native fisheries at Moricetown and along the Skeena River from Kitselas to Hazelton; and from steelhead tagging crews on Babine and Sustut rivers.

Seventeen of the 101 steelhead radio tagged near Kitselas died or regurgitated their tags as a result of tagging and nine travelled down-river to the ocean. Thus 75 radio-tagged fish were available to in-river fisheries or to spawn. Three to 16 of these 75 steelhead will not spawn because they were harvested or because they died or moved down-river after being captured by in-river fisheries. The remaining 59 radio-tagged fish are considered to be available for spawning in the spring of 1996.

Fishwheels were able to provide a source of steelhead to radio tag but not directly in proportion to the numbers moving past the tagging site. In addition, 16% of the steelhead that were tagged are believed to have lost their tag or been removed by in-river fisheries and 26% either died or returned down-river into the ocean without spawning. Several factors were examined as possible causes of down-river movements, but only two factors showed statistically significant relationships, release technique and holding time. Fish travelled up-river significantly more often than other fish if released directly from the fishwheel rather than being transported to a nearby calm area and if held for less than 10 h.

A preliminary estimate of the 1995 steelhead escapement is 22,300 after an allowance for an in-river harvest of 3200 fish. However, the precision of this estimate is uncertain because too few tags were applied and estimates for the steelhead mark rate obtain from surveys of in-river fisheries were subject to significant biases. Consequently, **our preliminary estimates are not comparable to the 1994 radio-telemetry results and should not be used as an indication of the absolute or relative size of the 1995 return of summer run steelhead to the Skeena River.** Additional surveys to determine mark rates of steelhead, particularly on Babine River, may permit a more reliable escapement estimate to be made for the Babine River stock. This study also provided information on in-river migration speeds and timing of movements for individual steelhead of different stocks.

INTRODUCTION

The Skeena River system is the second largest river system in British Columbia and is a major producer of anadromous salmonids. Considerable data are available on the numbers and timing of use of some parts of the river system for different life stages by most of these species. However, these data have been collected using different techniques. Also, many parts of the system have not been studied or they have only been studied superficially. With increased demand for access to anadromous species by commercial, native and sport fisheries, there is a need to actively manage the various fish stocks so that they can sustain all of the fisheries. Without improvements to stock assessment and harvesting techniques, it will be difficult or impossible to take full advantage of abundant sockeye stocks, which are harvested by commercial and native fisheries, without seriously reducing or depleting Skeena steelhead stocks.

Overlaps in run timing among the various salmon stocks prevent harvesting of single stocks or species in the intensive commercial fishery located at the mouth of the Skeena River (Area 4). Major differences in the productivity and size of stocks preclude the application of a single exploitation rate that would provide maximum sustained yield for all stocks (Sprout and Kadowaki 1987; Cox-Rogers 1994). Fisheries management in recent years has attempted to reduce harvest rates on summer run coho and steelhead by restricting commercial fishing opportunities in early August. In 1991, the Department of Fisheries and Oceans (DFO) committed to reducing the Area 4 steelhead harvest rate by 50% within three years (Cox-Rogers 1994).

In 1994, the Ministry of Environment, Lands and Parks (MELP) and DFO collaborated in a large scale radio telemetry study to provide detailed information on the timing, distribution and abundance of adult coho and steelhead returning to the Skeena River system. These data are essential for identifying fisheries management options and quantifying current harvest rates and escapement levels. The major impetus for using radio telemetry techniques was the recent advances in telemetry technology and it's successful application in studies of Nass River chinook population in 1992 and 1993 (Koski et al. 1993, 1994). While it was recognized that it would be more difficult to quantify coho and steelhead escapement to the Skeena than chinook escapement to the Nass, it was generally accepted that telemetry studies were more likely to succeed than alternative techniques. At a minimum, telemetry would provide detailed stock specific information on run timing, migration speeds, in-river harvest levels and migratory behaviour previously unknown for ocean-tagged coho and limited for steelhead.

Some of the challenges faced in 1994 included:

1. reduced tagging opportunities for ocean seine charters at the mouth of the Skeena River;

2. the application of 576 radio tags on two species at many different release locations;

3. the setup and maintenance of 17 new fixed-station receivers distributed throughout the Skeena watershed;

4. limited access to steelhead for mark-rate sampling;

5. extensive field efforts to maximize sample sizes to determine coho mark-rates;

6. ocean radio-tagged coho were tracked to several rivers outside the Skeena watershed: north to the Nass River and south to the Kitimat River.

Despite these challenges the 1994 study provided more detailed and reliable information on ocean-tagged coho and steelhead than any previous study along with quantitative estimates of the total escapement of these stocks to the Skeena River in 1994. Of the 113 radio-tagged steelhead tagged during the seining operations in 1994, 78 (69%) were known to have entered the Skeena River, 13 (12%) were removed by in-river fisheries and an estimated 62 (55%) were tracked to a spawning destination. Mark-recapture programs were able to recover 8 radio-tagged steelhead and provide an unbiased population estimate of 28,000 steelhead past the Tyee Test Fishery. However, the statistical bounds for the 1994 population estimate were wide due to a relatively low mark rate and the inability of the mark rate sampling programs to recover more marked fish during counting surveys (Koski et al. 1995; D. Atagi, MELP Smithers, pers. comm.).

In contrast to the challenges faced in 1994, the 1995 program design was comparatively simple:

1. radio tagging was to be limited to steelhead and all tags would be applied at one site, Kitselas Canyon;

2. fish for tagging would be captured using fishwheels and capture efforts were to be continuous over the steelhead migration period;

3. radio-tagged fish would not be vulnerable to commercial fisheries;

4. many of the fixed-station sites setup in 1994 were to be used again in 1995; and

5. mark-rate sampling would be limited to those fish examined through catch monitoring efforts for Kitselas and Moricetown fisheries and enumerations at counting fences run by DFO and MELP.

These simplifications were proposed and accepted as potential solutions to problems encountered in 1994. The use of Kitselas Canyon fishwheels to capture steelhead should increase the number of radio tags applied and ensure that the marks are distributed over the entire migration period of Skeena River summer run steelhead. Consequently, the number of radio tags observed in mark-rate sampling at Moricetown, Babine and Sustut should increase over 1994 levels and improve the reliability of total escapement estimates for these systems. Any radio-tagged steelhead that migrated upstream would add to the stock specific data on run timing, migration speeds, in-river harvest rates, and overwinter survival that were obtained in the 1994-95 and earlier programs.

This report summarizes the data collected during the July to November 1995 period and describes the fate and timing information of fish movements to the end of November 1995.

Study Area

The Skeena River drains 51,200 km^2 and is the second largest watershed in British Columbia. It originates in the Skeena Mountains and flows south and southwest for approximately 530 km. It empties into Chatham Sound on the north coast of British Columbia (Fig. 1). There is considerable variation in the flow rates depending on the season and weather conditions. Average mean monthly flow at Usk is 950 m^3/s with a spring freshet between mid-May and the end of June (Hoos 1975) and lowest flows during March. Maximum flow rates during the spring freshet are about three times average flow rates and minimum rates during March are about one sixth of mean rates.

The Skeena River enters Chatham Sound and Hecate Strait via a series of passages and channels between several islands lying off the river mouth. About 25% of the flow moves through Inverness Passage while the remaining 75% of the flow is divided nearly equally between Marcus and Telegraph passages.

The Skeena River supports significant populations of chinook, sockeye (*Oncorhynchus nerka*), coho, chum (*O. keta*), and pink salmon (*O. gorbuscha*) and steelhead. Steelhead are widely distributed throughout the Skeena watershed but a large proportion of the Skeena population is found in a few tributaries. Two tributaries (Bulkley-Morice with 45% and Babine with 25%) are believed to support about 70% of the steelhead that spawn on the Skeena River. Summer run Morice-Bulkley and Sustut steelhead are believed to enter the Skeena River earlier than Babine, Kispiox and most Zymoetz fish (Cox-Rogers 1985, 1986). The Zymoetz is also believed to have a significant component of early run fish (B. Hooton, MELP-Smithers, pers. comm). As a result the early run fish are suspected to be more susceptible to interception by sockeye fisheries which coincide with their arrival in the Skeena estuary. There are no direct long-term steelhead escapement estimates for any of the tributaries of the Skeena but indirect studies have suggested that escapement requirements have seldom, if ever, been met since 1956 (Spence and Hooton 1991; Ward et al. 1993).

Escapement estimates for the 1963-1995 period have averaged 13,824 steelhead and have ranged from 4063 to 32,193 (Table 1). The estimates of the number of spawners given in Table 1 may be overestimates of the spawning population because they do not include all First Nation harvests and mortality or fishery removals during winter and spring. For example: the 1992 harvest estimate of only 59 steelhead for all Skeena River First Nations is probably substantially less than the true harvest. Data from the 1994-95 telemetry study suggest that less than 2% of the ocean-tagged steelhead which entered the Skeena died or were removed during the winter (1 of 78 radio-tagged fish).

Steelhead spawn in the spring (mid-April to mid-June, Lough 1980; Cox-Rogers 1986; Bustard and Associates 1994) and the exact time of spawning is believed to be determined by a combination of water temperature (Lough 1980), photoperiod (Bromage et al. 1982; and Bromage and Duston 1986), and genetic background (i.e., is inherited from their mothers, Danzmann et al. 1994). Unlike other species of *Oncorhynchus*, steelhead are repeat spawners and most do not die after they spawn. Thus some steelhead return to the ocean to feed and are commonly referred to as "kelts" (i.e., spawned out fish). On the Skeena river this downstream migration is believed to occur from mid-May to mid-July (Lough 1980; Bustard and Associates 1994). Most of the radio-tagged kelts, tagged during the 1994 Skeena telemetry study, arrived in the Lower Skeena from late May to mid-June 1995. A few fish were recorded there in early May and late June, but none were recorded in April or July. Approximately 46% of ocean-radio-tagged steelhead that entered the Skeena migrated downstream after spawning in a tributary (36 of 78 tagged fish; MELP, unpublished data).

Fry emerge from the gravel in mid-to-late summer and remain in freshwater for two to five winters before smolting and migrating to the ocean. Juvenile steelhead may disperse from their natal streams to downstream locations to rear. The age-related juvenile distributions of different steelhead stocks have not been determined for many Skeena tributaries.

METHODS

Study Design

Data from several sources were integrated and used to monitor movements and numbers of steelhead in various parts of the Skeena River and its tributaries. However, the general approach was to tag steelhead captured in fishwheels near Terrace and to monitor their movements into the system using a combination of radio-telemetry techniques. Population estimates for steelhead are based on numbers of radio-tagged steelhead that reached overwintering destinations. These overwintering locations may differ from actual spawning locations. Mark rate data were determined from counts of live steelhead passing various fences, and examination of steelhead captured in the aboriginal fisheries at

Moricetown and along the Skeena River between Kitselas and Kispiox. The escapement estimates presented here use mark-recapture methods to estimate the number of steelhead.

Throughout the study whenever we refer to lower river or Lower Skeena we mean the section of the Skeena River downstream of Terrace, Middle Skeena means the section between Terrace and the Bulkley-Skeena junction and Upper Skeena means the section above the Bulkley-Skeena junction. Upper Skeena 1 refers to the section from the Bulkley-Skeena junction to the Babine-Skeena junction and Upper Skeena 2 is above there.

Radio Telemetry

The radio-telemetry component of the study involved catching and radio tagging steelhead and tracking them using a combination of stationary radio-tag receivers, foot and boat-based surveys, and aerial surveys. The different sources of information were integrated into one large database which archives the locations, dates and time when each tagged fish was tracked during field surveys. In addition, radio-tagging information from a separate MELP study on the Babine River have been included in the database to document all radio-tagged fish that were tracked during field surveys.

Tagging Effort

Fishwheels were the primary method used to capture steelhead to radio tag (Table 2). Additional steelhead were captured by angling near the fishwheels at Kitselas Canyon and on the Babine River (a separate study conducted by MELP-Smithers) (Table 2). Some of the steelhead caught during the food fishery at Moricetown were tagged with an anchor tag and released.

Fishwheels: Fishwheels that were operated by the Kitselas Band at Kitselas Canyon were the principal capture gear used to catch steelhead to radio tag. They were operated from 14 July to 21 September (Table 2). One to four fishwheels were operated throughout the period, and on average, three fishwheels were operated. There was reduced fishing effort from 24-30 August because rising water levels resulted in damage to three of the four fishwheels; unfortunately this appears to have coincided with an influx of steelhead (Appendices A-1 and A-2).

Daily fishing effort by the fishwheels was measured in two ways. First, total effort was measured as the time that each fishwheel was fishing from midnight to midnight. Second, the effort used to calculate catch per unit effort (CPUE) was measured as the number of hours that each fishwheel fished to obtain the daily catch. These two values were different because the time of the last sampling session on each day varied; this affected that day's and the following day's effort and catch. The daily catch of each species was recorded and used to estimate the daily CPUE. The speed of rotation of the fishwheel baskets (i.e., RPM measurements) was not used to adjust fishing effort.

Angling: Project personnel angled for steelhead near the fishwheels in order to supplement fishwheel catches after the fishwheels were damaged. Angling was conducted from 27 August to 2 September and was terminated shortly after three fishwheels were fishing. In total, 14 rod-days of fishing effort were conducted to tag steelhead during this period. In addition, 6 rod-days were spent tagging steelhead on the Babine River on 25-27 October as part of a separate MELP study to compare the spawning success of fish that were radio-tagged with orally implanted versus surgically implanted tags (M. Beere, MELP-Smithers, pers. comm.).

Dipnets: Steelhead caught in dipnets at Moricetown were opportunistically tagged with anchor tags. Fishing effort at Moricetown is described in a separate report (Nelson et al. 1995).

Anchor Tagging

Radio-tagged steelhead were also anchor-tagged. Two orange anchor tags were placed on each fish adjacent to and toward the posterior end of the dorsal fin. In addition, steelhead captured by the fishwheels that were not required for the radio-tagging program were tagged with a single orange anchor tag and otherwise processed in a similar manner to radio-tagged fish (see Radio-tagging Procedures below). Orange Skeena Fisheries Commission anchor tags were deployed on steelhead tagged at Moricetown.

Methods of Capturing Fish

Steelhead for radio tagging were captured primarily in fishwheels. However, a few fish for radio tagging were angled, and some steelhead that were captured by food fishermen using dipnets at Moricetown were anchor-tagged and released.

Fishwheels: Four large wooden and aluminium fishwheels, similar to those used on the Yukon, Taku and Nass rivers (Meehan 1961; Donaldson and Cramer 1971; Milligan et al. 1985; McGregor et al. 1991; Link et al. 1993; Link and English 1994), were operated by the Kitselas Band Council in 1995 to provide steelhead to radio tag, to selectively capture fish for local food consumption, and to sell sockeye and pink salmon under a ESSR licence. These fishwheels were operated from 14 July to 21 September and were located 17 km up-river of Terrace (Fig. 2). Three of the fishwheels (1, 2 and 4) were constructed in 1995 and the other one (3) was built in 1994. Fishwheel 3 had smaller baskets and holding pens than the other fishwheels.

The four fishwheels were operated at six different sites (Fig. 2). Site selection for fishwheels considered river velocity (measured by revolutions/min or RPM), shoreline attachment and protection from debris which was being transported downstream. Sites 1 and 2 were the same as sites used in 1994. Additional details of the construction of fishwheels

can be found in Link and English (1994) and additional details of the operation of the fishwheels in Kitselas Canyon are presented in Nelson and Alexander (1996).

Water temperatures and fishwheel RPMs were monitored daily at each fishwheel. The temperature in the inside holding pen of each fishwheel was recorded using a Fisherbrand, alcohol-filled thermometer. Temperatures were recorded during both the morning and afternoon sampling sessions. The fishwheel RPM was estimated by timing one complete revolution of the baskets and calculating the number of revolutions per minute. RPM measurements were made at each fishwheel during both the morning and afternoon sessions.

A staff gauge was installed in a side channel east of site 2 on 17 August. Water levels were recorded daily from then until the end of fishwheel operations on 21 September.

Dissolved oxygen was measured at the fishwheels using a Hydrolab IV water analysis kit on 29 and 30 August. The two days of measurements provided a rough estimate of dissolved oxygen levels in the holding pens during low-to-moderate fish densities. Unfortunately, the water analysis kit was not available during early August when holding pen densities were higher.

Angling: Standard angling methods were used to capture steelhead to radio tag below the fishwheels at Kitselas and on the Babine River.

Dipnets: Native food fishermen at Moricetown used dipnets to capture pink salmon for commercial sale under an ESSR licence and to capture food fish. They provided some of the steelhead that they caught to a tagging crew. The tagging program was conducted by the Office of the Wet'suwet'en Hereditary Chiefs. Fish were caught in dipnets below the falls and at the mouth of the fishway and were transferred to a tagging trough and tagged with a single anchor tag. For more details of tagging at Moricetown see Nelson et al. (1996).

Radio-tagging Procedures

All healthy steelhead longer than 55 cm (nose-fork length) that were captured near Kitselas were tagged with radio transmitters. Slightly different initial handling procedures were used depending on the method of capture of the fish. Steelhead that were caught angling were held and tagged while in the water. Fish caught in the fishwheels were removed from the holding pens in a vinyl sling and placed into a tagging tray. The tagging tray was a padded V-shaped trough filled with water. When immersed in water, fish generally became calm. This made handling easier and reduced the likelihood of fish being injured. Fish were not anaesthetized because some were likely to be caught by the in-river net fishery and the effects of the available anaesthetics on the edibility of the fish are unknown. Polyaqua®, which is a professional water conditioner, was added to water in the tagging tray to reduce scale loss and the possibility of disease outbreak. The addition of

Polyaqua created slick conditions which warranted the use of light cotton gloves to hold the fish during tagging. No adverse affects of wearing gloves were observed (i.e., scale loss, damage to skin, etc).

Processing included tagging each fish with one or two anchor tags; measuring the fish (nose-fork length); noting the presence of scars or marks; removing five scales; removing about one third of the adipose fin; and placing a radio tag down the throat of the fish with the antenna protruding from the corner of its mouth. The antenna was bent at the corner of the mouth so that the protruding section of the antenna trailed along the side of the fish. The anchor tag number and the frequency and coded signal of the radio tag were recorded for each individual fish. Processing of each individual fish generally took less than two minutes. Radio-tagged steelhead were released directly off the fishwheel from 23 July - 14 August and after 3 September. From 15 August to 2 September radio-tagged steelhead were transported in a large canvas holding tank to calmer water east of site 2 before they were released. This added approximately eight minutes to the processing time.

Scales were placed in scale books and labelled; they were taken for aging and possible stock identification analyses. Adipose tissue was placed in alcohol-filled vials and stored in a freezer for stock identification analyses.

Tracking Methods

We determined the movements of radio-tagged fish using data collected from tracking episodes conducted by boat, truck, helicopter and on foot. In addition, we set up fixed-station receivers that automatically detected and recorded radio-tagged fish that passed them. The tracking effort by each of these methods is summarized in Table 3.

Radio-tag Receivers and Tags: The radio-tag receiver used during this study was the SRX_400 built by LOTEK Engineering Inc. of Newmarket, Ontario, with their CODE_LOG version W16 data processing and storage program. The radio tag was the LOTEK model CFRT-3A digitally coded tag. This tag had a 460-d life and was 16.2 mm in diameter, 49.5 mm long, and weighed 7.0 grams in water. The frequency range of the tags was 149.54-149.70 MHz. This tag could be detected at >0.3 km from ground level if the fish was in 4-5 m of water and farther if the tag was in shallow water or the receiving antenna was higher. When flying at 500 m above ground level (AGL) we were able to pick up transmitters on fish in shallow water (1-3 m) from >3 km.

During all tracking the receiver was set to scan each frequency for six seconds during which time one to two pulses would be transmitted by a tag (the pulses are 5 s apart); the receiver then searched the next frequency. If a signal was received the receiver decoded the signal, reported the tag code and signal strength and stored the data in the internal memory. As many as 12-15 different fish can be recorded on the same frequency during the same scan cycle (6 s) so that the probability of a fish not being detected is low if only a few fish are

present on a single channel. The receivers, fitted with a single antenna, could scan six frequencies and decode over 70 different radio-tagged fish within a 36-s period. During aerial tracking surveys we were able to optimize tag detection and recording by varying our altitude and speed and by using two receivers that scanned different frequencies or the same frequencies offset.

Data from all types of surveys were automatically stored in an internal memory in the receiver and were transferred to a computer file on a portable computer whenever a survey was completed or a fixed station was visited. The data stored for each signal received by the receiver included the following:

1. date;
2. time (h/min/sec);
3. channel or frequency;
4. power level of signal;
5. antenna (if more than one antenna was hooked up to the receiver); and
6. signal code.

Six different frequencies (149.54, 149.58, 149.62, 149.66, 149.70 and 149.56 MHz) each containing up to 50 different digital codes were available to radio tag a maximum of 300 steelhead during this study. Because it became apparent that considerably fewer than 300 steelhead were likely to be tagged, we used only the first five frequencies listed above for steelhead. Tags to be applied to fish were selected so that different codes were applied to fish caught on the same date and so that tagged fish would be spread among the available frequencies. This precaution was taken to increase the detection efficiency of the receivers if fish captured at the same time or place remained together.

Fixed Stations: Twelve fixed-station receivers were established at strategic locations to automatically monitor the timing and the identities of fish moving up the Skeena River (Fig. 1). Eleven of these sites were used during the 1994-95 study. The location of these 11 previously-used sites was selected to monitor fish moving along the mainstem or entering known spawning systems of steelhead. A new site was established at Moricetown to monitor the removal of radio-tagged fish during periods when monitors were not present, and to provide more detailed information on fish movements in the vicinity of the fishway.

Each fixed station consisted of one, two or three antennas and the SRX-400 receiver which was powered by a 12-V deep discharge (RV) battery. Remote stations also had a solar panel to charge the battery. This reduced the helicopter time required to change batteries at the stations during the early and late parts of the field season. The battery and receiver were enclosed in a weather-proof container and could operate for 10 d to 6 wk without servicing, depending on the presence and size of a solar panel and weather conditions. The interval between visits to each station varied with the need to replace batteries and the need to download the data from the receiver. Frequent visits (every 7 d) were required to download

data from the receivers on the river during the peak of fish movements, most stations without solar panels were visited every 10 d and remote sites with solar panels were visited every 2 wk.

Koski et al. (1993) describe the operation of the antenna switching units for detecting and determining the direction of movement of fish and the probability of detecting fish. A 1-min scan delay was used at the Suskwa and Moricetown sites to reduce the amount of data obtained from radio-tagged fish that were holding near these stations.

Tracking by fixed stations provided the most continuous coverage of fish movements of the five tracking methods that were used. A total of 1495 site-days of monitoring have been obtained from the fixed stations up until 2 December 1995 (Table 3). The data from the fixed stations provided precise data on the arrival and departure times and dates that fish passed each site. These data could not have been obtained using the other tracking methods.

Aerial Tracking: Aerial tracking was conducted from a Bell 206 helicopter with one 4-element Yagi antenna attached to the cargo skid. The aircraft flew along the river and its tributaries at 80-190 (usually 130-160) km/h and at 90-300 m above-ground-level (AGL). The location and identities of each fish were determined and stored in real time by a Global Positioning System (GPS) with a built-in data logger and the SRX 400 receiver. The approximate position and the identity of each fish were also recorded manually on data sheets as a backup to the electronic systems. The position of the fish was later confirmed by comparing signal strengths and the GPS positions that were machine-recorded. During all surveys, two receivers were operated on different channels offset so that the probability of passing a fish without recording it was reduced. Aerial tracking was conducted whenever we flew and in 1995 almost all aerial telemetry data were obtained while ferrying to and from fixed-station receivers. A list of all telemetry surveys conducted during this study is found in Tables B-1 and supporting documentation is found in Table B-2.

Boat, Truck and Foot Tracking: Tracking was conducted from a boat near and downstream of the tagging site. Boat tracking was conducted to monitor movements of radio-tagged fish near the tagging site.

In addition, tracking by truck and on foot were conducted on an opportunistic basis. Most data were collected while visiting fixed-station receivers to download data, while tagging fish near Kitselas or while monitoring the food fishery at Moricetown (Table 3).

Data Processing

The data from each site or survey were screened for spurious signals using existing computer programs and were incorporated into the radio-tag database. Spurious signals were identified among the logged data by few or no repetitions, or by the fact that the tag was not deployed.

The data (~870,000 lines) were then converted into a dBase format (Foxpro 2.6) and condensed to one record for each period that each fish was found at each location. A new record was created whenever a fish was not detected at a site for 10 min. Programs were written to identify implausible movements or positions, match survey times and locations with fish tracking records and summarize the data for presentation in tables and figures.

Determination of Mark Rates

General Approach

Data collected from several different sources were used to determine mark rates for steelhead. Data were obtained from monitoring: a food fishery at Moricetown, native fisheries from Kitselas to Kispiox, angling catches of steelhead on the Babine and Sustut rivers, and fish passing counting fences on the Sustut River, Babine River and Toboggan Creek.

Counting Fences

Counting fences were operated during the summer and fall of 1995 by three different groups on the Skeena watershed as part of long-term monitoring of numbers of steelhead or salmon species returning to specific tributaries each year. These fences provided data on the mark rates of steelhead in various tributaries. The fence locations and operators were as follows:

Sustut River	DFO/MELP
Babine River	DFO
Toboggan Creek	SEP

Food Fishery Monitoring

In cooperation with the Office of the Wet'suwet'en Hereditary Chiefs we monitored the food fishery conducted at Moricetown from 5 August to 20 October. Observers recorded the catch of all species of fish from 06:00 to 22:00 h most days during this period (Nelson et al. 1996). The observers recorded the number of each species that were caught and fishermen checked each fish for tags. Fishermen were encouraged to find and return tags by the rewards (hats) that were provided by both this study and on-going MELP studies. The fish that are reported as being examined by our observers were not necessarily killed. We recorded data both for fish that were killed and for fish that were released. The catch monitoring report provides the data on the numbers or proportions of fish that were killed versus those that were released (Nelson et al. 1996).

The Gitskan Watershed Authority monitored catches of salmonids by native fisheries between Kitselas and Kispiox. They provided their estimates of steelhead catches and tagged fish to us.

Steelhead Angling

MELP personnel used angling to capture steelhead during the 25-27 October period to apply additional radio tags to steelhead on the Babine River to compare the winter movements and spawning success of steelhead that were radio tagged using oral implants in comparison to those tagged using surgical implants. These data will be used to determine mark rates on the Babine River.

Guides and clients of the Suskeena Lodge on the Sustut River participated in a MELP sponsored anchor-tagging program (R. Tetreau, Melp-Smithers, pers. comm.). They provided their data on numbers of steelhead captured and tagged to MELP. These data have been included in the mark rate data for Sustut River.

Systems Surveyed

Mark rate data were obtained from systems where on-going tagging, harvest and enumeration studies were being conducted. Tributary-specific mark rate data were obtained from the Sustut, Babine, and Bulkley rivers and system-wide mark rate data were obtained from the mainstem Skeena River between Kitselas and Kispiox. Obtaining mark rates from other systems would not have been cost effective and may have resulted in harm to the fish that were captured (B. Hooton, MELP-Smithers, pers. comm.).

Analytical Techniques

Steelhead escapement for the Middle and Upper Skeena River system (i.e., above Kitselas Canyon) were estimated using the adjusted Petersen estimate from Ricker (1975):

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

where N is the population estimate, M is the number of tagged fish in the river stratum as determined by telemetry surveys and fixed-station receivers, C is the number of fish examined for tags during mark rate surveys in that stratum, and R is the number of tags recovered in the sample C. Only steelhead radio tagged near Kitselas were included as marked fish.

Estimates for specific areas were made by prorating the total escapement estimate for a stratum using the portion of that stratum's radio tags tracked to each tributary. The low overall mark rates of fish during this study resulted in few tagged fish being recovered although relatively large numbers of steelhead were examined for radio tags.

Mark-Recapture Assumptions: Biases in Petersen estimates can occur when the principal assumptions of the estimation procedure are violated (p. 81-82, Ricker 1975). The relevant assumptions are:

1. The marked fish suffer the same natural and fishing mortality as the unmarked fish;

2. The marked fish are equally vulnerable to the recapture technique as are the unmarked fish;

3. The marked fish do not lose their marks;

4. The marks are applied randomly over the entire run; and/or marked fish become randomly mixed with the unmarked fish; and/or the recovery effort is proportional to the number of fish present in different reaches of the system; and

5. All marks are recognized and reported on recovery.

Our assessment of the validity of each of these assumptions is presented below (see DISCUSSION).

RESULTS

Steelhead Catches

A total of 121 steelhead were captured in the fishwheels near Kitselas from 15 July to 21 September 1995 (Table A-1). The first steelhead was captured on 23 July and the last steelhead was captured on 20 September (Fig. 3). Peak numbers of steelhead were caught during the last three weeks of the study. However, fishing effort was reduced during late August due to a rapid increase in water level that caused damage to three of the fishwheels (Figs. 4 and 5). Except for this period, the fishing effort was relatively uniform; however, analysis of sockeye catch data suggests that large short-term changes in sockeye catchability may have occurred (see DISCUSSION). Consequently, the pattern of catch and CPUE of all four fishwheels (Figs. 6 and 7) may not be good indicators of the total abundance or proportion of steelhead migrating past the tagging site.

One steelhead was angled near the fishwheels on 27 August. An additional 30 steelhead were angled on Babine River by MELP personnel from 25-27 October.

Radio Telemetry

Radio Tagging

Radio tags were placed in 131 steelhead during 1995. A total of 100 steelhead were radio tagged from the 121 captured in fishwheels near Kitselas from 23 July to 20 September. One steelhead was angled on the mainstem Skeena below the fishwheels on 27 August, and 30 steelhead were angled on the Babine River on 25-27 October (Tables 4, A-2 and A-3). The length-frequency distribution of the steelhead radio tagged near Kitselas is shown in Figure 8. The smallest steelhead caught could not be radio tagged; nine additional steelhead <60 cm were caught in the fishwheels and were not radio tagged because they were too small.

Although steelhead were radio tagged near Kitselas from 23 July to 21 September 1995, 82% (83 of 101) were tagged during a 5-wk period from 13 August to 16 September (Tables 4 and A-3). In fact, 38% of the steelhead radio tagged from the fishwheels were tagged during a 4-d period from 13-16 September. The 30 steelhead tags applied in the Babine River were part of a MELP study that will be reported elsewhere.

The number of steelhead with active radio tags during each week was less than the total number of steelhead that had been tagged to that date because radio-tagged fish were caught or tags were regurgitated. Table A-4 lists the radio-tagged steelhead that were recaptured or removed from the list of active fish because the tags became stationary, and Table 5 shows the number of tags that was active during each weekly period.

Anchor Tagging

A total of 153 steelhead were anchor-tagged; 90% were tagged at Moricetown (Tables 6 and A-5). Thirteen anchor-tagged steelhead were recaptured and reported; of these, four were retained as food fish (Tables 7 and A-6).

Tracking Methods

During this study we obtained 870,000 individual records of radio-tagged fish. Most of the tracking data were obtained by the fixed-station receivers. Tracking data were condensed to records of fish arrival and departure dates from the fixed-station receivers and to unique locations for each day that each fish was tracked using mobile tracking methods. Table 8 indicates the number of different fish tracked on each day during each weekly period. Final destinations for most fish will need to be confirmed during helicopter surveys conducted during the winter and spring.

Fate of Radio-tagged Fish

A total of 101 steelhead were radio-tagged near Kitselas. One of these fish was captured by angling and the rest were captured in the fishwheels. Of the 101 fish that were tagged, 29 were last tracked in the Upper Skeena, 35 were last tracked in the Middle Skeena and 37 were last tracked in the Lower Skeena (Table 9; Fig. 9). A total of 26 radio-tagged fish were considered lost due to the tagging and capture procedure; one of the fish regurgitated its tag at the tagging site, 16 fish appear to have died as a result of tagging-related factors and nine fish moved down-river into saltwater as a result of tagging and were probably alive when last tracked, but they are unlikely to spawn during the spring of 1996 (Appendices A-4 and A-7). Thus 75 radio-tagged steelhead were available to be captured by in-river fisheries or to spawn in the spring of 1996. The distribution of the 75 "available tags," based on last tracking information, was 29 in the Upper Skeena, 32 in the Middle Skeena and 14 in the Lower Skeena.

Sixteen of the 75 "available tags" were captured or suspected to have been captured by in-river fisheries. An unknown fraction of these 16 steelhead, that were captured or suspected to have been captured, may have been released or escaped capture after regurgitating their tags (Appendices A-4 and A-7). Thirty-nine steelhead were last located in mainstem locations (including 16 removals or suspected removals) and 36 were last seen in tributary locations (including 1 removal at Moricetown) (Table 9; Fig. 9).

Thirty steelhead were radio tagged on Babine River in late October. No major movements have been observed by these fish from aerial surveys last conducted at the end of November.

Up-river Movements

There was considerable variation in the rates of up-river movement by steelhead that were tagged near Kitselas. The initial movements, from the tagging site near Kitselas to Price Creek, were slower than movements that occurred farther up-river. Initial speeds varied from 3.4-11.7 km/d, but movements from Price Creek to the Bulkley-Skeena junction ranged from 6.2-32.6 km/d (Table 10). In general, steelhead travelling to destinations that were farther up-river moved faster than those with destinations closer to the tagging site. The Morice fish (8.8-38.7 km/d), Sustut fish (13.3-22.8 km/d) and Upper Skeena fish (3.2-19.8 km/d) travelled faster than steelhead destined to the Bulkley (5.1-14.5 km/d), Kispiox (2.1-13.0 km/d) and Middle Skeena (4.8-9.5 km/d, Table 10). The exception was steelhead that ended up in the Lower Skeena after first travelling up-river to the Bulkley and Suskwa rivers (11.5-21.7 km/d). These fish may have been heading for up-river locations such as the Morice but returned down-river after encountering in-river sport or net fisheries. Although there was evidence of different rates of movement among the different stocks, there was no clear separation in run timing for the different stocks even after fish had moved up-river to the Bulkley-Skeena and Babine-Skeena junctions (Figs. 10-12).

The mean travel times and residence times, including standard errors and sample sizes, and the travel times and residence times of individual fish are given in Appendices D-1 to D-5.

Downstream Movements

Fish that are captured and tagged often interrupt their upstream migration, probably as a result of stress due to handling. Fifty-five of the fishwheel-captured steelhead that were radio tagged dropped back from the tagging site to the mouth of Zymoetz River (11 km), before travelling up-river. Twenty-two 22 of these fish were detected as far downstream as the fixed-station receiver located near Exchamsiks River (82 km; Fig. 13). An additional 5 fish were tracked downstream of the tagging site after migrating to locations upstream of Price Creek.

A total of 63 radio-tagged steelhead were detected moving up-river after they were tagged at the fishwheels. This number excludes any fish that died or that returned down-river within 14 days of tagging, unless they were recaptured in another fishery. Of these 63 fish, 38 (60%) were recorded up-river at Price Creek (75 km from the tagging site) without being detected at the fixed-station receiver at the mouth of Zymoetz River. Twenty-two (35%) of the 63 were first recorded at Zymoetz River after a mean period of 67 h (n=55, s.d.=70). The other 3 fish were not seen at either Price Creek or Zymoetz Junction. The mean length of time between tagging and arrival at Price Creek was 306 h (n=60, s.d.=272) in 1995. In 1994, ocean-tagged steelhead took 159 h (n= 53, s.d.=120) to travel from Zymoetz River to Price Creek. This suggests that the mean drop-back in 1995 was about 147 h or about 6 d. This is much shorter than mean drop-backs of 11.5 d for fall steelhead, 40.5 d for summer steelhead on the Columbia River in 1992 (Bjornn et al. 1993), and 15.5 d and 9.5 d for chinook salmon on the Nass River in 1994 and 1995, respectively (Link and English 1994; Link and Gurak 1996). In contrast, the mean drop-back of 6 d is longer than drop-backs of 1.4 d and 2.2 d for chinook on the Columbia River in 1991 and 1992, respectively (Bjornn et al. 1992, 1993), 1.8 d for sockeye salmon and 2.7 d for coho salmon on the Nass River in 1995 (Link and Gurak 1996).

Stock Separation

Steelhead that were destined for the Sustut or Upper Skeena mainstem were tagged near Kitselas throughout the run (Fig. 10). Lower Sustut fish (i.e., destined for areas below Bear River) are believed to have a later run timing than Upper Sustut fish (B. Hooton, MELP-Smithers, pers. comm.). Two steelhead tagged near the end of the tagging period (16 and 19 September) were tracked to the Lower Sustut River. The latter fish was last tracked on the Upper Skeena near the Skeena-Sustut junction after moving down-river following capture-and-release by an angler on the Sustut near Bear River. Of the 21 fish that were tagged before 20 August, 10 were tracked to upstream destinations (3 to Bulkley, 2 to Sustut, 2 to Middle Skeena, 1 to Kispiox and 2 to Upper Skeena). The two Middle Skeena steelhead

from the early part of the run were captured by in-river fisheries and were probably destined for locations farther up-river.

During the middle part of the run from 22 August - 5 September, the Babine fish appeared to have been the dominant stock with smaller numbers destined for Kispiox River and the mainstem Skeena. Many of the mainstem fish were harvested by in-river fisheries and may have been destined for tributaries farther upstream. The late part of the run included numbers of fish from all stocks (Fig. 10).

Stock Composition

Of our 101 steelhead that were radio tagged near Kitselas, 75 (74%) were tracked to a over-wintering or harvest location on the Skeena River, as of 30 November 1995, and were used in the calculation of the preliminary total escapement estimate (Table 12). Sixteen of these are the last known locations for fish that were harvested, suspected to have been harvested, or that are suspected to have moved downstream after being captured and released. However, some of the 75 radio-tagged steelhead were tracked to mainstem locations where they will overwinter. In the spring these fish may move into spawning locations which may include small tributaries as well as the major tributaries (see Lough 1983; Alexander and Koski 1995). Thus the proportions of fish in some systems will increase in the spring. Of the 75 "available" steelhead tagged near Kitselas, 39% moved into the Upper Skeena River (Table 12): 16% were in the Babine River, 8% in the Kispiox, 4% in the Sustut, and 10% in the mainstem and small tributaries. The Middle Skeena was a final or overwintering destination for 43% of the steelhead tracked: 20% were in the Bulkley-Morice system, none were in Zymoetz River and 23% were along the mainstem between Terrace and Hazelton. The Lower Skeena was a final or overwintering location for 19% of the "available" steelhead tags; they were all along the mainstem. The number of "available" tags needs to be reduced by the 3-16 captures or suspected recaptures to determine the actual number of "active" tags (Fig. 9). Additional tracking information during the winter and spring will permit confirmation on the likely fates of these fish. Confirmed recaptures were: one on Bulkley River and two on the Middle Skeena mainstem. Suspected recaptures were: one on the Upper Skeena mainstem, eight on the Middle Skeena mainstem, and four on the Lower Skeena mainstem (Appendices A-4 and A-7).

Ground Surveys

Mark rates were determined for each of the major tributaries except for Kispiox River and in several of the smaller tributaries to determine the ratio of marked-to-unmarked fish for different stocks of Skeena River steelhead. We used data from other on-going studies; no direct counts were made as part of this study. Table 11 summarizes the data that have been compiled during these different studies; they will need to be supplemented by any data that are obtained during the spring of 1996. Figure 1 shows the locations where the mark rate data were obtained. Table C-1 gives the details of surveys at Moricetown, including date

and numbers of marked and unmarked fish that were counted. Additional details of the Moricetown data can be found in Nelson et al. (1996).

Escapement and Harvest Estimates

The mark rate information was combined with the data on the fates of the radio-tagged fish to estimate the numbers of fish that either spawned (escapement) or that were taken by the various fisheries on the Skeena River. The uncertainty associated with these estimates is discussed in detail below (see **DISCUSSION**). The mark rate data in Table 11 include more than one sampling within some systems, but it is unlikely that the samples include fish that have been examined more than once. Steelhead angled on Babine and Sustut rivers were tagged, and therefore, would have been recognized if they were resighted at up-river fences. Fish captured along the mainstem between Doreen and Hazelton included many fish that were harvested.

Radio-tagging data have been used to estimate harvest rates of chinook by sport and native food fisheries on the Nass River and steelhead and coho salmon on the Skeena River. The number of radio-tagged steelhead that were harvested by these fisheries on the Skeena River both in 1994 and 1995 were too small to make reliable estimates of harvests by user groups but they do provide useful information that can be used to monitor and assess fisheries in the future. They also give "ball-park" estimates of the total in-river harvests of steelhead above Kitselas; they include, at most, partial in-river harvests/losses that occur below Kitselas.

Sport-fishery Harvests

The steelhead sport fishery on the Skeena River is a catch-and-release fishery. However, some radio-tagged fish could have died after being captured and released and some could have regurgitated their tags when they were being played. During this study we identified one radio-tagged steelhead that died or regurgitated its tag at a sport fishing site for salmon and we identified one steelhead that moved down-river from Suskwa-Bulkley junction after it was suspected to have been caught by a sport fisherman. The latter fish left the Skeena River, but was alive when last tracked. Based on the radio-tagging data, sport fishing activities may result in a 0-3% reduction in the spawning population of steelhead due to mortality and premature downstream migration to the ocean.

