

**A SURVEY OF  
UPPER BABINE RIVER STEELHEAD ANGLERS  
DURING THE CLASSIFIED WATERS PERIOD  
OF 1997**

K.L. Morten

Skeena Fisheries Report # 114

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Skeena Fisheries Report # 114

March, 1998

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## Executive Summary

### Interviews

- ◆ Four-hundred and seventy-seven steelhead (*Oncorhynchus mykiss*) anglers were observed by the Interview Teams on the upper Babine River and 210 anglers were approached for an interview. Most interviews were conducted in the road and foot access areas where the majority of non-guided shore-access anglers fish.
- ◆ The number of anglers observed was positively correlated with the number of anglers interviewed in each week and indicated fair temporal representation of interviewing effort.
- ◆ Most anglers (62 percent) were interviewed in the bridge area while 18 percent were interviewed between Nichyeskwa and Nilkitkwa rivers, 11 percent were interviewed between the Department of Fisheries and Oceans (DFO) weir and Boucher Creek and the final 9 percent were interviewed downstream of the Nilkitkwa River.

### Angler Characteristics

- ◆ Forty-five percent (93 interviews) of anglers interviewed were B.C. residents. Of B.C. residents interviewed, 40 percent were from the Skeena Region. Residents from other areas of B.C. represented 60 percent of B.C. resident angler interviews.
- ◆ Nine percent (19 interviews) of all anglers interviewed lived in other Canadian provinces and 46 percent (96 interviews) were Non-Canadian residents.
- ◆ More B.C. residents than Non-Canadian residents were interviewed in the first (9-1) and last four weeks (9-5 through 10-3) of the classified waters period. Conversely, more Non-Canadian residents than B.C. residents were interviewed in the second, third and fourth weeks of the classified waters period. No interviews were conducted in the ninth week of the classified waters period (10-4).
- ◆ Ninety-seven percent of anglers interviewed were male, and only three percent were female. On average, males were 42.4 years old and females were 48.0 years old.
- ◆ On average, upper Babine River anglers had been steelhead angling for 11.7 years. Forty-five percent of B.C. residents had more than ten years of steelhead angling experience, whereas 32 percent of Non-Canadian residents and 17 percent of Canadian residents had more than ten years steelhead angling experience.
- ◆ Forty-seven percent (94 anglers) of upper Babine River anglers interviewed were a member of at least one conservation club. More Canadian (63 percent) and Non-Canadian (65 percent) residents were a member of a conservation club than B.C.

residents (25 percent). Of those anglers that were a member of at least one conservation club, 26 percent were member of a foreign country angling club, 18 percent were a member of a local angling club, 17 percent were a member of Trout Unlimited, 15 percent were a member of the B.C. Steelhead Society and six percent were a member of the B.C. Wildlife Federation.

- ◆ Of all anglers interviewed, 18 percent were guided and 82 percent were non-guided. Few B.C. residents or Canadian residents interviewed were guided anglers (8 and 5 percent, respectively), while 30 percent of Non-Canadian residents interviewed were guided.
- ◆ Guided anglers were known to be under-represented in the survey because almost all guided angler activity occurred downstream from Nilkitkwa River where sampling effort was minimal due to access constraints.
- ◆ Of all anglers interviewed, fly anglers were more common than gear anglers (70 and 30 percent, respectively). Among gear anglers, B.C. residents were approximately four times as frequent as Non-Canadian residents and Canadian and Non-Canadian residents were twice as frequent as B.C. residents.
- ◆ Of all anglers interviewed, the majority were shore-access anglers (75 percent), whereas 24 percent gained access by jet boat and one percent gained access by drift-boat. Of the anglers that gained access by jet boat, 63 percent (30 anglers) were guided and 37 (18 anglers) were non-guided.
- ◆ Overall, 85 percent of jet boat-access anglers were fly fishing and all of the drift boat-access anglers (2 anglers) were fly fishing. Fishing with gear was more common among shore-access anglers (36 percent) than jet or drift boat-access anglers (15 and 0 percent, respectively).
- ◆ Eight percent of anglers interviewed were cited for an infraction. Fifty percent of anglers (8 anglers) with at least one infraction were Non-Canadian residents while 31 percent were B.C. residents (5 anglers) and six percent were Canadian residents (1 angler). The residence of the remaining anglers with at least one infraction (2 anglers) was unknown.
- ◆ Failure to buy a classified waters license was the most frequently cited infraction (29 percent). None of the infractions cited were for illegal guiding.

#### **Angler Perceptions of Problems and Preferences for Management Strategies**

- ◆ A majority of anglers perceived no problems with the overall number of anglers, the number of boat-based anglers or the number of shore-based anglers.

- ◆ Among anglers responding to the question, six percent (11 anglers) perceived a major problem, 19 percent (32 anglers) perceived a minor problem and 69 percent (117 anglers) perceived no problems with the overall number of anglers on the river. Six percent (10 anglers) perceived a major problem, 14 percent (24 anglers) perceived a minor problem and 74 percent (126 anglers) perceived no problems with the number of boat-based anglers on the river. Six percent (10 anglers) perceived a major problem, 20 percent (34 anglers) perceived a minor problem and 68 percent (117 anglers) perceived no problems with the number of shore-based anglers on the river.
- ◆ B.C. residents perceived more problems than Canadian and Non-Canadian residents. In 1997, B.C. residents were concerned with a number of issues (general regulations, gear restrictions, fees and angler numbers), while over half (56 percent) of Non-Canadian resident concerns were about the licensing system or fees. Most Canadian residents concerns regarded the licensing system and fees (64 percent).
- ◆ The perceptions of problems did not vary among guided status and angling method categories, indicating that residence categories and in a limited way, access method may have shared some of the factors such as angler experience and angling preferences that affected the angler's perception of problems on the river.

#### Angler Catch and Effort

- ◆ For all anglers interviewed, a total of 663 hours were spent angling, which averaged 3.3 hours of fishing per angler at the time of the interview. One hundred and six (106) steelhead were caught and released. The observed catch rate for all angler interviews was 0.144 steelhead/hour, or assuming a rod day length of eight hours, 1.15 steelhead/rod day. A total of 267 anglers were observed angling but were not interviewed.
- ◆ The upper Babine River total effort estimate was 641 rod days, the total catch estimate was 1,054 steelhead (sum of weekly stratified estimates). These estimates exclude the majority of guided anglers downstream of Nilkitkwa River who were rarely surveyed.
- ◆ Steelhead anglers caught nine other species of fish, 104 sockeye salmon (*Oncorhynchus nerka*), 11 coho salmon (*O. kisutch*), 26 chinook salmon (*O. tshawytscha*), five pink salmon (*O. gorbuscha*), 115 rainbow trout (*O. mykiss*), 23 Dolly Varden/bull trout (*Salvelinus malma/S. confluentus*), 17 cutthroat trout (*O. clarki*), 90 whitefish (*Prosopium* sp.) and one northern squawfish (*Ptychocheilus oregonensis*).

## Abstract

Recreational angler's demographics, angling characteristics, angling methods and steelhead (*Oncorhynchus mykiss*) catch rates were examined with an on-site roving survey on the upper Babine River during the classified waters period of 1997. In addition, anglers were asked about their perceptions of problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers on the upper Babine River. Most interviews were conducted in the road and foot access areas where the majority of non-guided shore-access anglers fish.

Forty-five percent of anglers interviewed were B.C. residents, nine percent were Canadian residents and 46 percent were Non-Canadian residents. Of all anglers, 18 percent were guided and 82 percent were non-guided. Few B.C. or Canadian residents interviewed were guided anglers (8 and 5 percent, respectively), while 30 percent of Non-Canadian residents interviewed were guided. Fly anglers (70 percent) were more common than gear anglers (30 percent). Of all anglers interviewed, the majority were shore-access anglers (75 percent), whereas 24 percent gained access by jet boat and one percent gained access by drift-boat. Of the anglers that gained access by jet boat, 63 percent (30 anglers) were guided and 37 (18 anglers) were non-guided. Guided anglers were known to be under-represented in the survey because almost all guided angler activity occurred downstream from Nilkitkwa River where sampling effort was minimal due to access constraints.

Anglers perceptions of problems differed by residence category and to a lesser extent by access method. B.C. residents perceived more problems on the upper Babine River than Canadian or Non-Canadian residents. In 1997, B.C. residents were concerned with a number of issues (general regulations, gear restrictions, fees and angler numbers) while over half (56 percent) of Non-Canadian resident concerns were about the licensing system or fees. Most Canadian residents concerns regarded the licensing system and fees (64 percent). More shore-access anglers perceived problems with the overall number of anglers on the river than the anglers that gained river access by boat. Anglers within the guided status or angling method categories were similar in their perception of problems with the overall number of anglers, the number of boat-based anglers or the number of shore-based anglers.

The observed steelhead catch rate for all anglers interviewed in 1997 was 1.15 steelhead per rod day. The upper Babine River total effort estimate was 641 rod days and the total catch estimate was 1,054 steelhead (sum of stratified estimates). Steelhead anglers also caught nine other species of fish that included; 104 sockeye salmon (*Oncorhynchus nerka*), 11 coho salmon (*O. kisutch*), 26 chinook salmon (*O. tshawytscha*), 5 pink salmon (*O. gorbuscha*), 115 rainbow trout (*O. mykiss*), 23 Dolly Varden/bull trout (*Salvelinus malma/S. confluentus*), 17 cutthroat trout (*O. clarki*), 90 whitefish (*Prosopium* sp.) and one northern squawfish (*Ptychocheilus oregonensis*).

**Table of Contents**

Executive Summary ..... iii  
    Interviews ..... iii  
    Angler Characteristics ..... iii  
    Angler Perceptions of Problems and Preferences for Management Strategies ..... iv  
    Angler Catch and Effort ..... v  
Abstract ..... vi  
Table of Contents ..... vii  
List of Tables ..... ix  
List of Figures ..... xii  
List of Appendices ..... xiv  
1.0.0 Introduction ..... 1  
2.0.0 Study Area ..... 2  
3.0.0 Methods ..... 5  
    3.1.0 Interviews ..... 5  
        3.1.1 On-Site Interview Methods ..... 5  
        3.1.2 Relevant Definitions ..... 6  
        3.1.3 Analysis Methods ..... 6  
    3.2.0 Angler Characteristics ..... 8  
        3.2.1 Angler Demographics ..... 8  
        3.2.2 Angling Methods and Licenses ..... 8  
        3.2.3 Angler Compliance with Regulations ..... 9  
    3.3.0 Angler Perceptions of Problems and Preferences for Management Strategies ..... 9  
    3.4.0 Angler Catch and Effort ..... 10  
4.0.0 Results ..... 13  
    4.1.0 Interviews ..... 13  
    4.2.0 Angler Characteristics ..... 15  
        4.2.1 Angler Demographics ..... 15  
        4.2.2 Angling Methods and Licenses ..... 17  
        4.2.3 Angler Compliance with Regulations ..... 23  
    4.3.0 Anglers Perceptions of Problems and Preferences for Management Strategies ..... 24  
        4.3.1 Problems and Management Strategies for the Overall Number of Anglers ..... 24  
        4.3.2 Problems and Management Strategies for the Number of Boat-Based Anglers ..... 27  
        4.3.3 Problems and Management Strategies for the Number of Shore-Based Anglers ..... 29  
        4.3.4 Other Concerns and Management Strategies ..... 31  
        4.3.5 Angler Perceptions of all Major and Minor Problems ..... 34  
    4.4.0 Angler Catch and Effort ..... 36  
5.0.0 Discussion ..... 40  
    5.1.0 Interviews ..... 40  
    5.2.0 Angler Characteristics ..... 40  
    5.3.0 Angler Perceptions of Problems and Preferences for Management Strategies ..... 41  
    5.4.0 Angler Catch and Effort ..... 44  
    5.5.0 Limitations of the Survey ..... 45  
6.0.0 Recommendations ..... 46

7.0.0 Acknowledgments..... 47  
8.0.0 Literature Cited ..... 48  
9.0.0 Appendices..... 50



**List of Tables**

Table 1. The specific dates included in the weeks used for analysis. .... 6

Table 2. The Babine River sections used for analysis..... 7

Table 3. The number of anglers observed, the percentage of observed anglers interviewed and the total anglers interviewed on the weekday or weekends within each week. .... 13

Table 4. The percentage and number (n) of interviews initiated within each river section. 14

Table 5. The percentage of Babine River anglers interviewed by residence categories. .... 15

Table 6. The percentage of male and female anglers within each age category and the mean age of male and female anglers interviewed. .... 16

Table 7. The percentage of years steelhead angling experience within each residence category. .... 17

Table 8. Of the five most frequently mentioned conservation clubs, the percentage of all anglers that were a member of at least one conservation club and the percentage of anglers that were a member of all anglers that answered the question. .... 17

Table 9. The percentage of guided and non-guided anglers within each residence category. .... 18

Table 10. The percentage of fly and gear anglers and jet boat-access, drift boat-access and shore-access anglers in each residence and guided status category..... 18

Table 11. The percentage of fly and gear anglers that gained access to the river by jet boat, drift boat and shore. .... 19

Table 12. The percentage of anglers with a one day, eight day and annual license within each residence and guided status category. .... 19

Table 13. The number of classified waters days purchased at the time of the interview in each license class for Canadian and Non-Canadian residents. .... 20

Table 14. The percentage of anglers with an infraction and the percentage of offending anglers with one or two infractions. .... 23

Table 15. The type and frequency of angler infractions of all angler interviews on the Babine River. .... 23

Table 16. The percentage of anglers that perceived major, minor and no problems with the overall number of anglers within each residence category, guided status category, access method and angling method. .... 25

Table 17. The percentage of anglers that perceived major, minor and no problems with the number of boat-based anglers within each residence category, guided status category, access method and angling method..... 28

Table 18. The percentage of anglers that perceived major, minor and no problems with the number of shore-based anglers within each residence category, guided status category, access method and angling method..... 30

Table 19. Other regulation issues mentioned by anglers with suggested management strategies within each residence and guided status category. .... 32

Table 20. Other access issues mentioned by anglers with suggested management strategies within each residence and guided status category. .... 32

Table 21. Other fee issues mentioned by anglers with suggested management strategies within each residence and guided status category. .... 33

Table 22. Other anglers number issues mentioned by anglers with suggested management strategies within each residence and guided status category. .... 34

Table 23. Other guiding issues mentioned by anglers with suggested management strategies within each residence and guided status category. .... 34

Table 24. The percentage of anglers with one, two or three major and minor problems (the sum of and anglers major or minor problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers on the river) within each residence and guided status category. .... 35

Table 25. The steelhead caught, hours fished, catch rate and steelhead per rod day within each week. .... 37

Table 26. The steelhead caught, hours fished, catch rate and steelhead per rod day within each river section ..... 37

Table 27. The steelhead caught, hours fished, catch rate and steelhead per rod day within each residence, guided status, access method and angling method category. .... 38

Table 28. A summary of estimated total effort, catch rates and catch with confidence intervals by week. .... 39

Table 29. The number caught, catch rate and fish per rod day by species. .... 39

Table A1. The type of conservation club anglers were a member with the percentage and number of responses. .... 53

