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Assessment of the Distribution, Timing, and Abundance of Adult Steelhead Returns to the Bella Coola River Watershed in 1997 and 1998

by

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EXECUTIVE SUMMARY

The freshwater migration and spawning behavior of adult steelhead returns to the Bella Coola River watershed were studied using snorkel survey, aerial survey, catch monitoring, and radio-telemetry techniques. The assessment techniques used to derive escapement estimates for summer/fall-run steelhead were different from those required to assess the spring-run component of the steelhead population.

Estimates of the minimum escapement of summer/fall-run steelhead in the Bella Coola-Atnarko watershed were obtained in 1997 and 1998 using aerial and snorkel surveys. These surveys demonstrated that summer/fall-run steelhead can be consistently counted in the Atnarko River during winter low-flow periods. A systematic series of snorkel surveys covering 14 km of the Atnarko River (22% of the mainstem and spawning tributaries accessible to steelhead) conducted once every 7-10 days between late February and early April (or spring freshet) is required to detect the peak abundance and provide a minimum estimate of the escapement for the summer/fall-run component of the stock. These surveys also showed that aerial surveyors observed on average only 60% of the steelhead observed during snorkel surveys. Based on snorkel surveys alone, our minimum estimates for the number of summer/fall-run steelhead in the survey area in 1997 and 1998 were 116 and 59, respectively. After making adjustments for observer efficiency and the portion of the total population likely in the survey area, our escapement estimates for summer/fall-run component of the Bella Coola steelhead population would be 200 and 220 for 1997 and 1998, respectively.

Since visual surveys were not a reasonable option for assessing the spring component of the Bella Coola steelhead run, a radio-telemetry study was initiated in March 1997. Angling was used to catch steelhead and 26 radio tags were applied to adult steelhead (14 males and 12 females) on the Bella Coola River between 21 March and 21 June 1997. Fixed-station receivers, aircraft, and boat and foot surveys were used to track fish as they moved upstream into spawning areas or downstream once spawning was complete. Spawning destinations were determined for all of the 24 spring-run steelhead radio tagged in 1997 along the Bella Coola River. Major spawning destinations were Atnarko River (42%) and Burnt Bridge Creek (33%); other spawning areas were Salloomt (13%), Nusatsum (4%) and Noosgulch (4%) rivers. The two fish not tracked to a spawning location in the spring of 1997 were the last two fish tagged and were likely summer/fall-run fish destined to spawn in 1998. In addition, 17 (71%) of the 24 fish tracked to spawning areas were subsequently tracked as kelts emigrating out of the Bella Coola River.

In total, 9 radio tags were applied to summer/fall-run steelhead (5 males and 4 females) on the Atnarko River between 9 June and 10 December 1997. Spawning destinations were determined for 89% (8) of the summer/fall-run steelhead radio tagged. Six of the summer/fall-

run steelhead were tracked to spawning areas in the middle Atnarko River. A single summer/fall-run steelhead was tracked to a spawning area in Burnt Bridge Creek, and another single summer/fall-run steelhead was tracked to the upper Atnarko River several kilometers upstream of Lonesome Lake.

Comparison of the furthest upstream locations for each radio-tagged steelhead indicated that summer/fall-run and spring-run steelhead spawn in similar locations in Burnt Bridge Creek and in the upper Bella Coola, the middle Atnarko and Hotnarko rivers. None of the 9 summer/fall-run steelhead were tracked to spawning areas in tributaries downstream of Burnt Bridge Creek. None of the 26 spring-run steelhead (24 tagged 1997 and 2 tagged in 1998) were tracked above Stillwater Lake; however, five spring-run fish migrated further up the drainage than all but one of the summer/fall-run fish. One of the summer-run steelhead was tracked to a spawning in the upper Atnarko River several kilometers upstream of Lonesome Lake; this represented the furthest upstream migration documented for Bella Coola/Atnarko steelhead. The radio-telemetry data also showed very similar spawning and emigration timing for spring-run steelhead that spawned in 1997 and the summer/fall-run steelhead that spawned in 1998.

In the spring of 1997 and 1998, both the recreational fishery and the Nuxalk food fishery were monitored for steelhead catches. Recreational fishing effort has been highly variable in recent years and steelhead catch rates have been too low to provide a reliable indication of stock size. However, steelhead catch-per-effort data from the May-June Nuxalk fishery could provide an indication of annual steelhead returns. The Nuxalk fishing effort expended in this fishery ranged from 312-853 drifts, with a mean of 549 drifts for 1978-95. A regression of spring CPE values against of the annual run size estimates for Bella Coola steelhead for 1979-95 showed a significant relationship ($r^2 = 0.81$, $p < 0.0001$). Using the CPE data collected during 1997 and 1998 (5.5-7.6 steelhead per 100 drifts), the regression equation would predict a total return of 1280-1350 steelhead with 95% confidence limits of 780 and 2200. After subtracting our estimate of the summer-fall-run component from these total population estimates, our best estimate of the current size of the spring-run would be 1080-1130 steelhead. Several key concerns are identified and discussed regarding the use of a historical regression and current CPE data to provide an index of annual steelhead returns to the Bella Coola watershed. Managers should be cautious, and use these estimates only to provide indications of trends in abundance, not point estimates of total returns or escapement.

Recommendations resulting from this study include:

1. Future visual surveys should be conducted using snorkel surveys. These surveys should be conducted in reaches of the Atnarko River on at least three separate occasions between late February and early April depending on water conditions.

2. The Nuxalk and sport fisheries on the Bella Coola River should be monitored between early May and late June to provide an indication of the relative size and trend in steelhead returns to the Bella Coola River. A Nuxalk surveyor should be hired to work a minimum of 5 days/week interviewing Nuxalk fishermen as they finish their drifts at the community of Bella Coola. These efforts must be carefully coordinated with DFO to ensure the maximum coverage of the Nuxalk and sport fisheries and avoid conflicts.

3. The implementation of future recreational fisheries must limit harvest opportunities to periods and locations where healthy run-timing groups can be caught without impacting the less-productive or depressed steelhead runs. For example, once there is a clear indication that the spring-run component of the steelhead population has recovered to a level that can sustain some level of harvest, a targeted spring-run steelhead recreational fishery could be conducted in the mainstem Bella Coola River downstream of the Bailey Bridge from March through the end of May without having a significant impact on the summer or fall run-timing groups. However, no retention of steelhead should be permitted in June and July until fisheries managers are confident that the population of summer-run steelhead is high enough to sustain a harvest.

4. The annual stock assessment process for Bella Coola steelhead must incorporate both juvenile and adult survey programs. Data from juvenile surveys are essential for providing an early indication of stock rebuilding or decline. Data from adult surveys (snorkel counts and catch monitoring) are essential for assessing changes in spawner distribution and fishery impacts on adult returns.

INTRODUCTION

The quality and quantity of stock assessment data available for fish populations in Canada are largely determined by the priorities and resources of government agencies. In the Pacific Region, the responsibilities for management of anadromous salmonids have been split between the federal and provincial governments. The provincial government is responsible for managing steelhead (*Oncorhynchus mykiss*) and anadromous cutthroat trout (*O. clarkii*) while the federal government is responsible for sockeye (*O. nerka*), chinook (*O. tshawytscha*), coho (*O. kisutch*), pink (*O. gorbuscha*) and chum salmon (*O. keta*). The political pressure to maximize the harvest of British Columbia's abundant salmon resources has resulted in intensively managed ocean fisheries and substantial information on all major salmon stocks. In contrast, there are no commercial fisheries for steelhead or anadromous trout and the available information for these species is much less reliable and complete. In most areas of the province, historical information on steelhead is limited to that obtained from commercial landings, voluntary reporting by anglers and snorkel surveys of summer-run steelhead stocks. The resulting uncertainty associated with steelhead catch estimates have further undermined the ability of government agencies to assess and manage these less-abundant stocks.

The Bella Coola River, on British Columbia's central coast, has traditionally supported one of the largest spring run steelhead population in the province. This traditionally abundant stock has been highly prized as a sport and native food fish. Catch and stock size estimates compiled in Nelson et al. (1998a) indicated that the number of steelhead in the Bella Coola system has fluctuated widely since 1974 and declined substantially over the past decade (Figure 1). However, due to limited provincial resources and the remoteness of the system, limited information has been available to confirm or determine the status of Bella Coola steelhead stock. The current study of adult steelhead was initiated in response to concerns regarding Bella Coola steelhead expressed by local residents of the Bella Coola area. A detailed examination of all available historic data (Nelson et al. 1998a) confirmed that there was little reliable data for assessing recent adult steelhead returns to the Bella Coola watershed. The purpose of this study is to determine the current status of the Bella Coola steelhead stock and improve existing indices of annual run size and the abundance of spawning steelhead. The specific objectives for the 1996-98 Bella Coola River adult steelhead assessment project were:

a. to accurately determine (i) spawning numbers, (ii) habitat use, (iii) in-river movement patterns (behavior), and (iv) spawning segregation for each run timing component of the Bella Coola steelhead population;

b. to develop a methodology to calibrate MELP's annual steelhead counts in order to provide a reliable and repeatable index of the abundance of spawning steelhead for the foreseeable future; and

c. to collect steelhead and resident rainbow trout tissue, scale samples and body morphometrics in support of stock identification using DNA and other analyses.

Results of our investigations have provided new information on the distribution, migration timing, and relative abundance of adult steelhead populations within the Bella Coola/Atnarko river system.

Study Area

The Bella Coola River is formed by two main tributaries, the Atnarko and Talchako rivers, and drains an area of approximately 5130 km^2 (Nelson et al. 1998a). The river originates in the western area of the Chilcotin Plateau (via the Atnarko River drainage in the southeast) and from the Monarch ice fields (via the Talchako River drainage in the southwest). The river flows west for approximately 105 km, entering the Pacific Ocean at North Bentinck Arm on the central coast of British Columbia (Figure 2). Most of the Atnarko River, the eastern portion of the Talchako River watershed, and several kilometres of the Bella Coola River mainstem are incorporated within Tweedsmuir Provincial Park (established in 1936). The Bella Coola watershed supports at least nine species of salmonids: coho, chinook, chum, pink, and sockeye salmon; steelhead/rainbow; cutthroat trout; Dolly Varden (*Salvelinus malma*); and bull trout (*S. confluentus*).

Steelhead enter the Bella Coola River during most of the year, although three distinct run peaks have been recognized; a "summer" run that enters from July to August, a "fall" run that enters from September to early January, and a "spring" run that enters from March through June. Summer-and fall-run steelhead enter the river in a sexually immature state and are thought to overwinter in the upper Bella Coola and Atnarko rivers and spawn from early April to May. The spring run is considered to be the largest contributor to the total returning population. In contrast to the summer and fall runs, spring-run steelhead are sexually mature when they enter the river and spawn within two months of entering the system. Summer and fall runs are most vulnerable to harvesting because of their extended freshwater residence prior to spawning and their exposure to numerous saltwater salmon fisheries. Historically, the relative sizes of the summer, fall and spring runs have been estimated to be 11%, 22%, and 67%, respectively, of the total annual estimated steelhead escapement (Wilkinson 1995). These percentages are based on limited data, from creel census, steelhead harvest analysis (SHA), snorkel and aerial counts, and general observations, and are considered only representative of historical trends and not true escapement (T. Wilkinson, MELP Williams Lake, pers. comm.).

In this study, it was not feasible to conduct separate assessments for each of the three run timing components of the Bella Coola steelhead population. Given that the summer-run

component was expected to be few in numbers and difficult to enumerate prior to the arrival of the fall run-timing group, these two run-timing components were assessed together and are referred to in this report as summer/fall-run steelhead. Separate assessments were conducted for spring-run steelhead.

Fisheries Harvesting Bella Coola Steelhead

Historically, steelhead destined for the Bella Coola-Atnarko system have been harvested in three distinct fisheries: 1) commercial fisheries targeting salmon in Statistical Area 8; 2) First Nation fisheries concentrated in the lower Bella Coola River; and 3) sport fisheries along the Bella Coola River and lower Atnarko River.

The major commercial fisheries in Area 8 include: 1) the Fisher Channel/Fitz Hugh Sound seine and gillnet fisheries; 2) the Dean Channel gillnet fisheries; and 3) the Bella Coola gillnet fishery. Trollers are also permitted to fish these waters but their catch and effort in Area 8 is negligible. Historically, the Fisher Channel/Fitz Hugh seine fishery has taken approximately 70% of the total commercial catch in Area 8. The Fisher Channel/Fitz Hugh Sound, Dean Channel, and Burke Channel gillnet fisheries typically begin in mid-May and are directed at chinook stocks. Sockeye are not harvested until the first week of July, when gillnet vessels are permitted to fish with smaller mesh nets. Pinks and chums are initially taken as incidental catches in the sockeye fishery during the second week of July. The third week of July is generally the first week that pinks and chums become the target of fisheries, and the first week that seiners are permitted in Fisher Channel/Fitz Hugh Sound. By the last week in August, the fishery for pinks and summer chums is complete, unless there are large numbers of late summer or early fall chums. Steelhead are captured as a bycatch in these commercial fisheries. The bulk of the commercial steelhead harvest occurs between mid-July and the end of August when fishermen are targeting local pink and chum stocks. While some Bella Coola-Atnarko steelhead are harvested in these mid-summer fisheries, most of the steelhead harvested are believed to be destined for the Dean River (Lewynsky 1987; Nelson et al. 1998a).

Steelhead are a small but important component of the Nuxalk food fishery on the lower Bella Coola River. Prior to 1995, Nuxalk fishermen targeted steelhead from late November through late April using set gillnets and angling (Nelson et al. 1998a). Since 1995, this component of the Nuxalk fishery has been essentially eliminated. Currently, few steelhead are harvested by Nuxalk fishermen; most are taken during the peak fishing period from May through early July when fishermen target chinook and sockeye salmon. Few steelhead are taken during the summer chum and pink salmon fisheries or the fall fisheries that target coho. However, the few steelhead taken in summer fisheries could represent a significant portion of the total return of summer-run steelhead in recent years.

Prior to closure regulations imposed in 1995, the recreational fishery for steelhead in the Bella Coola/Atnarko river system was open throughout the year (Nelson et al. 1998a, Appendix 1). Historical angler effort focused on the summer/fall and spring runs of steelhead as they entered the river. Peak annual steelhead fishing activity generally occurred during March and April, and declined from early May through mid-June (at which time the river typically becomes turbid with glacial silt, and anglers target returning chinook). As in the food fishery, steelhead are captured as bycatch in the recreational fisheries that target salmon species throughout the remainder of the year. Under current closure regulations, steelhead continue to be captured incidentally during the salmon recreational fishery and most of these fish are released alive (M. Ramsay, MELP-Bella Coola, pers. comm.)

Historical Approach to Stock Assessment

Nelson et al. (1998a) provides a summary of the historical stock assessment data for Bella Coola steelhead. Most of the historical stock assessment data that have been collected were diverse, intermittent and under funded (or at least fiscally challenged). The repertoire has included the Steelhead Harvest Analysis (SHA), creel censuses, helicopter counts, snorkel surveys, tagging programs, habitat evaluations, redd counts, fry counts and surveys of net fisheries. The salient features of information obtained through these efforts are summarized below:

1. Historical time series data are available, but limited to the catch records for the local First Nation net fishery (1977 - present) and information provided by steelhead anglers through the SHA (1972 - present). Unfortunately, both of these data sets are known to include potential significant biases which limit their utility as a defensible indicator of stock strength (Smith 1998).

2. Records for helicopter and snorkel surveys suggest that these have been limited to only five of the past 20 years (1977, 82, 91, 95, 96) and only a few of these years have included the same survey locations and methods (Nelson et al. 1998a). Consequently, there has not been a standard annual approach for counting adult steelhead.

3. The helicopter and snorkel surveys described above are only useful for assessing the abundance of summer/fall-run steelhead. Increased runoff of turbid glacial waters in May and June makes it impossible to obtain useful visual counting of spring-run steelhead. Some spring counts of steelhead have been obtained from tributaries and a set of small fences operated in Camera Channel (1980) but these activities have been too limited to provide even a rough indication of run strength.

4. In part due to the above difficulties, steelhead fry assessment has been the primary method of assessment employed in recent years. The program was initiated in 1988, continued at reduced levels from 1990-95 and expanded in 1996-98. Results from the 1997 fry surveys indicate that the steelhead fry population is 50-60% of the number required for full saturation of the fry habitat in surveyed reaches along the Atnarko River. Several of the tributaries to the Bella Coola and Atnarko rivers had fry populations in 1997 that were close to the estimated capacity for those streams (Burt 1998).

There are a variety of reasons why the historical approaches have not adequately addressed the objectives of this study. An elaborated list of these reasons is provided below:

1. spacial complexities - only a portion of the Bella Coola River system is countable (for adult steelhead using visual counting techniques);

2. temporal complexities - visual counting can only occur during periods when the water is clear;

3. incomplete counts - even in the countable portions of the river system not all fish can be counted due to a variety of factors including water depth, instream cover, bank vegetation, etc.;

4. steelhead behavior and year to year variability - MELP has no information on the partitioning of reach use by steelhead between assessable (countable) and non-assessable reaches of the river (this is a particular problem since there is some information to suggest that steelhead tend to aggregate into schools and choose holding areas that change from year to year);

5. current closure of steelhead sport fishery - in the absence of a sport fishery the SHA has no ability to inform us of the status of Bella Coola system stocks; and

6. the available data are not adequate to derive separate estimates of the catch and escapement of the different run timing components of the steelhead return or the degree of spatial separation in spawning locations for summer, fall and spring runs.

Alternative Approaches

A variety of approaches have been employed to enumerate adult salmonid returns to west coast streams. The most frequently used techniques include: fish weirs, aerial surveys,

snorkel surveys, foot surveys, and mark-recapture studies (Cousens et al. 1982; Irvine et al. 1992). The suitability of a particular technique depends heavily on the characteristics of the specific river or stream, the species being enumerated and the funds available. Generally, from an accuracy perspective, the preferred technique is a fish weir where a large portion of the return, if not all, can be trapped and/or visually counted. However, the high costs for construction and operation of weirs has limited their use to relatively small streams (much smaller than the Bella Coola River) that support key salmon populations (e.g. Taltan Lake sockeye, Cowichan River chinook, Black Creek coho). Hydroacoustic methods have been used for many years to monitor sockeye returns to the Fraser River (Banneheka et al. 1994) and several large rivers in Alaska (King 1989; Burwen et al. 1998). However, hydroacoustic systems tend to be relatively expensive and require species composition data when the run timing of several species overlap.

Aerial- and ground-based surveys are the most commonly used enumeration techniques for salmonids; however, the data collected from these surveys are seldom adequate to derive reliable estimates of the total number of spawners, or even reliable indices of abundance. The utility of visual survey techniques is severely limited by the clarity and depth of the water. For streams or portions of streams less than 10 km long, where the water is clear but depths or instream cover reduce the utility of aerial and foot surveys, snorkel survey can be an effective alternative approach. However, like other visual survey techniques, snorkel counts provide *minimum* population numbers; underestimation of the true number of fish present is an inherent problem with all visual survey techniques. In order to produce reliable indices of abundance from visual survey data, estimates of observer efficiencies are required, and multiple surveys must be conducted during the spawning period. In large river systems such as the Bella Coola, the spawning period (May-June) for steelhead coincides with rising water levels and high turbidity, both of which create virtually impossible viewing conditions.

For most stocks of steelhead, data collected from anglers represent the bulk of the information available regarding abundance. The large number of variables associated with angler success (e.g., water conditions, access, number of anglers, experience, fish distribution, run timing, etc.) severely limits the utility of most angler survey data for inferences on the size or trends of fish populations. However, angler data derived from rigorous surveys of large stable sport fisheries (such as the Georgia Strait salmon sport fishery), or accurate reporting from a small group of anglers that apply a consistent level of effort on a specific stream, can provide useful indices of abundance for specific fish populations.

The final category of commonly applied enumeration methods for adult salmon, mark-recapture methods, has been sub-divided into two techniques: conventional tagging and radio tagging. Conventional tagging refers to the application of external marks to salmonids as they migrate upstream; subsequent resampling of the same population determines the mark rate (the

portion of the run that was marked). Properly designed and executed mark-recapture studies can produce reliable estimates of escapement or the number of potential spawners (Bocking et al.1988, 1990; Nelson 1993a, 1993b, 1994; Link and English 1994), however, the requirements for unbiased estimates are often difficult to meet using the conventional approach. Recently, a variety of studies have demonstrated that data derived from radio tagging (telemetry) applications can be used to provide reliable estimates of stock size, along with detailed information on stock-specific run timing, distribution, and in-river residence times for large river systems (Koski et al. 1993; 1994; 1995; Alexander et al. 1996; Alexander and English 1996). Unlike any of the other enumeration techniques, mark-recapture studies that use radio telemetry can provide reliable information on the distribution of fish within a watershed even in highly variable conditions (low to high water, clear or turbid). However, the reliability of the population inferences still depends on applying marks throughout the run and obtaining a representative sample of fish for mark rate determination. For the goals set out for the Bella Coola adult steelhead enumeration program, it was determined that a well-designed mark-recapture study using modern radio telemetry techniques had a substantially higher potential of achieving these goals than any other technique.

Study Design

The two biggest challenges associated with this study were: 1) to obtain a reliable estimate of the number of adult steelhead that spawn in the Bella Coola river system in each year of the study; and 2) develop a cost-effective approach for obtaining a reliable index of the abundance of spawning steelhead in each year. As mentioned above, we determined that the first challenge could be best addressed by implementing a radio telemetry mark-recapture study similar to those executed on the Nass and Skeena rivers. The second challenge required the simultaneous development and implementation of a systematic survey design which combined aerial and snorkel survey techniques and catch monitoring in the lower river.

Our approach integrated these challenges and techniques into a single study design. Mark-recapture studies designed to generate estimates of population size require that marks be applied to a portion of the population, and that a representative sample of the population be examined to determine the mark rate (the percent of the population marked). Often the most difficult element of these types of mark-recapture studies is obtaining adequate samples for determining the mark rate. In this study, the use of radio tags and tracking equipment made it possible for us to confirm the presence of marked fish during aerial and snorkel surveys when it was often difficult, if not impossible, to visually observe conventional external marks. In addition, radio-tagged steelhead can be tracked as they migrate upstream as they migrate towards their spawning destination and downstream after spawning. These tracking data provide precise information on migration timing and migration speeds along with the location of steelhead holding and spawning areas. This later information is critical for determining the

spatial and temporal separation of the different run-timing components of the Bella Coola steelhead population.

METHODS

Field Methods and Schedule

Our initial plan was to apply radio-tags to adult steelhead from each run timing group and compute escapement estimates using mark rate data obtained from snorkel surveys, aerial surveys and catch monitoring activities. However, plans to tag steelhead in the fall of 1996 were postponed due to local concerns regarding the perceived low numbers of summer/fall-run steelhead and the effect of radio-tagging on the survival of adult steelhead. Instead, our efforts were redirected at compiling all the available stock assessment information for Bella Coola River steelhead (Nelson et al. 1998a), implementing a systematic snorkel and aerial survey program to enumerate summer/fall-run steelhead during the low flow periods in February and March 1997, and conducting an extensive series of consultations with local groups and individuals in the Bella Coola valley from November 1996 through March 1997 (Appendix G).

In late March 1997, we were directed to initiate a radio-telemetry study of spring-run steelhead since this component of the run was believed to be more abundant and turbid waters precluded any enumeration using visual survey techniques. Radio-tags were applied to steelhead caught between late March and early June 1997 and these fish were tracked during their upstream and downstream migrations until mid-July. The local recreational and first Nation fisheries were also monitored to provide catch estimates and record any tags recovered between early May and early July 1997. Field activities were suspended between mid-July and late October 1997 because project managers believed that efforts to tag summer run steelhead should wait until the fall when water temperatures were lower and fish were more concentrated and vulnerable to capture. Angling effort targeting summer/fall runs continued through mid-February 1998 but no summer/fall-run steelhead were captured after 7 December 1997. Snorkel and aerial surveys were once again used to enumerate summer/fall-run steelhead that reside in the reaches that could be surveyed between late October 1997 and early April 1998. In order to determine the spawning location for resident rainbow trout and 1998 spring-run steelhead, additional radio tags were applied to rainbow trout in late March and spring-run steelhead in late April and late May. Aerial surveys were conducted from 11 April through 18 July 1998 to determine the movements and spawning locations for all radio tagged rainbow and steelhead.

Catch monitoring activities focused on the Nuxalk fishery from early May through mid-July 1998 to assess the potential for using Nuxalk catch rates as an indicator of the status of the

entire Bella Coola steelhead population (summer, fall and spring runs). The spring Nuxalk fishery catches spring-run steelhead shortly after they enter the Bella Coola River. Summer, fall and spring kelts are caught as they migrate downstream and the fishery also catches upstream migrating summer-run steelhead that enter the Bella Coola in June and early July.

Aerial Surveys

Aerial surveys were used in conjunction with snorkel surveys to enumerate summer/fall-run steelhead that could be observed in the upper Bella Coola and Atnarko rivers. Aerial counts were conducted from a Robertson 44 helicopter and usually coincided with a snorkel survey that was conducted one to three days earlier. Two experienced observers outfitted with polarized glasses and each seated on the left-hand side of the aircraft counted steelhead from (25-125 ft) above the river. Surveyors recorded fish counts, survey timing, and viewing conditions for each 1 km strata or sub-kilometer stream reach (see data form in Appendix H). Aerial survey days were chosen based upon good viewing conditions (i.e., water visibility and light penetration). Counting conditions were generally best when the helicopter was 25-50 ft above the river. At this altitude steelhead could be distinguished from resident trout and counted as they scattered in response to the approaching helicopter. The majority of the snorkel survey areas could be flown at these optimal altitudes; however, portions of the snorkel survey area (e.g., Fisheries Pool, Smokehouse Pool, Belarko Pool, Roadside Pool, Football Jam, Steelhead Hole) could not be reliably counted from the air because of water depth (>3 m) or dark substrate. Groups of steelhead counted were generally small (i.e., 1-40), and observers reached a consensus regarding specific counts; in some cases, the counts from two observers were averaged. A third person recorded the counts by location and indicated the time and viewing conditions of specific counting reaches. Incidental counts of "trout" and whitefish were also recorded during aerial surveys. Aerial surveyors included individuals from the Bella Coola Rod & Gun Club, BC Environment, the Nuxalk Band, Snootli Creek Hatchery, and LGL Limited.

Snorkel Surveys

Summer/fall-run steelhead were enumerated by snorkel surveys that were conducted by groups of two to four surveyors floating sections of the Atnarko and Bella Coola rivers. Areas surveyed were in most cases accessible by a short hike from a road and were safe to float. On one occasion (24 February 1997), snorkel surveys were conducted at the ice-free outlets of two of the lakes in the upper Atnarko (Rainbow and Stillwater lakes), and access was provided by helicopter. Data collected during snorkel surveys were similar to those obtained during aerial surveys; data were recorded on waterproof slates. Attempts were made to line up divers in a row across the river to maximize coverage during each float. In wide sections (like Padgett's Pool), 4 surveyors were required to cover the entire stream width under good viewing

conditions (i.e., 4-5 m visibility underwater). In most of the snorkel survey area, 2-3 surveyors were adequate to cover the entire stream width.

At the end of each drift the surveyors discussed the counts. In sections where steelhead were observed the drift was repeated 1-4 times until a consensus was reached regarding the number of steelhead in that section. Snorkel surveys included individuals with a wide range of experience. Several individuals were fisheries biologists with more than 10 years of snorkeling experience. Some surveys included volunteers from the Nuxalk First Nation and Bella Coola Rod and Gun Club who participated to get first-hand exposure to the survey conditions. Steelhead were distinguished from resident rainbow trout primarily based on size; all fish estimated to be over 50 cm were counted as steelhead unless obvious resident rainbow trout markings were evident (e.g. heavily spotted and stout body form). Incidental counts of rainbow and cutthroat trout, Dolly Varden/bull trout, and whitefish were also recorded during snorkel surveys. In 1998, surveyors also recorded any radio-tagged steelhead observed during snorkel surveys (identified by colored external anchor tags).

Radio Telemetry

The radio-tagging study involved catching and radio tagging spring-run steelhead in the Bella Coola River in the spring of 1997, and radio tagging summer/fall-run steelhead along the Atnarko River in the fall of 1997 (Figure 2). These fish were tracked using a combination of stationary radio-tag receivers, foot and boat-based surveys, and aerial surveys. The different sources of information were integrated into a single database which archives the locations, dates, and time when each radio-tagged fish was tracked during field surveys.

Tagging Effort

The tagging strategy during the spring of 1997 was to conduct approximately 75 rod-hours of fishing effort each week (based on an average of two anglers fishing 7.5 hours per day, 5 days per week) and to tag all healthy steelhead that were caught. Proposed fishing effort relied upon angler participation from the local community who were paid a stipend to cover their expenses. However, applied fishing effort varied due to water level changes, weather conditions, and availability of participating anglers. During high water levels in June, chinook sport fisheries located at Walker Island and the Bailey Bridge were monitored by technicians prepared to radio tag steelhead captured incidentally. The fall 1997 angling effort was largely determined by the availability of local anglers and suitable fishing conditions. Water temperature and water levels were recorded at the Bailey Bridge for each day of tagging effort.

Methods of Capturing Fish for Tagging

Angling for steelhead was conducted primarily from shore but some angling was conducted from a boat. Most shore-based locations were accessed by drifting sections between the lower and middle Bella Coola River with a 12-ft drift boat. Sections of the upper Bella Coola River and lower Atnarko River were accessed by foot and fished in an attempt to maximize mark rates as the fish migrated upstream. The predominant method of angling was casting a baited hook (e.g. floating fish roe) into the river and reeling in the line (12-20 lb test) slowly until a "strike" was felt. Once a steelhead was hooked, the angler brought the fish to the shore as quickly as a possible to minimize hooking and handling stress.

Tagging and Biosampling Procedures

Fish caught by angling were removed from the river with a dipnet or by hand and placed in a padded V-shaped trough filled with water. Fish were generally exhausted from the capture and when immersed in water became calm. This made handling easier and reduced the likelihood of fish being injured. Processing included tagging the fish with one or two anchor tags (specific color to identify each tagging week); measuring the fish (nose-fork length); noting the sex, presence of scars and marks; removing five scales; removing about one third of the adipose fin (for DNA analysis); and placing a radio tag down the throat of the fish. The radio tag was pushed into the stomach cavity using a hollow plastic tube which was smaller in diameter than the radio tag. Once the tag was beyond the cardiac sphincter of the stomach, the tube was removed and the protruding antenna was bent at the corner of the mouth so that it trailed along the side of the fish. The anchor tag numbers, specific channel and code of each radio tag was recorded for each individual fish. Processing of each individual fish generally took less than two minutes. Fish were released immediately after tagging.

Scales were placed in scale books and labeled; scales were taken for age and possible stock identification analyses. Adipose tissue was placed in alcohol-filled vials and stored in a freezer for future stock identification (DNA) analyses.

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. All the radio tags used in this study were LOTEK digitally coded tags. The radio tag used for steelhead was 16.2 mm in diameter, 50 mm long and weighed 16.0 grams in air and 6.2 grams in water. This tag was rated to transmit for 732 days from the release date. Two different sizes (11mm X 43 mm and 11 mm X 49 mm) of the MCFT-3BM radio tag were used for Rainbow trout. The tag life for these tags ranged from 230 to 470

days. Several of the longer life rainbow tags were time activated to transmit for 8 hrs during every 24-h interval. The frequency of these tags was in the 148-150 MHz range. These tags could be detected at 0.5 km from ground level if the fish was in water up to 5 m in depth, and farther if the tag was in shallower water or the antenna was higher. When flying at 500 m above ground level we were able to pick up transmitters on fish in shallow water (1-3 m) from 4-5 km.

During all monitoring events (both mobile and at fixed stations), the receivers were set to scan each frequency for six seconds, during which time one to two pulses would be transmitted by a tag (pulses were emitted every 5 s); 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 its 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. During aerial tracking surveys we were able to optimize tag detection and isolate tag location by varying the altitude and speed of the helicopter, and manually adjusting the gain on the receiver in order to control the power level of received signals.

Data from all types of surveys were automatically stored in the internal memory of the receiver; these data were later downloaded (transferred) as an electronic file to a portable computer whenever a mobile survey was completed or a fixed site was visited. The following information was stored in memory of the receiver for each signal received:

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.

Individually coded radio tags on three different frequencies (in the 149 MHz range) were used for radio-tagging steelhead during this study. Tags to be applied to fish were selected so that different frequencies (and codes between frequencies) were applied to fish captured on the same date; this precaution was taken to increase the detection efficiency of the receivers if fish captured at the same time or place remained together following release.

Fixed-Station Receiver Sites

During the course of this study, fixed-station receivers were established at two locations on the Bella Coola River (Walker Island and the confluence of Burnt Bridge Creek), and at five

locations on the Atnarko River (at the junction with the Talchako River, at Flat Rock, at Camera Channel, at the Hornarko River junction, and at the outlet of Stillwater lake). In general, all stations were placed in strategic locations to detect tags within or outside the census areas.

Each fixed-station consisted of two or three 4-element Yagi antennas and the SRX_400 receiver, which was powered by a 12-v, deep-cycle battery. Three stations on the upper Atnarko River were equipped with solar panels to keep the battery charged and reduce the frequency of site visits during the winter. The battery and receiver were enclosed in a weather-proof container and could operate for 10-12 d without servicing. Maintenance of the receiver sites included replacing the 12-v battery (unless equipped with a solar panel) and downloading data from the receiver using a portable laptop computer. Koski et al. (1996) 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 description of each fixed-station receiver site, and the rational for the selection of these sites, is provided below:

Walker Island (Station 05) This telemetry station was the first fixed-station site upstream of salt water influence on the mainstem Bella Coola River, and was operated during the duration of the telemetry study in 1997 and 1998. The site was situated to provide key information regarding "dropbacks" (return downstream) of any radio-tagged steelhead tagged at upstream locations, and also final detections of any post-spawning downstream migrants (kelts). The station at Walker Island was located on private property and could be easily accessed by vehicle. This station was set up with two antennas (upstream and downstream) to provide directional movement information.

Burnt Bridge (Station 10) This station was initially established in the spring of 1997 upstream of the Bella Coola/Burnt Bridge Creek confluence, but was moved to the confluence to detect the timing of steelhead that entered and exited Burnt Bridge Creek. This station also provide a checkpoint for the downstream boundary of the steelhead census area (Burnt Bridge Creek to Stillwater Lake). The station used three antennas to provide directional movement information for radio-tagged steelhead (upstream Bella Coola, downstream Bella Coola, or upstream/downstream Brunt Bridge Creek). This station was not re-established after the kelt outmigration in the early summer of 1997.

Atnarko Junction (Station 15) This station was strategically located at the junction of the Atnarko and Talchako rivers. It was operated during the duration of the telemetry study in 1997 and 1998. This station used three antennas to provide directional information for all "three" rivers (the Atnarko, the Talchako, and the Bella Coola) from a single point. The station was easy to access for servicing, and provided key information during the study.

Flat Rock (Station 18) This station was established on the mainstem Atnarko River in 1997 only, to provide residence time information for steelhead tagged in the lower Atnarko River, and monitor the movements of radio-tagged steelhead in and out of the area between Flat Rock and Camera Channel where visual surveys were not conducted due to poor visibility (rapids).

Camera Channel (Station 19/20) This station was operated in both 1997 and 1998 but at two different locations. The spring 1997 site (F20) was established just above Camera Channel to detect fish entering/leaving the rapids area before moving into the middle Atnarko survey area. The station was moved in the fall of 1997 because the previous site was situated in close proximity to a regurgitated tag and was in danger of flooding during high water. The 1997-98 site (F19) was located at the mouth of Camera Channel to detect any radio-tagged fish entering the channel. A solar panel (to charge the battery and reduce the frequency of station visits in the winter) and two antennas (upstream and downstream Atnarko) were used at this station. The distance between the 97 and 98 site was approximately 1 km.

Hotnarko (Station 25) This station was established in the fall of 1997 at the Atnarko/Hotnarko confluence in an effort to detect tags entering/exiting the Hotnarko River, and also to detect any steelhead movements to and from locations upstream on the Atnarko River. This site used three directional antennas and a solar panel. This site was operated until the end of the field program in July 1998.

Stillwater (Station 30) This station was established in January 1998 on the southeastern shore of Stillwater Lake, near the outlet. The site was selected to detect any fish that entered/exited the lake and upper Atnarko River. The station used two antennas and two solar panels.

Tracking by fixed stations provided the most continuous coverage of fish movements of all the tracking methods that were used. The data from the fixed stations provided precise data on the arrival and departure times and dates of movement fish past each site; these data could not have been obtained using any other type of tagging (non-telemetry), or with mobile telemetry surveys alone.