Native Fisheries

Three radio-tagged steelhead were harvested by native in-river fisheries on the Skeena River upstream of Kitselas (Table 9; Appendix A-4). An additional seven tags were regurgitated or the fish died at a native fishery site, three radio-tagged steelhead disappeared near a known native fishing site and may have been harvested by native fishermen, and one radio-tagged steelhead travelled down-river to the ocean after it was suspected to have been

caught and released at a native fishery site based on its last upstream location. Thus, 3-14 (4-19%) of the radio-tagged steelhead that passed Kitselas were removed by native fisheries. This range includes all the other native harvest estimates from studies on Skeena steelhead; the 10% rate used by Ward et al. (1993) and estimated by Beere (1991b), and the 8-12% estimated by Koski et al. (1995) using radio-tag data from 1994.

Total Harvests

A minimum of three and a maximum of 14 radio-tagged steelhead were captured and killed by in-river fisheries on the Skeena River either directly or as a result of mortality due to handling. In addition, two radio-tagged fish appear to have migrated down-river into the ocean after being captured and released by in-river fisheries. Therefore, an estimated 1021-5446 steelhead will not spawn in the spring of 1996 as a result of the activities of in-river fisheries during the summer and fall of 1995. The average of this range of estimates is 3234 steelhead. Because steelhead are more prone to regurgitating radio tags than other salmonid species (Ted Bjornn, University of Idaho, pers. comm.), it would not be correct to assume that all the stationary radio tags from steelhead represent dead fish.

Estimates of Gross Escapement

A preliminary estimate of the number of steelhead that entered the Middle and Upper Skeena River during the summer of 1995 has been made by using the overall mark rate from the Middle and Upper Skeena and the number of "available" radio-tagged fish in the Skeena River before sport and native fishery removals. This preliminary estimate is 25,500 (Table 12).

Estimates of Net Escapement

The best preliminary estimate of net escapement of steelhead to the Middle and Upper Skeena River above Kitselas was 22,300, assuming that 3200 steelhead were harvested by in-river fisheries. This estimate does not include estimates of overwinter mortality, overwinter fishery removals, or steelhead that enter Zymoetz River and lower-river tributaries such as Kitsumkalum River.

DISCUSSION

The 1995 radio-tagging program was planned to estimate the escapement of steelhead to the Middle and Upper Skeena River in 1995. All steelhead captured in fishwheels near Kitselas were to be radio tagged based on a constant fishing effort by three fishwheels. It should be noted that the reliability of the steelhead escapement estimates depends on continued tracking of steelhead to determine overwinter mortality and stock destinations for radio-tagged fish and on the success of spring mark rate sampling. The only major steelhead producing river above Kitselas that was not sampled during the fall part of this study was

Kispiox River. Unfortunately, spring conditions and fish distribution are not suitable for conducting spring surveys on the Kispiox River (B. Hooton, MELP-Smithers, pers. comm.). Additional mark rate information is required for the Babine River to increase the reliability of the population estimate; this information can be obtained by monitoring steelhead movements past Babine Fence during the spring of 1996.

Radio-tagging Success

Our tag application rate appears to have been affected by changes in the catching efficiency of the fishwheels during tagging. The most significant changes in the tag rate probably occurred during the 24-30 August period, when only one or two fishwheels were fishing, and 10-16 September, when dropping water levels created ideal capture conditions. Figure 3 shows the number of steelhead that were caught in relation to the catch per unit effort (CPUE) at the fishwheels. It shows that steelhead were under-tagged during the 24-26 August period based on the fishwheel CPUE. We cannot determine directly what percentage of the steelhead run passed by the tagging site during this period, but based on information from the test fishery at Tyee, we may have missed a substantial proportion of the run. Figure 14 shows run timing information of Skeena steelhead at the Tyee Test Fishery for the years of 1985-1995. The 1995 test fishery data suggests that 30% of the steelhead run passed Tyee between August 7 and August 14. Based on data collected in 1994-95, steelhead take about 12 d to travel from Tyee to Kitselas (Koski et al. 1995). Therefore, substantial numbers of steelhead may have reached the tagging site at Kitselas during the lower catchability period, 24-30 August. Figure 15 shows the temporal variation in numbers of steelhead that were radio tagged near Kitselas in comparison to the Tyee Test Fishery indices offset by 12 d. The same trend that appears in Figure 3 is seen in Figure 15; that is, steelhead appear to have been under-tagged during the mid-to-late August period when the fishwheels were damaged by the rising water levels. Similar changes in CPUE and fishwheel catchability are also seen in fishwheel catches of sockeye salmon in comparison to the Tyee Test Fishery indices offset by 13 d (Figs. 16 and 17). Sockeye CPUE were comparatively lower than Tyee test indices during mid-August indicating a lower catch efficiency of the run migrating through the canyon (Fig. 16). This trend is also reflected in the estimated catchability of the fishwheels (i.e., fishwheel CPUE divided by the estimated daily escapement passing Tyee 13 days earlier; Fig. 17). Increases in fishwheel catchability appear to strongly correspond with decreasing water levels after a major flow event.

The above problem was compounded by the fact that less than half of the steelhead tagged prior to August 26 were tracked to destinations upstream of the tagging site (Fig. 18). The net result of low fishwheel CPUE and downstream migration after tagging was that the first 70% of the steelhead run past Kitselas canyon was represented by only 17 radio-tagged fish. Consequently, very few radio-tagged steelhead were available for mark-rate sampling at the Moricetown fishway prior to September.

The survival to destination for radio-tagged steelhead tagged near Kitselas in 1995 are similar to other steelhead radio-tagging studies on the Skeena, Nass and Columbia rivers (Fig. 19). Radio-tagging studies on steelhead have had difficulty in achieving better than 50% survival to destination whereas radio-tagging studies on chinook salmon have had much better success, 67-83%. The lower survival percentages for radio-tagged steelhead make it much more difficult to obtain reliable population estimates; because a higher tagging rate is needed to get enough marks within each system.

Run Timing

The steelhead run in 1995 was, on average, later than in most years (Fig. 14) and steelhead movement into the Skeena River may have continued after the Tyee Test Fishery was terminated on 31 August 1995. It is also possible that some steelhead continued to migrate upstream past Kitselas after the fishwheels were removed. It is not known whether the relatively large number of steelhead, captured in the fishwheels from September 13 to 16, past the Tyee Test Fishery before or after it was terminated. However, both low water levels (Fig. 4) and high sockeye catchability (Fig. 15) suggest that the fishwheels were probably much more effective at catching steelhead during this period than during earlier portions of the run. Given these factors and the potential for steelhead to hold in the lower river between Tyee and Kitselas Canyon, the 1995 fishwheel catch rate data do not provide an accurate indication of run timing for the lower Skeena River.

The 1995 study provided additional stock specific information on steelhead run timing through Kitselas Canyon. Prior to the 1994 and 1995 steelhead telemetry studies, the most complete study of steelhead run timing was conducted by Spence and Hooton (1991) who analyzed data collected over a large number of years. Thus seasonal trends in movements could not be clearly separated from between-year differences in timing. Our study documented the early arrival of Sustut steelhead that has been documented by earlier studies (Cox-Rogers 1985; Spence and Hooton 1991; Bustard and Assoc. 1993; Koski et al. 1995); however, unlike the earlier studies we documented movements into Sustut River and other Upper Skeena areas near the end of the run (Figs. 10, 15 and 18). It was previously believed that the later-arriving steelhead belonged to primarily Babine-Kispiox stocks. Spence and Hooton (1991) and Cox-Rogers (1985) found that Morice steelhead were earlier than other stocks. Only one of the steelhead tagged in 1995 was tracked to the Morice River as of December 1995 and this fish was tagged during the early part of the run. The Morice River is known for smaller-sized steelhead based on a higher proportion of young fish (B. Hooton, MELP-Smithers, pers. comm.). We suspect that some of the early steelhead we caught near Kitselas that were too small to radio tag may have been destined for Morice. Appendix A-5 shows that a high proportion of the steelhead anchor-tagged at Moricetown during the early part of the run were <60 cm, which would have been too small to radio tag.

Rates of Movement

This study has provided additional information on the rates of movement of steelhead of different stocks as they migrate up the Skeena River. The data suggest that radio-tagged fish dropped down-river or slowed their rate of up-river movement after being captured in the fishwheels and radio tagged. After the initial period, speeds of movement increased and were similar to those found during the 1994 study and by Spence and Hooton (1992), but were higher than those recorded during studies by Lough (1981) and Beere (1991a). The combination of advanced telemetry equipment and fixed-station receivers set up at the mouths of all major tributaries during 1994 and 1995 resulted in more detailed information on rates of movements than previous studies.

Stock Composition

During this study we documented movement of steelhead from tributaries to the mainstem during late fall or winter and the last known position of many steelhead was in the mainstem Skeena. Similar movements have been observed during other studies (Lough 1981; Spence and Hooton 1989; Alexander and Koski 1995). Thus the exact proportions of tagged fish that will spawn in different tributaries is unknown at this time. Comparisons of the current locations of the 1995 radio-tagged steelhead with distributional data from the 1994 study shows a similar stock composition between the two years. Upper Skeena steelhead formed a similar proportion of steelhead in 1994 (44%) and 1995 (39%), but a much higher proportion than in 1980 (21%, Lough 1981). Lough (1981) estimated that the proportion of the steelhead run that spawned in the Bulkley (48%) system in 1980 was higher than that observed in mid-winter 1994-95 (33%) and late November of this study (20%).

Harvest Rates

The radio-tag data provide only approximate estimates of the harvests or other losses related to in-river fisheries by various user groups on the Skeena River in 1995. During this study, 0-3% and 4-19% of the steelhead that moved up-river did not spawn as a result of catch-and-release activities or harvests by in-river fisheries, respectively. The high degree of uncertainty associated with these estimates is the product of low mark rates, limited monitoring efforts and the small number of steelhead harvested in Skeena River fisheries. However, these estimates are consistent with those derived from other catch monitoring efforts and confirm that steelhead harvests in 1995 was limited to previously identified fisheries. In contrast, the 1993 chinook radio telemetry study on the Nass River documented significant chinook harvests by unmonitored First Nation fisheries initially implemented to harvest sockeye.

Estimates of the in-river harvests of steelhead have been made for management purposes by Spence and Hooton (1991). They estimated the sport harvest to be approximately 800 steelhead and native harvests to vary between 2000 and 8500 (average

5000) steelhead. Lough (1981) estimated that 17% of his radio-tagged steelhead were harvested and Koski et al. (1995) estimated that approximately 3000 (1900-4100 or 8-17%) steelhead were harvested on the Skeena River during the summer and fall of 1994. Our 1995 estimate of 3200 (1021-5446 or 4-19%) does not include winter, spring or early summer harvests, and therefore, is not directly comparable to estimates made before 1994.

Escapement Estimates

Our escapement estimate is based on tracking radio-tagged fish to their spawning destinations and determining their fates in combination with a Petersen mark-recapture design. Consequently, the following discussion focuses on the major assumptions associated with these mark-recapture estimates in an attempt to identify and assess potential sources of bias.

Mark-Recapture Estimates

Biases in Petersen estimates can occur when the principal assumptions of the estimation procedure are violated (p. 81-82, Ricker 1975). The relevant assumptions and how our study attempted to meet and/or test their validity are outlined below.

1. *The marked fish suffer the same natural and fishing mortality as the unmarked fish.*

This assumption is important in mark-recapture studies where the number of tagged fish available for recapture sampling is unknown. However, in this study modern radio telemetry have made it possible for us to determine the number of radio-tagged fish which escape sources of natural and fishing mortality and reach their destination spawning stream or mark rate sampling locations. By only using these fish to estimate population size this assumption is no longer relevant.

2. *The marked fish are equally vulnerable to the recapture technique as are the unmarked fish.*

During this study, the mark rate estimates came from counts of live fish passing counting fences in or near spawning areas or from examinations of fish that were caught during in-river fisheries. Counting fences should provide unbiased counts of marked and unmarked fish. In-river fishing gear included gillnets, dipnets and gaffs. Small steelhead may pass through gillnets used along the Skeena mainstem but small (<55 cm) steelhead were not radio-tagged so size selectivity alone should not bias the mark rates. Dipnets and gaffs used in the Moricetown fishery are capable of catching fish of all sizes, but larger fish (i.e., tagged fish) are more likely to escape before they are examined than are smaller fish. Thus mark rates using these gear types may be negatively biased. The bigger issue for all in-river fishery samples and, especially the Moricetown fishery, is the availability of marked

fish to these fisheries. This issue is addressed under assumption 4 since it is more related to the distribution of tags over the run and the mixing of tagged with untagged fish than gear selectivity.

3. *The marked fish do not lose their marks.*

This assumption is not required when using radio tags as marks on live fish. Only active tags are assumed to be in the system because only active tags can be detected by receivers monitoring movements into the system.

4. *The marks are applied randomly over the entire run; and/or marked fish become randomly mixed with the unmarked fish; and/or the recovery effort is proportional to the number of fish present in different reaches of the system.*

The available data concerning the temporal distribution of the steelhead run suggests that we did not tag steelhead proportional to the numbers passing through Kitselas canyon. There were several time periods during run when more steelhead should have been radio-tagged in order to obtain minimum tagging goals and maintain an uniform mark rate over the season. While most studies fail to achieve uniform mark rates across the run, this assumption can still be valid if some tags are applied to all segments of the run and the tagged fish mix with the unmarked population prior to sampling for mark rates. In the 1994 Skeena steelhead and coho radio telemetry study (Koski et al. 1996), ocean tagged fish were tracked migrating upstream throughout the run and these fish had ample time to mix with unmarked fish during their 20-60 d migration (150-500 km) from the tagging site to the locations where mark rate sampling occurred (Moricetown and Babine fence). Unfortunately, this was not the case in 1995. Comparison of the timing of Moricetown steelhead catches and the migration of radio-tagged steelhead past Moricetown clearly indicate that this assumptions was not valid for the 1995 mark rate sampling effort conducted at Moricetown. Only 7 radio-tagged steelhead were available for sampling in the Moricetown fishery and none of these fish were detected by the Moricetown fixed-station receiver prior to 4 September 1995. Approximately, 70% of the steelhead caught at Moricetown were caught prior the arrival of the first radio-tagged fish (Fig. 20).

While the Moricetown data clearly undermine one of the key mark-recapture assumptions, the daily counts of steelhead captured probably do not reflect relative daily abundance at Moricetown. These counts are affected by both fishing and survey effort which were not constant throughout the fishery (Nelson et al. 1996). Steelhead CPUE is probably a better indicator of the run timing for steelhead at Moricetown (Fig. 21). These data indicate that the bulk of the steelhead run were vulnerable to Moricetown fishery between Aug. 15 to Sep. 20, but there may have been a strong late component to the 1995 run. This observation is consistent with the large number of steelhead caught at the fishwheels in September and coincided with the arrival of radio-tagged fish at Moricetown. Unfortunately, the fishing

effort in late September and early October was too low to be confident that the high catch rates observed accurately reflect the relative importance the late component of the 1995 steelhead run.

Plans to obtain additional mark rate information from Babine fence counts in the spring of 1996 could produce an unbiased sample of the mark rate for that stock. However, given the clearly biased distribution of tags relative to the steelhead run in 1995, it would not be reasonable to assume that a mark rate obtained from the Babine fence would be appropriate for Skeena steelhead stocks with run timings that differ from that of the Babine stock.

5. *All marks are recognized and reported on recovery.*

Most radio-tagged steelhead had three marks: the radio tag and two orange anchor tags. Thus it is highly unlikely that a marked fish would loose all of its marks. The presence of multiple, highly-visible marks makes it unlikely that at least one of these marks would not be seen by the fishermen or surveyor examining the fish. The potential for error in identifying whether or not a fish is marked depends on the sampling procedures used to examine fish for marks. Steelhead were individually handled during the recovery programs reported here. Therefore, few if any, marked steelhead would have been missed during the mark rate recovery program. Furthermore, a radio-tag receiver was installed at the Moricetown fishway. The receiver would have detected any radio tags that were removed from the water, even if the recorders did not seen the marks. Thus marked fish would not have been missed at Moricetown.

In conclusion, the 1995 study was designed to minimize the biases and avoid major violations of the above assumptions. Unfortunately, we could not guarantee our access to steelhead in sufficient numbers to ensure that the radio-tagged fish were representative of all components of the run. Four modern fishwheels, fishing day and night from early July through late September, should have provided adequate supply of steelhead. The significant violation of assumption 4 has made it virtually impossible to obtain a reliable population estimate for any Skeena steelhead outside the Babine system. While we have provide preliminary steelhead population estimates based on the available data, these estimates are not comparable to the 1994 radio-telemetry results and should not be used as an indication of the absolute or relative size of the 1995 return of summer run steelhead to the Skeena River.

Use of Fishwheels

Based on the 1994 data, the fishwheels operated in Kitselas Canyon appeared to be a good source of large numbers of steelhead for the 1995 radio telemetry study. In 1994, two fishwheels caught 225 steelhead between July 24 and Sep. 11, but in 1995, three to four fishwheels caught only 121 steelhead during a longer fishing season. The Tyee Test Fishery

data suggest that the 1995 run was about 90% of the size of the 1994 run. While changes in water levels or other factors are likely to alter the efficiency of the Tyee test fishery from year to year, the reduction in catch efficiency between 1994 and 1995 appears to have been much greater for the fishwheels than the test fishery. Similar between-year changes in CPUE have been noted for sockeye and chinook at specific locations on the Nass River where fishwheels have been operated for four consecutive years (M. Link, LGL Limited, pers. comm.). With experience, these variations can be reduced by using fishwheel locations with different fishing efficiencies under different water conditions. Thus while the efficiencies of individual fishwheels may increase or decrease, the combined efficiencies can remain relatively stable.

Fishwheels were unable to provide a source of steelhead to radio tag that was proportional to numbers moving past the tagging site in 1995. In addition, a significant proportion of the steelhead that were tagged either died or returned down-river to the ocean without spawning. The reason for such high levels of mortality and downstream movement are unknown, but they have also been observed for radio-tagged steelhead captured at dams on the Columbia River in 1992 and fishwheels on the Nass and Skeena rivers in 1993 and 1994, respectively.

Only 42% of 210 summer-run steelhead and only 65% of 261 fall-run steelhead that were radio tagged on the lower Snake River in 1992 returned as far upstream as the original capture site (Bjornn et al. 1993). In 1993, 71% of 49 summer-run steelhead that were captured and radio tagged from fishwheels on the Nass River were tracked to a final destination (Alexander and Koski 1995); however, only 29% of 42 summer-run steelhead that were radio tagged from fishwheels on the Skeena River in 1994 migrated upstream of their tagging site (Koski et al. 1995). The Nass study attributed the losses to limited tracking ability and low water conditions causing premature exiting; and the Skeena study attributed the results to high water temperatures and poor fish handling. Similarly high rates of downstream migration have not been observed for other anadromous species.

Of the 113 steelhead radio tagged at the mouth of the Skeena River in 1994, five were recovered from the commercial fishery and 72% of the remaining tagged fish were tracked to the Skeena River (78 of 108). Given that harvest rates for commercial fisheries in Area 4 are typically greater than 30% (Cox-Rogers, DFO Prince Rupert, pers. comm.), it is likely that other radio-tagged fish were removed by the commercial fishery and not reported. Therefore, the 78 radio-tagged steelhead that entered the Skeena in 1994 was probably substantially more than 72% of the tagged fish that escaped the commercial fisheries. The high success rate for ocean-tagged fish was likely the result of the short holding times associated with purse seine capture techniques and the lower water temperatures found in the ocean.

Radio-tagging studies conducted on the Nass River in 1993 reported tagging associated losses that were much higher for steelhead captured in fishwheels than for chinook

salmon captured in fishwheels (Koski et al. 1994). Comparisons of the survival to destination for radio-tagged steelhead and chinook from a variety studies on the Nass, Skeena and Columbia rivers all indicate that steelhead are more susceptible to handling stress than chinook salmon (Fig. 19). Several of the factors that may have contribute to stress related to handling and resulted in the downstream movements observed in 1995 are examined below.

During the early part of this study we noticed that several radio-tagged fish had moved down-river after they were tagged. Concern was expressed that fish were being released directly from the fishwheels into the strong current, although this method has been used successfully on the Nass River (Koski et al. 1994; Link and English 1994). As a result, we transported steelhead captured from 15 August - 2 September, to a calm area a short distance from the fishwheels. After 2 September, when it became evident that transported fish were also moving down-river, steelhead were again released directly from the fishwheels.

Of steelhead transported to a calm area before being released, 54% travelled down-river of the tagging site, whereas only 30% of fish released directly from fishwheels moved down-river (Table 13). This difference was statistically significant ($\chi^2=5.00$, df=1, P=0.025), but this was only one of several factors that could have contributed to the observed downstream movements. Other factors examined included: the size of the fish, crowding in the holding pens, the physical condition of the fish, changes in the water temperature, the length of time held before being tagged, the experience of the tagger, and the period of the year (relative to the migration). We examined all of these factors with respect to whether fish moved upstream or downstream (Tables 14-19, A-8) and the results are summarized in Table 20. Of these factors, only the maximum length of time that a fish was held before being tagged proved to be significantly related to whether fish moved upstream or downstream. Because the actual time of capture was unknown, we do not know how long each fish was held. We used the elapsed time from the previous visit to the wheels to the tagging time as the maximum holding time. This factor was significantly related to whether fish moved up-river or down-river both when all fish were considered ($\chi^2=8.27$, df=2, P=0.016) and when only steelhead released from the fishwheel were considered ($\chi^2=7.35$, df=2, P=0.025). Only one other factor (date) was close to being significant and this factor was probably related to the temporal changes in releasing fish from the fishwheels or transporting them to a calm area. It is possible that some of the other factors did contribute to the likelihood that a fish would move either upstream or downstream, but the release method and holding time factors may have obscured their contribution. All factors were examined *a posteriori* and the data were not collected in a manner to permit unbiased paired comparisons.

In summary, the above results suggest that: 1) it is better to release radio-tagged steelhead directly from the fishwheel into turbulent water than to transport them to calmer water because the handling during transport may subject fish to additional stress; and 2)

minimal holding durations (i.e., less than 10 h) improve the likelihood of tagged fish travelling up-river to their overwintering or spawning location.

Future Studies

1. Future efforts to quantify the magnitude of steelhead escapements to the Skeena River should focus on determining the efficiency of the current or any future Skeena Test Fishery for catching steelhead. While it would be difficult, if not impossible, to obtain a direct measure of the test fishery's efficiency for catching steelhead, it should be possible to derive weekly efficiency estimates for sockeye and study the relationship between sockeye and steelhead catch rates. These efficiency estimates could improve the reliability of sockeye escapement estimate and bring us another step closer to the goal of a reliable annual index of summer run steelhead escapement for the Skeena River system.

2. The Tyee Test Fishery should be extended until mid-September to monitor late-arriving steelhead and provide a better indicator of total escapement for Skeena River summer run steelhead.

3. In addition to the above test fishery index, stock discrimination data would be required to monitor trends in specific stock and evaluate the effectiveness of management actions designed to reduce steelhead harvest rates in the Area 4 salmon fishery. Genetics techniques such as micro satellite DNA analysis appear to have potential as a stock discrimination tool, however, laser ablation mass spectometry appears to have promise and may provide similar or complimentary information at a lower cost. Both of these techniques should be seriously investigated as a means of identifying Skeena steelhead stocks in catch and escapement.

4. Mark recapture using radio-telemetry techniques is one of the only feasible methods of obtaining reliable estimates of escapement for Skeena River steelhead stocks. However, sufficient numbers of steelhead must be tagged and subsequently examined during mark rate monitoring programs. If radio-tagging studies are to be conducted for other species, steelhead should also be tagged. In the absence of other telemetry studies, steelhead radio-tagging studies should be delayed for 2-3 yrs in order to address several issues related specifically to steelhead telemetry studies. The most problematic issue is the method of capture, but there are also problems obtaining sufficient mark rate data to make reliable population estimates.

   Future radio-tagging studies might have to use a combination of capture methods to ensure capture of sufficient numbers of steelhead. Fish should probably be captured using seine vessels in Areas 4-9 and 4-12. Ocean caught fish experience little tagging mortality or permanent drop-back, but they have a high interception rate by the

commercial fishery. Fishwheels near Kitselas could then be used to supplement the ocean tagging.

Better mark rates would be obtained if more fish were radio-tagged. Since more fishwheels are being constructed for use on the Skeena River, they could provide an opportunity for additional data on mark rates for future studies. Modifications to the counting methods at Babine fence may also provide additional data from that system.

5. If live capture fisheries continue to expand along the Skeena, it may be possible to derive steelhead escapement estimates from conventional mark recapture studies, where steelhead are marked with external tags and released from lower river fisheries and mark rate samples are obtained from upstream fisheries. Similar studies have provided reliable information on sockeye and chinook salmon escapements to the Nass River (Link and English 1995), and radio telemetry studies have been used to quantify some of the critical assumptions associated with conventional mark-recapture studies (Koski et al. 1994; Link and Gurak in prep.).

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TABLES

Table 1. Estimates of catch, escapement, stock size and harvest rates for Skeena River steelhead. Shaded areas indicate periods where no information has been available.

Year	Commercial Fisheries		Test Fishery	Harvest		Spawners [f]	Total	Stock	Harvest
	Alaska [a]	Area 4 [b]	escape [c]	Native [d]	Sport [e]		catch	size	rate
1963	8708	8399	17726	1542		16184	18649	34833	54%
1964	9424	15854	12418	360		12058	25638	37696	68%
1965	8448	8402	16943	630		16313	17480	33793	52%
1966	17966	19997	33902	1709		32193	39672	71865	55%
1967	12944	15423	23410	810	4207	18393	33384	51777	64%
1968	10065	13487	16708	1053	3888	11767	28493	40260	71%
1969	10017	10680	19370	810	4489	14071	25996	40067	65%
1970	11659	10237	24741	1141	4059	19541	27096	46637	58%
1971	9551	13980	14672	1384	4086	9202	29001	38203	76%
1972	9154	13103	14359	1218	4173	8968	27648	36616	76%
1973	7880	9985	13655	692	3758	9205	22315	31520	71%
1974	6837	9817	10695	1201	2821	6673	20676	27349	76%
1975	6419	8843	10413	1053	3336	6024	19651	25675	77%
1976	9647	8537	20404	1170	2281	16953	21635	38588	56%
1977	8006	10426	13592	777	1976	10839	21185	32024	66%
1978	9201	9579	18024	1001	2014	15009	21795	36804	59%
1979	7082	11068	10178	1031	2399	6748	21580	28328	76%
1980	9395	9706	18478	3900	2672	11906	25673	37579	68%
1981	11795	14607	20779	5150	1415	14214	32967	47181	70%
1982	13789	18083	23285	7850	2506	12929	42228	55157	77%
1983	6133	10350	8049	1600	2386	4063	20469	24532	83%
1984	24331	31372	41622	7787	2029	31806	65519	97325	67%
1985	18278	29300	25535	11057	2504	11974	61139	73113	84%
1986	17469	19535	32873	7872	3595	21406	48471	69877	69%
1987	6929	8288	12500	6366	1944	4190	23527	27717	85%
1988	15217	17554	28097	6283	1734	20080	40788	60868	67%
1989	5524	3180	13391	1357	502	11532	10563	22095	48%
1990	7957	5654	18218	1806	534	15878	15952	31829	50%
1991	4163	3872	8617	1024	511	7082	9570	16652	57%

Table 1. Estimates of catch, escapement, stock size and harvest rates for Skeena River steelhead. Shaded areas indicate periods where no information has been available.

	Commercial Fisheries		Test Fishery	Harvest			Total	Stock	Harvest
Year	Alaska [a]	Area 4 [b]	escape [c]	Native [d]	Sport [e]	Spawners [f]	catch	size	rate
1992	5246	4176	11561	59	164	11338	9645	20983	46%
1993	5366	2804	13294	711	41	12542	8922	21464	42%
1994	7359	2522	19556	2261	47	17248	12189	29437	41%
1995	6507	1051	18469	620		17849	8178	26027	31%
Mean	**9954**	**11511**	**18350**	**2524**	**2360**	**13824**	**25991**	**39814**	**66%**

[a] Steelhead exploitation in Alaska and Canadian approach waters was set at 25% (Ward et al. 1993).

[b] Data prior to 1991 are from Pacific Salmon Commission (1991-Table 21) and represent adjusted commercial net catch based on sales slips (prior to 1983) and hail data (after 1983). Data from 1991-1995 were provided by D.F.O. Prince Rupert.

[c] The cummulative Skeena test fishery index is multiplied by 223.7 to give these estimates (TCNB (91) , 1991b).

[d] Data were provided by the Department of Fisheries and Oceans, Prince Rupert (Jim Steward, pers. comm.).

[e] Data prior to 1990 are from Pacific Salmon Commission (1991-Table 16), excluding Lakelse and Kitsumkalum estimates, and data after 1990 were calculated from M.E.L.P. data. Data are derived from mailed questionnaire sampling of angler licensees and have been adjusted downward by 32 percent to adjust for a positive response bias (TCNB (91)-1).

[f] Represents test fishery escapement less native and sport harvests.

Table 2. Summary of fishing effort to catch steelhead during the 1995 Skeena River telemetry program. Effort is presented as the number of days spent attempting to catch and tag fish by capture method and by release area.

	Days										
			Release area								
Week	Capture method		Middle Skeena near Kitselas [a]							Babine	Total
ending	Fishwheel	Angling	Below FW	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	River	effort
15 Jul	14	0	0	7	7	0	0	0	0	0	14
22 Jul	16	0	0	7	6	3	0	0	0	0	16
29 Jul	21	0	0	7	7	7	0	0	0	0	21
05 Aug	21	0	0	7	7	7	0	0	0	0	21
12 Aug	27	0	0	7	7	6	7	0	0	0	27
19 Aug	28	0	0	7	7	7	7	0	0	0	28
26 Aug	14	0	0	4	4	6	4 [b]	0	0	0	14
02 Sep	17	14	14	3	2	5	0	7	0	0	31
09 Sep	22	0	0	7	7	0	0	7	1	0	22
16 Sep	23	0	0	7	7	0	0	7	2	0	23
23 Sep	15	0	0	5	5	0	0	5	0	0	15
30 Sep	0	0	0	0	0	0	0	0	0	0	0
07 Oct	0	0	0	0	0	0	0	0	0	0	0
14 Oct	0	0	0	0	0	0	0	0	0	0	0
21 Oct	0	0	0	0	0	0	0	0	0	0	0
28 Oct	0	6 [c]	0	0	0	0	0	0	0	6 [c]	6
Total	**218**	**20**	**14**	**68**	**66**	**41**	**14**	**26**	**3**	**6**	**238**

[a] Site 1=fishwheel 1 (15 Jul-21 Sep), lower east bank; Site 2=fishwheels 2 (15 Jul-26 Aug), 3 (1-13 Sep) and 4 (14-21 Sep), upper east bank; Site 3=fishwheel 3 (20 Jul-31 Aug), lower west bank; Site 4= fishwheel 4 (12-24 Aug), upper west bank; Site 5=fishwheel 2 (27 Aug-21 Sep), upper west bank; and Site 6=fishwheel 4 (9-11 Sep), upper west slough.

[b] Shading indicates periods when fishwheels were not operating due to damage from high water.

[c] Angling efforts were conducted by MELP personnel from Smithers for a study investigating the effects of orally vs. surgically implanting radio tags.

Table 3. Summary of radio-tag tracking effort during the 1995 Skeena River telemetry program. Effort is presented as the number of days or part days that tracking was conducted using each method.

Week ending	Days														
	Mobile tracking		Mainstem stations						Tributary stations						
	Aerial	Ground [a]	EXC_n [b]	ZYM	PRI	BUL	BAB	SUS	SKW	MTN	TOB	MOR	KIS	BEA	Total
15 Jul	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
22 Jul	0	0	7	7	3	3	0	0	0	0	2	0	0	0	22
29 Jul	1	0	7	7	7	7	2	2	2	0	7	0	0	2	44
05 Aug	0	1	7	7	7	7	7	7	7	0	7	0	0	7	64
12 Aug	1	0	7	7	7	7	7	7	7	5	7	5	0	7	74
19 Aug	1	2	7	7	7	7	7	7	7	7	7	7	0	7	80
26 Aug	1	1	7	7	7	7	7	7	7	7	7	7	2	7	81
02 Sep	0	1	7	7	7	7	7	7	7	7	7	7	7	7	85
09 Sep	1	1	7	7	7	7	7	7	7	7	7	7	7	7	86
16 Sep	0	2	7	7	7	7	7	7	7	7	7	7	7	7	86
23 Sep	1	3	7	7	7	7	7	7	7	7	7	7	7	7	88
30 Sep	0	0	7	7	7	7	7	7	7	7	7	7	7	7	84
07 Oct	0	1	7	7	7	7	7	7	7	7	7	7	7	7	85
14 Oct	1	0	7	7	7	7	7	7	7	7	7	7	7	7	85
21 Oct	0	2	7	7	7	7	7	7	7	7	7	7	7	7	86
28 Oct	4	0	7	7	7	7	7	7	7	7	7	7	7	7	88
04 Nov	0	3	7	7	7	7	7	7	7	7	7	7	7	7	87
11 Nov	1	1	7	7	7	7	7	7	7	7	7	7	7	7	86
18 Nov	1	1	7	7	7	7	7	7	7	7	7	7	7	7	86
25 Nov	2	0	7	7	7	7	7	7	0	7	7	7	7	5	77
02 Dec	0	0	7	5	3	7	7	7		3	2	2	3	7	53
Total	**15**	**19**	**141**	**139**	**132**	**136**	**128**	**128**	**114**	**113**	**130**	**112**	**96**	**126**	**1529**

[a] Ground tracks include 1 foot, 12 truck and 6 boat surveys.

[b] EXC_n=Skeena/N. Exchamsiks R., ZYM=Skeena/Zymoetz R., PRI=Skeena/Price Cr., BUL=Skeena/Bulkley R., SKW=Bulkley/Suskwa R., MTN=Bulkley/Moricetown falls, TOB=Bulkley/Toboggan Cr., MOR=Morice R., KIS=Kispiox R., BAB=Skeena/Babine R., SUS=Skeena/Sustut R., and BEA=Sustut/Bear R.

[c] Shading indicates periods when stations were not operating due to either battery failure, data overload, or damage from bears.

Table 4. Numbers of steelhead radio-tagged during the Skeena River telemetry program, 15 July - 27 October 1995. Numbers are summarized by method of capture for weekly periods.

Week	Angling			Fishwheel [a]						Total fish
ending	Skeena	Babine R.	Total	Site 1	Site 2	Site 3	Site 4	Site 5	Total	tagged
15 Jul	0	0	0	0	0	0	0	0	0	0
22 Jul	0	0	0	0	0	0	0	0	0	0
29 Jul	0	0	0	1	1	1	0	0	3	3
05 Aug	0	0	0	0	1	0	0	0	1	1
12 Aug	0	0	0	4	2	0	0	0	6	6
19 Aug	0	0	0	2	4	0	5	0	11	11
26 Aug	0	0	0	1	1	11	0	0	13	13
02 Sep	1	0	1	0	0	4	0	2	6	7
09 Sep	0	0	0	1	0	0	0	7	8	8
16 Sep	0	0	0	15	9	0	0	20	44	44
23 Sep	0	0	0	2	2	0	0	4	8	8
30 Sep	0	0	0	0	0	0	0	0	0	0
07 Oct	0	0	0	0	0	0	0	0	0	0
14 Oct	0	0	0	0	0	0	0	0	0	0
21 Oct	0	0	0	0	0	0	0	0	0	0
28 Oct	0	30	30 [b]	0	0	0	0	0	0	30
Total	**1**	**30**	**31**	**26**	**20**	**16**	**5**	**33**	**100**	**131**

[a] Site 1=fishwheel 1 (15 Jul-21 Sep), lower east bank; Site 2=fishwheels 2 (15 Jul-26 Aug), 3 (1-13 Sep) and 4 (14-21 Sep), upper east bank; Site 3=fishwheel 3 (20 Jul-31 Aug), lower west bank; Site 4=fishwheel 4 (12-24 Aug), upper west bank; Site 5=fishwheel 2 (27 Aug-21 Sep), upper west bank, and Site 6=fishwheel 4 (9-11 Sep), upper west slough.

[b] The tagging of steelhead in the Babine was conducted by MELP personnel from Smithers for a study investigating the effects of orally vs. surgically implanting radio tags.

Table 5. Numbers of steelhead that were radio-tagged and recovered during weekly periods, 15 July - 2 December 1995.

Week ending	Number tagged	Number recovered [a]		Suspected recaptures		Suspected tagging losses		Total active tags
		From week	During week	From week	During week	From week	During week	
15 Jul	0	0	0	0	0	0	0	0
22 Jul	0	0	0	0	0	0	0	0
29 Jul	3	0	0	1	0	1	0	3
05 Aug	1	0	0	0	0	1	1	3
12 Aug	6	1	0	2	1	0	1	7
19 Aug	11	0	1	1	0	5	0	17
26 Aug	13	0	0	2	1	5	2	27
02 Sep	7	1	0	0	1	1	7	26
09 Sep	8	0	1	0	2	5	2	29
16 Sep	44	0	0	6	0	7	4	69
23 Sep	8	1	0	1	3	1	5	69
30 Sep	0	0	0	0	4	0	3	62
07 Oct	0	0	0	0	0	0	0	62
14 Oct	0	0	0	0	1	0	0	61
21 Oct	0	0	0	0	0	0	0	61
28 Oct	30	0	0	0	0	0	1	90
04 Nov	0	0	0	0	0	0	0	90
11 Nov	0	0	1	0	0	0	0	89
18 Nov	0	0	0	0	0	0	0	89
25 Nov	0	0	0	0	0	0	0	89
02 Dec [b]	0	0	0	0	0	0	0	89
Total	**131**	**3**	**3**	**13**	**13**	**26**	**26**	**89**

[a] Excludes steelhead that were caught and released (see Table A-4).

[b] The number of active radio tags did not change from 12 November - 2 December.

Table 6. Numbers of steelhead anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995. Numbers are summarized by method of capture and release area for weekly periods.

Week ending	Capture method		Release area							Total fish tagged
			Middle Skeena[a]						Bulkley River	
	Fishwheel	Dipnet	Site 1	Site 2	Site 3	Site 4	Site 5	Total		
15 Jul	0	0	0	0	0	0	0	0	0	0
22 Jul	0	0	0	0	0	0	0	0	0	0
29 Jul	2	1	1	1	0	0	0	2	1	5
05 Aug	0	6	0	0	0	0	0	0	6	6
12 Aug	2	3	2	0	0	0	0	2	3	7
19 Aug	0	11	0	0	0	0	0	0	11	11
26 Aug	0	68	0	0	0	0	0	0	68	68
02 Sep	1	30	0	0	1	0	0	1	30	32
09 Sep	2	1	0	0	0	0	2	2	1	5
16 Sep	7	18	2	1	0	0	4	7	18	32
23 Sep	1	0	0	1	0	0	0	1	0	2
Total	**15**	**138**	**5**	**3**	**1**	**0**	**6**	**15**	**138**	**153**

[a] Site 1=fishwheel 1 (15 Jul-21 Sep), lower east bank; Site 2=fishwheels 2 (15 Jul-26 Aug), 3 (1-13 Sep) and 4 (14-21 Sep), upper east bank; Site 3=fishwheel 3 (20 Jul-31 Aug), lower west bank; Site 4= fishwheel 4 (12-24 Aug), upper west bank; and Site 5=fishwheel 2 (27 Aug-21 Sep), upper west bank, Site 6=fishwheel 4 (9-11 Sep), upper west slough.

Table 7. Numbers of steelhead that were anchor-tagged and recovered during weekly periods, 15 July - 2 December 1995.

Week ending	Number tagged	Number recovered [a]		Total "active" tags
		From period	During period	
15 Jul	0	0	0	0
22 Jul	0	0	0	0
29 Jul	3	0	0	3
05 Aug	6	0	0	9
12 Aug	5	1	0	14
19 Aug	11	0	0	25
26 Aug	68	1	0	93
02 Sep	31	1	1	123
09 Sep	3	0	0	126
16 Sep	25	1	2	149
23 Sep	1	0	0	150
30 Sep	0	0	1	149
07 Oct	0	0	0	149
14 Oct	0	0	0	149
21 Oct	0	0	0	149
28 Oct	0	0	0	149
04 Nov	0	0	0	149
11 Nov	0	0	0	149
18 Nov	0	0	0	149
25 Nov	0	0	0	149
02 Dec	0	0	0	149
Total	**153**	**4**	**4**	**149**

[a] The number recovered excludes steelhead that were caught and released. All recovered steelhead were initially tagged at Moricetown.

Table 8. Summary of numbers of steelhead tracked using different methods during the 1995 Skeena River telemetry program. For each day, a fish that was detected is included only once for each tracking method at each site.