Table A2. A summary of weather and water conditions that were observed by the Interview Team by date. .... 54

Table A3. The date, week, time at start of interviewing stint, time at finish of interviewing stint, minutes interviewing, reach location at start, reach location at finish, the total anglers interviewed and observed and comments on the time estimation in minutes summarized from the angler count data forms. .... 56

Table A4. The count estimation of total effort and catch with approximate 95 percent confidence intervals for each week..... 58

## List of Figures

Figure 1. The Skeena River watershed. ....	3
Figure 2. The Babine River sections used for analysis. ....	4
Figure 3. The number of anglers observed and interviewed within each week. ....	14
Figure 4. The number of B.C. residents, Canadian residents and Non-Canadian residents interviewed within each week. ....	15
Figure 5. The number of B.C. residents and Non-Canadian residents interviewed within each river section. ....	16
Figure 6 The number of classified waters days purchased at the time of the interview by those anglers with an eight day angling license within each residence category. .	21
Figure 7. The number of classified waters days purchased at the time of the interview by those anglers with an eight day angling license by guided and non-guided anglers. ....	21
Figure 8. The number of classified waters days purchased at the time of the interview by those anglers with an annual angling license within each residence category. ....	22
Figure 9. The number of classified waters days purchased at the time of the interview by those anglers with an annual angling license by guided and non-guided anglers. ....	22
Figure 10. The percentage of anglers that perceived a minor or major problem with the overall number of anglers within each residence category, guided status, access method and angling method. ....	25
Figure 11. The preferred management strategies for anglers who perceived a problem with the overall number of anglers on the river. ....	26
Figure 12. The percentage of Babine River anglers perceiving a major problem with the number of boat based anglers. ....	27
Figure 13. The preferred management strategies of anglers who perceived a problem with the number of boat-based anglers. ....	29
Figure 14. The percentage of Babine River anglers perceiving major and minor problems with the number of shore-based anglers. ....	30

Figure 15. The percentage of major or minor problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers relative to all anglers interviewed within each week. .... 36

Figure 16. The percentage of major and minor problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers relative to all anglers interviewed within each river section. .... 36

**List of Appendices**

Appendix 1.0 The angler interview form and angler count data form..... 50

Appendix 2.0 The conservation clubs mentioned..... 53

Appendix 3.0 A summary of weather and water conditions during the classified waters  
period..... 54

Appendix 4.0 The method of grouping ‘other issues’ mentioned by Babine River anglers.55

Appendix 5.0 A summary of the time spent interviewing by the Interview Teams..... 56

Appendix 6.0 A summary of the estimated total effort and catch results. .... 58

## **1.0.0 Introduction**

The Babine River of the Skeena Region is well known for providing a high quality steelhead (*Oncorhynchus mykiss*) recreational fishery. In 1990, the province of B.C. implemented a classified waters system to protect such high quality angling experiences on rivers throughout B.C. The purpose of the classified waters system was to provide a diversity of angling opportunities, maintain a high quality angling experience and to improve regulation of the angling guide industry (ARA Consulting Group 1991). Rivers or sections of rivers were defined as classified waters during critical time periods which usually happened during preferred steelhead angling seasons.

The freshwater recreational fishery in B.C. was estimated to grow in value with a compound annual growth rate of 2.0 percent per year between 1994 and 1999 (Price Waterhouse and ARA Consulting Group Inc. 1996). Local anglers voiced concerns with respect to crowding caused by the growth on the classified waters in the Skeena Region. In response to these concerns, the Skeena Region Fisheries Branch of the Ministry of Environment, Lands and Parks has been reviewing policy and guidelines for angling licenses and the angling use plan on the Babine River.

To date, public information was solicited through open houses, public meetings and written submissions on draft angling use plans. The Steelhead Harvest Analysis (SHA) database was used to analyze angler effort and demographics relevant to the angling use plans. Limitations exist with respect to all these forms of data collection: open houses and public meetings often only solicit input from vocal individuals who may represent special interest groups. Also, most of the anglers who fish the Babine River do not live in the area where open houses and public meetings are held and therefore do not have the same opportunity to express their views. The SHA database was established by mailing questionnaires to a sample of anglers who purchased a steelhead conservation stamp. However, in recent years, some anglers on classified waters may not have been sampled because they could avoid purchasing a steelhead stamp due to a loophole in the fishing regulations. Also, there is some concern that the SHA results were only representative of those anglers that purchased a steelhead conservation stamp. Therefore, it was unknown if the SHA sample was representative of the angling population. The significance, if any, of these positive and negative biases in the SHA database is under review.

Meanwhile, persistent complaints of illegal guiding activities and license non-compliance prompted the province of B.C. to hire River Guardians to accompany Conservation Officers in enforcement duties on the Babine River during the classified water period. The addition of the River Guardians provided an opportunity to conduct a roving survey with on-site interviews of anglers. The survey collected information about steelhead anglers' demographics, perceptions of crowding and preferred fisheries management strategies.

## **2.0.0 Study Area**

The Babine River flows approximately 97 km from Nilkitkwa Lake into the Skeena River about 63 km north of Hazelton (Anonymous 1997b). Babine Lake heavily influences the Babine River, the 160 km long lake acts as a buffer to clear and moderate flows in the river. This study included the Babine River from the lowermost reaches where access to angling is possible (Gail Creek) to the outlet of Nilkitkwa Lake although sampling was concentrated in the road and foot access areas where the vast majority of interviews were conducted in areas upstream of Nilkitkwa River. This area is referred to hereafter as the upper Babine River. Few interviews were conducted downstream of this area which is dominated by guided anglers. This study focused on the upper Babine River.

Access to the upper Babine River was limited. Only one road access point was available to the upper reaches of the river as a logging road passes over the river about 2 km downstream of Nilkitkwa Lake. Shore access to about six kilometers downstream of the bridge can be reached via trail from the logging road. Angling guide lodges are located 6 km and 12 km downstream from the logging bridge are only accessed by boat or helicopter (Anonymous 1997b). A third angling lodge is located about 50 km downstream can only be reached by helicopter. Jet boats are used only by experienced recreationists and guides. In comparison, drift-boat use was limited due to the lack of pull-outs, as the nearest pull-out point is the confluence with the Skeena River. Otherwise, a helicopter must be used to transport the gear out. The Babine River is known for its beautiful scenery, high steelhead catch rates and large steelhead. Consequently, it is recognized as one of the world's premier steelhead fisheries (Anonymous 1996).

The Babine River is one of five class one, classified waters in B.C. The river is classified from the DFO fish counting weir to the confluence of the Babine and Skeena rivers from September 1 through October 31. Also, the Babine is a heritage river and the corridor extending within one km of either side of the river has been proposed a class "A" Provincial Park (Anonymous 1997b). The river is well known for its abundant fish and wildlife and its wilderness character. The system supports relatively larger steelhead than most other streams in the Skeena River drainage (Anonymous 1997b). Three licensed guides operate on the Babine, with an unlimited number of assistant guides and an allocation of 1,718 rod days during the classified waters period (Anonymous 1996).

Angling restrictions in the Babine River were published in the B.C. Freshwater Fishing Regulations and Synopsis (Anonymous 1997a). In short, no fishing was permitted from January 1 through June 15. From June 16 to December 31 the river was closed to bait. From June 16 there was a fly fishing only restriction above the DFO weir including Nilkitkwa Lake until December 31 and below the DFO weir to Nichyeskwa River until October 1. Angling from boats was not permitted downstream of the fish counting weir, and no angling was permitted between signs posted about 100 m above and 80 m below the fish counting weir. In the 1997 classified waters period, non-resident anglers were required to purchase a classified waters license at \$20.00 per day and B.C. residents were required to



purchase a classified waters license at \$10.00 per year. At the time of the survey, the Fisheries Branch had proposed to increase the classified waters license from \$20.00 per day to \$40.00 per day for non-resident anglers effective April 1, 1998. Since then, the proposed license fee increase has been canceled.

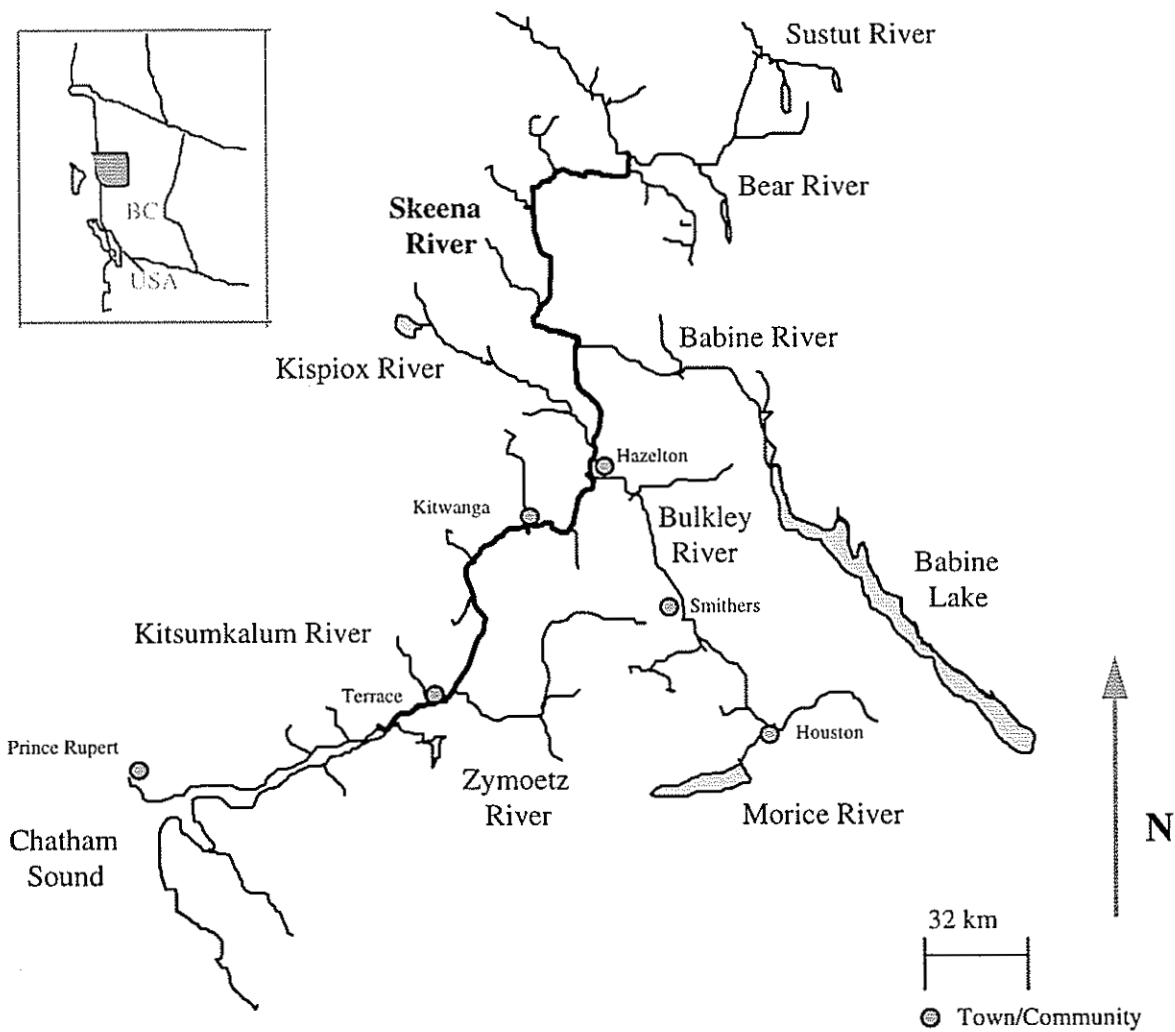


Figure 1. The Skeena River watershed.

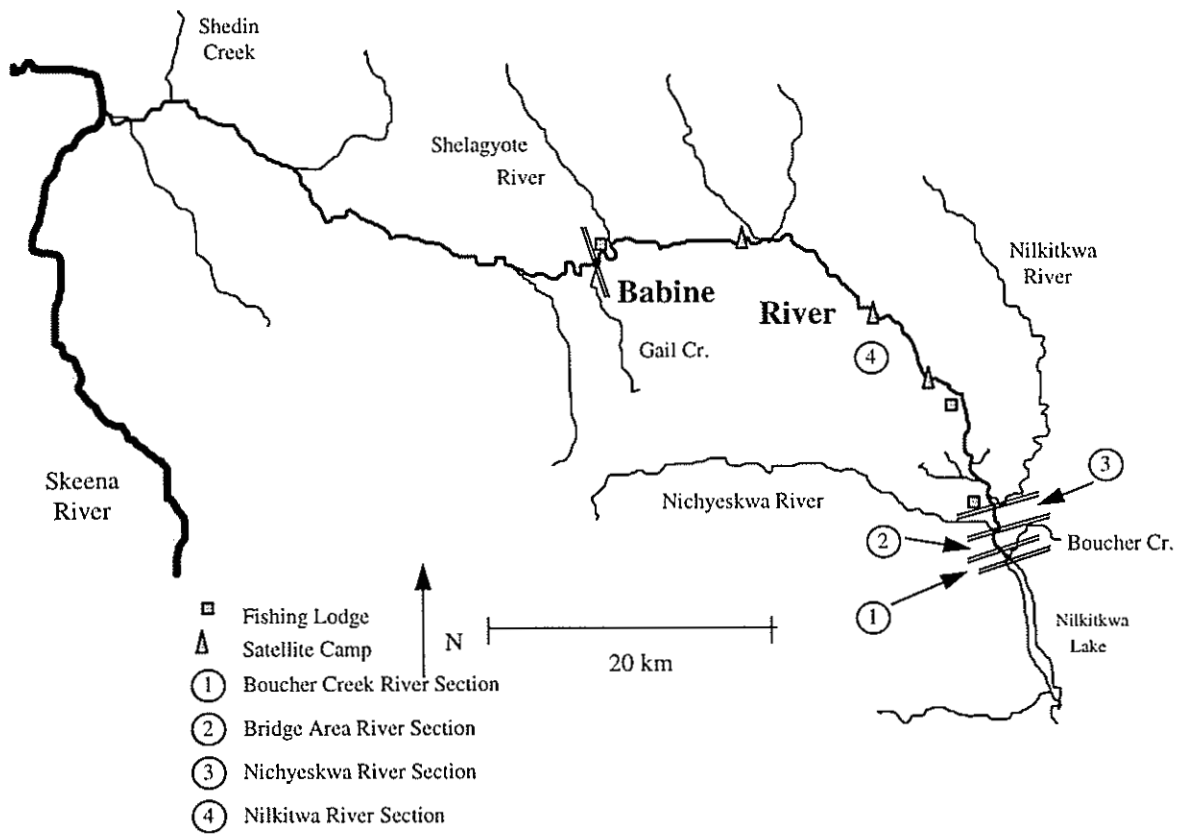


Figure 2. The Babine River sections used for analysis.