Mobile Tracking

Aerial tracking was conducted from a Robertson 44 helicopter with a single 2-element "H" antenna attached to the front of the aircraft. The helicopter flew along the river and its tributaries at 40-130 km/h and at 30-300 m above the ground. Whenever radio-tagged fish were located, the pilot would reduce speed or hover to permit identification of the position of

the fish, and to allow the receiver to scan the other frequencies. A global positioning system (GPS) with a built-in data logger (time-synchronized with the receiver) was used to record the location of individual radio tags; in addition, the UTM coordinates generated from the helicopter's GPS unit were called out by the pilot and recorded manually on a data sheet as a backup to the electronic systems. The position of the fish was later confirmed by comparing maximum signal strengths and the GPS positions that were machine-recorded.

Data Processing

Downloaded files from fixed-station receivers during the 1996-97 were retrieved in hexadecimal format. These files were converted to a text format prior to a final conversion into a dBase format (Visual Foxpro 3.0). The unedited text files were appended into a single database (the "raw" data base file) for inclusion in the a Windows™-based data management and illustration program, Telemetry Manager[3], which was used to analyze and display the telemetry data collected. Mobile data was entered into a separate database (the "mobile" data base file) for inclusion in the Telemetry Manager program. Also created for inclusion in the Telemetry Manager program were 1) the "tag" database (a data base of all tag release information, including species, tag number, channel, code, tag site number, tag type, and date); and 2) the "zone" database (all antennae to zone designations, and all mobile detection zones). An operational database was generated from the raw data base by running the Telemetry Manager software with all data bases.

During the generation process of the operational database, data filtering was used to eliminate "noise" events and discriminate between "real" detections (radio signals generated from radio tags released for this study) and "bogus" detections (radio signals not generated by a radio tag). The basic filtering system incorporated by the Telemetry Manager program for the raw database, for all telemetry data generated during the 1997-98 Bella Coola River steelhead study, was: 1) the identification of all code "0" and code "255" records for exclusion from the operational data base (no code "0" tags were used during the study; code "255" signals indicate an unidentifiable noise event on that particular frequency); 2) a requirement that, for any detection that matched a (deployed) channel and code combination, a second detection, within a 10-minute interval of the first detection, was needed in order to write the records to the operational data base (this second filter eliminated 99% of all "bogus" detections, as these detections tended to log sporadically on receivers, but rarely did the same "bogus" channel/code combination occur (log) twice within a 10-minute interval). Following generation, the operational data base was thoroughly reviewed, and any "bogus" records that

[3] Telemetry Manager Software is proprietary software of LGL Limited, 9768 Second Street, Sidney, B.C. V8L 3Y8

passed through the filtering process were manually marked for exclusion, and were written to a separate file for "bogus" record.

Catch Monitoring

First Nation Fisheries

The Nuxalk fishery was monitored by two technicians in both 1997 and 1998; one technician was hired by Fisheries and Oceans Canada (DFO) and the other worked under the adult steelhead assessment program (MELP). The two technicians interviewed drift net fishermen at the end of their fishing event at a boat launch site near the township of Bella Coola. Data collected for each "drift" event included number of fish caught and retained (by species), and the number of steelhead released (see data form in Appendix H). The two technicians collaborated in order to establish a split survey schedule, and also to provide data collected during split schedules (on a daily basis). As a result, daily catch and effort data summarized in this report are the combined data from the two catch-monitoring technicians.

Sport Fishery

Recreational fishermen were interviewed on a semi-random basis, typically by one of the technicians that monitored the Nuxalk fishery. Anglers, most of whom were targeting chinook, were asked how long they had been fishing and how many steelhead they had caught, retained, and/or released. The majority of recreational anglers interviewed were aware that under current regulations, any steelhead captured were to be released.

1997 RESULTS

Aerial and Snorkel Surveys

A total of 14 aerial surveys and 13 snorkel surveys were conducted on 28 separate days between 15 November 1996 and 24 April 1997 (Table 1). Details on survey dates, areas covered, survey conditions, observers and counts for each 1 km stratum are provided in Appendix A. Snorkel surveys were generally limited to two portions of the Atnarko River: 1) 5 km in the lower Atnarko between the Bella Coola-Atnarko junction and Belarko Pool; and 2) 9 km in the middle Atnarko between the Young Creek (Roadside Pool) and Line Cabin (Figure 2). Aerial surveys were routinely conducted in these areas plus the 5 km section above Belarko Pool. These surveys areas include the majority of the known steelhead spawning and holding areas along the mainstem Atnarko rivers but represented only 30% habitat accessible

to, and know to be used by, adult steelhead between Burnt Bridge Creek and Stillwater Lake (including Burnt Bridge Creek and Hotnarko River).

On selected occasions when water clarity was good (>3 m), aerial survey counts were recorded for 12 km of the mainstem Bella Coola between Burnt Bridge Creek and the Atnarko confluence. These counts expanded our survey coverage to roughly 50% of the waters accessible to steelhead between Burnt Bridge Creek and Stillwater Lake. Some steelhead were observed in these reaches on several occasions but all surveyors agreed that there were many areas where steelhead could be present but not observed. Aerial surveys of the Upper Atnarko above Goat Creek were conducted on a few occasions but few if any of the steelhead present could be observed in this portion of the watershed.

The maximum number of steelhead observed in the 31 km survey area during a survey period was calculated by summing the peak counts for each stratum within that period (Table 2). The highest count of summer/fall-run steelhead in 1997 was 131 fish (observed between 22-26 February). The majority of the steelhead observed in each survey period were located in the 3-km section between Young Creek and Goose Hole (78% of the highest count). Steelhead numbers remained high in this section from 22 February through 13 March when they declined as steelhead moved further upstream toward the spawning areas. Counts in the Young to Goose stratum increased again in early April as steelhead migrated upstream from the Bella Coola and lower Atnarko. The last survey day before spring freshet was 24 April, when survey conditions were poor in most areas and only 37 steelhead were observed.

Radio Telemetry

Angling was used to catch steelhead and 26 radio tags were applied to adult steelhead (14 males and 12 females) on the Bella Coola River between 21 March and 21 June 1997. A total of 386 rod-hours of steelhead angling effort produced 22 (85%) of the 26 steelhead radio tagged. Over 803 hours of chinook angling effort was monitored between 18 May and 21 June but provided only 4 additional steelhead for radio tagging (Table 3, Appendix Table B1). Most of the steelhead angling effort was expended along the middle and upper Bella Coola strata, whereas, all of the chinook angling effort was expended in the lower Bella Coola stratum (i.e. below the Baily Bridge). The upper Bella Coola stratum accounted for half of all steelhead tagged (Table 4). Sixteen (62%) of the 26 tags applied were released between 6-26 April 1997.

Fixed-station receivers, aircraft, and boat and foot surveys were used to track fish as they moved upstream into spawning areas or downstream once spawning was complete. Radio-tagged steelhead were tracked on 7 different aerial surveys and 30 ground based surveys conducted between 28 March and 2 August 1997. Fixed-station receivers were operated

continuously at Walker Island, Burnt Bridge junction, Atnarko junction, Flat Rock, and Camera Channel from 25 March through 11 July 1997 (Table 5).

Spawning destinations were determined for all of the 24 spring-run steelhead radio tagged in 1997 along the Bella Coola River (Table 6). Major spawning destinations were Atnarko River (42%) and Burnt Bridge Creek (33%); other spawning areas were Salloomt (13%), Nusatsum (4%) and Noosgulch (4%) rivers. Two additional fish, tagged in June, were not tracked to a spawning location in the spring of 1997 and were likely summer-run fish destined to spawn in 1998 (see summer/fall run results below). In addition, 17 (71%) of the 24 fish tracked to spawning areas were subsequently tracked as kelts emigrating out of the Bella Coola River. The seven spawners that did not emigrate included: six males that likely died after spawning and one fish that regurgitated its tag near Camera Channel. The furthest upstream location (likely the spawning area) for each radio-tagged fish is provided in Appendix Table B2. A comparison of these locations with those for summer/fall-run steelhead tracked during the spawning ground surveys in 1998 is provided in Figures 3-5 and discussed below.

The spring 1997 radio-telemetry data provided detailed information on the entry time, spawning interval, and emigration timing for spring-run steelhead from five stocks within the Bella Coola/Atnarko watershed (Table 7). The entry timing for spring-run steelhead destined for the upper Atnarko and Hotnarko rivers was generally earlier (late March to mid-April) than that for the other stocks (mid-April to late May). However, one of the upper Atnarko steelhead was tagged in the lower river on 19 May after the other radio-tagged members of that stock had spawned and emigrated from the Bella Coola. Tagged steelhead from each stock entered spawning areas in early May and most spawned by early June. The downstream emigration period extended from mid-May through the end of June in 1997.

Nuxalk Catch Monitoring

The spring 1997 Nuxalk fishery was monitored for steelhead catches from 27 April to 3 July 1997. Fishing effort was substantial (1084 drifts) and our best estimate of the incidental catch of steelhead in these fisheries was 60 fish (3% of the chinook catch during the same period). Of the 60 steelhead caught by Nuxalk fishers, 23 were kept and 37 were reported released. No radio-tagged fish were repored during these monitoring efforts.

Surveyors observed catches from roughly 60% of the estimated number of drifts fished during the survey period. Catch information was obtained for 142 of the drifts not observed (14% of the total effort) from interviews conducted in the community away from the landing site. DFO surveyors also provided daily catch estimates for the remainder of the drifts by applying an average catch rate to an estimate of the number of drifts missed on each day (Table 8, Appendix Table C1). Consequently, the above catch estimates are minimum estimates of

the number of steelhead caught by Nuxalk fishers between 27 April and 3 July 1997. It is likely that some of the steelhead caught and released were not reported to our surveyors. Also, our catch surveys were limited to the intensive spring fishing period and it is known that Nuxalk fishers catch steelhead during other fishing periods. Historical catch monitoring data suggests that the 27 April - 3 July fishing period represents 29% of the steelhead caught by Nuxalk fishers in years when the winter set net fishery was active (1978-90). From 1991-93, the 27 April - 3 July fishery represented 65-100% of the recorded steelhead catch..

The Nuxalk fishery in 1997 was opened each Sunday at 18:00 and closed each Thursday at 18:00. Nuxalk fishing effort was low (<20 drifts/week) prior to 10 May but increased rapidly to over 100 drifts/week for the week ending 24 May as chinook catch rates increased. Nuxalk fishing effort remained in the 125-155 drifts/week range throughout June and increased to over 200 drifts/week when sockeye catch rates increased in early July. Most fishers use 20 cm (8 inch) mesh nets when targeting chinook and 11 cm (4.5 inch) mesh when targeting sockeye.

Catch per effort (CPE) for the Nuxalk fishery was highest (58 steelhead per 100 drifts) during early May when effort was low (10-12 drifts/week). Half of the Nuxalk steelhead catch was taken in the last two weeks of May as fishing effort increased to 102-116 drifts per week. The next peak in steelhead CPE occurred in late June when the majority of Nuxalk fishers shifted from targeting chinook to targeting sockeye with smaller mesh gillnets. The average CPE for the entire catch monitoring period was 5.5 steelhead per 100 drifts.

Recreational Catch Monitoring

The recreational fisheries along the Bella Coola and lower Atnarko rivers monitored for steelhead catches from 12 May to 30 June 1997. No radio-tagged fish were observed during these monitoring efforts. Most anglers targeted chinook since it was illegal for anglers to target or retain steelhead in 1997. During the recreational fishery, a total of 2171 angler days produced only 47 steelhead (all were released). However, these numbers do not represent to the total number of steelhead caught by Bella Coola anglers. The portion of the total fishing effort and steelhead catch reported is unknown.

1998 RESULTS

Aerial and Snorkel Surveys

A total of 8 aerial surveys and 15 snorkel surveys were conducted on 23 separate days between 25 October 1997 and 11 April 1998 (Table 10, Appendix D). Two of the aerial

surveys and 4 of the snorkel surveys were conducted by Department of Fisheries and Oceans (DFO) crews. Snorkel surveys were limited to the same sections of the Atnarko River surveyed in 1996-97. Low flow conditions and clearer water in 1998 made it possible to conduct aerial counts along the Bella Coola River between Burnt Bridge and Atnarko Junction on every survey.

The largest number of summer/fall-run steelhead observed in our 31-km survey area in 1998 was 72 fish, observed between 5-11 April 1998. The majority of the steelhead observed in each survey period after 17 February 1998 were located in the 5-km section immediately above Goose Hole (see Figure 5); however, only 51% of the highest count was observed in this section. Steelhead numbers observed during snorkel surveys were very consistent (29-31 fish) between mid-February and mid-March 1998. These counts increased in late March and doubled during the last survey period when 60 steelhead were observed in the 14-km snorkel survey area. Surveyors noted that these fish were dark and, therefore, were likely summer/fall-run steelhead. An additional 12 steelhead were observed during the aerial survey of the upper Bella Coola on 9 April 1998. The maximum count from previous surveys of the upper Bella Coola was only 2 fish. The 12 steelhead observed on 9 April 1998 likely included some summer/fall-run fish that had moved upstream from holding in the lower Bella Coola and spring-run fish that had just entered the river. Regardless, all observations indicated that a large portion of the steelhead present in the Bella Coola/Atnarko watershed were holding in reaches where steelhead could not be readily observed using visual survey techniques. The very low water levels in 1998 are believed to be the major reason for the differences in steelhead distribution and behavior between the two survey years.

Radio Telemetry

In total, 9 radio tags were applied to summer/fall-run steelhead (5 males and 4 females): one summer-run steelhead was radio-tagged at Walker Island on 9 June 1997 and 8 summer/fall-run steelhead were radio-tagged on the Atnarko River between 27 October and 10 December 1997. A total of 45.6 rod-hours of steelhead angling was expended to tag the later 8 fish. Additional efforts to increase the number of summer/fall-run steelhead tagged resulted in a total of 148.4 rod-hours expended between 17 December and 11 February, but no steelhead were caught. The last tagging effort, initiated in late April 1998, focused on catching spring-run steelhead to augment the timing and distribution information collected in 1997. A total of 50 rod-hours resulted in two spring-run steelhead being radio-tagged (one on 28 April and the other on 25 May 1998; Table 12).

Fixed-station receivers, aircraft, and boat and foot surveys were used to track fish as they moved upstream into spawning areas or downstream once spawning was complete. Radio-tagged steelhead were tracked on 13 different aerial surveys and 27 ground-based

surveys conducted between 27 October 1997 and 13 July 1998 (Table 13). Radio-tagged rainbow trout were tracked on 8 aerial surveys conducted between 11 April and 13 July 1998. Fixed-station receivers were operated at Walker Island, Atnarko junction, Camera Channel, Hotnarko and Stillwater. The first receiver was installed at the Atnarko junction on 28 October 1997 and the last fixed station demobilized was removed on 13 July 1998. The time periods when each station was operating are summarized in Table 13. Each station, except Stillwater, experienced short periods when batteries or solar panels did not provide sufficient current to power the radio receiver/data logger.

Spawning destinations were determined for 89% (8) of the summer/fall-run steelhead radio tagged (Table 14). Most of these steelhead were tracked to spawning areas in the middle Atnarko River from the area near Young Creek to the lower Hotnarko River. However, three of the four steelhead tagged at BC Wrights (4 km below Young Creek) in late October migrated substantial distances before spawning: one was tracked moving downstream to the Upper Bella Coola (near the Grizzly Pool) where it resided through the spawning period; one was tracked downstream below Burnt Bridge Creek between 27 January and 21 March 1998 but later returned upstream to spawn just below Young Creek; and the third migrated upstream to a location in the upper Atnarko River upstream of Lonesome Lake, where it resided from 17 February to 28 May 1998. The later two steelhead were subsequently tracked at Walker Island in June as they emigrated as kelts from the Bella Coola system. The single fish that spawned in Burnt Bridge Creek was tagged on 7 December 1997 at the confluence of the Bella Coola and Atnarko rivers; this fish was also tracked at the Walker Island site during its post-spawning emigration. In total, only 3 (38%) of the 8 summer/fall-run steelhead tracked to spawning areas were subsequently tracked emigrating out of the Bella Coola River as kelts.

Comparison of the furthest upstream locations for each radio-tagged steelhead indicated that summer/fall-run and spring-run steelhead spawn in similar locations in Burnt Bridge Creek and in the upper Bella Coola, the middle Atnarko and Hotnarko rivers (Figures 3-5). None of the 9 summer/fall-run steelhead were tracked to spawning areas in tributaries below Burnt Bridge Creek. This was expected since all these fish were tagged along the middle Atnarko River and the lower tributaries are generally believed to only support spring-run steelhead. None of the 26 spring-run steelhead (24 tagged 1997 and 2 tagged in 1998) were tracked above Stillwater Lake. However, five spring-run fish migrated further up the drainage than all but one of the summer/fall-run fish. This was surprising since summer/fall run fish are generally believed to migrate further upstream than spring-run steelhead. The single summer-run steelhead that was tracked to a spawning location several kilometers above Lonesome Lake represented the furthest upstream migration documented for Bella Coola/Atnarko steelhead.

Sequential tracking data for radio-tagged rainbow trout showed very little movement for most of these fish. Of the 12 radio tagged, 10 fish did not move more than 2 km from the

release site in the 3.5 month interval from tagging to final detection. The other two were last tracked 7 km downstream of the release site. All but one of the radio-tagged rainbow were last tracked during the last aerial survey on 13 July 1998 (Appendix E: Table 4).

The spring 1998 radio-telemetry data provided some information on the spawning interval and emigration timing for summer/fall-run steelhead for comparison with that observed for spring-run steelhead in 1997 (Table 15). We expected that summer/fall run steelhead would spawn and emigrate earlier than spring-run fish, especially in a relatively warm, low flow year like 1998. However, the radio-telemetry data show very similar spawning and emigration timing for spring-run steelhead that spawned in 1997 and the summer/fall-run steelhead that spawned in 1998.

In addition to the above distribution and timing data, mobile tracking during aerial and snorkel surveys provided information on the location of radio-tagged steelhead in the sections where steelhead could be counted using visual surveys techniques (Table 16). As indicated above, the only sections of the Bella Coola/Atnarko system where steelhead could be consistently counted using snorkel techniques were a 5-km portion of the lower Atnarko (Junction to Belarko Pool) and a 9 km section of the middle Atnarko River (Young Creek to Line Cabin, see Figure 2). Two radio-tagged steelhead were located in the middle Atnarko snorkel survey area from 21 November 1997 to 15 March 1998. Both of these radio-tagged steelhead were observed during a snorkel survey on 26 November 1997. Throughout the period (17 February to 15 March 1998) when snorkel surveys consistently observed 26-29 summer/fall-run steelhead in the middle Atnarko survey area, these 2 radio-tagged steelhead represented 25% of the 8 summer/fall-run steelhead that had retained their radio-tags after release (one fish regurgitated its tag immediately after tagging, Table 14). During the last survey period when the total count for the snorkel survey area increased to 59 steelhead, there were 3 radio-tagged steelhead in the snorkel survey area. The one additional radio-tagged steelhead moved upstream from just below the snorkel survey area in early April 1998 and was observed during snorkel surveys on 5 April and 7 April 1998.

Assuming that the mark rates observed in the areas that could be surveyed were representative of other parts of the river, the minimum population size for the 1998 spawners of summer/fall-run steelhead would be 108-155 fish. This must be considered a minimum estimate for two reasons: 1) all of the radio-tags in the survey area were detected but it is unlikely that all of the steelhead in these areas were enumerated during our snorkel and aerial surveys; and 2) the majority of the radio-tagged steelhead were tagged adjacent to the middle Atnarko survey area, therefore, the mark rate would probably be lower for summer/fall run steelhead that were holding in downstream locations in the lower Atnarko and Bella Coola rivers.

Nuxalk Catch Monitoring

The spring 1998 Nuxalk fishery was monitored for steelhead catches from 3 May to 23 July 1998. On site interview were not initiated until 10 May 1998 but information on the previous weeks catch was obtained from Nuxalk fishers interviewed during the first week of monitoring (Table 17). The catch monitoring program should have been initiated 2-3 weeks earlier but was delayed due to pesonnel availability. In 1523 drifts by Nuxalk fishermen, 110 steelhead were caught (16 kept, 94 released). The temporal trends in steelhead CPE were similar to that observed in 1997. Catch rates were highest in early May when effort was low and peaked again in early July as sockeye catches increased. The average CPE was 7.2 steelhead per 100 drifts for the entire survey period (Table 17) and 7.6 steelhead per 100 drifts for the period comparable to that surveyed in 1997 (3 May - 4 July). This was slightly higher than the CPE estimated for 1997 (5.5 steelhead/100 drifts). As in 1997, no radio-tagged fish were observed during the catch monitoring surveys.

The 1998 monitoring of the Nuxalk fishery was initiated two weeks later than in 1997. Once initiated our coverage was more complete than in 1997. Surveyors observed catches from roughly 85% of the estimated number of drifts fished during the survey period. Catch information was obtained for 151 of the drifts not observed (10% of the total effort) and DFO surveyors provided daily catch estimates for the remaining 5% of the drifts (Table 17, Appendix Table F1). As indicated above for the 1997 survey, the catch estimates do not represent the total number of steelhead caught by Nuxalk fishers; the 1998 are minimum estimates of the number of steelhead caught by Nuxalk fishers during the survey period.

Recreational Catch Monitoring

Most of the information on the spring 1998 recreational fishery was collected by the DFO surveyor. The total sport fishing effort expended from 16 May through 18 July 1998 was estimated to be 3275 angler days (Table 18). A total of 36 steelhead were reported caught and released by anglers on the Bella Coola and Atnarko rivers. Most of these fish (89%) were reported caught in late May and early June during the period of peak steelhead activity (all stocks; see Table 7). As in 1997, these catch numbers do not represent to the total number of steelhead caught by Bella Coola anglers. Several anglers indicated that steelhead catch rates were higher than chinook during the first few weeks of the fishery before the DFO catch monitoring was initiated and not all steelhead caught during the survey period were reported to DFO or MELP surveyors (Chris Winkler, Bella Coola angler, pers. comm.).

DISCUSSION

Aerial and Snorkel Surveys

Aerial and snorkel survey techniques have been used in a wide variety of studies to enumerate juvenile and adult salmonids (see reviews by Thurow 1994 and Cousens et al. 1982). Several studies have examined the accuracy of underwater counts in comparison with estimates derived from mark-recapture studies or fence counts (Neilson and Geen 1981; Slaney and Martin 1987; Shardlow et al. 1987; Hillman et al. 1992; Nass et al. 1993; Bocking et al. 1993). The accuracy of visual fish counts depends on a variety of factors including: water clarity, light conditions, fish size, fish abundance, species composition, observer experience, number of observers, stream depth, stream width, instream cover, etc. In general, visual surveys tend to underestimate the number of fish present because of limited visibility and the tendency of fish to hide in deep waters or under instream cover. Where population numbers are low and water depths exceed 2 m, underwater surveys tend to provide more reliable counts than other visual survey techniques (Shardlow et al. 1987). Under ideal conditions on the Big Qualicum River, surveyor observed on average 63% of the chinook present and 44% of the coho present (Shardlow et al. 1987). In another series on the Trent River between 1987 and 1989, snorkel surveys were used to enumerate adult coho escapement in conjunction with extensive mark-recapture efforts. On average, 87% of the adult coho present in the surveyed portion of the river were observed during snorkel surveys (Bocking et al. 1993). These results were reflective of maximum observer efficiencies because survey conditions in the Trent River were close to ideal (>3 m visibility, <1000 fish, few other species, depths less than 3 m, limited instream cover, 9 km survey area).

Direct measures of observer efficiency are not available for our surveys on the Bella Coola and Atnarko rivers. River size, instream cover and concerns regarding the handling of any steelhead near spawning areas made it impossible to obtain a complete count of the number of steelhead in any reach. Comparison of the survey conditions in the Atnarko River (>3 m visibility on most surveys, low numbers of fish, the presents of other species, depths exceeding 5 m in some areas, extensive instream cover in some reaches and 9-14 km survey area) with those of the Trent and Big Qualicum rivers suggest that observer efficiencies for snorkel surveys likely ranged between 60% and 80% depending on the survey stratum and water clarity.

Comparison of aerial and snorkel survey counts on the lower and middle Atnarko indicated that on average aerial counts of adult steelhead were 60% of the snorkel count. A regression analysis of 15 paired counts from the 1997 and 1998 surveys showed a significant relationship between the aerial counts (A) and snorkel (S) counts ($S=1.04A+16.3$, $p<0.0001$, Figure 6). There were some strata in the middle Atnarko where aerial counts were consistently

close to those obtained from snorkel surveys (e.g., Padgett's Pool and Goose Hole) and other adjacent strata where aerial surveyors observed few if any of the steelhead present (Roadside Pool, Football Jam, Steelhead Hole).

Comparison of the visual survey results between years shows that the number of steelhead observed can change substantially over the study period (Figure 7). In 1997, counts of summer/fall-run steelhead peaked in late February, remained high through mid-March and fluctuated in late March and early April with changes in water clarity, flow, and fish distribution. In contrast, the 1998 counts of summer/fall-run steelhead were low in late February but increased significantly toward the end of the survey period. Therefore, a single survey will not provide a reliable index of the annual return of summer/fall-run steelhead.

Radio Telemetry

Radio telemetry has been used extensively over the past 10 years to assess the spawning distribution, run timing, instream behavior and abundance of adult salmonids returning to large river systems along the Pacific coast. Major studies involving the application and tracking of more than 100 radio-tagged adult salmonids have been conducted on Taku River sockeye, chinook and coho (Eiler et al. 1988; 1990), Nass River chinook (Koski et al 1996a; 1996b), the Skeena River steelhead and coho (Koski et al. 1995; Alexander et al. 1996); Fraser River sockeye and steelhead (Schubert and Scarborough 1996; Nelson et al. 1998b), and Columbia River steelhead, chinook and sockeye (Stuehrenberg et al. 1986; Bjornn et al. 1992; 1993; Alexander et al. 1998; English et al. 1998). These studies have provided fisheries managers with key information on spawning locations, upstream and downstream run timing; migration speeds, in-river holding areas, fishery removals and, in some cases, stock-specific escapement estimates.

Radio telemetry techniques were employed on the Bella Coola/Atnarko watershed to obtain information on adult steelhead numbers, habitat use and partitioning, in-river movement patterns; and stock segregation (see Objective 1). Unfortunately, we were not able to capture and radio tag sufficient numbers of adult steelhead in 1997 and 1998 to compute reliable escapement estimates for the Bella Coola/Atnarko steelhead stock. We were, however, able to track both summer/fall-run and spring-run steelhead to their respective spawning areas and document the spawning intervals and downstream migration timing for these two components of the steelhead population. These data have provided new information on the degree of overlap in spawning locations and timing, and distance steelhead migration upstream on Burnt Bridge Creek, Atnarko River and Hotnarko River. The study has also provided some of the first reliable information on the post-spawning survival rates (71%) for spring-run steelhead. This survival rate was similar to that estimated for fall-run steelhead radio tagged on the Somass River in 1986 (Lirette and Hooton 1988) but higher than the post-spawning survival

rate of 58% estimated for Skeena River summer-run steelhead radio-tagged in 1994 (English et al. 1996) and 47% estimated for Fraser fall-run steelhead radio-tagged in 1996 (Nelson et al. 1998b). Since we were only able to apply 9 radio tags to the summer/fall-run component of the Bella Coola steelhead population we could not compute a reliable estimate of the post-spawning survival for this component of the run.

Catch Monitoring

Reliable harvest data is critical for the effective management of any fish stock (Ricker 1975, and many others). Managers responsible for steelhead fisheries have relied heavily on harvest data from recreational fisheries because of the difficulties and expense associated with obtaining reliable escapement estimates for steelhead (Smith 1998). In fact, the historical run size estimates for both Dean River and Bella Coola/Atnarko steelhead stocks were derived from catch and effort data from the recreational fishery (Nelson et al. 1998a). However, the closure of the recreational fishery on the Bella Coola in November 1995 has eliminated this source of information on annual returns. The Nuxalk fishery on the lower Bella Coola is the only other fishery that could provide an index of steelhead returns to Bella Coola system.

The spring fishery is an intensive portion of the annual Nuxalk fishery on the lower Bella Coola. The later portion of this fishery (early May through late June) targets chinook using drift gillnet gear but accounts for the majority (65-100%) of the steelhead caught by Nuxalk fishers in recent years (1991-93). The Nuxalk fishing effort expended in this spring fishery is substantial and has ranged from 312-853 drifts per year, with a mean of 549 drifts for 1978-95. Since the fishery catches both upstream migrating adults and downstream migrating kelts, we hypothesized that the steelhead CPE for this fishery might provide an indication of the relative size of the total annual return of Bella Coola steelhead. This hypothesis was tested by regressing spring CPE values against of the annual run size estimates for Bella Coola steelhead for 1979-94, provided in Nelson et al. (1998a). This regression showed a significant relationship (Figure 8, $p < 0.0001$). There are, however, several obvious concerns regarding the use of this relationship and CPE data to provide an index of annual steelhead returns to the Bella Coola:

1. the regression equation is based on indirect estimates of annual steelhead returns and CPE of unknown accuracy;

2. the estimates of annual returns are not completely independent from the Nuxalk catch data;

3. relationships between CPE and fishing effort often make CPE a poor index of abundance. Fishing effort often decreases as the target stock declines but reductions in competition between fishermen and the removal of the poorer fishermen can result in increasing CPE; and

4. fisheries and stocks are not static; consequently, static relationship derived from historical data will eventually fail.

These are all real concerns and good reasons for managers to be cautious when using a historical regression and current CPE to estimate annual returns. However, it should be noted that the catch information used to generate the historical estimates of steelhead returns were adjusted for known biases, and the Nuxalk catch for the spring fishery represented, on average, less than 7% of the estimated total annual steelhead return (1979-94). During the 1979-94 period, the allocation of the remainder of the steelhead return was 60% to escapement, 21% to the summer, fall and winter Nuxalk fisheries, and 12% to the recreational fishery. The concern regarding the relationship between CPE and effort is not currently a major concern because fishing effort has been high and is largely determined by chinook abundance. However, a major reduction in fishing effort or the lack of information to update the relationship between total return and CPE would make the resulting run size estimates highly uncertain.

Population Estimates

The two primary goals of this study were: 1) to derive a population estimate for each of the major run-timing groups of Bella Coola steelhead; and 2) to develop a methodology to provide a reliable and repeatable index of the abundance of spawning steelhead for the foreseeable future. The two major run-timing components of the Bella Coola steelhead population (summer/fall-run steelhead and spring-run steelhead) present substantially different challenges for escapement monitoring. Summer/fall-run steelhead enter the Bella Coola watershed over an extended period (June-December) and can be observed and counted in selected areas from late February through early April as they move out of deep-water holding areas toward their spawning locations. In contrast, the spring-run enters the watershed during a relatively narrow period of time from late April through late May as water levels rise and water clarity precludes any visual enumeration technique. Consequently, our abundance estimates and recommended methodology are different for each timing group.

Summer/fall-run steelhead

Minimum counts of summer/fall-run steelhead in the Bella Coola-Atnarko watershed were obtained in 1997 and 1998 using aerial and snorkel surveys. These surveys demonstrated

that summer/fall-run steelhead can be consistently counted in the Atnarko River during winter low-flow periods. A systematic series of snorkel surveys covering 14 km of the Atnarko River (22% of the mainstem and spawning tributaries accessible to steelhead) conducted once every 7-10 days between late February and early April (or spring freshet) is required to detect the peak abundance and provide a minimum estimate of the escapement for the summer/fall-run component of the stock. These surveys also showed that aerial surveyors observed on average only 60% of the steelhead observed during snorkel surveys. Using snorkel surveys alone our minimum estimates for the number of summer/fall-run steelhead in the 14 km snorkel survey area in 1997 and 1998 were 116 and 59, respectively. If we apply a reasonable estimate of observer efficiency for the conditions under which these counts were made (i.e., 70%) and account for the portion of the total summer/fall-run population in the survey area each year (80% in 1997 based on water levels and fish distribution, and 38% in 1998 based on radio telemetry data), our escapement estimates for summer/fall-run component of the Bella Coola steelhead population would be 200 and 220 for 1997 and 1998, respectively.

A comparison of the 1997 and 1998 survey results with those from all previous surveys (Figure 8) illustrates the limited historical data and major increase in effort over the past two years. After adjusting each year's survey results for the area of coverage survey type, a comparison can be made between the escapement estimates for summer/fall-run steelhead from 1988-98. While these estimates suggest that there has been little change in the escapement estimates between survey years, one must be cautious when drawing any conclusions from data as sparse as that available for 1988-1996. When only one or two surveys are conducted in a year, the results are highly vulnerable to interannual variation in steelhead distribution and observer efficiencies.

Spring-Run Steelhead

Estimating escapement for spring-run steelhead returns to a large river system like the Bella Coola is a significant challenge. In the absence of any viable approach for visually enumerating spring-run steelhead in turbid waters, a mark-recapture study using radio telemetry and intensive catch monitoring was initiated in March 1997. A total of 24 spring-run steelhead were tagged in 1997. All of these radio-tagged steelhead were tracked to spawning destinations and 17 (71%) were subsequently tracked as kelts emigrating out of the Bella Coola River. Intensive sport and Nuxalk fisheries along the lower Bella Coola resulted in a total of 107 steelhead captured but no recaptures of radio-tagged steelhead were reported. Consequently, an escapement estimate for spring-run steelhead could not be computed using the radio-telemetry data. However, an analysis of the historical catch and run size estimates for Bella Coola steelhead has provided an alternative approach for assessing recent and future returns to the river.

Using the CPE data collected during 1997 and 1998 (5.5-7.6 steelhead per 100 drifts), the regression equation in Figure 9 would predict a total return of 1280-1350 steelhead with 95% confidence limits of 780 and 2200. After subtracting our estimate of the summer/fall-run component from these total population estimates, our best estimate of the current size of the spring-run would be 1080-1130 steelhead.

Given the large confidence interval associated with these regression estimates (Figure 9), CPE would have to increase to 40 steelhead per 100 drifts to be confident that the run size had increased from current levels. Historical estimates for CPE values in excess of 70 steelhead per 100 drifts are too limited (n=2) to compute a defensible population estimate, but CPE values in this range would be indicative of a healthy Bella Coola steelhead stock. However, managers must not rely solely on this harvest monitoring indicator of stock size. Annual monitoring programs must include the visual surveys of the summer/fall run component, juvenile fry surveys and annual monitoring of the spring Nuxalk fishery and the recreational fishery. A consistency in results from all of these programs would be required for the managers to be confident that the population has increased or decreased.

RECOMMENDATIONS

Visual Surveys

Future visual surveys should be conducted using snorkel surveys. These surveys should be conducted on at least three separate occasions between late February and early April depending on water conditions. The survey areas must include the two portions of the Atnarko River routinely surveyed in 1997 and 1998: 1) 5 km in the lower Atnarko between the Bella Coola-Atnarko junction and Belarko Pool; and 2) 9 km in the middle Atnarko between the Young Creek (Roadside Pool) and Line Cabin (Figure 2). The field procedures for these surveys should follow those outlined in Thurow (1994). Annual surveys should record the number of each species observed in each km strata of the survey areas so the results can be compared with those obtained in 1997 and 1998 (see Appendix A).

Catch Monitoring

Annual catch monitoring of the Nuxalk fishery between early May and late June is essential to provide some indication of the relative size and trend in steelhead returns to the Bella Coola River. A Nuxalk surveyor should be hired to work a minimum of 5 days/week interviewing Nuxalk fishermen as they finish their drifts at the community of Bella Coola. These efforts must be carefully coordinated with DFO to ensure the maximum coverage of the Nuxalk fishery and sport fisheries and avoid conflicts. An additional benefit of this type of

program is it would provide a means of directly communicating information on steelhead stock status to both Nuxalk and sport fishers and communicating the concerns of these fishers back to the Ministry.

It is also critical that all fishers and fisheries managers recognize that significant numbers of steelhead from all run timing groups are vulnerable during the intensive spring fisheries that currently target the abundant chinook stocks. Spring-run steelhead are caught in these intensive fisheries during both upstream and downstream migrations (see Table 7). Some summer-run steelhead enter the Bella Coola in June and these fish are also vulnerable to these intensive fisheries (both as they migrate upstream in one year and downstream the following spring). While fall-run steelhead are less vulnerable to the spring fisheries than the other two run timing groups, their extended freshwater residence period makes them vulnerable to over harvesting in retention sport fisheries. Consequently, the implementation of future recreational fisheries must limit harvest opportunities to periods and locations where healthy run-timing groups can be caught without impacting the less-productive or depressed steelhead runs. For example, once there is a clear indication that the spring-run component of the steelhead population has recovered to a level that can sustain some level of harvest, a targeted spring-run steelhead recreational fishery could be conducted in the mainstem Bella Coola River downstream of the Bailey Bridge from March through the end of May without having a significant impact on the summer or fall run-timing groups. However, no retention of steelhead should be permitted in June and July until fisheries managers are confident that the population of summer-run steelhead is high enough to sustain a harvest.

Annual Stock Assessments

An annual stock assessment process for Bella Coola steelhead must incorporate both juvenile and adult survey programs. Data from juvenile surveys are essential for providing an early indication of stock rebuilding or decline. Data from adult surveys is essential for assessing changes in spawner distribution and fishery impacts on adult returns. The information provided in this report and Nelson et al. (1998a) should be updated on a regular basis so longer-term trends can be readily identified and future stock recruitment analyses are facilitated.