Week	Mobile tracking		Mainstem stations [c]						Tributary stations [c]						
ending	Aerial [a]	Ground [b]	EXC_n	ZYM	PRI	BUL	BAB	SUS	SKW	MTN	TOB	MOR	KIS	BEA	Total
15 Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22 Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 Jul	3	0	0	3	0	0	0	0	0	0	0	0	0	0	6
05 Aug	0	0	1	2	1	1	0	0	0	0	0	0	0	0	5
12 Aug	8	0	0	8	1	0	1	0	0	0	0	0	0	0	18
19 Aug	2	0	0	6	2	1	0	0	0	0	0	0	0	0	11
26 Aug	20	2	3	23	1	1	0	1	0	0	0	0	0	1	52
02 Sep	1	8	6	23	8	3	1	0	0	0	0	0	0	0	50
09 Sep	25	0	3	6	7	11	3	1	3	3	1	0	0	1	64
16 Sep	0	13	7	27	6	2	1	1	0	8	1	1	0	0	67
23 Sep	58	55	7	12	29	10	2	0	0	7	0	0	0	0	180
30 Sep	0	0	3	4	27	17	8	0	5	14	0	0	0	0	78
07 Oct	0	5	2	2	9	9	5	2	11	8	3	0	4	0	60
14 Oct	35	0	1	5	4	2	3	0	6	5	0	0	6	0	67
21 Oct	0	21	0	1	1	3	0	0	6	3	0	0	1	3	39
28 Oct	96	0	1	1	2	2	0	0	0	0	0	0	1	0	103
04 Nov	0	26	0	0	1	0	0	0	1	5	0	0	0	0	33
11 Nov	70	5	0	0	1	0	0	2	8	2	0	0	0	0	88
18 Nov	23	11	0	0	0	0	0	0	8	0	0	0	6	0	48
25 Nov	56	0	0	0	0	2	0	0	0	0	0	0	4	0	62
02 Dec	0	0	0	0	2	2	0	0	0	0	0	0	2	0	6
Total	**397**	**146**	**34**	**123**	**102**	**66**	**24**	**7**	**48**	**55**	**5**	**1**	**24**	**5**	**1037**

[a] Aerial tracks include 15 helicopter flights.

[b] Ground tracks include 1 foot, 12 truck and 6 boat surveys.

[c] EXC_n=Skeena/N. Exchamsiks R., ZYM=Skeena/Zymoetz R., PRI=Skeena/Price Cr., BUL=Skeena/Bulkley R., SKW=Bulkley/Suskwa R., MTN=Bulkley/Moricetown falls, TOB=Bulkley/Toboggan Cr., MOR=Morice R., KIS=Kispiox R., BAB=Skeena/Babine R., SUS=Skeena/Sustut R., and BEA=Sustut/Bear R.

Table 9. Last known locations or fates of steelhead that were captured near Kitselas and radio-tagged during the 1995 Skeena River telemetry program.

Stratum Reach/tributary	Number of fish tracked		Percent of fish tracked to Skeena	
Upper Skeena				
Mainstem: above Sustut	1		1	
Mainstem: Babine-Sustut	6		6	
Mainstem: Hazelton-Babine	1 [a]		1	
Sustut	3		3	
Babine	12		12	
Kispiox	6		6	
Upper Skeena total	**29**		**28.7**	
Middle Skeena				
Mainstem: Terrace-Hazelton	20 [b]		20	
Bulkley System	15 [c]		15	
Bulkley		14		14
Morice/Gosnell		1		1
Zymoetz	0		0	
Middle Skeena total	**35**		**34.7**	
Lower Skeena				
Mainstem: Exchamsiks-Terrace	15 [d]		15	
Mainstem: below Exchamsiks	22 [e]		22	
Lower Skeena total	**37**		**36.6**	
Total tracked to a destination	**101**		**100**	
Fish never tracked	**0**			
Total number radio-tagged	**101**			

Table 9 continued . . . .

Table 9. continued . . . .

Stratum Reach/tributary	Number of fish tracked	Percent of fish tracked to Skeena
Radio tags attributed to in-river fisheries [f]		
Native fisheries	3	
Sport fishery	0	
Regurgitations/mortalities	8	
At sport fishing site		1
At native fishing site		7
Tags disappeared	3	
Near sport fishery location		0
Near food fishery location		3
Left Skeena (alive)	2	
After susp. recap. at sport fishery location		1
After susp. recap. at native fishery location		1
Total in-river fisheries	**16**	
Tagging losses		
Regurgitation at tagging site		1
Possible mortality [g]		16
Left Skeena (alive)		9
Total tagging losses	**26**	

[a] Includes one tag regurgitated along the mainstem at a native fishery location at the mouth of Kispiox River.

[b] Includes one tag recovered at Price Cr., one tag recovered at Kitseguecla and 10 suspected recoveries in the Middle Skeena (see Table A-4).

[c] Includes one tag recovered at Moricetown (Idiot Rock).

[d] Includes one tag regurgitated at a sport fishery location.

[e] Includes three radio-tagged steelhead that were suspected to have regurgitated their tag, died or left the Skeena as a result of capture by sport (one) or native (two) fisheries.

[f] The in-river fisheries classification includes regurgitated and harvested radio-tagged steelhead that are included among those tracked to a destination (see Table A-4).

[g] Radio-tagged steelhead last detected near Tyee may or may not be dead.

Table 10. Mean travel time (d) and speed of travel (km/d) between fixed-station receivers on the Skeena River for steelhead radio-tagged near Kitselas, 1995.

	Steelhead stock groupings								
Site-site	Bulk	Mori	Kisp	Babi	Sust	LowR	MidR	Upp1	Upp2
Mean travel time (d)									
EXC - ZYM				-2.1		-6.8			-1.8
ZYM - TAG	-20.6	-14.8	-9.1	-4.0	-6.6	-9.9	-7.2		-5.1
TAG - PRI	14.8	22.3	14.3	13.1	8.3	6.5	15.5	6.4	10.4
PRI - BUL	7.3	1.4	3.5	2.6	2.0	2.1	4.8	3.0	2.3
BUL - SKW	4.3	2.5				1.9			
SKW - MTN	4.0	1.5							
MTN - TOB	0.8	0.3							
TOB - MOR		9.5							
BUL - KIS			11.8	8.9					
BUL - BAB				5.7	4.9				5.9
BAB - SUS					7.8				8.9
SUS - BEA					2.3				10.2
Mean speed of travel (km/d)									
EXC - ZYM				-34.0		-10.5			-39.7
ZYM - TAG	-0.5	-0.7	-1.1	-2.6	-1.6	-1.1	-1.5		-2.0
TAG - PRI	5.1	3.4	5.2	5.7	9.0	11.5	4.8	11.7	7.2
PRI - BUL	6.2	32.6	13.0	17.5	22.8	21.7	9.5	15.2	19.8
BUL - SKW	5.1	8.8				11.5			
SKW - MTN	8.2	21.8							
MTN - TOB	14.5	38.7							
TOB - MOR		10.8							
BUL - KIS			2.1	2.8					
BUL - BAB				11.5	13.3				11.1
BAB - SUS					18.3				16.1
SUS - BEA					14.0				3.2
Sample size									
EXC - ZYM				1		24			1
ZYM - TAG	3	1	3	2	2	37	9		3
TAG - PRI	14	1	6	12	3	4	13	1	7
PRI - BUL	14	1	6	12	3	3	3	1	7
BUL - SKW	11	1				1			
SKW - MTN	6	1							
MTN - TOB	3	1							
TOB - MOR		1							
BUL - KIS			6	1					
BUL - BAB				12	3				7
BAB - SUS					3				2
SUS - BEA					2				1

Table 11. Summary of counts of live and dead steelhead examined for radio tags on the Skeena River and its tributaries, 1995.

System / Tributary	Survey date	Survey method [a]	Counts of steelhead by: Trap	Fishway	Fishery	Total counts	Radio tags	Mark rate	Comments
Skeena R. Mainstem									
Doreen-Kispiox	22 Jul - 16 Sep	2	0	0	915	915	2	458	provided by the Hazelton Band
Bulkley R.									
Moricetown	15 Jul - 20 Oct	9	0	988	0	988	1		provided by the OWHC
Toboggan Cr.	1 Aug - 1 Nov	9	0	1	0	1	0		from the Toboggan Cr. hatchery
Total			0	989	0	989	1	989	
Babine R.									
Babine fence	15 Jul - 3 Nov	9	0	2	0	2	0		provided by DFO
Babine angling	25 Oct - 27 Oct	10	0	0	30	30	0		provided by MELP
Total			0	2	30	32	0		
Sustut R.									
Sustut fence [b]	15 Jul - 29 Sep	9	465	0	0	465	1		provided by DFO and MELP
Sustut angling	15 Sep - 19 Oct	10	0	0	28	28	1		provided by Skeena Lodge (F & W Boyd)
Total			465	0	28	493	2	247	
All Systems			**465**	**991**	**973**	**2429**	**5**	**486**	

[a] Methods: 1=fishwheel, 2=gillnet, 3=foot/snorkel, 4=boat/snorkel, 5=boat only, 6=foot only, 7=raft/foot, 8=aerial, 9=counting fence, 10=angling.

[b] The first steelhead that passed through the Sustut fence was on 8 August.

NA Not applicable.

Table 12. Preliminary estimates of the 1995 steelhead escapement to the Skeena River and its tributaries (bold numbers are our best estimates).

Stratum Reach/Tributary	Radio tags (M)	Percent of total tags	Fish exam. (C)	Tags recov. (R)	Adjusted tag rate C+1)/(R+1)	Petersen estimate (N)	Range of return estimates [a] Upper Skeena 175.3	Middle Skeena 476.3	Lower Skeena 1.0	All 405.0	Best Estimate
Upper Skeena											
Above Sustut	1	1%					181	493	1	**419**	419
Babine to Sustut	6	8%					1088	2956	6	**2514**	2514
Hazelton to Babine	1	1%					181	493	1	**419**	419
Sustut	3	4%	493	2	164.7	659	544	1478	3	**1257**	1257
Babine	12	16%	32	0			2176	5913	12	**5028**	5028
Kispiox	6	8%					1088	2956	6	**2514**	2514
Upper Skeena Total	29	39%	525	2	175.3	5259	5259	14289	30	**12150**	**12150**
Middle Skeena											
Terrace-Hazelton	17	23%	915	2	305.3	5495	3073	8350	18	**7100**	7100
Bulkley System	15	20%	988	1	494.5	7912	2712	7368	15	**6265**	6265
Bulkley	14		1				2531	6877	14	**5847**	5847
Morice/Gosnell	1						181	491	1	**418**	418
Zymoetz	0	0%					0	0	0	**0**	0
Middle Skeena Total	32	43%	1904	3	476.3	15718	5785	15718	33	**13365**	**13365**
Lower Skeena											
Exchamsiks-Terrace	11	15%					2066	5614	**12**	4773	12
Below Exchamsiks	3	4%					563	1531	**3**	1302	3
Kitsumkalum	0	0%					0	0	**0**	0	0
Lakelse	0	0%					0	0	**0**	0	0
Gitnadoix	0	0%					0	0	**0**	0	0
Exchamsiks	0	0%					0	0	**0**	0	0
Lower Skeena Total	14	19%	0	0	1.0	15	2630	7145	**15**	6075	**15**
Total for all systems	**75** [b]	**100%**	**2429**	**5**	405.0	30780	13673	37151	78	31590	**25530**

[a] Tributary specific values for the upper and lower Skeena strata were derived by prorating that stratum's return by the portion of that stratum's radio-tagged fish tracked to that tributary.

[b] Excludes radio tags attributed to tagging-related losses (i.e., regurgitation, mortalities and fish that migrated downstream to saltwater as a result of capture and tagging (see Table A-4)).

Table 13. The effects of release strategies on fates of steelhead radio-tagged near Kitselas, 1995.

Release strategy	Number of fish that moved		Total tagged	Statistical comparison
	Up-river	Down-river		
Fishwheel-capture [a]				
Released off fishwheels [a]	50	21	71	$\chi^2=5.00$
Transported to calm area	13	15	28	P=0.025
				n=99
Angle-capture (Middle Skeena)				
Released at capture site	1	0	1	
Total [a]	**64**	**36**	**100**	

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 14. The effects of fish density in the holding pens on fates of steelhead that were radio-tagged near Kitselas, 1995.

Density in pens	Number of fish that moved: Up-river	Number of fish that moved: Down-river	Total tagged	Statistical comparison
Fishwheel-capture: All [a]				
1 - 75 fish	20	10	30	χ^2=2.35
76 - 150 fish	26	11	37	P=0.31
150 + fish [a]	17	15	32	n=99
Angle-capture (Middle Skeena)				
Released without being held	1	0	1	
Total [a]	**64**	**36**	**100**	
Fishwheel-capture: Released off fishwheels [a]				
1 - 75 fish	17	7	24	χ^2=1.16
76 - 150 fish	22	7	29	P=0.56
150 + fish [a]	11	7	18	n=71
Fishwheel-capture: Transport to calm area				
1 - 75 fish	3	3	6	χ^2=0.144
76 - 150 fish	4	4	8	P=0.93
150 + fish	6	8	14	n=28

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 15. The effects of condition when released on fates of steelhead that were radio-tagged near Kitselas, 1995.

Condition of fish	Number of fish that moved		Total tagged	Statistical comparison
	Up-river	Down-river		
Fishwheel-capture: All [a]				
Excellent health [a]	17	12	29	χ^2=0.456
Good health	35	18	53	P=0.80
Fair and poor health	11	6	17	n=99
Angle-capture (Middle Skeena)				
Excellent health	1	0	1	
Total [a]	**64**	**36**	**100**	
Fishwheel-capture: Released off fishwheels				
Excellent health [a]	11	5	16	χ^2=0.05
Good health	31	13	44	P=0.98
Fair and poor health	8	3	11	n=71
Fishwheel-capture: Transport to calm area				
Excellent health	6	7	13	χ^2=0.05
Good health	4	5	9	P=0.98
Fair and poor health	3	3	6	n=28

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 16. The effects of water temperature in the pens on fates of steelhead that were captured in fishwheels and radio-tagged near Kitselas, 1995.

Temperature in pens	Number of fish that moved: Up-river	Number of fish that moved: Down-river	Total tagged	Statistical comparisons
Fishwheel-capture: All [a]				
Temperature 12.5-13.5°C	19	16	35	χ^2=2.28
Temperature 14.0-14.5°C	24	12	36	P=0.32
Temperature 15.0-15.5°C	14	5	19	n=90
Temperature unknown [a]	6	3	9	
Angle-capture (Middle Skeena)				
Temperature unknown	1	0	1	
Total [a]	**64**	**36**	**100**	
Fishwheel-capture: Released off fishwheels				
Temperature 12.5-13.5°C	10	7	17	χ^2=1.09
Temperature 14.0-14.5°C	20	8	28	P=0.58
Temperature 15.0-15.5°C	14	5	19	n=64
Temperature unknown [a]	6	1	7	
Fishwheel-capture: Transport to calm area				
Temperature 12.5-13.5°C	9	9	18	χ^2=0.00
Temperature 14.0-14.5°C	4	4	8	P=1.00
Temperature 15.0-15.5°C	0	0	0	n=28
Temperature unknown	0	2	2	

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 17. The effects of time held in holding pens on fates of steelhead that were radio-tagged near Kitselas, 1995.

Time held in pens (min)	Number of fish that moved		Total tagged	Statistical comparison
	Up-river	Down-river		
Fishwheel-capture: All [a]				
0 - 600	24	6	30	χ^2=8.27
601 - 1080 [a]	34	21	55	**P=0.016**
1081 and over	5	9	14	n=99
Angle-capture (Middle Skeena)				
10	1	0	1	
Total [a]	**64**	**36**	**100**	
Fishwheel-capture: Released off fishwheels				
0 - 600	20	3	23	χ^2=7.35
601 - 1080 [a]	27	13	40	**P=0.025**
1081 and over	3	5	8	n=71
Fishwheel-capture: Transport to calm area				
0 - 600	4	3	7	χ^2=0.74
601 - 1080	7	8	15	P=0.69
1081 and over	2	4	6	n=28

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 18. The effects of different taggers on fates of steelhead that were radio-tagged near Kitselas, 1995.

Tagger	Number of fish that moved: Up-river	Number of fish that moved: Down-river	Total tagged	Statistical comparison
Fishwheel-capture [a]				
Tagger 1	43	25	68	χ^2=1.00
Tagger 2 [a]	16	7	23	P=0.61
Others	4	4	8	n=99
Angle-capture (Middle Skeena)				
Others	1	0	1	
Total [a]	**64**	**36**	**100**	
Fishwheel-capture: Released off fishwheels				
Tagger 1	30	10	40	χ^2=2.01
Tagger 2	16	7	23	P=0.37
Others	4	4	8	n=71
Fishwheel-capture: Transport to calm area				
Tagger 1	13	15	28	
Tagger 2	-	-	0	
Others	-	-	0	

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 19. The effects of period during the season on fates of steelhead that were radio-tagged near Kitselas, 1995.

Period	Number of fish that moved: Up-river	Number of fish that moved: Down-river	Total tagged	Statistical comparisons
Fishwheel-capture: All [a]				
23 July - 19 August	13	8	21	χ^2=4.58
20 August - 9 September	13	14	27	P=0.10
10 September - 24 September [a]	37	14	51	n=99
Angle-capture (Middle Skeena)				
20 August - 9 September	1	0	1	
Total [a]	**64**	**36**	**100**	
Fishwheel-capture: Released off fishwheels [a]				
23 July - 19 August	9	2	11	χ^2=3.71
20 August - 9 September	4	5	9	P=0.16
10 September - 24 September [a]	37	14	51	n=71
Fishwheel-capture: Transport to calm area				
23 July - 19 August	4	6	10	χ^2=0.258
20 August - 9 September	9	9	18	P=0.61
10 September - 24 September	0	0	0	n=28

[a] One steelhead that regurgitated its tag at the tagging site is excluded from the analyses.

Table 20. Effects of different variables on the fate of steelhead that were captured in the Kitselas fishwheels and radio-tagged in 1995. The only variable that was normally distributed was fish length (see Fig. 3). Other variables were not suitable to normalization using transformation, and therefore, were examined using a goodness-of-fit test. See Tables 13-19 for details of categorical tests.

	Moved upstream			Moved downstream			Statistical test	
Variable	Mean	s.d.	n	Mean	s.d.	n	Statistic	Probability
Release method	NA	NA	63	NA	NA	36	$\chi^2 = 5.00$	**P = 0.025**
Length of fish								
Released from fishwheel	74.0	7.88	50	75.0	8.30	21	t = 0.47	$P_{2\text{-tailed}} = 0.64$
Transported	75.6	11.79	13	75.3	8.93	15	t = -0.07	$P_{2\text{-tailed}} = 0.94$
All steelhead	74.3	8.74	63	75.1	8.44	36	t = 0.45	$P_{2\text{-tailed}} = 0.65$
Density of fish in holding pen								
Released from fishwheel	114	75	50	129	113	21	$\chi^2 = 1.16$	P = 0.56
Transported	146	80	13	168	95	15	$\chi^2 = 0.14$	P = 0.93
All steelhead	122	76	63	143	107	36	$\chi^2 = 2.35$	P = 0.31
Condition of fish [a]								
Released from fishwheel	1.96	0.67	50	1.90	0.62	21	$\chi^2 = 0.05$	P = 0.98
Transported	1.77	0.83	13	1.73	0.79	15	$\chi^2 = 0.05$	P = 0.98
All Steelhead	1.92	0.70	63	1.83	0.70	36	$\chi^2 = 0.46$	P = 0.80
Water temperature								
Released from fishwheel	14.3	0.66	44	14.1	0.65	20	$\chi^2 = 1.09$	P = 0.58
Transported	13.3	0.52	13	13.3	0.47	13	$\chi^2 = 0.00$	P = 1.00
All Steelhead	14.1	0.75	57	13.8	0.69	33	$\chi^2 = 2.28$	P = 0.32

Table 20. Concluded.

Variable	Moved upstream			Moved downstream			Statistical test	
	Mean	s.d.	n	Mean	s.d.	n	Statistic	Probability
Maximum time held [b]								
Released from fishwheel	750	288	50	922	243	21	$\chi^2 = 7.35$	**P = 0.025**
Transported	901	366	13	944	373	15	$\chi^2 = 0.74$	P = 0.69
All Steelhead	781	309	63	931	299	36	$\chi^2 = 8.27$	**P = 0.016**
Tagger								
Released from fishwheel	NA	NA	50	NA	NA	21	$\chi^2 = 2.01$	P = 0.37
Transported	NA	NA	13	NA	NA	15	NA	NA
All Steelhead	NA	NA	63	NA	NA	36	$\chi^2 = 1.00$	P = 0.61
Date interval								
Released from fishwheel	NA	NA	50	NA	NA	21	$\chi^2 = 3.71$	P = 0.16
Transported	NA	NA	13	NA	NA	15	$\chi^2 = 0.26$	P = 0.61
All steelhead	NA	NA	63	NA	NA	36	$\chi^2 = 4.58$	P = 0.10

[a] 1 = excellent, 2 = good, 3 = fair and 4 = poor

[b] This represents the maximum time that a fish could have been held. The actual time of capture, and hence of holding could have been from a few minutes (if it was caught immediately after the previous sampling period) to the stated value (if it was caught just before it was tagged).

FIGURES

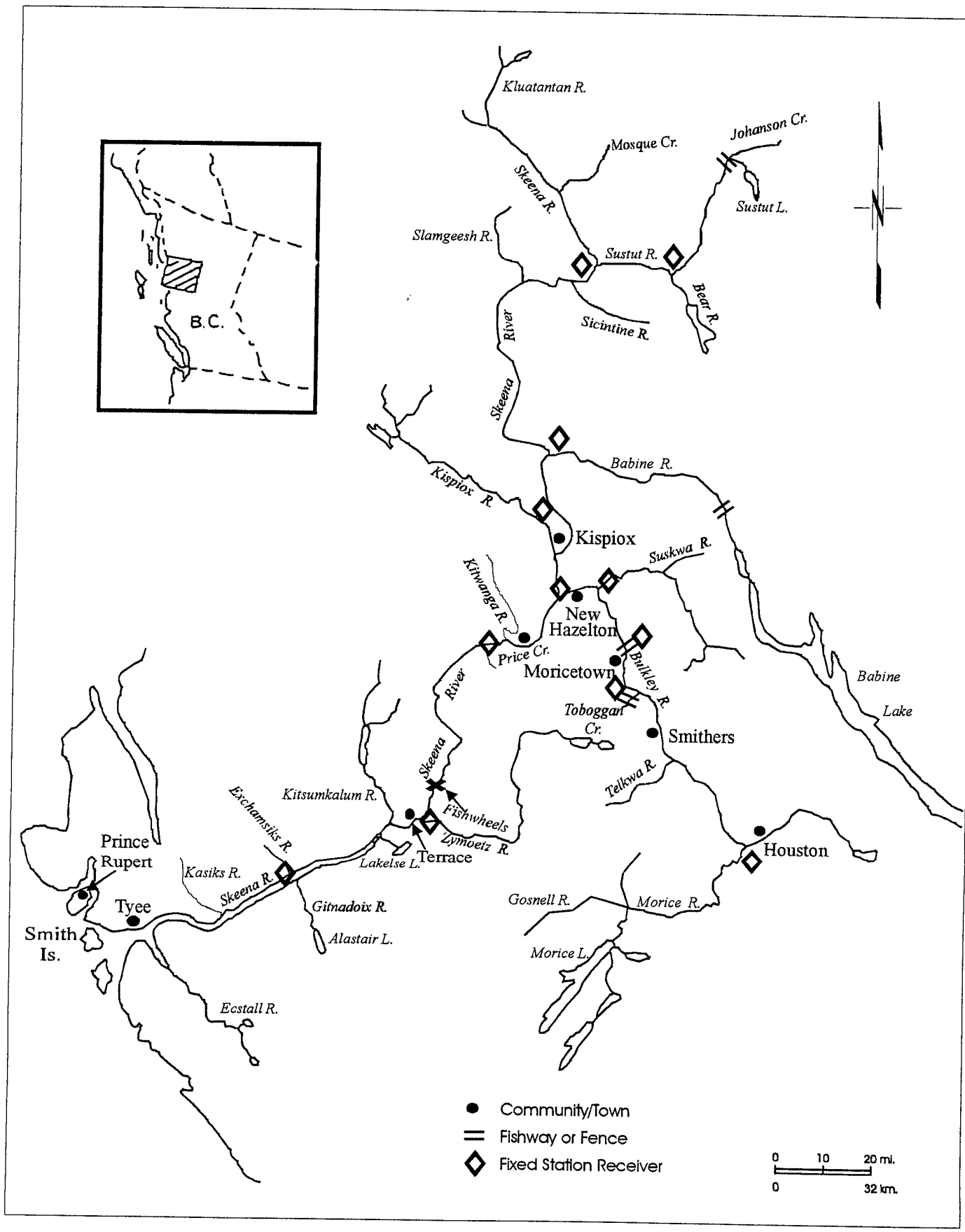

Figure 1. Map of the Skeena River with locations of fixed-station receivers, counting fences, fishwheels, and in-river fishery monitoring locations used during the 1995 Skeena River radio-telemetry program.

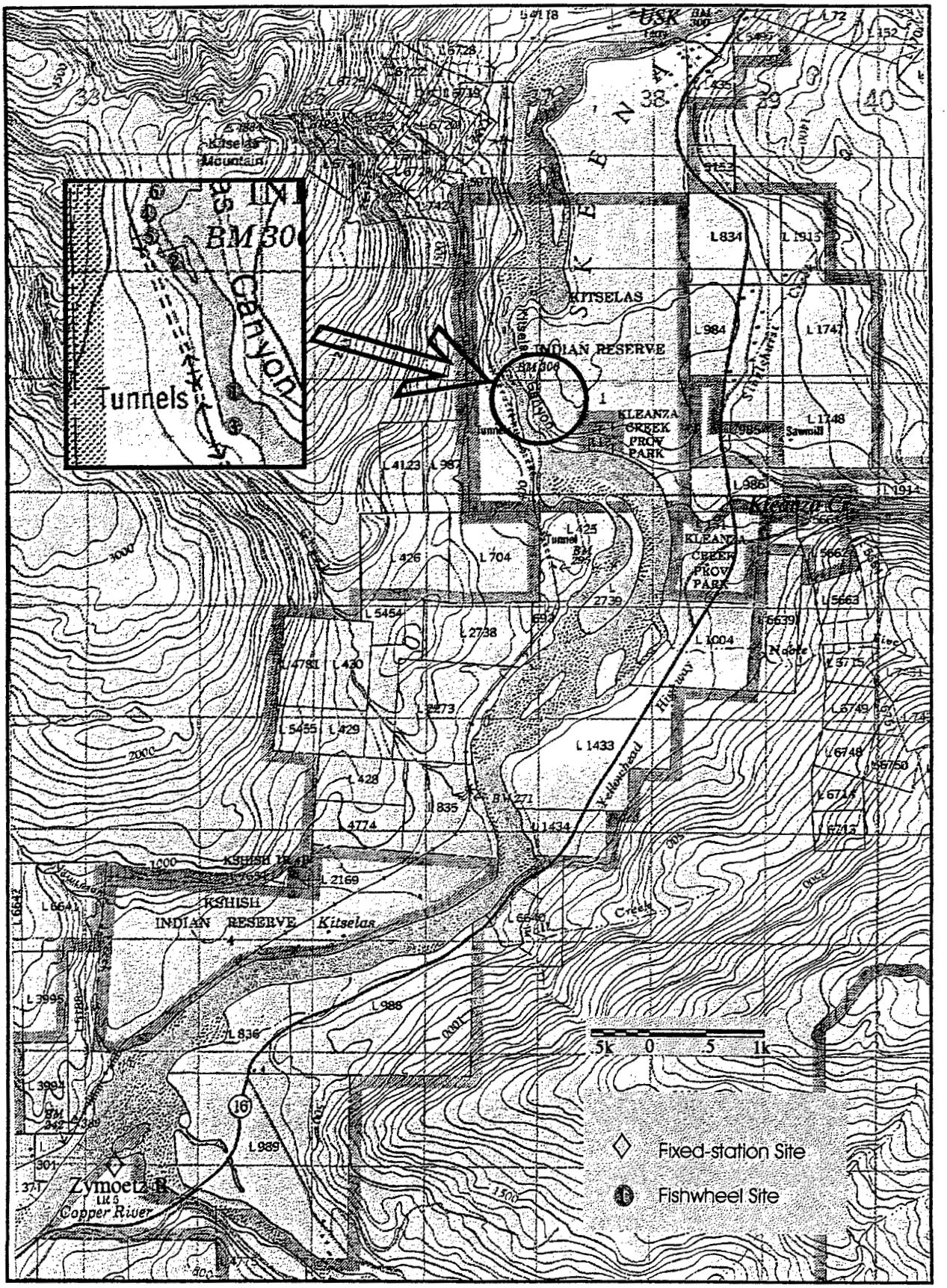

Figure 2. Map of the Middle Skeena River from Zymoetz River to Usk showing the locations of the fishwheels in Kitselas Canyon.

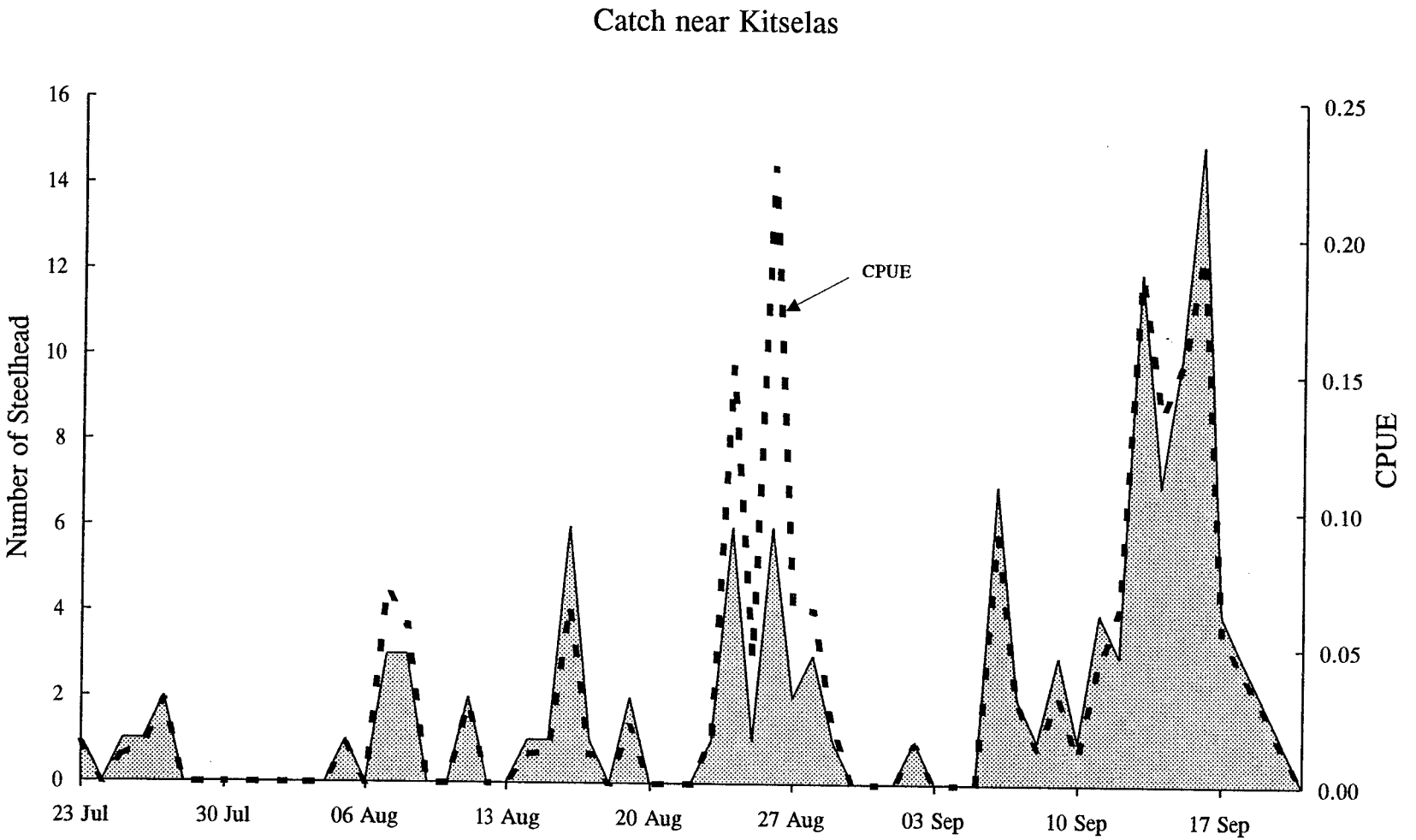

Figure 3. Daily catches of steelhead near Kitselas in comparision to CPUE at fishwheels during 1995.

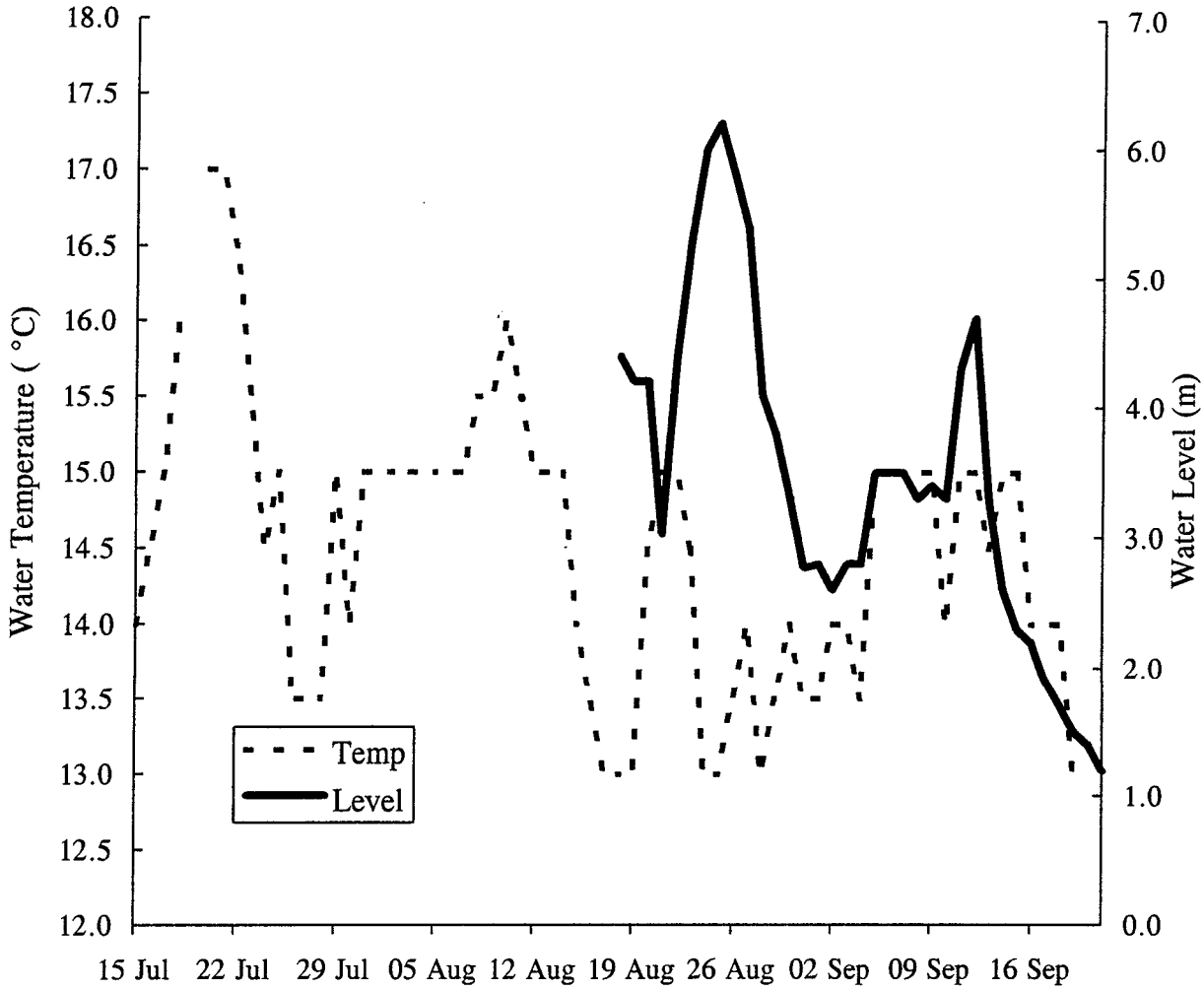

Figure 4. Water temperatures and water levels recorded at the Kitselas fishwheels, 15 July - 21 September 1995.

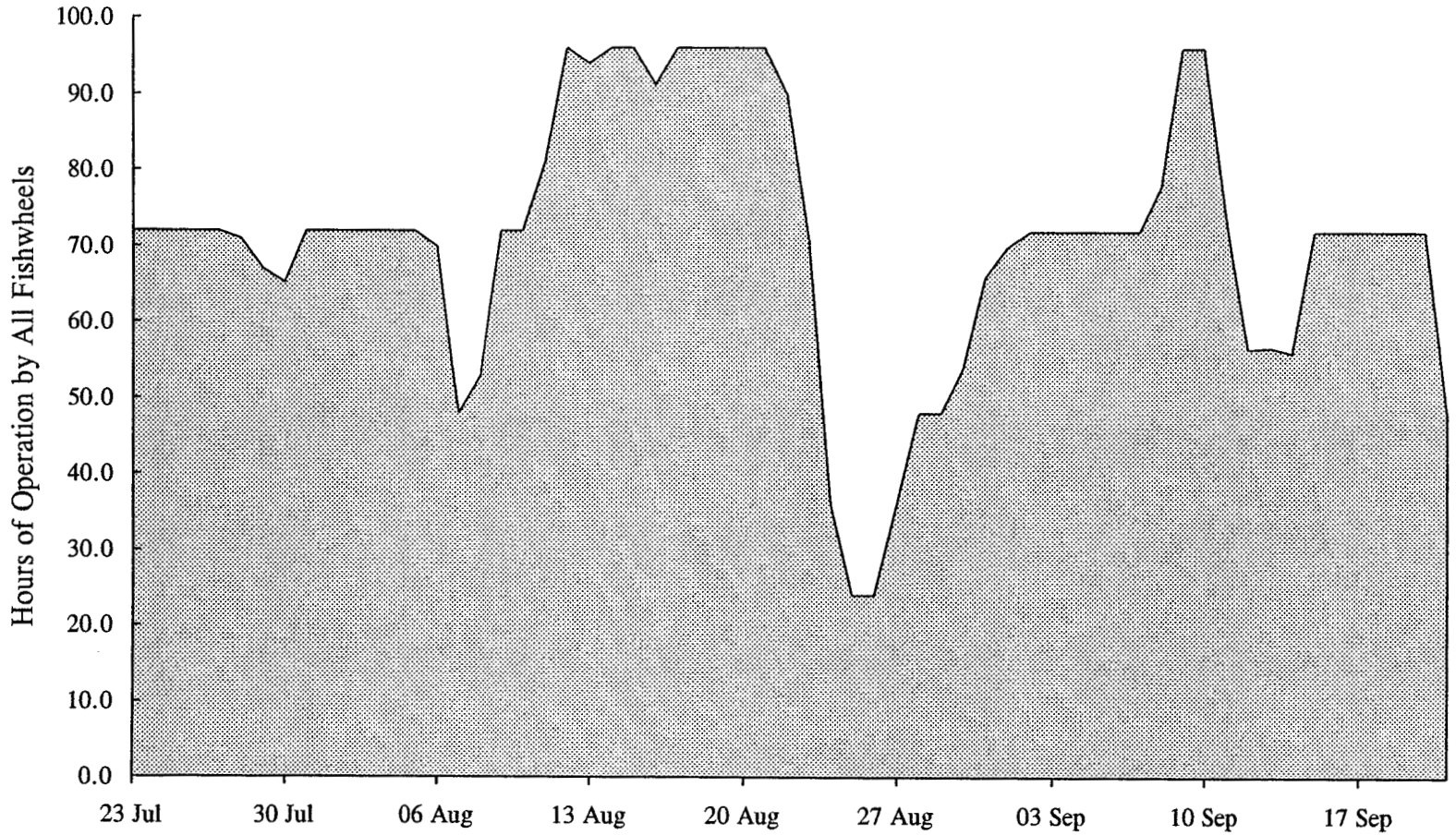

Figure 5. Fishwheel effort to catch steelhead near Kitselas during 1995. Effort is the combined number of hours that all fishwheels operated on each day.