## 3.0.0 Methods

### 3.1.0 Interviews

#### 3.1.1 On-Site Interview Methods

The province of B.C. hired River Guardians to accompany Conservation Officers in enforcement duties on the Babine River during the classified waters period in 1997. 'Deputy Conservation Officer' status was obtained for each River Guardian, which allowed them to address license violations under the *Wildlife Act*. An agreement between the Conservation Officer Services and the Fisheries Branch of the B.C. Ministry of Environment, Lands and Parks enabled the Fisheries Branch to collect information from steelhead anglers regarding their perceptions of problems regarding angler numbers on the river. The short interview was designed by the Fisheries Branch, Cascadia Natural Resource Consulting and the Conservation Officer Service.

A roving design was used to conduct on-site interviews in the upper Babine River. The interviewing was conducted by one River Guardian who was occasionally joined by another Conservation Officer (herein Interview Team). The primary River Guardian lived on-site at the DFO field camp during the operation of the fish counting weir. Jet boat-access anglers, drift boat-access anglers and shore-access anglers were asked to complete a short interview while angling. The Interview Team completed two forms while on the river: the angler interview form and the angler count form (see Appendix 1).

The Interview Team collected information on the residence of the anglers, conservation club membership, years steelhead angling, hours angling that day, catch of all species, perceptions of problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers on the river and suggested management strategies around those issues. The Interview Team also recorded information about weather, the angler's access method (jet boat, drift boat or shore), angling method (fly or gear), gender and other data collected from the angler's license, such as name, birthdate, residence, license type, if guided or non-guided, the number of classified days purchased and used and the number and type of angling infractions that were cited (if any). All data was recorded on the angler interview form.

In addition, the Interview Team completed an angler count form every time they were on the river. The date, time at start of interviewing stint, time at finish of interviewing stint, location at start, location at finish, total anglers interviewed, total anglers observed, the initials of the Interview Team and any additional comments were recorded on the angler count form.

Interviews were conducted in the classified waters period from September 1 through October 23, 1997. Because the primary duty of the River Guardians and Conservation Officers was to provide an enforcement presence, a strict sampling schedule could not be used and therefore, a convenience sample of anglers was collected. The Interview Team

usually contacted anglers on foot, but on rare occasions used a jet boat or helicopter to access areas that were inaccessible by foot. The angler was approached and asked for their cooperation to complete the interview. The Interview Team proceeded with the interview and asked to see the angler's license, and if needed, cited them for any infractions. If the anglers did not agree to the interview, had already completed the interview or there was a language barrier, the Interview Team only recorded data on the weather, access method, angling method, gender, hours fished, catch and license details.

The large majority of interview effort occurred in the area where use was dominated by non-guided, shore access anglers. Therefore, guided anglers were known to be under-represented in the survey because almost all guided angler activity occurred downstream from Nilkitkwa River where sampling effort was minimal due to access constraints.

### *3.1.2 Relevant Definitions*

**B.C. Resident:** The anglers' permanent residence was within B.C. The angler must have been present in B.C. for at least six months during the 12 months immediately prior to purchasing an angling license (Anonymous 1997a).

**Canadian Resident:** The anglers' permanent residence was outside of B.C. but within Canada. The angler resided outside of B.C. for more than six months during the 12 months prior to purchasing an angling license (Anonymous 1997a).

**Non-Canadian Resident:** The anglers' permanent residence was outside of Canada. The angler resided outside of Canada for more than six months during the 12 months prior to purchasing an angling license (Anonymous 1997a).

**Non-Resident Angler:** The anglers' permanent residence was outside of B.C. Non-Resident anglers were mentioned in several responses from anglers about preferred management strategies, they were not specific to the Non-Canadian or Canadian residence status.

**Rod Day:** Eight hours of angler effort constituted one rod day.

### *3.1.3 Analysis Methods*

Several sources were used to report the number of anglers observed and where and when the Interview Team(s) were on the river. The angler count data forms were used to summarize the total anglers observed and the approximate time the Interview Team(s) spent interviewing each week (see Appendix 5). The number of angler interview forms completed was used to summarize the number of anglers interviewed by week (Table 1) and river section (Table 2; Figure 2).

Table 1. The specific dates included in the weeks used for analysis.

Week	Dates
9-1	Sept. 1 - Sept. 6
9-2	Sept. 7 - Sept. 13
9-3	Sept. 14 - Sept. 20
9-4	Sept. 21 - Sept. 27
9-5	Sept. 28 - Oct. 4
10-1	Oct. 5 - Oct. 11
10-2	Oct. 12 - Oct. 18
10-3	Oct. 19 - Oct. 25
10-4	Oct. 26 - Nov. 1 <sup>1</sup>

1. No interviews were conducted in week 10-4.

River sections were defined by the access method and character of the area. The Boucher Creek river section was accessible by shore and was a short walk (approximately 1 km) from the main access road or by boat from Babine Lake. A classified waters license was not required to angle in this part of the river. It was usually lightly fished unless other rivers in the Skeena Region were 'out' or turbid due to weather conditions. The bridge area was the most easily accessible area as it was just minutes from the access road. The Nichyeskwa River section consisted of approximately 4 km of shore-access angling downstream of the bridge area. The area downstream of the confluence of the Babine and Nilkitkwa rivers was only accessible by boat or helicopter (Nilkitkwa River section). Most anglers accessed that area by jet boat and were guided as three guide camps and satellite guide camps were located there. The upper Babine River consisted of the Boucher Creek, the bridge area and Nichyeskwa River section.

Table 2. The Babine River sections used for analysis.

	River Section	Label
1	Boucher Creek - upstream of DFO weir	Boucher Cr.
2	downstream of DFO weir - upstream of Nichyeskwa R.	Bridge Area
3	downstream of Nichyeskwa R. - upstream of Nilkitkwa R.	Nichyeskwa R.
4	downstream of Nilkitkwa R. - Gail Cr.	Nilkitkwa R.

1. Department of Fisheries and Oceans Canada = DFO

For Babine River angler interviews, nonresponse bias was checked by testing differences of those anglers that responded to all questions with those that refused to complete the interview, or could not complete the interview because of a language barrier. Several comparisons were made in order to ensure that responses provided by anglers who completed the interview were not significantly different from those not completing the interview (residence, guided status, age, hours fished). It was possible to check for a nonresponse bias because Interview Teams collected catch and data from the angling license even if the angler did not agree to the interview. Residence and guided status were compared with a Pearson chi-square test and differences in age or hours fished were determined with a Mann Whitney U test.

### 3.2.0 Angler Characteristics

#### 3.2.1 Angler Demographics

Anglers were approached once for an interview, with the exception of one B.C. resident angler that was approached twice. Angler residency was determined from the angling license. For B.C. residents, the postal code was used to determine if the angler was from the Bulkley Valley (Houston-Hazelton), Skeena Region or remaining areas in the province. In addition, the date of birth was collected from the angler license. Age categories were summarized by male and female anglers.

Anglers were asked, “*How many years have you been steelhead fishing?*” The years of steelhead angling experience was summarized by residence categories. The mean years steelhead angling by B.C. residents, Canadian residents and Non-Canadian residents were compared with a one way ANOVA. A Levene test for homogeneity of variances between years was performed to test if the assumption of equal variances were met. Because the one-way ANOVA is so robust, it still operates well even when there is heterogeneity among variances (Zar 1984). Consequently, a one way ANOVA was used to compare the years steelhead fishing between resident categories. A five percent ( $P \leq 0.05$ ) level of significance was used to analyze test results. Additional Bonferonni and Tukey HSD *post hoc* tests were used to determine which residence categories were significantly different from each other.

Anglers were asked, “*Are you a member of a conservation club or organization? If YES, what organization?*” Responses were summarized by the percentage of anglers belonging to at least one type of conservation club. A chi-square test of homogeneity was used to compare the frequency of membership in a conservation club with residence categories and guided status. For 2x2 contingency tables (one degree of freedom), a Yates correction for continuity was used when necessary (Zar 1984).

#### 3.2.2 Angling Methods and Licenses

The Interview Team recorded guided status (non-guided or guided) from the angler’s license which was summarized by angler residence. The angling method (fly or gear) and access method (jet boat, drift boat or shore anglers) were recorded by the Interview Team and summarized by angler residence and guided status. In addition, angling method was summarized by access method. A chi-square test of homogeneity was used to compare frequencies for all summaries and a Yates correction for continuity was used when necessary (Zar 1984).

The Interview Team recorded the angler’s license class and the number of classified days purchased and used from the angler’s license. The license class (one day, eight day and annual) and the number of classified days purchased and used were summarized by residence category and guided status.

Anglers were not required to purchase all the classified waters days at one time, nor were they required to carry all the used classified waters licenses they purchased with them.

Therefore, the Interview Team recorded the number of classified days purchased by the angler just prior to the day the angler was interviewed. When an angler was carrying previous classified waters licenses, the Interview Team also recorded the number of classified waters days purchased from the additional licenses. It was not possible to determine the total number of days fished by individual non-resident anglers over the duration of their visit.

### 3.2.3 Angler Compliance with Regulations

The number and type of infractions cited by the Interview Teams were recorded on the angler interview form. The frequency of infractions were summarized by angler residence, river section and week. The type of infraction was summarized by angler residence and guided status.

### 3.3.0 Angler Perceptions of Problems and Preferences for Management Strategies

The Interview Team asked anglers;

*“On the Babine River to what degree do you perceive steelhead angler management problems about each of the following concerns?*

*Do you perceive the;*

- |   |          |               |               |
|---|----------|---------------|---------------|
| 1. Number of boat-based anglers to be;  | NO PROB. | A MINOR PROB. | A MAJOR PROB. |
| 2. Number of shore-based anglers to be; | NO PROB. | A MINOR PROB. | A MAJOR PROB. |
| 3. Overall number of anglers to be;     | NO PROB. | A MINOR PROB. | A MAJOR PROB. |
| 4. Other Concerns _____;                | NO PROB. | A MINOR PROB. | A MAJOR PROB. |

If the angler perceived a problem about any of the above concerns they were asked to suggest a management strategy to deal with the problem. Anglers were also asked about any other concerns they perceived on the river and management strategies to deal with those concerns.

The major, minor and no problem categories (for the number of boat-based, the number of shore-based and the overall number of anglers) were summarized by residence categories, guided status, access method and angling method. For small samples, the major and minor problems were grouped and compared to no problems within each of the categories using a chi-square test of homogeneity and when necessary, a Yates correction for continuity (Zar 1984). The management strategies suggested by anglers were summarized for all three concerns.

Other concerns were summarized in several ways because there was a wide variety of responses. Each response was categorized into one of 23 ‘response groups’ and then groups were placed into one of five broader categories: regulation issues, fee issues, angler number issues and guiding issues (see Appendix 4 for details). The response within each broader category was summarized by the anglers’ residence categories and guided status. The suggested management strategy was listed for each of these concerns. Management strategies were not subdivided by residence or guided status because of small samples.

The overall perceptions of problems on the river was assessed by summing the percentage of major and minor problems for all three concerns (the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers). The frequency of major and minor problems was summarized for each residence category and guided status. The differences between the number of minor and major problems within each residence category and guided status were compared with a non-parametric Kruskal-Wallis test. A Mann-Whitney U test was used to compare difference in the number of major and minor problems between guided and non-guided anglers. The overall number of major and minor problems were also summarized by week and river section.

### 3.4.0 Angler Catch and Effort

The Interview Team asked anglers, "How many hours have you fished today?" and "What type of fish have you landed today? How many did you keep or release?" The hours angling, steelhead landed, Dolly Varden/bull trout (*Salvelinus malma/S. confluentus*) kept and released and other species kept and released were recorded on the angler interview form.

Typically, anglers were not interviewed at the end of the angling day (trip) and therefore incomplete angler catch and effort data were collected. Thus, the mean of the ratios was used instead of the ratio of the means since anglers were sampled while they were still fishing, implying probabilities were proportional to their trip length (Pollock *et al.* 1994; Jones *et al.* 1995; Pollock *et al.* 1997). Also, short incomplete trips (< 0.5 hr.) were excluded to prevent the variance from being influenced by extreme catch rates that may occur during short trips (Pollock *et al.* 1994; Hoenig *et al.* 1997). Catch rate ( $\hat{R}$ ) was estimated by:

$$\text{Equation 1} \quad \hat{R} = \frac{\sum_{i=1}^n c_i / L_i}{n}$$

where  $\hat{R}$  = catch rate of the sample,  $n$  = the number of sampling units (interviews),  $L_i$  = the length of the fishing trip at the time of the interview and  $c_i$  = the catch for the  $i$ th sampling unit (angler interview).

For steelhead, catch rate, steelhead caught and effort (in hours) were summarized by week, river section, angler residence, guided status, access method and angling method. For all other species of fish, fish caught, catch rate (in hours) and the fish per rod day were summarized. Fish per rod day was the catch rate multiplied by eight hours of effort, since eight hours was representative of the typical rod day during the classified waters period (R.S. Hooton personnel communication).

The total effort and catch were calculated for the upper Babine River (Boucher Creek, Bridge area and Nichyeskwa River sections) with observed counts of anglers from the angler count forms. For each week the mean of the catch rate ratios were used to estimate



weekly catch rates ( $\hat{R}_{\text{week}}$ ; Equation 1). The variance in the weekly catch rate ( $Var(\hat{R}_{\text{week}})$ ) was the day-to-day variation in catch rates within the week ( $s_R^2$ ; Pollock *et al.* 1994). The variance of the total catch rate ( $Var(\hat{R})$ ) was the sum of the variance of catch rates for each week (Equation 3, Pollock *et al.* 1994).

Equation 2 
$$Var(\hat{R}_{\text{week}}) = s_R^2$$

Equation 3 
$$Var(\hat{R}) = \sum_{\text{week}} Var(\hat{R}_{\text{week}})$$

The daily counts were multiplied by eight hours (8 hr. = 1 rod day) to estimate the daily effort. For each week, the daily effort estimates were used to calculate the mean daily effort within a week ( $\bar{e}_{\text{week}}$ ). The total effort within a week ( $\hat{E}_{\text{week}}$ ) was estimated by multiplying the mean daily effort by the number of days in the week ( $N = 7$ ; Equation 4).

Equation 4 
$$\hat{E}_{\text{week}} = N \times \bar{e}_{\text{week}}$$

Equation 5 
$$\hat{E} = \sum_{\text{week}} \hat{E}_{\text{week}}$$

The total effort ( $\hat{E}$ ) was the sum of the effort of all weeks ( $\hat{E}_{\text{week}}$ ). The variance in the estimate of total effort within each week ( $Var(\hat{E}_{\text{week}})$ ) was estimated by:

Equation 6 
$$Var(\hat{E}_{\text{week}}) = N^2 \times (s^2 / n) \times fpc$$

where  $N$  was the total number of days in the week,  $s^2$  was the sample variance of the daily effort within the week,  $n$  was the number of observations of total daily effort within the week, and  $fpc$  was the finite population correction factor ( $(N-n)/N$ , Schubert 1988). The variance in total effort ( $Var(\hat{E})$ ) was estimated by:

Equation 7 
$$Var(\hat{E}) = \sum_{\text{week}} Var(\hat{E}_{\text{week}})$$

where the variance in effort for each week ( $Var(\hat{E}_{\text{week}})$ ) was summed (Schubert 1988).