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TABLES

Table 1. Number of snorkel and aerial surveys conducted during each survey period summarized by method and location, 15 November 1996 and 24 April 1997.

Period	Dates (1996-97)	Method		Location						
					Atnarko River [a]					Survey area total[c]
		Snorkel	Aerial	Bella Coola River	Jct. to Flat Rock	Young to Goose	Goose to Line Cabin	Above Line Cabin	Total[b]	
1	15-18 Nov	1	1	0	2	1	1	1	1	0
2	7-16 Feb	1	2	1	2	1	0	0	0	0
3	18-21 Feb	1	2	0	2	3	2	2	2	0
4	22-26 Feb	2	2	3	3	2	2	2	1	1
5	27 Feb - 5 Mar	3	1	2	2	1	0	0	1	1
6	6-9 Mar	1	1	1	1	1	1	0	1	1
7	13-16 Mar	2	2	2	3	3	3	1	3	2
8	28-29 Mar	1	1	1	1	2	2	1	2	1
9	5-7 Apr	1	1	1	2	1	1	1	1	1
10	24-Apr		1	1	1	1	1	1	1	1
Total		**13**	**14**	**12**	**19**	**16**	**13**	**9**	**13**	**8**

[a] Reach definitions are based on mainstem areas that could be surveyed; between Bella/Atnarko junction and Mosher Cr.; Young Cr. (Roadside Pool) and Goose Hole; Goose Hole to Line Cabin; and above Line Cabin to Stillwater Lake.

[b] Complete coverage of the survey areas on the Atnarko River below Line Cabin.

[c] Complete coverage of the survey areas on the Bella Coola River above Burnt Bridge Creek and Atnarko River below Line Cabin.

Table 2. Summary of the highest counts during each survey period for each of the survey areas along the Bella Coola and Atnarko rivers, 15 November 1996 to 24 April 1997.

		Highest count of steelhead during a survey period [a]						
		Location						
			Atnarko River [b]					Survey
Period	Dates	Bella Coola River	Jct. to Flat Rock	Young to Goose	Goose to Line Cabin	Above Line Cabin	Total[c]	area total[d]
1	15-18 Nov		19	0	0	0	19	19
2	7-16 Feb	10	5	40			45	55
3	18-21 Feb		9	52	0	0	61	61
4	**22-26 Feb**	**15**	**13**	**103**	**0**	**0**	**116**	**131**
5	27 Feb - 5 Mar	0	12	84			96	96
6	6-9 Mar	1	10	81	1		92	93
7	13-16 Mar	1	7	57	35	0	99	100
8	28-29 Mar	4	4	33	26	0	63	67
9	5-7 Apr	7	18	67	7	0	92	99
10	24-Apr	11	9	16	1	0	26	37

[a] Numbers in bold indicate the period with the highest total count; blanks indicate areas not surveyed during that period

[b] Reach definitions are based on mainstem areas that could be surveyed; between Bella/Atnarko junction and Mosher Cr.; Young Cr. (Roadside Pool) and Goose Hole; Goose Hole to Line Cabin; and above Line Cabin to Stillwater Lake.

[c] Total count for the survey areas on the Atnarko River below Line Cabin.

[d] Total count for the survey areas on the Bella Coola River above Burnt Bridge Creek and Atnarko River below Line Cabin.

Table 3. Summary of fishing effort to catch spring run steelhead during the 1997 Bella Coola River telemetry program. Effort is presented as the number of rod hours spent attempting to catch and tag fish by angling gear and by stratum.

Week ending	Angling gear		Rod Hours Stratum [a]			
	Steelhead	Chinook [b]	Lower Bella	Middle Bella	Upper Bella	Total
22 Mar	13.3			9.9	3.4	13.3
29 Mar	22.2		8.6	13.6		22.2
05 Apr	17.7		15.1		2.6	17.7
12 Apr	33.9		8.0	12.4	13.4	33.8
19 Apr	68.0		15.5	33.4	19.1	68.0
26 Apr	70.9		25.4	20.2	25.3	70.9
03 May	61.6		10.1	39.1	12.5	61.6
10 May	72.1		29.4	13.3	29.4	72.0
17 May	14.2			14.2		14.2
24 May	0.5	86.5	86.5	0.5		87.0
31 May	11.7	199.6	211.4			211.4
07 Jun		53.5	53.5			53.5
14 Jun		367.8	367.8			367.8
21 Jun		96.0	96.0			96.0
Total	386.1	803.4	927.3	156.4	105.6	1189.4

[a] Lower Bella=mainstem between Walker Island and the Baily Bridge; Middle Bella=mainstem between the Baily Bridge and Noosgulch R; Upper Bella=mainstem between Noosgulch R. and Atnarko R.

[b] The general sport fishery accounted for most of the fishing effort using chinook angling gear. The radio-tagging crew monitored the lower Bella Coola sport fishery for incidental catches of steelhead.

Table 4. Numbers of spring run steelhead radio tagged during the 1997 Bella Coola River telemetry program, 21 March - 15 June 1997. Numbers are summarized for weekly periods.

Week ending	Number of Steelhead Radio Tagged			
	Stratum [a]			
	Lower Bella	Middle Bella	Upper Bella	Total
22-Mar				0
29-Mar		1		1
05-Apr			1	1
12-Apr			2	2
19-Apr	1	4	1	6
26-Apr		2	6	8
03-May				0
10-May			3	3
17-May				0
24-May	2	1		3
31-May				0
07-Jun	1			1
14-Jun	1			1
21-Jun				0
Total	5	8	13	26

[a] Lower Bella=mainstem between Walker Island and the Baily Bridge; Middle Bella=mainstem between the Baily Bridge and Noosgulch R; Upper Bella=mainstem between Noosgulch R. and Atnarko R.

Table 5. Summary of radio-tag tracking effort during the 1997 Bella Coola 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]	Walker [b]	Burnt Br.	Atnarko	Flatrock	Camera	Total
22 Mar	0	0	6		2			8
29 Mar	0	2	7	6	7	4	6	32
05 Apr	0	2	7	7	7	7	7	37
12 Apr	1	0	7	7	7	7	7	36
19 Apr	0	5	7	7	7	7	7	40
26 Apr	1	5	7	7	7	7	7	41
03 May	0	6	7	7	7	7	7	41
10 May	1	2	7	7	7	7	7	38
17 May	0	2	7	7	7	7	6	36
24 May	1	1	7	6	7	7	7	36
31 May	0	1	7	7	7	7	7	36
07 Jun	1	1	7	7	7	7	7	37
14 Jun	0	2	7	7	7	7	7	37
21 Jun	1	0	7	7	7	7	7	36
28 Jun	0	0	7	7	7	7	7	35
05 Jul	0	0	7	7	7	7	7	35
12 Jul	0	0	7	7	7	6	7	34
19 Jul	0	1	1	2	1		2	7
26 Jul	0	0						
02 Aug	1	0						
Total	7	30	119	112	115	108	112	602

[a] Ground tracks include 8 boat and 22 foot/truck surveys

[b] Walker=Bella Coola R. near Walker Island; Burnt Br=Bella/Burnt Br. Cr.; Atnarko=Bella/Atnarko R.; Flatrock=Atnarko mainste near Mosher Cr.; and Camera=Atnarko mainstem downstream of Young Cr.

[c] Shading indicates periods when stations were not operating due to data overload or electronic failure

Table 6. Fates of spring-run steelhead that were radio tagged during the 1997 telemetry study on the Bella Coola River.

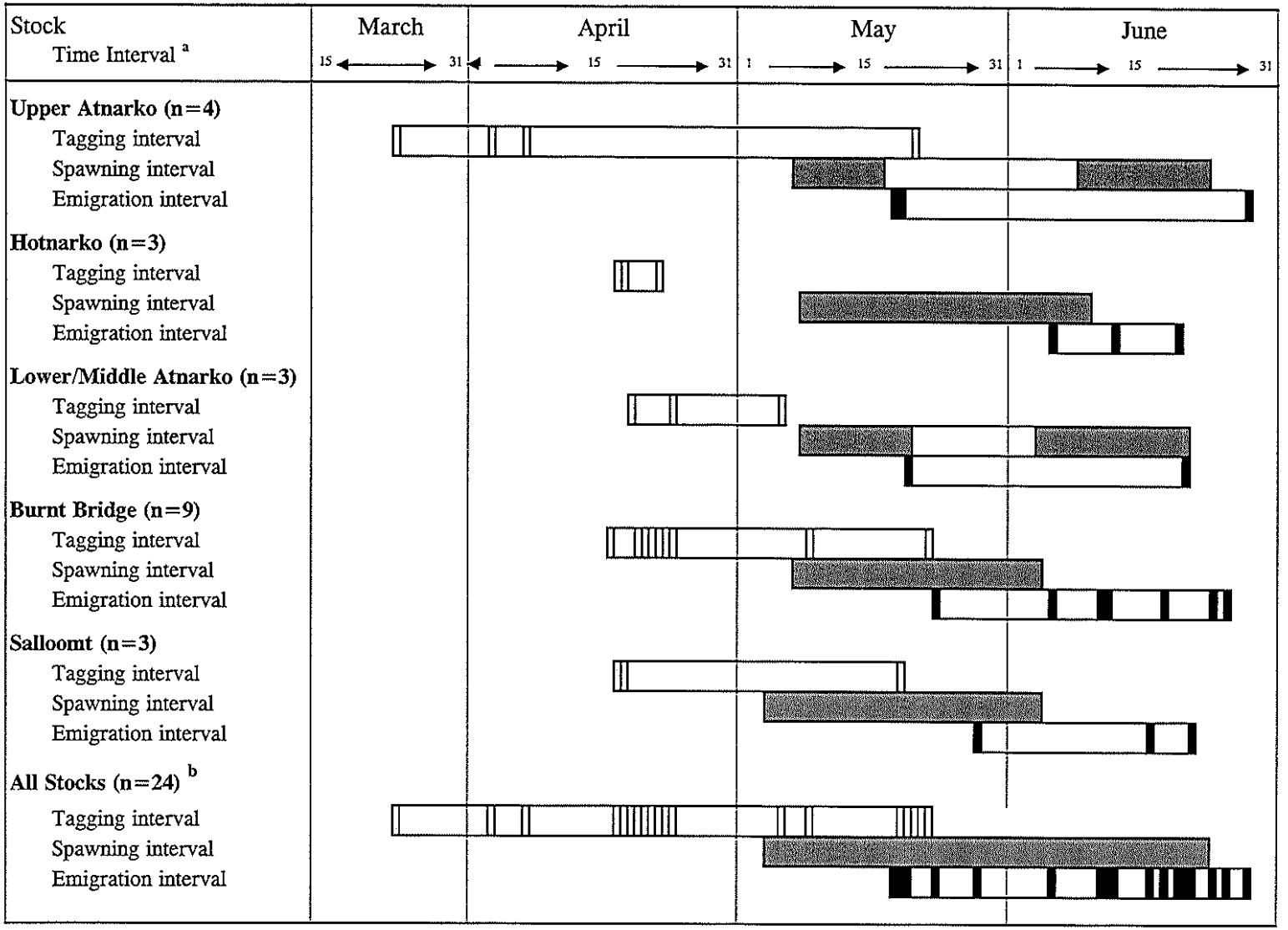
Reach/tributary	Upstream migration		Downstream migration	
Location/fate	No. tracked	% tracked	No. tracked	% of upstream
Atnarko River				
Upper/Hotnarko	3	13%	2	67%
Middle	5	21%	3	60%
Lower	2	8%	0	0%
Atnarko sub-total	**10**	**42%**	**5**	50%
Other Tribs.				
Mainstem: Upper Bella	1	4%	0	0%
Burnt Bridge Creek	8	33%	8	100%
Noosgulch River	1	4%	0	0%
Nusatsum River	1	4%	1	100%
Salloomt River	3	13%	3	100%
Other Tribs. sub-total	**14**	**58%**	**12**	86%
Total tracked to a destination [a]	**24**	**100%**	**17**	71%
Losses of tags				
Post-spawning mortality [b]	NA		6	
Regurgitation [c]	0		1	
Total Losses	**0**		**7**	
Total number radio-tagged	**24**		**24**	

[a] Includes all radio-tagged fish that were tracked to a spawning destination or were tracked emigrating from the Bella Coola-Atnarko watershed after spawning

[b] Includes six male radio-tagged fish that were believed to have spawned and likely died near their spawning sites (ch 25 codes 77 and 79; ch 11 code 73) or drifted downstream (ch 25 code 76; ch 11 codes 59 and 64)

[c] Includes one radio-tag (ch 11 code 66) tracked in turbulent water at a location near Camera Channel on every survey conducted after 28 April 1997. It is unlikely that a carcass would remain at this turbulent location

Table 7. Summary of timing information for spring-run steelhead radio-tagged on the Bella Coola River in 1997.



[a] Thin bars indicate the tagging and emigration dates for individual fish. Wide bars indicate the length of the entry, spawning and emigration interval for each stock. Spawning intervals indicate the period when radio-tagged fish were consistently tracked in their furthest upstream location.

[b] **All Stocks** includes all spring-run steelhead radio tagged in 1997 regardless of spawning or emigration fate

Table 8. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola/Atnarko watershed, 27 April - 3 July 1997.

Week Ending	No. of Drifts				Chinook			Steelhead				Steelhead
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Released	Total	Sockeye	CPE[1]
03-May	3	7	0	10	3	0	0	3	0	3	0	30.0
10-May	2	10	0	12	12	0	0	1	6	7	0	58.3
17-May	33	9	28	70	47	0	0	4	1	5	0	7.1
24-May	58	17	27	102	131	3	1	11	7	18	0	17.6
31-May	82	9	25	116	142	7	0	3	9	12	0	10.3
07-Jun	98	17	40	155	207	5	0	0	1	1	1	0.6
14-Jun	83	14	48	145	338	10	0	0	3	3	4	2.1
21-Jun	80	14	45	139	327	13	0	0	1	1	18	0.7
28-Jun	64	11	50	125	385	35	0	1	5	6	131	4.8
05-Jul	102	29	79	210	597	17	0	0	4	4	433	1.9
Total	605	137	342	1084	2189	90	1	23	37	60	587	5.5

[1]steelhead caught per 100 drifts

Table 9. Weekly catch and effort for the recreational fisheries within the Bella Coola/Atnarko watershed, 27 Apr. - 3 July 1997.

Watershed	Week Ending	Number of Anglers	Chinook		Steelhead	
			Kept	Released	Fresh	Kelts
Atnarko						
	31-May	29	0	0	0	0
	07-Jun	38	4	0	4	4
	14-Jun	68	18	0	4	0
	21-Jun	202	16	0	0	0
	28-Jun	280	35	0	3	0
	30-Jun	143	20	0	0	0
Bella Coola						
	17-May	62	0	0	0	0
	24-May	112	17	0	16	0
	31-May	150	18	0	0	0
	07-Jun	140	13	0	0	3
	14-Jun	246	34	0	0	1
	21-Jun	223	15	0	3	0
	28-Jun	320	50	0	1	2
	30-Jun	150	51	0	4	0
	Totals	**2163**	**291**	**0**	**35**	**10**

Table 10. Number of snorkel and aerial surveys conducted during each survey period summarized by method and location, 25 October 1997 and 11 April 1998.

Period	Dates (1997-98)[b]	Method		Location						Survey area total[d]
					Atnarko River [a]					
		Snorkel	Aerial	Bella Coola River	Jct. to Flat Rock	Young to Goose	Goose to Line Cabin	Above Line Cabin	Total[c]	
1	25 Oct - 3 Nov	2			1	1	1	0	1	0
2	21-26 Nov	2	1	1	2	2	2	1	2	1
3	18 Dec - 4 Feb	1	2	2	3	2	2	0	2	2
4	17-25 Feb	2	1	1	2	2	2	1	2	1
5	26 Feb - 3 Mar	1	1	2	2	2	2	1	2	2
6	12-15 Mar	2	1	1	2	2	2	1	2	1
7	20-22 Mar	2	1	1	1	3	3	1	1	1
8	5-11 Apr	3	1	1	2	3	3	1	2	1
Total		**15**	**8**	**9**	**15**	**17**	**17**	**6**	**14**	**9**

[a] Reach definitions are based on mainstem areas that could be surveyed; between Bella/Atnarko junction and Mosher Cr.; Young Cr. (Roadside Pool) and Goose Hole; Goose Hole to Line Cabin; and above Line Cabin to Stillwater Lake.

[b] Includes surveys (3, 21, 26 Nov; 18 Dec; 26, 27 Feb; 3 Mar) conducted by Snootli Cr. Hatchery (Russ Hilland, DFO, pers. comm.)

[c] Complete coverage of the survey areas on the Atnarko River below Line Cabin.

[d] Complete coverage of the survey areas on the Bella Coola River above Burnt Bridge Creek and Atnarko River below Line Cabin.

Table 11. Summary of the highest counts during each survey period for each of the survey areas along the Bella Coola and Atnarko rivers, 25 October 1997 to 11 April 1998.

		Highest count of steelhead during a survey period [a]						
		Location						
			Atnarko River [b]					Survey
Period	Dates (1997-98)[c]	Bella Coola River	Jct. to Flat Rock	Young to Goose	Goose to Line Cabin	Above Line Cabin	Total[d]	area total[e]
1	25 Oct - 3 Nov		3	3	0		6	6
2	21-26 Nov	0	0	20	14	0	34	34
3	18 Dec - 4 Feb	2	0	15	0		15	17
4	17-25 Feb	0	1	0	27	0	28	28
5	26 Feb - 3 Mar	0	0		29	0	29	29
6	12-15 Mar	2	2	9	20	0	31	33
7	20-22 Mar	1	0	6	31	4	41	42
8	**5-11 Apr**	**12**	**8**	**15**	**36**	**1**	60	**72**

[a] Numbers in bold indicate the period with the highest total count; blanks indicate areas not surveyed during that period.

[b] Reach definitions are based on mainstem areas that could be surveyed; between Bella/Atnarko junction and Mosher Cr.; Young Cr. (Roadside Pool) and Goose Hole; Goose Hole to Line Cabin; and above Line Cabin to Stillwater Lake.

[c] Includes surveys (3, 21, 26 Nov; 18 Dec; 26, 27 Feb; 3 Mar) conducted by Snootli Cr. Hatchery (Russ Hilland, DFO, pers. comm.)

[d] Total count for the survey areas on the Atnarko River below Line Cabin.

[e] Total count for the survey areas on the Bella Coola River above Burnt Bridge Creek and Atnarko River below Line Cabin.

Table 12. Summary of fishing effort to catch steelhead during the 1997-98 Bella Coola River telemetry program. Effort is presented as the number of rod hours spent attempting to catch and tag fish by angling gear and by stratum.

Week	Bella Coola				Atnarko R.			System	Steelhead	Tagged
ending (97-98)	Lower	Middle	Upper	Total	Lower	Middle	Total	Total	Number	Location
01-Nov				0.0	6.6	11.0	17.6	17.6	6	Middle Atnarko
08-Nov				0.0	5.2	3.5	8.7	8.7	0	
15-Nov		1.6		1.6		2.0	2.0	3.6	0	
22-Nov		9.6	5.2	14.8	6.9	2.6	9.5	24.3	1	Middle Atnarko
29-Nov	2.0			2.0			0.0	2.0	0	
06-Dec				0.0			0.0	0.0	0	
13-Dec			6.5	6.5	2.0	5.8	7.8	14.3	1	Lower Atnarko
20-Dec				0.0	10.0		10.0	10.0	0	
27-Dec				0.0			0.0	0.0	0	
03-Jan				0.0	8.4	0.9	9.3	9.3	0	
10-Jan				0.0			0.0	0.0	0	
17-Jan				0.0			0.0	0.0	0	
24-Jan		8.7	1.0	9.7	13.7		13.7	23.4	0	
31-Jan	7.0	10.0	5.7	22.7			0.0	22.7	0	
07-Feb	10.5	11.4	25.3	47.2	13.2	1.6	14.8	62.0	0	
14-Feb	10.5	10.5		21.0			0.0	21.0	0	
21-Feb				0.0			0.0	0.0	0	
28-Feb				0.0			0.0	0.0	0	
07-Mar				0.0			0.0	0.0	0	
14-Mar				0.0			0.0	0.0	0	
21-Mar				0.0			0.0	0.0	0	
28-Mar				0.0			0.0	0.0	0	
04-Apr				0.0			0.0	0.0	0	
11-Apr				0.0			0.0	0.0	0	
18-Apr				0.0			0.0	0.0	0	
25-Apr				0.0			0.0	0.0	0	
02-May			30.2	30.2			0.0	30.2	1	Bella Coola
09-May				0.0			0.0	0.0	0	
16-May				0.0			0.0	0.0	0	
23-May				0.0			0.0	0.0	0	
30-May				0.0		19.8	19.8	19.8	1	Middle Atnarko
Summary										
27 Oct - 10 Dec	2.0	11.2	11.7	24.9	20.7	24.9	45.6	70.5	8	
17 Dec - 11 Feb	28.0	40.6	32.0	100.6	45.3	2.5	47.8	148.4	0	
28 Apr - 25 May	0.0	0.0	30.2	30.2	0.0	19.8	19.8	50.0	2	
Grand Total	**30.0**	**51.8**	**73.9**	**155.7**	**66.0**	**47.2**	**113.2**	**268.9**	**10**	

Table 13. Summary of radio-tag tracking effort during the 1997-98 Bella Coola River telemetry program. Effort is presented as the number of days or part days that tracking was

Week	Mobile tracking		Bella Coola stations	Atnarko stations				
ending (97-98)	Aerial	Ground [a]	Walker [b]	Junction	Camera	Hotnarko	Stillwater	Total
01-Nov		1		5				6
08-Nov		2		7	1	1		11
15-Nov		1		7	2	7		17
22-Nov		1		7	3	7		18
29-Nov	1	1		7	7	6		22
06-Dec		1	1	7	7	2		18
13-Dec		1	7	7	7	7		29
20-Dec		1	7	7	7	7		29
27-Dec		1	0	7	7	7		22
03-Jan		1	0	7	7	7		22
10-Jan		1	0	7	7	2		17
17-Jan		1	5	7	7	0		20
24-Jan		1	7	7	7	1		23
31-Jan	1		4	6	7	7	5	30
07-Feb			0	7	7	7	7	28
14-Feb			5	7	7	7	7	33
21-Feb	1	1	7	7	7	7	7	37
28-Feb		1	7	7	6	7	7	35
07-Mar		1	7	7	2	7	7	31
14-Mar	1	1	7	7	6	7	7	36
21-Mar	1	2	7	7	1	7	7	32
28-Mar			7	7	7	7	7	35
04-Apr		1	7	7	7	7	7	36
11-Apr	1		7	7	6	7	7	35
18-Apr			7	7	3	7	7	31
25-Apr		1	7	7	7	7	7	36
02-May			0	7	7	7	7	28
09-May	1	1	6	7	7	7	7	36
16-May			7	7	7	7	7	35
23-May	1		7	7	7	7	7	36
30-May	1	1	7	7	7	5	7	35
06-Jun			7	7	7	0	7	28
13-Jun	1		7	7	7	4	7	33
20-Jun	1	1	7	7	7	7	7	37
27-Jun	1	1	7	7	7	7	2	32
04-Jul		1	7	7	7	7		29
11-Jul			7	7	7	7		28
18-Jul	1		2	2	2	2		9
Total	**13**	**27**	**177**	**258**	**221**	**212**	**147**	**1055**

[a] Ground tracks include 4 boat and 23 foot/truck surveys

[b] Walker=Bella Coola R. near Walker Island; Junction=Bella/Atnarko R.; Camera=Atnarko mainstem downstream of Young Cr.; and Stillwater=outlet Stillwater Lake

[c] Shading indicates periods when stations were not operating due to data overload or electronic failure

Table 14. Fates of summer/fall-run steelhead that were radio-tagged during 1997 along the Bella Coola and Atnarko rivers.

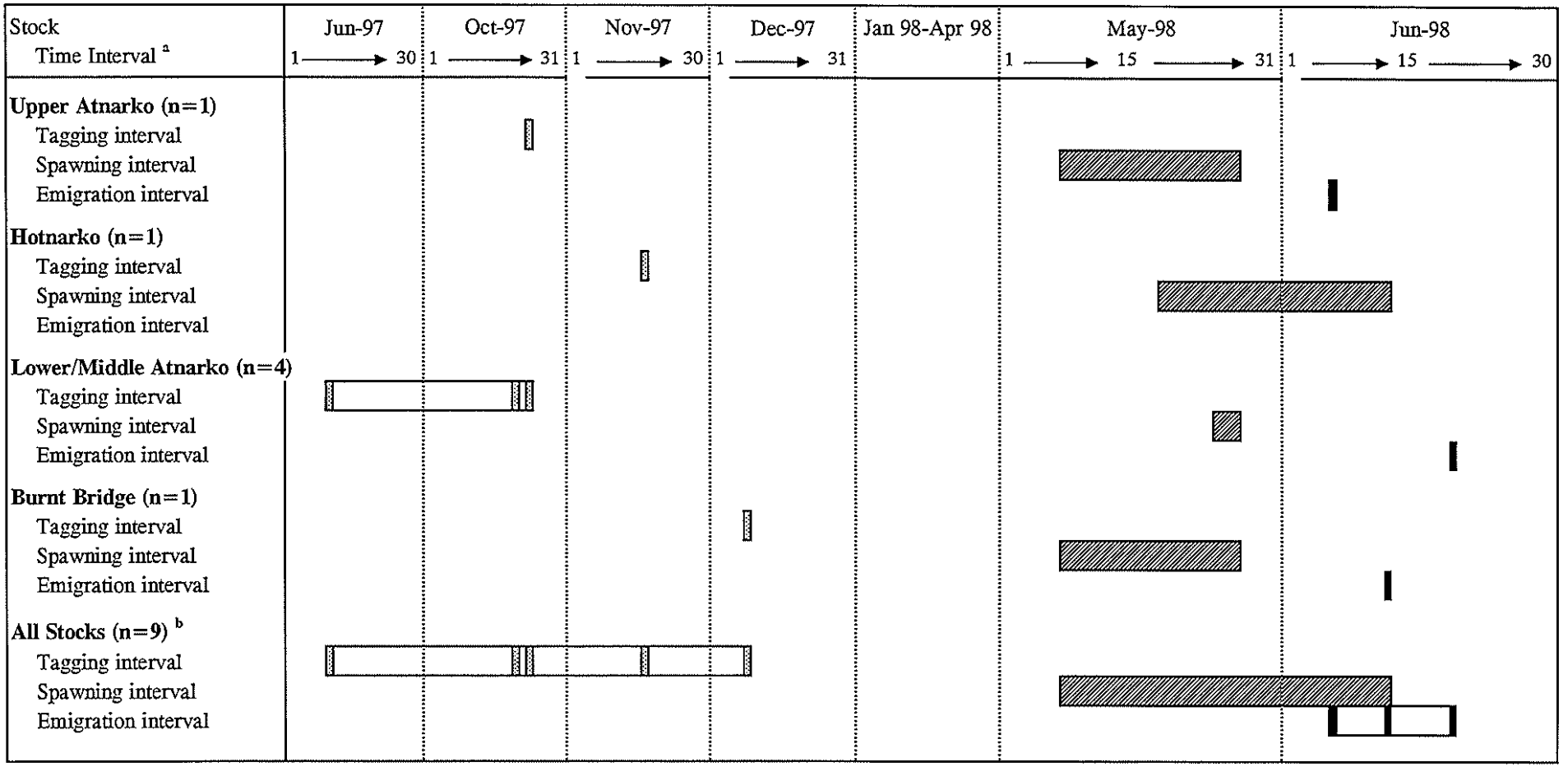
Reach/tributary	Upstream Migration		Downstream Migration	
Location/fate	No. tracked	% tracked	No. tracked	% of upstream
Atnarko River				
Upper/above Lonesome Lake	1	13%	1	100%
Hotnarko	1	13%	0	0%
Middle (Young to Hotnarko)	3	38%	1	33%
Lower (mouth to Young)	1	13%	0	0%
Atnarko sub-total	**6**	**75%**	**2**	**33%**
Other Tribs.				
Mainstem: Upper Bella Coola	1	13%	0	0%
Burnt Bridge Creek	1	13%	1	100%
Noosgulch River	0	0%	0	
Nusatsum River	0	0%	0	
Salloomt River	0	0%	0	
Other Tribs. sub-total	**2**	**25%**	**1**	**50%**
Total tracked to a destination [a]	**8**	**100%**	**3**	**38%**
Losses of tags				
Post-spawning mortality [b]	NA		2	
Regurgitation [c]	1		4	
Total Losses	**1**		**6**	
Total number radio-tagged	**9**		**9**	

[a] Includes all summer/winter-run steelhead tracked to a spawning locations or were tracked emigrating from the Bella Coola-Atnarko watershed after spawning

[b] Includes two female radio-tagged fish, one (ch 11 code 52) that is believed to have spawned and likely died near its spawning site, and the other (ch 25 code 58) that spawned in the Hotnarko and was last detected in the Upper Bella Coola

[c] Includes one radio-tagged fish (ch 9 code 60) that is believed to have regurgitated its tag immediately after tagging, and three radio-tagged fish (ch 9 codes 59, 65 and ch 11 code 69) that lost their tags after long post-tagging activity periods

Table 15. Summary of timing information for summer/fall-run steelhead radio-tagged in 1997 along the Bella Coola and Atnarko rivers.



[a] Thin bars indicate the tagging and emigration dates for individual fish. Wide bars indicate the length of the entry, spawning and emigration interval for each stock. Spawning intervals indicate the period when radio-tagged fish were consistently tracked in their furthest upstream location.

[b] **All Stocks** includes all summer/fall-run steelhead radio tagged in 1997 regardless of spawning or emigration fate (note: four steelhead were tagged on 31 Oct. 1997)

Table 16. Numbers of radio-tagged steelhead observed and tracked during snorkel and aerial surveys on the Bella Coola and Atnarko rivers, 25 October 1997 to 11 April 1998.

				Tracking locations of radio-tagged steelhead							
					Atnarko River [a]						
		Tags Observed		Bella Coola	Jct. to	Flat Rock to	Young to	Goose to	Above		Active
Period	Dates (97-98) [b]	Snorkel	Aerial	River	Flat Rock	Young	Goose	Line Cabin	Line Cabin	Total	tags [c]
1	25 Oct - 3 Nov	0	0	0	0	5	1	0	0	6	6
2	21-26 Nov	2	0	0	0	4	1	1	1	7	7
3	18 Dec - 4 Feb	0	0	3	1	1	1	1	1	5	8
4	17-25 Feb	0	0	3	0	2	1	1	1	5	8
5	26 Feb - 3 Mar [d]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	12-15 Mar	0	0	3	0	2	1	1	1	5	8
7	20-22 Mar	0	0	3	0	2	1	1	1	5	8
8	5-11 Apr	1	0	3	0	1	2	1	1	5	8

[a] Reach definitions are based on mainstem areas that could be surveyed; between Bella/Atnarko junction (60 RKM) and Flatrock (70 RKM); Young Cr. (80 RKM) and Goose Hole (85 RKM); and above Goose Hole and Stillwater Lake (97 RKM)

[b] Includes surveys (3, 21, 26 Nov; 18 Dec; 26, 27 Feb; 3 Mar) conducted by Snootli Cr. Hatchery (Russ Hilland, DFO, pers. comm.)

[c] Excludes one summer/fall-run steelhead whose tag (ch 9 code 60) was likely regurgitated because it was stationary at the release site immediately after release.

[d] All surveys during this period were conducted by Snootli Cr. Hatchery staff and radio-tagged fish were not tracked during these surveys.

Table 17. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola/Atnarko watershed, 3 May - 23 July 1998.

Week Ending	No. of Drifts				Chinook			Steelhead			Sockeye	Steelhead
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Released	Total		CPE[1]
09-May	0	45	0	45	29	0	0	5	7	12	0	26.7
16-May	77	12	22	111	106	0	0	0	5	5	0	4.5
23-May	114	16	4	134	125	7	0	2	10	12	0	9.0
30-May	84	8	0	92	124	5	0	0	4	4	0	4.3
06-Jun	162	13	13	188	447	17	0	0	10	10	0	5.3
13-Jun	173	19	8	200	529	20	0	0	14	14	1	7.0
20-Jun	108	9	5	122	696	46	0	0	11	11	39	9.0
27-Jun	109	6	2	117	562	31	0	2	3	5	54	4.3
04-Jul	157	0	0	157	824	111	0	0	16	16	326	10.2
11-Jul	199	1	6	206	651	129	0	5	7	12	820	5.8
18-Jul	90	15	21	126	391	68	0	2	7	9	413	7.1
25-Jul	18	7	0	25	119	7	0	0	0	0	36	0.0
Total	**1291**	**151**	**81**	**1523**	**4603**	**441**	**0**	**16**	**94**	**110**	**1689**	7.2
3 May-4 Jul	984	128	54	1166	3442	237	0	9	80	89	420	7.6

[1]steelhead caught per 100 drifts

Table 18. Weekly catch and effort for the recreational fisheries within the Bella Coola/Atnarko watershed, 16 May - 23 July 1998. Note: The numbers of chinook and steelhead reported here that were captured by angling are minimum numbers only and represent only a portion of the total catch.

Watershed	Week Ending	Number of Anglers	Number of Fish Captured by Angling	
			Chinook	Steelhead
Atnarko				
	16-May	0	0	0
	23-May	21	0	0
	30-May	29	0	0
	6-Jun	62	8	0
	13-Jun	58	32	0
	20-Jun	187	32	1
	27-Jun	333	31	0
	4-Jul	366	45	0
	11-Jul	520	79	2
	18-Jul [a]	217	74	0
	Total (Atnarko)	**1793**	**301**	**3**
Bella Coola				
	16-May	70	6	0
	23-May	156	11	5
	30-May [b]	188	22	11
	6-Jun [b]	174	6	13
	13-Jun	162	4	3
	20-Jun	101	7	0
	27-Jun	183	17	1
	4-Jul	243	23	0
	11-Jul	92	7	0
	18-Jul	57	5	0
	25-Jul	56	0	0
	Total (Bella Coola)	**1482**	**108**	**33**
Grand Totals (Atnarko and Bella Coola)		**3275**	**409**	**36**

[a] Sport fishing in the Atnarko River closed on 15 July 1998

[b] Additional steelhead catch information obtained from Chris Winkler (week ending 23 May, 7 steelhead caught at Airport Run; week ending 6 June, 11 steelhead caught at Bailey Bridge)

FIGURES

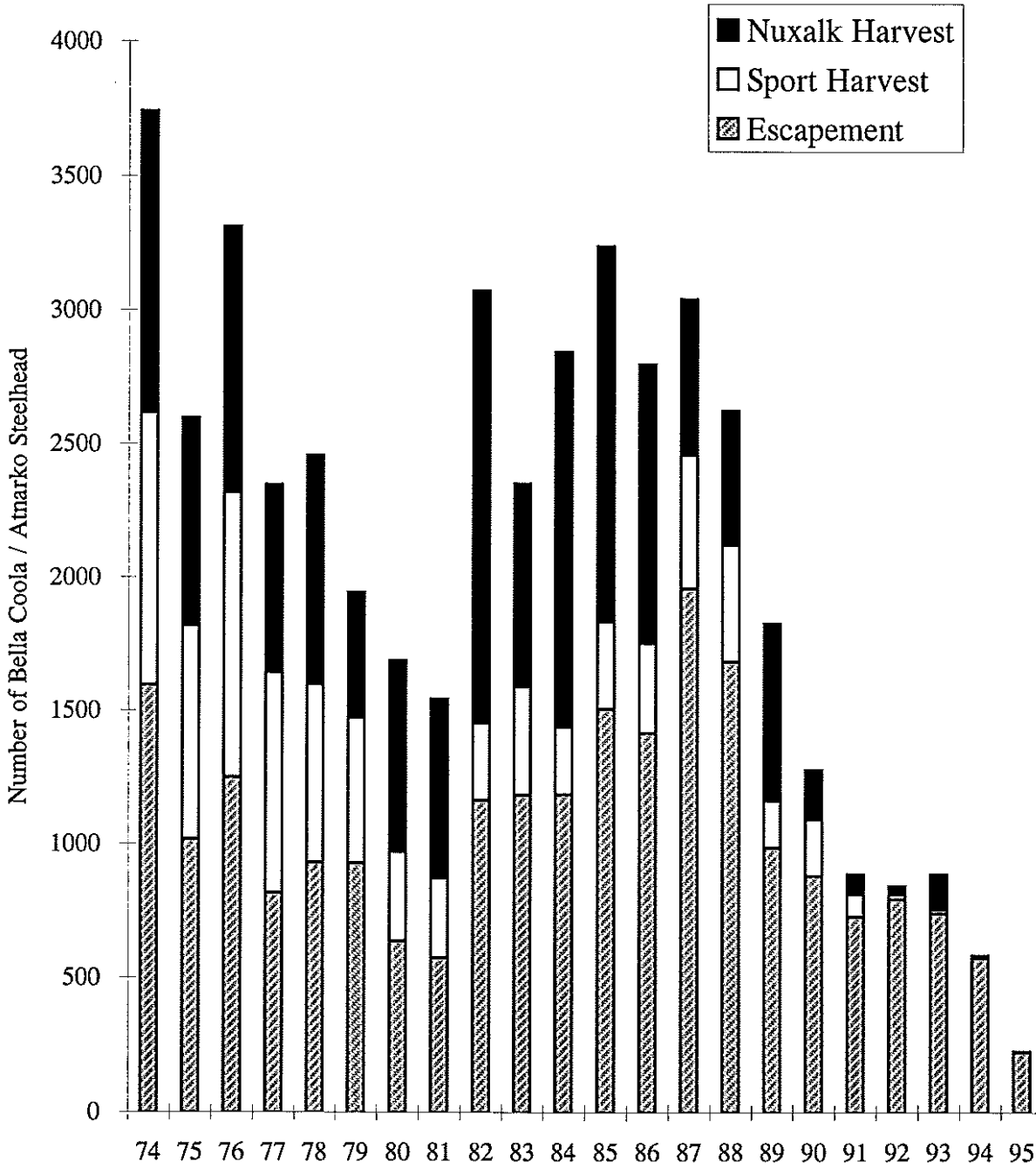


Figure 1. Summary of harvests and harvest-based escapement estimates for Bella Coola/Atnarko steelhead, 1974-95 (from: Nelson et al. 1998).