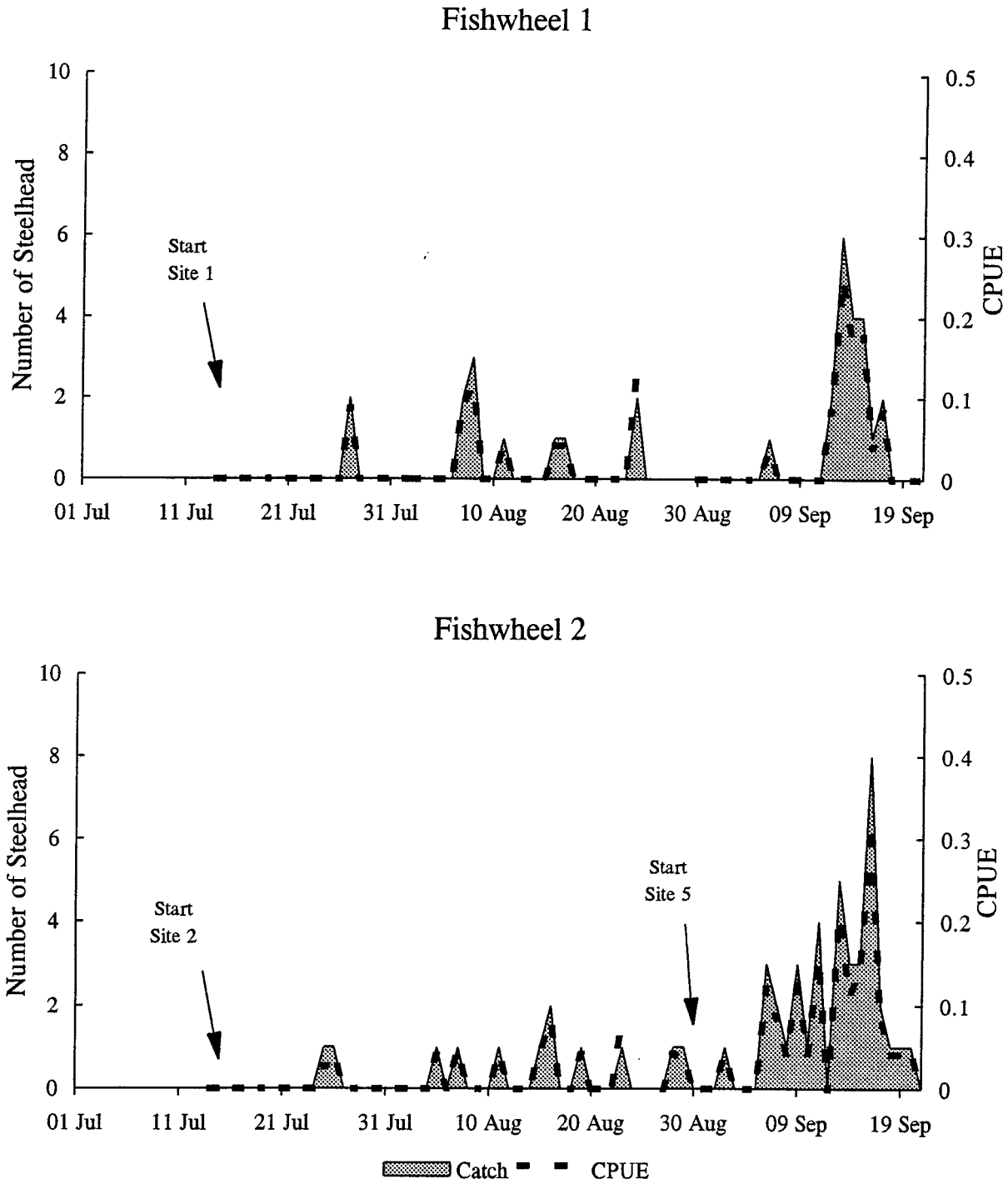

Figure 6. Fishwheel catches and CPUE (number/h) of steelhead captured in fishwheels 1 and 2 on the Skeena River near Kitselas, 1995.

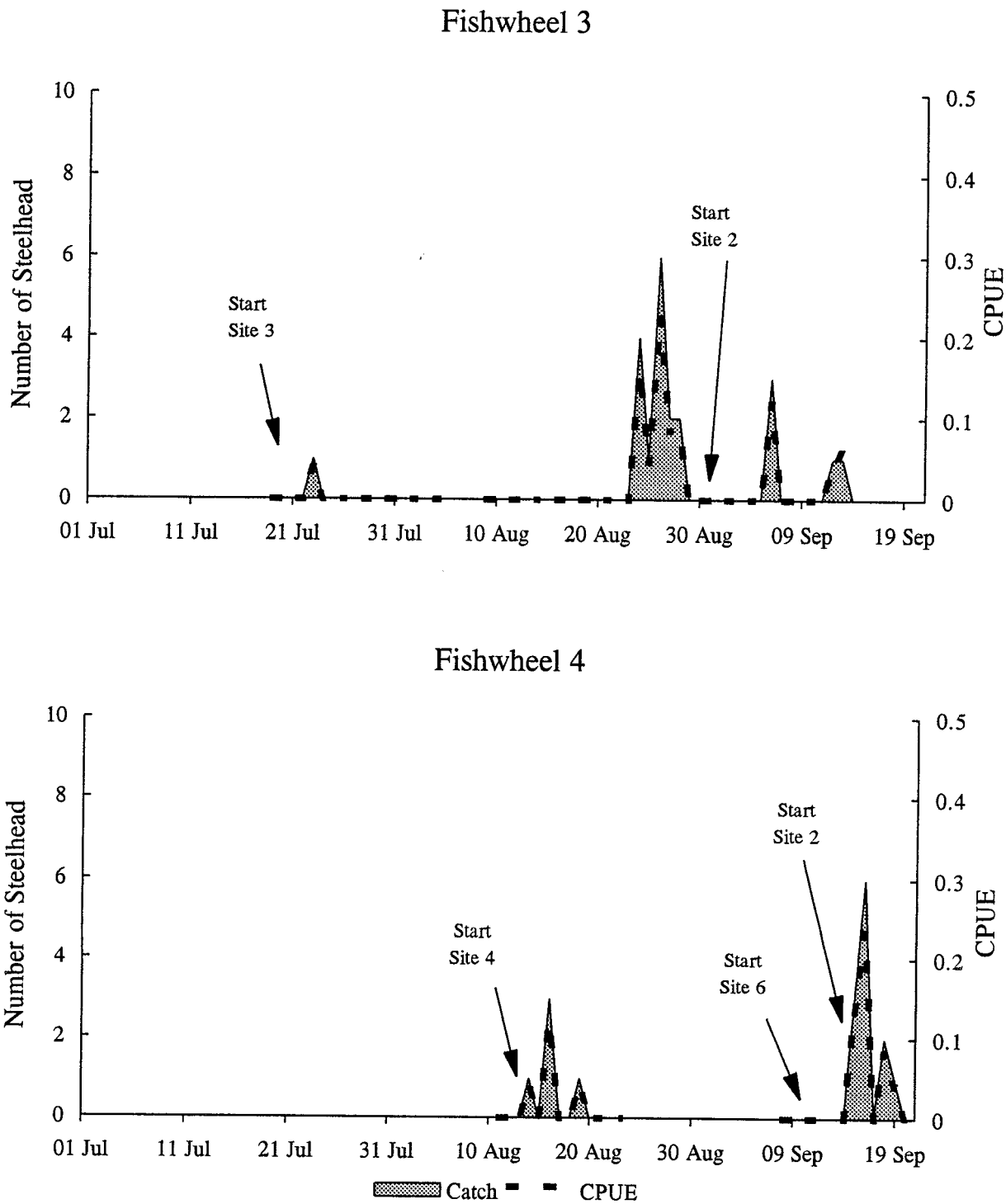

Figure 7. Fishwheel catches and CPUE (number/h) of steelhead captured in fishwheels 3 and 4 on the Skeena River near Kitselas, 1995.

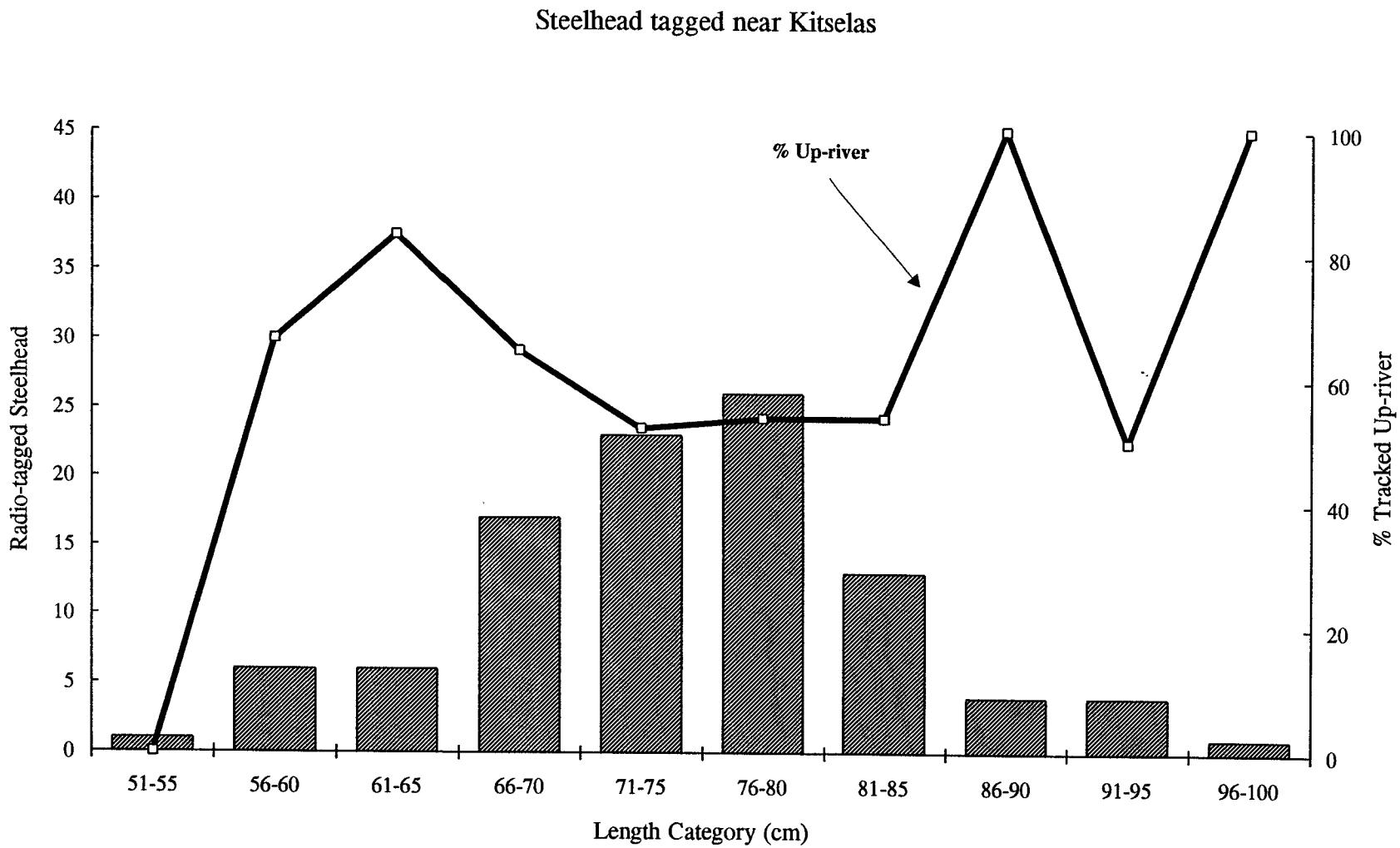

Figure 8. Length-frequency distribution of steelhead radio-tagged near Kitselas in 1995 in comparison to the proportions that were tracked up-river of the tagging site.

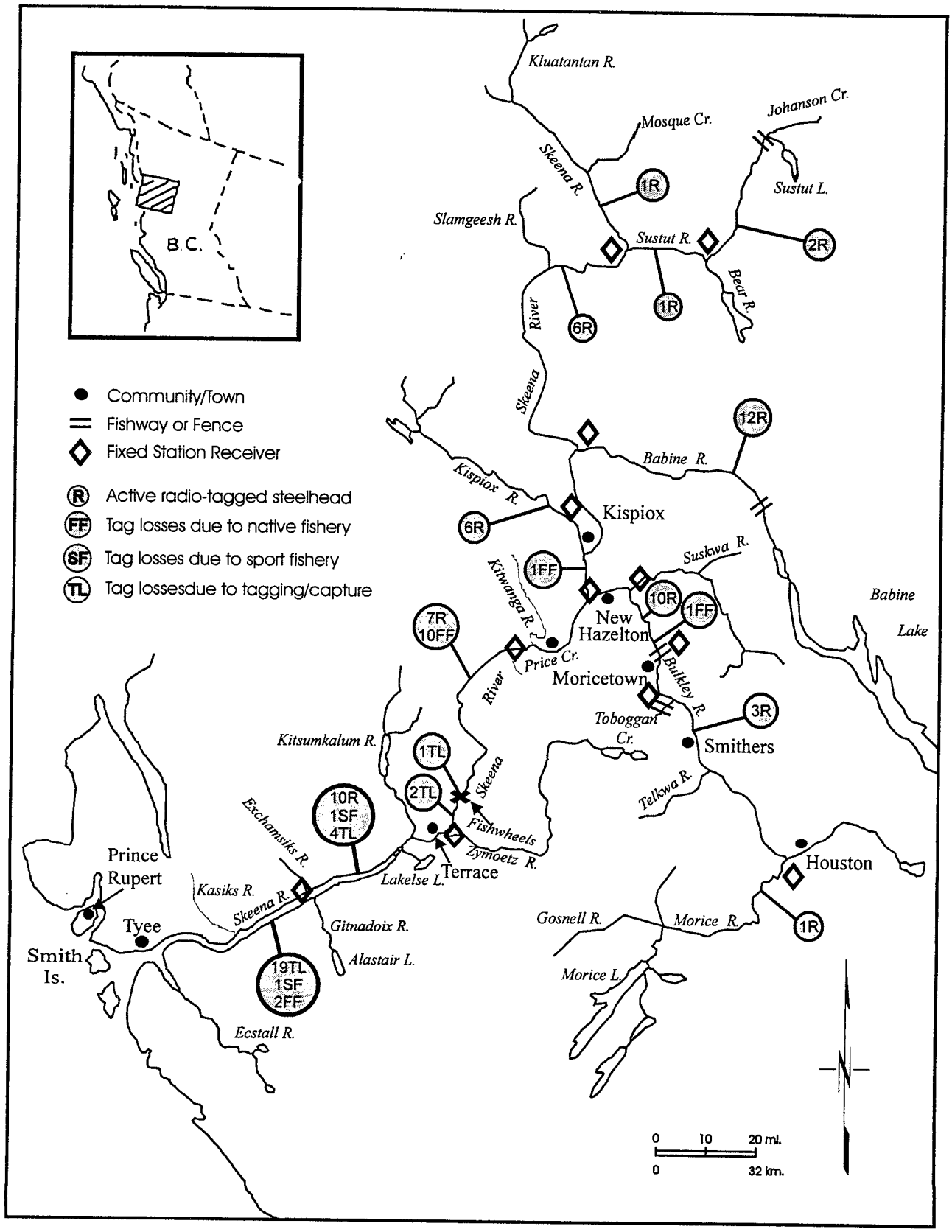

Figure 9. Map of the Skeena River with last known locations of radio-tagged steelhead that were tagged near Kitselas during the 1995 Skeena River telemetry program. A total of 59 radio-tagged fish ("R") are considered to be available for spawning in the spring of 1996.

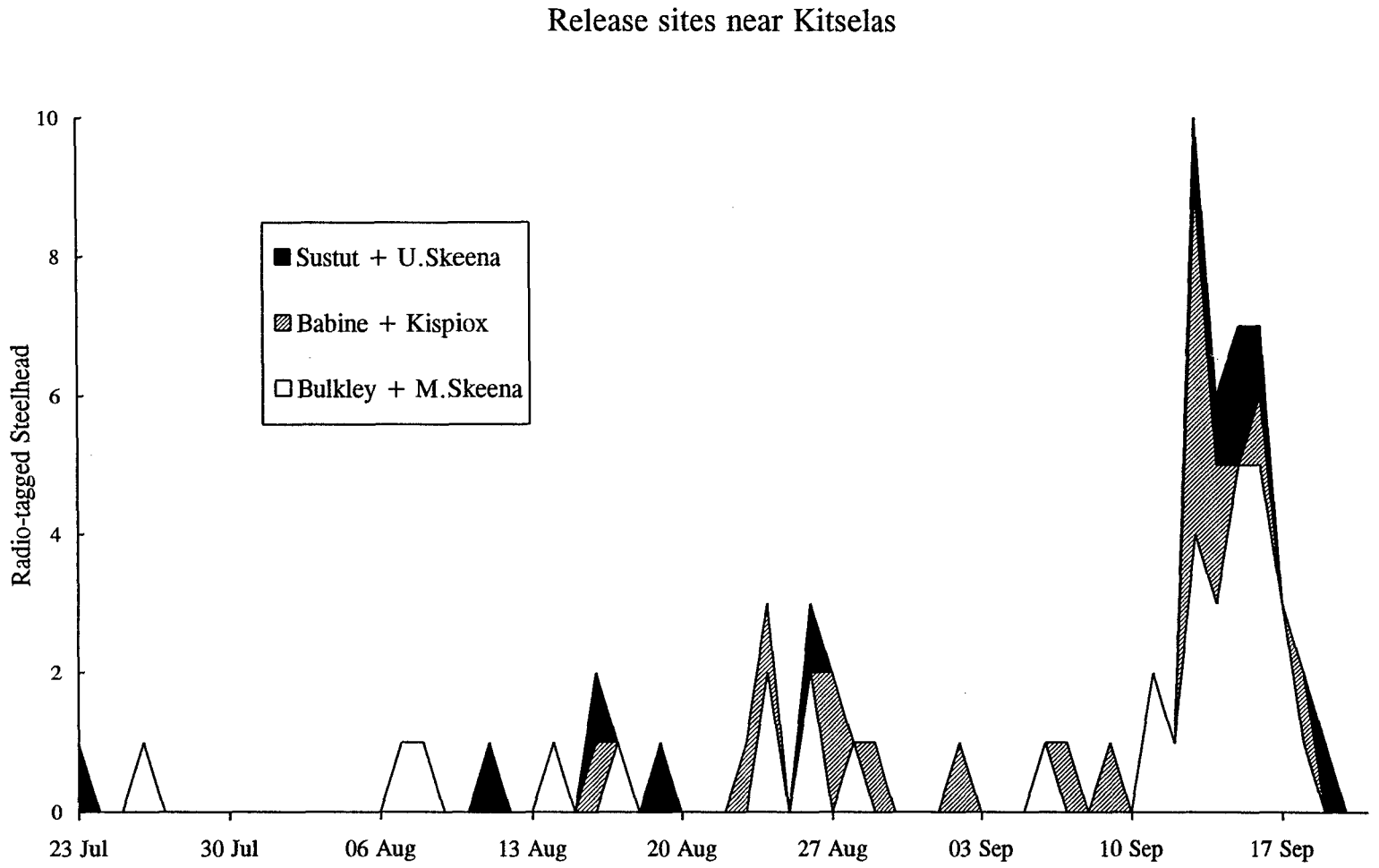

Figure 10. Last known locations of steelhead that were captured near Kitselas and radio-tagged during 1995 according to their date of capture.

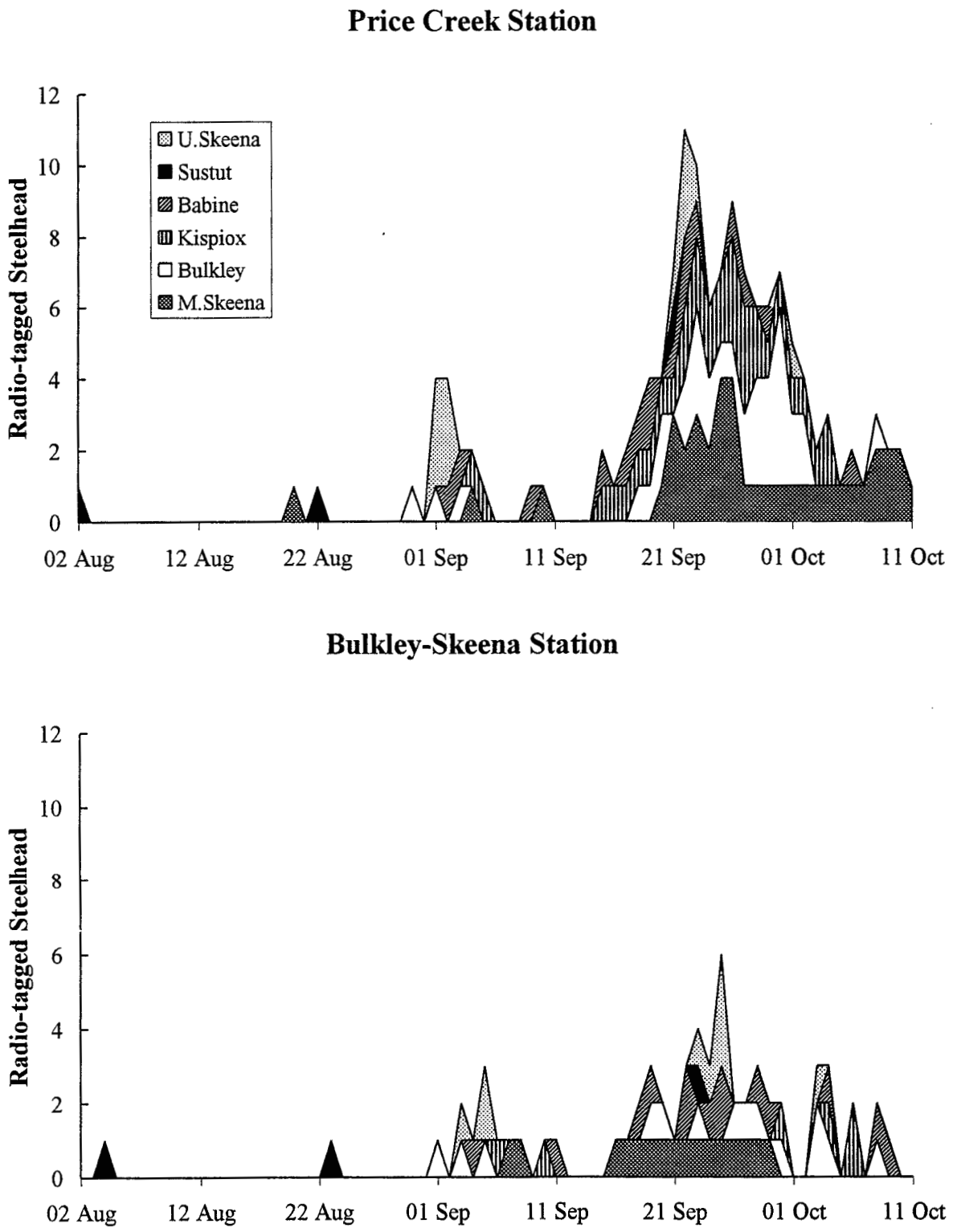

Figure 11. Timing of movement of radio-tagged steelhead of different stocks by fixed-station receivers near Price Creek and the Bulkley-Skeena junction in 1995.

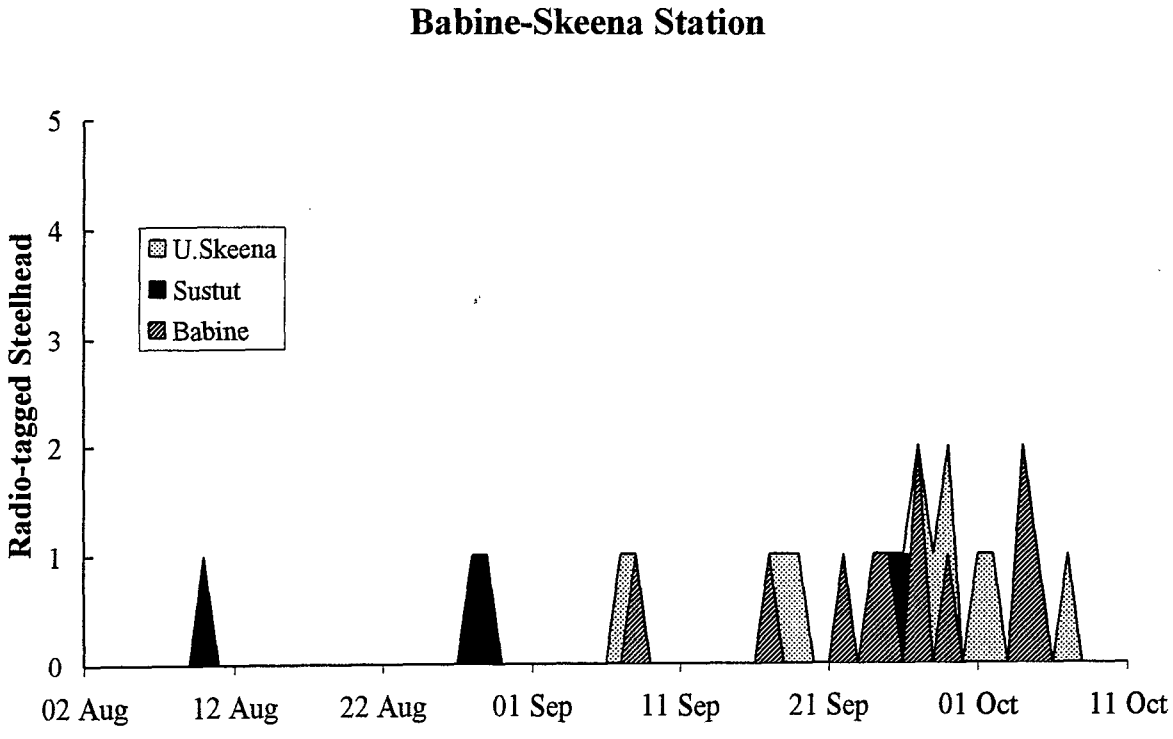

Figure 12. Timing of movement of radio-tagged steelhead of different stocks by a fixed-station receiver at the Babine-Skeena junction in 1995.

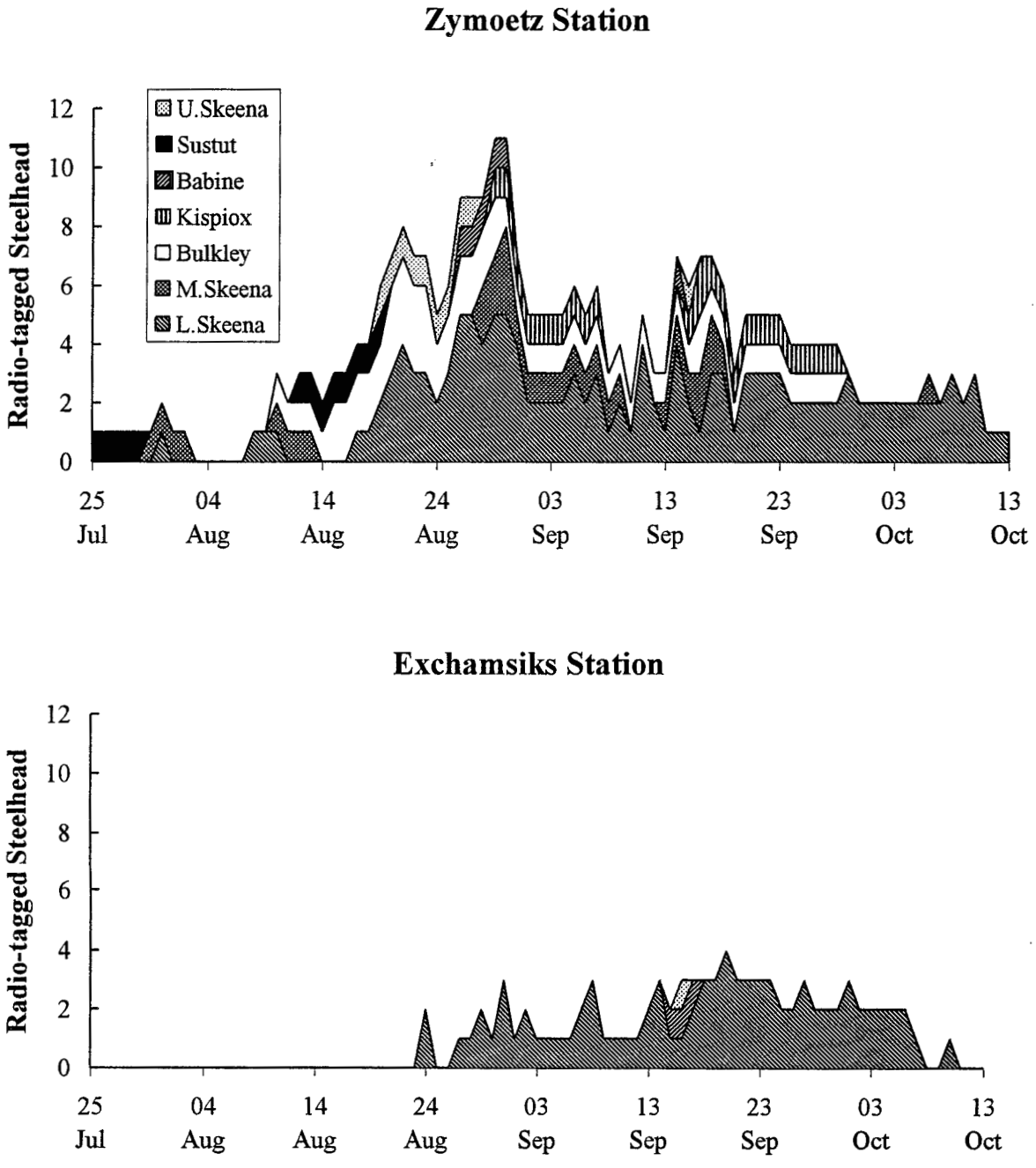

Figure 13. Timing of movement of radio-tagged steelhead of different stocks by fixed-station receivers near Zymoetz and Exchamsiks rivers in 1995.

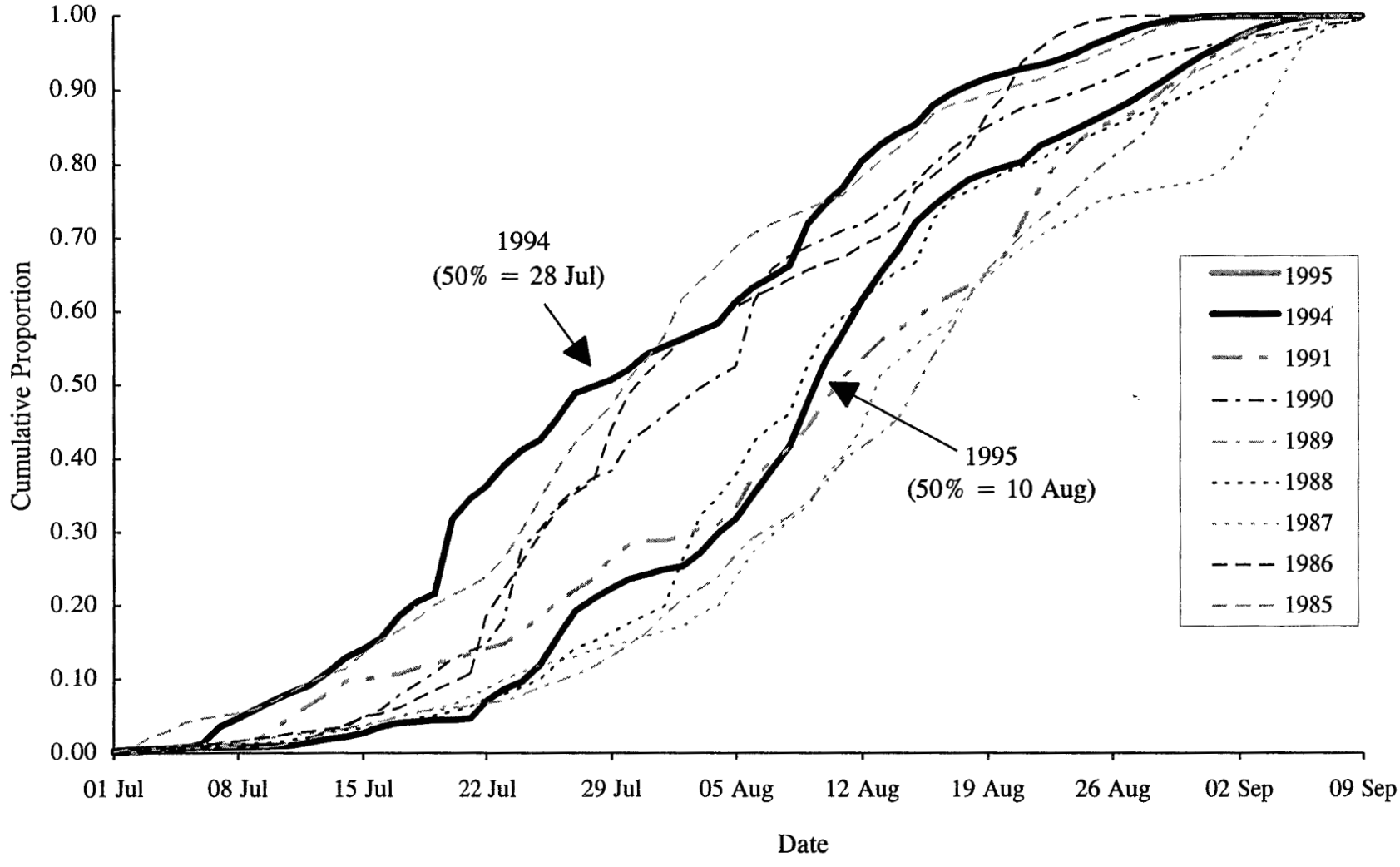

Figure 14. Run timing of steelhead at the Tyee Test Fishery, expressed as a cumulative proportion of the total test index count, 1985-1995 (S. Cox-Rogers, DFO - Prince Rupert, pers. comm.). Data from 1992 and 1993 are not available.

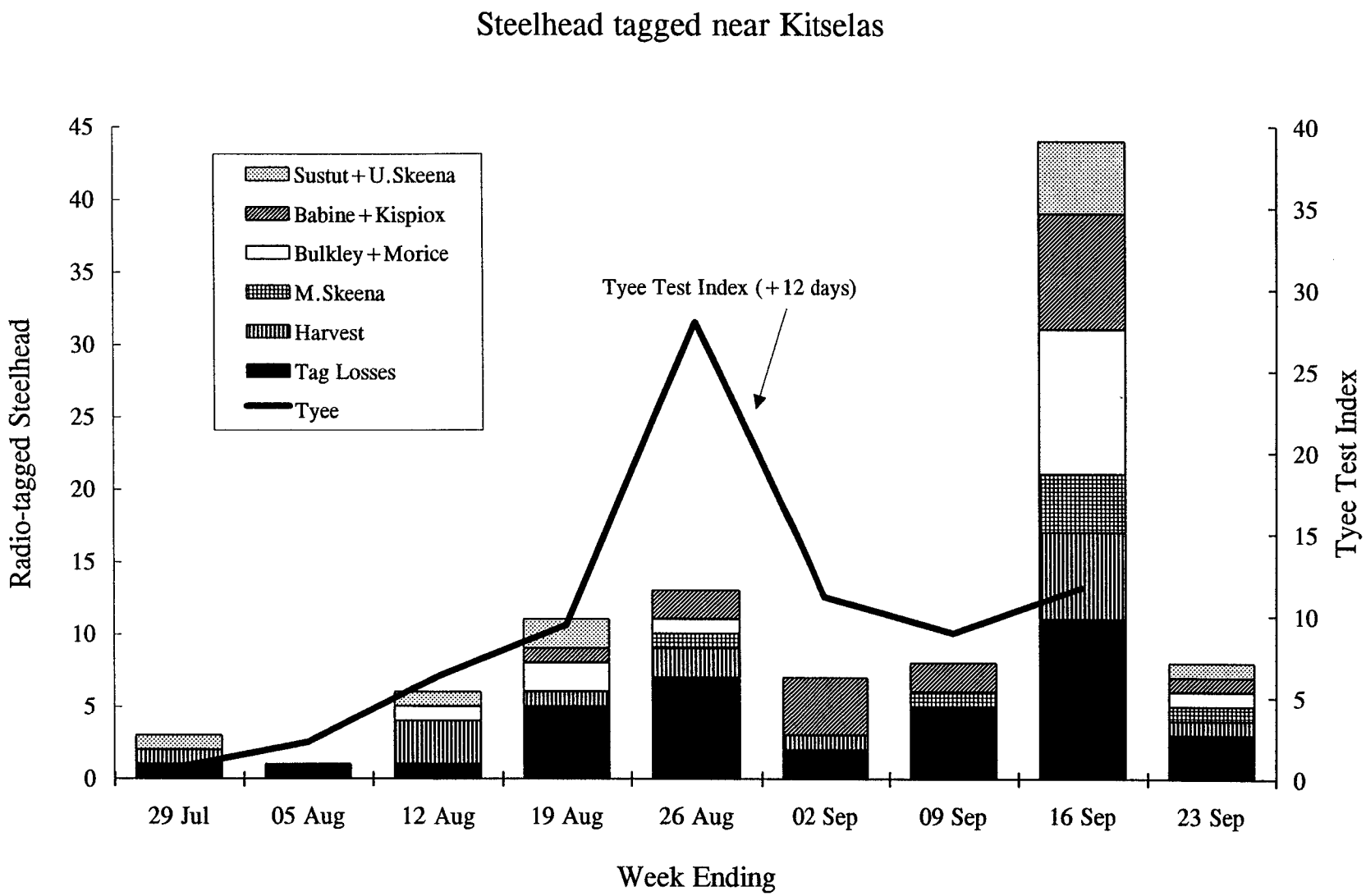

Figure 15. Temporal variation in the numbers of steelhead that were radio-tagged near Kitselas in 1995 in comparison to the Tyee Test Fishery indices offset by 12 days.

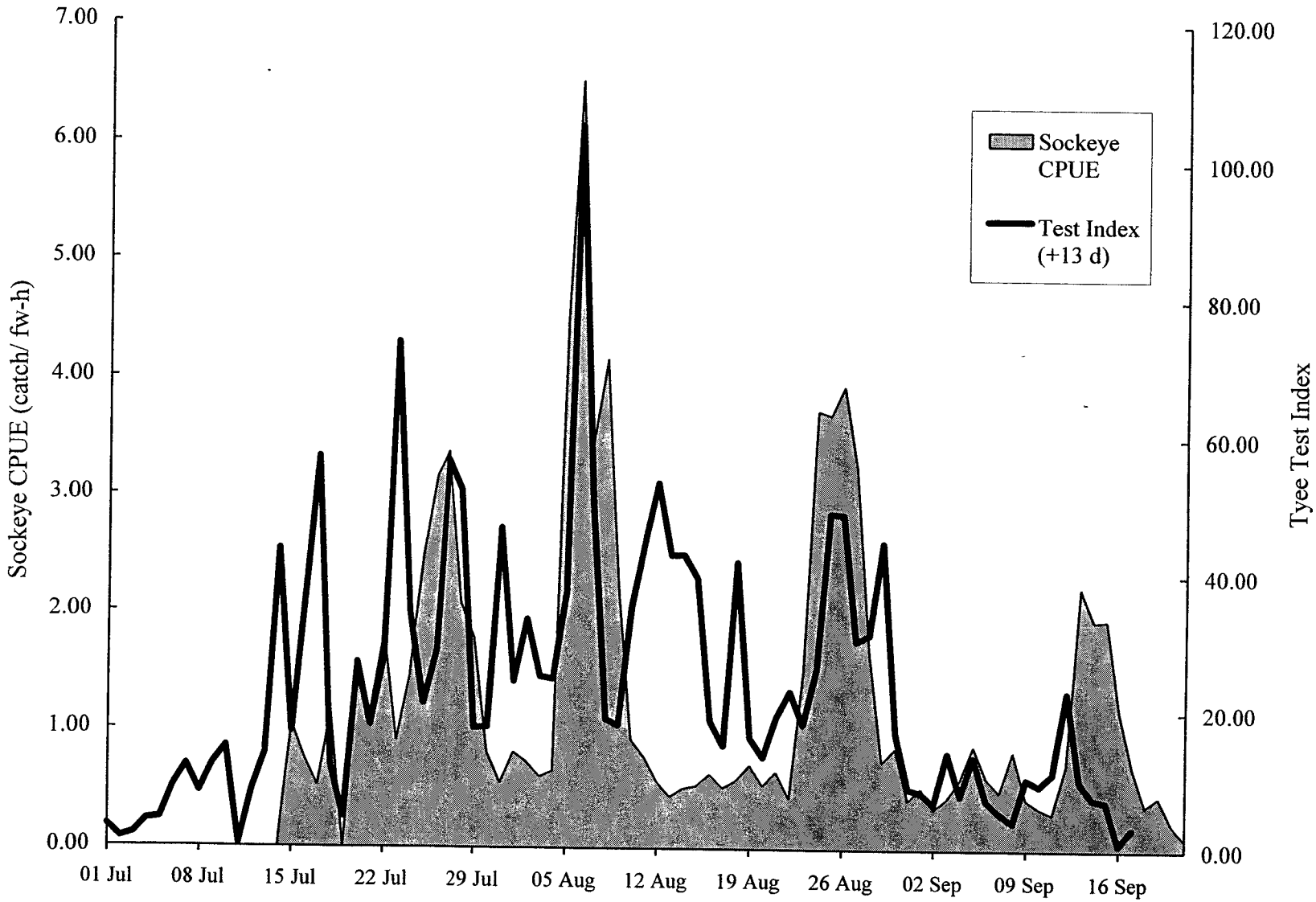

Figure 16. Temporal variation in CPUE (number/h) of sockeye salmon that were caught by fishwheels operated in Kitselas Canyon in 1995 in comparison to the Tyee Test Fishery indices offset by 13 days.