The catch within a week ( $\hat{C}_{\text{week}}$ ) was the product of the catch rates for each week and the total effort within a week ( $\hat{E}_{\text{week}}$ ; Equation 8). The variance of catch within a week ( $Var(\hat{C}_{\text{week}})$ ) was calculated with the method described by Pollock *et al.* (1994; Equation 9). The approximate 95 percent confidence intervals were calculated with the method described by Scheaffer *et al.* (1990; Equation 10):

Equation 8 
$$\hat{C}_{\text{week}} = \hat{R}_{\text{week}} \times \hat{E}_{\text{week}}$$

Equation 9 
$$\text{Var}(\hat{C}_{\text{week}}) = \hat{E}_{\text{week}}^2 \times \text{Var}(\hat{R}_{\text{week}}) + \hat{R}_{\text{week}}^2 \times \text{Var}(\hat{E}_{\text{week}}) + \text{Var}(\hat{E}_{\text{week}}) \times \text{Var}(\hat{R}_{\text{week}})$$

Equation 10 
$$95\% \text{ Confidence Intervals} = 2 \times \sqrt{\text{Var}(\hat{C}_{\text{week}})}$$

The total catch ( $\hat{C}$ ) was the sum of the weekly catch estimates and the variance for total catch was the sum of the weekly variance estimates in weekly catch  $\text{Var}(\hat{C}_{\text{week}})$ . The approximate 95 percent confidence intervals were calculated using Equation 11.

Equation 11 
$$95\% \text{ Confidence Intervals} = 2 \times \sqrt{\text{Var}(\hat{C})}$$

Catch rates and effort were not available for week 10-4 because interviews were not completed. Therefore, catch rate and effort counts from 10-3 were used for week 10-4.

## 4.0.0 Results

### 4.1.0 Interviews

Four-hundred and seventy-seven anglers were observed by the Interview Teams on the Babine River (Table 3). Two-hundred and ten anglers were approached for an interview and of those two (1.0 percent) were not angling. The remaining 208 anglers at least partially completed the interview. Of those, 27 anglers (12.9 percent) did not know enough English to complete all the questions. One B.C. resident angler was interviewed twice.

Overall, the Interview Team approached 44 percent of the anglers observed (Table 3). Twenty-seven percent of interviews were completed on the weekend days (Saturday and Sunday) and 73 percent were completed on week days. No interviews were conducted in the last week of the classified waters period because the DFO camp where the primary River Guardian resided in was not available. The time spent interviewing was a minimum estimate because the time other Conservation Officers spent relieving the primary River Guardian was not available. Weeks 9-2, 9-3, 10-2 and 10-3 had at least one day when the river was 'out' or turbid below the Nichyeskwa River (see Appendix 3.0).

Approximately 44 percent of anglers observed were interviewed. There were several reasons for the low proportion of interviews conducted. The interview team did not approach anglers they had already interviewed a second time but these anglers were recorded as observed. Also, a jet boat was rarely available for the Interview Team to use so jet boat-access anglers could pass in a jet boat and the Interview Team had no way of stopping them for an interview.

Table 3. The number of anglers observed, the percentage of observed anglers interviewed and the total anglers interviewed on the weekday or weekends within each week.

Week	Approximate Time Interviewing <sup>2</sup>	Anglers Observed	Percentage Interviewed	Percentage Interviews Initiated		
				Total (n)	Weekday (n)	Weekend (n)
9-1	19.5 hr.	11	91.1	4.8 (10)	40.0 (4)	60.0 (6)
9-2 <sup>1</sup>	56.2 hr	41	41.5	8.1 (17)	94.1 (16)	5.8 (1)
9-3 <sup>1</sup>	30.5 hr	44	84.1	12.6 (37)	78.0 (29)	21.6 (8)
9-4	39.5 hr	42	50.0	10.0 (21)	100.0 (21)	0.0 (0)
9-5	39.3 hr	104	54.8	27.1 (57)	70.2 (40)	29.8 (17)
10-1	27.5 hr	47	31.9	7.1 (15)	46.6 (7)	53.3 (8)
10-2 <sup>1</sup>	54.5 hr	129	37.2	22.9 (48)	77.1 (37)	22.9 (11)
10-3 <sup>1</sup>	38.5 hr	59	8.5	2.4 (5)	0.0 (0)	100.0 (5)
10-4	0.0 hr	0	0.0	0.0 (0)	0.0 (0)	0.0 (0)
<b>Total</b>	<b>305.4 hr</b>	<b>477</b>	<b>44.0</b>	<b>210</b>	<b>73.3 (154)</b>	<b>26.7 (56)</b>

1. Each week had at least one day when the water was recorded as turbid or the lower part of the river (below Nichyeskwa River) was 'out'.

2. See appendix 5.0 for details of the calculation of time spent interviewing.

In weeks 9-1 and 9-3 the number of anglers interviewed was close to the number of anglers observed. In weeks, 9-2, and 9-4 through 10-3, the number of anglers observed was considerably higher than the anglers interviewed (Table 2, Figure 3). Although, the number of anglers observed was positively correlated with the number of anglers interviewed in

each week and indicated good temporal representation (Pearson Correlation  $R = 0.777$ ,  $P \leq 0.012$ ). In week 10-2 the Bulkley River was 'out' and the Interview Team noted many anglers that would have fished the Bulkley River were displaced and were fishing the upper Babine.

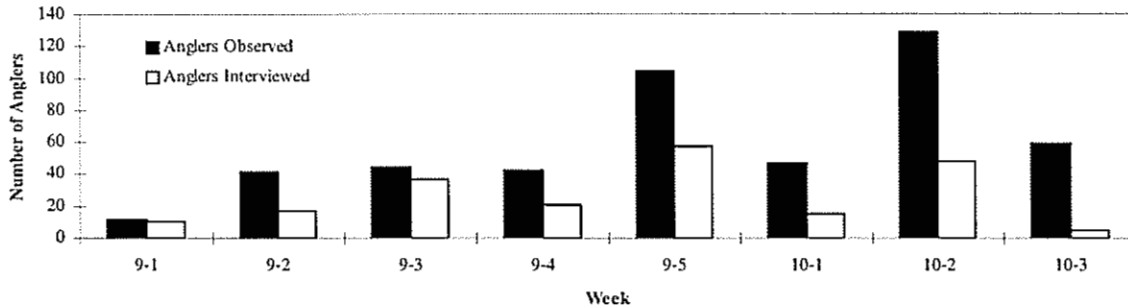


Figure 3. The number of anglers observed and interviewed within each week.

The distribution of interviewed anglers was not equal throughout the upper Babine River (Table 4). Most anglers (61 percent) were interviewed in the bridge area river section, 18 percent were interviewed just downstream of the bridge area in the Nichyeskwa River section, 11 percent were interviewed in the Nilkitkwa River section and 9 percent were interviewed upstream of the bridge between the DFO weir and Boucher Creek. From this result it was clear that guided anglers under-represented in the survey because almost all guided angler activity occurred downstream from Nilkitkwa River where sampling effort was minimal due to access constraints.

Table 4. The percentage and number (n) of interviews initiated within each river section.

	River Section (Label)	Percentage (n) of Interviews Initiated <sup>1</sup>
1	Boucher Creek - upstream of DFO weir (Boucher Cr.)	9.4 (19)
2	downstream of DFO weir - upstream of Nichyeskwa R. (Bridge Area)	61.4 (59)
3	downstream of Nichyeskwa R. - upstream of Nilkitkwa R. (Nichyeskwa R.)	17.8 (36)
4	downstream of Nilkitkwa R. - Gail Cr. (Nilkitkwa R.)	11.4 (23)

1. Eight (8) angler interviews initiated could not be assigned a river section.

A non-response bias check was completed for those anglers that only partially completed the on-site interview. Respondents and non-respondents were similar in the number of hours fished (Mann Whitney  $U = 1971.5$ ,  $df=1$ ,  $P \leq 0.397$ ), angler age (Mann Whitney  $U = 1961.0$ ,  $df=1$ ,  $P \leq 0.402$ ) and guided status (chi-square  $\chi^2 = 1.155$ ,  $df=1$ ,  $P \leq 0.282$ ). However, respondents differed from non-respondents by their residence categories (chi-square  $\chi^2 = 31.130$ ,  $df=2$ ,  $P \leq 0.0005$ ). There were more Non-Canadian residents that did not complete the whole survey (because they could not speak English) than B.C. residents or Canadian residents.

## 4.2.0 Angler Characteristics

### 4.2.1 Angler Demographics

Forty-five percent (93 interviews) of all anglers interviewed were B.C. residents (Table 5). Of all B.C. resident interviews, 38 percent (35 interviews) were from the Skeena Region and most Skeena Region anglers (72 percent, 25 interviews) resided in the Bulkley Valley (all from Houston or Smithers). Residents from other areas of B.C. represented 58 percent of all B.C. resident angler interviews. Nine percent (19 interviews) of all anglers interviewed lived in other Canadian provinces and 46 percent (96 interviews) were Non-Canadian residents (Table 5).

Table 5. The percentage of Babine River anglers interviewed by residence categories.

Anglers Residence	Percentage of Angler Interviews Initiated (n)
B.C. Resident Total	44.7 (93)
Skeena Region	37.6 (35)
Other areas of the Province	58.1 (54)
Unknown (postal code not collected)	4.3 (4)
Canadian Resident	9.1 (19)
Non-Cdn. Resident	46.2 (96)

More B.C. residents than Non-Canadian residents were interviewed in the first and last four weeks of interviewing in the classified waters period (Figure 4). Conversely, more Non-Canadian residents were interviewed than B.C. residents in the second, third and fourth weeks of the classified waters period (Figure 4). Canadian residents were interviewed only in weeks 9-3, 9-5 and 10-2. More anglers were interviewed in week 9-5 because the fly fishing only period ended downstream of the DFO weir. In addition, the Interview Team noted that in 10-2 the Bulkley River was 'out' which caused displaced anglers to fish on the Babine River.

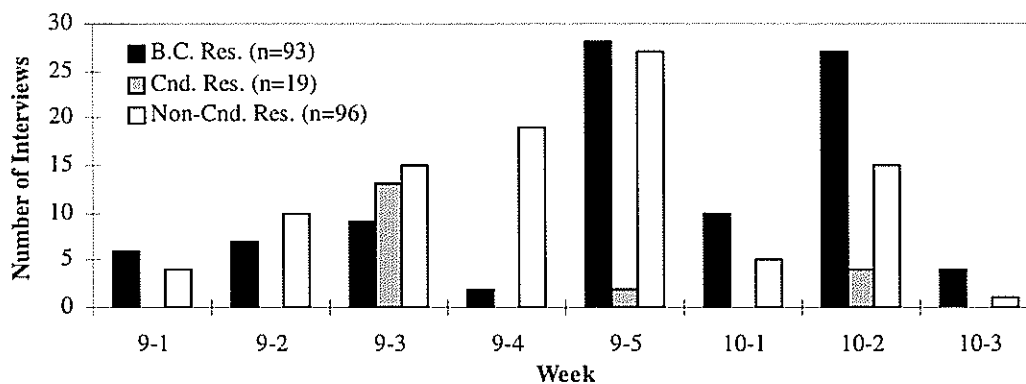


Figure 4. The number of B.C. residents, Canadian residents and Non-Canadian residents interviewed within each week.

Fewer B.C. residents were interviewed than Non-Canadian residents in all river sections except in bridge area (Figure 5). Canadian residents were interviewed in all river sections although only one Canadian resident was interviewed in the Nilkitkwa River section.

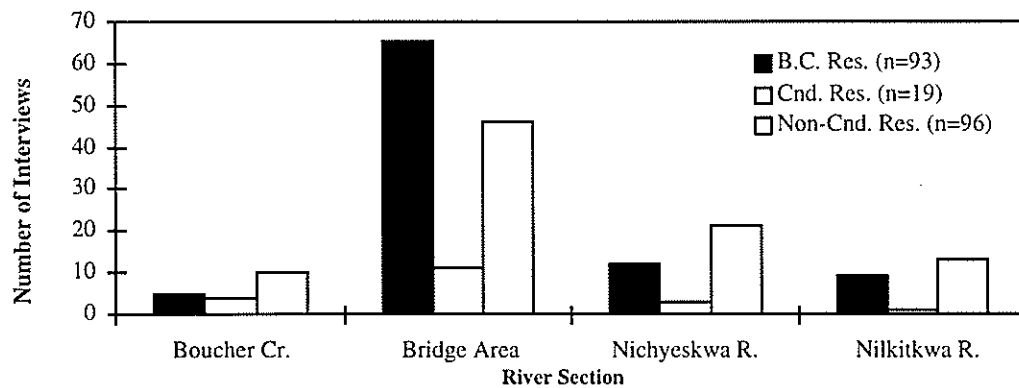


Figure 5. The number of B.C. residents and Non-Canadian residents interviewed within each river section.

Ninety-seven percent of anglers were male (189 anglers) and only three percent (6 anglers) were female (Table 6). On average, males were 42 years old and females were 48 years old. About half of male and female anglers were between 25 and 45 years old (55 and 50 percent, respectively).

Table 6. The percentage of male and female anglers within each age category and the mean age of male and female anglers interviewed.

Age Categories	Percentage of Male Anglers (n)	Percentage of Female Anglers (n)
under 16	0.0 (0)	0.0 (0)
17-24	5.8 (11)	0.0 (0)
25-34	23.3 (44)	33.3 (2)
35-44	32.3 (31)	16.7 (1)
45-54	21.7 (41)	16.7 (1)
55-64	12.1 (22)	16.7 (1)
65+	5.3 (10)	16.7 (1)
<b>Total</b>	<b>96.9 (189)</b>	<b>3.1 (6)</b>
<b>Mean Age</b>	<b>42.4</b>	<b>48.0</b>

On average, upper Babine River steelhead anglers had been angling for 9.3 years (Table 7). Forty-four percent of B.C. residents had more than ten years of steelhead angling experience whereas 32 percent of Canadian residents and 17 percent of Non-Canadian residents had more than ten years of steelhead angling experience. Consequently, the years of steelhead angling experience differed significantly between B.C. residents, Canadian residents and Non-Canadian residents (ANOVA  $F = 4.130$ ,  $df = 2$ ,  $P \leq 0.017$ ). This result indicated that at least one of the residence categories (and not necessarily all of the residence categories) was different in mean years angling experience from another residence category. Further *post hoc* tests (Bonferonni and Tukey HSD) suggested B.C. residents had more years of steelhead angling experience than Non-Canadian residents (Tukey HSD = 4.62,  $P \leq 0.012$ ). The years of steelhead angling experience were similar between B.C. residents and Canadian residents (Tukey HSD = 3.05,  $P \leq 0.512$ ) or between Canadian residents and Non-Canadian residents (Tukey HSD = 1.58,  $P \leq 0.836$ ).

Table 7. The percentage of years steelhead angling experience within each residence category.