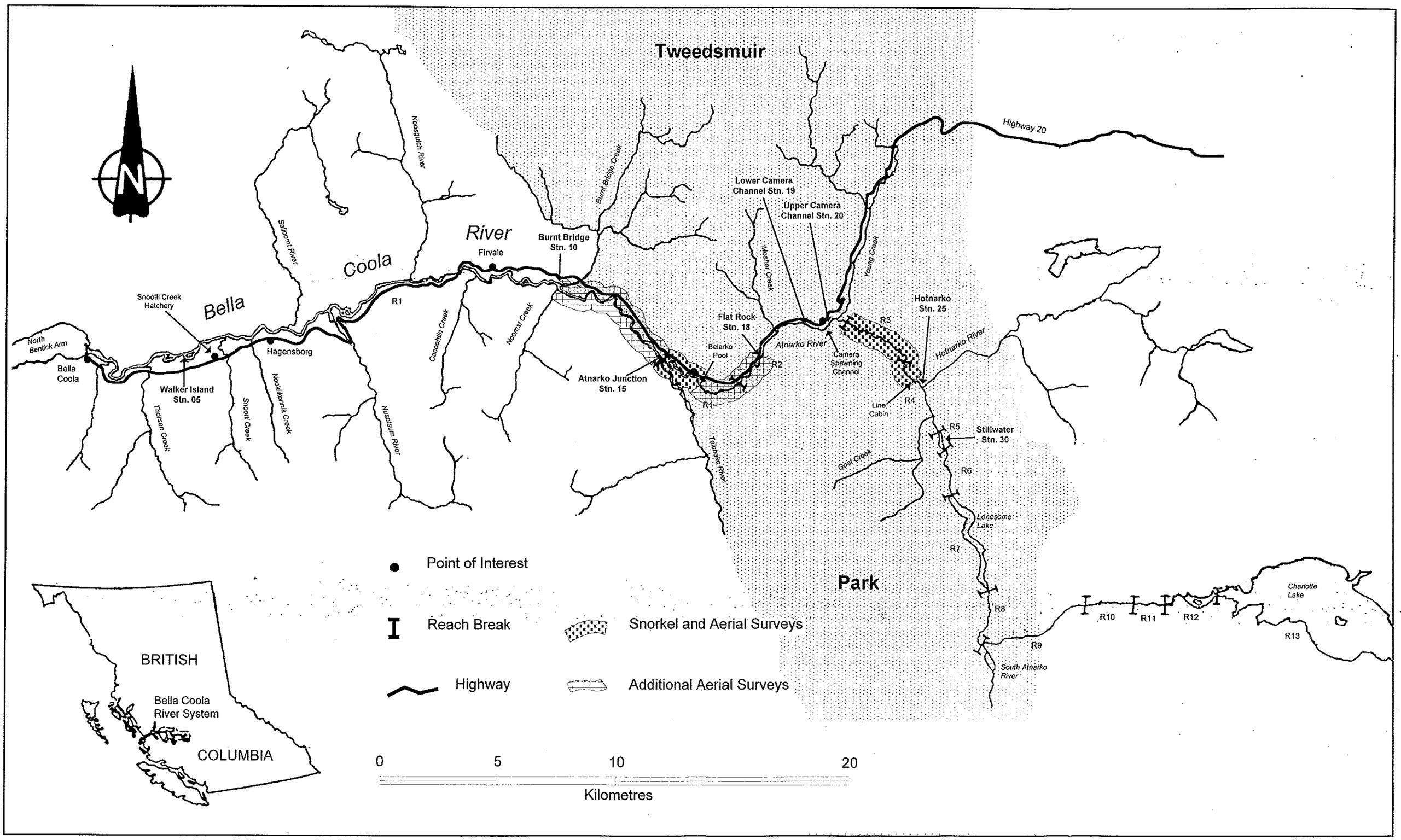


Figure 2. Map of Bella Coola River system that shows major tributaries, reach breaks (for juvenile surveys), the location of fixed-station receiver sites, and areas routinely covered by snorkel and aerial survey, 1997-98.

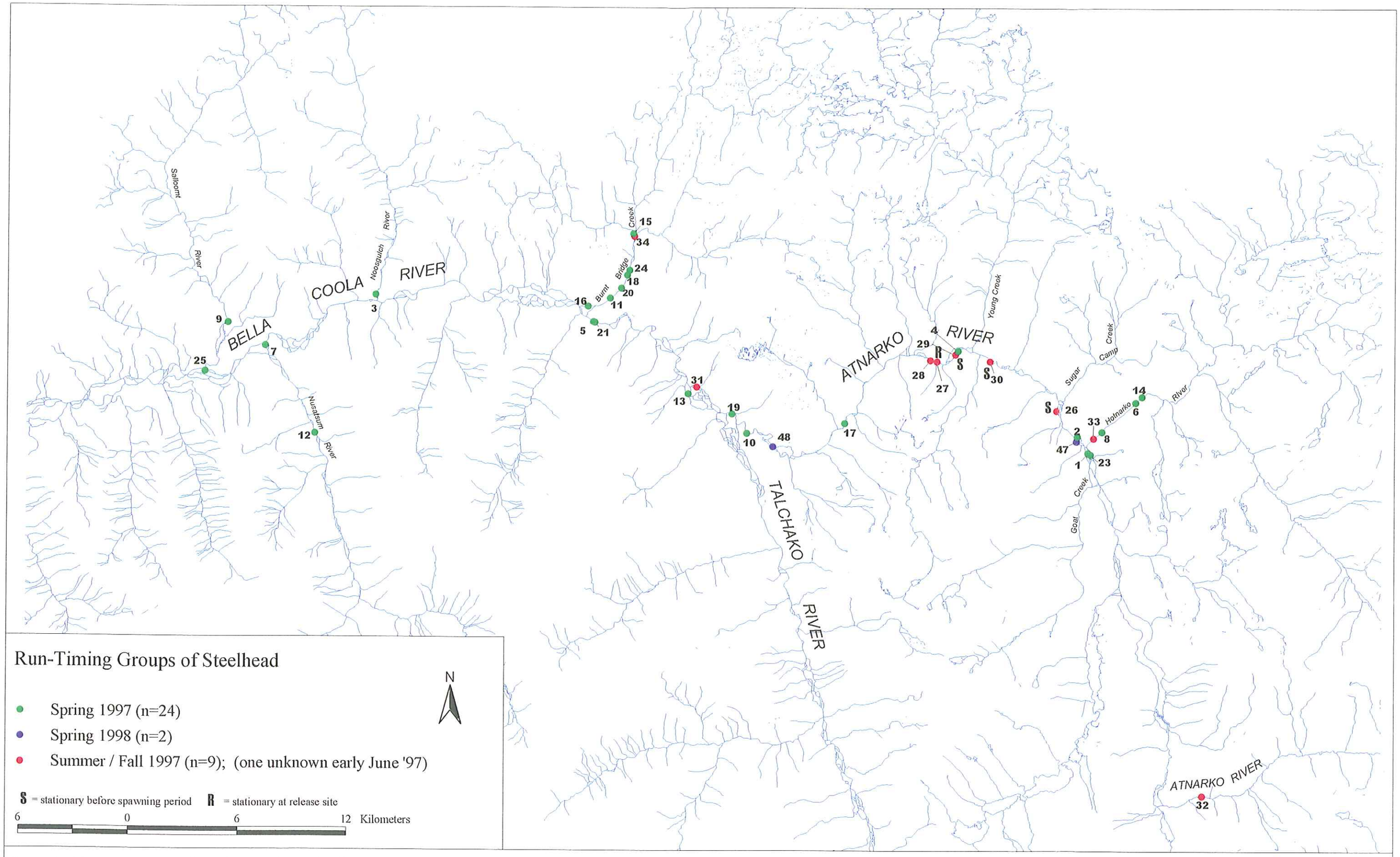


Figure 3. Furthest upstream detection locations of radio-tagged adult steelhead tagged in the Bella Coola River. Markers indicate the suspected spawning locations for individual steelhead (labelled by radio tag number), by run-timing group. Run-timing group was unknown for one radio-tagged steelhead (radio tag number 25).

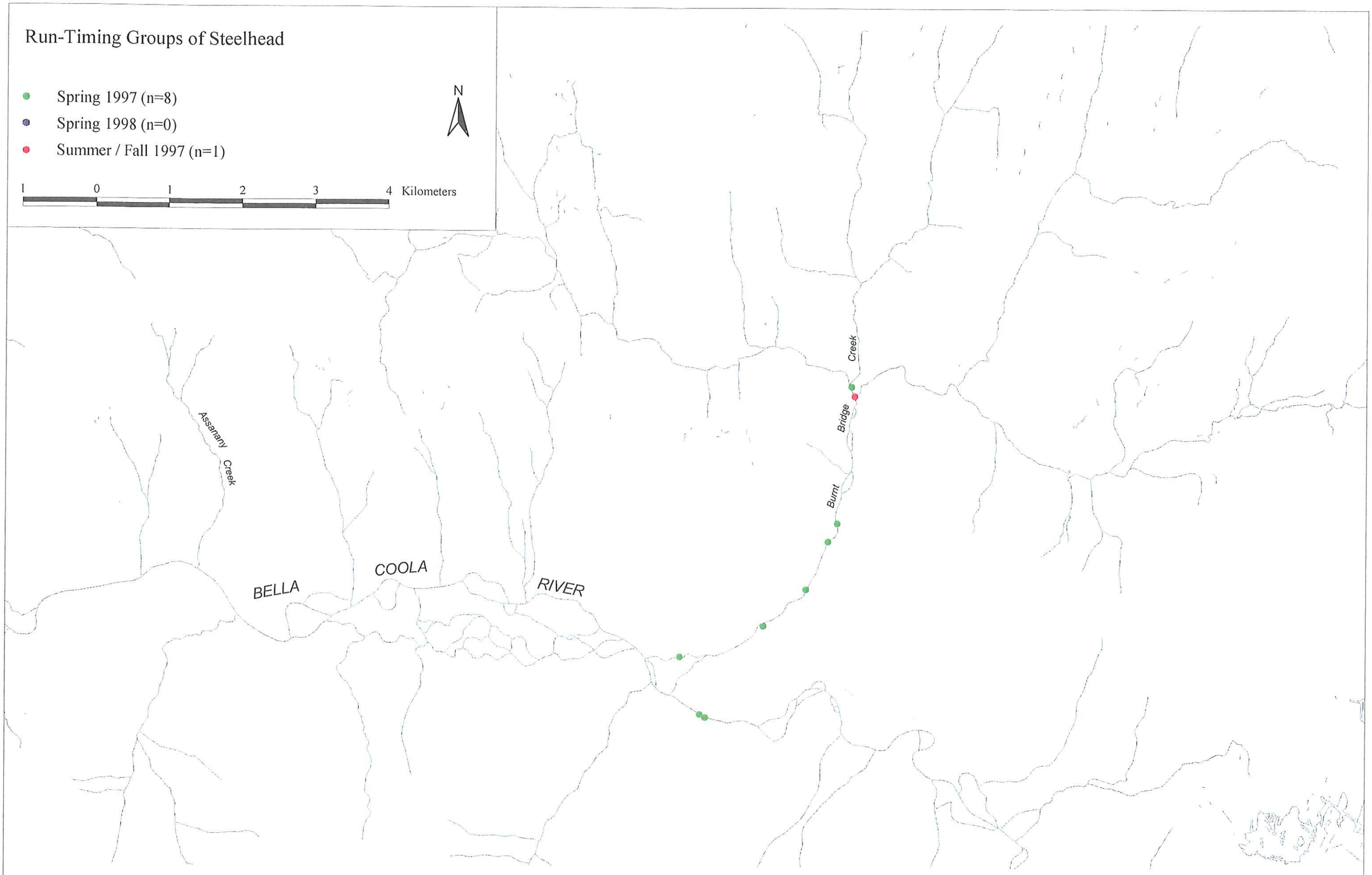


Figure 4: Furthest upstream detection locations of radio-tagged adult steelhead tracked to spawning areas in the vicinity of Burnt Bridge Creek. Markers indicate the suspected spawning locations for individual steelhead, by run-timing group.

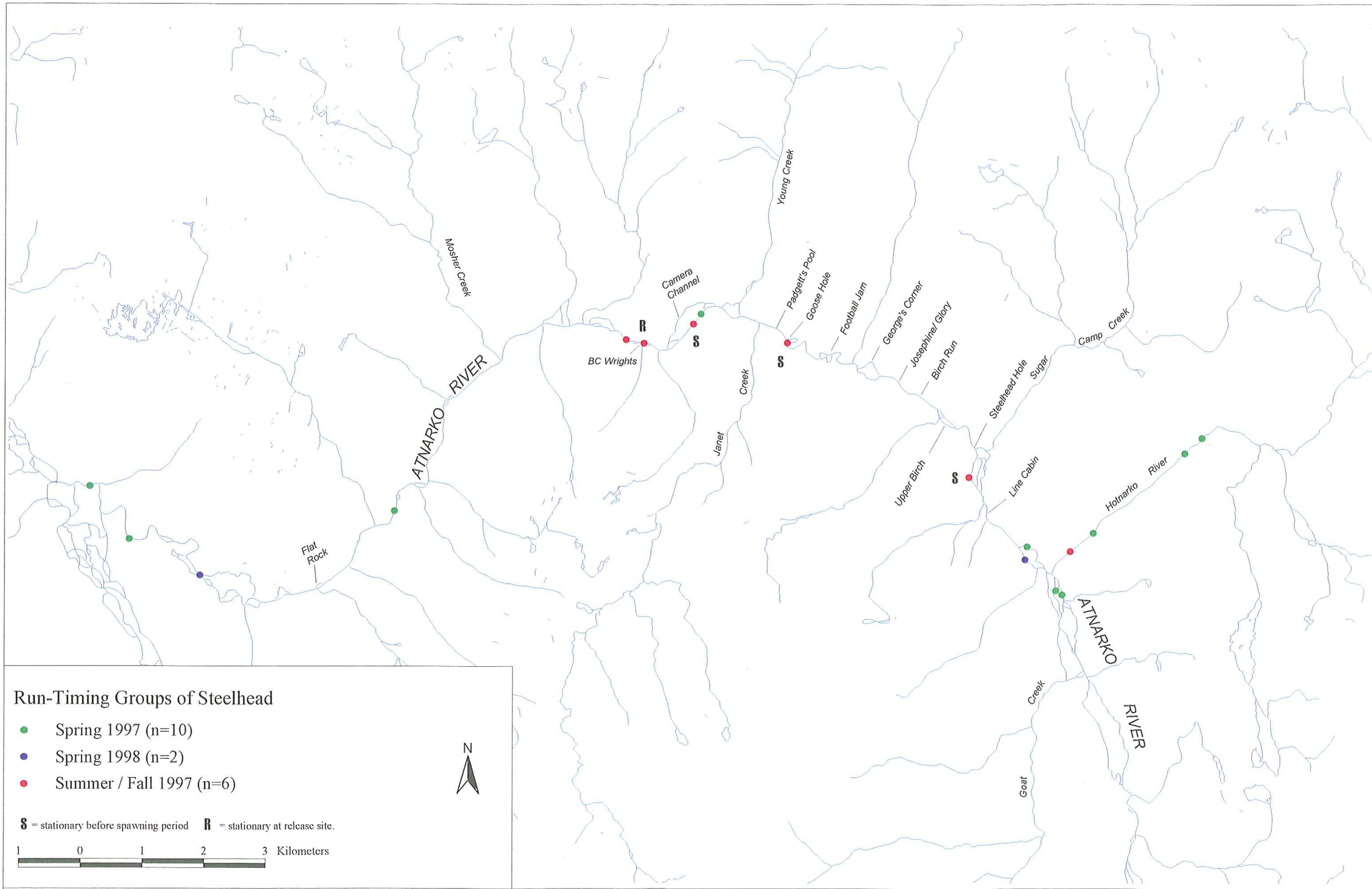


Figure 5: Furthest upstream detection locations of radio-tagged adult steelhead tracked to spawning areas in the middle Atnarko River. Markers indicate the suspected spawning locations for individual steelhead, by run-timing group.

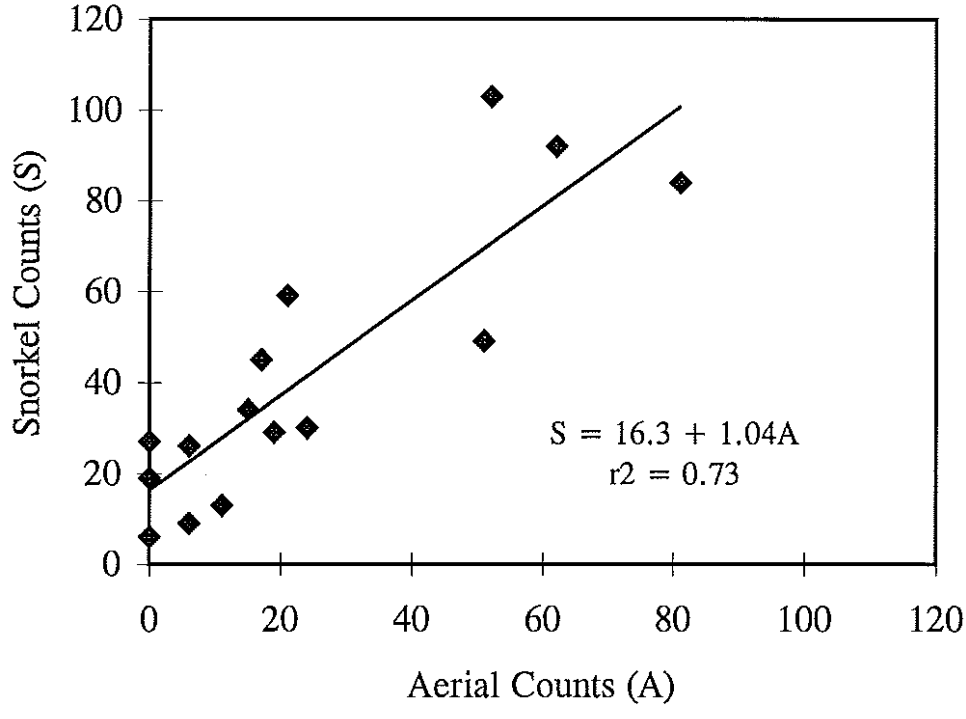


Figure 6. Relationship between aerial counts and snorkel counts of adult steelhead in the Atnarko River, 1997-98.

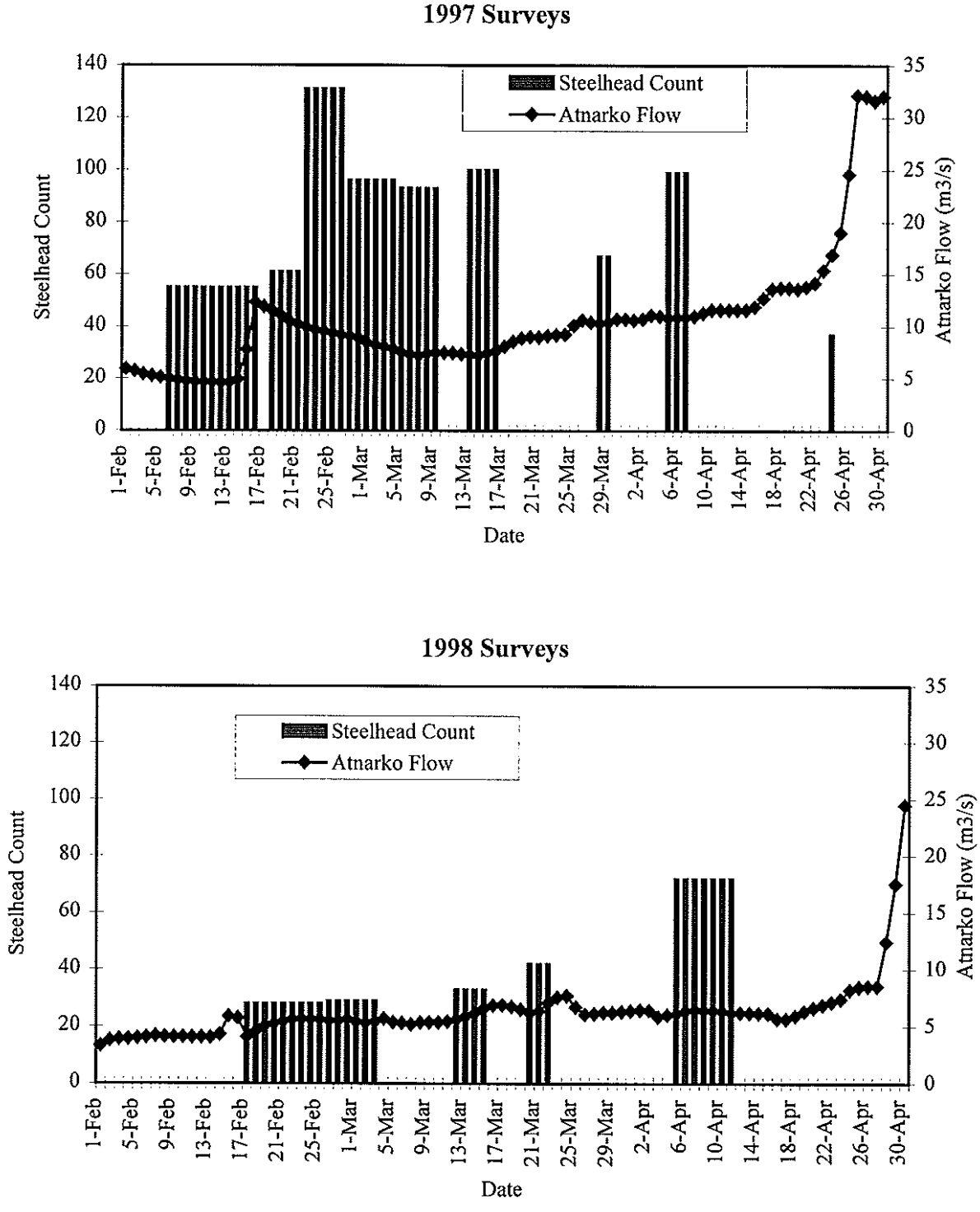


Figure 7. Comparison of 1997 and 1998 counts of summer/fall-run steelhead and flow in the Atnarko River during the February-March survey period.

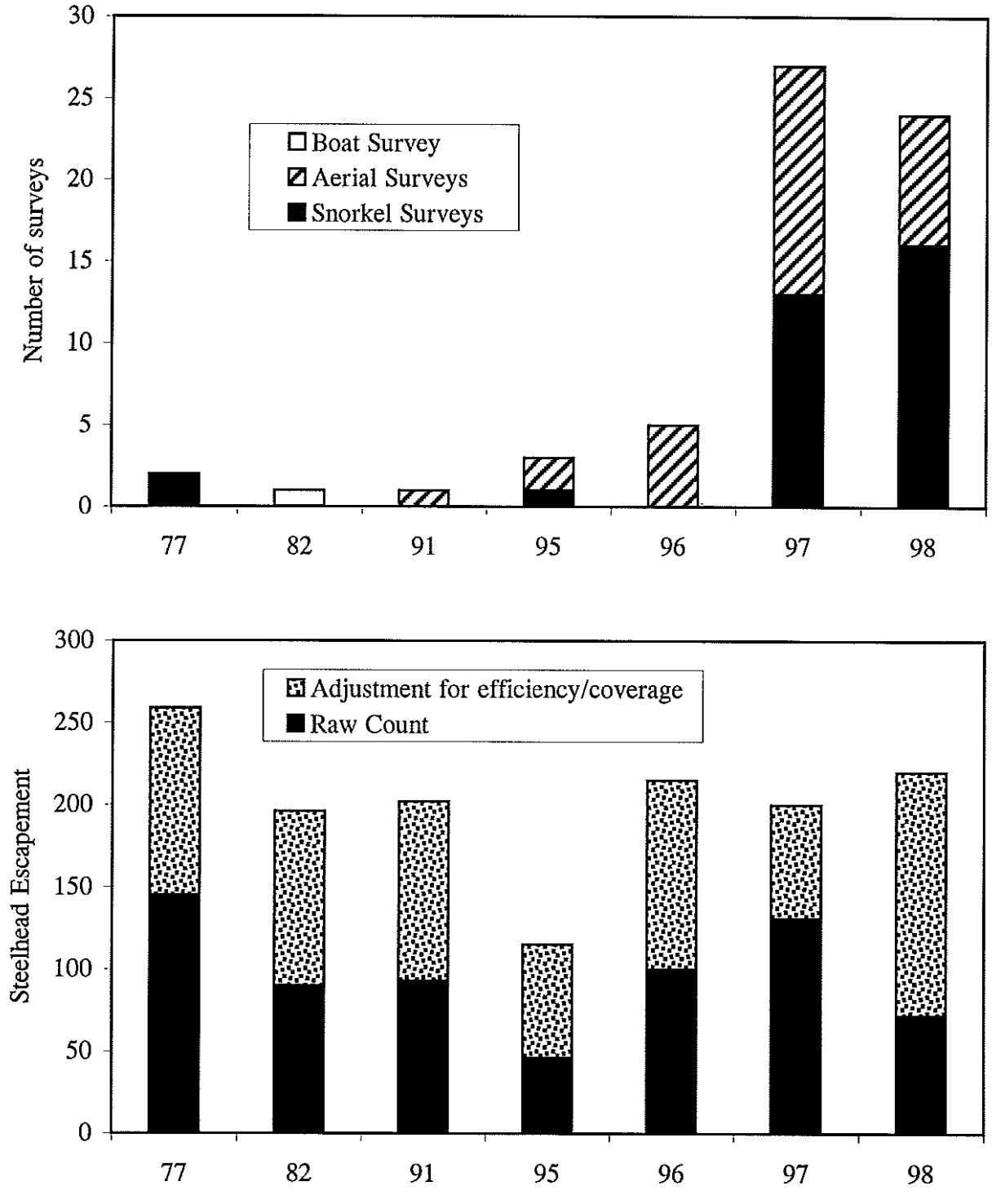
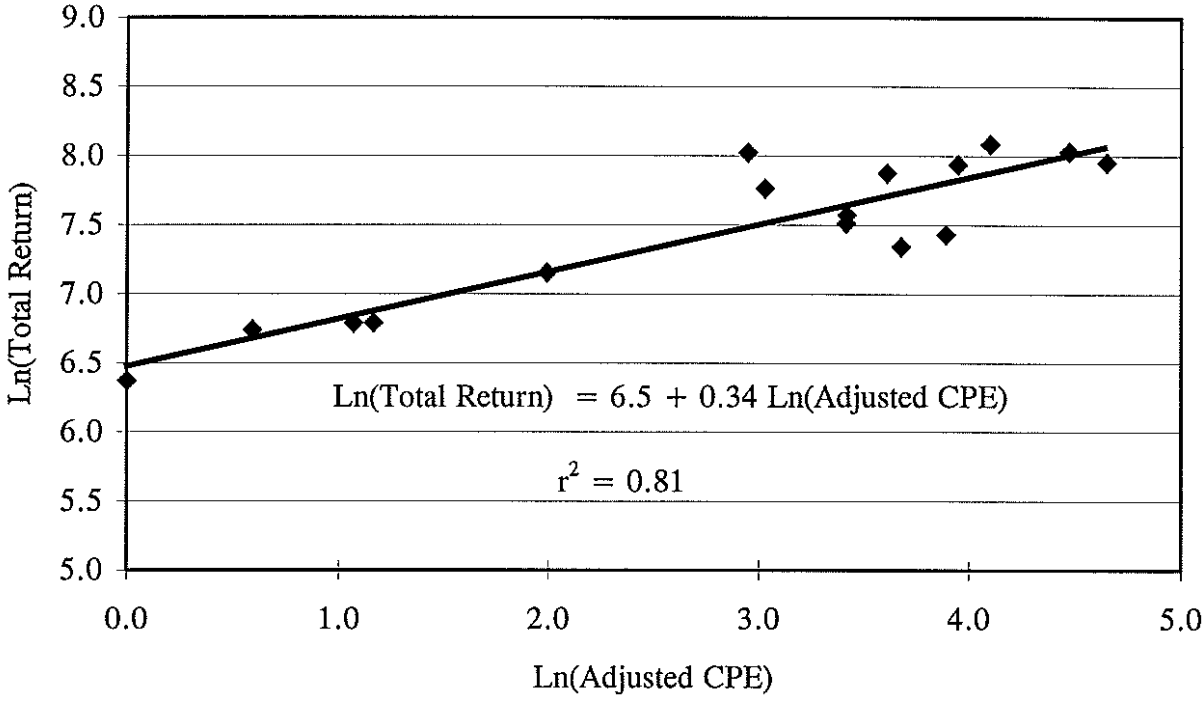


Figure 8. Historical survey effort and escapement estimates for summer/fall-run steelhead for the Bella Coola watershed, 1977-98.



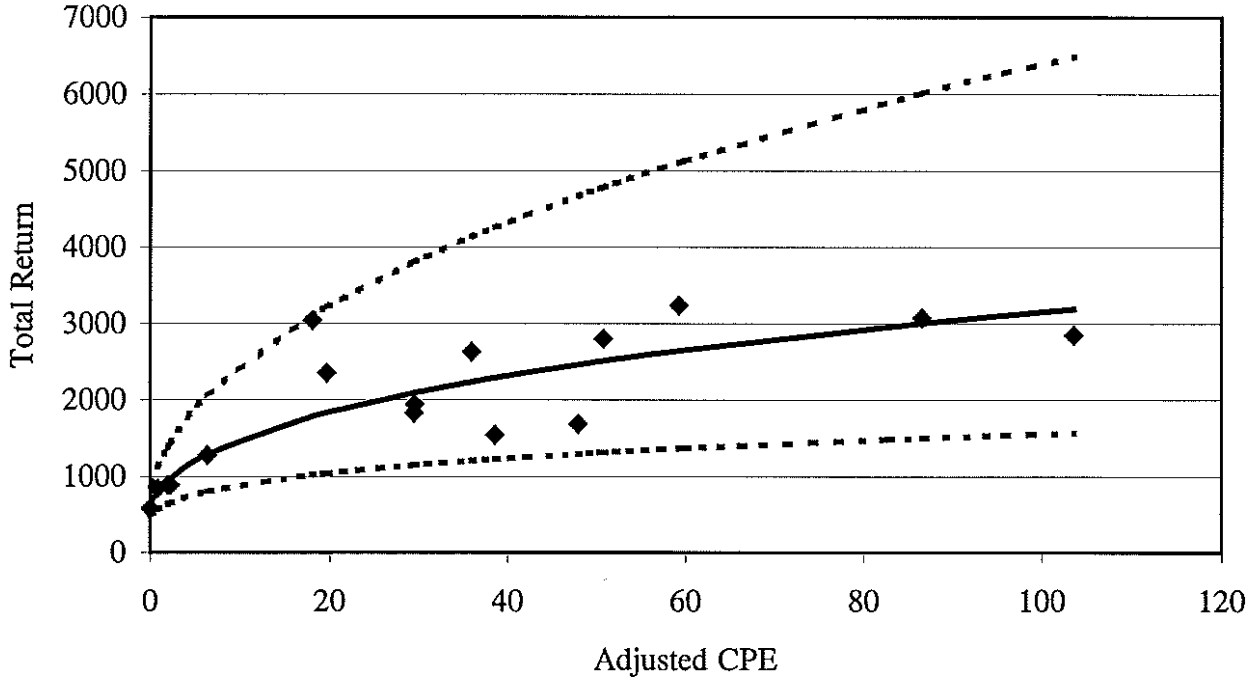


Figure 9. Relationship between the adjusted CPE for the Nuxalk spring fishery and the estimated total return of Bella Coola steelhead for 1979-94. CPE units are steelhead per 100 drifts.

APPENDICES

Appendix A -- Snorkel and Aerial Surveys 1996-97

Appendix A: Table 1. Snorkel and aerial survey counts of adult steelhead on the Bella Coola and Atnarko rivers, 15 November 1996 to 24 April 1997.

			Steelhead Counts (SS = Snorkel Survey, AS = Aerial Survey) [1,2,3]																													
Total Km	Location	Local Name	15-Nov-96 SS	18-Nov-96 AS	7-Feb-97 SS	8-Feb-97 AS	16-Feb-97 AS	18-Feb-97 AS	19-Feb-97 SS [3]	21-Feb-97 AS	22-Feb-97 SS	23-Feb-97 SS	24-Feb-97 AS [4]	26-Feb-97 AS	27-Feb-97 SS [5]	2-Mar-97 SS	3-Mar-97 AS [6]	5-Mar-97 SS	6-Mar-97 AS [7]	7-Mar-97 AS	9-Mar-97 SS	13-Mar-97 AS [8]	14-Mar-97 SS	15-Mar-97 AS [9]	16-Mar-97 SS	28-Mar-97 AS [10]	29-Mar-97 SS [11]	5-Apr-97 SS [12]	7-Apr-97 AS [13]	24-Apr-97 AS [14]
0-48	Bella	Below Burnt Br.															0		0			0		0						2
48-49	Bella	Burnt Bridge				1								0			0		0			0		0		0			0	0
49-50	Bella	Picnic Hole				0								0			0		0			0		0		0			0	0
50-51	Bella	Boulder Hole				0								0			0		0			0		0		0			0	0
51-52	Bella	McCall/CZ Bridge				0								0			0		0			0		0		0			0	2
52-53	Bella	Log-jam Pool				0								0			0		0			0		0		0			0	0
53-54	Bella	Cry Rock Pool				0								0			0		0			0		0		0			0	0
54-55	Bella	Above Cry Rock				0								0			0		1			0		1		1			0	2
55-56	Bella	Steep/L Class.				2							0	0	0		0		0			0		0		0			1	2
56-57	Bella	Classic				4							0	15	0		0		0			0		0		0			0	0
57-58	Bella	above Classic				0							0	0	0		0		0			0		0		3			4	1
58-59	Bella	Grizzly Pool				3						0	0	0	0		0		0			0		0		0			2	2
59-60	Bella	Slough/Junction				0				0		0	0	0	0		0		0			0		0		4			12	2
60-61	L.Atnarko	Fisheries Pool & above	0	0		0		0		0		0	0	0			0				0	0		0	0	0			0	1
61-62	L.Atnarko	Smokehouse	0	0		1		0		0		0	0	0			0				0	0		0	0	0		5	0	1
62-63	L.Atnarko	Corbould's Br.	9	0	0	0		0		0		0	0	0			0				0	0		4	0	0		1	0	0
63-64	L.Atnarko	Spwn.chan/D.Griz	0	0	0	4		0		7		13	11	11			12				10	2		0	0	0		0	6	0
64-65	L.Atnarko	<Belarko Pool	10	0	0	0		0		0		0	0	0		0	0				0	4		0	0	0		2	0	0
65-66	L.Atnarko	Zonrette/Right Now		0				0		0			0	0		0	0					0		0	0	0			0	0
66-67	L.Atnarko	Boar/Elbow Pool		0				0		0			0	0		5	0					0		0	3	0			0	4
67-68	L.Atnarko	<Boulder Pool		0				0		0			0	0		0	0					0		1	0	0			0	0
68-69	L.Atnarko	Boul. Pool/Flat R.		0				0		2			0	0		1	0					1		1	2	0			0	1
69-70	L.Atnarko	Alger Cr/rapids		0				0		0			0	0		0	0					0		0	0	0			0	0
70-71	L.Atnarko	rapids																														
71-72	L.Atnarko	rapids																														
72-73	L.Atnarko	rapids																														
73-74	L.Atnarko	rapids																														
74-75	L.Atnarko	chute																														
75-76	L.Atnarko	Mosher Cr/rapids																														
76-77	L.Atnarko	BC Wrights																														
77-78	L.Atnarko	chute																														
78-79	L.Atnarko	Parks Branch																														
79-80	L.Atnarko	chute																														
80-81	L.Atnarko	Cam/Young/rapids																														
81-82	M.Atnarko	rapids																														
82-83	M.Atnarko	Roadside pool		0				10	10	0	35			4				18		6		8	8	1		2	7		27	2
83-84	M.Atnarko	Padgett's Pool		0		12	40	39	13	44	43			58				49		57		29	31	27		9	6		31	13
84-85	M.Atnarko	Goose Hole		0				2	26	8	19			14				17		18		18	18	20		3	15		9	0
85-86	M.Atnarko	Football/George		0				0		0	6			0				0		0		0	0	0		0	3		0	1
86-87	M.Atnarko	Josephine/Glory		0				0		0	0			0						0		0	0	0		1	2		0	0
87-88	M.Atnarko	Birch run/Cherry Run		0				0		0	0			0						0		0	1	0		0	0		0	0
88-89	M.Atnarko	Upper Birch		0				0		0	0			0						0		0	0	1		0	0		0	0
89-90	M.Atnarko	Sugar Camp/Steel. hole		0				0		0				1						1		7	34	8		6	25		6	0
90-91	M.Atnarko	Line Cabin		0				0		0				0						0		0	0	3		0	1		0	0
91-92	M.Atnarko	Upper Line																											0	0
92-93	U.Atnarko	Hotnarko																											1	1
93-94	U.Atnarko																													
94-95	U.Atnarko	Goat Cr																												
95-97	U.Atnarko	Stillwater Lake		0				0		0			0	0								0				0			0	0
97-102	U.Atnarko	Lonesome Lake		0									0																0	0
102-119	U.Atnarko	Tenas Lake		0									0																	
119-122	U.Atnarko	Rainbow Lake											0																	
122-128	U.Atnarko	Elbow Lake											0																	
128-140	U.Atnarko	Upper Elbow											0																	
Total			19	0	0	27	40	51	49	61	103	13	11	102	0	6	12	84	1	82	10	69	92	67	5	29	59	9	99	37

Appendix A: Table 1. Snorkel and aerial survey counts of adult steelhead on the Bella Coola and Atnarko rivers, 15 November 1996 to 24 April 1997.