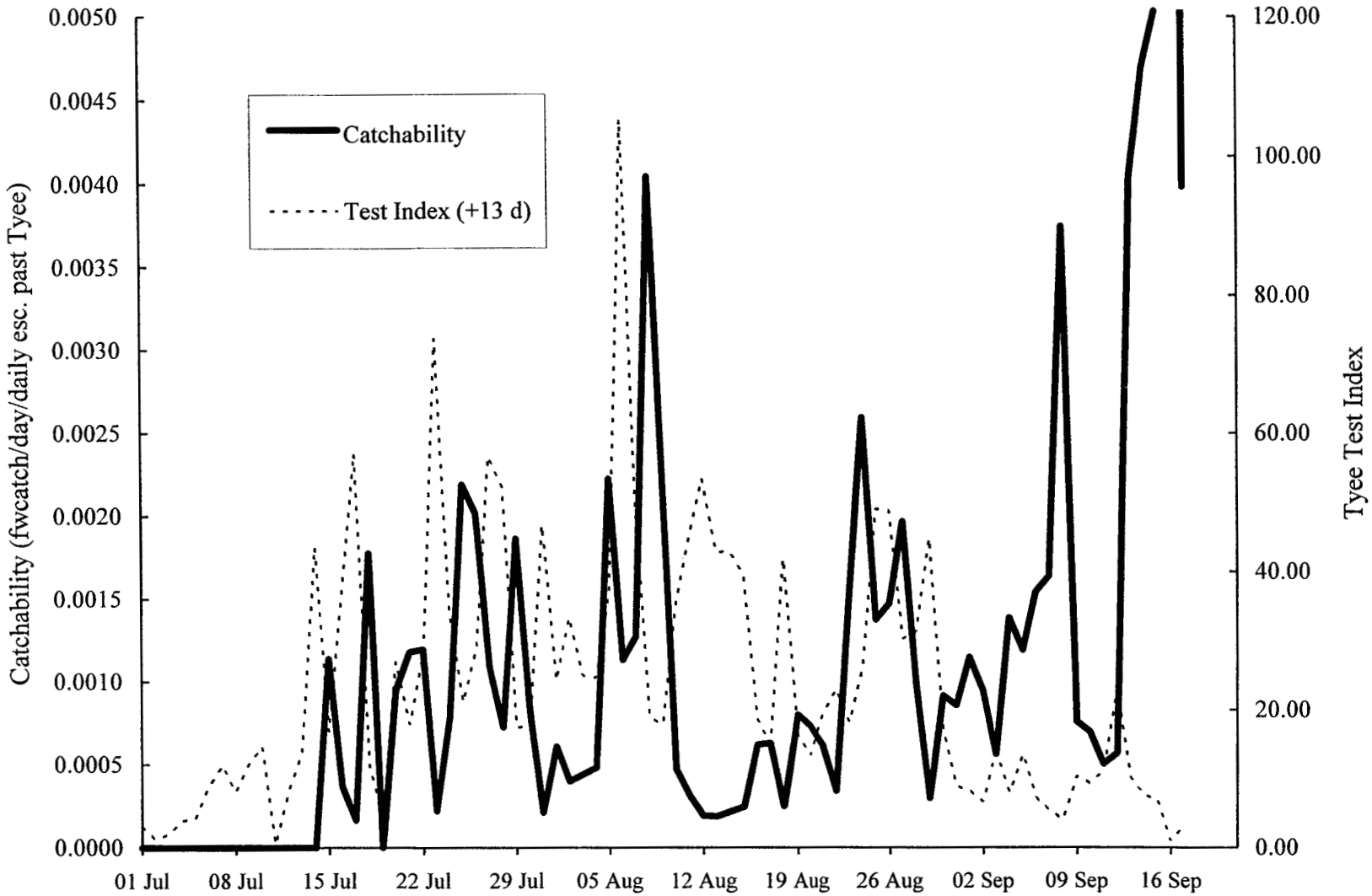

Figure 17. Temporal variation in fishwheel catchability of sockeye salmon that were caught by fishwheels operated in Kitselas Canyon in 1995 in comparison to the Tyee Test Fishery indices offset by 13 days.

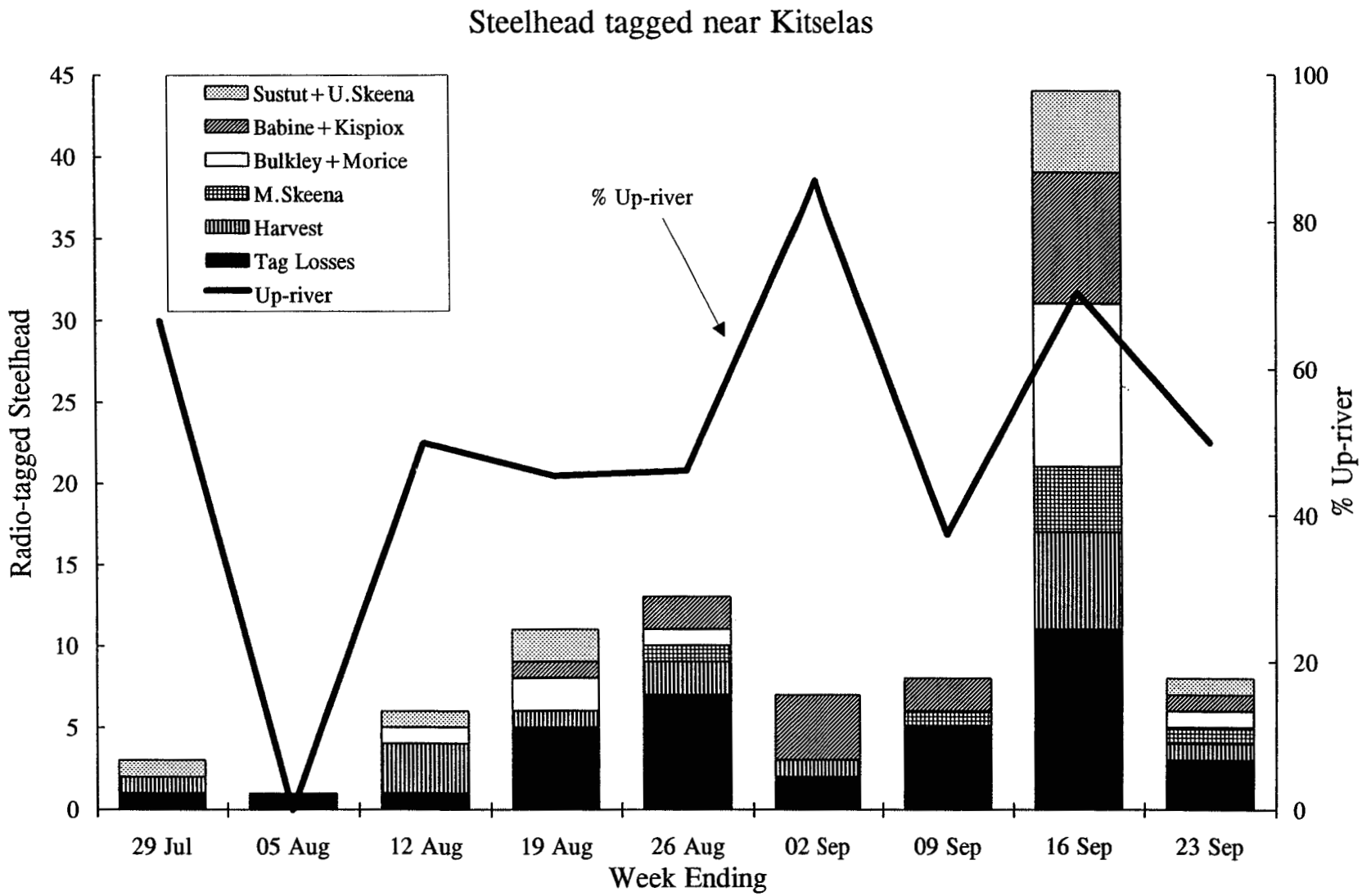

Figure 18. Temporal variation in the numbers of steelhead that were radio-tagged near Kitselas in comparison to the proportions that were tracked up-river of the tagging site.

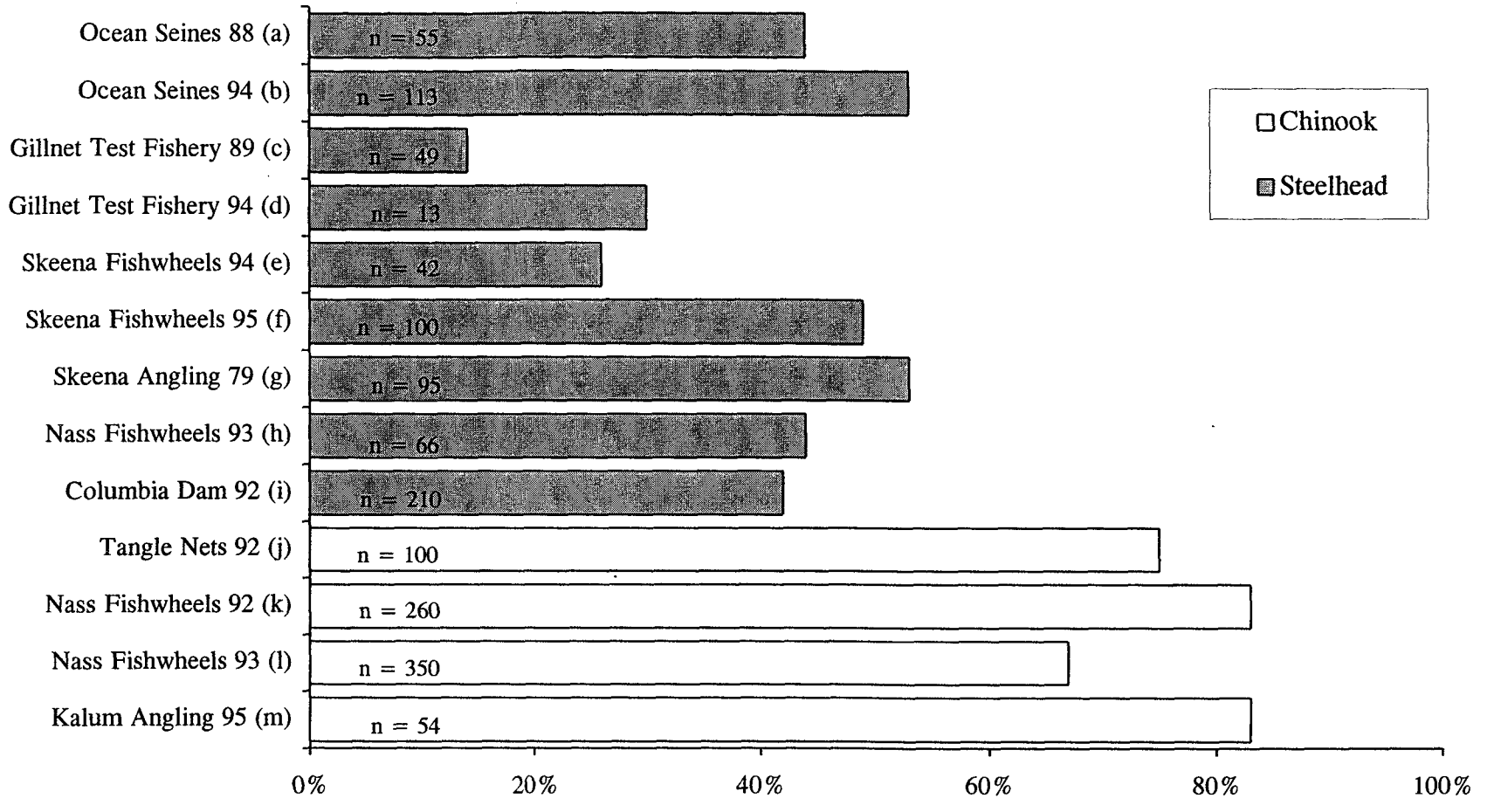

Figure 19. Survival to destination for radio-tagged steelhead and chinook from a variety of studies conducted on the Skeena, Nass and Columbia rivers, 1979 - 1995. Studies a (Spence and Hooton 1988); b, d and e (Koski et al. 1995); c (Beere 1991); f (this study); g (Lough 1981); and m (Alexander and English 1995) were all conducted on the Skeena River. Studies h (Alexander and Koski 1995); j and k (Koski et al. 1993); and l (Koski et al. 1994) were all conducted on the Nass River. Study i (Bjorn et al. 1993) was conducted on the Columbia River.

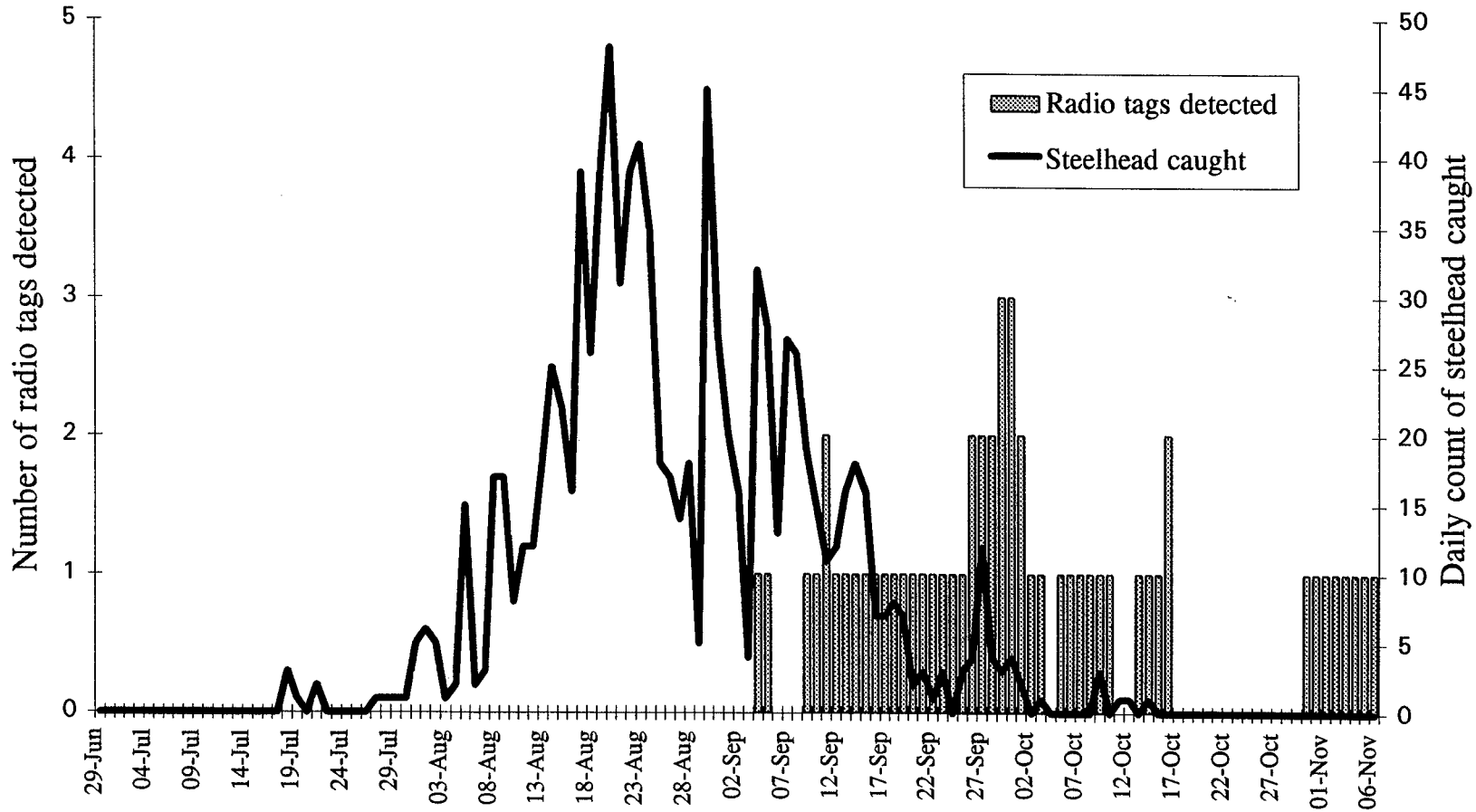

Figure 20. Daily counts of steelhead captured in the Moricetown fishery and radio-tagged steelhead detected by the fixed-station receiver at Moricetown.

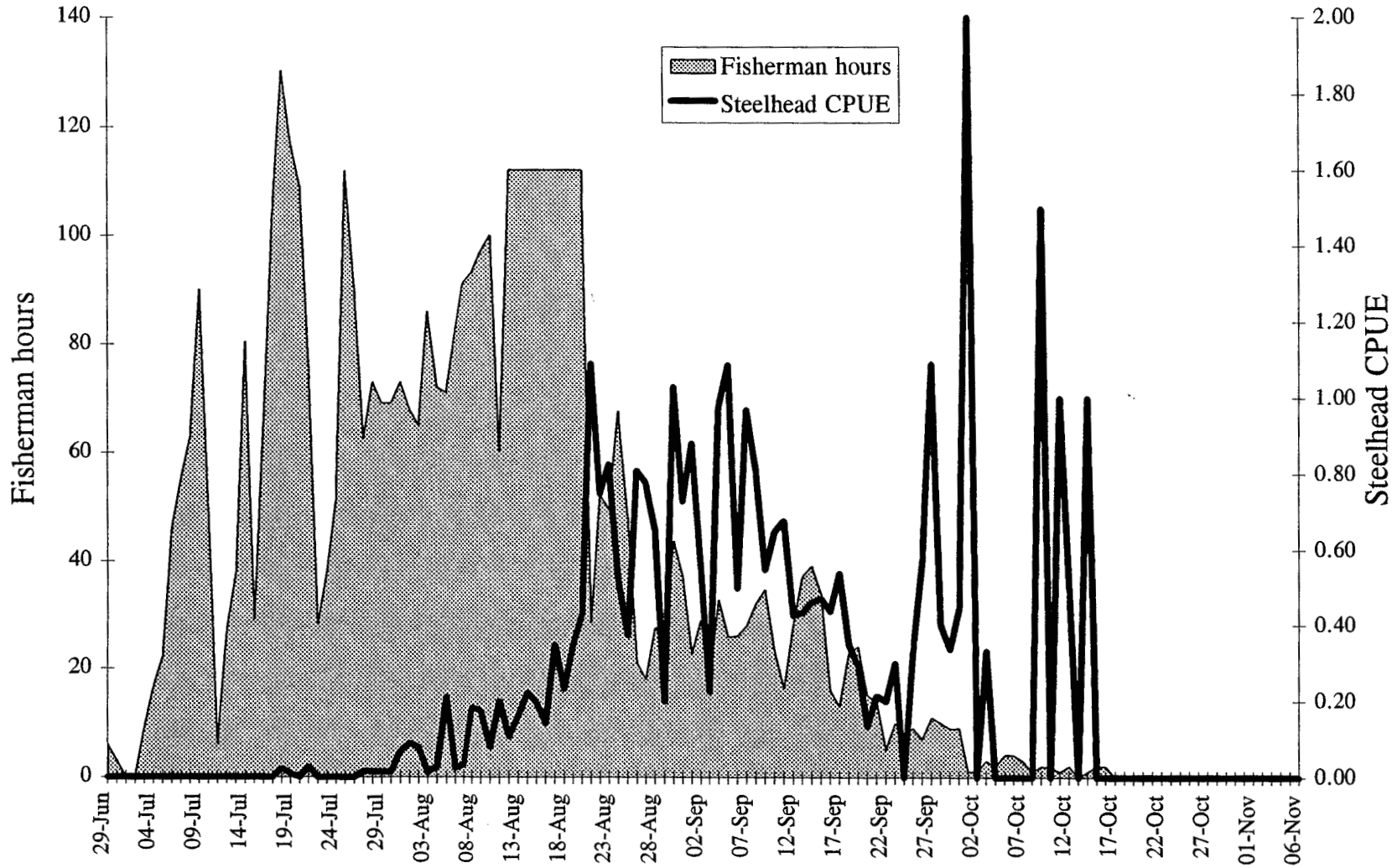

Figure 21. Daily fishing effort and steelhead catch per unit effort (CPUE) for the Moricetown fishery.

APPENDICES

Table A-1. Numbers of fish caught by fishwheels operated in Kitselas Canyon, 15 July - 21 September 1995.

	Number of												
	Sockeye									Dolly	White-		
Date	Adults	Jacks	Total	Pink	Coho	Steelhead	Chum	Chinook	Lamprey	varden	fish	Sucker	Cutthroat
15 Jul	67	16	83	9	0	0	0	0	0	0	0	0	0
16 Jul	32	15	47	7	0	0	0	0	0	0	0	0	0
17 Jul	25	26	51	1	0	0	1	0	0	4	0	0	0
18 Jul	55	63	118	3	0	0	0	1	1	4	0	0	0
19 Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Jul	93	67	160	12	0	0	0	0	0	9	0	0	2
21 Jul	80	90	170	11	0	0	0	0	0	12	0	0	0
22 Jul	129	108	237	13	0	0	0	0	1	30	0	1	0
23 Jul	68	94	162	17	0	1	0	2	0	37	1	0	2
24 Jul	100	87	187	30	0	0	0	1	4	18	0	0	0
25 Jul	276	226	502	302	2	1	2	6	4	16	2	0	2
26 Jul	231	228	459	366	2	1	0	5	19	8	3	0	2
27 Jul	231	204	435	418	0	2	0	2	79	3	1	0	1
28 Jul	150	170	320	154	0	0	1	4	99	1	1	0	1
29 Jul	114	113	227	34	0	0	0	1	13	2	0	0	0
30 Jul	54	78	132	12	0	0	0	1	19	0	1	0	0
31 Jul	38	129	167	3	1	0	0	0	16	9	0	0	0
01 Aug	59	139	198	14	0	0	0	0	2	3	1	0	0
02 Aug	52	133	185	26	0	0	2	0	1	5	0	0	0
03 Aug	21	55	76	4	0	0	0	0	0	1	0	0	0
04 Aug	70	213	283	62	0	0	0	1	6	6	0	0	0
05 Aug	339	224	563	1043	1	1	1	2	14	4	0	0	0
06 Aug	481	353	834	2485	6	0	2	0	195	4	0	0	9
07 Aug	148	87	235	656	0	3	1	1	126	2	0	0	1
08 Aug	218	502	720	436	3	3	0	0	110	1	2	0	0
09 Aug	163	451	614	118	0	0	0	0	22	4	1	0	0

Table A-1. Numbers of fish caught by fishwheels operated in Kitselas Canyon, 15 July - 21 September 1995.

	Number of												
	Sockeye									Dolly	White-		
Date	Adults	Jacks	Total	Pink	Coho	Steelhead	Chum	Chinook	Lamprey	varden	fish	Sucker	Cutthroat
10 Aug	62	229	291	24	1	0	0	0	21	3	1	0	0
11 Aug	55	168	223	82	1	2	0	0	7	0	1	0	0
12 Aug	57	199	256	91	0	0	0	0	1	9	1	0	0
13 Aug	42	153	195	169	1	0	0	0	3	5	1	0	0
14 Aug	49	134	183	449	5	1	0	0	6	1	0	0	4
15 Aug	46	195	241	209	0	1	1	1	5	4	0	0	3
16 Aug	59	243	302	334	6	6	0	0	4	0	4	0	1
17 Aug	50	221	271	205	1	1	0	0	3	3	2	0	0
18 Aug	54	145	199	102	0	0	0	1	0	1	0	0	0
19 Aug	69	185	254	82	1	2	1	0	3	0	4	0	0
20 Aug	48	256	304	75	1	0	1	0	2	5	1	0	0
21 Aug	66	232	298	57	0	0	0	1	2	1	1	1	0
22 Aug	41	164	205	43	0	0	0	0	0	5	1	0	0
23 Aug	96	170	266	356	1	1	4	0	4	6	1	0	0
24 Aug	147	138	285	263	4	6	1	0	2	0	0	0	0
25 Aug	79	57	136	151	2	1	0	0	4	1	0	0	0
26 Aug	105	124	229	168	7	6	4	0	5	1	0	0	0
27 Aug	100	174	274	129	5	2	6	0	27	0	0	0	0
28 Aug	80	172	252	177	8	3	2	0	72	3	1	1	0
29 Aug	37	115	152	57	1	1	1	1	11	3	2	0	0
30 Aug	40	80	120	18	2	0	0	1	3	0	2	1	1
31 Aug	27	102	129	21	0	0	1	0	2	2	1	0	0
01 Sep	35	105	140	13	0	0	0	0	0	0	2	0	0
02 Sep	25	91	116	28	0	1	0	0	1	1	4	0	0
03 Sep	30	64	94	24	1	0	1	0	1	0	7	0	0
04 Sep	44	139	183	49	0	0	0	0	0	1	16	1	0

Table A-1. Numbers of fish caught by fishwheels operated in Kitselas Canyon, 15 July - 21 September 1995.

	Number of												
	Sockeye									Dolly	White-		
Date	Adults	Jacks	Total	Pink	Coho	Steelhead	Chum	Chinook	Lamprey	varden	fish	Sucker	Cutthroat
05 Sep	63	165	228	46	1	0	2	0	1	3	8	8	0
06 Sep	47	111	158	39	1	7	0	0	0	1	11	0	0
07 Sep	34	130	164	60	2	2	5	0	1	5	13	2	0
08 Sep	60	129	189	37	3	1	4	0	0	6	10	4	0
09 Sep	41	78	119	51	6	3	1	0	0	8	9	0	0
10 Sep	34	86	120	55	1	1	3	0	0	2	2	5	0
11 Sep	28	82	110	156	9	4	4	0	0	4	8	4	0
12 Sep	34	44	78	166	5	3	3	0	4	4	0	1	1
13 Sep	144	143	287	295	19	12	5	0	2	12	13	8	0
14 Sep	100	134	234	222	12	7	6	0	5	9	10	6	0
15 Sep	128	94	222	340	24	10	17	0	5	19	28	18	0
16 Sep	91	156	247	176	11	15	12	1	1	18	17	12	16
17 Sep	50	104	154	69	5	4	6	0	0	15	6	3	1
18 Sep	27	62	89	37	4	3	2	0	3	12	12	0	1
19 Sep	33	68	101	24	4	2	0	0	0	19	10	2	1
20 Sep	16	85	101	9	6	1	0	0	1	5	7	0	0
21 Sep	7	20	27	8	0	0	3	0	1	4	5	0	0
Total	**5774**	**9617**	**15391**	**11402**	**176**	**121**	**106**	**33**	**944**	**384**	**235**	**78**	**49**

Table A-2. Fishing effort and numbers of steelhead caught and tagged at four fishwheels operated in Kitselas Canyon, 14 July - 21 September 1995. Effort is the number of hours that the fishwheel was fishing.

Date	No. of steelhead	Number Tagged			Effort (h)				
		Radio	Anchor only	Total	Wheel 1	Wheel 2	Wheel 3	Wheel 4	Total
14 Jul	0			0	12	12			24
15 Jul	0			0	24	24			48
16 Jul	0			0	24	24			48
17 Jul	0			0	20	24			44
18 Jul	0			0	24	19			43
19 Jul	0			0	24	6	5		35
20 Jul	0			0	24	24	24		72
21 Jul	0			0	24	24	24		72
22 Jul	0			0	24	24	24		72
23 Jul	1	1	0	1	24	24	24		72
24 Jul	0			0	24	24	24		72
25 Jul	1	0	1	1	24	24	24		72
26 Jul	1	1	0	1	24	24	24		72
27 Jul	2	1	1	2	24	24	24		72
28 Jul	0			0	24	24	23		71
29 Jul	0			0	24	24	19		67
30 Jul	0			0	17	24	24		65
31 Jul	0			0	24	24	24		72
01 Aug	0			0	24	24	24		72
02 Aug	0			0	24	24	24		72
03 Aug	0			0	24	24	24		72
04 Aug	0			0	24	24	24		72
05 Aug	1	1	0	1	24	24	24		72
06 Aug	0			0	24	24	22		70
07 Aug	3	3	0	3	24	24	0		48
08 Aug	3	2	1	3	24	24	5		53

Table A-2. Fishing effort and numbers of steelhead caught and tagged at four fishwheels operated in Kitselas Canyon, 14 July - 21 September 1995. Effort is the number of hours that the fishwheel was fishing.

Date	No. of steelhead	Number Tagged			Effort (h)				
		Radio	Anchor only	Total	Wheel 1	Wheel 2	Wheel 3	Wheel 4	Total
09 Aug	0			0	24	24	24		72
10 Aug	0			0	24	24	24		72
11 Aug	2	1	1	2	24	24	24	9	81
12 Aug	0			0	24	24	24	24	96
13 Aug	0			0	24	24	22	24	94
14 Aug	1	1	0	1	24	24	24	24	96
15 Aug	1	1	0	1	24	24	24	24	96
16 Aug	6	6	0	6	24	24	19	24	91
17 Aug	1	1	0	1	24	24	24	24	96
18 Aug	0			0	24	24	24	24	96
19 Aug	2	2	0	2	24	24	24	24	96
20 Aug	0			0	24	24	24	24	96
21 Aug	0			0	24	24	24	24	96
22 Aug	0			0	24	21	21	24	90
23 Aug	1	1	0	1	24	15	8	24	71
24 Aug	6	5	0	5	12	0	24	0	36
25 Aug	1	1	0	1	0	0	24	0	24
26 Aug	6	6	0	6	0	0	24	0	24
27 Aug	2	1	1	2	0	12	24	0	36
28 Aug	3	3	0	3	0	24	24	0	48
29 Aug	1	1	0	1	0	24	24	0	48
30 Aug	0			0	6	24	24	0	54
31 Aug	0			0	24	18	24	0	66
01 Sep	0			0	24	24	22	0	70
02 Sep	1	1	0	1	24	24	24	0	72
03 Sep	0			0	24	24	24	0	72

Table A-2. Fishing effort and numbers of steelhead caught and tagged at four fishwheels operated in Kitselas Canyon, 14 July - 21 September 1995. Effort is the number of hours that the fishwheel was fishing.

	No. of	Number Tagged			Effort (h)				
Date	steelhead	Radio	Anchor only	Total	Wheel 1	Wheel 2	Wheel 3	Wheel 4	Total
04 Sep	0			0	24	24	24	0	72
05 Sep	0			0	24	24	24	0	72
06 Sep	7	2	2	4	24	24	24	0	72
07 Sep	2	2	0	2	24	24	24	0	72
08 Sep	1	1	0	1	24	24	24	6	78
09 Sep	3	3	0	3	24	24	24	24	96
10 Sep	1	1	0	1	24	24	24	24	96
11 Sep	4	3	1	4	24	18	24	8	74
12 Sep	3	2	0	2	24	9	24	0	57
13 Sep	12	11	1	12	24	24	9	0	57
14 Sep	7	7	0	7	24	24		8	56
15 Sep	10	7	3	10	24	24		24	72
16 Sep	15	13	2	15	24	24		24	72
17 Sep	4	4	0	4	24	24		24	72
18 Sep	3	3	0	3	24	24		24	72
19 Sep	2	1	1	2	24	24		24	72
20 Sep	1	0	0	0	24	24		24	72
21 Sep	0	0	0	0	16	16		16	48
Total	**121**	**100**	**15**	**115**	**1499**	**1513**	**1255**	**527**	**4794**

Table A-3. Information regarding steelhead that were radio-tagged as part of the 1995 Skeena River telemetry program.

Anchor tag no.		Radio tag [a]		Nose-fork		Tagging	Release		Scale		Vial	Scar	Health	Comments
First	Second	Chan. [b]	Code	length (cm)	Sex	date	Time	Location	Book	No.	no.	code [c]	code [d]	
Fishwheel capture - Kitselas Canyon														
N07177	N07178	14	97	87.0	m	23-Jul	9:00	Site 3	47002	10	1	E	2	healed scar left oper.
N07180	N07181	14	2	73.0	f	26-Jul	21:39	Site 2	47002	8	3	F	2	released in 2 min
N07183	N07184	16	96	57.0	m	27-Jul	19:01	Site 1	47002	6	5	F	1	released < 2 min
N07185	N07186	12	61	82.0	f	5-Aug	7:34	Site 2	47002	5	7	F	2	released < 2 min
N07187	N07188	16	92	76.0	f	7-Aug	8:15	Site 1	47002	4	2	F	2	
N07189	N07190	18	48	71.5	f	7-Aug	9:35	Site 1	47002	3	10	F	3	fishwheel pen anoxic
N07192	NA [e]	16	91	76.0	f	7-Aug	17:20	Site 2	47001	10	11	E	2	tail mark, 20 min recov.
N07193	N07195	12	98	76.0	f	8-Aug	8:25	Site 1	47001	9	14	F	2	prev. tag: C07133
N07199	N07198	12	48	58.0	f	8-Aug	18:50	Site 1	47001	7	18	F	3	sluggish release
N07201	N07202	12	99	76.0	m	11-Aug	7:30	Site 2	47001	6	20	B	2	
N07204	N07205	12	15	78.0	m	14-Aug	20:00	Site 4	47003	10	26	F	3	5 min release off wheel
N07206	N07207	12	51	70.0	f	15-Aug	18:46	Site 2	47003	9	27	B	1	light net marks, nursery rel.
N07208	N07211	14	47	79.0	m	16-Aug	7:30	Site 1	47003	8	28	F	3	held 5 min, nursery rel.
N07212	N07213	16	39	72.0	f	16-Aug	9:00	Site 2	47003	7	30	F	2	held 8 min, nursery rel.
N07214	N07215	12	52	83.0	m	16-Aug	9:40	Site 4	47003	6	32	F	1	held 5 min, nursery rel.
N07217	N07218	18	31	77.0	m	16-Aug	10:25	Site 4	47003	5	33	F	3	S00558, nursery rel.
N07219	N07220	14	42	55.0	f	16-Aug	17:20	Site 2	47003	4	37	C	2	old marks, nursery rel.
N07221	N07222	18	32	100.0	m	16-Aug	18:05	Site 4	47003	3	39	F	2	nursery release
N07223	N07224	12	35	65.0	f	17-Aug	7:40	Site 1	47004	10	42	F	3	held 5 min, nursery rel.
N07226	N07227	18	28	66.0	f	19-Aug	10:10	Site 2	47004	9	43	B	3	held 6 min, nursery rel.
N07229	N07230	14	34	67.0	f	19-Aug	10:50	Site 4	47004	8	44	F	3	held 5 min, nursery rel.
N07232	N07233	16	46	65.0	m	23-Aug	9:15	Site 2	47004	7	40	B	2	healed gillnet scar
N07234	N07235	14	44	76.0	f	24-Aug	16:50	Site 3	47004	6	52	B	2	bleeding from adipose
N07237	NA	16	37	59.0	m	24-Aug	16:55	Site 3	47004	5	48	F	2	prev. tag: S02463
N07238	N07239	14	41	67.0	m	24-Aug	17:20	Site 3	47004	4	41	F	2	
N07241	N07244	18	27	75.0	m	24-Aug	17:40	Site 3	47004	3	37	B	2	
N07245	N07246	16	38	84.0	m	24-Aug	17:55	Site 1	47004	2	49	B	1	
N07247	N07248	16	40	76.0	f	25-Aug	14:25	Site 3	47005	10	51	F	1	

Table A-3. Information regarding steelhead that were radio-tagged as part of the 1995 Skeena River telemetry program.

Anchor tag no.		Radio tag [a]		Nose-fork		Tagging	Release		Scale		Vial	Scar	Health	Comments
First	Second	Chan. [b]	Code	length (cm)	Sex	date	Time	Location	Book	No.	no.	code [c]	code [d]	
N07249	N07902	18	29	68.0	f	26-Aug	8:35	Site 3	47005	9	36	E	1	minor scale loss
N07903	N07905	18	33	76.0	f	26-Aug	8:45	Site 3	47005	8	38	D	1	minor scale loss
N07906	N07907	16	34	86.0	m	26-Aug	8:55	Site 3	47005	7	47	F	1	
N07908	N07909	14	43	75.0	f?	26-Aug	9:20	Site 3	47005	6	57	F	1	sl. bleeding from left tag
N07911	N07913	16	45	88.0	m	26-Aug	16:45	Site 3	47005	5	208	F	1	
N07914	N07915	16	27	78.0	f	26-Aug	17:35	Site 3	47005	4	64	E	2	bleeding from maxillary
N07926	N07927	16	24	82.0	m	27-Aug	16:40	Site 3	47005	2	59	F	1	
N07928	N07930	16	22	84.0	f	28-Aug	8:30	Site 3	47005	1	46	F	1	
N07931	N07935	16	31	94.0	m	28-Aug	9:15	Site 5	47006	10	65	F	1	
N07937	N07938	14	51	78.0	m	28-Aug	16:30	Site 3	47006	9	61	B	3	bleeding from left floy
N07939	N07941	14	35	68.0	m	29-Aug	9:10	Site 3	47006	8	105	F	1	
N07951	N07952	14	23	59.0	m	2-Sep	8:45	Site 5	47006	7	93	F	1	
N07953	N07954	14	46	70.0	f	6-Sep	8:20	Site 1	47006	6	97	B	2	dorsal/oper. damage
N07959	N07960	14	16	68.0	f	6-Sep	17:10	Site 5	47006	3	86	F	2	
N07961	N07962	14	17	75.0	m	7-Sep	8:25	Site 5	47006	2	101	F	2	
N07964	N07965	14	19	70.0	m	7-Sep	16:35	Site 5	47006	1	103	B	2	
N07967	N07968	14	99	64.0	f	8-Sep	16:32	Site 5	47007	1	76	B	1	
N07971	N07972	12	78	61.0	f	9-Sep	8:40	Site 5	47007	10	82	F	1	
N07973	N07974	18	39	72.0	f	9-Sep	8:50	Site 5	47007	9	102	F	3	
N07976	N07977	12	2	79.0	f	9-Sep	9:00	Site 5	47007	8	83	B	2	
N07978	N07979	16	86	71.0	f	10-Sep	8:25	Site 5	47007	7	90	E	2	minor scale loss
N07984	N07985	12	66	74.0	m	11-Sep	8:55	Site 5	47007	6	111	F	2	minor fin erosion
N07987	N07988	18	36	74.0	f	11-Sep	9:15	Site 5	47007	5	109	F	2	
N07989	NA	12	8	73.0	f	11-Sep	17:20	Site 5	47007	4	128	D	2	prev. tag: S02426
N07991	N07992	12	74	69.0	m	12-Sep	8:45	Site 1	47008	10	127	F	2	
N07993	N07994	12	67	85.0	f	12-Sep	16:08	Site 1	47008	9	112	F	2	
N07995	N07996	12	70	91.0	f	13-Sep	8:15	Site 2	47008	8	110	F	2	
N07997	NA	14	14	62.0	m	13-Sep	8:55	Site 1	47008	7	68	F	2	
N07251	N07252	12	33	76.0	f	13-Sep	9:05	Site 1	47008	6	116	F	4	held ~ 8 min
N07253	N07254	12	31	68.0	f	13-Sep	9:14	Site 1	47008	5	124	E	2	minor scale loss

Table A-3. Information regarding steelhead that were radio-tagged as part of the 1995 Skeena River telemetry program.

Anchor tag no.		Radio tag [a]		Nose-fork		Tagging	Release		Scale		Vial	Scar	Health	Comments
First	Second	Chan. [b]	Code	length (cm)	Sex	date	Time	Location	Book	No.	no.	code [c]	code [d]	
N07255	N07256	16	47	77.0	f	13-Sep	10:10	Site 5	47008	4	120	F	3	rough tag insertion
N07257	N07258	18	46	68.0	f	13-Sep	10:20	Site 5	47008	3	129	F	2	minor scale loss
N07260	N07261	18	35	80.0	f	13-Sep	15:10	Site 5	47008	1L	136	F	2	
N07262	N07263	14	28	84.0	m	13-Sep	15:15	Site 5	47008	1R	137	B	3	old scar, held 4 min
N07265	N07266	16	42	93.0	m	13-Sep	15:50	Site 1	47015	9	133	F	2	
N07267	N07268	18	24	60.0	m	13-Sep	15:55	Site 1	47015	10	142	F	2	
N07269	N07270	12	16	76.0	f	13-Sep	16:10	Site 1	47015	8	135	B	1	old scars
N07271	N07272	12	32	60.0	m	14-Sep	9:35	Site 1	47009	10	149	F	2	
N07273	N07274	12	29	74.0	f	14-Sep	16:20	Site 1	47009	9	182	E	2	minor scale loss
N07326	N07327	14	45	74.0	f	14-Sep	16:30	Site 1	47009	8	185	B	2	old scars
N07328	N07329	14	38	79.0	f	14-Sep	16:37	Site 1	47009	7	161	F	2	
N07330	N07331	14	39	70.0	f	14-Sep	17:15	Site 5	47009	6	188	E	2	dorsal fin injury
N07332	N07333	16	48	76.0	f	14-Sep	17:40	Site 5	47009	5	168	F	2	
N07334	N07335	16	44	75.0	f	14-Sep	17:42	Site 5	47009	4	163	F	2	
N07336	N07337	16	43	83.0	f	15-Sep	8:17	Site 5	NA	NA	174	F	1	
N07338	N07339	12	36	69.0	f	15-Sep	9:07	Site 2	47009	3	151	F	2	
N07340	N07341	14	40	76.0	f	15-Sep	9:14	Site 2	47009	2	148	D	1	hook wound to mouth
N07342	N07343	18	98	61.0	m	15-Sep	9:46	Site 2	47009	1	171	F	1	
N07344	NA	18	37	93.0	m	15-Sep	10:36	Site 1	47010	10	165	D	2	tag gun problems, delay
N07348	N07349	16	41	75.0	f	15-Sep	11:06	Site 1	47010	8	152	F	1	
N07278	N07279	18	34	79.0	f	15-Sep	14:43	Site 5	47010	5	147	F	2	
N07280	NA	12	19	84.0	m	16-Sep	8:41	Site 2	47010	4	270	F	3	tag needle broke in fish
N07281	N07282	14	52	80.0	m	16-Sep	8:52	Site 2	47010	3	272	E	1	dorsal damage
N07283	N07284	16	67	72.0	f	16-Sep	9:02	Site 2	47010	2	190	F	2	
N07285	N07286	16	51	73.0	m	16-Sep	9:10	Site 2	47010	1	158	F	2	
N07289	N07290	18	91	73.0	f	16-Sep	9:24	Site 2	47011	9	271	F	3	
N07294	N07295	12	42	72.0	f	16-Sep	10:05	Site 5	47011	7	146	E	2	side scar
N07296	N07297	14	20	88.0	f	16-Sep	10:12	Site 5	47011	6	273	E	1	caudal scar
N07298	N07299	12	44	67.0	f	16-Sep	10:22	Site 5	47011	5	227	F	1	
N07301	N07302	18	40	76.0	f	16-Sep	10:29	Site 5	47011	4	240	F	1	

Table A-3. Information regarding steelhead that were radio-tagged as part of the 1995 Skeena River telemetry program.