Residence	Percentage of Anglers in Years Angling Experience Categories (n)						Mean* (total n)
	1	2-5	6-10	11-15	16-20	21+	
B.C. Resident	21.5 (20)	21.5 (20)	12.9 (12)	19.4 (18)	8.6 (18)	16.1 (15)	11.7 (103)
Canadian Resident	47.4 (9)	21.1 (4)	0.0 (0)	10.5 (2)	5.3 (1)	15.8 (3)	8.3 (19)
Non-Cdn. Resident	38.5 (35)	28.6 (26)	16.5 (15)	4.4 (4)	3.3 (3)	8.8 (8)	7.1 (91)
<b>Total</b>	<b>30.0 (64)</b>	<b>23.5 (50)</b>	<b>12.7 (27)</b>	<b>11.3 (24)</b>	<b>10.3 (22)</b>	<b>12.2 (26)</b>	<b>9.32 (213)</b>

\*SE of the mean for B.C. resident, Canadian resident and Non-Cdn. Resident and total were 1.16, 2.70, 1.05 and 0.78 respectively.

Forty-seven percent of upper Babine River anglers (94 anglers) were members of a conservation club. Of those, 86 percent were members of at least one club, 8.5 percent were members of two clubs and 5.3 percent were members of three or more clubs. Twenty-five percent of B.C. residents (24 anglers), 63 percent (12 anglers) of Canadian residents and 65 percent (58 anglers) were members of at least one conservation club. More Canadian and Non-Canadian residents were members of a conservation club than B.C. residents (chi-square  $\chi^2 = 30.57$ ,  $df=2$ ,  $P \leq 0.0005$ ). Seventy-five percent of guided anglers were members of a conservation club while 42 percent of non-guided anglers were members of a conservation club. More guided anglers interviewed were members of a conservation club than non-guided anglers (chi-square  $\chi^2 = 10.67$ ,  $df=1$ ,  $P \leq 0.001$ ).

Of those anglers that were members of at least one conservation club, most were members of a foreign country angling club (26 percent), less were members of a local angling club (18 percent) and Trout Unlimited (17 percent), 15 percent were members of the B.C. Steelhead Society and a few were members of the B.C. Wildlife Federation (6 percent; Table 8).

Table 8. Of the five most frequently mentioned conservation clubs, the percentage of all anglers that were a member of at least one conservation club and the percentage of anglers that were a member of all anglers that answered the question.

Conservation Club	Percentage of anglers that were a member of at least one conservation club (n)	Percentage of anglers that answered the question (n)
Foreign country angling club	25.5 (24)	11.9 (24)
Other angling club (local)	18.1 (17)	8.4 (17)
Trout Unlimited	17.0 (16)	7.9 (16)
B.C. Steelhead Society	14.9 (14)	6.9 (14)
B.C. Wildlife Federation	6.4 (6)	2.9 (6)

#### 4.2.2 Angling Methods and Licenses

Of all anglers interviewed, 18 percent (38 anglers) were guided and 82 percent (169 anglers) were non-guided. Few B.C. and Canadian residents were guided (8 and 5 percent, respectively) however, thirty percent (29 anglers) of Non-Canadian residents were guided (Table 9). Non-Canadian residents were more likely to be guided anglers than B.C. or Canadian residents (chi-square  $\chi^2 = 16.9$ ,  $df=2$ ,  $P < 0.0005$ ). Fifty-three percent (9 of 17 anglers interviewed) of anglers interviewed in week 9-2 were guided anglers and 43 percent

(16 of 37 anglers interviewed) of anglers interviewed in week 9-3 were guided anglers. In contrast, in weeks 10-2 and 9-1 the number of guided anglers was relatively low (6.5 and 10 percent, respectively). Eighty-three percent (19 anglers) of anglers interviewed in the Nilkitkwa River section were guided, whereas 26, 11 and 3 percent of anglers interviewed in the Boucher Creek, Nichyeskwa River and Bridge area river sections were guided. Encounters with guided anglers in the Boucher Creek, Nichyeskwa River and bridge area river sections were expected to be low because they do not frequent those areas except on trips in and out of the steelhead lodges and in the event the river is 'out' downstream.

Table 9. The percentage of guided and non-guided anglers within each residence category.

	Percentage of Anglers	
	Guided (n)	Non-Guided (n)
B.C. Resident	7.8 (8)	91.3 (84)
Canadian Resident	5.3 (1)	94.7 (18)
Non-Cdn. Resident	30.2 (29)	69.8 (67)

Of all anglers, fly anglers were more common than gear anglers (70 and 30 percent, respectively; Table 11). Forty-seven percent of B.C. residents were fly anglers, while 53 percent were gear anglers (Table 10). The majority of Canadian residents interviewed were fly anglers (95 percent), while five percent were gear anglers. Of all Non-Canadian resident anglers, 85 percent were fly anglers and 15 percent were gear anglers. The ratio of fly to gear anglers differed by residence category (chi-square  $\chi^2 = 39.15$ ,  $df=2$ ,  $P \leq 0.0005$ ). Among gear anglers, B.C. residents were almost four times more frequent than Non-Canadian residents and among fly anglers Canadian and Non-Canadian residents were twice as frequent as B.C. residents.

Gear use was prohibited until October 1 in the area from the DFO weir to Nichyeskwa River. Therefore, all anglers using gear were interviewed in the second half of the classified waters period. Almost half of all gear anglers were interviewed in the second half of week 9-5 (October 1-4), 35 percent were interviewed in week 10-2, 11 percent were interviewed in week 10-1 and the remaining six percent were interviewed in week 10-3.

Table 10. The percentage of fly and gear anglers and jet boat-access, drift boat-access and shore-access anglers in each residence and guided status category.

	Percentage of Anglers			Percentage of Anglers	
	Jet Boat Access	Drift Boat Access	Shore Access	Fly Anglers	Gear Anglers
B.C. Resident	21.3 (19)	0.0 (0)	78.7 (70)	46.7 (42)	53.3 (48)
Canadian Resident	26.3 (5)	0.0 (0)	73.7 (14)	94.7 (18)	5.3 (1)
Non-Cdn. Residents	27.2 (26)	2.2 (0)	70.7 (65)	85.4 (82)	14.6 (14)
Guided	85.7 (30)	0.0 (0)	14.3 (5)	82.1 (35)	7.9 (3)
Non-Guided	11.0 (18)	1.2 (2)	87.8 (144)	75.4 (107)	35.5 (59)

The majority of anglers interviewed were shore-access anglers (75 percent, Table 11), whereas 24 percent gained access by jet boat and one percent gained access by drift boat (2 anglers). Seventy-nine percent of B.C. residents, 74 percent of Canadian residents and 71 percent of Non-Canadian residents were shore-access anglers (Table 10). Similarly, 21



percent of B.C. residents, 26 percent of Canadian residents and 27 percent of Non-Canadian residents gained river access with a jet boat. There were no differences in the frequency of jet boat-access and shore-access methods between residence categories (chi-square  $\chi^2 = 1.02$ ,  $df=2$ ,  $P \leq 0.600$ ). Of the anglers that gained access by jet boat, 63 percent (30 anglers) were guided and 37 percent (18 anglers) were non-guided.

Guided anglers were more likely to fly fish than non-guided anglers (chi-square  $\chi^2 = 8.06$ ,  $df=1$ ,  $P \leq 0.005$ , Table 10). Only eight percent of guided anglers fished with gear while 36 percent of non-guided anglers fished with gear. Most guided anglers interviewed accessed the river by jet boat (86 percent) while only 14 percent accessed the river from shore. In contrast, 11 percent of non-guided anglers accessed the river by jet boat whereas 88 percent accessed the river from shore. Guided anglers accessed the river differently than non-guided anglers (chi-square  $\chi^2 = 82.92$ ,  $df=1$ ,  $P < 0.0005$ ).

Overall, 85 percent of jet boat-access anglers were fly fishing and all (2 anglers) drift boat-access anglers were fly fishing (Table 11). Fishing with gear was more common among shore-access anglers (36 percent) than jet or drift boat-access anglers (15 and 0 percent, respectively). The composition of fly and gear anglers differed by access method (chi-square  $\chi^2 = 6.72$ ,  $df=1$ ,  $P \leq 0.015$ ; Table 11).

Table 11. The percentage of fly and gear anglers that gained access to the river by jet boat, drift boat and shore.

<b>Gear Type</b>	<b>Jet Boat Access (%)</b>	<b>Drift Boat Access (%)</b>	<b>Shore Access (%)</b>	<b>Total (%)</b>
Fly	85.4 (41)	100.0 (2)	64.2 (95)	<b>69.7 (138)</b>
Gear	14.6 (7)	0.0 (0)	35.8 (53)	<b>30.3 (60)</b>
<b>Total</b>	<b>24.2 (48)</b>	<b>1.0 (2)</b>	<b>74.7 (148)</b>	<b>100.0 (198)</b>

Almost all of B.C. residents anglers purchased an annual angling license (98.9 percent, 89 anglers). Only one B.C. resident angler bought an eight day angling license (1 percent; Table 12). Seventy-four percent of Non-Canadian residents bought annual licenses, while 26 percent bought eight day licenses. Canadian residents also bought more annual angling licenses (56 percent) than eight day licenses (44 percent). None of the anglers interviewed bought one day angling licenses. The distribution of license class days differed by residence category ( $\chi^2 = 31.09$ ,  $df=2$ ,  $P \leq 0.0005$ ; Table 12). Non-Canadian residents were less likely to buy an annual license than B.C. or Canadian resident anglers. Similarly, guided anglers were less likely to buy an annual license than non-guided anglers (chi-square  $\chi^2 = 18.92$ ,  $df=2$ ,  $P \leq 0.0005$ ).

Table 12. The percentage of anglers with a one day, eight day and annual license within each residence and guided status category.

	Percentage of Anglers in License Class		
	1 Day (n)	8 Day (n)	Annual (n)
B.C. Resident	0.0 (0)	1.1 (1)	98.9 (89)
Canadian Resident	0.0 (0)	44.4 (8)	55.6 (10)
Non-Cdn. Resident	0.0 (0)	26.4 (24)	73.6 (67)
Guided	0.0 (0)	42.4 (14)	57.6 (19)
Non-Guided	0.0 (0)	11.5 (19)	88.5 (146)

Anglers were not required to purchase all the classified waters days at one time, nor were they required to carry all of their used classified waters licenses they purchased with them. Therefore, the data represented the number of classified days purchased by the angler just prior to the day the angler was interviewed. The total number of classified waters licenses purchased up to the time of the interview was only available when the angler carried previous classified waters licenses.

Table 13. The number of classified waters days purchased at the time of the interview in each license class for Canadian and Non-Canadian residents.

License Class	Classified Waters Days Purchased (n)							
	1 Day	2 Day	3 Day	4 Day	5 Day	6 Day	7 Day	8 Day
<b>Canadian Resident</b>								
1 Day	0	0	0	0	0	0	0	0
8 Day	3	0	4	1	0	0	0	0
Annual	4	1	3	1	0	0	0	1
<b>Non-Cdn. Resident</b>								
1 Day	0	0	0	0	0	0	0	0
8 Day	7	1	3	0	0	0	12	1
Annual	29	6	7	8	0	0	6	6

The number of classified waters days purchased with an eight day license varied among residence categories (Table 13, Figure 6). Three Canadian and seven Non-Canadian residents purchased one day classified waters licenses. Four Canadian residents purchased three days of classified waters angling and one Canadian resident purchased five days of classified waters angling. More Non-Canadian residents (13 anglers, all guided) purchased seven or eight days of classified waters angling. (Table 13, Figure 6).

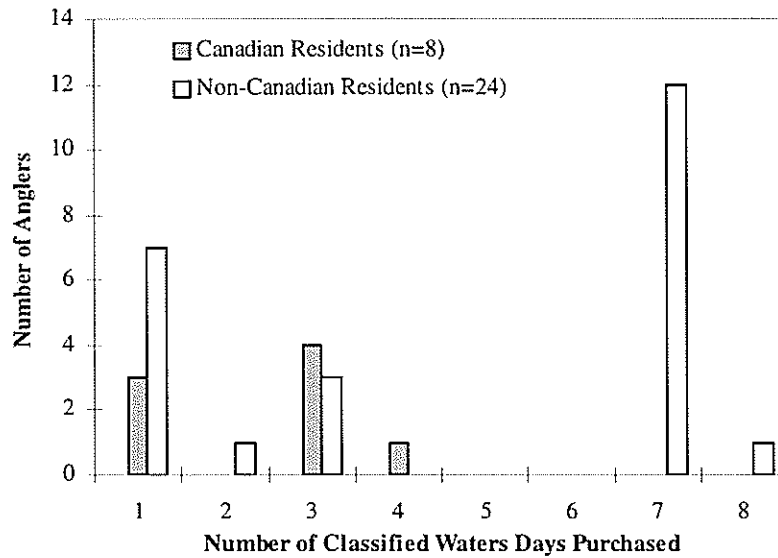


Figure 6 The number of classified waters days purchased at the time of the interview by those anglers with an eight day angling license within each residence category.

All of the guided anglers that purchased eight day angling licenses purchased four, seven or eight days of classified waters angling (Figure 7). Conversely, non-guided anglers that bought eight day angling licenses purchased one, two or three days of classified waters angling (Figure 7).

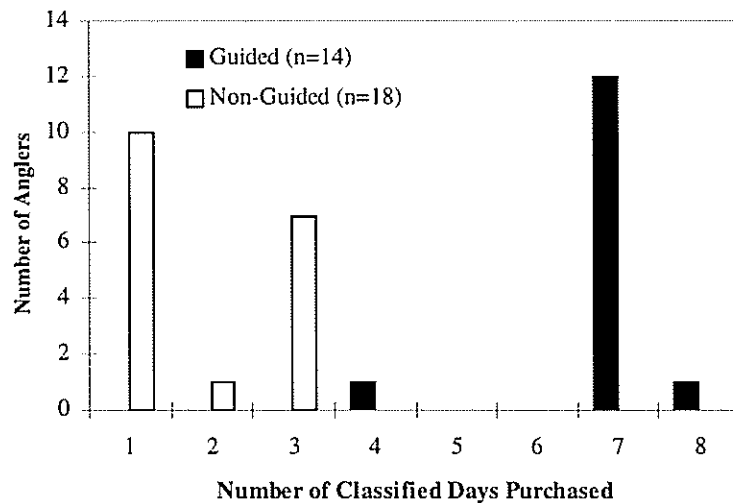


Figure 7. The number of classified waters days purchased at the time of the interview by those anglers with an eight day angling license by guided and non-guided anglers.

Most Canadian residents who bought annual angling licenses purchased four days or less of classified waters angling and only one Canadian resident angler purchased eight days of classified waters angling (Table 13, Figure 8). About half of Non-Canadian residents who bought annual angling licenses purchased one day of classified waters angling at the time of

the interview. The other half of Non-Canadian residents purchased two, three, four, seven or eight days of classified waters angling (Table 13, Figure 8).