(Footnotes)

1 Blank cells indicate areas not surveyed. Dark shaded areas indicate reaches that could not be surveyed due to poor visibility or limited access.
Lightly shaded areas indicate reaches where counts were made but visibility was limited for a complete survey.

2 Surveys: 15 Nov (KE,RA,AA); 18 Nov (RA,AA,JW); 7 Feb (GR,MR); 8 Feb (GR,MR,LM); 16 Feb (DH); 19 Feb (RA,GR,MH,MR); 21 Feb (TN,LM,RA);
22 Feb (RA,TN,MR,LM,RH); 23 Feb (RA,TN,MR); 24 Feb (RA,TN,MR); 26 Feb (RA,HM,RS); 27 Feb (RA,GR,LM,HT); 2 Mar (GR,LM,RH); 3 Mar (GR,MR,AP);
5 Mar (GR,MR,LM); 6 Mar (GR,MR,LM); 7 Mar (GR,MR,LM); 9 Mar (GR,MR,RH); 13 Mar (TN,MR,AA); 14 Mar (TN,AA,LM,DH); 15 Mar (TN,MR); 16 Mar (TN,GR,LM,RH); 28 Mar (GR,MR,LM); 29 Mar (GR,MR,JW,RH,T);
5 Apr (GR,AA); 7 Apr (RA,MR,LM); 24 Apr (RA,AA).

3 Ice coverage in upper Atnarko until 12 Feb; heavy rainfall occurred on 14 Feb; snorkel counts on 19 Feb missed part of Padgett's pool and roadside pool;
aerial survey on 18 Nov beginning of ice formation.

4 Aerial survey on 24 Feb was conducted to survey upper Atnarko lakes and includes snorkel surveys at outlets of Stillwater and Rainbow lakes.

5 Snorkel survey on 27 Feb was limited to 4-6 ft visibility due to turbid water conditions.

6 Aerial survey on 3 Mar was from Firvale Pool (38 km) to Flat Rock (69 km).

7 Aerial survey on 6 Mar was Bella Coola mainstem from mouth (0 km) to Atnarko-Talchako junction (60 km). Considered the best viewing conditions to date.

8 Extensive glare and shadows within Pagett's pool area, ice formation along bank in some sections.

9 Flight from Line cabin to Walker Island (Bella Coola); includes 2 km upstream of Talchako (no fish observed). Some glare and shadows within Pagett's pool area, ice formation still along bank in some sections.

10 Flight from Stillwater to Burnt Br.; water conditions were poorer (visibility 4-6 ft).

11 Snorkel survey from Line Cabin to Roadside Pool; water conditions were poorer than previous surveys (6-8 ft visibility).

12 Snorkel from Belarko to confluence, visibility approx. 12 ft.; sunny; 1 radio-tag fish detected via mobile receiver at Flatrock

13 Aerial from Burnt Br to Lonesome Lk; sunny (good viewing conditions; best aerial of roadside pool); 3 radio-tag fish detected via receiver (< Young Cr., Last Chance, Classic); none observed during counts.

14 Aerial from Salloomt to Lonesome Lk; sunny (poor viewing conditions in Atnarko, better in the Bella mainstem (2-4 ft vis.)); 15 radio-tag fish detected via receiver (> Hotnarko, Roadside, Belarko,
Grizzly, < Steeproof, > Burnt,at Burnt, < Firvale, Noosgulch (2); Sheltons; Cutthroat; Jimmy Meecham; Nusatsum (2); Salloomt); none observed during counts.

Appendix A: Table 2. Snorkel and aerial survey incidental counts of resident rainbow trout, cutthroat trout, Dolly Varden, and whitefish, 15 November 1996 to 24 April 1997.

			Fish Counts (SS = Snorkel Survey, AS = Aerial Survey) [1,2,3]																												
Total Km	Location	Local Name	15-Nov-96 SS [4]	18-Nov-96 AS [5]	7-Feb-97 SS	8-Feb-97 AS [6]	16-Feb-97 AS	18-Feb-97 AS	19-Feb-97 SS [7]	21-Feb-97 AS [8]	22-Feb-97 SS [9]	23-Feb-97 SS [10]	24-Feb-97 AS [11]	26-Feb-97 AS [12]	27-Feb-97 SS [13]	2-Mar-97 SS [14]	3-Mar-97 AS	5-Mar-97 SS [15]	6-Mar-97 AS	7-Mar-97 AS	9-Mar-97 SS [16]	13-Mar-97 AS [17]	14-Mar-97 SS [18]	15-Mar-97 AS [19]	16-Mar-97 SS [20]	28-Mar-97 AS [21]	29-Mar-97 SS [22]	5-Apr-97 SS [23]	7-Apr-97 AS [24]	24-Apr-97 AS [25]		
0-48	Bella	Below Burnt Br.															5		204					0						0	
48-49	Bella	Burnt Bridge				0								0			0		70			0		0		0			0	0	
49-50	Bella	Picnic Hole				0								0			0		0			0		0		0			1	0	
50-51	Bella	Boulder Hole				0								0			0		0			0		0		0			0	0	
51-52	Bella	McCall/CZ Bridge				5								0			0		0			0		0		0			0	0	
52-53	Bella	Log-jam Pool				0								100			0		0			200		0		0			0	0	
53-54	Bella	Cry Rock Pool				60								30			0		0			0		0		0			0	0	
54-55	Bella	Above Cry Rock				80								0			0		200			0		0		0			0	0	
55-56	Bella	Steep/L Class.				100							0	30	0		0		4			0		0		0			0	0	
56-57	Bella	Classic				50							0	0	3		10		150			0		0		0			0	0	
57-58	Bella					20							0	0	other		0		0			0		0		0			0	0	
58-59	Bella	Grizzly Pool				seal						0	0	20	11		0		0			0		0		0			0	0	
59-60	Bella	Slough/Junction				0				30		0	0	0	5		0		25			0		20	0	0		0	0	0	
60-61	L.Atnarko	Fisheries Pool	5	0		0		0		0		0	0	0	0		0				0	0		0	18	0		12	0	0	
61-62	L.Atnarko	Smokehouse	0	0		0		0		0		0	0	0			0				0	0		0	2	0		52	0	0	
62-63	L.Atnarko	Corbould's Br.	22	0	0	7		0		2		24	0	0			0				0	0		0	0	0		1	0	0	
63-64	L.Atnarko	Spwn.chan/D.Griz	0	0	0	0		0		0		15	0	0			0				2	0		0	0	0		0	0	0	
64-65	L.Atnarko	<Belarko Pool	5	0	0	0		0		6		5	0	0		0	0				6	0		0	0	0		50	0	0	
65-66	L.Atnarko	Zonreme/Right New		5				0		5			0	0		0	0					0		0	4	0			0	0	
66-67	L.Atnarko	Boat/Elbow Pool		0				0		5			0	0		2	0					0		0	16	0			0	0	
67-68	L.Atnarko	<Boulder Pool		0				0		0			0	0		38	0					0		0	12	0			0	1	
68-69	L.Atnarko	Boul. Pool/Flat R.		0				0		0			0	0		5	0					0		0	0	0			0	0	
69-70	L.Atnarko	Algar Cr/rapids		0				0		0																0			0	0	
70-71	L.Atnarko	rapids																													
71-72	L.Atnarko	rapids																													
72-73	L.Atnarko	rapids																													
73-74	L.Atnarko	rapids																													
74-75	L.Atnarko	chute																													
75-76	L.Atnarko	Mosher Cr/rapids																													
76-77	L.Atnarko	BC Wrights																													
77-78	L.Atnarko	chute																													
78-79	L.Atnarko	Parks Branch																													
79-80	L.Atnarko	chute																													
80-81	L.Atnarko	Cam/Young/rapids																													
81-82	M.Atnarko	rapids																													
82-83	M.Atnarko	Roadside pool		0				0	67	0	200			100				280		100		6	182	165		20	110		50	0	
83-84	M.Atnarko	Padgett's Pool		0		0	0	0	0	8	0			0				4		2		0	0	0		0	1		12	0	
84-85	M.Atnarko	Goose Hole		0				0	0	0	0			0				0		1		0	0	0		0	0		3	0	
85-86	M.Atnarko	Football/George		0				0		0	0			0				0		0		0	0	0		0	7		0	0	
86-87	M.Atnarko	Josephine/Glory		0				0		0	0			0						0		0	0	0		0	13		0	0	
87-88	M.Atnarko	Birch run		0				0		100	92			0						50		0	40	0		0	10		0	0	
88-89	M.Atnarko	Upper Birch		0				0		0	0									0		0	0	0		0	0		0	0	
89-90	M.Atnarko	Sugar Camp/Steel, hole		0				0		0										0		0	13	0		0	0		0	0	
90-91	M.Atnarko	Line Cabin		0				0		0										0		0	0	0		0	0		0	0	
91-92	M.Atnarko	Upper Line																											0	0	
92-93	U.Atnarko	Heinarko																											0	0	
93-94	U.Atnarko																														
94-95	U.Atnarko	Goat Cr																													
95-97	U.Atnarko	Stillwater Lake		0				0		33			1	0												50			25	0	
97-102	U.Atnarko	Lonesome Lake		0									0																0	1	
102-119	U.Atnarko	Tonas Lake		0									0																		
119-122	U.Atnarko	Rainbow Lake											0																		
122-128	U.Atnarko	Elbow Lake											0																		
128-140	U.Atnarko	Upper Elbow											0																		
Total			32	5	0	322	0	0	67	189	292	44	1	280	19	45	15	284	653	153	8	206	235	185	52	70	141	115	91	2	

Appendix A: Table 2. Snorkel and aerial survey incidental counts of resident rainbow trout, cutthroat trout, Dolly Varden, and whitefish, 15 November 1996 to 24 April 1997.

(Footnotes)

1 Blank cells indicate areas not surveyed. Dark shaded areas indicate reaches that could not be surveyed due to poor visibility or limited access.
Lightly shaded areas indicate reaches where counts were made but visibility was limited for a complete survey.

2 Surveys: 15 Nov (KE,RA,AA); 18 Nov (RA,AA,JW); 7 Feb (GR,MR); 8 Feb (GR,MR,LM); 16 Feb (DH); 19 Feb (RA,GR,MH,MR); 21 Feb (TN,LM,RA);
22 Feb (RA,TN,MR,LM,RH); 23 Feb (RA,TN,MR); 24 Feb (RA,TN,MR); 26 Feb (RA,HM,RS); 27 Feb (RA,GR,LM,HT); 2 Mar (GR,LM,RH); 3 Mar (GR,MR,AP);
5 Mar (GR,MR,LM); 6 Mar (GR,MR,LM); 7 Mar (GR,MR,LM); 9 Mar (GR,MR,RH); 13 Mar (TN,MR,AA); 14 Mar (TN,AA,LM,DH); 15 Mar (TN,MR); 16 Mar (TN,GR,LM,RH); 28 Mar (GR,MR,LM); 29 Mar (GR,MR,JW,RH,T).
5 Apr (GR,AA); 7 Apr (RA,MR,LM); 24 Apr (RA,AA).

3 Ice coverage in upper Atnarko until 12 Feb; heavy rainfall occurred on 14 Feb; snorkel counts on 19 Feb missed part of Padgett's pool and roadside pool;
aerial survey on 18 Nov beginning of ice formation.

4 27 rainbows; 5 coho

5 5 coho

6 322 "trout"; 1 seal

7 67 whitefish, cutthroat, rainbow, Dollys (Roadside Pool)

8 189 "trout"

9 160 whitefish, 80 Cutthroat (30@Birch Run; 50@Roadside Pool), 30 Dollys, 22 rainbows

10 44 whitefish

11 1 rainbow (4 lb)

12 280 trout

13 6 Dollys (large), 13 whitefish, 1 otter

14 42 whitefish, 1 rainbow, 2 cutthroats (<Boulder Pool)

15 200 whitefish, 29 rainbow, 55 cutthroat (Roadside Pool)

16 8 whitefish

17 6 RB, 200 "trout"

18 175 whitefish, 22 RB, 18 Cutthroat (3 above Sugar Camp, 15 at roadside), 15 Dollys

19 150 whitefish; 15 trout; 20 RB

20 46 whitefish (15 above Atnarko junction, 4 Zonrette hole, 15 Boar, 12 Boulder); 2 Cutthroat (above Atnarko junction, Elbow); 2 Dollys (above Atnarko Junction); 2 RB (Corboulds Br), 1 otter (Elbow)

21 70 RB; flight from Stillwater to Burnt Br.; water conditions were poorer (visibility 4-6 ft).

22 111 RB (all at roadside/Pagetts), 30 whitefish; snorkel survey from Line Cabin to Roadside Pool; water conditions were poorer than previous surveys (6-8 ft visibility).

23 115 whitefish

24 91 whitefish, RB etc

25 Poor viewing conditions; only 2 trout observed.

Appendix B -- Radio Telemetry - Spring 1997

Appendix B: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 21 March to 15 June 1997. Catch-per-unit-effort (number of steelhead per rod hour) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
21-Mar	Middle Bella	Albert Meecham	Drift	3	12:19	12:45	0:26	0.4	1.3	0	0.00
21-Mar	Middle Bella	see GPS (P2)	Drift	3	12:55	13:15	0:20	0.3	1.0	0	0.00
21-Mar	Middle Bella	Leons Hole	Drift	3	13:20	14:15	0:55	0.9	2.8	0	0.00
21-Mar	Middle Bella	7 Alders	Drift	3	14:30	15:25	0:55	0.9	2.8	0	0.00
21-Mar	Middle Bella	Nusatsum Hole	Drift	3	16:30	16:56	0:26	0.4	1.3	0	0.00
21-Mar	Middle Bella	Bailey Br.	Drift	3	17:15	17:30	0:15	0.3	0.8	0	0.00
22-Mar	Upper Bella	Noomst Rock Hole	Drift	2	14:45	15:17	0:32	0.5	1.1	0	0.00
22-Mar	Upper Bella	Firvale Hole	Drift	2	16:00	16:45	0:45	0.8	1.5	0	0.00
22-Mar	Upper Bella	Canoe Crossing	Drift	2	17:15	17:40	0:25	0.4	0.8	0	0.00
24-Mar	Lower Bella	Otter Run	Drift	3	10:40	11:38	0:58	1.0	2.9	1	0.34
24-Mar	Lower Bella	Tritschler's Run	Drift	3	12:20	12:39	0:19	0.3	1.0	0	0.00
24-Mar	Lower Bella	Airport Run	Drift	3	14:15	14:30	0:15	0.3	0.8	0	0.00
24-Mar	Lower Bella	Snootli Hole	Drift	3	15:00	15:43	0:43	0.7	2.2	0	0.00
24-Mar	Lower Bella	Walker Island	Drift	3	16:08	16:45	0:37	0.6	1.9	0	0.00
27-Mar	Middle Bella	"Glacier View"	Drift	3	9:05	9:37	0:32	0.5	1.6	0	0.00
27-Mar	Middle Bella	<Glacier View	Drift	3	9:56	10:17	0:21	0.4	1.1	0	0.00
27-Mar	Middle Bella	Albert Meecham	Drift	3	10:35	11:28	0:53	0.9	2.7	0	0.00
27-Mar	Middle Bella	Leons Hole	Drift	3	11:47	12:28	0:41	0.7	2.1	0	0.00
27-Mar	Middle Bella	7 Alders	Drift	3	12:45	13:36	0:51	0.9	2.6	0	0.00
27-Mar	Middle Bella	Upper Bordens	Drift	3	14:25	15:05	0:40	0.7	2.0	0	0.00
27-Mar	Middle Bella	Nusatsum Hole	Drift	3	15:42	16:15	0:33	0.6	1.7	0	0.00
02-Apr	Upper Bella	Atnarko junction	Drift	2	10:35	11:05	0:30	0.5	1.0	1	1.00
02-Apr	Upper Bella	Atnarko junction	Drift	2	11:15	11:45	0:30	0.5	1.0	0	0.00
02-Apr	Upper Bella	Slough hole	Drift	2	12:10	12:25	0:15	0.3	0.5	0	0.00
02-Apr	Upper Bella	Grizzly Pool	Drift	1	12:40	12:45	0:05	0.1	0.1	0	0.00
04-Apr	Lower Bella	Bailey Br.	Drift	1	9:02	9:08	0:06	0.1	0.1	0	0.00
04-Apr	Lower Bella	Below Bailey	Drift	1	9:09	9:10	0:01	0.0	0.0	0	0.00
04-Apr	Lower Bella	Jungle Hole	Drift	1	9:14	9:19	0:05	0.1	0.1	0	0.00
04-Apr	Lower Bella	Below Jungle	Drift	1	9:20	9:25	0:05	0.1	0.1	0	0.00
04-Apr	Lower Bella	Purkiss Run	Drift	3	9:35	10:55	1:20	1.3	4.0	0	0.00
04-Apr	Lower Bella	Ruby Run	Drift	1	11:04	11:10	0:06	0.1	0.1	0	0.00
04-Apr	Lower Bella	Otter Run	Drift	3	11:18	12:15	0:57	1.0	2.9	0	0.00
04-Apr	Lower Bella	Salloomt	Drift	3	12:37	13:38	1:01	1.0	3.1	0	0.00
04-Apr	Lower Bella	Store Run	Drift	3	13:45	14:54	1:09	1.2	3.5	0	0.00
04-Apr	Lower Bella	BCTel/Airport	Drift	1	14:59	15:10	0:11	0.2	0.2	0	0.00
04-Apr	Lower Bella	Walker Island	Drift	2	16:04	16:25	0:21	0.4	0.7	0	0.00
04-Apr	Lower Bella	Walker Island	Drift	1	16:30	17:00	0:30	0.5	0.5	0	0.00
06-Apr	Upper Bella	Atnarko junction	Drift	2	10:00	11:00	1:00	1.0	2.0	0	0.00
06-Apr	Upper Bella	Classic	Drift	2	12:10	13:35	1:25	1.4	2.8	1	0.35
06-Apr	Upper Bella	Classic	Drift	2	14:45	15:15	0:30	0.5	1.0	0	0.00
06-Apr	Middle Bella	Noosgulch	Drift	1	9:48	9:50	0:02	0.0	0.0	0	0.00
06-Apr	Middle Bella	Noosgulch	Drift	2	9:54	10:36	0:42	0.7	1.4	0	0.00
06-Apr	Middle Bella	Big Cr.	Drift	2	10:42	10:55	0:13	0.2	0.4	0	0.00
06-Apr	Middle Bella	Robins Nest	Drift	2	11:00	11:42	0:42	0.7	1.4	0	0.00
06-Apr	Middle Bella	<Robins	Drift	2	11:48	11:53	0:05	0.1	0.2	0	0.00
06-Apr	Middle Bella	Shelton's Pool	Drift	1	12:20	12:30	0:10	0.2	0.2	0	0.00
06-Apr	Middle Bella	Shelton's Pool	Drift	2	12:30	13:12	0:42	0.7	1.4	0	0.00
06-Apr	Middle Bella	Jimmy Meechan	Drift	1	13:20	13:32	0:12	0.2	0.2	0	0.00
06-Apr	Middle Bella	Albert Meechan	Drift	2	13:40	14:20	0:40	0.7	1.3	0	0.00
06-Apr	Middle Bella	Mitz Hole	Drift	3	14:30	15:00	0:30	0.5	1.5	0	0.00
06-Apr	Middle Bella	Mitz Hole	Drift	2	15:00	15:15	0:15	0.2	0.5	0	0.00
06-Apr	Middle Bella	7 Alders	Drift	1	15:15	15:22	0:07	0.1	0.1	0	0.00
06-Apr	Middle Bella	Ace in Hole	Drift	3	16:02	16:37	0:35	0.6	1.7	0	0.00
06-Apr	Middle Bella	Ace in Hole	Drift	2	16:40	16:54	0:14	0.2	0.5	0	0.00
06-Apr	Middle Bella	Bordens Rock	Drift	2	17:15	17:31	0:16	0.3	0.5	0	0.00
06-Apr	Middle Bella	Nusatsum Pool	Drift	2	17:40	18:04	0:24	0.4	0.8	0	0.00
06-Apr	Middle Bella	Bailey Br.	Drift	1	18:15	18:30	0:15	0.3	0.3	0	0.00
07-Apr	Upper Bella	Atnarko Junction	Drift	1	14:17	14:28	0:11	0.2	0.2	1	5.45
07-Apr	Upper Bella	Atnarko Junction	Drift	1	14:45	15:30	0:45	0.8	0.8	0	0.00

Appendix B: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 21 March to 15 June 1997. Catch-per-unit-effort (number of steelhead per rod hour) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
07-Apr	Upper Bella	Atnarko Junction	Drift	2	15:30	17:00	1:30	1.5	3.0	0	0.00
08-Apr	Upper Bella	Canoe Crossing	Drift	2	18:04	18:53	0:49	0.8	1.6	0	0.00
08-Apr	Lower Bella	<Bailey Br.	Drift	2	9:00	9:35	0:35	0.6	1.2	0	0.00
08-Apr	Lower Bella	Purkiss	Drift	2	9:40	10:10	0:30	0.5	1.0	0	0.00
08-Apr	Lower Bella	Welding Hole	Drift	2	10:30	11:00	0:30	0.5	1.0	0	0.00
08-Apr	Lower Bella	Otter Run	Drift	2	11:15	12:00	0:45	0.8	1.5	0	0.00
08-Apr	Lower Bella	<Otter Run	Drift	2	12:30	13:00	0:30	0.5	1.0	0	0.00
08-Apr	Lower Bella	Salloomt	Drift	2	14:00	14:40	0:40	0.7	1.3	0	0.00
08-Apr	Lower Bella	Store Run	Drift	2	15:00	15:30	0:30	0.5	1.0	0	0.00
09-Apr	Upper Bella	Atnarko junction	Drift	2	10:30	11:30	1:00	1.0	2.0	0	0.00
14-Apr	Upper Bella	Atnarko junction	Drift	2	8:05	9:15	1:10	1.2	2.3	0	0.00
14-Apr	Upper Bella	Atnarko junction	Drift	2	9:20	10:20	1:00	1.0	2.0	0	0.00
14-Apr	Upper Bella	Classic	Drift	2	11:30	12:00	0:30	0.5	1.0	0	0.00
14-Apr	Upper Bella	Upper Classic	Drift	2	12:20	13:00	0:40	0.7	1.3	0	0.00
14-Apr	Upper Bella	Log Jam	Drift	2	13:20	14:20	1:00	1.0	2.0	0	0.00
14-Apr	Upper Bella	Hell Hole	Drift	2	14:40	15:10	0:30	0.5	1.0	0	0.00
16-Apr	Middle Bella	Below Glacier View	Drift	3	7:50	8:40	0:50	0.8	2.5	0	0.00
16-Apr	Middle Bella	Jimmy Mechams Run	Drift	3	9:00	9:40	0:40	0.7	2.0	0	0.00
16-Apr	Middle Bella	Albert Mechams Run	Drift	2	9:50	11:05	1:15	1.3	2.5	0	0.00
16-Apr	Middle Bella	Mitz Hole	Drift	3	11:15	11:45	0:30	0.5	1.5	0	0.00
16-Apr	Middle Bella	7 Alders	Drift	3	12:10	13:40	1:30	1.5	4.5	0	0.00
16-Apr	Middle Bella	7 Alders-Upper Borde	Drift	2	13:50	14:20	0:30	0.5	1.0	0	0.00
16-Apr	Middle Bella	Upper Borden	Drift	3	14:20	14:50	0:30	0.5	1.5	0	0.00
16-Apr	Middle Bella	pper Borden-Nusatsu	Drift	2	14:50	15:30	0:40	0.7	1.3	0	0.00
16-Apr	Middle Bella	Nusatsum	Drift	3	15:30	16:15	0:45	0.8	2.3	1	0.44
17-Apr	Lower Bella	Bailey Br.	Drift	2	8:25	8:35	0:10	0.2	0.3	0	0.00
17-Apr	Lower Bella	Grizzly Hole	Drift	3	8:40	9:07	0:27	0.5	1.4	1	0.74
17-Apr	Lower Bella	Darwin Putin	Drift	3	9:15	9:35	0:20	0.3	1.0	0	0.00
17-Apr	Lower Bella	Upper Purkiss Run	Drift	3	9:40	10:00	0:20	0.3	1.0	0	0.00
17-Apr	Lower Bella	Lower Purkiss Run	Drift	3	10:07	10:20	0:13	0.2	0.7	0	0.00
17-Apr	Lower Bella	Otter Run	Drift	3	10:50	11:35	0:45	0.8	2.3	0	0.00
17-Apr	Lower Bella	Salloomt	Drift	3	11:45	12:35	0:50	0.8	2.5	1	0.40
17-Apr	Lower Bella	Old Store Run	Drift	3	12:45	13:10	0:25	0.4	1.3	0	0.00
17-Apr	Lower Bella	Old Store Run-Snootli	Drift	2	13:25	13:55	0:30	0.5	1.0	0	0.00
17-Apr	Lower Bella	Snootli Hole	Drift	3	14:10	14:35	0:25	0.4	1.3	0	0.00
17-Apr	Lower Bella	Walker Island	Drift	2	15:00	15:20	0:20	0.3	0.7	0	0.00
17-Apr	Lower Bella	Marco Polo	Drift	3	15:40	16:00	0:20	0.3	1.0	0	0.00
17-Apr	Lower Bella	Spruce Pool	Drift	3	16:17	16:40	0:23	0.4	1.2	0	0.00
18-Apr	Middle Bella	>Noosgulch	Drift	2	8:45	9:35	0:50	0.8	1.7	0	0.00
18-Apr	Middle Bella	Noosgulch	Drift	2	9:42	9:52	0:10	0.2	0.3	0	0.00
18-Apr	Middle Bella	Big Cr.	Drift	2	10:09	11:20	1:11	1.2	2.4	0	0.00
18-Apr	Middle Bella	Robins Nest	Drift	2	11:30	12:30	1:00	1.0	2.0	0	0.00
18-Apr	Middle Bella	Below Glacier View	Drift	2	11:45	13:00	1:15	1.3	2.5	0	0.00
18-Apr	Middle Bella	Shelton's Pool	Drift	2	13:12	13:30	0:18	0.3	0.6	0	0.00
18-Apr	Middle Bella	Jimmy Mechams	Drift	2	13:37	14:13	0:36	0.6	1.2	1	0.83
18-Apr	Middle Bella	Albert Mechams	Drift	2	14:47	14:56	0:09	0.1	0.3	0	0.00
18-Apr	Middle Bella	7 Alders	Drift	2	15:20	15:40	0:20	0.3	0.7	0	0.00
18-Apr	Middle Bella	Nusatsum	Drift	2	16:22	17:15	0:53	0.9	1.8	1	0.57
19-Apr	Upper Bella	Firvale Dump Run	Drift	3	9:50	10:30	0:40	0.7	2.0	1	0.50
19-Apr	Upper Bella	ower Firvale Dump R	Drift	3	10:35	10:45	0:10	0.2	0.5	0	0.00
19-Apr	Upper Bella	<Firvale	Drift	3	11:00	11:12	0:12	0.2	0.6	0	0.00
19-Apr	Upper Bella	Hanger Pool	Drift	3	11:15	11:25	0:10	0.2	0.5	0	0.00
19-Apr	Upper Bella	Cochitin Cr	Drift	3	11:35	12:10	0:35	0.6	1.8	0	0.00
19-Apr	Upper Bella	Upper Cochotin	Drift	3	12:15	12:42	0:27	0.5	1.4	0	0.00
19-Apr	Upper Bella	Upper Canoe Crossing	Drift	3	12:50	13:15	0:25	0.4	1.3	0	0.00
19-Apr	Upper Bella	anoe Crossing-BC brid	Drift	2	13:15	14:00	0:45	0.8	1.5	0	0.00
19-Apr	Middle Bella	>Noosgulch	Drift	2	14:30	15:00	0:30	0.5	1.0	0	0.00
20-Apr	Middle Bella	>Noosgulch	Drift	1	8:50	9:00	0:10	0.2	0.2	0	0.00
20-Apr	Middle Bella	>Noosgulch	Drift	2	9:10	10:20	1:10	1.2	2.3	0	0.00

Appendix B: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 21 March to 15 June 1997. Catch-per-unit-effort (number of steelhead per rod hour) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
20-Apr	Middle Bella	Big Cr.	Drift	3	10:25	10:55	0:30	0.5	1.5	0	0.00
20-Apr	Middle Bella	Big Cr.	Drift	2	10:57	11:10	0:13	0.2	0.4	0	0.00
20-Apr	Middle Bella	Robins Nest	Drift	2	11:15	11:50	0:35	0.6	1.2	0	0.00
20-Apr	Middle Bella	Robins Nest	Drift	3	12:00	12:35	0:35	0.6	1.8	0	0.00
20-Apr	Middle Bella	Shelton's Pool	Drift	2	12:40	13:20	0:40	0.7	1.3	0	0.00
20-Apr	Middle Bella	Jimmy Mechams	Drift	3	13:40	13:50	0:10	0.2	0.5	0	0.00
20-Apr	Middle Bella	Jimmy Mechams	Drift	2	13:50	14:07	0:17	0.3	0.6	0	0.00
20-Apr	Middle Bella	Jimmy Mechams	Drift	3	14:10	14:50	0:40	0.7	2.0	0	0.00
20-Apr	Middle Bella	Albert Mechams	Drift	2	14:50	15:30	0:40	0.7	1.3	0	0.00
20-Apr	Middle Bella	Mitz Hole	Drift	3	15:40	15:50	0:10	0.2	0.5	0	0.00
20-Apr	Middle Bella	Seven alders	Drift	3	16:00	16:20	0:20	0.3	1.0	0	0.00
20-Apr	Middle Bella	Ace in Hole	Drift	3	16:22	17:35	1:13	1.2	3.7	1	0.27
20-Apr	Middle Bella	Ace in Hole	Drift	2	18:00	18:30	0:30	0.5	1.0	1	1.00
20-Apr	Middle Bella	Nusatsum	Drift	2	18:50	19:10	0:20	0.3	0.7	0	0.00
21-Apr	Upper Bella	Atnarko jct	Drift	2	16:50	17:20	0:30	0.5	1.0	1	1.00
21-Apr	Upper Bella	Atnarko jct	Drift	2	17:30	17:55	0:25	0.4	0.8	0	0.00
22-Apr	Lower Bella	Bailey Br	Drift	2	9:21	9:31	0:10	0.2	0.3	0	0.00
22-Apr	Lower Bella	<Bailey	Drift	3	9:32	9:55	0:23	0.4	1.2	0	0.00
22-Apr	Lower Bella	Jungle Pool	Drift	3	10:00	10:27	0:27	0.4	1.4	0	0.00
22-Apr	Lower Bella	<Jungle	Drift	3	10:40	10:43	0:03	0.1	0.2	0	0.00
22-Apr	Lower Bella	>Purkiss	Drift	3	10:55	11:04	0:09	0.1	0.4	0	0.00
22-Apr	Lower Bella	Purkiss	Drift	1	11:05	11:10	0:05	0.1	0.1	0	0.00
22-Apr	Lower Bella	Ruby Run	Drift	1	11:00	11:25	0:25	0.4	0.4	0	0.00
22-Apr	Lower Bella	Otter Run	Drift	3	11:30	12:07	0:37	0.6	1.9	0	0.00
22-Apr	Lower Bella	Salloomt	Drift	2	12:24	13:06	0:42	0.7	1.4	0	0.00
22-Apr	Lower Bella	BC Tel Hole	Drift	2	13:30	13:58	0:28	0.5	0.9	0	0.00
22-Apr	Lower Bella	Store Run	Drift	3	14:15	14:21	0:06	0.1	0.3	0	0.00
22-Apr	Lower Bella	Mill Cr.	Drift	3	14:45	15:11	0:26	0.4	1.3	0	0.00
22-Apr	Lower Bella	Clifford	Drift	2	15:30	15:44	0:14	0.2	0.5	0	0.00
22-Apr	Lower Bella	Airport Run	Drift	3	15:45	16:00	0:15	0.2	0.7	0	0.00
22-Apr	Lower Bella	Elbow Run	Drift	3	16:12	16:20	0:08	0.1	0.4	0	0.00
22-Apr	Lower Bella	>Walker	Drift	3	16:45	17:11	0:26	0.4	1.3	0	0.00
22-Apr	Lower Bella	Walker	Drift	1	17:15	17:30	0:15	0.2	0.2	0	0.00
23-Apr	Upper Bella	SteepRoof	Drift	2	8:40	9:25	0:45	0.8	1.5	0	0.00
23-Apr	Upper Bella	<SteepRoof	Drift	3	9:25	10:05	0:40	0.7	2.0	0	0.00
23-Apr	Upper Bella	<Noomst Br	Drift	3	10:10	11:00	0:50	0.8	2.5	0	0.00
23-Apr	Upper Bella	McCall Flats	Drift	2	11:10	11:47	0:37	0.6	1.2	1	0.81
23-Apr	Upper Bella	<Flats	Drift	3	12:15	12:30	0:15	0.3	0.8	0	0.00
23-Apr	Upper Bella	Burnt Br	Drift	3	13:17	13:45	0:28	0.5	1.4	2	1.43
23-Apr	Upper Bella	<Burnt Br	Drift	3	15:58	16:20	0:22	0.4	1.1	0	0.00
23-Apr	Upper Bella	Firvale Run	Drift	2	16:45	17:00	0:15	0.3	0.5	0	0.00
23-Apr	Upper Bella	Firvale Dump run	Drift	2	17:05	17:30	0:25	0.4	0.8	0	0.00
23-Apr	Middle Bella	Noosgulch	Drift	2	17:45	18:00	0:15	0.2	0.5	0	0.00
25-Apr	Upper Bella	Atnarko jct	Drift	2	16:15	16:50	0:35	0.6	1.2	0	0.00
25-Apr	Upper Bella	Atnarko jct	Drift	2	16:55	17:25	0:30	0.5	1.0	1	1.00
25-Apr	Lower Bella	<Bailey	Drift	2	8:05	8:40	0:35	0.6	1.2	0	0.00
25-Apr	Lower Bella	Jungle Hole	Drift	2	8:50	9:10	0:20	0.3	0.7	0	0.00
25-Apr	Lower Bella	Purkiss	Drift	2	9:18	9:45	0:27	0.5	0.9	0	0.00
25-Apr	Lower Bella	Welding Hole	Drift	2	10:00	10:05	0:05	0.1	0.2	0	0.00
25-Apr	Lower Bella	Ruby Run	Drift	2	10:10	10:15	0:05	0.1	0.2	0	0.00
25-Apr	Lower Bella	Otter Run	Drift	2	10:20	11:00	0:40	0.7	1.3	0	0.00
25-Apr	Lower Bella	Salloomt	Drift	2	11:18	12:10	0:52	0.9	1.7	0	0.00
25-Apr	Lower Bella	Store Run	Drift	2	12:15	12:50	0:35	0.6	1.2	0	0.00
25-Apr	Lower Bella	Richard Run	Drift	2	13:08	14:10	1:02	1.0	2.1	0	0.00
25-Apr	Lower Bella	Airport run	Drift	2	14:22	14:55	0:33	0.6	1.1	0	0.00
25-Apr	Lower Bella	Big Rock	Drift	2	15:05	15:20	0:15	0.3	0.5	0	0.00
25-Apr	Lower Bella	Big Rock	Drift	2	15:20	16:00	0:40	0.7	1.3	0	0.00
26-Apr	Upper Bella	Picnic Hole	Drift	3	9:30	10:05	0:35	0.6	1.8	0	0.00
26-Apr	Upper Bella	Boulder Run	Drift	3	10:20	11:00	0:40	0.7	2.0	0	0.00