Anchor tag no.		Radio tag [a]		Nose-fork		Tagging	Release		Scale		Vial	Scar	Health	Comments
First	Second	Chan. [b]	Code	length (cm)	Sex	date	Time	Location	Book	No.	no.	code [c]	code [d]	
N07303	N07304	18	44	77.0	m	16-Sep	10:40	Site 5	47011	3	244	F	1	
N07306	N07307	14	49	77.0	m	16-Sep	10:47	Site 5	47011	2	239	F	1	
N07308	N07310	14	32	75.0	f	16-Sep	16:27	Site 1	47011	1	220	F	2	some scale loss
N07312	N07313	18	7	71.0	f	16-Sep	17:12	Site 5	47012	10	236	F	1	
N07316	N07317	18	99	71.0	f	17-Sep	8:46	Site 5	47012	9	235	B	3	healed hvy gillnet marks
N07318	N07319	16	21	72.0	f	17-Sep	9:40	Site 1	47012	8	226	B	2	healed scars
N07320	N07321	12	45	70.0	f	17-Sep	9:59	Site 1	47012	7	233	F	2	
N07322	N07323	16	33	85.0	m	17-Sep	16:45	Site 5	47012	6	222	E	3	sluggish, some scale loss
N07324	N07325	18	8	68.5	f	18-Sep	8:28	Site 5	47012	5	225	F	2	
N07942	N07943	16	75	79.0	f	18-Sep	9:10	Site 2	47012	4	243	D	2	hook wound lower jaw
N07944	N07945	12	83	83.0	f	18-Sep	9:21	Site 2	47012	3	203	F	2	fungus on dorsal
N07946	N07947	14	96	81.0	m	19-Sep	9:37	Site 5	47012	2	200	F	1	
Angled - Middle Skeena														
N07921	N07924	16	32	87.0	m	27-Aug	12:20	At Klea	NA	NA	63	F	1	5 min on line
Angled - Babine River [f]														
C06651	C06652	20	7	78.5	f	25-Oct	NA	BA03	NA	1	NA	NA	NA	surgical implant
C06653	C06654	20	8	74.0	f	25-Oct	NA	BA03	NA	2	NA	NA	NA	oral implant
C06655	C06656	20	21	75.0	f	25-Oct	NA	BA03	NA	3	NA	NA	NA	oral implant
C06657	C06658	20	22	69.5	f	25-Oct	NA	BA03	NA	4	NA	NA	NA	surgical implant
C06659	C06660	20	27	73.0	f	25-Oct	NA	BA03	NA	6	NA	NA	NA	oral implant
C06661	C06662	20	28	60.0	f	25-Oct	NA	BA03	NA	7	NA	NA	NA	surgical implant
C06663	C06664	20	29	79.0	f	25-Oct	NA	BA03	NA	8	NA	NA	NA	surgical implant
C06665	C06666	20	31	93.5	m	25-Oct	NA	BA03	NA	9	NA	NA	NA	surgical implant
C06667	C06668	20	32	69.0	f	25-Oct	NA	BA03	NA	10	NA	NA	NA	oral implant
C06669	C06670	20	33	77.0	m	25-Oct	NA	BA03	NA	11	NA	NA	NA	surgical implant
C06671	C06672	20	34	95.0	m	25-Oct	NA	BA03	NA	12	NA	NA	NA	oral implant
C06673	C06674	20	35	77.0	m	25-Oct	NA	BA03	NA	13	NA	NA	NA	surgical implant

Table A-3. Information regarding steelhead that were radio-tagged as part of the 1995 Skeena River telemetry program.

Anchor tag no.		Radio tag [a]		Nose-fork		Tagging	Release		Scale		Vial	Scar	Health	Comments
First	Second	Chan. [b]	Code	length (cm)	Sex	date	Time	Location	Book	No.	no.	code [c]	code [d]	
C06675	NA	20	36	NA	f	25-Oct	NA	BA03	NA	15	NA	NA	NA	oral implant
C06676	C06677	20	39	94.0	m	25-Oct	NA	BA03	NA	17	NA	NA	NA	surgical implant
C06679	NA	20	41	74.0	f	26-Oct	NA	BA03	NA	19	NA	NA	NA	oral implant
C06680	C06681	20	69	78.0	f	26-Oct	NA	BA03	NA	20	NA	NA	NA	surgical implant
C06682	C06683	20	70	79.0	m	26-Oct	NA	BA03	NA	21	NA	NA	NA	oral implant
C06684	C06685	20	74	81.0	f	26-Oct	NA	BA03	NA	22	NA	NA	NA	oral implant
C06686	C06687	20	77	81.0	m	26-Oct	NA	BA03	NA	23	NA	NA	NA	surgical implant
C06690	C06691	20	79	81.0	m	26-Oct	NA	BA03	NA	24	NA	NA	NA	oral implant
C06692	C06695	20	81	73.0	f	26-Oct	NA	BA03	NA	25	NA	NA	NA	surgical implant
C06701	C06702	20	82	80.0	f	26-Oct	NA	BA03	NA	26	NA	NA	NA	oral implant
C06703	C06704	20	83	92.0	m	26-Oct	NA	BA03	NA	27	NA	NA	NA	oral implant
C06696	C06697	20	84	88.0	m	26-Oct	NA	BA03	NA	28	NA	NA	NA	oral implant
C06698	NA	20	85	86.0	f	26-Oct	NA	BA03	NA	29	NA	NA	NA	surgical implant
C06705	C06706	20	86	73.0	f	26-Oct	NA	BA03	NA	30	NA	NA	NA	surgical implant
C06707	C06708	20	87	62.0	m	27-Oct	NA	BA03	NA	37	NA	NA	NA	surgical implant
C06709	C06710	20	88	65.0	m	27-Oct	NA	BA03	NA	38	NA	NA	NA	oral implant
C06711	C06712	20	89	83.0	m	27-Oct	NA	BA03	NA	39	NA	NA	NA	surgical implant
C06713	C06714	20	90	100.0	m	27-Oct	NA	BA03	NA	47	NA	NA	NA	oral implant

[a] Shaded radio-tagged steelhead were previously anchor-tagged in 1993.

[b] Five frequencies (MHz) were used: Channels 12=149.540, 14=149.580, 16=149.620, 18=149.660 and 20=149.700.

[c] Scar code: A=seal, B=gillnet, C=troll, D=hook, E=other, and F=none.

[d] Health code: 1=excellent (little scale loss/extremely vigourous), 2=good (some scale loss/vigourous), 3=fair (mod. scale loss/sluggish), and 4=poor (heavy scale loss/lethargic).

[e] Not available or not applicable.

[f] Radio tagging of steelhead in the Babine R. was conducted by MELP personnel from Smithers for a study investigating the effects of orally vs. surgically implanting radio tags.

Table A-4. Information concerning radio-tagged steelhead recovered during the 1995 Skeena River telemetry program.

Date		Radio tag		Anchor tag				Radio tag	Recovery		Size	
Recovery	Tagging	Chan	Code	First	Second	Presen	Reported by	recovered[a]	location	Sex	(cm)	Comments
Aboriginal food fishery												
11 Aug	26 Jul	14	2	N07180	N07181	?	Telemetry	stationary	above Kitselas	F	73.0	susp. food fish/regurg. at net site
19 Aug	07 Aug	18	48	N07189	N07190	both	Hazelton Band	yes	Price Cr.	F	71.5	seine capture, released fish, kept tag
01 Sep	26 Aug	18	29	N07249	N07902	?	Telemetry	stationary	Chimdemash	F	68.0	susp. food fish/regurg. at seine site
07 Sep	07 Aug	16	91	N07192	NA	?	Telemetry	stationary	below Price Cr.	F	76.0	susp. mort after net cap./release
07 Sep	26 Aug	16	34	N07906	N07907	?	Telemetry	stationary	Kispiox mouth	M	86.0	susp. food fish/regurg. at net site
08 Sep	28 Aug	14	51	N07937	N07938	both	Arnold Russell	yes	Kitseguecla	M	78.0	captured by gillnet
21 Sep	15 Sep	16	43	N07336	N07337	?	Telemetry	stationary	Kitwanga Br.	F	83.0	susp. food fish/regurg. at net site
21 Sep	17 Sep	12	45	N07320	N07321	?	Telemetry	stationary	Kitwanga Br.	F	72.0	susp. food fish/regurg. at net site
23 Sep	14 Sep	14	45	N07326	N07327	?	Telemetry	disappeared	below Cedarville	F	74.0	disappeared at food fish site
24 Sep	16 Sep	16	67	N07283	N07284	?	Telemetry	disappeared	below Price Cr	F	70.0	disappeared at food fish site
26 Sep	16 Sep	18	7	N07312	N07313	?	Telemetry	disappeared	below Price Cr.	M	93.0	disappeared at food fish site
27 Sep	13 Sep	16	47	N07255	N07256	?	Telemetry	stationary	below Price Cr.	F	77.0	susp. food fish/regurg. at seine site
08 Oct	08 Aug	12	48	N07198	N07199	?	Telemetry	exited	near Cedarville	F	58.0	susp. food fish recapture
06 Nov	17 Sep	16	21	N07318	N07319	both	Gordon Thomas	yes	Moricetown	F	72.0	angled at Idiot Rock
Sport fishery												
26 Aug	16 Aug	16	39	N07212	N07213	?	Telemetry	stationary	Ferry Island	F	72.0	sportfish/regurg. at sport fish site
21 Sep	16 Aug	12	52	N07214	N07215	both	Francis Wolfson	released	Kispiox R.	M	83.0	angled at the "potato patch"
26 Sep	16 Sep	14	32	N07308	N07310	?	Telemetry	exited	Suskwa R.	F	75.0	susp. sport fish recapture
11 Oct	19 Sep	14	96	N07946	N07947	1 or 2	F. & W. Boyd	released	Sustut R.	M	81.0	1.6 km below jct'n Bear R.
14 Oct	24 Aug	16	37[b]	S02463	N07237	both	Glen Sikkes	released	Bulkley R.	F	59.0	angled at Moricetown
18 Oct	07 Sep	14	19	N07964	N07965	both	Dave Goodheart	released	Babine R.	M	70.0	angled btwn Shelagyote & Home Run
Mark-recapture recoveries												
04 Sep	23 Jul	14	97	N07177	N07178	both	Ian Bergsma	released	Sustut fence	M	87.0	good condition, Johanson Cr.
09 Oct	17 Aug	12	35	N07223	N07224	one	Leslie Morris	released	Moricetown	F	65.0	good condition, at the falls
Tagging-related losses												
02 Aug	27 Jul	16	96	N07183	N07184	?	Telemetry	exited	Excham. station	M	57.0	left Skeena alive
10 Aug	05 Aug	12	61	N07185	N07186	?	Telemetry	stationary	below Ferry Is.	F	82.0	suspected tagging mortality

Table A-4. Information concerning radio-tagged steelhead recovered during the 1995 Skeena River telemetry program.

Date		Radio tag		Anchor tag				Radio tag	Recovery		Size	
Recovery	Tagging	Chan	Code	First	Second	Presen	Reported by	recovered [a]	location	Sex	(cm)	Comments
23 Aug	15 Aug	12	51	N07206	N07207	?	Telemetry	exited	Excham. station	F	70.0	left Skeena alive
24 Aug	16 Aug	18	31 [b]	N07217	N07218	?	Telemetry	exited	Excham. station	M	77.0	left Skeena alive
28 Aug	19 Aug	14	34	N07229	N07230	?	Telemetry	exited	Excham. station	F	67.0	left Skeena alive
30 Aug	16 Aug	14	47	N07208	N07211	?	Telemetry	stationary	below Kasiks	M	79.0	suspected tagging mortality
30 Aug	16 Aug	14	42	N07219	N07220	?	Telemetry	exited	Excham. station	F	55.0	left Skeena alive
31 Aug	26 Aug	16	27	N07914	N07915	?	Telemetry	stationary	Ferry Island	F	78.0	suspected tagging mortality
01 Sep	24 Aug	14	41	N07238	N07239	?	Telemetry	stationary	Below Ferry Is.	F	72.0	suspected tagging mortality
01 Sep	24 Aug	14	44	N07234	N07235	?	Telemetry	stationary	Log Cr.	F	76.0	suspected tagging mortality
01 Sep	26 Aug	14	43	N07908	N0709	?	Telemetry	exited	Excham. station	F	75.0	left Skeena alive
08 Sep	25 Aug	16	40	N07247	N07248	?	Telemetry	stationary	Snowband Cr.	F	76.0	suspected tagging mortality
08 Sep	28 Aug	16	22	N07928	N07930	?	Telemetry	stationary	below Kwinitsa	F	84.0	suspected tagging mortality
12 Sep	08 Sep	14	99	N07967	N07968	?	Telemetry	exited	Excham. station	F	64.0	left Skeena alive
14 Sep	06 Sep	14	46	N07953	N07954	?	Telemetry	stationary	above Khyex R.	F	70.0	suspected tagging mortality
14 Sep	07 Sep	14	17	N07961	N07962	?	Telemetry	stationary	Marigonish Cr.	M	75.0	suspected tagging mortality
15 Sep	15 Sep	14	40	N07340	N07341	?	Telemetry	stationary	Kitselas	F	76.0	regurgitation at fishwheel
18 Sep	09 Sep	12	2	N07976	N07977	?	Telemetry	stationary	near Khyex R.	F	79.0	suspected tagging mortality
18 Sep	16 Sep	14	20	N07296	N07297	?	Telemetry	stationary	below Ferry Is.	F	88.0	suspected tagging mortality
19 Sep	13 Sep	18	46	N07257	N07258	?	Telemetry	stationary	near Alder Cr.	F	68.0	suspected tagging mortality
20 Sep	09 Sep	18	39	N07973	N07974	?	Telemetry	stationary	Kwinitsa Cr.	F	72.0	suspected tagging mortality
23 Sep	15 Sep	18	37	N07344	NA	?	Telemetry	stationary	below Kleanza	M	93.0	suspected tagging mortality
24 Sep	18 Sep	16	75	N07942	N07943	?	Telemetry	exited	Excham. station	F	79.0	left Skeena alive
27 Sep	16 Sep	18	91	N07289	N07290	?	Telemetry	stationary	Kwinitsa Cr.	F	73.0	suspected tagging mortality
27 Sep	17 Sep	18	99	N07316	N07317	?	Telemetry	stationary	below Kleanza	F	71.0	suspected tagging mortality
24 Oct	14 Sep	16	44	N07334	N07335	?	Telemetry	exited	Excham. station	F	75.0	left Skeena alive

[a] Radio tags were recovered from a fishery, detected by telemetry, or released unharmed after recording anchor tag numbers.

[b] Shaded radio-tagged steelhead were previously anchor-tagged in 1993.

Table A-5. Information regarding steelhead that were only anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995.

Anchor tag no.	Nose-fork length (cm)	Sex	Tagging date	Release Time	Release Location	Scale Book	Scale No.	Vial no.	Scar code [a]	Health code [b]	Comments
Fishwheel capture - Kitselas											
N07179	81.0	m	25 Jul	10:42	Site 2	47002	9	2	B	2	too scarred to radio tag
N07182	86.0	m	27 Jul	8:15	Site 1	47002	7	4	B/E	2	badly scarred dorsal fin
N07196	50.0	f	08 Aug	8:50	Site 1	47001	8	15	F	1	too small to radio tag
N07203	36.0	m	11 Aug	18:20	Site 1	NA	NA [c]	21	F	1	too small to radio tag
N07919/N07920	54.0	f	27 Aug	8:30	Site 3	47005	3	76	F	1	too small to radio tag
N07955/N07956	55.0	m	06 Sep	17:00	Site 5	47006	5	79	D	2	too small, maxillary damaged
N07957/N07958	69.0	m	06 Sep	17:05	Site 5	47006	4	88	D	3	eye missing, maxillary sev. damaged
N07990	72.0	f	11 Sep	17:28	Site 5	47007	3	113	E	2	major head injury
N07259	55.0	f	13 Sep	15:00	Site 5	47008	2	143	B	1	too small to radio tag
N07347	55.0	f	15 Sep	10:45	Site 1	47010	9	162	F	2	too small to radio tag
N07276	52.0	m	15 Sep	11:14	Site 1	47010	7	154	F	2	too small to radio tag
N07277	58.0	f	15 Sep	14:28	Site 5	47010	6	195	F	2	too small to radio tag
N07287	72.0	f	16 Sep	9:16	Site 2	47011	10	274	E	1	severe fungus on head
N07293	77.0	f	16 Sep	9:55	Site 5	47011	8	155	A	4	severe seal bite on side
N07948	51.0	m	19 Sep	9:55	Site 2	47012	1	211	E	3	caudal erosion, mod. scale loss
Dipnet capture - Moricetown [d]											
47446	70.0	?	26 Jul	NA	Fishway	NA	NA	NA	F	1	good shape
25976	70.0	?	01 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25996	60.0	?	01 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26704	55.0	?	02 Aug	NA	Fishway	NA	NA	NA	E	2	bear claw mark
26708	65.0	?	02 Aug	NA	Fishway	NA	NA	NA	E	2	scars on both sides
26713	66.0	?	02 Aug	NA	Fishway	NA	NA	NA	E	2	damaged dorsal
26891	50.0	?	03 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
25471	68.0	?	08 Aug	NA	Fishway	NA	NA	NA	F	1	
26201	73.0	?	08 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26825	68.0	?	11 Aug	NA	Fishway	NA	NA	NA	F	1	

Table A-5. Information regarding steelhead that were only anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995.

Anchor tag no.	Nose-fork length (cm)	Sex	Tagging date	Release Time	Release Location	Scale Book	Scale No.	Vial no.	Scar code [a]	Health code [b]	Comments
26361	59.0	?	13 Aug	NA	Fishway	NA	NA	NA	F	1	
26363	64.0	?	13 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
26365	51.0	?	13 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
26366	50.0	?	13 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
26368	51.0	?	14 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26369	55.0	?	14 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26903	63.0	?	17 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
S05252	57.0	?	17 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
S05254	60.0	?	17 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
26459	60.0	?	18 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26475	50.0	?	19 Aug	NA	Fishway	NA	NA	NA	B	2	net mark
25478	53.0	?	20 Aug	NA	Fishway	NA	NA	NA	E	2	damaged dorsal
25479	71.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25480	63.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25482	63.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25483	70.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25484	71.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25488	73.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25489	51.0	?	20 Aug	NA	Fishway	NA	NA	NA	E	2	damaged dorsal
25493	50.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25494	61.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25496	72.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25497	73.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25498	74.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25499	57.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25500	53.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25880	56.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25881	53.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape

Table A-5. Information regarding steelhead that were only anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995.

Anchor tag no.	Nose-fork length (cm)	Sex	Tagging date	Release Time	Release Location	Scale Book	Scale No.	Vial no.	Scar code [a]	Health code [b]	Comments
25882	76.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25883	56.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25885	71.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25886	55.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25887	52.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25888	53.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25889	52.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25890	59.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25891	76.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26576	64.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26577	60.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26578	62.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26579	55.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26580	49.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26583	52.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26584	50.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26928	67.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26929	66.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26935	52.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26936	57.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26938	77.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26943	50.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26944	56.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26945	60.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26947	63.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26948	67.0	?	20 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25893	54.0	?	21 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
25897	55.0	?	21 Aug	NA	Fishway	NA	NA	NA	E	2	damaged caudal

Table A-5. Information regarding steelhead that were only anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995.

Anchor tag no.	Nose-fork length (cm)	Sex	Tagging date	Release Time	Release Location	Scale Book	Scale No.	Vial no.	Scar code [a]	Health code [b]	Comments
25900	83.0	?	21 Aug	NA	Fishway	NA	NA	NA	E	2	dorsal damage
26905	62.0	?	21 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26906	67.0	?	21 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26907	69.0	?	21 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26911	52.0	?	22 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26913	60.0	?	22 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26916	52.0	?	22 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26917	56.0	?	22 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26919	67.0	?	22 Aug	NA	Fishway	NA	NA	NA	F	1	good shape
26923	51.0	?	24 Aug	13:25	Fishway	NA	NA	NA	F	2	good shape
26924	73.0	f	24 Aug	13:35	Fishway	NA	NA	312	F	2	heavy scale loss
26922	68.0	?	24 Aug	14:52	Fishway	NA	NA	313	D	1	right hook damage
26921	57.0	?	24 Aug	15:25	Fishway	NA	NA	316	F	2	good shape
26585	87.0	f	25 Aug	9:56	Fishway	NA	NA	NA	F	2	good shape
26586	54.0	f	25 Aug	10:25	Fishway	NA	NA	317	E	1	dorsal fin damage
26587	53.0	f	25 Aug	12:50	Fishway	NA	NA	NA	F	1	good shape
26588	?	?	25 Aug	14:00	Fishway	NA	NA	319	F	1	good shape
26589	70.0	m	26 Aug	7:50	Fishway	NA	NA	NA	F	2	good shape
26590	72.0	m	26 Aug	7:55	Fishway	NA	NA	NA	F	2	good shape
26591	78.0	m	26 Aug	8:30	Fishway	NA	NA	NA	F	1	good shape
26592	64.0	f	26 Aug	9:22	Fishway	NA	NA	322	F	1	good shape
26593	71.0	f	26 Aug	9:33	Fishway	NA	NA	NA	F	1	good shape
26594	71.0	f	26 Aug	10:30	Fishway	NA	NA	NA	F	3	good shape
26596	82.0	f	29 Aug	14:05	Fishway	NA	NA	NA	F	4	dropped on rock
26597	72.0	?	30 Aug	11:45	Fishway	NA	NA	NA	F	2	good shape
26598	71.0	?	30 Aug	11:50	Fishway	NA	NA	NA	F	2	good shape
26599	78.0	f	30 Aug	11:52	Fishway	NA	NA	NA	F	2	good shape
26600	58.0	m	30 Aug	12:23	Fishway	NA	NA	NA	F	1	good shape

Table A-5. Information regarding steelhead that were only anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995.

Anchor tag no.	Nose-fork length (cm)	Sex	Tagging date	Release Time	Release Location	Scale Book	Scale No.	Vial no.	Scar code [a]	Health code [b]	Comments
26601	72.0	m	30 Aug	12:35	Fishway	NA	NA	NA	F	4	bleeding from gills
26477	72.0	f	30 Aug	12:45	Fishway	NA	NA	NA	F	4	bleeding from gills
26478	68.0	f	30 Aug	13:00	Fishway	NA	NA	NA	F	1	good shape
26479	57.0	f	30 Aug	13:02	Fishway	NA	NA	NA	F	1	good shape
26480	92.0	m	30 Aug	13:15	Fishway	NA	NA	NA	F	3	held in net too long
26481	80.0	m	30 Aug	13:15	Fishway	NA	NA	NA	B	3	held in net too long
26482	72.0	f	30 Aug	13:25	Fishway	NA	NA	NA	A	4	dropped on rocks
26483	56.0	m	30 Aug	14:15	Fishway	NA	NA	NA	F	4	dropped on rocks
26485	76.0	m	30 Aug	14:20	Fishway	NA	NA	NA	F	1	good shape
26486	51.0	m	30 Aug	14:25	Fishway	NA	NA	NA	B	4	gilled in net
26487	54.0	m	30 Aug	14:30	Fishway	NA	NA	NA	F	4	some bleeding
26488	71.0	f	30 Aug	14:31	Fishway	NA	NA	NA	F	2	good shape
26489	72.0	m	30 Aug	14:46	Fishway	NA	NA	NA	F	1	good shape
26491	73.0	f	30 Aug	15:25	Fishway	NA	NA	NA	F	1	good shape
26492	73.0	m	30 Aug	15:35	Fishway	NA	NA	NA	F	1	good shape
26493	75.0	m	30 Aug	15:40	Fishway	NA	NA	NA	F	1	good shape
26494	80.0	m	30 Aug	15:45	Fishway	NA	NA	NA	F	1	good shape
26495	70.0	f	30 Aug	15:50	Fishway	NA	NA	NA	F	1	good shape
26496	51.0	f	30 Aug	16:00	Fishway	NA	NA	NA	F	1	good shape
26497	55.0	f	30 Aug	16:13	Fishway	NA	NA	NA	F	4	bleeding from gills
26498	71.0	f	30 Aug	16:20	Fishway	NA	NA	NA	F	1	good shape
26499	58.0	f	31 Aug	10:50	Fishway	NA	NA	NA	F	1	good shape
26500	67.0	f	31 Aug	10:52	Fishway	NA	NA	NA	F	1	good shape
26376	70.0	m	31 Aug	11:00	Fishway	NA	NA	326	F	1	good shape
26377	50.0	f	31 Aug	11:02	Fishway	NA	NA	NA	F	3	heavy scale loss
26378	87.0	f	07 Sep	11:43	Fishway	NA	NA	NA	F	2	prev. red anchor tag CF00908
26379	81.0	?	13 Sep	11:14	Fishway	NA	NA	NA	F	1	good shape
26380	57.0	?	13 Sep	11:50	Fishway	NA	NA	NA	F	4	bleeding from gills

Table A-5. Information regarding steelhead that were only anchor-tagged during the Skeena River telemetry program, 15 July - 21 September 1995.

Anchor tag no.	Nose-fork length (cm)	Sex	Tagging date	Release Time	Release Location	Scale Book	Scale No.	Vial no.	Scar code [a]	Health code [b]	Comments
26381	86.0	?	13 Sep	12:00	Fishway	NA	NA	NA	F	3	damaged eye
26382	65.0	?	13 Sep	13:38	Fishway	NA	NA	NA	F	1	good shape
26383	73.0	?	13 Sep	13:44	Fishway	NA	NA	NA	F	1	good shape
26384	57.0	?	13 Sep	13:47	Fishway	NA	NA	NA	F	1	good shape
26385	55.0	?	13 Sep	13:54	Fishway	NA	NA	NA	D	2	snag mark
26386	83.0	?	13 Sep	14:18	Fishway	NA	NA	NA	F	1	good shape
26387	75.0	?	13 Sep	15:30	Fishway	NA	NA	NA	F	1	good shape
26388	57.0	?	13 Sep	16:00	Fishway	NA	NA	NA	F	1	good shape
26389	76.0	?	14 Sep	10:00	Fishway	NA	NA	NA	E	3	damaged nose
26390	92.0	?	14 Sep	12:13	Fishway	NA	NA	NA	F	1	good shape
26391	64.0	?	14 Sep	16:39	Fishway	NA	NA	NA	F	1	good shape
26393	65.0	?	15 Sep	11:03	Fishway	NA	NA	NA	F	1	good shape
26394	71.0	?	15 Sep	11:52	Fishway	NA	NA	NA	E	4	bleeding from eye
26395	70.0	?	15 Sep	14:51	Fishway	NA	NA	NA	F	1	good shape
26396	75.0	?	15 Sep	15:00	Fishway	NA	NA	NA	F	1	good shape
26397	73.0	?	15 Sep	15:43	Fishway	NA	NA	NA	F	1	good shape

[a] Scar code: A=seal, B=gillnet, C=troll, D=hook, E=other, and F=none.

[b] Health code: 1=excellent (little scale loss/extremely vigourous), 2=good (some scale loss/vigourous), 3=fair (mod. scale loss/sluggish), and 4=poor (heavy scale loss/lethargic).

[c] Not available or not applicable.

[d] Tagging at Moricetown was conducted by the Office of the Wet'suwet'en Hereditary Chiefs with LGL participation from 24 August - 15 September. Orange Skeena Fish Commission anchor tags were used.

Table A-6. Information concerning anchor-tagged steelhead recovered during the 1995 Skeena River telemetry program.

Date				Recovery		Size	
Recovery	Tagging	Tag no.	Reported by	location	Sex	(cm)	Comments
Aboriginal food fishery							
18 Aug	02 Aug	26713 [a]	Mark Tommy	Moricetown	?	66.0	dipnet capture, released in good condition
07 Sep	20 Aug	25489	Gary McKinnon	Moricetown	?	51.0	dipnet capture, released in good condition
11 Sep	08 Aug	25471	Mark Tommy	Moricetown	?	68.0	harvested by gaffing
13 Sep	30 Aug	26492	Gary McKinnon	Moricetown	m	73.0	dipnet capture, released
14 Sep	18 Aug	26459	Gary McKinnon	Moricetown	?	60.0	dipnet capture, released, heavy scale loss
15 Sep	30 Aug	26493	Earl Mitchell	Moricetown	m	75.0	dipnet captured, fish harvested
26 Sep	14 Sep	26389	Earl Mitchell	Moricetown	?	76.0	dipnet captured, fish harvested
Sport fishery							
24 Aug	19 Aug	26469	Paul Balise	Bulkley R.	?	56.0	angled and released
26 Sep	20 Aug	25494 [b]	Dave Goodheart	Bulkley R.	f	61.0	angled and released at Chicken Cr.
04 Oct	13 Sep	26380	Mike Maxwell	Bulkley R.	?	57.0	angled and released near Smithers
09 Oct	30 Aug	26483	Andre LePort	Bulkley R.	m	56.0	angled and released near Driftwood Cr.
13 Oct	19 Aug	26475	Robert Hasner	Bulkley R.	f	50.0	angled and released near Quick
Incidental recoveries							
29 Aug	20 Aug	25499	Richard Alexander	Kleanza Cr.	?	57.0	fish discovered near shore, severe fungus

[a] Shaded steelhead were tagged at the Moricetown fishway.

[b] Angler identified tag number as 26494, however based on the size and sex recorded, the information provided matched tag number 25494.

Table A-7. Last known positions of steelhead radio-tagged during the 1995 Skeena River telemetry program.

Last known location	Fish	Radio tag		Survey	Survey	Date			GPS position		
Tagging location	no.	Chan	Code	method	code[a]	Position	Tagging	Time	Latitude	Longitude	Comments
Sustut River											
Kitselas	1	14	97	F31	SU03	24 Aug	23 Jul	17:36			upstream antenna
Kitselas	10	12	99	F31	SU03	04 Sep	11 Aug	21:14			upstream antenna
Kitselas	90	18	44	F30	SU01	03 Oct	16 Sep	14:23			
Babine River											
Kitselas	59	12	31	HEL	BA02	09 Nov	13 Sep	14:53	55.63671	127.4210	
Kitselas	47	12	78	HEL	BA02	09 Nov	09 Sep	14:46	55.60064	127.1734	
Kitselas	66	12	16	HEL	BA03	09 Nov	13 Sep	14:42	55.61839	127.0384	
Kitselas	58	12	33	HEL	BA03	09 Nov	13 Sep	14:40	55.62043	126.9531	
Kitselas	45	14	19	HEL	BA03	09 Nov	07 Sep	14:37	55.59254	126.8597	
Kitselas	41	14	23	HEL	BA03	09 Nov	02 Sep	14:41	55.62062	126.9647	
Kitselas	63	14	28	HEL	BA03	09 Nov	13 Sep	14:36	55.57137	126.8194	
Kitselas	40	14	35	HEL	BA03	09 Nov	29 Aug	14:36	55.57356	126.8235	
Kitselas	22	16	46	HEL	BA03	09 Nov	23 Aug	14:34	55.55623	126.7897	
Kitselas	98	18	8	HEL	BA03	09 Nov	18 Sep	14:43	55.61952	127.0564	
Kitselas	65	18	24	HEL	BA03	09 Nov	13 Sep	14:42	55.61878	127.0192	
Kitselas	23	18	27	HEL	BA03	09 Nov	24 Aug	14:44	55.61930	127.1142	
Babine R.	121	20	7	HEL	BA03	09 Nov	25 Oct	14:43	55.61997	127.0611	
Babine R.	122	20	8	HEL	BA03	09 Nov	25 Oct	14:32	55.53392	126.7626	
Babine R.	124	20	22	HEL	BA03	09 Nov	25 Oct	14:33	55.56281	126.7911	
Babine R.	126	20	28	HEL	BA03	09 Nov	25 Oct	14:31	55.52576	126.7418	
Babine R.	127	20	29	HEL	BA03	27 Oct	25 Oct	10:37	55.49917	126.7235	
Babine R.	130	20	33	HEL	BA03	09 Nov	25 Oct	14:31	55.52946	126.7512	
Babine R.	133	20	36	HEL	BA03	09 Nov	25 Oct	14:32	55.53392	126.7626	
Babine R.	135	20	41	HEL	BA03	09 Nov	26 Oct	14:35	55.56979	126.8085	
Babine R.	136	20	69	HEL	BA03	09 Nov	26 Oct	14:35	55.56979	126.8085	
Babine R.	137	20	70	HEL	BA03	09 Nov	26 Oct	14:40	55.62068	126.9254	
Babine R.	138	20	74	HEL	BA03	09 Nov	26 Oct	14:36	55.57694	126.8349	
Babine R.	139	20	77	HEL	BA03	09 Nov	26 Oct	14:36	55.57861	126.8385	

Table A-7. Last known positions of steelhead radio-tagged during the 1995 Skeena River telemetry program.

Last known location	Fish	Radio tag		Survey	Survey	Date			GPS position		
Tagging location	no.	Chan	Code	method	code [a]	Position	Tagging	Time	Latitude	Longitude	Comments
Babine R.	140	20	79	HEL	BA03	09 Nov	26 Oct	14:41	55.62062	126.9647	
Babine R.	141	20	81	HEL	BA03	09 Nov	26 Oct	14:37	55.58394	126.8449	
Babine R.	142	20	82	HEL	BA03	09 Nov	26 Oct	14:41	55.62019	126.9940	
Babine R.	143	20	83	HEL	BA03	09 Nov	26 Oct	14:38	55.60225	126.8763	
Babine R.	144	20	84	HEL	BA03	09 Nov	26 Oct	14:41	55.61972	127.0010	
Babine R.	145	20	85	HEL	BA03	09 Nov	26 Oct	14:42	55.61937	127.0077	
Babine R.	146	20	86	HEL	BA03	09 Nov	26 Oct	14:40	55.62068	126.9254	
Babine R.	147	20	87	HEL	BA03	09 Nov	27 Oct	14:42	55.61844	127.0317	
Babine R.	148	20	88	HEL	BA03	09 Nov	27 Oct	14:39	55.61514	126.8996	
Babine R.	149	20	89	HEL	BA03	09 Nov	27 Oct	14:40	55.62046	126.9411	
Babine R.	150	20	90	HEL	BA03	27 Oct	27 Oct	13:43	55.62073	126.9257	
Babine R.	123	20	21	HEL	BA04	09 Nov	25 Oct	14:30	55.49466	126.7229	
Babine R.	125	20	27	HEL	BA04	09 Nov	25 Oct	14:23	55.52282	126.7337	
Babine R.	128	20	31	HEL	BA04	09 Nov	25 Oct	14:24	55.50232	126.7278	
Babine R.	129	20	32	HEL	BA04	09 Nov	25 Oct	14:30	55.49868	126.7234	
Babine R.	131	20	34	HEL	BA04	09 Nov	25 Oct	14:28	55.45283	126.7014	
Babine R.	132	20	35	HEL	BA04	09 Nov	25 Oct	14:30	55.50142	126.7244	
Babine R.	134	20	39	HEL	BA04	09 Nov	25 Oct	14:30	55.49144	126.7257	
Kispiox River											
Kitselas	15	12	52	HEL	KI01	23 Nov	16 Aug	14:14	55.38475	127.6891	
Kitselas	82	14	52	HEL	KI01	23 Nov	16 Sep	14:50	55.47038	127.7595	
Kitselas	35	16	32	HEL	KI01	23 Nov	27 Aug	14:51	55.45700	127.7496	
Kitselas	67	12	32	HEL	KI02	23 Nov	14 Sep	14:22	55.50936	127.8341	
Kitselas	70	14	38	F21	KI02	27 Nov	14 Sep	17:39			downstream antenna
Kitselas	36	16	24	HEL	KI04	23 Nov	27 Aug	14:37	55.64008	128.1516	
Bulkley River											
Kitselas	72	16	48	F12	BU01	27 Nov	14 Sep	21:36			
Kitselas	53	12	8 [b]	HEL	BU02	24 Nov	11 Sep	12:54			
Kitselas	81	12	19	HEL	BU02	24 Nov	16 Sep	12:59	55.26214	127.5510	

Table A-7. Last known positions of steelhead radio-tagged during the 1995 Skeena River telemetry program.

Last known location	Fish	Radio tag		Survey	Survey	Date			GPS position		
Tagging location	no.	Chan	Code	method	code[a]	Position	Tagging	Time	Latitude	Longitude	Comments
Kitselas	19	12	35	HEL	BU02	09 Nov	17 Aug	10:00	55.24742	127.4532	
Kitselas	51	12	66	HEL	BU02	24 Nov	11 Sep	12:59	55.26214	127.5510	
Kitselas	71	14	39	HEL	BU02	24 Nov	14 Sep	12:54	55.23144	127.4495	
Kitselas	95	16	21	HEL	BU03	06 Nov	17 Sep	23:59			recovered at Idiot Rock
Kitselas	24	16	37[b]	HEL	BU03	24 Nov	24 Aug	11:43	55.07557	127.3133	
Kitselas	64	16	42	HEL	BU03	24 Nov	13 Sep	11:48	55.19160	127.3992	
Kitselas	84	16	51	HEL	BU03	24 Nov	16 Sep	11:44	55.08385	127.3144	
Kitselas	77	18	98	HEL	BU03	24 Nov	15 Sep	11:49	55.20822	127.4088	
Kitselas	57	14	14	HEL	BU07	24 Nov	13 Sep	10:53	54.65565	126.9827	
Kitselas	91	14	49	HEL	BU07	24 Nov	16 Sep	10:51	54.61473	126.8865	
Kitselas	11	12	15	HEL	BU09	24 Nov	14 Aug	10:45	54.45738	126.8200	
Morice River											
Kitselas	8	12	98[b]	HEL	MO03	24 Nov	08 Aug	10:32	54.20540	126.8892	
Upper Skeena River Mainstem											
Kitselas	20	18	28	F30	SK21	15 Sep	19 Aug	13:20			upstream antenna
Kitselas	68	12	29	HEL	SK19	23 Nov	14 Sep	11:19	56.26129	127.5158	
Kitselas	56	12	70	HEL	SK19	23 Nov	13 Sep	11:18	56.26076	127.5191	
Kitselas	79	16	41	HEL	SK19	23 Nov	15 Sep	11:20	56.26491	127.4579	
Kitselas	18	18	32	HEL	SK19	23 Nov	16 Aug	11:13	56.28377	127.7347	
Kitselas	75	12	36	HEL	SK18	23 Nov	15 Sep	13:10	55.99659	127.9174	
Kitselas	101	14	96	HEL	SK18	23 Nov	19 Sep	12:53	56.27486	127.8100	
Kitselas	31	16	34	HEL	SK14	23 Nov	26 Aug	9:52	55.33386	127.6872	susp. rec./reg. at Kispiox
Middle Skeena River Mainstem											
Kitselas	39	14	51	HEL	SK11	08 Sep	28 Aug	23:59			removed at Kitseguecla
Kitselas	74	16	43	HEL	SK11	24 Nov	15 Sep	13:14	55.09610	128.0362	susp. recap./regurg. at net site
Kitselas	96	12	45	HEL	SK10	24 Nov	17 Sep	13:15	55.09719	128.0591	susp. recap./regurg. at net site
Kitselas	54	12	74	HEL	SK10	24 Nov	12 Sep	13:17	55.08146	128.1818	
Kitselas	43	14	16	F11	SK10	28 Nov	06 Sep	15:54			upstream antenna

Table A-7. Last known positions of steelhead radio-tagged during the 1995 Skeena River telemetry program.