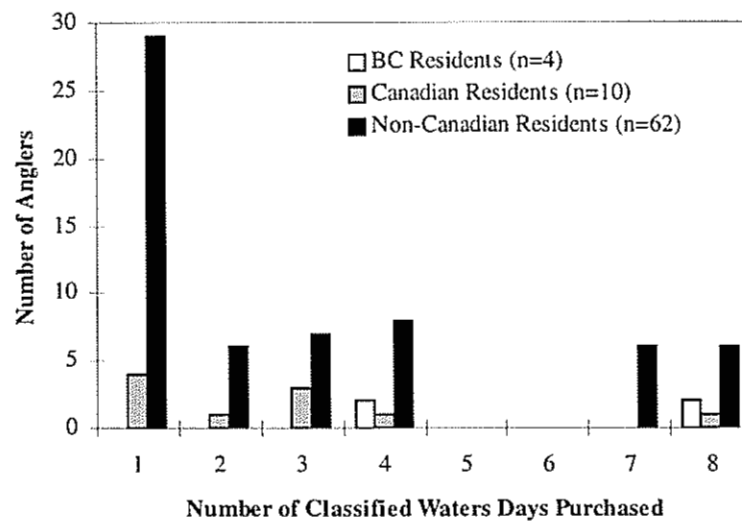


Figure 8. The number of classified waters days purchased at the time of the interview by those anglers with an annual angling license within each residence category.

Thirty-three non-guided anglers who bought annual angling licenses purchased one day of classified waters angling (Figure 9). In addition, non-guided anglers purchased two (7 anglers), three (10 anglers), four (9 anglers) and eight days (2 anglers) of classified waters angling. Most guided angler trips are a week long and thus, the majority of guided anglers purchased seven or eight days of classified waters angling and only two guided anglers bought four days of classified waters angling.

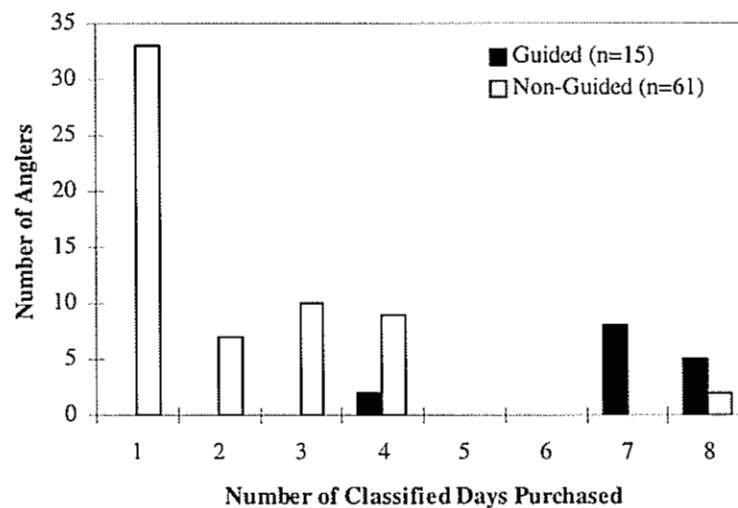


Figure 9. The number of classified waters days purchased at the time of the interview by those anglers with an annual angling license by guided and non-guided anglers.

### 4.2.3 Angler Compliance with Regulations

Eight percent of anglers (16 anglers) interviewed were cited for an infraction (Table 14). Of those anglers with an infraction, 94 percent (15 anglers) had one infraction and one angler had two infractions (6 percent). Fifty percent of anglers (8 anglers) with at least one infraction were Non-Canadian residents, 31 percent were B.C. residents (5 anglers) and six percent were Canadian residents (1 angler). The residence of the remaining anglers with at least one infraction (13 percent, 2 anglers) was unknown. One B.C. resident was cited with two infractions.

Table 14. The percentage of anglers with an infraction and the percentage of offending anglers with one or two infractions.

	Percentage of Anglers
Anglers with Infractions	7.7 (16)
1 Infraction	93.8 (15)
2 Infractions	6.3 (1)

Failure to buy a classified waters license was the most frequent infraction cited (29 percent, Table 15). Eighty percent of the failure to buy a classified waters license citations were given to Non-Canadian residents (4 anglers cited) representing four percent of all Non-Canadian residents interviewed. The remaining citation for not having a classified waters license was given to a B.C. resident. Failure to buy a steelhead stamp made up 21 percent of all citations. Two percent of all B.C. residents interviewed and one percent of all Non-Canadian residents interviewed failed to purchase a steelhead stamp. The remaining infractions were angling in a closed area (2 Non-Canadian residents), use of prohibited gear/bait (1 Non-Canadian resident) and retention of an illegal fish (1 B.C. resident). In addition, one warning for littering was given (1 B.C. resident). None of the guided anglers interviewed were cited for an infraction and no citations were given for illegal guiding.

Table 15. The type and frequency of angler infractions of all angler interviews on the Babine River.

Type of Infraction <sup>1</sup>	Percentage of Anglers with Infractions (n)			
	Total <sup>1</sup>	B.C. Residents	Canadian Residents	Non-Cdn. Resident
No classified waters license	35.7 (5)	1.1 (1)	0.0 (0)	4.2 (4)
No steelhead stamp	21.4 (3)	2.2 (2)	0.0 (0)	1.0 (1)
Failure to carry/produce license	14.3 (2)	1.1 (1)	5.3 (1)	0.0 (0)
Angling in a closed area	14.3 (2)	0.0 (0)	0.0 (0)	2.1 (2)
Prohibited gear/bait	7.1 (1)	0.0 (0)	0.0 (0)	1.0 (1)
Retained and illegal fish	7.1 (1)	1.1 (1)	0.0 (0)	0.0 (0)
Warning for littering	7.1 (1)	1.1 (1)	0.0 (0)	0.0 (0)

1. The type of infraction for two of those cited was not recorded.

There were seven anglers cited with eight infractions in the first four weeks of the classified waters period and nine anglers cited with nine infractions in the second half of the classified waters period. Spatially, eight infractions were cited to seven anglers in the bridge area, while four anglers were given citations in the Boucher Creek river section. Three anglers were given citations downstream Nichyeskwa River section and two anglers were given citations in Nilkitkwa River section.

### **4.3.0 Anglers Perceptions of Problems and Preferences for Management Strategies**

#### *4.3.1 Problems and Management Strategies for the Overall Number of Anglers*

Among anglers that completed the question, six percent (11 anglers) perceived a major problem, 19 percent (32 anglers) perceived a minor problem and 69 percent perceived no problems with the overall number of anglers on the river. Six percent of anglers (11 anglers) responded they were on the river for the first time and did not answer the question. Twenty-five percent of anglers perceived at least a minor problem with the overall number of anglers on the river.

Eleven anglers perceived a major problem with the overall number of anglers on the Babine River (Table 16, Figure 10). Of B.C. residents, 10 percent perceived a major problem with the overall number of anglers on the Babine River while 26 percent perceived a minor problem. None of the Canadian residents perceived a major problem, however 12 percent perceived a minor problem with the overall number of anglers on the river. Four percent of Non-Canadian residents perceived a major problem and 13 percent perceived a minor problem with the overall number of anglers. Angler perceptions of problems with the overall number of anglers on the Babine River differed by residence category (chi-square  $\chi^2 = 9.099$ ,  $df=2$ ,  $P \leq 0.011$ ).

Among guided anglers, none perceived a major or minor problem with the overall number of anglers on the river (Table 16, Figure 10). All guided anglers perceived no problems with the overall number of anglers on the river. Although guided anglers fished in areas where non-guided anglers were rare and therefore, not likely to perceive themselves as a problem. Seven percent and 22 percent of non-guided anglers perceived major and minor problems (respectively) with the overall number of anglers on the river. Small sample sizes prevented the use of the chi-square test to examine the differences in perceptions of problems of guided and non-guided anglers.

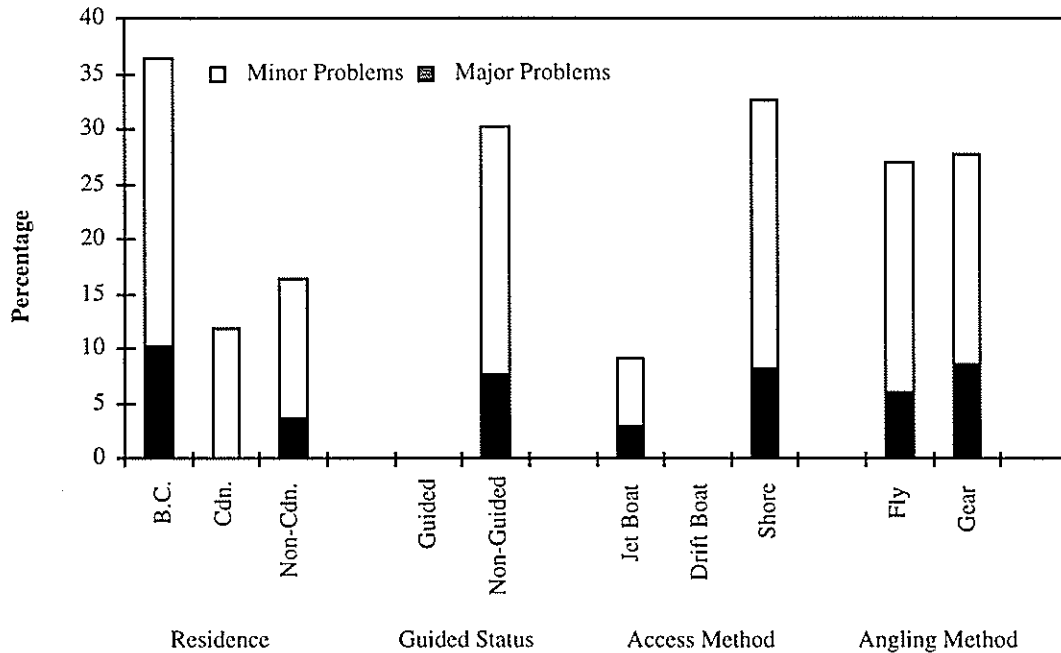


Figure 10. The percentage of anglers that perceived a minor or major problem with the overall number of anglers within each residence category, guided status, access method and angling method.

Three percent (1 angler) of jet boat-access anglers perceived a major problem and six percent perceived a minor problem with the overall number of anglers on the river (Table 16, Figure 10). Eight percent of shore-access perceived a major problem and 24 percent perceived a minor problem with the overall number of anglers on the river. The one drift boat-access angler that completed the question had no problems with the overall number of anglers on the river. Angler perceptions of problems toward the overall number of anglers on the river differed by boat and shore access anglers (chi-square  $\chi^2 = 6.382$ ,  $df=1$ ,  $P \leq 0.012$ ). The shore-access anglers perceived more problems with the overall number of anglers on the river than boat-access anglers.

Six percent of fly anglers and nine percent of gear anglers perceived a major problem with the overall number of anglers on the river (Table 16, Figure 10). In comparison, 21 percent and 19 percent of fly and gear anglers (respectively) perceived a minor problem with the overall number of anglers on the river. Angler perception of problems with the overall number of anglers on the river were similar among fly and gear anglers (chi-square  $\chi^2 = 0.006$ ,  $df=1$ ,  $P \leq 0.936$ ).

Table 16. The percentage of anglers that perceived major, minor and no problems with the overall number of anglers within each residence category, guided status category, access method and angling method.

	Percentage of Anglers with			Chi Square Value, df (significance level)
	Major Problems (n)	Minor Problems (n)	No Problems (n)	
<b>Residence</b>				$\chi^2 = 9.10, df=2, P \leq 0.011^1$
B.C. Resident	10.2 (9)	26.1 (23)	63.6 (56)	
Cdn. Resident	0.0 (0)	11.8 (2)	88.2 (15)	
Non-Cdn. Resident	3.6 (2)	12.7 (7)	83.6 (46)	Does not meet assumptions
<b>Guided</b>				
Guided	0.0 (0)	0.0 (0)	100.0 (16)	
Non-Guided	7.4 (11)	21.5 (32)	67.1 (100)	$\chi^2 = 6.38, df=1, P \leq 0.012^2$
<b>Access Method</b>				
Jet-Boat	3.0 (1)	6.1 (2)	90.9 (30)	
Drift Boat	0.0 (0)	0.0 (0)	100.0 (1)	$\chi^2 = 0.439, df=1, P \leq 0.803^3$
Shore	8.1 (10)	24.4 (30)	67.5 (83)	
<b>Angling Method</b>				
Fly fishing	6.0 (6)	21.0 (21)	73.0 (73)	
Gear fishing	8.6 (5)	19.0 (11)	72.4 (42)	

1. The major and minor problems were grouped together for residence categories to meet sample size assumptions for the chi-square test.
2. The jet boat and drift boat categories and the major and minor problems were grouped together to meet sample size assumptions for the chi-square test.
3. The Yates correction for continuity was not used for angling method because  $df=1$  and  $|f_{11}f_{22}-f_{12}f_{21}|$  was  $\leq n/2$ .

Anglers suggested nine management strategies to deal with the overall number of anglers on the upper Babine River. Ten anglers responded to the question, although one response was not a management strategy but a comment on the overall number of anglers on the river (Figure 11). Two anglers each suggested to implement a lottery/limited entry system, increase fees, implement a no conflicts section/ season (longer than October 1 or whole river), and limit Non-Resident anglers. One angler suggested to limit the overall number of people on the Babine River.



Figure 11. The preferred management strategies for anglers who perceived a problem with the overall number of anglers on the river.



4.3.2 Problems and Management Strategies for the Number of Boat-Based Anglers

Of all anglers, six percent (10 anglers) perceived a major problem, 14 percent (24 anglers) perceived a minor problem and 74 percent (126 anglers) perceived no problems with the number of boat-based anglers on the river. Six percent of anglers (11 anglers) responded they were on the river for the first time and did not answer the question. Twenty percent of anglers perceived at least a minor problem with the overall number of anglers on the river. Most of the boat-based anglers did not frequent the area where the majority of anglers were interviewed and thus, the frequency of problems with boat-based anglers was expected to be low.

Ten anglers perceived a major problem with the number of boat-based anglers (Table 17, Figure 12). Eight percent of B.C. resident anglers perceived a major problem and 16 percent perceived a minor problem with the number of boat-based anglers on the Babine River. No Canadian resident anglers perceived a major problem and 24 percent perceived a minor problem with the number of boat-based anglers on the Babine River. Six and ten percent of Non-Canadian residents perceived a major and minor problem with the number of boat-based anglers on the river. Angler perceptions of problems with the number of boat-based anglers were similar between residence categories (chi-square  $\chi^2 = 1.197$ ,  $df=2$ ,  $P \leq 0.550$ ).

None of the guided anglers perceived a major problem and 13 percent perceived a minor problem with the number of boat-based anglers on the river (Table 17; Figure 12). Although most guided anglers used a jet boat to access the river and were not likely to perceive themselves as problems. Six and 15 percent of the non-guided anglers perceived a major problem and minor problem (respectively) with the number of boat-based anglers. Small sample sizes prevented the use of the chi-square test to examine the differences in perceptions of problems of guided and non-guided anglers.