Appendix B: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 21 March to 15 June 1997. Catch-per-unit-effort (number of steelhead per rod hour) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
26-Apr	Upper Bella	Burnt Br.	Drift	3	11:15	12:30	1:15	1.3	3.8	1	0.27
26-Apr	Upper Bella	<Burnt Br.	Drift	2	13:00	14:00	1:00	1.0	2.0	0	0.00
27-Apr	Middle Bella	Noosgulch	Drift	2	16:26	16:52	0:26	0.4	0.9	0	0.00
29-Apr	Middle Bella	>Noosgulch	Drift	3	8:30	8:40	0:10	0.2	0.5	0	0.00
29-Apr	Middle Bella	<Noosgulch	Drift	2	8:45	8:55	0:10	0.2	0.3	0	0.00
29-Apr	Middle Bella	Big Cr.	Drift	3	9:20	10:15	0:55	0.9	2.8	0	0.00
29-Apr	Middle Bella	Glacier View	Drift	2	10:30	11:00	0:30	0.5	1.0	0	0.00
29-Apr	Middle Bella	Sheltons	Drift	3	11:10	11:45	0:35	0.6	1.8	0	0.00
29-Apr	Middle Bella	<Sheltons	Drift	3	12:00	12:10	0:10	0.2	0.5	0	0.00
29-Apr	Middle Bella	Jimmy Meechams	Drift	3	12:15	13:00	0:45	0.8	2.3	0	0.00
29-Apr	Middle Bella	Albert Meechams	Drift	3	13:01	13:35	0:34	0.6	1.7	0	0.00
29-Apr	Middle Bella	Albert Meechams	Drift	2	14:00	14:25	0:25	0.4	0.8	0	0.00
29-Apr	Middle Bella	7 Alders	Drift	3	14:30	15:00	0:30	0.5	1.5	0	0.00
29-Apr	Middle Bella	Ace in the Hole	Drift	3	15:15	16:00	0:45	0.8	2.3	0	0.00
29-Apr	Middle Bella	Bordens Hole	Drift	3	16:15	16:30	0:15	0.2	0.7	0	0.00
29-Apr	Middle Bella	Nusatsum	Drift	3	16:45	17:30	0:45	0.8	2.3	0	0.00
29-Apr	Middle Bella	Nusatsum	Drift	3	17:30	17:45	0:15	0.3	0.8	0	0.00
30-Apr	Upper Bella	Junction	Drift	2	17:15	18:40	1:25	1.4	2.8	0	0.00
30-Apr	Upper Bella	Junction	Drift	2	18:45	19:10	0:25	0.4	0.8	0	0.00
30-Apr	Lower Bella	<Bailey Br.	Drift	2	8:10	8:40	0:30	0.5	1.0	0	0.00
30-Apr	Lower Bella	>Purkiss	Drift	2	9:00	9:10	0:10	0.2	0.3	0	0.00
30-Apr	Lower Bella	Otter Run	Drift	2	9:23	10:05	0:42	0.7	1.4	0	0.00
30-Apr	Lower Bella	Salloomt	Drift	2	10:20	10:55	0:35	0.6	1.2	0	0.00
30-Apr	Lower Bella	Store Run	Drift	2	11:00	11:50	0:50	0.8	1.7	0	0.00
30-Apr	Lower Bella	BC Tel	Drift	2	12:10	12:34	0:24	0.4	0.8	0	0.00
30-Apr	Lower Bella	Rock Run	Drift	2	12:45	13:00	0:15	0.2	0.5	0	0.00
30-Apr	Lower Bella	Airport Run	Drift	2	13:10	13:45	0:35	0.6	1.2	0	0.00
30-Apr	Lower Bella	>Walker	Drift	2	13:55	14:15	0:20	0.3	0.7	0	0.00
30-Apr	Lower Bella	Walker	Drift	2	14:40	15:23	0:43	0.7	1.4	0	0.00
01-May	Upper Bella	Burnt Br.	Drift	2	11:15	12:30	1:15	1.3	2.5	0	0.00
01-May	Upper Bella	<Burnt	Drift	2	13:00	13:30	0:30	0.5	1.0	0	0.00
01-May	Upper Bella	Boulder Run	Drift	2	14:15	14:44	0:29	0.5	1.0	0	0.00
01-May	Upper Bella	McCall Flats	Drift	2	15:00	16:30	1:30	1.5	3.0	0	0.00
01-May	Upper Bella	Junction	Drift	2	18:20	19:00	0:40	0.7	1.3	0	0.00
02-May	Middle Bella	Noosgulch	Drift	1	8:20	8:27	0:07	0.1	0.1	0	0.00
02-May	Middle Bella	<Noosgulch	Drift	3	8:45	9:36	0:51	0.9	2.6	0	0.00
02-May	Middle Bella	<Noosgulch	Drift	2	9:45	10:00	0:15	0.3	0.5	0	0.00
02-May	Middle Bella	Big Cr.	Drift	3	10:15	10:45	0:30	0.5	1.5	0	0.00
02-May	Middle Bella	Big Cr.	Drift	2	10:48	10:52	0:04	0.1	0.1	0	0.00
02-May	Middle Bella	<Big Cr.	Drift	3	11:00	11:10	0:10	0.2	0.5	0	0.00
02-May	Middle Bella	Sheltons	Drift	3	11:40	11:54	0:14	0.2	0.7	0	0.00
02-May	Middle Bella	<Sheltons	Drift	3	12:15	12:28	0:13	0.2	0.7	0	0.00
02-May	Middle Bella	Jimmy Meecham	Drift	3	12:30	12:59	0:29	0.5	1.4	0	0.00
02-May	Middle Bella	Albert Meecham	Drift	3	13:00	13:24	0:24	0.4	1.2	0	0.00
02-May	Middle Bella	Mitz/7 Alders	Drift	3	13:30	14:47	1:17	1.3	3.9	0	0.00
02-May	Middle Bella	Ace in the Hole	Drift	3	15:00	15:50	0:50	0.8	2.5	0	0.00
02-May	Middle Bella	Nusatsum	Drift	3	16:00	16:20	0:20	0.3	1.0	0	0.00
02-May	Middle Bella	Nusatsum	Drift	3	16:30	17:18	0:48	0.8	2.4	0	0.00
04-May	Lower Bella	Bailey Br	Drift	2	8:36	9:00	0:24	0.4	0.8	0	0.00
04-May	Lower Bella	<Bailey	Drift	3	9:05	9:16	0:11	0.2	0.5	0	0.00
04-May	Lower Bella	Jungle Hole	Drift	2	9:20	9:45	0:25	0.4	0.8	0	0.00
04-May	Lower Bella	Ruby Run	Drift	2	9:52	9:54	0:02	0.0	0.1	0	0.00
04-May	Lower Bella	Ruby Run	Drift	2	9:55	10:43	0:48	0.8	1.6	0	0.00
04-May	Lower Bella	Otter Run	Drift	3	10:46	11:25	0:39	0.6	2.0	0	0.00
04-May	Lower Bella	Salloomt	Drift	3	11:32	11:53	0:21	0.3	1.1	0	0.00
04-May	Lower Bella	Store Run	Drift	2	11:53	12:58	1:05	1.1	2.2	0	0.00
04-May	Lower Bella	BC tel hole	Drift	2	13:03	13:26	0:23	0.4	0.8	0	0.00
04-May	Lower Bella	Clifford	Drift	2	13:35	13:45	0:10	0.2	0.3	0	0.00
04-May	Lower Bella	Airport Run	Drift	2	14:00	14:44	0:44	0.7	1.5	0	0.00

Appendix B: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 21 March to 15 June 1997. Catch-per-unit-effort (number of steelhead per rod hour) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
04-May	Lower Bella	Airport Run	Drift	2	14:50	15:05	0:15	0.2	0.5	0	0.00
04-May	Lower Bella	<Airport Run	Drift	2	15:15	15:48	0:33	0.6	1.1	0	0.00
04-May	Lower Bella	Walker	Drift	2	16:00	16:30	0:30	0.5	1.0	0	0.00
05-May	Upper Bella	<CZB Br	Drift	2	8:20	8:40	0:20	0.3	0.7	0	0.00
05-May	Upper Bella	McCall Flats	Drift	2	8:56	9:30	0:34	0.6	1.1	0	0.00
05-May	Upper Bella	Boulder Run	Drift	2	10:00	11:00	1:00	1.0	2.0	1	0.50
05-May	Upper Bella	Burnt	Drift	2	11:00	13:30	2:30	2.5	5.0	0	0.00
05-May	Upper Bella	Car pool	Drift	2	13:45	14:00	0:15	0.3	0.5	0	0.00
05-May	Upper Bella	>Firvale	Drift	2	14:20	14:53	0:33	0.6	1.1	0	0.00
05-May	Upper Bella	<Firvale	Drift	2	15:00	15:10	0:10	0.2	0.3	0	0.00
06-May	Middle Bella	Noosgulch	Drift	2	8:20	8:30	0:10	0.2	0.3	0	0.00
06-May	Middle Bella	Noosgulch	Drift	3	9:10	9:30	0:20	0.3	1.0	0	0.00
06-May	Middle Bella	<Noosgulch	Drift	2	9:32	9:45	0:13	0.2	0.4	0	0.00
06-May	Middle Bella	Big Cr.	Drift	3	9:52	10:30	0:38	0.6	1.9	0	0.00
06-May	Middle Bella	Glacier View	Drift	3	10:40	10:58	0:18	0.3	0.9	0	0.00
06-May	Middle Bella	Sheltons	Drift	2	11:10	11:45	0:35	0.6	1.2	0	0.00
06-May	Middle Bella	Sheltons	Drift	3	11:50	12:20	0:30	0.5	1.5	0	0.00
06-May	Middle Bella	Jimmy Meechams	Drift	3	12:30	13:02	0:32	0.5	1.6	0	0.00
06-May	Middle Bella	Albert Meechams	Drift	3	13:05	13:13	0:08	0.1	0.4	0	0.00
06-May	Middle Bella	Ace in the hole	Drift	3	13:30	14:11	0:41	0.7	2.1	0	0.00
06-May	Middle Bella	Ace in the hole	Drift	2	14:30	15:00	0:30	0.5	1.0	0	0.00
06-May	Middle Bella	Bordens Rock	Drift	3	15:10	15:20	0:10	0.2	0.5	0	0.00
06-May	Middle Bella	Nusatsum	Drift	3	15:30	15:40	0:10	0.2	0.5	0	0.00
07-May	Upper Bella	Classic	Drift	2	11:45	13:40	1:55	1.9	3.8	0	0.00
07-May	Upper Bella	Boulder Run	Drift	2	15:15	16:10	0:55	0.9	1.8	0	0.00
07-May	Upper Bella	McCall Flats	Drift	2	16:30	17:15	0:45	0.8	1.5	0	0.00
09-May	Upper Bella	McCall Flats	Drift	2	9:53	10:20	0:27	0.5	0.9	0	0.00
09-May	Upper Bella	Boulder Run	Drift	1	10:30	10:52	0:22	0.4	0.4	0	0.00
09-May	Upper Bella	Boulder Run	Drift	2	10:50	11:15	0:25	0.4	0.8	0	0.00
09-May	Upper Bella	Burnt Br	Drift	2	11:40	12:09	0:29	0.5	1.0	1	1.03
09-May	Upper Bella	Burnt Br	Drift	2	12:10	13:00	0:50	0.8	1.7	1	0.60
09-May	Upper Bella	Burnt Br	Drift	2	13:15	14:00	0:45	0.8	1.5	0	0.00
09-May	Upper Bella	Noomst Cr.	Drift	1	14:20	14:33	0:13	0.2	0.2	0	0.00
09-May	Upper Bella	<Noomst Cr.	Drift	2	14:45	15:30	0:45	0.8	1.5	0	0.00
09-May	Upper Bella	Canoe Crossing	Drift	2	17:00	18:45	1:45	1.8	3.5	0	0.00
10-May	Lower Bella	<Bailey	Drift	3	8:20	8:35	0:15	0.2	0.7	0	0.00
10-May	Lower Bella	Jungle Pool	Drift	3	8:42	9:00	0:18	0.3	0.9	0	0.00
10-May	Lower Bella	Ruby Run	Drift	3	9:10	9:25	0:15	0.3	0.8	0	0.00
10-May	Lower Bella	Ruby Run	Drift	2	9:30	10:00	0:30	0.5	1.0	0	0.00
10-May	Lower Bella	Otter Run	Drift	2	10:05	10:35	0:30	0.5	1.0	0	0.00
10-May	Lower Bella	Salloomt	Drift	2	10:45	11:25	0:40	0.7	1.3	0	0.00
10-May	Lower Bella	Store Run	Drift	3	11:35	12:40	1:05	1.1	3.3	0	0.00
10-May	Lower Bella	BC tel hole	Drift	3	12:50	13:30	0:40	0.7	2.0	0	0.00
10-May	Lower Bella	Cliffords Hole	Drift	2	13:45	14:15	0:30	0.5	1.0	0	0.00
10-May	Lower Bella	Airport Run	Drift	3	14:30	15:00	0:30	0.5	1.5	0	0.00
10-May	Lower Bella	Walker Island	Drift	3	15:20	15:55	0:35	0.6	1.7	0	0.00
11-May	Middle Bella	Noosgulch	Drift	2	8:45	9:16	0:31	0.5	1.0	0	0.00
11-May	Middle Bella	Big Cr	Drift	2	9:22	9:42	0:20	0.3	0.7	0	0.00
11-May	Middle Bella	Glacier View	Drift	2	9:45	10:15	0:30	0.5	1.0	0	0.00
11-May	Middle Bella	Sheltons	Drift	2	10:22	10:43	0:21	0.4	0.7	0	0.00
11-May	Middle Bella	Jimmy Meechams	Drift	2	10:45	11:15	0:30	0.5	1.0	0	0.00
11-May	Middle Bella	Albert Meechams	Drift	2	11:18	11:25	0:07	0.1	0.2	0	0.00
11-May	Middle Bella	Albert Meechams	Drift	3	11:28	12:15	0:47	0.8	2.4	0	0.00
11-May	Middle Bella	Albert Meechams	Drift	1	12:20	12:40	0:20	0.3	0.3	0	0.00
11-May	Middle Bella	Albert Meechams	Drift	2	12:45	13:05	0:20	0.3	0.7	0	0.00
11-May	Middle Bella	Mitz Hole	Drift	2	13:10	13:56	0:46	0.8	1.5	0	0.00
11-May	Middle Bella	Mitz Hole	Drift	3	14:00	14:30	0:30	0.5	1.5	0	0.00
11-May	Middle Bella	7 Alders	Drift	2	14:36	14:48	0:12	0.2	0.4	0	0.00
11-May	Middle Bella	Ace in the hole	Drift	3	14:54	15:09	0:15	0.2	0.7	0	0.00

Appendix B: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 21 March to 15 June 1997. Catch-per-unit-effort (number of steelhead per rod hour) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
11-May	Middle Bella	Bordens Rock	Drift	2	15:20	15:40	0:20	0.3	0.7	0	0.00
11-May	Middle Bella	Nusatsum	Drift	3	15:50	16:08	0:18	0.3	0.9	0	0.00
11-May	Middle Bella	<Nusatsum	Drift	2	16:10	16:24	0:14	0.2	0.5	0	0.00
18-May	Lower Bella	Doctors Hole	Bar	2	7:10	11:20	4:10	4.2	8.3	0	0.00
18-May	Lower Bella	Doctors Hole	Bar	2	4:43	9:38	4:55	4.9	9.8	0	0.00
19-May	Lower Bella	Doctors Hole	Bar	2	3:10	9:05	5:55	5.9	11.8	1	0.08
20-May	Lower Bella	Doctors Hole	Bar	2	7:30	12:10	4:40	4.7	9.3	0	0.00
20-May	Lower Bella	Doctors Hole	Bar	2	18:00	22:05	4:05	4.1	8.2	0	0.00
21-May	Lower Bella	Ruby Run	Bar	10	9:30	11:30	2:00	2.0	20.0	0	0.00
21-May	Lower Bella	Otter Run	Bar	5	11:40	12:05	0:25	0.4	2.1	0	0.00
21-May	Lower Bella	Store Run	Bar	4	12:25	13:50	1:25	1.4	5.7	1	0.18
22-May	Middle Bella	Burnt Bridge	Drift	2	9:25	9:39	0:14	0.2	0.5	1	2.14
24-May	Lower Bella	Bailey Br	Bar	5	13:00	15:15	2:15	2.3	11.3	0	0.00
25-May	Lower Bella	Noosgulch	Drift	2	9:00	9:30	0:30	0.5	1.0	0	0.00
25-May	Lower Bella	Big Creek	Drift	2	9:45	10:15	0:30	0.5	1.0	0	0.00
25-May	Lower Bella	Robins Nest	Drift	2	10:20	10:40	0:20	0.3	0.7	0	0.00
25-May	Lower Bella	Sheltons Pool	Drift	2	10:45	11:00	0:15	0.2	0.5	0	0.00
25-May	Lower Bella	Jimmy Mechams	Drift	2	11:05	11:30	0:25	0.4	0.8	0	0.00
25-May	Lower Bella	Albert Mechams	Drift	2	11:35	11:50	0:15	0.3	0.5	0	0.00
25-May	Lower Bella	Mitz Hole	Drift	3	12:00	13:40	1:40	1.7	5.0	0	0.00
25-May	Lower Bella	Fish Trap	Drift	2	13:50	14:15	0:25	0.4	0.8	0	0.00
25-May	Lower Bella	Mrs. Borden	Drift	2	14:30	14:45	0:15	0.3	0.5	0	0.00
25-May	Lower Bella	Jungle	Drift	2	15:15	15:42	0:27	0.5	0.9	0	0.00
26-May	Lower Bella	Waker Island	Bar	6	13:00	17:20	4:20	4.3	26.0	0	0.00
27-May	Lower Bella	Ruby Run	Bar	2	13:00	18:30	5:30	5.5	11.0	0	0.00
28-May	Lower Bella	Bailey Br	Bar	6	16:38	18:00	1:22	1.4	8.2	0	0.00
29-May	Lower Bella	Bailey Br	Bar	3	9:50	17:00	7:10	7.2	21.5	0	0.00
29-May	Lower Bella	Bailey Br	Bar	3	13:30	16:45	3:15	3.3	9.8	0	0.00
30-May	Lower Bella	Ruby Run	Bar	4	10:10	16:30	6:20	6.3	25.3	0	0.00
30-May	Lower Bella	Bailey Br	Bar	7	9:30	11:00	1:30	1.5	10.5	0	0.00
30-May	Lower Bella	Bailey Br	Bar	3	11:00	14:30	3:30	3.5	10.5	0	0.00
30-May	Lower Bella	Bailey Br	Bar	8	14:30	15:45	1:15	1.3	10.0	0	0.00
30-May	Lower Bella	Bailey Br	Bar	10	15:45	16:50	1:05	1.1	10.8	0	0.00
31-May	Lower Bella	Bailey Br	Bar	7	9:00	17:00	8:00	8.0	56.0	0	0.00
01-Jun	Lower Bella	Bailey Br	Bar								
02-Jun	Lower Bella	Bailey Br	Bar								
03-Jun	Lower Bella	Bailey Br	Bar	5	15:00	18:00	3:00	3.0	15.0	0	0.00
04-Jun	Lower Bella	Bailey Br	Bar	4	8:30	12:30	4:00	4.0	16.0	1	0.06
07-Jun	Lower Bella	Bailey Br	Bar	5	12:30	17:00	4:30	4.5	22.5	0	0.00
09-Jun	Lower Bella	Bailey Br	Bar	9	10:00	13:00	3:00	3.0	27.0	0	0.00
09-Jun	Lower Bella	Bailey Br	Bar	3	13:00	18:00	5:00	5.0	15.0	0	0.00
09-Jun	Lower Bella	Walker Island	Bar	8	15:05	18:30	3:25	3.4	27.3	1	0.04
10-Jun	Lower Bella	Walker Island	Bar	7	10:00	17:30	7:30	7.5	52.5	0	0.00
10-Jun	Lower Bella	Bailey Br	Bar	6	10:30	18:00	7:30	7.5	45.0	0	0.00
11-Jun	Lower Bella	Ruby Run	Bar	10	10:00	18:00	8:00	8.0	80.0	0	0.00
11-Jun	Lower Bella	Walker	Bar	11	10:00	12:00	2:00	2.0	22.0	0	0.00
11-Jun	Lower Bella	Walker	Bar	9	12:00	15:30	3:30	3.5	31.5	0	0.00
11-Jun	Lower Bella	Walker	Bar	6	15:30	16:00	0:30	0.5	3.0	0	0.00
11-Jun	Lower Bella	Walker	Bar	3	16:00	18:00	2:00	2.0	6.0	0	0.00
13-Jun	Lower Bella	Bailey Br	Bar								
14-Jun	Lower Bella	Ruby Run	Bar	9	10:30	17:00	6:30	6.5	58.5	0	0.00
15-Jun	Lower Bella	Bailey Br	Bar	12	10:00	18:00	8:00	8.0	96.0	0	0.00
		Total		**913**			**17:15**	**305.3**	**1189.4**	**26**	**0.02**

Location: Lower=mouth to Salloomt (0-20 km), Middle=Salloomt to Noosgulch (20-40 km), Upper=Noosgulch to Atnarko-Talchako junction (40-60 km)

Appendix B: Table 2. Information regarding spring-run steelhead that were caught on the Bella Coola River as part of the 1997 radio-tagging program

Anchor tag no.		Radio tag		Nose-fork		Tagging			Release	Scale		Vial	Scar	Health
First	Second	Chan [a]	Code	Size	Sex	Method	Date	Location	Time	Book	No.	no.	cod [c]	code [d]
2451	2452	11	63	81.0	F	Angle	24-Mar-97	Otter Run	11:25	47017	10-50	1	F	1
2453	2454	11	75	79.0	M	Angle	02-Apr-97	Atnarko jct	11:10	47017	9-49	NA	F	1
70701	70702	25	77	77.0	M	Angle	06-Apr-97	Classic	13:52	47023	10-50	16	E	3
20651	20652	11	66	77.0	F	Angle	07-Apr-97	Atnarko jct	14:36	47023	9-49	5	B	1
70210	70211	25	56	83.0	F	Angle	16-Apr-97	Nusatsum	15:43	47017	8-48	15	E	2
70212	70213	25	53	86.0	F	Angle	17-Apr-97	Jungle Pool	08:50	47017	7-47	20	F	1
70214	70215	25	80	89.0	M	Angle	17-Apr-97	Salloomt	12:02	47017	6-46	18	F	1
70216	70217	25	51	84.0	F	Angle	18-Apr-97	Jimmy Meechan	13:53	47017	5-45	11	F	3
70218	70219	25	52	83.0	F	Angle	18-Apr-97	Nusatsum	16:54	47017	4-44	17	F	2
70220	70221	25	76	89.0	M	Angle	19-Apr-97	Firvale Dump	09:55	47026	1-41	23	F	1
64100	64099	25	75	81.0	F	Angle	20-Apr-97	Ace in the Hole	16:34	47020	2-42	21	F	2
64098	64097	25	55	86.0	F	Angle	20-Apr-97	Ace in the Hole	17:12	47020	3-53	22	F	1
64095	64096	25	79	82.0	M	Angle	21-Apr-97	Atnarko jct	17:22	47027	10-50	14	E	1
70653	70654	11	64	88.0	M	Angle	23-Apr-97	McCall Flats	12:42	47023	8-48	8	E	1
70655	70656	11	72	92.0	M	Angle	23-Apr-97	Burnt Br	13:25	47023	7-47	7	F	1
70657	70659	11	77	87.0	M	Angle	23-Apr-97	Burnt Br	14:59	47023	6-46	10	E	2
70660	70661	11	73	92.0	M	Angle	25-Apr-97	Atnarko jct	17:33	47023	5-45	3	E	2
1193	1194	25	73	73.0	F	Angle	26-Apr-97	Burnt Br	11:43	47027	9-49	13	F	1
5901	NA	NA	NA	70.0	F	Angle	02-May-97	<Noosgulch	10:36	47027	8-48	35	F	1
5902	5903	11	59	74.0	M	Angle	05-May-97	Noomst Rocks	10:31	47027	7-47	4	F	1
5905	5906	9	67	86.0	M	Angle	09-May-97	Burnt Br.	12:09	47027	6-46	38	F	1
5907	5908	9	70	82.0	F	Angle	09-May-97	Burnt Br.	13:13	47027	5-45	33	A	2
NA	NA	NA	NA	75.0	F	Angle	10-May-97	Store Run	12:15	NA	NA	30	F	1
75501	75502	9	61	63.0	M	Angle	19-May-97	Doctors Run	16:18	47029	# 1-41	31	NA	2
71528	71530	25	72	64.0	F	Angle	21-May-97	Store Run	13:07	47021	10-50	43	F	1
NA	NA	9	72	81.0	M	Angle	22-May-97	Burnt Bridge	09:50	47029	2-42	37	NA	2
71534	71533	NA	NA	77.0	F	Angle	30-May-97	Bailey Bridge	10:00	NA	NA	23	F	1
NA	NA	NA	NA	72.0	M	Net	23-Jun-97	Bella Coola	NA	47022	10-50	40	NA	2

[a] Frequencies (MHz) used: Channels 9=149.480, 11=149.520, and 25=149.800 .

[b] Not available or not applicable.

[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).

Appendix B: Table 3. Furthest upstream detection locations and GPS coordinates for spring-run steelhead radio-tagged on the Bella Coola River in 1997.

	Radio tag		Tagging		Furthest Upstream or Spawning Location		Upstream GPS			
No.	han.	Code	Date	Location	Date	Location	Latitude		Longitude	
1	11	63	24-Mar	Otter Run	08-May	Atnarko (near Goat Cr; 21.5 km)	52	21.3500	125	46.7600
2	11	75	02-Apr	Atnarko jct	08-May	Atnarko (near Goat; 21.2 km)	52	22.0960	125	46.9200
3	25	77	06-Apr	Classic	03-Jun	Noosgulch (0.6 km)	52	26.2100	126	23.5400
4	11	66	07-Apr	Atnarko jct	03-Jun	Camera Channel	52	29.5200	125	53.4400
5	25	56	16-Apr	Nusatsum	3-9 Jun	Burnt Br (mouth)	52	25.3690	125	12.3420
6	25	53	17-Apr	Jungle Pool	03-Jun	Hotnarko (4 km)	52	22.9100	125	44.2500
7	25	80	17-Apr	Salloomt	03-Jun	Salloomt (1 km)	52	24.5900	126	29.2200
8	25	51	18-Apr	Jimmy Meechan	22-May	Hotnarko (1.5 km)	52	22.0400	125	46.0900
9	25	52	18-Apr	Nusatsum	22-May	Salloomt (2 km)	52	25.3000	126	31.1500
10	25	76	19-Apr	Firvale Dump	08-May	Atnarko (near Corbould; 2 km)	52	21.9500	126	4.3300
11	25	75	20-Apr	Ace in the Hole	22-May	Burnt Br (1.8 km)	52	26.1300	126	11.3900
12	25	55	20-Apr	Ace in the Hole	08-May	Nusatsum (6 km)	52	21.8700	126	26.6000
13	25	79	21-Apr	Atnarko jct	22-May	Bella Coola (upsteam of Burnt; 44.2 km)	52	23.1900	126	7.3400
14	11	64	23-Apr	McCall Flats	03-Jun	Hotnarko (4.5 km)	52	23.0700	125	43.9200
15	11	72	23-Apr	Burnt Br	22-May	Burnt Br (3.3 km)	52	26.4800	126	10.8600
16	11	77	23-Apr	Burnt Br	03-Jun	Burnt Br (1.4 km)	52	26.1000	126	12.5800
17	11	73	25-Apr	Atnarko jct	21-Jun	Atnarko (above Mosher Cr.)	52	22.2900	125	59.3400
18	25	73	26-Apr	Burnt Br	22-May	Burnt Br (4 km)	52	26.8800	126	10.5400
19	11	59	05-May	Noomst Rocks	03-Jun	Atnarko (Fisheries Pool; 1 km)	52	22.5600	126	5.0800
20	9	67	09-May	Burnt Br.	22-May	Burnt Br (below mouth)	52	28.1800	126	10.2300
21	9	70	09-May	Burnt Br.	09-May	Burnt Br (mouth)	52	25.3690	125	12.3420
22	9	61	19-May	Doctors Run	03-Jun	Salloomt (1 km)	52	24.5900	126	29.2200
23	25	72	21-May	Store Run	21-Jun	Atnarko (near Goat; 21.7 km)	52	21.3000	125	46.6400
24	9	72	22-May	Burnt Bridge	21-Jun	Burnt Br (4 km)	52	27.0400	126	10.3700

Appendix B: Table 4. Furthest upstream detection and last detection locations for steelhead radio tagged on the Bella Coola River between 24 March and 22 May 1997.

	Radio tag		Tagging		Furthest Upstream or Spawning Location		Last Detection	
No.	han.	Code	Date	Location	Date	Location	Date	
1	11	63	24-Mar	Otter Run	08-May	Atnarko (near Goat Cr; 21.5 km)	19-May-97	Lower Walker (F05)
2	11	75	02-Apr	Atnarko jct	08-May	Atnarko (near Goat; 21.2 km)	18-May-97	Lower Walker (F05)
3	25	77	06-Apr	Classic	03-Jun	Noosgulch (0.6 km)	21-Mar-98	Noosgulch (0.6 km)
4	11	66	07-Apr	Atnarko jct	03-Jun	Camera Channel	28-Apr-97	Camera Channel
5	25	56	16-Apr	Nusatsum	3-9 Jun	Burnt Br (mouth)	13-Jun-97	Lower Walker (F05)
6	25	53	17-Apr	Jungle Pool	03-Jun	Hotnarko (4 km)	14-Jun-97	Lower Walker (F05)
7	25	80	17-Apr	Salloomt	03-Jun	Salloomt (1 km)	16-Jun-97	Lower Walker (F05)
8	25	51	18-Apr	Jimmy Meechan	22-May	Hotnarko (1.5 km)	05-Jun-97	Lower Walker (F05)
9	25	52	18-Apr	Nusatsum	22-May	Salloomt (2 km)	30-May-97	Lower Walker (F05)
10	25	76	19-Apr	Firvale Dump	08-May	Atnarko (near Corbould; 2 km)	05-Jul-98	Lower Atnarko
11	25	75	20-Apr	Ace in the Hole	22-May	Burnt Br (1.8 km)	05-Jun-97	Lower Walker (F05)
12	25	55	20-Apr	Ace in the Hole	08-May	Nusatsum (6 km)	13-Jun-97	Lower Walker (F05)
13	25	79	21-Apr	Atnarko jct	22-May	Bella Coola (upsteam of Burnt; 44.2 km)	22-Jun-98	Upper Bella Coola
14	11	64	23-Apr	McCall Flats	03-Jun	Hotnarko (4.5 km)	22-Jun-98	Middle Atnarko
15	11	72	23-Apr	Burnt Br	22-May	Burnt Br (3.3 km)	18-Jun-97	Lower Walker (F05)
16	11	77	23-Apr	Burnt Br	03-Jun	Burnt Br (1.4 km)	12-Jun-97	Lower Walker (F05)
17	11	73	25-Apr	Atnarko jct	21-Jun	Atnarko (above Mosher Cr.)	13-Jul-98	Middle Atnarko
18	25	73	26-Apr	Burnt Br	22-May	Burnt Br (4 km)	05-Jun-97	Lower Walker (F05)
19	11	59	05-May	Noomst Rocks	03-Jun	Atnarko (Fisheries Pool; 1 km)	09-Jun-98	Upper Bella Coola
20	9	67	09-May	Burnt Br.	22-May	Burnt Br (below mouth)	27-Jun-97	Lower Walker (F05)
21	9	70	09-May	Burnt Br.	09-May	Burnt Br (mouth)	24-May-97	Lower Walker (F05)
22	9	61	19-May	Doctors Run	03-Jun	Salloomt (1 km)	22-Jun-97	Upper Walker (F05)
23	25	72	21-May	Store Run	21-Jun	Atnarko (near Goat; 21.7 km)	30-Jun-97	Lower Walker (F05)
24	9	72	22-May	Burnt Bridge	21-Jun	Burnt Br (4 km)	25-Jun-97	Lower Walker (F05)

Appendix C -- Catch Monitoring 1997

Appendix C: Table 1. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola / Atnarko watershed, 16 April - 3 July 1997.

Date	No. of Drifts				Chinook			Steelhead			Sock.	Coho	Pink	Chum
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Rlsd.	Mks				
Week 16														
16-Apr	0	1	0	1	0	0	0	2	0	0	0			
17-Apr	0	1	0	1	0	0	0	1	2	0	0			
Week Totals	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**3**	**2**	**0**	**0**			
Week 17														
22-Apr	1	0	0	1	1	0	0	0	0	0	0			
23-Apr	0	1	0	1	1	0	0	0	0	0	0			
24-Apr	0	0	0	0	0	0	0	0	0	0	0			
25-Apr	0	1	0	1	1	0	0	0	0	0	0			
26-Apr	0	0	0	0	0	0	0	0	0	0	0			
Week Totals	**1**	**2**	**0**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**			
Week 18														
27-Apr	2	2	0	4	1	0	0	1	0	0	0			
28-Apr	1	2	0	3	1	0	0	0	0	0	0			
29-Apr	0	2	0	2	1	0	0	0	0	0	0			
30-Apr	0	1	0	1	0	0	0	2	0	0	0			
Week Totals	**3**	**7**	**0**	**10**	**3**	**0**	**0**	**3**	**0**	**0**	**0**			
Week 19														
04-May	0	1	0	1	2	0	0	0	0	0	0			
05-May	2	4	0	6	9	0	0	0	0	0	0			
06-May	0	0	0	0	0	0	0	0	0	0	0			
07-May	0	4	0	4	0	0	0	1	5	0	0			
08-May	0	1	0	1	1	0	0	0	1	0	0			
Week Totals	**2**	**10**	**0**	**12**	**12**	**0**	**0**	**1**	**6**	**0**	**0**			
Week 20														
11-May	0	0	10	10	8	0	0	0	0	0	0			
12-May	5	4	6	15	12	0	0	0	0	0	0			
13-May	10	1	8	19	11	0	0	2	0	0	0			
14-May	7	1	4	12	5	0	0	1	0	0	0			
15-May	11	3	0	14	11	0	0	1	1	0	0			
Week Totals	**33**	**9**	**28**	**70**	**47**	**0**	**0**	**4**	**1**	**0**	**0**			
Week 21														
18-May	14	3	5	22	26	0	0	5	3	0	0			
19-May	10	3	4	17	22	0	0	2	1	0	0			
20-May	15	3	7	25	62	1	1	3	2	0	0			
21-May	10	6	6	22	16	1	0	1	1	0	0			
22-May	9	2	5	16	5	1	0	0	0	0	0			
Week Totals	**58**	**17**	**27**	**102**	**131**	**3**	**1**	**11**	**7**	**0**	**0**			

Appendix C: Table 1. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola / Atnarko watershed, 16 April - 3 July 1997.

Date	No. of Drifts				Chinook			Steelhead			Sock.	Coho	Pink	Chum
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Rlsd.	Mks				
Week 22														
25-May	16	2	7	25	28	0	0	1	2	0	0			
26-May	14	1	10	25	37	2	0	0	1	0	0			
27-May	20	3	3	26	30	2	0	0	1	0	0			
28-May	12	2	0	14	27	3	0	2	2	0	0			
29-May	20	1	5	26	20	0	0	0	3	0	0			
Week Totals	**82**	**9**	**25**	**116**	**142**	**7**	**0**	**3**	**9**	**0**	**0**			
Week 23														
01-Jun	9	3	6	18	30	0	0	0	0	0	1			
02-Jun	16	2	11	29	47	0	0	0	1	0	0			
03-Jun	13	2	9	24	15	2	0	0	0	0	0			
04-Jun	28	2	11	41	53	1	0	0	0	0	0			
05-Jun	32	8	3	43	62	2	0	0	0	0	0			
Week Totals	**98**	**17**	**40**	**155**	**207**	**5**	**0**	**0**	**1**	**0**	**1**			
Week 24														
08-Jun	13	1	10	24	50	3	0	0	0	0	0			
09-Jun	14	1	11	26	52	4	0	0	1	0	0			
10-Jun	15	4	9	28	78	1	0	0	0	0	0			
11-Jun	25	5	10	40	93	2	0	0	2	0	0			
12-Jun	16	3	8	27	65	0	0	0	0	0	0			
Week Totals	**83**	**14**	**48**	**145**	**338**	**10**	**0**	**0**	**3**	**0**	**0**			
Week 25														
15-Jun	9	4	6	19	58	0	0	0	0	0	0			
16-Jun	16	0	11	27	73	1	0	0	1	0	2			
17-Jun	11	3	7	21	49	2	0	0	0	0	0			
18-Jun	16	1	12	29	56	6	0	0	0	0	4			
19-Jun	28	6	9	43	91	4	0	0	0	0	12			
Week Totals	**80**	**14**	**45**	**139**	**327**	**13**	**0**	**0**	**1**	**0**	**18**			
Week 26														
22-Jun	9	1	6	16	94	1	0	0	0	0	10			
23-Jun	12	1	12	25	97	10	0	1	1	0	26			
24-Jun	13	3	11	27	57	9	0	0	4	0	32			
25-Jun	14	4	12	30	54	10	0	0	0	0	40			
26-Jun	16	2	9	27	83	5	0	0	0	0	23			
Week Totals	**64**	**11**	**50**	**125**	**385**	**35**	**0**	**1**	**5**	**0**	**131**			
Week 27														
29-Jun	11	0	8	19	95	2	0	0	1	0	29			
30-Jun	16	17	13	46	151	2	0	0	0	0	50			
01-Jul	12	4	16	32	133	6	0	0	0	0	148			
02-Jul	26	4	30	60	86	2	0	0	2	0	146			
03-Jul	37	4	12	53	132	5	0	0	1	0	60			
Week Totals	**102**	**29**	**79**	**210**	**597**	**17**	**0**	**0**	**4**	**0**	**433**			
Grand Totals	**606**	**141**	**342**	**1089**	**2192**	**90**	**1**	**26**	**39**	**0**	**583**			

Appendix C: Table 2. DFO and MELP sport monitoring data 1997.