Last known location	Fish	Radio tag		Survey	Survey	Date			GPS position		
Tagging location	no.	Chan	Code	method	code[a]	Position	Tagging	Time	Latitude	Longitude	Comments
Kitselas	83	16	67	F11	SK10	24 Sep	16 Sep	12:22			disappeared near Price Cr.
Kitselas	93	18	7	F11	SK10	26 Sep	16 Sep	12:00			disappeared near Price Cr.
Kitselas	6	18	48	HEL	SK10	19 Aug	07 Aug	23:59			removed at Price Cr.
Kitselas	69	14	45	F11	SK09	23 Sep	14 Sep	12:00			disappeared near Cedarville
Kitselas	33	16	45	HEL	SK09	24 Nov	26 Aug	13:19	55.04932	128.2666	
Kitselas	60	16	47	HEL	SK09	24 Nov	13 Sep	13:23	55.04871	128.2823	susp. recap./regurg. at net site
Kitselas	80	18	34	HEL	SK09	24 Nov	15 Sep	13:30	54.90706	128.3895	
Kitselas	62	18	35	HEL	SK09	24 Nov	13 Sep	13:27	55.00100	128.3402	
Kitselas	2	14	2	HEL	SK08	11 Aug	26 Jul	23:59			susp. recap at net site
Kitselas	29	18	29	HEL	SK08	24 Nov	26 Aug	13:40	54.68489	128.3581	susp. recap./regurg. at net site
Kitselas	100	12	83	TRU	SK07	17 Nov	18 Sep	20:46			
Kitselas	76	14	40	HEL	SK07	23 Nov	15 Sep	15:33			regurgitated at tag site
Kitselas	25	16	38	TRU	SK07	20 Oct	24 Aug	18:12			
Kitselas	78	18	37	HEL	SK07	24 Nov	15 Sep	13:44	54.57419	128.4555	susp. tagging mortality
Kitselas	94	18	99	HEL	SK07	23 Nov	17 Sep	8:43	54.56441	128.4432	susp. tagging mortality
Lower Skeena River Mainstem											
Kitselas	88	12	44	HEL	SK06	23 Nov	16 Sep	8:34	54.50183	128.6517	
Kitselas	4	12	61	HEL	SK06	24 Nov	05 Aug	9:08	54.50230	128.5718	susp. tagging mortality
Kitselas	87	14	20	HEL	SK06	24 Nov	16 Sep	13:47	54.51671	128.5625	susp. tagging mortality
Kitselas	26	14	41	HEL	SK06	23 Nov	24 Aug	8:36	54.49748	128.6208	susp. tagging mortality
Kitselas	34	16	27	HEL	SK06	24 Nov	26 Aug	13:47	54.51178	128.5684	susp. tagging mortality
Kitselas	38	16	31	HEL	SK06	15 Nov	28 Aug	12:42	54.49823	128.7051	
Kitselas	97	16	33	HEL	SK06	15 Nov	17 Sep	14:17	54.44651	128.7784	
Kitselas	14	16	39	HEL	SK06	23 Nov	16 Aug	8:34	54.50590	128.6711	susp. recap./regurg. at sport site
Kitselas	50	16	86	HEL	SK06	15 Nov	10 Sep	14:15	54.41858	128.8474	
Kitselas	52	18	36	HEL	SK06	15 Nov	11 Sep	14:16	54.43272	128.8117	
Kitselas	86	12	42	HEL	SK04	15 Nov	16 Sep	14:08	54.35109	129.1508	
Kitselas	55	12	67	HEL	SK04	15 Nov	12 Sep	14:05	54.32251	129.2588	
Kitselas	5	16	92	HEL	SK04	15 Nov	07 Aug	14:04	54.31719	129.3045	
Kitselas	30	18	33	HEL	SK04	15 Nov	26 Aug	14:10	54.37783	129.0707	

Table A-7. Last known positions of steelhead radio-tagged during the 1995 Skeena River telemetry program.

Last known location	Fish	Radio tag		Survey	Survey	Date			GPS position		
Tagging location	no.	Chan	Code	method	code [a]	Position	Tagging	Time	Latitude	Longitude	Comments
Kitselas	89	18	40	HEL	SK04	15 Nov	16 Sep	13:07	54.33116	129.1987	
Kitselas	9	12	48	F05	SK03	09 Oct	08 Aug	22:48			susp. native recap./exit
Kitselas	12	12	51	F05	SK03	23 Aug	15 Aug	20:19			downstream antenna/exit
Kitselas	92	14	32	F05	SK03	30 Sep	16 Sep	20:12			susp. sport recap./exit
Kitselas	21	14	34	F05	SK03	28 Aug	19 Aug	12:00			downstream antenna/exit
Kitselas	17	14	42	F05	SK03	30 Aug	16 Aug	19:47			downstream antenna/exit
Kitselas	32	14	43	F05	SK03	01 Sep	26 Aug	19:06			downstream antenna/exit
Kitselas	46	14	99	F05	SK03	12 Sep	08 Sep	19:32			downstream antenna/exit
Kitselas	73	16	44	F05	SK03	24 Oct	14 Sep	6:58			downstream antenna/exit
Kitselas	99	16	75	F05	SK03	24 Sep	18 Sep	1:47			downstream antenna/exit
Kitselas	3	16	96	F05	SK03	02 Aug	27 Jul	11:41			prob. exit Skeena
Kitselas	16	18	31 [b]	F05	SK03	24 Aug	16 Aug	2:36			downstream antenna/exit
Kitselas	61	18	46	HEL	SK03	15 Nov	13 Sep	13:57	54.21104	129.5671	susp. tagging mortality
Kitselas	49	12	2	HEL	SK02	15 Nov	09 Sep	13:46	54.22485	129.8190	susp. tagging mortality
Kitselas	44	14	17	HEL	SK02	15 Nov	07 Sep	13:50	54.21720	129.8421	susp. tagging mortality
Kitselas	27	14	44	HEL	SK02	15 Nov	24 Aug	13:54	54.18729	129.6691	susp. tagging mortality
Kitselas	42	14	46	TRU	SK02	02 Nov	06 Sep	16:34			susp. tagging mortality
Kitselas	13	14	47	HEL	SK02	15 Nov	16 Aug	13:34	54.28011	129.4000	susp. tagging mortality
Kitselas	37	16	22	HEL	SK02	15 Nov	28 Aug	13:56	54.18457	129.6100	susp. tagging mortality
Kitselas	28	16	40	TRU	SK02	02 Nov	25 Aug	17:29			susp. tagging mortality
Kitselas	7	16	91	HEL	SK02	15 Nov	07 Aug	13:37	54.24079	129.4908	susp. mort from net capture
Kitselas	48	18	39	HEL	SK02	15 Nov	09 Sep	13:56	54.18624	129.6047	susp. tagging mortality
Kitselas	85	18	91	HEL	SK02	15 Nov	16 Sep	13:39	54.22123	129.5598	susp. tagging mortality

[a] For mainstem codes refer to Table B-2.

[b] Shaded radio-tagged steelhead were previously anchor-tagged in 1993.

Table A-8. Factors that could have affected behaviour of steelhead captured in fishwheels and tagged at Kitselas, 1995.

Channel	Code	Tag			Method [a]	Density	Water temp	Length	Health code [b]	Fate [c]	Max Hold time (min)	Tagger [d]
		Date	Time	Site								
14	97	23-Jul	09:00	Site 3	1	64	15	87	2	1	900	1
14	2	26-Jul	21:39	Site 2	1	149	NA	73	2	1	797	2
16	96	27-Jul	19:01	Site 1	1	168	13.5	57	1	0	614	1
12	61	5-Aug	07:34	Site 2	1	115	14	82	2	0	743	5
16	92	7-Aug	08:15	Site 1	1	389	14	76	2	1	745	2
18	48	7-Aug	09:35	Site 1	1	389	14	71.5	3	1	825	2
16	91	7-Aug	17:20	Site 2	1	55	15	76	2	1	390	1
12	98	8-Aug	08:25	Site 1	1	380	14	76	2	1	920	1
12	48	8-Aug	18:50	Site 1	1	505	15.5	58	3	1	555	1
12	99	11-Aug	07:30	Site 2	1	51	15	76	2	1	765	1
12	15	14-Aug	20:00	Site 4	1	71	15	78	3	1	695	1
12	51	15-Aug	18:46	Site 2	2	36	14	70	1	0	601	1
14	47	16-Aug	07:30	Site 1	2	179	NA	79	3	0	897	1
16	39	16-Aug	09:00	Site 2	2	125	14	72	2	0	842	1
12	52	16-Aug	09:40	Site 4	2	24	14	83	1	1	987	1
18	31	16-Aug	10:25	Site 4	2	24	14	77	3	0	1032	1
14	42	16-Aug	17:20	Site 2	2	141	14	55	2	0	470	1
18	32	16-Aug	18:05	Site 4	2	55	14	100	2	1	430	1
12	35	17-Aug	07:40	Site 1	2	136	13	65	3	1	898	1
18	28	19-Aug	10:10	Site 2	2	58	12.5	66	3	1	1023	1
14	34	19-Aug	10:50	Site 4	2	31	13	67	3	0	1055	1
16	46	23-Aug	09:15	Site 2	2	140	14	65	2	1	976	1
14	44	24-Aug	16:50	Site 3	2	226	13	76	2	0	1460	1
16	37	24-Aug	16:55	Site 3	2	226	13	59	2	1	1465	1
14	41	24-Aug	17:20	Site 3	2	226	13	67	2	0	1490	1
18	27	24-Aug	17:40	Site 3	2	226	13	75	2	1	1510	1
16	38	24-Aug	17:55	Site 1	2	335	NA	84	1	0	1537	1
16	40	25-Aug	14:25	Site 3	2	122	13	76	1	0	310	1
18	29	26-Aug	08:35	Site 3	2	262	13	68	1	1	1045	1
18	33	26-Aug	08:45	Site 3	2	262	13	76	1	0	1055	1
16	34	26-Aug	08:55	Site 3	2	262	13	86	1	1	1065	1
14	43	26-Aug	09:20	Site 3	2	262	13	75	1	0	1090	1
16	45	26-Aug	16:45	Site 3	2	158	13.5	88	1	1	430	1
16	27	26-Aug	17:35	Site 3	2	158	13.5	78	2	0	480	1
16	24	27-Aug	16:40	Site 3	2	160	14	82	1	1	470	1
16	22	28-Aug	08:30	Site 3	2	267	13	84	1	0	922	1
16	31	28-Aug	09:15	Site 5	2	125	13	94	1	0	915	1
14	51	28-Aug	16:30	Site 3	2	104	13	78	3	1	440	1
14	35	29-Aug	09:10	Site 3	2	87	13	68	1	1	970	1
14	23	2-Sep	08:45	Site 5	1	51	13.5	59	1	1	980	1
14	46	6-Sep	08:20	Site 1	1	25	14.5	70	2	0	970	1
14	16	6-Sep	17:10	Site 5	1	24	15	68	2	1	500	1
14	17	7-Sep	08:25	Site 5	1	53	15	75	2	0	910	1
14	19	7-Sep	16:35	Site 5	1	81	15	70	2	1	480	1
14	99	8-Sep	16:32	Site 5	1	45	15	64	1	0	489	2
12	78	9-Sep	08:40	Site 5	1	77	14.5	61	1	1	960	1
18	39	9-Sep	08:50	Site 5	1	77	14.5	72	3	0	970	1
12	2	9-Sep	09:00	Site 5	1	77	14.5	79	2	0	980	1
16	86	10-Sep	08:25	Site 5	1	66	14	71	2	0	956	1
12	66	11-Sep	08:55	Site 5	1	90	15	74	2	1	986	1
18	36	11-Sep	09:15	Site 5	1	90	15	74	2	0	1006	1
12	8	11-Sep	17:20	Site 5	1	75	15	73	2	1	470	1
12	74	12-Sep	08:45	Site 1	1	114	14.5	69	2	1	959	1
12	67	12-Sep	16:08	Site 1	1	74	15	85	2	0	420	1
12	70	13-Sep	08:15	Site 2	1	103	14	91	2	1	935	1
14	14	13-Sep	08:55	Site 1	1	138	14	62	2	1	985	1
12	33	13-Sep	09:05	Site 1	1	138	14	76	4	1	995	1
12	31	13-Sep	09:14	Site 1	1	138	14	68	2	1	1004	1

Table A-8. Factors that could have affected behaviour of steelhead captured in fishwheels and tagged at Kitselas, 1995.

		Tag					Water		Health		Max Hold	
Channel	Code	Date	Time	Site	Method [a]	Density	temp	Length	code [b]	Fate [c]	time (min)	Tagger [d]
16	47	13-Sep	10:10	Site 5	1	238	14	77	3	1	970	1
18	46	13-Sep	10:20	Site 5	1	238	14	68	2	0	980	1
18	35	13-Sep	15:10	Site 5	1	78	14.5	80	2	1	280	1
14	28	13-Sep	15:15	Site 5	1	78	14.5	84	3	1	285	1
16	42	13-Sep	15:50	Site 1	1	96	14.5	93	2	1	396	1
18	24	13-Sep	15:55	Site 1	1	96	14.5	60	2	1	401	1
12	16	13-Sep	16:10	Site 1	1	96	14.5	76	1	1	466	1
12	32	14-Sep	09:35	Site 1	1	103	14	60	2	1	1010	1
12	29	14-Sep	16:20	Site 1	1	59	15	74	2	1	400	1
14	45	14-Sep	16:30	Site 1	1	59	15	74	2	1	410	1
14	38	14-Sep	16:37	Site 1	1	59	15	79	2	1	417	1
14	39	14-Sep	17:15	Site 5	1	115	15	70	2	1	410	1
16	48	14-Sep	17:40	Site 5	1	115	15	76	2	1	435	1
16	44	14-Sep	17:42	Site 5	1	115	15	75	2	0	437	1
16	43	15-Sep	08:17	Site 5	1	154	NA	83	1	1	852	4
12	36	15-Sep	09:07	Site 2	1	165	NA	69	2	1	907	4
14	*40*	*15-Sep*	*09:14*	*Site 2*	*1*	*165*	*NA*	*76*	*1*	*reg*	*914*	*4*
18	98	15-Sep	09:46	Site 2	1	165	NA	61	1	1	946	4
18	37	15-Sep	10:36	Site 1	1	183	NA	93	2	0	1070	4
16	41	15-Sep	11:06	Site 1	1	183	NA	75	1	1	1100	4
18	34	15-Sep	14:43	Site 5	1	95	NA	79	2	1	363	4
12	19	16-Sep	08:41	Site 2	1	99	13.5	84	3	1	1049	4
14	52	16-Sep	08:52	Site 2	1	99	13.5	80	1	1	1060	4
16	67	16-Sep	09:02	Site 2	1	99	13.5	72	2	1	1070	4
16	51	16-Sep	09:10	Site 2	1	99	13.5	73	2	1	1078	4
18	91	16-Sep	09:24	Site 2	1	99	13.5	73	3	0	1092	4
12	42	16-Sep	10:05	Site 5	1	193	13.5	72	2	0	1182	4
14	20	16-Sep	10:12	Site 5	1	193	13.5	88	1	0	1189	4
12	44	16-Sep	10:22	Site 5	1	193	13.5	67	1	0	1199	4
18	40	16-Sep	10:29	Site 5	1	193	13.5	76	1	0	1206	4
18	44	16-Sep	10:40	Site 5	1	193	13.5	77	1	1	1217	4
14	49	16-Sep	10:47	Site 5	1	193	13.5	77	1	1	1224	4
14	32	16-Sep	16:27	Site 1	1	34	14	75	2	1	491	4
18	7	16-Sep	17:12	Site 5	1	35	14.5	71	1	1	379	4
18	99	17-Sep	08:46	Site 5	1	79	13	71	3	0	934	4
16	21	17-Sep	09:40	Site 1	1	64	13	72	2	1	1025	4
12	45	17-Sep	09:59	Site 1	1	64	13	70	2	1	1044	4
16	33	17-Sep	16:45	Site 5	1	25	14	85	3	1	465	1
18	8	18-Sep	08:28	Site 5	1	68	14	68.5	2	1	508	3
16	75	18-Sep	09:10	Site 2	1	20	14	79	2	0	998	3
12	83	18-Sep	09:21	Site 2	1	20	14	83	2	0	1009	3
14	96	19-Sep	09:37	Site 5	1	51	13	81	1	1	1012	4
Total				**100**						**63**		

[a] Methods: 1 = released directly off fishwheel, and 2 = transported to calm area and released.

[b] Health code: 1=excellent, 2=good, 3=fair and 4=poor.

[c] Fate: 1 = moved upriver of tagging site, 2 = moved downriver of tagging site within 14 d of tagging without being recaptured. Italics indicate that the tag was regurgitated at the tagging site.

[d] Tagger: 1=Lee, 2=Bartlett, 3=Miller, 4=Alexander, 5=Mason.

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Babine River						
Babine River Mainstem	BA05	HEL	Systematic	11/09/95	14:26	14:27
Babine River Mainstem	BA04	HEL	Systematic	11/09/95	14:20	14:25
Babine River Mainstem	BA04	HEL	Systematic	11/09/95	14:28	14:30
Babine River Mainstem	BA03	HEL	Incidental	10/25/95	16:20	17:00
Babine River Mainstem	BA03	HEL	Incidental	10/26/95	10:00	10:20
Babine River Mainstem	BA03	HEL	Incidental	10/26/95	16:15	16:20
Babine River Mainstem	BA03	HEL	Incidental	10/27/95	10:34	11:00
Babine River Mainstem	BA03	HEL	Incidental	10/27/95	13:30	14:05
Babine River Mainstem	BA03	HEL	Systematic	11/09/95	14:31	14:44
Babine River Mainstem	BA02	HEL	Systematic	11/09/95	14:45	14:58
Babine River Mainstem	BA01	HEL	Systematic	11/09/95	14:59	15:00
Bulkley, Telkwa and Morice Rivers						
Bulkley River Mainstem	BU09	TRU	Systematic	09/19/95	17:01	17:15
Bulkley River Mainstem	BU09	TRU	Systematic	10/29/95	15:48	15:58
Bulkley River Mainstem	BU09	HEL	Systematic	11/24/95	10:43	10:47
Bulkley River Mainstem	BU08	TRU	Systematic	09/19/95	16:52	17:00
Bulkley River Mainstem	BU08	TRU	Systematic	10/29/95	15:59	16:11
Bulkley River Mainstem	BU08	HEL	Systematic	11/24/95	10:48	10:50
Bulkley River Mainstem	BU07	TRU	Systematic	09/19/95	16:46	16:51
Bulkley River Mainstem	BU07	TRU	Systematic	10/29/95	16:12	16:35
Bulkley River Mainstem	BU07	TRU	Systematic	11/07/95	16:13	16:23
Bulkley River Mainstem	BU07	HEL	Systematic	11/24/95	10:51	10:54
Bulkley River Mainstem	BU06	TRU	Systematic	09/19/95	16:38	16:45
Bulkley River Mainstem	BU06	TRU	Systematic	10/29/95	16:36	16:50
Bulkley River Mainstem	BU06	HEL	Systematic	11/24/95	10:55	11:00
Bulkley River Mainstem	BU05	TRU	Systematic	09/19/95	16:06	16:20
Bulkley River Mainstem	BU05	TRU	Systematic	10/19/95	16:50	17:00
Bulkley River Mainstem	BU05	TRU	Systematic	10/30/95	10:00	10:18
Bulkley River Mainstem	BU05	TRU	Systematic	11/07/95	15:35	15:46
Bulkley River Mainstem	BU05	HEL	Systematic	11/24/95	11:31	11:37
Bulkley River Mainstem	BU04	TRU	Systematic	09/16/95	10:21	11:00
Bulkley River Mainstem	BU04	TRU	Systematic	09/19/95	15:40	16:05
Bulkley River Mainstem	BU04	TRU	Systematic	10/19/95	16:01	16:49
Bulkley River Mainstem	BU04	TRU	Systematic	10/30/95	10:19	10:33
Bulkley River Mainstem	BU04	TRU	Systematic	11/07/95	15:04	15:17
Bulkley River Mainstem	BU04	HEL	Systematic	11/24/95	11:38	11:40

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Bulkley River Mainstem	BU03	TRU	Systematic	09/16/95	11:45	12:17
Bulkley River Mainstem	BU03	TRU	Systematic	09/19/95	13:35	14:00
Bulkley River Mainstem	BU03	TRU	Systematic	09/20/95	07:36	07:55
Bulkley River Mainstem	BU03	TRU	Systematic	10/19/95	15:46	16:00
Bulkley River Mainstem	BU03	HEL	Systematic	10/26/95	10:38	10:43
Bulkley River Mainstem	BU03	TRU	Systematic	10/30/95	10:34	10:45
Bulkley River Mainstem	BU03	TRU	Systematic	11/07/95	14:18	14:36
Bulkley River Mainstem	BU03	TRU	Systematic	11/17/95	14:20	14:40
Bulkley River Mainstem	BU03	HEL	Systematic	11/24/95	11:41	11:51
Bulkley River Mainstem	BU02	HEL	Systematic	08/11/95	09:34	09:35
Bulkley River Mainstem	BU02	HEL	Systematic	08/25/95	09:36	09:39
Bulkley River Mainstem	BU02	HEL	Systematic	09/08/95	11:15	11:22
Bulkley River Mainstem	BU02	HEL	Incidental	09/08/95	12:00	12:05
Bulkley River Mainstem	BU02	TRU	Systematic	09/19/95	13:26	13:34
Bulkley River Mainstem	BU02	TRU	Systematic	09/20/95	07:30	07:35
Bulkley River Mainstem	BU02	HEL	Systematic	09/22/95	09:50	09:59
Bulkley River Mainstem	BU02	HEL	Incidental	09/22/95	10:33	10:36
Bulkley River Mainstem	BU02	HEL	Systematic	10/10/95	09:26	09:35
Bulkley River Mainstem	BU02	HEL	Incidental	10/10/95	10:04	10:09
Bulkley River Mainstem	BU02	TRU	Systematic	10/19/95	15:41	15:45
Bulkley River Mainstem	BU02	HEL	Systematic	10/26/95	10:02	10:03
Bulkley River Mainstem	BU02	HEL	Systematic	11/09/95	09:15	09:22
Bulkley River Mainstem	BU02	HEL	Systematic	11/09/95	09:59	10:03
Bulkley River Mainstem	BU02	HEL	Systematic	11/24/95	12:54	13:00
Bulkley River Mainstem	BU01	HEL	Systematic	08/11/95	09:29	09:33
Bulkley River Mainstem	BU01	HEL	Systematic	08/25/95	09:34	09:35
Bulkley River Mainstem	BU01	HEL	Systematic	09/08/95	11:12	11:14
Bulkley River Mainstem	BU01	HEL	Incidental	09/08/95	12:06	12:07
Bulkley River Mainstem	BU01	TRU	Systematic	09/16/95	12:18	12:25
Bulkley River Mainstem	BU01	TRU	Systematic	09/20/95	11:30	11:43
Bulkley River Mainstem	BU01	HEL	Systematic	09/22/95	09:48	09:49
Bulkley River Mainstem	BU01	HEL	Incidental	09/22/95	10:37	10:38
Bulkley River Mainstem	BU01	HEL	Systematic	10/10/95	09:23	09:25
Bulkley River Mainstem	BU01	HEL	Incidental	10/10/95	10:10	10:10
Bulkley River Mainstem	BU01	TRU	Systematic	10/19/95	15:31	15:40
Bulkley River Mainstem	BU01	HEL	Systematic	10/26/95	10:00	10:01
Bulkley River Mainstem	BU01	HEL	Systematic	10/26/95	10:44	10:45
Bulkley River Mainstem	BU01	HEL	Systematic	11/09/95	09:12	09:14

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System[a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Bulkley River Mainstem	BU01	HEL	Systematic	11/09/95	10:04	10:05
Bulkley River Mainstem	BU01	TRU	Systematic	11/17/95	11:41	11:45
Bulkley River Mainstem	BU01	HEL	Systematic	11/24/95	13:01	13:02
Telkwa River	TELK	HEL	Incidental	11/24/95	10:01	10:11
Morice River Mainstem	MO04	HEL	Systematic	11/24/95	10:12	10:26
Morice River Mainstem	MO03	HEL	Systematic	11/24/95	10:27	10:32
Morice River Mainstem	MO02	HEL	Systematic	11/24/95	10:33	10:40
Morice River Mainstem	MO01	TRU	Systematic	09/19/95	17:16	17:23
Morice River Mainstem	MO01	HEL	Systematic	11/24/95	10:41	10:42
Kispiox River						
Kispiox River Mainstem	KI04	HEL	Systematic	11/23/95	14:36	14:39
Kispiox River Mainstem	KI03	TRU	Systematic	11/07/95	12:54	13:15
Kispiox River Mainstem	KI03	HEL	Incidental	11/09/95	15:10	15:20
Kispiox River Mainstem	KI03	HEL	Systematic	11/23/95	14:29	14:35
Kispiox River Mainstem	KI03	HEL	Incidental	11/23/95	14:40	14:44
Kispiox River Mainstem	KI02	TRU	Systematic	10/19/95	14:15	15:16
Kispiox River Mainstem	KI02	TRU	Systematic	11/07/95	12:38	12:53
Kispiox River Mainstem	KI02	TRU	Systematic	11/07/95	13:16	13:27
Kispiox River Mainstem	KI02	HEL	Systematic	11/23/95	14:21	14:28
Kispiox River Mainstem	KI02	HEL	Incidental	11/23/95	14:45	14:49
Kispiox River Mainstem	KI01	TRU	Systematic	09/20/95	12:54	13:03
Kispiox River Mainstem	KI01	TRU	Systematic	10/19/95	14:11	14:17
Kispiox River Mainstem	KI01	TRU	Systematic	10/30/95	13:54	14:11
Kispiox River Mainstem	KI01	TRU	Systematic	11/07/95	11:59	12:05
Kispiox River Mainstem	KI01	TRU	Systematic	11/07/95	12:24	12:37
Kispiox River Mainstem	KI01	TRU	Systematic	11/07/95	13:28	13:44
Kispiox River Mainstem	KI01	TRU	Systematic	11/17/95	12:51	13:06
Kispiox River Mainstem	KI01	TRU	Systematic	11/17/95	13:32	13:49
Kispiox River Mainstem	KI01	HEL	Systematic	11/23/95	14:13	14:20
Kispiox River Mainstem	KI01	HEL	Incidental	11/23/95	14:50	14:55
Skeena River Mainstem						
Upper River Mainstem	SK21	HEL	Systematic	11/09/95	12:32	12:53
Upper River Mainstem	SK20	HEL	Systematic	08/25/95	12:03	12:05
Upper River Mainstem	SK20	HEL	Systematic	09/08/95	14:15	14:18
Upper River Mainstem	SK20	HEL	Systematic	09/22/95	12:27	12:29
Upper River Mainstem	SK20	HEL	Systematic	10/10/95	11:55	11:56

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Upper River Mainstem	SK20	HEL	Systematic	10/26/95	12:39	12:42
Upper River Mainstem	SK20	HEL	Systematic	11/09/95	12:03	12:05
Upper River Mainstem	SK20	HEL	Systematic	11/23/95	11:22	11:24
Upper River Mainstem	SK19	HEL	Systematic	08/25/95	11:55	12:02
Upper River Mainstem	SK19	HEL	Systematic	09/08/95	14:07	14:14
Upper River Mainstem	SK19	HEL	Systematic	09/22/95	12:18	12:26
Upper River Mainstem	SK19	HEL	Systematic	10/10/95	11:44	11:54
Upper River Mainstem	SK19	HEL	Systematic	10/26/95	12:30	12:38
Upper River Mainstem	SK19	HEL	Systematic	11/09/95	11:54	12:02
Upper River Mainstem	SK19	HEL	Systematic	11/23/95	11:12	11:21
Upper River Mainstem	SK19	HEL	Incidental	11/23/95	12:45	12:52
Upper River Mainstem	SK18	HEL	Systematic	08/25/95	11:35	11:54
Upper River Mainstem	SK18	HEL	Systematic	09/08/95	13:42	14:06
Upper River Mainstem	SK18	HEL	Systematic	09/22/95	11:54	12:17
Upper River Mainstem	SK18	HEL	Systematic	10/10/95	10:22	11:43
Upper River Mainstem	SK18	HEL	Systematic	10/26/95	12:10	12:29
Upper River Mainstem	SK18	HEL	Systematic	11/09/95	11:26	11:53
Upper River Mainstem	SK18	HEL	Systematic	11/23/95	10:47	11:11
Upper River Mainstem	SK18	HEL	Incidental	11/23/95	12:53	13:17
Upper River Mainstem	SK17	HEL	Systematic	08/11/95	11:15	11:21
Upper River Mainstem	SK17	HEL	Systematic	08/25/95	11:22	11:34
Upper River Mainstem	SK17	HEL	Systematic	09/08/95	13:23	13:41
Upper River Mainstem	SK17	HEL	Systematic	09/22/95	11:40	11:53
Upper River Mainstem	SK17	HEL	Systematic	10/10/95	10:10	10:21
Upper River Mainstem	SK17	HEL	Systematic	10/26/95	11:57	12:09
Upper River Mainstem	SK17	HEL	Systematic	11/09/95	11:13	11:25
Upper River Mainstem	SK17	HEL	Systematic	11/23/95	10:33	10:46
Upper River Mainstem	SK17	HEL	Incidental	11/23/95	13:18	13:28
Upper River Mainstem	SK16	HEL	Systematic	08/11/95	10:38	10:51
Upper River Mainstem	SK16	HEL	Systematic	08/25/95	10:48	10:58
Upper River Mainstem	SK16	HEL	Systematic	09/08/95	12:43	12:56
Upper River Mainstem	SK16	HEL	Systematic	09/22/95	11:09	11:17
Upper River Mainstem	SK16	HEL	Systematic	10/10/95	10:40	10:47
Upper River Mainstem	SK16	HEL	Systematic	10/26/95	11:21	11:30
Upper River Mainstem	SK16	HEL	Systematic	11/09/95	10:44	10:52
Upper River Mainstem	SK16	HEL	Systematic	11/23/95	10:03	10:10
Upper River Mainstem	SK16	HEL	Incidental	11/23/95	13:29	13:34
Upper River Mainstem	SK15	HEL	Systematic	08/11/95	10:31	10:37

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Upper River Mainstem	SK15	HEL	Systematic	08/25/95	10:41	10:47
Upper River Mainstem	SK15	HEL	Systematic	09/08/95	12:33	12:42
Upper River Mainstem	SK15	HEL	Systematic	09/22/95	10:58	11:08
Upper River Mainstem	SK15	HEL	Systematic	10/10/95	10:30	10:39
Upper River Mainstem	SK15	HEL	Systematic	10/26/95	11:10	11:20
Upper River Mainstem	SK15	HEL	Systematic	11/09/95	10:34	10:43
Upper River Mainstem	SK15	HEL	Systematic	11/23/95	09:54	10:02
Upper River Mainstem	SK15	HEL	Incidental	11/23/95	13:35	13:43
Upper River Mainstem	SK14	HEL	Systematic	08/11/95	10:29	10:30
Upper River Mainstem	SK14	HEL	Systematic	08/25/95	10:38	10:40
Upper River Mainstem	SK14	HEL	Systematic	09/08/95	12:28	12:32
Upper River Mainstem	SK14	TRU	Systematic	09/20/95	13:04	13:19
Upper River Mainstem	SK14	HEL	Systematic	09/22/95	10:55	10:57
Upper River Mainstem	SK14	HEL	Systematic	10/10/95	10:27	10:29
Upper River Mainstem	SK14	TRU	Systematic	10/19/95	14:08	14:10
Upper River Mainstem	SK14	TRU	Systematic	10/19/95	15:17	15:20
Upper River Mainstem	SK14	HEL	Systematic	10/26/95	11:07	11:09
Upper River Mainstem	SK14	TRU	Systematic	10/30/95	13:48	13:53
Upper River Mainstem	SK14	TRU	Systematic	11/07/95	11:38	11:58
Upper River Mainstem	SK14	HEL	Systematic	11/09/95	10:31	10:33
Upper River Mainstem	SK14	TRU	Systematic	11/17/95	12:47	12:50
Upper River Mainstem	SK14	TRU	Systematic	11/17/95	13:50	13:59
Upper River Mainstem	SK14	HEL	Systematic	11/23/95	09:52	09:53
Upper River Mainstem	SK14	HEL	Incidental	11/23/95	14:11	14:12
Upper River Mainstem	SK14	HEL	Incidental	11/23/95	14:56	14:57
Upper River Mainstem	SK13	HEL	Systematic	08/11/95	10:27	10:28
Upper River Mainstem	SK13	HEL	Systematic	08/25/95	10:16	10:22
Upper River Mainstem	SK13	HEL	Systematic	09/08/95	12:08	12:09
Upper River Mainstem	SK13	HEL	Incidental	09/08/95	16:14	16:16
Upper River Mainstem	SK13	TRU	Systematic	09/20/95	13:20	13:25
Upper River Mainstem	SK13	HEL	Systematic	09/22/95	10:39	10:42
Upper River Mainstem	SK13	HEL	Systematic	10/10/95	10:12	10:14
Upper River Mainstem	SK13	TRU	Systematic	10/19/95	13:59	14:07
Upper River Mainstem	SK13	HEL	Systematic	10/26/95	10:46	10:49
Upper River Mainstem	SK13	HEL	Incidental	10/26/95	14:47	14:48
Upper River Mainstem	SK13	TRU	Systematic	10/30/95	13:40	13:47
Upper River Mainstem	SK13	TRU	Systematic	11/07/95	11:30	11:37
Upper River Mainstem	SK13	HEL	Systematic	11/09/95	10:06	10:08

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Upper River Mainstem	SK13	HEL	Systematic	11/09/95	10:29	10:30
Upper River Mainstem	SK13	TRU	Systematic	11/17/95	11:50	12:02
Upper River Mainstem	SK13	TRU	Systematic	11/17/95	12:44	12:46
Upper River Mainstem	SK13	TRU	Systematic	11/17/95	14:00	14:04
Upper River Mainstem	SK13	HEL	Systematic	11/23/95	09:29	09:30
Upper River Mainstem	SK13	HEL	Systematic	11/23/95	09:50	09:51
Upper River Mainstem	SK13	HEL	Incidental	11/23/95	14:58	14:59
Middle River Mainstem	SK12	HEL	Systematic	08/11/95	09:27	09:28
Middle River Mainstem	SK12	HEL	Systematic	08/25/95	09:32	09:33
Middle River Mainstem	SK12	HEL	Incidental	08/25/95	13:58	14:01
Middle River Mainstem	SK12	HEL	Systematic	09/08/95	11:04	11:11
Middle River Mainstem	SK12	HEL	Incidental	09/08/95	16:17	16:23
Middle River Mainstem	SK12	TRU	Systematic	09/20/95	14:25	14:40
Middle River Mainstem	SK12	HEL	Systematic	09/22/95	09:39	09:47
Middle River Mainstem	SK12	HEL	Systematic	10/10/95	09:16	09:22
Middle River Mainstem	SK12	HEL	Incidental	10/10/95	13:50	13:53
Middle River Mainstem	SK12	TRU	Systematic	10/19/95	13:05	13:19
Middle River Mainstem	SK12	TRU	Systematic	10/20/95	15:51	16:07
Middle River Mainstem	SK12	HEL	Systematic	10/26/95	09:53	09:59
Middle River Mainstem	SK12	HEL	Incidental	10/26/95	14:49	14:55
Middle River Mainstem	SK12	TRU	Systematic	10/30/95	15:25	15:40
Middle River Mainstem	SK12	TRU	Systematic	11/07/95	10:32	10:56
Middle River Mainstem	SK12	HEL	Systematic	11/09/95	09:05	09:11
Middle River Mainstem	SK12	TRU	Systematic	11/17/95	11:24	11:38
Middle River Mainstem	SK12	HEL	Systematic	11/23/95	09:22	09:28
Middle River Mainstem	SK12	HEL	Incidental	11/23/95	15:00	15:04
Middle River Mainstem	SK12	HEL	Incidental	11/24/95	13:03	13:09
Middle River Mainstem	SK11	HEL	Systematic	08/11/95	09:21	09:26
Middle River Mainstem	SK11	HEL	Systematic	08/25/95	09:26	09:31
Middle River Mainstem	SK11	HEL	Incidental	08/25/95	14:02	14:06
Middle River Mainstem	SK11	HEL	Systematic	09/08/95	10:57	11:03
Middle River Mainstem	SK11	HEL	Incidental	09/08/95	16:24	16:31
Middle River Mainstem	SK11	HEL	Systematic	09/22/95	09:31	09:38
Middle River Mainstem	SK11	HEL	Systematic	10/10/95	09:10	09:15
Middle River Mainstem	SK11	TRU	Systematic	10/19/95	12:16	12:20
Middle River Mainstem	SK11	TRU	Systematic	10/20/95	16:08	16:35
Middle River Mainstem	SK11	HEL	Systematic	10/26/95	09:45	09:52
Middle River Mainstem	SK11	HEL	Incidental	10/26/95	14:56	15:02

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Middle River Mainstem	SK11	HEL	Systematic	11/09/95	08:59	09:04
Middle River Mainstem	SK11	HEL	Incidental	11/09/95	15:30	15:33
Middle River Mainstem	SK11	TRU	Systematic	11/17/95	11:05	11:23
Middle River Mainstem	SK11	HEL	Systematic	11/23/95	09:16	09:21
Middle River Mainstem	SK11	HEL	Incidental	11/23/95	15:05	15:09
Middle River Mainstem	SK11	HEL	Incidental	11/24/95	13:10	13:14
Middle River Mainstem	SK10	HEL	Systematic	08/11/95	09:14	09:20
Middle River Mainstem	SK10	HEL	Systematic	08/25/95	09:19	09:25
Middle River Mainstem	SK10	HEL	Incidental	08/25/95	14:07	14:12
Middle River Mainstem	SK10	HEL	Systematic	09/08/95	10:53	10:56
Middle River Mainstem	SK10	HEL	Incidental	09/08/95	16:32	16:35
Middle River Mainstem	SK10	TRU	Systematic	09/12/95	08:56	09:35
Middle River Mainstem	SK10	TRU	Systematic	09/19/95	12:05	12:20
Middle River Mainstem	SK10	HEL	Systematic	09/22/95	09:25	09:30
Middle River Mainstem	SK10	HEL	Systematic	10/10/95	09:06	09:09
Middle River Mainstem	SK10	HEL	Incidental	10/10/95	14:00	14:03
Middle River Mainstem	SK10	TRU	Systematic	10/19/95	11:41	11:49
Middle River Mainstem	SK10	TRU	Systematic	10/19/95	12:07	12:15
Middle River Mainstem	SK10	TRU	Systematic	10/20/95	16:36	16:50
Middle River Mainstem	SK10	HEL	Systematic	10/26/95	09:40	09:44
Middle River Mainstem	SK10	HEL	Incidental	10/26/95	15:23	15:25
Middle River Mainstem	SK10	TRU	Systematic	10/30/95	15:58	16:24
Middle River Mainstem	SK10	HEL	Systematic	11/09/95	08:54	08:58
Middle River Mainstem	SK10	HEL	Incidental	11/09/95	15:34	15:37
Middle River Mainstem	SK10	TRU	Systematic	11/17/95	10:31	11:05
Middle River Mainstem	SK10	HEL	Systematic	11/23/95	09:11	09:15
Middle River Mainstem	SK10	HEL	Incidental	11/23/95	15:10	15:15
Middle River Mainstem	SK10	HEL	Incidental	11/24/95	13:15	13:18
Middle River Mainstem	SK09	HEL	Systematic	08/11/95	09:11	09:13
Middle River Mainstem	SK09	HEL	Incidental	08/11/95	14:02	14:26
Middle River Mainstem	SK09	HEL	Systematic	08/25/95	09:15	09:18
Middle River Mainstem	SK09	HEL	Incidental	08/25/95	14:13	14:30
Middle River Mainstem	SK09	HEL	Systematic	09/08/95	10:34	10:52
Middle River Mainstem	SK09	HEL	Incidental	09/08/95	16:36	16:55
Middle River Mainstem	SK09	TRU	Systematic	09/12/95	08:31	08:55
Middle River Mainstem	SK09	TRU	Systematic	09/16/95	13:30	14:10
Middle River Mainstem	SK09	TRU	Systematic	09/19/95	10:38	11:52
Middle River Mainstem	SK09	HEL	Systematic	09/22/95	09:03	09:24

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System[a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Middle River Mainstem	SK09	HEL	Systematic	10/10/95	08:50	09:05
Middle River Mainstem	SK09	HEL	Incidental	10/10/95	14:04	14:20
Middle River Mainstem	SK09	TRU	Systematic	10/19/95	10:46	11:40
Middle River Mainstem	SK09	TRU	Systematic	10/20/95	16:51	17:26
Middle River Mainstem	SK09	HEL	Systematic	10/26/95	09:25	09:39
Middle River Mainstem	SK09	TRU	Systematic	10/30/95	16:25	17:08
Middle River Mainstem	SK09	HEL	Systematic	11/09/95	08:34	08:53
Middle River Mainstem	SK09	HEL	Incidental	11/09/95	15:38	15:49
Middle River Mainstem	SK09	TRU	Systematic	11/17/95	09:45	10:30
Middle River Mainstem	SK09	HEL	Systematic	11/23/95	08:52	09:10
Middle River Mainstem	SK09	HEL	Incidental	11/23/95	15:16	15:28
Middle River Mainstem	SK09	HEL	Incidental	11/24/95	13:19	13:38
Middle River Mainstem	SK08	HEL	Systematic	07/28/95	08:33	08:55
Middle River Mainstem	SK08	HEL	Incidental	07/28/95	16:49	16:52
Middle River Mainstem	SK08	FOT	Systematic	08/01/95	12:25	12:59
Middle River Mainstem	SK08	HEL	Systematic	08/11/95	08:48	09:10
Middle River Mainstem	SK08	HEL	Incidental	08/11/95	14:27	14:31
Middle River Mainstem	SK08	HEL	Systematic	08/25/95	08:54	09:14
Middle River Mainstem	SK08	HEL	Incidental	08/25/95	14:31	14:35
Middle River Mainstem	SK08	BOA	Systematic	08/29/95	09:30	10:05
Middle River Mainstem	SK08	HEL	Systematic	09/08/95	10:28	10:34
Middle River Mainstem	SK08	HEL	Incidental	09/08/95	16:56	17:01
Middle River Mainstem	SK08	TRU	Systematic	09/12/95	08:20	08:30
Middle River Mainstem	SK08	TRU	Systematic	09/16/95	14:11	14:46
Middle River Mainstem	SK08	BOA	Systematic	09/17/95	10:30	10:54
Middle River Mainstem	SK08	TRU	Systematic	09/19/95	10:11	10:37
Middle River Mainstem	SK08	HEL	Systematic	09/22/95	08:53	09:02
Middle River Mainstem	SK08	HEL	Systematic	10/10/95	08:45	08:49
Middle River Mainstem	SK08	HEL	Incidental	10/10/95	14:21	14:25
Middle River Mainstem	SK08	TRU	Systematic	10/19/95	10:29	10:45
Middle River Mainstem	SK08	TRU	Systematic	10/20/95	17:27	17:54
Middle River Mainstem	SK08	HEL	Systematic	10/26/95	09:20	09:24
Middle River Mainstem	SK08	HEL	Incidental	10/26/95	15:40	15:47
Middle River Mainstem	SK08	TRU	Systematic	10/30/95	17:09	17:28
Middle River Mainstem	SK08	HEL	Systematic	11/09/95	08:27	08:33
Middle River Mainstem	SK08	HEL	Incidental	11/09/95	15:50	15:54
Middle River Mainstem	SK08	TRU	Systematic	11/17/95	09:33	09:44
Middle River Mainstem	SK08	TRU	Systematic	11/17/95	20:25	20:35