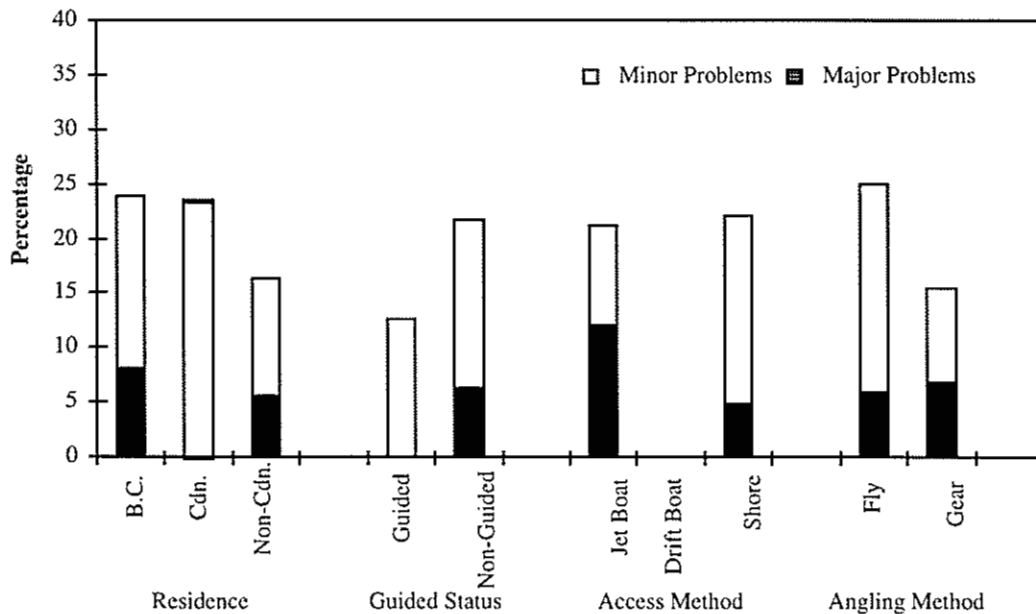


Figure 12. The percentage of Babine River anglers perceiving a major problem with the number of boat based anglers.

Twelve percent (4 anglers) of jet boat-access anglers perceived a major problem and nine percent perceived a minor problem with the number of boat-based anglers on the river (Table 17, Figure 12). Five percent of shore-access anglers perceived a major problem and 17 percent perceived a minor problem with the overall number of anglers on the river. The one drift boat access angler that responded to the question had no problems with the number of boat-based anglers on the river. Angler perceptions of problems toward the number of boat-based anglers on the river did not differ between boat and shore-access methods (chi-square  $\chi^2 = 0.029$ ,  $df=1$ ,  $P \leq 0.864$ ).

Six percent of fly anglers and seven percent of gear anglers perceived a major problem with the number of boat-based anglers on the river (Table 17, Figure 12). In comparison, 19 and 9 percent of fly and gear anglers (respectively) perceived a minor problem with the number of boat-based anglers on the river. Angler perception of problems with the number of boat-based anglers on the river were similar among fly and gear anglers (chi-square  $\chi^2 = 14.33$ ,  $df=1$ ,  $P \leq 0.162$ ).

Table 17. The percentage of anglers that perceived major, minor and no problems with the number of boat-based anglers within each residence category, guided status category, access method and angling method.

	Percentage of Anglers with			Chi Square Value, df (significance level)
	Major Problems (n)	Minor Problems (n)	No Problems (n)	
<b>Residence</b>				$\chi^2 = 1.197$ , $df=2$ , $P \leq 0.550^1$
B.C. Resident	8.0 (7)	15.9 (14)	76.1 (67)	
Cdn. Resident	0.0 (0)	23.5 (4)	76.5 (13)	
Non-Cdn. Resident	5.5 (3)	10.9 (6)	83.6 (46)	Does not meet assumptions
<b>Guided</b>				
Guided	0.0 (0)	12.5 (2)	87.5 (14)	
Non-Guided	6.3 (9)	15.4 (22)	78.3 (112)	$\chi^2 = 0.029$ , $df=1$ , $P \leq 0.864^2$
<b>Access Method</b>				
Jet-Boat	12.1 (4)	9.1 (3)	78.8 (26)	
Drift Boat	0.0 (0)	0.0 (0)	100.0 (1)	$\chi^2 = 14.33$ , $df=1$ , $P \leq 0.162$
Shore	4.9 (6)	17.1 (21)	78.0 (96)	
<b>Angling Method</b>				
Fly fishing	6.0 (6)	19.0 (19)	75.0 (75)	
Gear fishing	6.9 (4)	8.6 (5)	84.5 (49)	

1. The major and minor problems were grouped together for residence categories to meet sample size assumptions for the chi-square test.

2. The jet boat and drift boat categories and the major and minor problems were grouped together to meet sample size assumptions for the chi-square test.

Anglers suggested 16 management strategies to deal with the number of boat-based anglers on the upper Babine River. Fifteen anglers responded to the question, although one response was not a management strategy but a comment on the number of boat-based anglers on the river (Figure 13). Six anglers suggested limiting the overall number of boats on the Babine River, but anglers were not specific as to what type of boats to limit. A limit to the motor size or noise of jet boats was suggested by four anglers. Three anglers were

specific in their request to limit the number of jet boats on the river. A limit to guiding and a no conflicts or fly only section/season (after October 1) were suggested by one angler each (Figure 13).

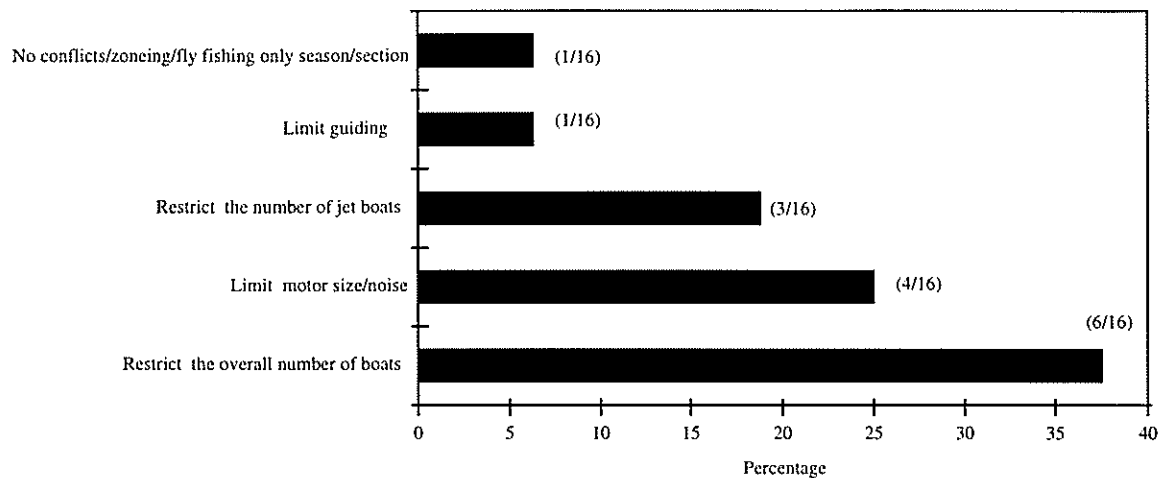


Figure 13. The preferred management strategies of anglers who perceived a problem with the number of boat-based anglers.

#### 4.3.3 Problems and Management Strategies for the Number of Shore-Based Anglers

Of all anglers, six percent (10 anglers) perceived a major problem, 20 percent (34 anglers) perceived a minor problem and 68 percent (117 anglers) perceived no problems with the number of shore-based anglers on the river. Six percent of anglers (11 anglers) responded they were on the river for the first time and did not answer the question. Twenty-six percent of anglers perceived at least a minor problem with the overall number of anglers on the river.

Ten anglers perceived a major problem with the number of shore-based anglers on the Babine River (Table 18, Figure 14). Nine percent of B.C. resident anglers perceived a major problem and 27 percent perceived a minor problem with the number of shore-based anglers on the Babine River. None of the Canadian resident anglers perceived a major problem and 18 percent perceived a minor problem with the number of shore-based anglers on the Babine River. Four and thirteen percent of Non-Canadian residents perceived a major and minor problem (respectively) with the number of shore-based anglers on the river. Angler perceptions of problems with the number of shore-based anglers differed between residence categories ( $\chi^2 = 7.717$ ,  $df=2$ ,  $P \leq 0.021$ ).

None of the guided anglers perceived a major problem and 13 percent perceived a minor problem with the number of shore-based anglers on the river (Table 18; Figure 14), although guided anglers do not frequent the area where most shore-access anglers fished. Seven and 24 percent of the non-guided anglers perceived a major problem and minor problem (respectively) with the number of shore-based anglers. Small sample sizes prevented the use of the chi-square test to examine the differences in perceptions of problems of guided and non-guided anglers.

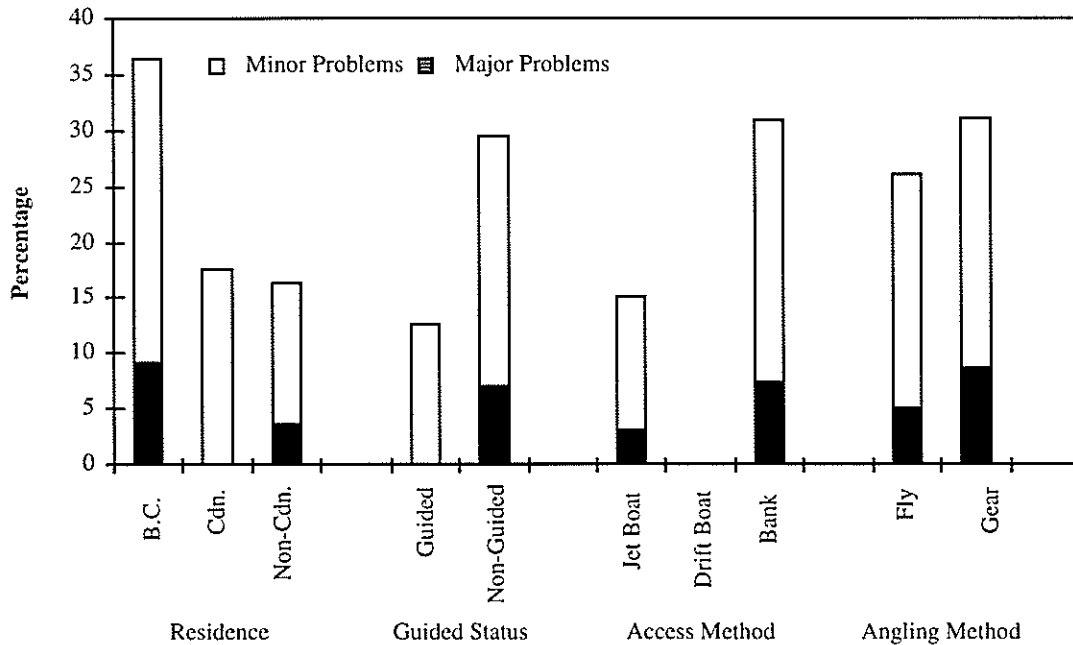


Figure 14. The percentage of Babine River anglers perceiving major and minor problems with the number of shore-based anglers.

Three percent of jet boat-access anglers perceived a major problem and 20 percent perceived a minor problem with the number of shore-based anglers on the river (Table 18, Figure 14). Seven percent of shore-access anglers perceived a major problem and 24 percent perceived a minor problem with the number of shore-based anglers on the river. The one drift boat access angler that responded to the question had no problems with the number of shore-based anglers on the river. Angler perceptions of problems toward the number of shore-based anglers on the river were similar between boat and shore access methods (chi-square  $\chi^2 = 2.74$ ,  $df=1$ ,  $P \leq 0.098$ ).

Five percent of fly anglers and nine percent of gear anglers perceived a major problem with the number of shore-based anglers on the river (Table 18, Figure 14). In comparison, 21 and 22 percent of fly and gear anglers (respectively) perceived a minor problem with the number of shore-based anglers on the river. Angler perception of problems with the number of shore-based anglers on the river were similar among fly and gear anglers (chi-square  $\chi^2 = 0.246$ ,  $df=1$ ,  $P \leq 0.620$ ).

Table 18. The percentage of anglers that perceived major, minor and no problems with the number of shore-based anglers within each residence category, guided status category, access method and angling method.

	Percentage of Anglers with			Chi Square Value, df (significance level) <sup>1</sup>
	Major Problems (n)	Minor Problems (n)	No Problems (n)	
<b>Residence</b>				
B.C. Resident	9.1 (8)	27.3 (24)	63.6 (56)	$\chi^2 = 7.717, df=2, P \leq 0.021^1$
Cdn. Resident	0.0 (0)	17.6 (3)	82.4 (14)	
Non-Cdn. Resident	3.6 (2)	12.7 (7)	83.6 (46)	
<b>Guided</b>				Does not meet assumptions
Guided	0.0 (0)	12.5 (2)	87.5 (14)	
Non-Guided	7.0 (10)	22.4 (32)	70.6 (101)	
<b>Access Method</b>				$\chi^2 = 2.743, df=1, P \leq 0.098^2$
Jet-Boat	3.0 (1)	12.1 (4)	84.8 (28)	
Drift Boat	0.0 (0)	0.0 (0)	100.0 (1)	
Shore	7.3 (9)	23.6 (29)	69.1 (85)	
<b>Angling Method</b>				
Fly fishing	5.0 (5)	21.0 (21)	69.0 (40)	$\chi^2 = 0.246, df=1, P \leq 0.620$
Gear fishing	8.6 (5)	22.4 (13)	74.0 (74)	

1. The major and minor problems were grouped together for residence categories to meet sample size assumptions for the chi-square test.

2. The jet boat and drift boat categories and the major and minor problems were grouped together to meet sample size assumptions for the chi-square test.

Anglers suggested five management strategies to deal with the number of shore-based anglers on the upper Babine River. Seven anglers responded to the question, although two responses were not management strategies but a comment on the number of shore-based anglers on the river. Two anglers suggested to increase fees and one angler each suggested to implement a no conflicts, fly only section or season (after October 1), to limit the overall number of people and to limit non-resident angler numbers.

#### 4.3.4 Other Concerns and Management Strategies

One hundred and seventeen steelhead angler management issues were mentioned. Fifty-four percent of the concerns were made by B.C. residents (63 responses), 19 percent (22 responses) were made by Canadian residents and 27 percent (32 responses) were made by Non-Canadian residents. All issues were categorized in one of five broader categories, regulation issues, access issues, fee/license issues, angler number issues and guiding issues. Of all anglers, 45 percent (52 responses) of issues mentioned regarded regulations, nine percent (11 responses) regarded access, 30 percent (36 responses) regarded fees/licenses, 14 percent (16 responses) regarded angler numbers and two percent (2 responses) regarded guiding issues.

Forty-eight percent (30 responses) of B.C. resident responses, 40 percent (9 responses) of Canadian responses and 41 percent (13 responses) of Non-Canadian responses regarded regulations (Table 19). The majority of B.C. resident responses were in regard to general regulations and gear restriction whereas Canadian and Non-Canadian resident responses were concerned with the licensing system and the lack of a fly-only angling section. B.C. resident responses were also concerned with enforcement, the lack of a fly only section and

the licensing system. One guided angler was concerned with the lack of a fly only section on the river. The most suggested management strategies include; to zone or add a section of river for fly fishing only (after October 1 or the whole river), to have the classified waters license not be river specific, to have a barbless only hook regulation and to improve the confusing classified waters licensing system (Table 19).

Table 19. Other regulation issues mentioned by anglers with suggested management strategies within each residence and guided status category.