Week	Date	Location	Number of Anglers	Chinook			Steelhead		
				Kept	Released	Total	Fresh	Kelts	Total
Week 22									
	27-May	Atnarko	5	0	0	0	0	0	0
	28-May	Atnarko	8	0	0	0	0	0	0
	29-May	Atnarko	8	0	0	0	0	0	0
	30-May	Atnarko	8	0	0	0	0	0	0
	31-May	Atnarko	8	0	0	0	1	1	2
	Week Totals		**37**	**0**	**0**	**0**	**1**	**1**	**2**
Week 23									
	01-Jun	Atnarko	4	2	0	2	0	1	1
	02-Jun	Atnarko	4	0	0	0	1	0	1
	03-Jun	Atnarko	4	0	0	0	0	1	1
	04-Jun	Atnarko	6	0	0	0	0	0	0
	05-Jun	Atnarko	4	0	0	0	0	0	0
	06-Jun	Atnarko	8	1	0	1	0	0	0
	07-Jun	Atnarko	8	1	0	1	3	2	5
	Week Totals		**38**	**4**	**0**		**4**	**4**	**8**
Week 24									
	08-Jun	Atnarko	8	4	0	4	2	0	2
	09-Jun	Atnarko	4	1	0	1	1	0	1
	10-Jun	Atnarko	8	2	0	2	1	0	1
	11-Jun	Atnarko	10	3	0	3	0	0	0
	12-Jun	Atnarko	8	2	0	2	0	0	0
	13-Jun	Atnarko	15	3	0	3	0	0	0
	14-Jun	Atnarko	15	3	0	3	0	0	0
	Week Totals		**68**	**18**	**0**	**18**	**4**	**0**	**4**
Week 25									
	15-Jun	Atnarko	20	3	0	3	0	0	0
	16-Jun	Atnarko	18	1	0	1	0	0	0
	17-Jun	Atnarko	16	1	0	1	0	0	0
	18-Jun	Atnarko	25	2	0	2	0	0	0
	19-Jun	Atnarko	33	3	0	3	0	0	0
	20-Jun	Atnarko	45	3	0	3	0	0	0
	21-Jun	Atnarko	45	3	0	3	0	0	0
	Week Totals		**202**	**16**	**0**	**16**	**0**	**0**	**0**
Week 26									
	22-Jun	Atnarko	40	4	0	4	3	0	3
	23-Jun	Atnarko	43	3	0	3	0	0	0
	24-Jun	Atnarko	33	4	0	4	0	0	0
	25-Jun	Atnarko	36	5	0	5	0	0	0

Appendix C: Table 2. DFO and MELP sport monitoring data 1997.

Week	Date	Location	Number of Anglers	Chinook			Steelhead		
				Kept	Released	Total	Fresh	Kelts	Total
	26-Jun	Atnarko	38	7	0	7	0	0	0
	27-Jun	Atnarko	45	6	0	6	0	0	0
	28-Jun	Atnarko	45	6	0	6	0	0	0
	Week Totals		**280**	**35**	**0**	**35**	**3**	**0**	**3**
Week 27									
	29-Jun	Atnarko	77	12	0	12	0	0	0
	30-Jun	Atnarko	66	8	0	8	0	0	0
	Week Totals		**143**	**20**	**0**	**20**	**0**	**0**	**0**
Week 20									
	12-May	Bella Coola	12	0	0	0	0	0	0
	13-May	Bella Coola	1	0	0	0	0	0	0
	14-May	Bella Coola	3	0	0	0	0	0	0
	15-May	Bella Coola	1	0	0	0	0	0	0
	16-May	Bella Coola	20	0	0	0	0	0	0
	17-May	Bella Coola	25	0	0	0	0	0	0
	Week Totals		**62**	**0**	**0**	**0**	**0**	**0**	**0**
Week 21 *									
	18-May	Bella Coola	7	4	0	4		0	0
	19-May	Bella Coola	4	1	0	1		0	0
	20-May	Bella Coola	8	2	0	2		0	0
	21-May	Bella Coola	17	2	0	2		0	0
	22-May	Bella Coola	16	2	0	2		0	0
	23-May	Bella Coola	30	3	0	3		0	0
	24-May	Bella Coola	30	3	0	3		0	0
	Week Totals		**112**	**17**	**0**	**17**	**16**	**0**	**16**
Week 22									
	25-May	Bella Coola	21	3	0	3	0	0	0
	26-May	Bella Coola	16	5	0	5	0	0	0
	27-May	Bella Coola	18	1	0	1	0	0	0
	28-May	Bella Coola	13	0	0	0	0	0	0
	29-May	Bella Coola	22	3	0	3	0	0	0
	30-May	Bella Coola	30	3	0	3	0	0	0
	31-May	Bella Coola	30	3	0	3	0	0	0
	Week Totals		**150**	**18**	**0**	**18**	**0**	**0**	**0**
Week 23 **									
	01-Jun	Bella Coola	20	1	0	1	0	0	0
	02-Jun	Bella Coola	14	1	0	1	0	0	0
	03-Jun	Bella Coola	13	0	0	0	0	0	0

Appendix C: Table 2. DFO and MELP sport monitoring data 1997.

Week	Date	Location	Number of Anglers	Chinook			Steelhead		
				Kept	Released	Total	Fresh	Kelts	Total
	04-Jun	Bella Coola	11	1	0	1	0	0	0
	05-Jun	Bella Coola	12	2	0	2	0	0	0
	06-Jun	Bella Coola	35	4	0	4	0	3	3
	07-Jun	Bella Coola	35	4	0	4	0	0	0
	Week Totals		**140**	**13**	**0**	**13**	**0**	**3**	**3**
Week 24									
	08-Jun	Bella Coola	33	7	0	7	0	1	1
	09-Jun	Bella Coola	31	5	0	5	0	0	0
	10-Jun	Bella Coola	31	10	0	10	0	0	0
	11-Jun	Bella Coola	35	7	0	7	0	0	0
	12-Jun	Bella Coola	26	5	0	5	0	0	0
	13-Jun	Bella Coola	45	0	0	0	0	0	0
	14-Jun	Bella Coola	45	0	0	0	0	0	0
	Week Totals		**246**	**34**	**0**	**34**	**0**	**1**	**1**
Week 26									
	15-Jun	Bella Coola	22	2	0	2	0	0	0
	16-Jun	Bella Coola	21	1	0	1	0	0	0
	17-Jun	Bella Coola	16	1	0	1	0	0	0
	18-Jun	Bella Coola	38	2	0	2	0	0	0
	19-Jun	Bella Coola	36	3	0	3	0	0	0
	20-Jun	Bella Coola	45	3	0	3	0	0	0
	21-Jun	Bella Coola	45	3	0	3	3	0	3
	Week Totals		**223**	**15**	**0**	**15**	**3**	**0**	**3**
Week 26									
	22-Jun	Bella Coola	42	12	0	12	0	0	0
	23-Jun	Bella Coola	33	2	0	2	0	1	1
	24-Jun	Bella Coola	46	8	0	8	1	0	1
	25-Jun	Bella Coola	48	8	0	8	0	0	0
	26-Jun	Bella Coola	41	6	0	6	0	0	0
	27-Jun	Bella Coola	55	7	0	7	0	1	1
	28-Jun	Bella Coola	55	7	0	7	0	0	0
			320	**50**	**0**	**50**	**1**	**2**	**3**
Week 27									
	29-Jun	Bella Coola	73	28	0	28	3	0	3
	30-Jun	Bella Coola	77	23	0	23	1	0	1
	Week Totals		**150**	**51**	**0**	**51**	**4**	**0**	**4**

Appendix C: Table 2. DFO and MELP sport monitoring data 1997.

Week	Date	Location	Number of Anglers	Chinook			Steelhead		
				Kept	Released	Total	Fresh	Kelts	Total
Grand Totals									
		Atnarko	**768**	**93**	**0**	**93**	**12**	**5**	**17**
		Bella Coola	**1403**	**198**	**0**	**198**	**24**	**6**	**30**
		Atnarko/Bella Coola	**2171**	**291**	**0**	**291**	**36**	**11**	**47**

* 16 steelhead were reported being caught during the week ending May 24, but the dates of capture were unknown

** The MELP survey technician commented that the number of steelhead reported to be caught by sport anglers during the week that ended 7 June significantly underestimated the true number of steelhead caught that week in the Atnarko River

Appendix D -- Snorkel and Aerial Surveys 1997-98

Appendix D: Table 1. Snorkel and aerial survey counts of adult steelhead on the Bella Coola and Atnarko rivers, 25 October 1997 to 11 April 1998.

			Steelhead Counts (SS = Snorkel Survey, AS = Aerial Survey) [1,2]																						
Total Km	Location	Local Name	25-Oct-97 SS	3-Nov-97 SS [3]	21-Nov-97 SS	24-Nov-97 AS [4]	26-Nov-97 SS [5]	18-Dec-97 AS [6]	27-Jan-98 AS [7]	4-Feb-98 SS [8]	17-Feb-98 AS [9]	18-Feb-98 SS [10]	25-Feb-98 SS [11]	26-27-Feb SS [12]	3-Mar-98 AS [13]	12-Mar-98 AS [14]	14-Mar-98 SS [15]	15-Mar-98 SS [16]	20-Mar-98 SS [17]	21-Mar-98 AS [18]	22-Mar-98 SS [19]	Max Count	5-Apr-98 SS [20]	7-Apr-98 SS [21]	9-Apr-98 AS [22]	11-Apr-98 SS [23]	Max Count
0-48	Bella	Below Burnt Br.													0	1				0		0					
48-49	Bella	Burnt Bridge				0			0		0					1				0		0			4		4
49-50	Bella	Picnic Hole				0			0		0					0				0		0			0		0
50-51	Bella	Boulder Hole				0			0		0					0				0		0			0		0
51-52	Bella	McCall/CZ Bridge				0			0		0					0				0		0			0		0
52-53	Bella	Log-jam Pool				0		2	0		0					0				0		0			2		2
53-54	Bella	Cry Rock Pool				0			0		0					0				0		0			0		0
54-55	Bella	Above Cry Rock				0			0		0					0				0		0			0		0
55-56	Bella	Steep/L Class.				0			0		0					0				0		0			0		0
56-57	Bella	Classic				0			0		0					0				1		1			0		0
57-58	Bella	above Classic				0			0		0					0				0		0			6		6
58-59	Bella	Grizzly Pool				0			0		0					0				0		0			0		0
59-60	Bella	Slough/Junction				0			0		0					0		0		0		0			0		0
60-61	L.Atnarko	Fisheries Pool & above	0		0	0			0	0	0		0			0		0		0		0			0	0	0
61-62	L.Atnarko	Smokehouse	0		0	0			0	0	0		0			0		0		0		0			3	4	
62-63	L.Atnarko	Corbould's Br.	1		0	0			0	0	0		0			0		0		0		0			4	2	8
63-64	L.Atnarko	Spwn.chan/D.Griz	2		0	0			0	0	0		0			0		1		0		0			0	0	
64-65	L.Atnarko	<Belarko Pool	0		0	0			0	0	0		0			0		0		0		0			0	2	
65-66	L.Atnarko	Zonrette/Right Now				0			0		0		0			0				0		0			0		0
66-67	L.Atnarko	Boar/Elbow Pool				0			0		0		0			0				0		0			0		0
67-68	L.Atnarko	<Boulder Pool				0			0		0		1			1				0		0			0		0
68-69	L.Atnarko	Boul. Pool/Flat R.				0			0		0		0			0				0		0			0		0
69-70	L.Atnarko	Alger Cr/rapids				0			0		0					0				0		0			0		0
70-71	L.Atnarko	rapids																									
71-72	L.Atnarko	rapids																									
72-73	L.Atnarko	rapids																									
73-74	L.Atnarko	rapids																									
74-75	L.Atnarko	chute																									
75-76	L.Atnarko	Mosher Cr/rapids																									
76-77	L.Atnarko	BC Wrights																									
77-78	L.Atnarko	chute																									
78-79	L.Atnarko	Parks Branch																									
79-80	L.Atnarko	chute																									
80-81	L.Atnarko	Cam/Young/rapids																									
81-82	M.Atnarko	rapids																									
82-83	M.Atnarko	Roadside pool				0			0		0	0				0	6		0	0	6	6	12	14	15		15
83-84	M.Atnarko	Pndgett's Pool		3		8	34	8	7		0	0		29	19	3	0		0	0	0	0	0	0	0		0
84-85	M.Atnarko	Goose Hole				0			8		0	0				0	0		0	0	0	0	0	0	0		0
85-86	M.Atnarko	Football/George				7			0		0					0				4	7	7	10	20	0		20
86-87	M.Atnarko	Josephine/Glory				0			0		0					0				0	0	0	0	0	0		0
87-88	M.Atnarko	Birch run/Cherry Run				0			0		0	10				3	13		14	0	15		1	1	0		1
88-89	M.Atnarko	Upper Birch				0			0		0	5				0	3		5	20	2	20	7	10	1		10
89-90	M.Atnarko	Sugar Camp/Steel. hole				0			0		0	12				0	4		4	0		4	5	0	1		5
90-91	M.Atnarko	Line Cabin				0			0		0	0				0				0		0	0	0	0		0
91-92	M.Atnarko	Upper Line																									
92-93	U.Atnarko	Hotnarko																									
93-94	U.Atnarko	Below Goat																									
94-95	U.Atnarko	Goat Cr																									
95-97	U.Atnarko	Stillwater Lake				0					0				0	0				4		4			1		1
97-102	U.Atnarko	Lonesome Lake									0				0					0		0			0		0
102-119	U.Atnarko	Tenas Lake													0												
119-122	U.Atnarko	Rainbow Lake													0												
122-128	U.Atnarko	Elbow Lake													0												
128-140	U.Atnarko	Upper Elbow													0												
Total			3	3	0	15	34	10	15	0	0	27	1	29	19	9	26	1	23	29	30	42	35	45	37	8	72

Appendix D: Table 1. Snorkel and aerial survey counts of adult steelhead on the Bella Coola and Atnarko rivers, 25 October 1997 to 11 April 1998.

(Footnotes)

1 Blank cells indicate areas not surveyed. Dark shaded areas indicate reaches that could not be surveyed due to poor visibility or limited access. Lightly shaded areas indicate reaches where counts were made but visibility was limited for a complete survey; or dates of surveys that were conducted by Snootli Cr. Hatchery.

2 Surveys: 25 Oct (MR,GR); 3, 21, 26 Nov, 18 Dec, 26, 27 Feb, 3 Mar (DFO-Snootli Cr.); 24 Nov (MR,RA), 27 Jan (MR, GR); 4 Feb (GR,CK); 17 Feb (MR,NT,GR); 25 Feb (GR,NT); 12 Mar (RA,NT,GR); 14 Mar (RA,GR,CK); 15 Mar (RA,MR,GR); 20 Mar (RA,GR,KC); 21 Mar (MR,NT,RA); 22 Mar (GR,CK); 5 Apr (GR,MR,CK); 7 Apr (RP,GR,MR); 9 Apr (RP,JL,MR); 11 Apr (MR,CK).

3 Of the three steelhead observed, one was recorded as a radio-tagged fish.

4 Seven active radio-tagged fish were tracked in the Atnarko, but none observed during aerial counts (<Flatrock (2), <Camera (2), Camera (1), Pagetts (1), and Upper Birch (1)). One radio-tagged fish was in the same location of the eight fish counted at Pagetts.

5 Of the 34 steelhead counted, two radio-tagged fish were reported as being observed.

6 Conducted by DFO, no tracking of radio-tagged fish was made. Eight active radio-tagged fish were in counting area but none were reported as observed.

7 Eight radio-tagged fish were in counting area but none observed. They were tracked to Burnt Br (2), below Flatrock (1), between Flatrock and Camera (2), and between Camera and Hotnarko (3).

8 No radio-tagged fish were tracked or observed in counting area.

9 Eight active radio-tagged fish were in counting area but none observed. Seven were tracked to Burnt Br (1), below Classic (1), between Flatrock and Camera (2), and between Camera and Hotnarko (2) and Lonesome Lake (1).

10 Two radio-tagged fish were in counting area but none were observed. One radio-tagged fish was in the location of where 12 steelhead were counted at Steel. Hole, and the other at Roadside Pool where no steelhead were observed. The survey below Goose Hole had limited visibility due to extensive light penetration.

11 Water clarity was good in calm water (6 m) but much poorer in rapids areas (< 1 m); sunny conditions.

12 Conducted by DFO, no tracking of radio-tagged fish was made. Five radio-tagged fish were in counting areas by none were reported as being seen.

13 Conducted by DFO, eight active radio-tagged steelhead were in counting area but none were observed.

14 Seven active radio-tagged fish were in counting area but none observed. Seven were tracked to Burnt Br (1), below Flatrock (1), between Flatrock and Camera (3), and between Camera and Hotnarko (2).

15 Two radio-tagged fish were in counting area but none were observed. One radio-tagged fish was in the location of where 4 steelhead were counted at Steel. Hole, and the other at Pagetts where no steelhead were observed.

16 No radio-tagged fish were tracked or observed in counting area.

17 Two radio-tagged fish were in counting area but none were observed. One radio-tagged fish was in the location of where 4 steelhead were counted at Steel. Hole, and the other at Pagetts where no steelhead were observed.

18 Eight active radio-tagged fish were in counting area but none observed. Three were tracked in the Bella Coola (Burnt Br (1), below Noomst (1), above Classic (1)) and five were tracked in the Atnarko (below BC Wrights (2), pagetts (1), steelhead hole (1) and Lonesome Lake (1)). Two stationary tags were also tracked at Salloomt (mort/reg, tagged in June) and Atnarko campground (regurg.).

19 One radio-tagged fish was in counting area but not observed. No steelhead were observed at the location of the radio-tagged fish (Pagetts).

20 Three radio-tagged fish were in counting area, only one was observed at roadside. All but one (at Pagetts) of the radio-tagged steelhead were in areas that steelhead were counted.

21 Three radio-tagged fish were in counting area, only one was observed at roadside. All but one (at Pagetts) of the radio-tagged steelhead were in areas that steelhead were counted.

22 Eight active radio-tagged fish were in counting area but none observed. Three were tracked in the Bella Coola (below Burnt Br (2), Smokey's Last Run (1)) and five were tracked in the Atnarko (Young Cr. hole (1), roadside (1), pagetts (1), steelhead hole (1) and Lonesome Lake (1)). Two stationary tags were also tracked at Salloomt (mort/reg, tagged in June) and Atnarko campground (regurg.).

23 No radio-tagged fish were tracked or observed in counting area.

Appendix D: Table 2. Snorkel and aerial survey incidental counts of resident rainbow, cutthroat and Dolly Varden trout, 25 October 1997 to 11 April 1998.

Steelhead Counts (SS = Snorkel Survey, AS = Aerial Survey) [1,2]

Total Km	Location	Local Name	25-Oct-97 SS [3]	3-Nov-97 SS	21-Nov-97 SS	24-Nov-97 AS	26-Nov-97 SS	18-Dec-97 AS	27-Jan-98 AS	4-Feb-98 SS	17-Feb-98 AS	18-Feb-98 SS	25-Feb-98 SS [4]	26-27-Feb SS	3-Mar-98 AS	12-Mar-98 AS	14-Mar-98 SS [5]	15-Mar-98 SS	20-Mar-98 SS [6]	21-Mar-98 AS	22-Mar-98 SS [7]	Max Count	5-Apr-98 SS	7-Apr-98 SS	9-Apr-98 AS	11-Apr-98 SS	Max Count
0-48	Bella	Below Burnt Br.													0	105				69		69					
48-49	Bella	Burnt Bridge				0			0		0					6				0		0			0		0
49-50	Bella	Picnic Hole				0			0		0					0				0		0			0		0
50-51	Bella	Boulder Hole				0			0		0					0				0		0			0		0
51-52	Bella	McCall/CZ Bridge				0			0		0					0				20		20			0		0
52-53	Bella	Log-jam Pool				0		na	0		0				na	0				0		0			0		0
53-54	Bella	Cry Rock Pool				0			0		0					0				0		0			0		0
54-55	Bella	Above Cry Rock				0			12		0					0				0		0			0		0
55-56	Bella	Steep/L Class.				0			0		0					30				23		23			0		0
56-57	Bella	Classic				0			0		0					60				20		20			0		0
57-58	Bella	above Classic				0			0		0					0				10		10			0		0
58-59	Bella	Grizzly Pool				0			0		0					0				0		0			0		0
59-60	Bella	Slough/Junction				0			0		0					0		0		0		0			0		0
60-61	L.Atnarko	Fisheries Pool & above				0			0	0	0		0			0		0		0		0			20		20
61-62	L.Atnarko	Smokehouse				0			0	0	0		0			0		0		0		0			0		0
62-63	L.Atnarko	Corbould's Br.	80		na	0			0	0	0		0			7		0		0		0			0	na	0
63-64	L.Atnarko	Spwn.chan/D.Griz				0			0	0	0		0			0		0		0		0			0		0
64-65	L.Atnarko	<Belarko Pool				0			0	0	0		3			0		0		0		0			0		0
65-66	L.Atnarko	Zonrette/Right Now				0			0		0		0			0				0		0			0		0
66-67	L.Atnarko	Boar/Elbow Pool				0			0		0		3			0				0		0			0		0
67-68	L.Atnarko	<Boulder Pool				0			0		0		0			0				0		0			0		0
68-69	L.Atnarko	Boul. Pool/Flat R.				0			0		0		0			0				0		0			0		0
69-70	L.Atnarko	Alger Cr/rapids				0			0		0					0				0		0			0		0
70-71	L.Atnarko	rapids																									
71-72	L.Atnarko	rapids																									
72-73	L.Atnarko	rapids																									
73-74	L.Atnarko	rapids																									
74-75	L.Atnarko	chute																									
75-76	L.Atnarko	Mosher Cr/rapids																									
76-77	L.Atnarko	BC Wrights																									
77-78	L.Atnarko	chute																									
78-79	L.Atnarko	Parks Branch																									
79-80	L.Atnarko	chute																									
80-81	L.Atnarko	Cam/Young/rapids																									
81-82	M.Atnarko	rapids																									
82-83	M.Atnarko	Roadside pool				0			0		0	0				0	13		0	0	30	30	100		0		100
83-84	M.Atnarko	Padgett's Pool		na		0	na	na	20		0	0		na	na	3	0		0	0	0	0	1		0		1
84-85	M.Atnarko	Goose Hole				0			0		0	0				0	0		0	0	0	0	2		0		2
85-86	M.Atnarko	Football/George				0			1		0					0				12	6	12	155		0		155
86-87	M.Atnarko	Josephine/Glory				0			0		0					0				0	2	0	0	na	0		0
87-88	M.Atnarko	Birch run/Cherry Run				0			0		0	15				0	15		35	0	5	35	1		0		1
88-89	M.Atnarko	Upper Birch				0			0		0	60				0	10		0	0	15	53	53		0		53
89-90	M.Atnarko	Sugar Camp/Steel. hole				0			0		0	18				0	6		7	0		7	4		0		4
90-91	M.Atnarko	Line Cabin				0			0		0	3				0			1	0		1	0		0		0
91-92	M.Atnarko	Upper Line																									
92-93	U.Atnarko	Hotnarko																									
93-94	U.Atnarko	Below Goat																									
94-95	U.Atnarko	Goat Cr																									
95-97	U.Atnarko	Stillwater Lake				0					0				0	0				44		44			0		0
97-102	U.Atnarko	Lonesome Lake									0				0					0		0			0		0
102-119	U.Atnarko	Tenas Lake													0												
119-122	U.Atnarko	Rainbow Lake													0												
122-128	U.Atnarko	Elbow Lake													0												
128-140	U.Atnarko	Upper Elbow													0												
Total			80	0	0	0	0	0	33	0	0	96	6	0	0	211	44	0	43	198	58	271	316	0	20	0	336

Appendix D: Table 2. Snorkel and aerial survey incidental counts of resident rainbow, cutthroat and Dolly Varden trout, 25 October 1997 to 11 April 1998.

(Footnotes)

1 Blank cells indicate areas not surveyed. Dark shaded areas indicate reaches that could not be surveyed due to poor visibility or limited access.
Lightly shaded areas indicate reaches where counts were made but visibility was limited for a complete survey; or dates of surveys that were conducted by Snootli Cr. Hatchery.

2 Surveys: 25 Oct (MR,GR); 3, 21, 26 Nov, 18 Dec, 26, 27 Feb, 3 Mar (DFO-Snootli Cr.); 24 Nov (MR,RA), 27 Jan (MR, GR); 4 Feb (GR,CK); 17 Feb (MR,NT,GR); 25 Feb (GR,NT);
12 Mar (RA,NT,GR); 14 Mar (RA,GR,CK); 15 Mar (RA,MR,GR); 20 Mar (RA,GR,KC); 21 Mar (MR,NT,RA); 22 Mar (GR,CK); 5 Apr (GR,MR,CK); 7 Apr (RP,GR,MR); 9 Apr (RP,JL,MR); 11 Apr (MR,CK).

3 25 October - observers estimated that 40 were cutthroat and 40 were dolly varden.

4 25 February - 3 cutthroat in Belarko Pool, 3 rainbow trout in Boar/Elbow Pool

5 14 March - 3 cutthroat in Roadside Pool and the rest were rainbow trout.

6 20 March - 1 dolly varden at Line Cabin and the rest were rainbow trout.

7 22 March - 6 cutthroat in Football Jam and the rest were rainbow trout.

Appendix E --Radio Telemetry - Fall 1997 and Spring 1998

Appendix E: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 27 October 1997 to 25 May 1998. Catch-per-unit-effort (number/rod-h) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
27-Oct	Middle Atnark	Atnarko Parks	Shore	2	14:00	15:00	1:00	1.0	2.0	1	0.50
27-Oct	Middle Atnark	BC Wrights	Shore	2	15:30	16:30	1:00	1.0	2.0	1	0.50
29-Oct	Lower Atnarko	Belarko	Shore	2	11:00	11:10	0:10	0.2	0.3	0	0.00
29-Oct	Lower Atnarko	Dead Grizzley	Shore	2	11:15	12:00	0:45	0.8	1.5	0	0.00
29-Oct	Lower Atnarko	Corboulds	Shore	2	12:05	14:00	1:55	1.9	3.8	0	0.00
29-Oct	Lower Atnarko	Rope Swing	Shore	2	14:15	14:27	0:12	0.2	0.4	0	0.00
29-Oct	Lower Atnarko	Elbow	Shore	2	14:35	14:51	0:16	0.3	0.5	0	0.00
31-Oct	Middle Atnark	Atnarko Parks	Shore	2	11:15	11:35	0:20	0.3	0.7	0	0.00
31-Oct	Middle Atnark	<Atnarko Parks	Shore	2	11:45	13:45	2:00	2.0	4.0	1	0.25
31-Oct	Middle Atnark	BC Wrights	Shore	2	14:10	15:20	1:10	1.2	2.3	3	1.29
06-Nov	Middle Atnark	BC Wrights	Shore	2	11:00	11:45	0:45	0.8	1.5	0	0.00
06-Nov	Middle Atnark	Flatrock	Shore	2	15:00	16:00	1:00	1.0	2.0	0	0.00
08-Nov	Lower Atnarko	Boat Launch	Shore	2	10:30	11:15	0:45	0.8	1.5	0	0.00
08-Nov	Lower Atnarko	Dead Grizzley	Shore	2	11:20	12:00	0:40	0.7	1.3	0	0.00
08-Nov	Lower Atnarko	Spawning chan.	Shore	2	12:05	12:25	0:20	0.3	0.7	0	0.00
08-Nov	Lower Atnarko	Spawning chan.out	Shore	2	12:28	13:00	0:32	0.5	1.1	0	0.00
08-Nov	Lower Atnarko	>Corboulds	Shore	2	13:05	13:20	0:15	0.2	0.5	0	0.00
08-Nov	Lower Atnarko	Corboulds	Shore	2	13:25	13:30	0:05	0.1	0.2	0	0.00
11-Nov	Middle Atnark	BC Wrights	Shore	1	14:26	14:53	0:27	0.5	0.5	0	0.00
14-Nov	Middle Atnark	BC Wrights	Shore	1	16:45	17:00	0:15	0.3	0.3	0	0.00
15-Nov	Middle Atnark	BC Wrights	Shore	2	12:00	12:40	0:40	0.7	1.3	0	0.00
15-Nov	Middle Bella	Canoe Crossing	Shore	1	15:00	15:22	0:22	0.4	0.4	0	0.00
15-Nov	Middle Bella	Canoe Crossing	Shore	2	15:22	16:00	0:38	0.6	1.3	0	0.00
17-Nov	Middle Atnark	BC Wrights	Shore	2	10:33	11:15	0:42	0.7	1.4	0	0.00
17-Nov	Lower Atnarko	Boat Launch	Shore	2	11:50	11:58	0:08	0.1	0.3	0	0.00
17-Nov	Lower Atnarko	Corboulds	Shore	2	12:15	13:15	1:00	1.0	2.0	0	0.00
17-Nov	Lower Atnarko	Confluence	Shore	2	13:55	16:00	2:05	2.1	4.2	0	0.00
19-Nov	Upper Bella	Burnt Br.	Shore	2	10:33	12:00	1:27	1.5	2.9	0	0.00
19-Nov	Upper Bella	Boulder Run	Shore	2	13:00	13:30	0:30	0.5	1.0	0	0.00
19-Nov	Upper Bella	Canoe Crossing	Shore	2	14:00	14:40	0:40	0.7	1.3	0	0.00
19-Nov	Middle Atnark	BC Wrights	Shore	2	12:35	13:10	0:35	0.6	1.2	0	0.00
19-Nov	Middle Atnark	Atnarko Parks	Shore	1	13:44	13:47	0:03	0.0	0.0	0	0.00
19-Nov	Lower Atnarko	Corboulds	Shore	2	15:02	15:17	0:15	0.2	0.5	1	2.00
20-Nov	Middle Bella	Noosgulch	Drift	2	10:10	10:23	0:13	0.2	0.4	0	0.00
20-Nov	Middle Bella	Noosgulch	Drift	2	10:25	10:40	0:15	0.3	0.5	0	0.00
20-Nov	Middle Bella	Big Cr.	Drift	3	11:00	11:10	0:10	0.2	0.5	0	0.00
20-Nov	Middle Bella	Glacier View	Drift	2	11:30	12:15	0:45	0.7	1.5	0	0.00
20-Nov	Middle Bella	Sheltons	Drift	2	12:25	12:32	0:07	0.1	0.2	0	0.00
20-Nov	Middle Bella	J. Meechams	Drift	2	12:45	13:00	0:15	0.2	0.5	0	0.00
20-Nov	Middle Bella	A. Meechams	Drift	3	13:15	13:30	0:15	0.2	0.7	0	0.00
20-Nov	Middle Bella	Mitz Hole	Drift	2	13:45	14:00	0:15	0.3	0.5	0	0.00
20-Nov	Middle Bella	7 Alders	Drift	3	14:00	15:00	1:00	1.0	3.0	0	0.00
20-Nov	Middle Bella	Ace in the Hole	Drift	3	15:01	15:15	0:14	0.2	0.7	0	0.00
20-Nov	Middle Bella	Below Ace	Drift	2	15:30	16:00	0:30	0.5	1.0	0	0.00
27-Nov	Lower Bella	<Bailey Br	Shore	2	14:00	14:30	0:30	0.5	1.0	0	0.00
27-Nov	Lower Bella	Bailey Br	Shore	2	14:30	15:00	0:30	0.5	1.0	0	0.00
07-Dec	Lower Atnarko	Lower Fisheries Pool	Shore	2	9:30	9:45	0:15	0.3	0.5	0	0.00
07-Dec	Lower Atnarko	Upper Confluence	Shore	2	9:50	10:05	0:15	0.2	0.5	0	0.00
07-Dec	Lower Atnarko	Confluence	Shore	2	10:15	10:30	0:15	0.3	0.5	1	2.00
07-Dec	Lower Atnarko	Lower Confluence	Shore	2	10:30	10:45	0:15	0.3	0.5	0	0.00
07-Dec	Upper Bella	Grizzly	Shore	2	11:00	11:45	0:45	0.8	1.5	0	0.00
07-Dec	Upper Bella	Lower Grizzly	Shore	2	12:00	12:15	0:15	0.2	0.5	0	0.00
07-Dec	Upper Bella	unknown	Shore	2	12:30	13:15	0:45	0.8	1.5	0	0.00
07-Dec	Upper Bella	Classic	Shore	2	14:00	15:30	1:30	1.5	3.0	0	0.00
10-Dec	Middle Atnark	<Camera	Shore	2	10:30	12:10	1:40	1.7	3.3	0	0.00

Appendix E: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 27 October 1997 to 25 May 1998. Catch-per-unit-effort (number/rod-h) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
10-Dec	Middle Atnark	<Camera	Shore	2	12:30	12:45	0:15	0.2	0.5	0	0.00
10-Dec	Middle Atnark	BC Wrights	Shore	2	13:25	14:00	0:35	0.6	1.2	0	0.00
10-Dec	Middle Atnark	Boulder Run	Shore	2	14:40	15:05	0:25	0.4	0.8	0	0.00
17-Dec	Lower Atnarko	Boat Launch	Shore	2	10:00	15:00	5:00	5.0	10.0	0	0.00
29-Dec	Lower Atnarko	Boat Launch	Shore	2	10:30	11:10	0:40	0.7	1.3	0	0.00
29-Dec	Lower Atnarko	Dead Grizzley	Shore	2	11:20	11:45	0:25	0.4	0.8	0	0.00
29-Dec	Lower Atnarko	Dead Grizzley	Drift	2	11:50	12:40	0:50	0.8	1.7	0	0.00
29-Dec	Lower Atnarko	Corboulds	Shore	2	12:45	13:50	1:05	1.1	2.2	0	0.00
29-Dec	Lower Atnarko	Smokehouse	Shore	2	14:05	14:23	0:18	0.3	0.6	0	0.00
31-Dec	Middle Atnark	BC Wrights	Shore	2	11:00	11:27	0:27	0.5	0.9	0	0.00
31-Dec	Lower Atnarko	Atnarko jct	Shore	2	12:15	13:10	0:55	0.9	1.8	0	0.00
19-Jan	Upper Bella	BC Bridge	Shore	2	9:00	9:30	0:30	0.5	1.0	0	0.00
19-Jan	Middle Bella	Noosgulch	Shore	2	9:45	10:00	0:15	0.3	0.5	0	0.00
19-Jan	Middle Bella	Big Cr.	Shore	2	10:15	10:30	0:15	0.3	0.5	0	0.00
19-Jan	Middle Bella	Robin's Nest	Shore	2	10:45	11:05	0:20	0.3	0.7	0	0.00
19-Jan	Middle Bella	Sheltons	Shore	2	11:30	12:00	0:30	0.5	1.0	0	0.00
19-Jan	Middle Bella	<Sheltons	Shore	2	12:15	13:00	0:45	0.8	1.5	0	0.00
19-Jan	Middle Bella	Ace in the Hole	Shore	2	13:15	14:00	0:45	0.8	1.5	0	0.00
19-Jan	Middle Bella	Above Nusatsum	Shore	2	14:30	15:30	1:00	1.0	2.0	0	0.00
19-Jan	Middle Bella	Nusatsum	Shore	2	16:00	16:30	0:30	0.5	1.0	0	0.00
21-Jan	Lower Atnarko	Fisheries Pool	Shore	2	9:55	16:45	6:50	6.8	13.7	0	0.00
25-Jan	Middle Bella	Noosgulch	Shore	2	8:30	13:30	5:00	5.0	10.0	0	0.00
30-Jan	Lower Bella	Bailey Bridge	Shore	2	10:00	13:30	3:30	3.5	7.0	0	0.00
30-Jan	Upper Bella	Picnic	Shore	2	10:48	11:30	0:42	0.7	1.4	0	0.00
30-Jan	Upper Bella	Noomst	Shore	2	12:10	12:15	0:05	0.1	0.2	0	0.00
30-Jan	Upper Bella	Burnt Br.	Shore	2	12:17	13:12	0:55	0.9	1.8	0	0.00
30-Jan	Upper Bella	Above Firvale	Shore	2	14:08	14:43	0:35	0.6	1.2	0	0.00
30-Jan	Upper Bella	Firvale	Shore	2	15:07	15:40	0:33	0.6	1.1	0	0.00
03-Feb	Lower Atnarko	Belarko	Drift	2	10:25	11:15	0:50	0.8	1.7	0	0.00
03-Feb	Lower Atnarko	Dead Grizzley	Drift	2	11:24	12:00	0:36	0.6	1.2	0	0.00
03-Feb	Lower Atnarko	Wagon Wheel	Drift	2	12:15	13:30	1:15	1.3	2.5	0	0.00
03-Feb	Lower Atnarko	Corboulds	Drift	2	13:00	13:50	0:50	0.8	1.7	0	0.00
03-Feb	Lower Atnarko	Above Corboulds	Drift	2	13:50	14:01	0:11	0.2	0.4	0	0.00
03-Feb	Lower Atnarko	Swimming hole	Drift	2	14:05	14:54	0:49	0.8	1.6	0	0.00
03-Feb	Lower Atnarko	Elbow	Drift	2	15:00	15:17	0:17	0.3	0.6	0	0.00
03-Feb	Lower Atnarko	Fisheries Pool	Drift	2	15:30	16:00	0:30	0.5	1.0	0	0.00
03-Feb	Upper Bella	Cement Bar	Drift	2	9:10	10:40	1:30	1.5	3.0	0	0.00
03-Feb	Middle Bella	Robin's Nest	Drift	2	11:15	11:30	0:15	0.3	0.5	0	0.00
03-Feb	Middle Bella	Above Robins Nest	Drift	2	11:43	12:05	0:22	0.4	0.7	0	0.00
03-Feb	Middle Bella	Jimmy Mech.	Drift	2	12:30	14:05	1:35	1.6	3.2	0	0.00
03-Feb	Middle Bella	Fish Trap	Drift	2	14:08	14:20	0:12	0.2	0.4	0	0.00
03-Feb	Middle Bella	7 Alders	Drift	2	14:25	15:10	0:45	0.8	1.5	0	0.00
03-Feb	Middle Bella	Ace in the Hole	Drift	2	15:15	15:45	0:30	0.5	1.0	0	0.00
03-Feb	Middle Bella	Nusatsum	Drift	2	16:00	17:00	1:00	1.0	2.0	0	0.00
04-Feb	Lower Bella	Bailey Br.	Drift	2	8:55	9:35	0:40	0.7	1.3	0	0.00
04-Feb	Lower Bella	<Bailey Br.	Drift	2	9:40	10:05	0:25	0.4	0.8	0	0.00
04-Feb	Lower Bella	Jungle Hole	Drift	2	10:12	11:00	0:48	0.8	1.6	0	0.00
04-Feb	Lower Bella	Ruby Run	Drift	2	11:13	12:10	0:57	0.9	1.9	0	0.00
04-Feb	Lower Bella	Otter Run	Drift	2	12:15	12:55	0:40	0.7	1.3	0	0.00
04-Feb	Lower Bella	BC Tel Run	Drift	2	13:47	14:15	0:28	0.5	0.9	0	0.00
04-Feb	Lower Bella	Airport	Drift	2	14:55	15:50	0:55	0.9	1.8	0	0.00
04-Feb	Lower Bella	Walker Island	Drift	2	15:50	16:45	0:55	0.9	1.8	0	0.00
05-Feb	Middle Atnark	<Camera	Shore	2	10:20	10:40	0:20	0.3	0.7	0	0.00
05-Feb	Middle Atnark	Atnarko CMGD	Shore	2	11:00	11:07	0:07	0.1	0.2	0	0.00
05-Feb	Middle Atnark	BC Wrights	Shore	2	11:20	11:30	0:10	0.2	0.3	0	0.00

Appendix E: Table 1. Fishing effort and numbers of steelhead caught by angling on the Bella Coola River, 27 October 1997 to 25 May 1998. Catch-per-unit-effort (number/rod-h) is also shown.