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Middle River Mainstem	SK08	HEL	Systematic	11/23/95	08:46	08:51
Middle River Mainstem	SK08	HEL	Incidental	11/23/95	15:29	15:32
Middle River Mainstem	SK08	HEL	Incidental	11/24/95	13:39	13:42
Middle River Mainstem	SK07	HEL	Systematic	07/28/95	08:23	08:32
Middle River Mainstem	SK07	HEL	Incidental	07/28/95	16:53	17:12
Middle River Mainstem	SK07	FOT	Systematic	08/01/95	10:21	12:10
Middle River Mainstem	SK07	HEL	Systematic	08/11/95	08:34	08:47
Middle River Mainstem	SK07	HEL	Incidental	08/11/95	14:32	14:42
Middle River Mainstem	SK07	BOA	Systematic	08/16/95	06:55	07:05
Middle River Mainstem	SK07	BOA	Systematic	08/18/95	13:00	15:00
Middle River Mainstem	SK07	BOA	Systematic	08/21/95	09:50	10:45
Middle River Mainstem	SK07	HEL	Systematic	08/25/95	08:37	08:53
Middle River Mainstem	SK07	HEL	Incidental	08/25/95	14:36	14:45
Middle River Mainstem	SK07	BOA	Systematic	08/29/95	10:06	12:30
Middle River Mainstem	SK07	BOA	Systematic	09/05/95	09:00	13:00
Middle River Mainstem	SK07	HEL	Systematic	09/08/95	10:23	10:27
Middle River Mainstem	SK07	HEL	Incidental	09/08/95	17:02	17:11
Middle River Mainstem	SK07	TRU	Systematic	09/16/95	14:47	15:00
Middle River Mainstem	SK07	BOA	Systematic	09/17/95	10:55	11:53
Middle River Mainstem	SK07	TRU	Systematic	09/19/95	09:57	10:10
Middle River Mainstem	SK07	HEL	Systematic	09/22/95	08:42	08:52
Middle River Mainstem	SK07	HEL	Systematic	10/10/95	08:40	08:44
Middle River Mainstem	SK07	HEL	Incidental	10/10/95	14:26	14:30
Middle River Mainstem	SK07	TRU	Systematic	10/19/95	10:10	10:28
Middle River Mainstem	SK07	TRU	Systematic	10/20/95	18:17	18:30
Middle River Mainstem	SK07	HEL	Systematic	10/26/95	09:15	09:19
Middle River Mainstem	SK07	HEL	Incidental	10/26/95	15:48	15:52
Middle River Mainstem	SK07	TRU	Systematic	10/30/95	17:29	17:40
Middle River Mainstem	SK07	HEL	Systematic	11/09/95	08:21	08:26
Middle River Mainstem	SK07	HEL	Incidental	11/09/95	15:55	15:57
Middle River Mainstem	SK07	TRU	Systematic	11/17/95	20:36	20:46
Middle River Mainstem	SK07	HEL	Systematic	11/23/95	08:38	08:45
Middle River Mainstem	SK07	HEL	Incidental	11/23/95	15:33	15:40
Middle River Mainstem	SK07	HEL	Incidental	11/24/95	09:09	09:10
Middle River Mainstem	SK07	HEL	Incidental	11/24/95	13:43	13:46
Lower River Mainstem	SK06	HEL	Systematic	07/28/95	08:20	08:22
Lower River Mainstem	SK06	HEL	Incidental	07/28/95	17:13	17:15
Lower River Mainstem	SK06	HEL	Systematic	08/11/95	08:25	08:33

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Lower River Mainstem	SK06	HEL	Incidental	08/11/95	14:43	14:52
Lower River Mainstem	SK06	HEL	Systematic	08/17/95	13:25	13:31
Lower River Mainstem	SK06	HEL	Systematic	08/25/95	08:30	08:36
Lower River Mainstem	SK06	HEL	Incidental	08/25/95	14:46	14:49
Lower River Mainstem	SK06	HEL	Incidental	09/01/95	10:14	10:19
Lower River Mainstem	SK06	HEL	Systematic	09/08/95	10:20	10:22
Lower River Mainstem	SK06	HEL	Incidental	09/08/95	17:12	17:19
Lower River Mainstem	SK06	BOA	Systematic	09/17/95	11:54	12:21
Lower River Mainstem	SK06	BOA	Systematic	09/17/95	13:24	14:00
Lower River Mainstem	SK06	HEL	Systematic	09/22/95	08:31	08:41
Lower River Mainstem	SK06	TRU	Systematic	10/06/95	12:20	12:44
Lower River Mainstem	SK06	TRU	Systematic	10/06/95	14:59	15:18
Lower River Mainstem	SK06	HEL	Systematic	10/10/95	08:31	08:39
Lower River Mainstem	SK06	HEL	Incidental	10/10/95	14:31	14:33
Lower River Mainstem	SK06	HEL	Systematic	10/26/95	09:06	09:14
Lower River Mainstem	SK06	HEL	Incidental	10/26/95	15:53	15:54
Lower River Mainstem	SK06	TRU	Systematic	11/02/95	08:45	09:04
Lower River Mainstem	SK06	TRU	Systematic	11/02/95	18:14	18:30
Lower River Mainstem	SK06	HEL	Systematic	11/09/95	08:12	08:20
Lower River Mainstem	SK06	HEL	Systematic	11/15/95	12:17	12:21
Lower River Mainstem	SK06	HEL	Systematic	11/15/95	12:40	12:45
Lower River Mainstem	SK06	HEL	Systematic	11/15/95	12:55	12:58
Lower River Mainstem	SK06	HEL	Systematic	11/15/95	14:15	14:17
Lower River Mainstem	SK06	HEL	Systematic	11/23/95	08:32	08:37
Lower River Mainstem	SK06	HEL	Incidental	11/23/95	15:41	15:44
Lower River Mainstem	SK06	HEL	Incidental	11/24/95	09:06	09:08
Lower River Mainstem	SK06	HEL	Incidental	11/24/95	13:47	13:49
Lower River Mainstem	SK05	TRU	Systematic	10/06/95	12:45	12:54
Lower River Mainstem	SK05	TRU	Systematic	10/06/95	14:51	14:58
Lower River Mainstem	SK05	TRU	Systematic	11/02/95	09:05	09:12
Lower River Mainstem	SK05	TRU	Systematic	11/02/95	18:05	18:13
Lower River Mainstem	SK05	HEL	Systematic	11/15/95	12:59	13:01
Lower River Mainstem	SK05	HEL	Systematic	11/15/95	14:11	14:14
Lower River Mainstem	SK04	TRU	Systematic	10/06/95	12:55	13:14
Lower River Mainstem	SK04	TRU	Systematic	10/06/95	14:39	14:50
Lower River Mainstem	SK04	TRU	Systematic	11/02/95	09:13	09:34
Lower River Mainstem	SK04	TRU	Systematic	11/02/95	17:43	18:04
Lower River Mainstem	SK04	HEL	Systematic	11/15/95	13:02	13:06

Table B-1. Systematic and incidental telemetry surveys conducted in the Skeena River drainage, 1995.

Location	System [a]	Survey Method	Survey Type	Date (mm/dd/yr)	Start time	End time
Lower River Mainstem	SK04	HEL	Systematic	11/15/95	13:30	13:31
Lower River Mainstem	SK04	HEL	Systematic	11/15/95	14:04	14:10
Lower River Mainstem	SK03	TRU	Systematic	10/06/95	13:48	13:54
Lower River Mainstem	SK03	TRU	Systematic	10/06/95	14:35	14:38
Lower River Mainstem	SK03	TRU	Systematic	11/02/95	09:50	09:54
Lower River Mainstem	SK03	TRU	Systematic	11/02/95	17:37	17:42
Lower River Mainstem	SK03	HEL	Systematic	11/15/95	13:32	13:34
Lower River Mainstem	SK03	HEL	Systematic	11/15/95	13:57	14:03
Lower River Mainstem	SK02	TRU	Systematic	10/06/95	13:55	14:34
Lower River Mainstem	SK02	TRU	Systematic	11/02/95	09:55	10:15
Lower River Mainstem	SK02	TRU	Systematic	11/02/95	16:27	17:36
Lower River Mainstem	SK02	HEL	Systematic	11/15/95	13:35	13:56
Lower River Mainstem	SK01	TRU	Systematic	11/02/95	10:16	10:30
Sustut River						
Sustut River Mainstem	SU02	HEL	Systematic	09/08/95	14:48	14:53
Sustut River Mainstem	SU02	HEL	Systematic	10/10/95	12:26	12:34
Sustut River Mainstem	SU02	HEL	Systematic	10/26/95	13:14	13:20
Sustut River Mainstem	SU02	HEL	Systematic	11/09/95	13:01	13:04
Sustut River Mainstem	SU02	HEL	Systematic	11/23/95	11:59	12:03
Sustut River Mainstem	SU01	HEL	Systematic	08/25/95	12:29	12:35
Sustut River Mainstem	SU01	HEL	Systematic	08/25/95	12:36	12:41
Sustut River Mainstem	SU01	HEL	Systematic	09/08/95	14:39	14:47
Sustut River Mainstem	SU01	HEL	Systematic	10/10/95	12:20	12:25
Sustut River Mainstem	SU01	HEL	Systematic	10/26/95	13:06	13:13
Sustut River Mainstem	SU01	HEL	Systematic	11/09/95	12:54	13:00
Sustut River Mainstem	SU01	HEL	Systematic	11/23/95	11:50	11:58
Other Skeena Tributaries						
Zymoetz River Mainstem	ZY05	HEL	Systematic	11/24/95	09:50	09:56
Zymoetz River Mainstem	ZY04	HEL	Systematic	11/24/95	09:33	09:49
Zymoetz River Mainstem	ZY03	HEL	Systematic	11/24/95	09:29	09:32
Zymoetz River Mainstem	ZY02	HEL	Systematic	11/24/95	09:25	09:28
Zymoetz River Mainstem	ZY01	HEL	Systematic	11/24/95	09:11	09:24
Lakelse River	LAKE	HEL	Systematic	11/15/95	12:46	12:54
Kitsumkalum River	KALUM	HEL	Systematic	11/15/95	12:22	12:39
Gitnadoix River	GIT	HEL	Systematic	11/15/95	13:07	13:29

[a] System refers to a major tributary or mainstem area. For mainstem codes refer to Table B-2.

Table B-2. Mainstem/survey codes used for telemetry surveys conducted in the Skeena River drainage, 1995.

Survey code	Description	Reach bounds	
		Downstream	Upstream
BA01	Babine River Mainstem	Babine mouth	Shedin Creek
BA02	Babine River Mainstem	Shedin Creek	Shelagyote River
BA03	Babine River Mainstem	Shelagyote River	Home Run
BA04	Babine River Mainstem	Home Run	Nilkitwa River
BA05	Babine River Mainstem	Nilkitwa River	Babine Fence
BU01	Bulkley River Mainstem	Bulkley mouth	Hazelton Bridge
BU02	Bulkley River Mainstem	Hazelton Bridge	Suskwa/Bulkley (F13)
BU03	Bulkley River Mainstem	Suskwa/Bulkley (F13)	Moricetown Falls
BU04	Bulkley River Mainstem	Moricetown Falls	Toboggan/Bulkley (F15)
BU05	Bulkley River Mainstem	Toboggan/Bulkley (F15)	Smithers Airport
BU06	Bulkley River Mainstem	Smithers Airport	Telkwa/Bulkley
BU07	Bulkley River Mainstem	Telkwa/Bulkley	Quick
BU08	Bulkley River Mainstem	Quick	Barret
BU09	Bulkley River Mainstem	Barret	Morice/Bulkley
BU10	Bulkley River Mainstem	Morice/Bulkley	Upper Bulkley
EC01	Ecstall River Mainstem	Ecstall mouth	Hayward Creek
EC02	Ecstall River Mainstem	Hayward Creek	Sparkling Creek
EC03	Ecstall River Mainstem	Sparkling Creek	Ecstall Lake
KI01	Kispiox River Mainstem	Kispiox mouth	McCully Creek
KI02	Kispiox River Mainstem	McCully Creek	Cullon Creek
KI03	Kispiox River Mainstem	Cullon Creek	Ironside Creek
KI04	Kispiox River Mainstem	Ironside Creek	Clifford Creek
KI05	Kispiox River Mainstem	Clifford Creek	Sweetin River
KI06	Kispiox River Mainstem	Sweetin River	Nangeese River
KI07	Kispiox River Mainstem	Nangeese River	Williams Lake Creek
KI08	Kispiox River Mainstem	Williams Lake Creek	East Kispiox River
MO01	Morice River Mainstem	Morice mouth	Morice Bridge
MO02	Morice River Mainstem	Morice Bridge	Owen/Morice
MO03	Morice River Mainstem	Owen/Morice	Lamprey/Morice
MO04	Morice River Mainstem	Lamprey/Morice	Gosnell/Morice
MO05	Morice River Mainstem	Gosnell/Morice	Morice Lake
SK01	Skeena River Mainstem	Skeena Estuary (Area 4-12)	Tyee Test Fishery
SK02	Skeena River Mainstem	Tyee Test Fishery	Kasiks/Skeena

Table B-2. Mainstem/survey codes used for telemetry surveys conducted in the Skeena River drainage, 1995.

Survey code	Description	Reach bounds	
		Downstream	Upstream
SK03	Skeena River Mainstem	Kasiks/Skeena	Exchamsiks/Skeena (F05)
SK04	Skeena River Mainstem	Exchamsiks/Skeena (F05)	Exstew/Skeena
SK05	Skeena River Mainstem	Exstew/Skeena	Shames River
SK06	Skeena River Mainstem	Shames River	Terrace Bridge
SK07	Skeena River Mainstem	Terrace Bridge	Kitselas Canyon
SK08	Skeena River Mainstem	Kitselas Canyon	St. Croix Bridge
SK09	Skeena River Mainstem	St. Croix Bridge	Woodstock Airstrip
SK10	Skeena River Mainstem	Woodstock Airstrip	Kitwanga Bridge
SK11	Skeena River Mainstem	Kitwanga Bridge	Kitseguecla Bridge
SK12	Skeena River Mainstem	Kitseguecla Bridge	Bulkley/Skeena (F12)
SK13	Skeena River Mainstem	Bulkley/Skeena (F12)	Glen Vowell
SK14	Skeena River Mainstem	Glen Vowell	Kispiox/Skeena
SK15	Skeena River Mainstem	Kispiox/Skeena	Fish Camp
SK16	Skeena River Mainstem	Fish Camp	Babine/Skeena (F25)
SK17	Skeena River Mainstem	Babine/Skeena (F25)	Kuldo Creek
SK18	Skeena River Mainstem	Kuldo Creek	Slamgeesh River
SK19	Skeena River Mainstem	Slamgeesh River	Squingula River
SK20	Skeena River Mainstem	Squingula River	Sustut/Skeena (F30)
SK21	Skeena River Mainstem	Sustut/Skeena (F30)	Mosque/Skeena (upper)
SU01	Sustut River Mainstem	Sustut mouth	Birdflat Creek
SU02	Sustut River Mainstem	Birdflat Creek	Bear/Sustut (F31)
SU03	Sustut River Mainstem	Bear/Sustut (F31)	Upper Sustut
ZY01	Zymoetz River Mainstem	Copper mouth	Clore River
ZY02	Zymoetz River Mainstem	Clore River	Limonite Creek
ZY03	Zymoetz River Mainstem	Limonite Creek	Many Bear Creek
ZY04	Zymoetz River Mainstem	Many Bear Creek	Serb Creek
ZY05	Zymoetz River Mainstem	McDonnel Lake	Upper Copper

Table C-1. Daily counts of tagged and untagged steelhead captured at the Moricetown fishway, 1 July - 20 October 1995.

Date	Fishway observations			
	Tags recovered		Untagged	
	Radio	Anchor only [a]	steelhead	Total
01 Jul	0	0	0	0
02 Jul	0	0	0	0
03 Jul	0	0	0	0
04 Jul	0	0	0	0
05 Jul	0	0	0	0
06 Jul	0	0	0	0
07 Jul	0	0	0	0
08 Jul	0	0	0	0
09 Jul	0	0	0	0
10 Jul	0	0	0	0
11 Jul	0	0	0	0
12 Jul	0	0	0	0
13 Jul	0	0	0	0
14 Jul	0	0	0	0
15 Jul	0	0	0	0
16 Jul	0	0	0	0
17 Jul	0	0	0	0
18 Jul	0	0	3	3
19 Jul	0	0	1	1
20 Jul	0	0	0	0
21 Jul	0	0	2	2
22 Jul	0	0	0	0
23 Jul	0	0	0	0
24 Jul	0	0	0	0
25 Jul	0	0	0	0
26 Jul	0	0	0	0
27 Jul	0	0	1	1
28 Jul	0	0	1	1
29 Jul	0	0	1	1
30 Jul	0	0	1	1
31 Jul	0	0	5	5
01 Aug	0	0	6	6
02 Aug	0	0	5	5
03 Aug	0	0	1	1
04 Aug	0	0	2	2
05 Aug	0	0	15	15
06 Aug	0	0	2	2
07 Aug	0	0	3	3
08 Aug	0	0	17	17
09 Aug	0	0	17	17
10 Aug	0	0	8	8
11 Aug	0	0	12	12
12 Aug	0	0	12	12
13 Aug	0	0	18	18

Table C-1. Daily counts of tagged and untagged steelhead captured at the Moricetown fishway, 1 July - 20 October 1995.

Date	Fishway observations			
	Tags recovered		Untagged	
	Radio	Anchor only [a]	steelhead	Total
14 Aug	0	0	25	25
15 Aug	0	0	22	22
16 Aug	0	0	16	16
17 Aug	0	0	39	39
18 Aug	0	1	25	26
19 Aug	0	0	39	39
20 Aug	0	0	48	48
21 Aug	0	0	31	31
22 Aug	0	0	39	39
23 Aug	0	0	41	41
24 Aug	0	0	35	35
25 Aug	0	0	18	18
26 Aug	0	0	17	17
27 Aug	0	0	14	14
28 Aug	0	0	18	18
29 Aug	0	0	5	5
30 Aug	0	0	45	45
31 Aug	0	0	27	27
01 Sep	0	0	20	20
02 Sep	0	0	16	16
03 Sep	0	0	4	4
04 Sep	0	0	32	32
05 Sep	0	0	28	28
06 Sep	0	0	13	13
07 Sep	0	1	26	27
08 Sep	0	0	26	26
09 Sep	0	0	19	19
10 Sep	0	0	15	15
11 Sep	0	1	10	11
12 Sep	0	0	12	12
13 Sep	0	1	15	16
14 Sep	0	1	17	18
15 Sep	0	1	15	16
16 Sep	0	0	7	7
17 Sep	0	0	7	7
18 Sep	0	0	8	8
19 Sep	0	0	7	7
20 Sep	0	0	2	2
21 Sep	0	0	3	3
22 Sep	0	0	1	1
23 Sep	0	0	3	3
24 Sep	0	0	0	0
25 Sep	0	0	3	3
26 Sep	0	1	3	4

Table C-1. Daily counts of tagged and untagged steelhead captured at the Moricetown fishway, 1 July - 20 October 1995.

	Fishway observations			
	Tags recovered		Untagged	
Date	Radio	Anchor only [a]	steelhead	Total
27 Sep	0	0	12	12
28 Sep	0	0	4	4
29 Sep	0	0	3	3
30 Sep	0	0	4	4
01 Oct	0	0	2	2
02 Oct	0	0	0	0
03 Oct	0	0	1	1
04 Oct	0	0	0	0
05 Oct	0	0	0	0
06 Oct	0	0	0	0
07 Oct	0	0	0	0
08 Oct	0	0	0	0
09 Oct	1	0	2	3
10 Oct	0	0	0	0
11 Oct	0	0	1	1
12 Oct	0	0	1	1
13 Oct	0	0	0	0
14 Oct	0	0	1	1
15 Oct	0	0	0	0
16 Oct	0	0	0	0
17 Oct	0	0	0	0
18 Oct	0	0	0	0
19 Oct	0	0	0	0
20 Oct	0	0	0	0
Total	**1**	**7**	**980**	**988**

[a] Recovered anchor tags were from steelhead tagged at Moricetown (see Table A-6).

Table D-1. Definitions of fish numbers and stock codes used for travel and residence time calculations for steelhead radio-tagged near Kitselas, 1995.

Fish no.	Radio tag		Fish no.	Radio tag	
	Chan	Code		Chan	Code
1	14	97	40	14	35
2	14	2	41	14	23
3	16	96	42	14	46
4	12	61	43	14	16
5	16	92	44	14	17
6	18	48	45	14	19
7	16	91	46	14	99
8	12	98	47	12	78
9	12	48	48	18	39
10	12	99	49	12	2
11	12	15	50	16	86
12	12	51	51	12	66
13	14	47	52	18	36
14	16	39	53	12	8
15	12	52	54	12	74
16	18	31	55	12	67
17	14	42	56	12	70
18	18	32	57	14	14
19	12	35	58	12	33
20	18	28	59	12	31
21	14	34	60	16	47
22	16	46	61	18	46
23	18	27	62	18	35
24	16	37	63	14	28
25	16	38	64	16	42
26	14	41	65	18	24
27	14	44	66	12	16
28	16	40	67	12	32
29	18	29	68	12	29
30	18	33	69	14	45
31	16	34	70	14	38
32	14	43	71	14	39
33	16	45	72	16	48
34	16	27	73	16	44
35	16	32	74	16	43
36	16	24	75	12	36
37	16	22	76	14	40
38	16	31	77	18	98
39	14	51	78	18	37

Table D-1. Definitions of fish numbers and stock codes used for travel and residence time calculations for steelhead radio-tagged near Kitselas, 1995.

Fish	Radio tag		Fish	Radio tag	
no.	Chan	Code	no.	Chan	Code
79	16	41	91	14	49
80	18	34	92	14	32
81	12	19	93	18	7
82	14	52	94	18	99
83	16	67	95	16	21
84	16	51	96	12	45
85	18	91	97	16	33
86	12	42	98	18	8
87	14	20	99	16	75
88	12	44	100	12	83
89	18	40	101	14	96
90	18	44			

Stock codes:

Bulk	Bulkley River
Mori	Morice River
Kisp	Kispiox River
Babi	Babine River
Sust	Sustut River
Sk-Low	Skeena Mainstem - Lower (mouth to Terrace)
Sk-Mid	Skeena Mainstem - Middle (Terrace to Hazelton)
Sk-Up1	Skeena Mainstem - Upper 1 (Hazelton to Babine confluence)
Sk-Up2	Skeena Mainstem - Upper 2 (Babine confluence to upper Skeena)

Table D-2. Travel time (d) between fixed-station receivers on the Skeena River, by stock, for steelhead radio-tagged near Kitselas, 1995.

Site-Site	Bulk	Mori	Kisp	Babi	Sust	LowR	MidR	Upp1	Upp2
Mean									
EXC - ZYM				-2.1		-6.8			-1.8
ZYM - TAG	-20.6	-14.8	-9.1	-4.0	-6.6	-9.9	-7.2		-5.1
TAG - PRI	14.8	22.3	14.3	13.1	8.3	6.5	15.5	6.4	10.4
PRI - BUL	7.3	1.4	3.5	2.6	2.0	2.1	4.8	3.0	2.3
BUL - SKW	4.3	2.5				1.9			
SKW - MTN	4.0	1.5							
MTN - TOB	0.8	0.3							
TOB - MOR		9.5							
BUL - KIS			11.8	8.9	0.0				
BUL - BAB				5.7	4.9				5.9
BAB - SUS					7.8				8.9
SUS - BEA					2.3				10.2
Standard Error									
EXC - ZYM						1.62			
ZYM - TAG	4.59		3.45	2.56	0.94	1.93	1.91		1.93
TAG - PRI	2.68		2.19	1.27	1.82	0.90	5.77		2.09
PRI - BUL	1.71		0.73	0.18	0.17	0.13	1.12		0.26
BUL - SKW	0.58								
SKW - MTN	1.64								
MTN - TOB	0.01								
TOB - MOR									
BUL - KIS			5.08						
BUL - BAB				0.55	1.04				1.39
BAB - SUS					1.58				0.04
SUS - BEA					0.85				
Sample Size									
EXC - ZYM				1		24			1
ZYM - TAG	3	1	3	2	2	37	9		3
TAG - PRI	14	1	6	12	3	4	13	1	7
PRI - BUL	14	1	6	12	3	3	3	1	7
BUL - SKW	11	1				1			
SKW - MTN	6	1							
MTN - TOB	3	1							
TOB - MOR		1							
BUL - KIS			6	1					
BUL - BAB				12	3				7
BAB - SUS					3				2
SUS - BEA					2				1

Table D-3. Residence time (d) at fixed-station receivers on the Skeena River, by stock, for steelhead radio-tagged near Kitselas, 1995.

Site	Bulk	Mori	Kisp	Babi	Sust	LowR	MidR	Upp1	Upp2
Mean									
EXC				1.4		2.5			0.6
ZYM	17.5	12.5	7.7	2.0	5.0	3.0	2.6		2.4
PRI	1.4		4.1	0.1	0.1	0.3	3.1	0.1	0.2
BUL	2.4	0.1		0.1	0.1	6.3	4.2	0.1	0.1
SKW	7.6	0.1				2.2			
MTN	11.3	0.6							
TOB	0.3								
KIS			15.6						
BAB				0.2	0.1				0.1
SUS					0.2				0.1
BEA					0.1				3.0
MOR									
Standard Error									
EXC						1.64			
ZYM	4.85		3.58	2.00	1.77	0.93	1.25		1.46
PRI	0.64		3.12	0.04	0.03	0.15	1.72		0.06
BUL	2.14		0.01	0.04	0.03	3.61	2.88		0.01
SKW	4.90								
MTN	5.74								
TOB	0.23								
KIS			9.28						
BAB				0.07	0.01				0.04
SUS					0.14				
BEA									
MOR									
Sample Size									
EXC				1		24			1
ZYM	3	1	3	2	2	37	9		3
PRI	14	1	6	12	3	4	13	1	7
BUL	14	1	6	12	3	3	3	1	7
SKW	11	1				1			
MTN	6	1				1			
TOB	3	1							
KIS			6	1					
BAB				12	3				7
SUS					3				2
BEA					2				1
MOR		1							

Table D-4. Travel time (d) between fixed-station receivers on the Skeena River for individual steelhead radio-tagged near Kitselas, 1995.

Fish no.	Stock	Release date	EXC ZYM	ZYM TAG	TAG PRI	PRI BUL	BUL SKW	SKW MTN	MTN TOB	TOB MOR	BUL KIS	BUL BAB	BAB SUS	SUS BEA
22	Babine	23-Aug		-6.6	10.5	1.9						3.2		
23	Babine	24-Aug			15.6	2.0						5.9		
40	Babine	29-Aug			16.7	2.3						4.8		
41	Babine	02-Sep			16.5	3.1						5.6		
45	Babine	07-Sep			9.5	2.6						5.2		
47	Babine	09-Sep			10.4	2.3						4.4		
58	Babine	13-Sep			8.5	2.9					8.9	10.0		
59	Babine	13-Sep			22.5	2.8						6.0		
63	Babine	13-Sep	-2.1	-1.5	9.5	2.0						4.1		
65	Babine	13-Sep			12.6	2.4						5.5		
66	Babine	13-Sep			16.3	4.1						8.7		
98	Babine	18-Sep			8.7	2.5						5.0		
11	Bulkley	14-Aug		-15.5	19.7	2.0	2.2	1.8	.8					
19	Bulkley	17-Aug		-29.8	35.8	3.0	2.7	3.8						
24	Bulkley	24-Aug			7.6	2.6	6.0	1.8						
51	Bulkley	11-Sep		-16.5	32.6	10.5								
53	Bulkley	11-Sep			8.4	7.0	6.9							
57	Bulkley	13-Sep			4.7	1.6	7.0	2.6	.8					
64	Bulkley	13-Sep			16.8	16.1	3.8							
71	Bulkley	14-Sep			13.3	5.1	6.4							
72	Bulkley	14-Sep			23.5	20.3								
77	Bulkley	15-Sep			7.4	4.3	4.4							
81	Bulkley	16-Sep			11.9	18.0								
84	Bulkley	16-Sep			14.2	3.1	3.1							
91	Bulkley	16-Sep			4.3	2.1	2.0	1.9	.8					
95	Bulkley	17-Sep			6.4	5.8	3.3	12.1						
15	Kispiox	16-Aug			19.3	2.0					28.5			
35	Kispiox	27-Aug			9.3	4.2					26.8			
36	Kispiox	27-Aug		-11.5	18.8	2.5					1.9			
67	Kispiox	14-Sep		-2.3	8.5	2.7					2.9			
70	Kispiox	14-Sep		-13.6	19.5	2.9					3.0			
82	Kispiox	16-Sep			10.5	6.9					7.7			
8	Morice	08-Aug		-14.8	22.3	1.4	2.5	1.5	.3	9.5				
3	SK-Low	27-Jul	-2.5	-3.9										
4	SK-Low	05-Aug		-5.0										
5	SK-Low	07-Aug	-37.9	-22.8	5.9	2.0								
7	SK-Low	07-Aug	-2.0	-28.9										
9	SK-Low	08-Aug	-.4	-62.5										
12	SK-Low	15-Aug	-6.5	-8.2										
13	SK-Low	16-Aug	-10.3	-12.0										
14	SK-Low	16-Aug		-9.8										
16	SK-Low	16-Aug	-3.8	-4.6										

Table D-4. Travel time (d) between fixed-station receivers on the Skeena River for individual steelhead radio-tagged near Kitselas, 1995.

Fish no.	Stock	Release date	EXC ZYM	ZYM TAG	TAG PRI	PRI BUL	BUL SKW	SKW MTN	MTN TOB	TOB MOR	BUL KIS	BUL BAB	BAB SUS	SUS BEA
17	SK-Low	16-Aug	-5.1	-12.6										
21	SK-Low	19-Aug	-7.7	-7.1										
26	SK-Low	24-Aug		-7.5										
27	SK-Low	24-Aug	-4.8	-2.5										
28	SK-Low	25-Aug	-10.6	-12.5										
30	SK-Low	26-Aug		-15.7										
32	SK-Low	26-Aug	-3.8	-3.0										
34	SK-Low	26-Aug		-1.0										
37	SK-Low	28-Aug	-.5	-10.2										
38	SK-Low	28-Aug		-3.5	8.4									
42	SK-Low	06-Sep	-3.2	-4.6										
44	SK-Low	07-Sep	-4.9	-1.7										
46	SK-Low	08-Sep	-1.9	-3.8										
48	SK-Low	09-Sep	-8.5	-2.9										
49	SK-Low	09-Sep	-.6	-7.8										
50	SK-Low	10-Sep		-5.4										
52	SK-Low	11-Sep		-3.5										
55	SK-Low	12-Sep	-8.5	-2.7										
61	SK-Low	13-Sep	-4.5	-.6										
73	SK-Low	14-Sep	-20.0	-2.9										
85	SK-Low	16-Sep	-8.8	-2.3										
86	SK-Low	16-Sep		-24.5										
87	SK-Low	16-Sep		-1.6										
88	SK-Low	16-Sep		-26.8										
89	SK-Low	16-Sep		-2.4										
92	SK-Low	16-Sep	-1.5	-13.3	4.3	1.9	1.9							
97	SK-Low	17-Sep		-20.6	7.3	2.3								
99	SK-Low	18-Sep	-4.3	-5.2										
2	SK-Mid	26-Jul		-7.2										
6	SK-Mid	07-Aug		-5.7	12.6									
25	SK-Mid	24-Aug		-15.8										
29	SK-Mid	26-Aug		-3.7										
33	SK-Mid	26-Aug		-4.3	14.5	6.8								
39	SK-Mid	28-Aug			7.3	3.0								
43	SK-Mid	06-Sep			82.5									
54	SK-Mid	12-Sep		-3.6	8.7									
60	SK-Mid	13-Sep		-3.8	11.7									
62	SK-Mid	13-Sep			24.7									
69	SK-Mid	14-Sep												
74	SK-Mid	15-Sep			5.4									
76	SK-Mid	15-Sep												
78	SK-Mid	15-Sep		-2.5										

Table D-4. Travel time (d) between fixed-station receivers on the Skeena River for individual steelhead radio-tagged near Kitselas, 1995.

Fish no.	Stock	Release date	EXC ZYM	ZYM TAG	TAG PRI	PRI BUL	BUL SKW	SKW MTN	MTN TOB	TOB MOR	BUL KIS	BUL BAB	BAB SUS	SUS BEA
80	SK-Mid	15-Sep			7.3	4.7								
83	SK-Mid	16-Sep			6.7									
93	SK-Mid	16-Sep			8.7									
94	SK-Mid	17-Sep			7.9									
96	SK-Mid	17-Sep			3.7									
100	SK-Mid	18-Sep		-18.1										
31	SK-Up1	26-Aug			6.4	3.0								
18	SK-Up2	16-Aug		-5.3	16.5	3.2						13.7		
20	SK-Up2	19-Aug		-8.3	13.5	1.8						3.2	8.8	
56	SK-Up2	13-Sep	-1.8	-1.6	18.1	1.7						3.7		
68	SK-Up2	14-Sep			7.5	2.8						7.0		
75	SK-Up2	15-Sep			6.5	1.8						4.7		
79	SK-Up2	15-Sep			6.8	3.0						5.1		
101	SK-Up2	19-Sep			4.0	1.7						3.7	8.9	10.2
1	Sustut	23-Jul		-5.6	9.7	2.0						6.6	10.9	3.2
10	Sustut	11-Aug		-7.5	10.5	1.7						5.1	5.8	1.5
90	Sustut	16-Sep			4.7	2.3						3.0	6.8	

Table D-5. Residence time (d) at fixed-station receivers on the Skeena River for individual steelhead radio-tagged near Kitselas, 1995.

Fish no.	Stock	Release date	Fixed-station receivers											
			EXC	ZYM	PRI	BUL	SKW	MTN	TOB	MOR	KIS	BAB	SUS	BEA
22	Babine	23-Aug		4.0	.1	.0						.6		
23	Babine	24-Aug			.0	.0						.0		
40	Babine	29-Aug			.6	.0						.0		
41	Babine	2-Sep			.1	.0						.0		
45	Babine	7-Sep			.1	.0						.1		
47	Babine	9-Sep			.1	.5						.1		
58	Babine	13-Sep			.1	.1					.0	.1		
59	Babine	13-Sep			.1	.1						.1		
63	Babine	13-Sep	1.4	.0	.0	.0						.1		
65	Babine	13-Sep			.1	.1						.0		
66	Babine	13-Sep			.1	.0						.7		
98	Babine	18-Sep			.1	.0						.0		
11	Bulkley	14-Aug		14.0	.0	.7	.0	2.2	.0					
19	Bulkley	17-Aug		27.1	7.8	.1	.2	0.4						
24	Bulkley	24-Aug			.2	.1	.0	35.1						
51	Bulkley	11-Sep		11.5	.1	.1								
53	Bulkley	11-Sep			.1	.1	45.7							
57	Bulkley	13-Sep			.1	.1	.2	4.3	.8					
64	Bulkley	13-Sep			.6	.1	.3							
71	Bulkley	14-Sep			5.0	.8	34.4							
72	Bulkley	14-Sep			.8	30.3								
77	Bulkley	15-Sep			.9	.5	.8							
81	Bulkley	16-Sep			3.7	.9								
84	Bulkley	16-Sep			.1	.1	1.4							
91	Bulkley	16-Sep			.1	.1	.1	3.9	.1					
95	Bulkley	17-Sep			.5	.0	.1	22.2						
15	Kispiox	16-Aug			.1	.0					40.1			
35	Kispiox	27-Aug			.1	.0					.1			
36	Kispiox	27-Aug		9.8	19.2	.0					.0			
67	Kispiox	14-Sep		.7	5.0	.1					.3			
70	Kispiox	14-Sep		12.5	.1	.0					49.2			
82	Kispiox	16-Sep			.2	.0					4.0			
8	Morice	8-Aug		12.5	.0	.1	.1	0.6	.0	0				
3	SK-Low	27-Jul	.0	.0										
4	SK-Low	5-Aug		2.3										
5	SK-Low	7-Aug	36.2	.2	.4	12.8								
7	SK-Low	7-Aug	.1	.0										
9	SK-Low	8-Aug	.0	.0										
12	SK-Low	15-Aug	.0	5.9										
13	SK-Low	16-Aug	.0	8.8										
14	SK-Low	16-Aug		.0										
16	SK-Low	16-Aug	.0	.3										

Table D-5. Residence time (d) at fixed-station receivers on the Skeena River for individual steelhead radio-tagged near Kitselas, 1995.

Fish no.	Stock	Release date	Fixed-station receivers										
			EXC	ZYM	PRI	BUL	SKW	MTN	TOB	MOR	KIS	BAB	SUS	BEA
17	SK-Low	16-Aug	.1	2.9										
21	SK-Low	19-Aug	1.7	5.2										
26	SK-Low	24-Aug		6.0										
27	SK-Low	24-Aug	.0	.0										
28	SK-Low	25-Aug	.1	9.3										
30	SK-Low	26-Aug		12.9										
32	SK-Low	26-Aug	.0	.0										
34	SK-Low	26-Aug		.0										
37	SK-Low	28-Aug	.0	.0										
38	SK-Low	28-Aug		1.4	.8									
42	SK-Low	6-Sep	.0	.0										
44	SK-Low	7-Sep	.0	.0										
46	SK-Low	8-Sep	.0	.8										
48	SK-Low	9-Sep	.0	.7										
49	SK-Low	9-Sep	.0	.0										
50	SK-Low	10-Sep		2.8										
52	SK-Low	11-Sep		.2										
55	SK-Low	12-Sep	4.8	.2										
61	SK-Low	13-Sep	.0	.0										
73	SK-Low	14-Sep	17.4	.4										
85	SK-Low	16-Sep	.0	.3				0						
86	SK-Low	16-Sep		21.9										
87	SK-Low	16-Sep		.4										
88	SK-Low	16-Sep		23.2										
89	SK-Low	16-Sep		.1										
92	SK-Low	16-Sep	.0	.0	.1	.3	2.2							
97	SK-Low	17-Sep		.0	.1	5.9								
99	SK-Low	18-Sep	.0	3.4										
2	SK-Mid	26-Jul		3.5										
6	SK-Mid	7-Aug		2.4	.0									
25	SK-Mid	24-Aug		12.0										
29	SK-Mid	26-Aug		2.0										
33	SK-Mid	26-Aug		.0	.1	9.9								
39	SK-Mid	28-Aug			.1	.7								
43	SK-Mid	6-Sep			1.1									
54	SK-Mid	12-Sep		2.7	19.3									
60	SK-Mid	13-Sep		1.0	1.6									
62	SK-Mid	13-Sep			14.4									
69	SK-Mid	14-Sep												
74	SK-Mid	15-Sep			.2									
76	SK-Mid	15-Sep												
78	SK-Mid	15-Sep		.1										

Table D-5. Residence time (d) at fixed-station receivers on the Skeena River for individual steelhead radio-tagged near Kitselas, 1995.

Fish no.	Stock	Release date	Fixed-station receivers										
			EXC	ZYM	PRI	BUL	SKW	MTN	TOB	MOR	KIS	BAB	SUS	BEA
80	SK-Mid	15-Sep			.2	2.0								
83	SK-Mid	16-Sep			1.8									
93	SK-Mid	16-Sep			.8									
94	SK-Mid	17-Sep			.7									
96	SK-Mid	17-Sep			.1									
100	SK-Mid	18-Sep		.0										
31	SK-Up1	26-Aug			.1	.1								
18	SK-Up2	16-Aug		2.1	.1	.0						.3		
20	SK-Up2	19-Aug		5.0	.1	.1						.1	0.1	
56	SK-Up2	13-Sep	.6	.0	.1	.0						.0		
68	SK-Up2	14-Sep			.2	.1						.1		
75	SK-Up2	15-Sep			.1	.0						.3		
79	SK-Up2	15-Sep			.5	.1						.1		
101	SK-Up2	19-Sep			.1	.0						.1	0.1	3
1	Sustut	23-Jul		3.3	.0	.1						.0	0.1	0.1
10	Sustut	11-Aug		6.8	.0	.0						.1	0.1	0.1
90	Sustut	16-Sep			.1	.1						.1	0.5	