Date	Location	Name	Type	Rods	Stime	Etime	Hr:Min	Fished (h)	Teffort	Steel	CPUE
05-Feb	Middle Atnark	<BC Wrights	Shore	2	11:40	11:50	0:10	0.2	0.3	0	0.00
05-Feb	Lower Atnarko	Atnarko jct	Shore	2	12:35	12:50	0:15	0.2	0.5	0	0.00
05-Feb	Lower Atnarko	Atnarko jct (upper)	Shore	2	13:05	13:15	0:10	0.2	0.3	0	0.00
05-Feb	Lower Atnarko	Fisheries Pool	Shore	2	13:20	13:28	0:08	0.1	0.3	0	0.00
05-Feb	Middle Bella	Firvale Pool	Shore	2	14:10	14:40	0:30	0.5	1.0	0	0.00
06-Feb	Upper Bella	McCall Falls	Drift	2	9:08	9:22	0:14	0.2	0.5	0	0.00
06-Feb	Upper Bella	McCall Picnic	Drift	2	9:22	10:05	0:43	0.7	1.4	0	0.00
06-Feb	Upper Bella	Picnic	Drift	2	10:05	10:30	0:25	0.4	0.8	0	0.00
06-Feb	Upper Bella	Grizzly	Drift	2	10:30	11:05	0:35	0.6	1.2	0	0.00
06-Feb	Upper Bella	Boulder Run	Drift	2	11:05	11:53	0:48	0.8	1.6	0	0.00
06-Feb	Upper Bella	Burnt Br.	Drift	2	11:53	13:05	1:12	1.2	2.4	0	0.00
06-Feb	Upper Bella	Burnt Br. To Fivale	Drift	1	13:05	14:55	1:50	1.8	1.8	0	0.00
06-Feb	Upper Bella	Firvale Pool	Drift	2	14:55	15:15	0:20	0.3	0.7	0	0.00
06-Feb	Upper Bella	Firvale Pool - Canoe	Drift	2	15:15	16:40	1:25	1.4	2.8	0	0.00
07-Feb	Lower Atnarko	Atnarko Pool	Drift	2	10:10	10:30	0:20	0.3	0.7	0	0.00
07-Feb	Lower Atnarko	Atnarko jct	Drift	2	10:40	11:05	0:25	0.4	0.8	0	0.00
07-Feb	Upper Bella	Grizzly	Drift	2	11:15	13:20	2:05	2.1	4.2	0	0.00
07-Feb	Upper Bella	Pool Below Grizzly	Drift	2	13:25	14:10	0:45	0.8	1.5	0	0.00
07-Feb	Upper Bella	ool below Below Grizz	Drift	2	14:18	14:45	0:27	0.5	0.9	0	0.00
07-Feb	Upper Bella	Classic	Drift	2	15:30	16:45	1:15	1.3	2.5	0	0.00
10-Feb	Lower Bella	<Bailey Br.	Drift	2	10:05	10:30	0:25	0.4	0.8	0	0.00
10-Feb	Lower Bella	Jungle Hole	Drift	2	10:15	11:20	1:05	1.1	2.2	0	0.00
10-Feb	Lower Bella	Ruby Run	Drift	2	11:35	12:40	1:05	1.1	2.2	0	0.00
10-Feb	Lower Bella	Otter Run	Drift	2	12:48	13:22	0:34	0.6	1.1	0	0.00
10-Feb	Lower Bella	BC Tel Run	Drift	2	14:00	15:00	1:00	1.0	2.0	0	0.00
10-Feb	Lower Bella	Mill Streach	Drift	2	15:00	15:15	0:15	0.2	0.5	0	0.00
10-Feb	Lower Bella	BC Tel Run	Drift	2	15:30	15:45	0:15	0.2	0.5	0	0.00
10-Feb	Lower Bella	Airport	Drift	2	16:00	16:30	0:30	0.5	1.0	0	0.00
10-Feb	Lower Bella	Below Airport	Drift	2	16:45	16:50	0:05	0.1	0.2	0	0.00
11-Feb	Middle Bella	BC Bridge	Drift	2	8:45	8:50	0:05	0.1	0.2	0	0.00
11-Feb	Middle Bella	Noosgulch	Drift	2	8:53	9:21	0:28	0.5	0.9	0	0.00
11-Feb	Middle Bella	Big Cr.	Drift	2	9:32	10:01	0:29	0.5	1.0	0	0.00
11-Feb	Middle Bella	Robin's Nest	Drift	2	10:10	10:35	0:25	0.4	0.8	0	0.00
11-Feb	Middle Bella	Sheltons	Drift	2	10:40	11:40	1:00	1.0	2.0	0	0.00
11-Feb	Middle Bella	Jimmy Mech.	Drift	2	12:00	12:45	0:45	0.8	1.5	0	0.00
11-Feb	Middle Bella	Albert Meecham	Drift	2	1:00	1:17	0:17	0.3	0.6	0	0.00
11-Feb	Middle Bella	Mitz Hole	Drift	2	13:40	14:00	0:20	0.3	0.7	0	0.00
11-Feb	Middle Bella	7 Alders	Drift	2	14:10	15:10	1:00	1.0	2.0	0	0.00
11-Feb	Middle Bella	Ace in the Hole	Drift	2	15:15	15:30	0:15	0.3	0.5	0	0.00
11-Feb	Middle Bella	Lower Boulder	Drift	1	16:10	16:30	0:20	0.3	0.3	0	0.00
28-Apr	Upper Bella	Boat Launch	Drift	2	10:30	16:50	6:20	6.3	12.7	0	0.00
28-Apr	Upper Bella	Cement Bridge	Drift	2	8:20	17:07	8:47	8.8	17.6	1	0.06
25-May	Middle Atnark	Atnarko CMGD	Shore	3	9:25	16:00	6:35	6.6	19.8	1	0.05
Total				**305**			**12:00**	**132.0**	**269.0**	**10**	**0.04**

Location: Lower=mouth to Salloomt (0-20 km), Middle=Salloomt to Noosgulch (20-40 km), Upper=Noosgulch to Atnarko-Talchako junction (40-60 km)

Appendix E: Table 2. Information regarding steelhead and rainbow that were radio-tagged on the Bella Coola/Atnarko River as part of the 1997-98 radio-tagging program.

Anchor tag no.		Radio tag		Nose-fork			Tagging		Release	Scale		Vial	Scar	Health
First	Second	Ch [a]	Code	Size	Sex	Method	Date	Location	Time	Book	No.	no.	code [c]	code [d]
Steelhead														
71535	71536	11	71	85.0	F	Angle	04-Jun-97	Bailey Bridge	17:05	47019	10-50	42	NA	3
71509	71510	9	65	63.0	M	Angle	09-Jun-97	Walkers Island	18:45	47030	10-50	45	F	1
71515	71516	9	60	79.0	M	Angle	27-Oct-97	Atnarko Parks	14:54	47018	10-50	50	F	1
71517	71518	25	74	67.0	F	Angle	27-Oct-97	BC Wrights	15:49	47018	9-49	39	F	1
71519	71520	9	59	74.0	M	Angle	31-Oct-97	Atnarko Parks	11:52	47018	8-48	51	F	3
71523	71522	11	69	77.0	F	Angle	31-Oct-97	BC Wrights	14:17	47018	7-37	57	F	1
71524	71525	11	52	80.0	F	Angle	31-Oct-97	BC Wrights	14:24	47018	6-46	53	F	1
71621	71624	11	74	57.0	M	Angle	31-Oct-97	BC Wrights	14:33	47018	5-55	54	F	1
71626	61627	25	58	67.0	M	Angle	19-Nov-97	Atnarko Parks	13:50	47031	10-50	56	F	1
70051	70052	11	62	55.0	F	Angle	07-Dec-97	Atnarko/Bella jct	11:14	47031	9-49	100	F	3
70046	70047	9	74	70.0	F	Angle	28-Apr-98	Noosgulch jct	10:19	NA	NA	19	F	1
70049	70050	25	59	80.0	M	Angle	25-May-98	BC Wrights	11:14	NA	NA	100	F	3
Rainbow [b]														
NA	NA	21	37	50.0	M	Angle	19-Mar-98	Atnarko (Birch Run)	12:52	47032	10-50	1	F	1
NA	NA	20	35	41.0	F	Angle	19-Mar-98	Atnarko (Birch Run)	14:00	47032	9-49	2	F	1
NA	NA	24	86	43.0	F	Angle	19-Mar-98	Atnarko (Birch Run)	14:00	47032	8-48	3	F	1
NA	NA	23	56	47.0	F	Angle	19-Mar-98	Atnarko (Birch Run)	15:00	47032	7-47	4	F	1
NA	NA	16	59	40.0	F	Angle	19-Mar-98	Atnarko (Birch Run)	15:15	47032	6-46		F	1
NA	NA	14	42	40.5	F	Angle	22-Mar-98	Atnarko (Football jam)	13:45	47032	5-35	6	F	1
NA	NA	21	53	40.5	F	Angle	22-Mar-98	Atnarko (Football jam)	14:34	47032	4-44	7	F	1
NA	NA	21	35	55.0	F	Angle	22-Mar-98	Atnarko (Football jam)	15:25	47032	3-43	8	F	1
NA	NA	20	21	51.0	F	Angle	22-Mar-98	Atnarko (Football jam)	15:40	47032	2-42	9	F	1

Appendix E: Table 2. Information regarding steelhead and rainbow that were radio-tagged on the Bella Coola/Atnarko River as part of the 1997-98 radio-tagging program.

Anchor tag no.		Radio tag		Nose-fork			Tagging		Release	Scale		Vial	Scar	Health
First	Second	Ch [a]	Code	Size	Sex	Method	Date	Location	Time	Book	No.	no.	code [c]	code [d]
NA	NA	22	43	37.0	M	Angle	22-Mar-98	Atnarko (Football jam)	15:55	47032	1-41	10	F	1
NA	NA	13	35	45.0	M	Angle	22-Mar-98	Atnarko (Football jam)	17:44	47033	10-50	11	F	1
NA	NA	16	79	44.5	M	Angle	01-Apr-98	Atnarko (Birch Run)	12:29	47033	9-49	72	F	1

[a] Frequencies (MHz) used: Channels 9=149.480, 11=149.520, and 25=149.800 for steelhead; 13=149.560, 14=149.580, 16=149.620, 20=149.700, 21=149.720, 22=149.740, 23=148.760, and 24=148.750 for rainbow trout.

[b] Not available or not applicable.

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

[d] Health code: 1=excellent (no scale loss/extremely vigourous), 2=good (some scale loss/vigourous), 3=fair (mod. scale loss/sluggish), and 4=poor (heavy scale loss/lethargic).

Appendix E: Table 3. Furthest upstream detection locations and GPS coordinates for steelhead radio tagged on the Bella Coola and Atnarko rivers between 1 June 1997 and 25 May 1998.

Fish	Radio tag		Tagging		Furthest Upstream or Spawning Location		Upstream GPS			
No.	han.	Code	Date	Location	Date	Location	Latitude		Longitude	
Steelhead (unknown run timing group)										
25	11	71	04-Jun	Bailey Bridge	21-Jun	Bella Coola (Salloomt)	52	23.7720	126	32.3100
Steelhead (Summer/fall run timing group)										
26	9	65	09-Jun	Walkers Island	30-Jul	Atnarko (Birch Run)	52	22.6620	125	48.4020
27	9	60	27-Oct	Atnarko Parks	09-Jun	Atnarko (BC Wrights)	52	24.3180	125	54.5520
28	25	74	27-Oct	BC Wrights	08-May	Atnarko (BC Wrights)	52	24.2520	125	54.9120
29	9	59	31-Oct	Atnarko Parks	22-Dec	Atnarko (Camera Channel)	52	24.4020	125	53.5620
30	11	69	31-Oct	BC Wrights	14-Nov	Atnarko (Goose Hole)	52	24.1980	125	51.7920
31	11	52	31-Oct	BC Wrights	17-Feb	Bella Coola (below Atnarko)*	52	23.4000	126	6.9000
32	11	74	31-Oct	BC Wrights	08-May	Atnarko (above Lonesome Lake)	52	10.6380	125	40.9020
33	25	58	19-Nov	Atnarko Parks	22-May	Hotnarko	52	21.7980	125	46.4820
34	11	62	07-Dec	Atnarko/Bella jct	08-May	Burnt Bridge*	52	28.1520	126	10.2480
Steelhead (Spring 1998 run timing group)										
47	9	74	28-Apr	Noosgulch jct	29-May	Atnarko (Hotnarko Junction)	52	21.7080	125	47.3400
48	25	59	25-May	BC Wrights	30-May	Bella Coola (below Atnarko)*	52	21.6000	126	3.0000

* likely spawning location, not the furthest upstream detection.

Appendix E: Table 4. Furthest upstream detection and last detection locations for steelhead and rainbow trout radio tagged on the Bella Coola and Atnarko rivers between 1 June 1997 and 25 May 1998.

	Radio tag		Tagging		Furthest Upstream or Spawning Location		Last Detection	
No.	Chan.	Code	Date	Location	Date	Location	Date	
Steelhead (unknown run timing group)								
25	11	71	4-Jun	Bailey Bridge	21-Jun	Bella Coola (above Burnt Bridge)	12-Mar-98	Below Salloomt
Steelhead (Summer/fall run timing group)								
26	9	65	9-Jun	Walkers Island	30-Jul	Atnarko (Birch Run)	13-Jul-98	Atnarko (Birch Run)
27	9	60	27-Oct	Atnarko Parks	9-Jun	Atnarko (BC Wrights)	10-Jul-98	Atnarko (BC Wrights)
28	25	74	27-Oct	BC Wrights	8-May	Atnarko (BC Wrights)	20-Jun-98	Lower Walker (F05)
29	9	59	31-Oct	Atnarko Parks	22-Dec	Atnarko (Camera Channel)	11-Jul-98	Below Camera Ch.
30	11	69	31-Oct	BC Wrights	14-Nov	Atnarko (Goose Hole)	22-Jun-98	Atnarko (Goose Hole)
31	11	52	31-Oct	BC Wrights	17-Feb	Bella Coola (below Atnarko)*	13-Jul-98	Bella Coola (below Atnarko)
32	11	74	31-Oct	BC Wrights	8-May	Atnarko (above Lonesome Lake)	7-Jun-98	Lower Walker (F05)
33	25	58	19-Nov	Atnarko Parks	22-May	Hotnarko	5-Jul-98	Bella Coola (below Atnarko)
34	11	62	7-Dec	Atnarko/Bella jct	8-May	Burnt Bridge*	15-Jun-98	Lower Walker (F05)
Steelhead (Spring 1998 run timing group)								
47	9	74	28-Apr	Noosgulch jct	29-May	Atnarko (Hotnarko Junction)	13-Jul-98	Upper Atnarko
48	25	59	25-May	BC Wrights	30-May	Bella Coola (below Atnarko)*	5-Jul-98	Bella Coola (below Atnarko)
Rainbow Trout								
35	21	37	19-Mar	Atnarko (Birch Run)	19-Mar	Atnarko (Birch Run)	13-Jul-98	Atnarko (Football jam)
36	20	35	19-Mar	Atnarko (Birch Run)	19-Mar	Atnarko (Birch Run)	13-Jul-98	Atnarko (Birch Run)
37	24	86	19-Mar	Atnarko (Birch Run)	19-Mar	Atnarko (Birch Run)	13-Jul-98	Atnarko (Birch Run)
38	23	56	19-Mar	Atnarko (Birch Run)	8-May	Atnarko (Sugar Camp)	13-Jul-98	Atnarko (Sugar Camp)
39	16	59	19-Mar	Atnarko (Birch Run)	9-Apr	Atnarko (Upper Birch)	13-Jul-98	Atnarko (Upper Birch)
40	14	42	22-Mar	Atnarko (Football jam)	26-May	Atnarko (Josephine)	13-Jul-98	Atnarko (Josephine)
41	21	53	22-Mar	Atnarko (Football jam)	22-Apr	Atnarko (Josephine)	13-Jul-98	Atnarko (Josephine)
42	21	35	22-Mar	Atnarko (Football jam)	22-Mar	Atnarko (Football jam)	13-Jul-98	Atnarko (Football jam)
43	20	21	22-Mar	Atnarko (Football jam)	22-Mar	Atnarko (Football jam)	13-Jul-98	Atnarko (Parks Branch)
44	22	43	22-Mar	Atnarko (Football jam)	22-Mar	Atnarko (Football jam)	13-Jul-98	Atnarko (Parks Branch)
45	13	35	22-Mar	Atnarko (Roadside Pool)	26-May	Atnarko (Josephine)	26-May-98	Atnarko (Josephine)
46	16	79	1-Apr	Atnarko (Birch Run)	1-Apr	Atnarko (Birch Run)	13-Jul-98	Atnarko (Birch Run)

* likely spawning location, not the furthest upstream detection.

Appendix F - Catch Monitoring 1998

Appendix F: Table 1. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola / Atnarko watershed, 3 May - 23 July 1998.

Date	No. of Drifts				Chinook			Steelhead			Sock.	Coho	Pink	Chum
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Rlsd.	Mks				
Week 19														
03-May	0	6	0	6	4	0		5	0					
04-May	0	12	0	12	10	0		0	0					
05-May	0	8	0	8	3	0		0	2					
06-May	0	11	0	11	8	0		0	4					
07-May	0	8	0	8	4	0		0	1					
Week Totals	**0**	**45**	**0**	**45**	**29**	**0**		**5**	**7**					
Week 20														
10-May	10	2	4	16	13	0		0	0					
11-May	13	1	10	24	29	0		0	0					
12-May	12	2	8	22	17	0		0	3					
13-May	21	4	0	25	24	0		0	0					
14-May	21	3	0	24	23	0		0	2					
Week Totals	**77**	**12**	**22**	**111**	**106**	**0**		**0**	**5**					
Week 21														
17-May	16	1	4	21	12	0		0	1					
18-May	36	5	0	41	37	1		2	1					
19-May	22	3	0	25	14	3		0	2					
20-May	14	3	0	17	28	2		0	2					
21-May	26	4	0	30	34	1		0	4					
Week Totals	**114**	**16**	**4**	**134**	**125**	**7**		**2**	**10**					
Week 22														
24-May	17	0	0	17	17	4		0	0					
25-May	16	3	0	19	25	0		0	0					
26-May	19	0	0	19	26	0		0	1					
27-May	19	2	0	21	42	1		0	3					
28-May	13	3	0	16	14	0		0	0					
Week Totals	**84**	**8**	**0**	**92**	**124**	**5**		**0**	**4**					
Week 23														
31-May	26	0	0	26	63	0		0	0					
01-Jun	35	1	0	36	69	0		0	5					
02-Jun	26	5	13	44	118	2		0	3					
03-Jun	30	2	0	32	90	1		0	1					
04-Jun	45	5	0	50	107	14		0	1					
Week Totals	**162**	**13**	**13**	**188**	**447**	**17**		**0**	**10**					
Week 24														
07-Jun	28	2	8	38	80	2		0	3					
08-Jun	46	5	0	51	149	6		0	2			1		
09-Jun	34	4	0	38	102	3		0	4					
10-Jun	39	3	0	42	104	8		0	3					

Appendix F: Table 1. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola / Atnarko watershed, 3 May - 23 July 1998.

Date	No. of Drifts				Chinook			Steelhead			Sock.	Coho	Pink	Chum
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Rlsd.	Mks				
11-Jun	26	5	0	31	94	1		0	2					
Week Totals	**173**	**19**	**8**	**200**	**529**	**20**		**0**	**14**		**1**			
Week 25														
14-Jun	16	0	5	21	113	1		0	2		11			
15-Jun	19	5	0	24	150	4		0	0		2			
16-Jun	18	4	0	22	176	20		0	5		8	1		
17-Jun	24	0	0	24	126	16		0	3		9			
18-Jun	31	0	0	31	131	5		0	1		9		1	2
Week Totals	**108**	**9**	**5**	**122**	**696**	**46**		**0**	**11**		**39**	**1**	**1**	**2**
Week 26														
21-Jun	17	2	0	19	105	5		1	2		8			1
22-Jun	24	0	0	24	100	1		0	0		11			
23-Jun	22	2	2	26	116	8		1	1		16			
24-Jun	25	2	0	27	106	12		0	0		9			4
25-Jun	21	0	0	21	135	5		0	0		10			2
Week Totals	**109**	**6**	**2**	**117**	**562**	**31**		**2**	**3**		**54**	**0**	**0**	**7**
Week 27														
28-Jun	12	0	0	12	88	4		0	5		21	1	0	2
29-Jun	21	0	0	21	204	32		0	3		82	3	5	5
30-Jun	30	0	0	30	123	34		0	0		49	8	9	11
01-Jul	41	0	0	41	176	24		0	3		48	4	13	8
02-Jul	53	0	0	53	233	17		0	5		126	2	7	12
Week Totals	**157**	**0**	**0**	**157**	**824**	**111**		**0**	**16**		**326**	**18**	**34**	**38**
Week 28														
05-Jul	30	0	6	36	89	4		0	0		89	0	7	4
06-Jul	40	0	0	40	171	19		1	3		154	3	14	14
07-Jul	49	0	0	49	92	24		1	0		173	4	14	1
08-Jul	37	0	0	37	110	37		3	2		235	10	69	9
09-Jul	43	1	0	44	189	45		0	2		169	6	24	8
Week Totals	**199**	**1**	**6**	**206**	**651**	**129**		**5**	**7**		**820**	**23**	**128**	**36**
Week 29														
11-Jul	10	10	6	26	60	13		0	0		105	0	0	0
12-Jul	18	2	15	35	58	6		0	0		84	4	56	19
13-Jul	24	1	0	25	83	13		1	2		90	15	74	4
14-Jul	22	2	0	24	100	23		1	1		65	10	24	31
15-Jul	16	0	0	16	90	13		0	4		69	34	30	25
Week Totals	**90**	**15**	**21**	**126**	**391**	**68**		**2**	**7**		**413**	**63**	**184**	**79**
Week 30														
19-Jul	2	2	0	4	9	1		0	0		4	5	12	15

Appendix F: Table 1. Weekly catch and effort for the Nuxalk fisheries within the Bella Coola / Atnarko watershed, 3 May - 23 July 1998.

Date	No. of Drifts				Chinook			Steelhead			Sock.	Coho	Pink	Chum
	Obs.	Not Obs.	Est.	Total	Adults	Jacks	Mks	Kept	Rlsd.	Mks				
20-Jul	4	2	0	6	24	5		0	0		19	10	66	63
21-Jul	3	2	0	5	33	0		0	0		3	12	34	24
22-Jul	2	1	0	3	13	0		0	0		9	7	0	0
23-Jul	7	0	0	7	40	1		0	0		1	10	0	0
Week Totals	**18**	**7**	**0**	**25**	**119**	**7**		**0**	**0**		**36**	**44**	**112**	**102**
Grand Totals	**1291**	**151**	**81**	**1523**	**4603**	**441**		**16**	**94**		**1689**	**149**	**459**	**264**

Appendix G - Summary of Consultations

Appendix G: Table 1. Summary of consultations with individuals from the Nuxalk First Nation, the Bella Coola Rod and Gun Club, the Department of Fisheries and Oceans, and other resident of the Bella Coola Valley, 14 November 1996 to 22 May 1997.

Group/Individual	Initial Consultations					Further Consultations						Total to date (days)
	Belarko Hall Nov.14	Hatchery Meeting Nov.18	Rod & Gun Meeting Nov.22	Nuxalt Meeting Nov.22	Other Dates in Nov.	Dates in Jan.	Dates in Feb.	March Field Work	SFAB Meeting Mar.31	Dates in Apr.	Dates in May	
Nuxalk					21		25					2
Archi Pootlass (Chief)				X		na	17			na	na	2
Harvey Mack (councilor)				X			17,26					3
Robert Schooner (councilor)				X			17,26					3
Ivan Tallio (Tribal Council)				X			17				20	3
Andrew Andy	X			X			17	13-30		1-30	1-22	many
Rod & Gun Club					19,20							2
David Hall	X		X				14		X			4
Clarence Hall	X		?				14					2
Harvey Tommasen	X		X		21		25,27			21,25,28	12	9
Larence Michalchuk			?				15-28	2-28	X			many
Randy Hodson			?		29		21,25	2-29				many
Fisheries & Oceans, Canada					19,21,27,29	13,24	17,18,20					9
Lyle Enderud	X						25		X		20	4
Russ Hilland	X	X							X			3
John Willis		X										1
Sandy McLaurin	X						25		X			3
Phillip Sheppard	X	X										2
Dennis Tippie		X										1
Jack Phillips		X										1
Other residents												
Chris Winkler							27			22,25,29	5,10,21	7
Al Purkiss	X				16,20		16					4
Ross Mikkleson	X						25					2
Dick Blewitt					19		16					2
Rob Stewart					19				X			2
Darwin Unrau									X		4,11	3
Ken Corbould									X			1
Jim Knudsen									X			1
Dave Bazett									X			1
Ray Glebe									X			1
John Mansell									X			1

Appendix G: Table 2. Summary of consultations with individuals from the Nuxalk First Nation, the Bella Coola Rod and Gun Club, the Department of Fisheries and Oceans, and other resident of the Bella Coola Valley, June 1997 to 24 November 1998.

Group/Individual	1997 Consultations					1998 Consultations					Total
	Catch Monitorin Jun-Jul	Nuxalk Meeting Nov.13	Bella Coola SFAB Nov.13	Nuxalt Assembly Nov.19	N. Coast SFAB Nov.30	Winter Surveys Feb.	Winter Surveys Mar.	Catch onitorin May-Jul	Nuxalk Meeting Nov.24	Bella Coola SFAB Nov.24	Jun97-Nov98 (days)
Nuxalk											
Archi Pootlass (Chief)		X		X				12	X	X	5
Nelson Tallio				X		17,25	12,20,21		X		5
Andrew Andy	X		X	X				X		X	many
Wally Webber	X	X		X				X			many
Frank Brooks								X			many
Fisheries Technicians	X			X		17,25			X		many
Nuxalk Members				X				X	X	X	many
Rod & Gun Club											
Phil Parr										X	1
David Hall			X		X	12					3
Clarence Hall			X								1
Harvey Tommasen			X								1
Randy Hodson			X			17	12,21				many
Fisheries & Oceans, Canada											
Lyle Enderud	X		X		X					X	4
Russ Hilland			X			16				X	3
John Willis							16				1
Sandy McLaurin			X				10			X	3
Bryan Anderson			X								1
Henri Ragletti			X								1
Dave Einarson					X						1
Elmer Fast					X						1
Other residents											
Chris Winkler	X		X			X	X			X	5
Al Purkiss			X							X	2
Rob Stewart			X		X					X	3
Darwin Unrau			X								1
Ken Corbould			X							X	2
Jim Knudsen			X								1
Dave Bassett			X								1
John Mansell			X							X	2
Barry Farynk							11				1

Appendix H - Data Forms

1997 Bella Coola Steelhead Survey Counts

Date: _____ Surveyors: _____

Weather: _____ Page: _____

View conditions: 0=no visibility; 1=poor visibility; 2=murky (<0.5 m); 3=cloudy (1.5 m); 4=clear (>1.5 m).
Light conditions: A=no glare; B=few shadows good penetration; C=extensive glare and shadows; D=windy, choppy, or poor light penetration.

Survable

Dist. (km)	Mainstem location / Local name of fishing area	Time	View cond.	Light cond	Number Steelhead	Number Trout	Comments
0	**Mouth of Bella Coola**						
	Zubens Field Pool						
	Thorsen Creek Pool						
2	**Tatsquun Creek**						
	Fourmile Pool						
	Spruce Pool						
	Dump Truck Run						
	Marco Polo Run						
7	**Thorsen Creek**						
	Lower Walker Island Pool						
	Upper Walker Island Pool						
	Meat Hole						
	Snootli Hole						
	Airport Run						
	Klonik Pool						
15	**Snootli Creek**						
	Crow's Nest Run						
	Big Rock Hole						
	Clay Bank						
	Mill Creek Hole						
	Culvert Pool						
	Hagensborg Run						
	Tritschler's Run						
21	**Salloomt River**						
	Salloomt Pool						
	Otter Run						
	Ruby Run						
	Purkiss Run						
	Jungle Pool						
	Bailey Bridge Pool						
	Leaning Cedar Pool						
27	**Nusatsum River**						
	Nusatsum Pool						

1997 Bella Coola Steelhead Survey Counts

Date: _____ Surveyors: _____

Weather: _____ Page: _____

View conditions: 0=no visibility; 1=poor visibility; 2=murky (<0.5 m); 3=cloudy (1.5 m); 4=clear (>1.5 m).
Light conditions: A=no glare; B=few shadows good penetration; C=extensive glare and shadows; D=windy, choppy, or poor light penetration.

Survable Dist. (km)	Mainstem location / Local name of fishing area	Time	View cond.	Light cond	Number Steelhead	Number Trout	Comments
	Mrs. Borden's Pool						
	Lower Borden's Pool						
	Upper Borden's Pool						
	Happy Thompson's Pool						
	Fish Trap						
	Ace in the Hole						
	7 Alder's Pool						
	Mitz's Hole						
	Leon's Hole						
	Albert Meecham's Run						
	Jimmy Meecham's Run						
	Cutthroat Pool						
	Shelton's Pool						
	Nylen Pool						
	Robin's Nest Pool						
	Big Creek Pool Area						
36	Noosgulch River						
	Noosgulch Pool						
	Owen's Field Pool						
	Canoe Crossing						
	Cacoahtin Pool						
	Hanger Pool						
	Elbow Pool						
	Firvale Pool						
	School House Pool						
	Stacker Pool						
	Recent Pool						
	Anne Creek						
	Poacher's Run						
	Diversion Pool						
	Boulder Run						
	Floyd's Run						

1997 Bella Coola Steelhead Survey Counts

Date: _____ Surveyors: _____

Weather: _____ Page: _____

View conditions: 0=no visibility; 1=poor visibility; 2=murky (<0.5 m); 3=cloudy (1.5 m); 4=clear (>1.5 m).
Light conditions: A=no glare; B=few shadows good penetration; C=extensive glare and shadows; D=windy, choppy, or poor light penetration.

Survable Dist. (km)	Mainstem location / Local name of fishing area	Time	View cond.	Light cond	Number Steelhead	Number Trout	Comments
48	**Noomst Creek**						
	Noomst Rapids						
	Burnt Bridge Pool						
48	**Burnt Bridge Creek**						
	Noomst's Rock Pool						
	Boulder Hole						
	McColl Flats (CZB Br)						
	Log-jam Pool						
	Pull-out Pool						
	Steep Roof Pool						
	Last Chance Pool						
	Classic Pool						
	Old Channel Pool						
	Smokey's Last Run						
	Grizzly Pool						
	Slough Run						
	Junction Run						
60	**Atnarko Junction**						
	Fisheries Pool						
	Counting Tower						
	Swash Hill Run						
	Smokehouse Pool						
	Corbould's Bridge						
	Wagon Wheel						
	Spawning channel Outlet						
	Dead Grizzly						
	Spawning channel Inlet						
	Campground						
64	Belarko Pool						
	Leaning Cedar						
	Zonrette Hole						
	Boar Run						
	Elbow Pool						

1997 Bella Coola Steelhead Survey Counts

Date: _____ Surveyors: _____

Weather: _____ Page: _____

View conditions: 0=no visibility; 1=poor visibility; 2=murky (<0.5 m); 3=cloudy (1.5 m); 4=clear (>1.5 m).
Light conditions: A=no glare; B=few shadows good penetration; C=extensive glare and shadows; D=windy, choppy, or poor light penetration.

Survable Dist. (km)	Mainstem location Local name of fishing area	Time	View cond.	Light cond	Number Steelhead	Number Trout	Comments
	Boulder Pool						
	Flat Rock						
70	Alger Cr.						
	Canyon Pool						
75	Mosher Creek						
	B.C. Wright's Pool						
	Park Headquarters						
	Above Parks Branch						
	Camera channel area						
81	Below Young Creek						
	Janet Creek						
	Pagead's Pool						
	Goose Hole						
	Football jam						
	Below George's Hole						
	George's Corner						
	Pink City						
	Josephine's Pool						
	Cherry Run (Glory Run)						
	63 Run						
	Birch Run						
	Steelhead Hole						
89	Sugar Camp Cr.						
	Line Cabin Pool						
	Upper Line Cabin						
92	Hotnarko R.						
	Above Hotnarko						
95	Stillwater Lake						
	Above Stillwater Lake						
102	Lonesome Lake						
	Totals						

Bella Coola Catch Monitoring Program 1997

Date: ____________ Location: ____________

MELP Survey Times: ____________

Stop Time	Fishermen Name		Chinook		Steelhead		Sock	Mesh Size	Comments
			Adults	Jacks	Kept	Rel.			(marks, etc.)
MELP Total									

DFO Data	Drifts							Survey Times
Section I - Observed								
Section II - Not Observed								
Section III - Estimated								
DFO Total								
Grand Total								

Comments: ____________