Regulation Issues	Percentage of Responses (n)					Suggested Management Strategies (All)
	B.C.	Cdn.	Non-Cdn.	Guided	Non-Guided	
Total	47.6 (30)	40.9 (9)	40.6 (13)	40.0 (2)	43.2 (48)	
Licensing System	3.2 (2)	36.4 (8)	18.7 (6)	0.0 (0)	14.7 (16)	<ul style="list-style-type: none"> <li>◆ Class. license should not be river specific (10)</li> <li>◆ Improve confusing classified license system(5)</li> <li>◆ More vendors (1)</li> </ul>
Lack of Fly Only Section	4.8 (3)	4.5 (1)	12.5 (4)	20.0 (1)	6.4 (7)	<ul style="list-style-type: none"> <li>◆ Zone, manage for no conflicts, add fly fishing only zone. (13)</li> </ul>
Enforcement	7.9 (5)	0.0 (0)	0.0 (0)	0.0 (0)	4.6 (5)	<ul style="list-style-type: none"> <li>◆ More enforcement(4)</li> </ul>
General Regs.	14.3 (9)	0.0 (0)	6.3 (2)	0.0 (0)	10.8 (12)	<ul style="list-style-type: none"> <li>◆ Zone, manage for no conflicts, add fly fishing only zone (3)</li> <li>◆ Improve confusing classified license system (2)</li> <li>◆ Don't segregate residents and non-residents (1)</li> </ul>
Gear Restrictions <sup>2</sup>	15.9 (10)	0.0 (0)	0.0 (0)	20.0 (1)	7.2 (8)	<ul style="list-style-type: none"> <li>◆ Have a barbless hook regulation (8)</li> <li>◆ Zone, manage for no conflicts, add fly fishing only zone (1)</li> <li>◆ Lower the number of restrictions (1)</li> </ul>

2. One concern about gear restrictions could not be assigned a residence category.

Nine percent, (11 responses) regarded access issues (Table 20). Fourteen percent of all B.C. resident responses and six percent on Non-Canadian responses concerned access issues. Five B.C. resident responses concerned restricting more access and one wanted more access to the area. Four of the B.C. resident responses and the two Non-Canadian responses regarded facility issues. The majority of those (4 responses) wanted more facilities, while two wanted camping near the bridge area stopped. Guided anglers did not have any concerns regarding access to the Babine River (Table 20).

Table 20. Other access issues mentioned by anglers with suggested management strategies within each residence and guided status category.

Access Issues	Percentage of Responses (n)					Suggested Management Strategies (All)
	B.C.	Cdn.	Non-Cdn.	Guided	Non-Guided	
Total	14.3 (9)	0.0 (0)	6.3 (2)	0.0 (0)	9.9 (11)	
Access Issues	7.9(5)	0.0 (0)	0.0 (0)	0.0 (0)	4.6 (5)	<ul style="list-style-type: none"> <li>◆ Do not increase access (4)</li> <li>◆ Increase access (1)</li> </ul>
Facility Issues	6.3 (4)	0.0 (0)	6.3 (2)	0.0 (0)	5.5 (6)	<ul style="list-style-type: none"> <li>◆ Increase facilities (4)</li> <li>◆ There should be no camping near bridge (2)</li> </ul>

Angling license fees were of concern to 36 anglers (31 percent of responses, Table 21). Nineteen percent of B.C. resident responses were concerned about the license fee issue. Of all B.C. resident responses, eight percent were concerned with the proposed license fee increase, ten percent mentioned licenses were too expensive and two percent (1 angler) were concerned with the vendors that sell the licenses. Forty-one percent of all Non-Canadian resident responses and 50 percent of all Canadian resident responses were concerns regarding expensive licenses, the proposed license fee increase and vendor issues. Vendor issues included the lack of vendors to sell classified licenses and the lack of vendor education, mainly that vendors suggested anglers buy licenses that were not needed. One guided angler was concerned with the proposed license fee increase. Management strategies included; not raising fees, to have the Canadian resident fee be less than the Non-Canadian resident fee, to limit Non-Resident anglers and to provide more vendor education (Table 21).

Table 21. Other fee issues mentioned by anglers with suggested management strategies within each residence and guided status category.

License/Fee Issues	Percentage of Responses (n)					Suggested Management Strategies (All)
	B.C.	Cdn.	Non-Cdn.	Guided	Non-Guided	
Total	19.0 (12)	50.0 (11)	40.6 (13)	20.0 (1)	31.5 (35)	
Proposed License Fee Increase	7.9 (5)	9.1 (2)	2.8 (9)	20.0 (1)	13.8 (15)	<ul style="list-style-type: none"> <li>◆ Do not raise fees (14)</li> </ul>
Licenses are too expensive	9.5 (6)	18.2 (4)	9.4 (3)	0.0 (0)	11.9 (13)	<ul style="list-style-type: none"> <li>◆ Do not raise fees (4)</li> <li>◆ Cdn. resident fees should be less than non resident fees (4)</li> <li>◆ Limit non-residents/ increase fees for non-residents (2)</li> <li>◆ River should not be classified for locals (1)</li> </ul>
Vendor Issues	1.6 (1)	22.7 (5)	3.1 (1)	0.0 (0)	6.4 (7)	<ul style="list-style-type: none"> <li>◆ More vendors/more vendor education (7)</li> </ul>

Fourteen percent of responses (16 responses) were concerned with the number of anglers on the river (Table 22). Sixteen percent of B.C. resident responses, nine percent of Canadian resident responses and three percent of Non-Canadian residents responses regarded concerns with the number of anglers on the Babine River. All residents groups were concerned with garbage in the area and the management strategies suggested were to clean up the garbage in the area. B.C. and Non-Canadian residents were concerned about angler education and etiquette and crowding. Suggested management strategies to deal with those problems were to publish an article on angler education and to provide more enforcement on the river. B.C. residents were also concerned about fly and gear conflicts

and non-resident anglers. Management strategies included to zone, or manage for no conflicts and to limit non-resident angler numbers (stated after October 1 or fly only for the whole river).

Table 22. Other anglers number issues mentioned by anglers with suggested management strategies within each residence and guided status category.

Angler Number Issues	Percentage of Responses (n)					Suggested Management Strategies (All)
	B.C.	Cdn.	Non-Cdn.	Guided	Non-Guided	
Total	15.9 (10)	9.1 (2)	3.4 (4)	40.0 (2)	13.5 (15)	
Fly/gear conflicts	3.2 (2)	0.0 (0)	0.0 (0)	20.0 (1)	1.8 (2)	♦ Zone, manage for no conflicts, add fly fishing only zone (2)
Non-Resident Anglers	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1.8 (2)	♦ Limit Non-Resident angler numbers (1)
Garbage/littering/campsite garbage	1.6 (1)	9.1 (2)	3.1 (1)	0.0 (0)	3.7 (4)	♦ Clean up garbage (1) ♦ Limit guiding (causing garbage) (1)
Angler Education/Etiquette	7.9 (5)	0.0 (0)	6.3 (2)	0.0 (0)	6.4 (7)	♦ Publish article on angler education, etiquette (6) ♦ More enforcement (1)
Crowding	1.6 (1)	0.0 (0)	3.1 (1)	20.0 (1)	0.0 (0)	♦ Limit overall number of people (1)

Two percent of all responses were about guiding issues (2 responses, Table 23). Three percent of all B.C. resident responses and two percent of non-guided resident responses concerned guiding issues. One B.C. resident angler suggested there were too many guides and one B.C. resident angler was concerned about illegal guiding. Management strategies suggested were to limit guides on weekends and to provide more enforcement to stop illegal guiding.

Table 23. Other guiding issues mentioned by anglers with suggested management strategies within each residence and guided status category.

Guiding Issues	Percentage of Responses (n)					Suggested Management Strategies (All)
	B.C.	Cdn.	Non-Cdn.	Guided	Non-Guided	
Total	3.2 (2)	0.0 (0)	0.0 (0)	0.0 (0)	1.8 (2)	
Too many guides	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.9 (1)	♦ Limit guiding on weekends (1)
Illegal guides	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.9 (1)	♦ More enforcement

Sixteen responses regarding steelhead abundance issues were also mentioned as other concerns from anglers. The majority (53 percent, 8 concerns) were mentioned by B.C. residents, who were concerned with native fishing (2 concerns), low numbers of fish (2 concerns), commercial fishing (4 concerns). One Canadian resident and three Non-Canadian residents mentioned commercial fishing as a concern.

#### 4.3.5 Angler Perceptions of all Major and Minor Problems

The sum of the number of major and minor problems of all three concerns (the overall number of anglers on the river, the number of boat-based anglers and the number of shore-based anglers) was examined within each residence category, guided status category, week and river section.



Thirteen percent of all anglers (21 anglers) had at least one major problem (Table 24). Seven percent (11 anglers) reported one major problem, six percent (10 anglers) reported two major problems and no anglers reported three major problems (Table 24). Nine percent of B.C. residents had one major problem and an additional nine percent of had two major problems. Six percent of Non-Canadian residents had one major problem and four percent had two major problems. None of the Canadian resident anglers perceived major problems on the Babine River. Seven percent of non-guided anglers perceived one major problem and seven percent perceived two major problems, while none of the guided anglers perceived any problems on the Babine River. Although statistically, the frequency of major problems was similar within each residence category and between guided status guided and non-guided anglers (Kruskal-Wallis = 5.347,  $df = 2$ ,  $P \leq 0.069$ , Mann Whitney U = 984.0,  $P \leq 0.112$ ).

Thirty-two percent of anglers (51 anglers) had at least one minor problem (Table 24). Eleven percent (17 anglers) reported one minor problem, 18 percent (29 anglers) reported two minor problems and three percent (5 anglers) reported three minor problems. The frequency of minor problems was similar within each residence category and between guided status guided and non-guided anglers (Kruskal-Wallis = 4.412,  $df = 2$ ,  $P \leq 0.110$ , Mann Whitney U = 1678.5,  $P \leq 0.753$ , respectively).

Table 24. The percentage of anglers with one, two or three major and minor problems (the sum of and anglers major or minor problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers on the river) within each residence and guided status category.

	Percentage of Major Problems (n)			Percentage of Minor Problems (n)		
	1	2	3	1	2	3
<b>Residence</b>						
B.C. Resident	9.1% (8)	9.1% (8)	0% (0)	8.6% (8)	23.7% (22)	3.2% (3)
Canadian Resident	0% (0)	0% (0)	0% (0)	23.5% (4)	5.9% (1)	5.9% (1)
Non-Cdn. Resident	5.5% (3)	3.6% (2)	0% (0)	9.1% (5)	10.9% (6)	1.8% (1)
<b>Statistical Result</b>	Kruskal-Wallis = 5.347, $df = 2$ , $P \leq 0.069$			Kruskal-Wallis = 4.412, $df = 2$ , $P \leq 0.110$		
<b>Guided<sup>1</sup></b>						
Guided	0% (0)	0% (0)	0% (0)	12.6% (2)	6.3% (1)	0% (0)
Non-Guided	7.0% (10)	7.0% (10)	0% (0)	10.5% (15)	19.6% (28)	3.5% (5)
<b>Statistical Result</b>	Mann Whitney U = 984.0, $P \leq 0.112$			Mann Whitney U = 1678.5, $P \leq 0.753$		

1. Three anglers were not assigned to a guided status category, fifty percent had one major problem (1 angler).

The percentage of minor problems reported within each week relative to all anglers interviewed was more than the percentage of major problems reported within each week (Figure 15). Major problems were only reported in weeks 9-1, 9-5, 10-1 and 10-2. The minor problems reported was relatively high in weeks 9-1 and 10-3, and lower in weeks 9-2 (none), 9-3 and 9-4. There were more minor problems reported in October (half of week 9-5 and weeks 10-1, 10-2 and 10-3) than September relative to all anglers interviewed in that week.

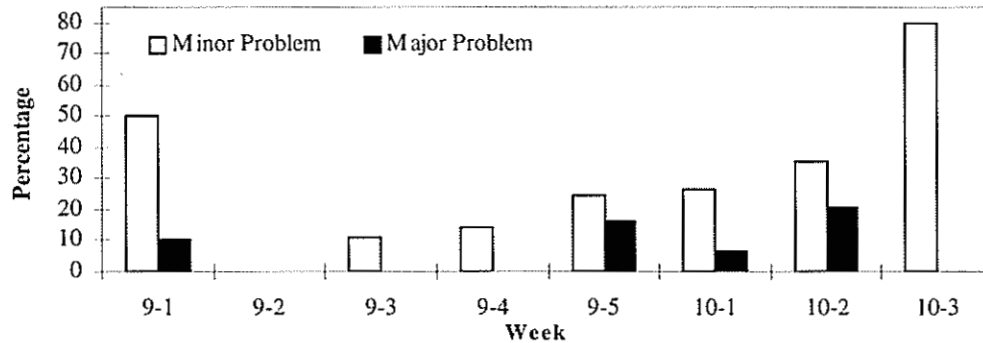


Figure 15. The percentage of major or minor problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers relative to all anglers interviewed within each week.

The percentage of minor problems reported within each river section relative to all anglers interviewed was more than the percentage of major problems reported within each river section (Figure 16). There were no major problems reported in the Nilkitkwa river section which was accessed mainly by boat and guided anglers. More major and minor problems were reported in the bridge area river section where more shore-access anglers fished. The Boucher Creek and Nichyeskwa River sections had relatively similar frequencies of major problems relative to all anglers interviewed within that river section.

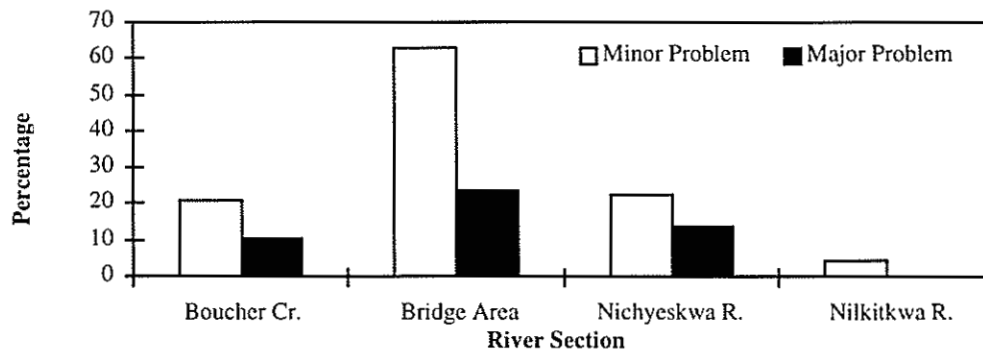


Figure 16. The percentage of major and minor problems with the overall number of anglers, the number of boat-based anglers and the number of shore-based anglers relative to all anglers interviewed within each river section.

#### 4.4.0 Angler Catch and Effort

A total of 663 hours were spent fishing by Babine River anglers which averaged 3.3 hours of fishing per angler at the time of the interview. One hundred and six (106) steelhead were caught and released. At the time of the interview, 144 anglers caught nothing, 31 anglers caught one steelhead, 11 anglers caught two steelhead, eight anglers caught three steelhead, one angler caught five steelhead and one angler caught six steelhead. An additional 267 anglers were observed but not interviewed, therefore their catch was unknown.

The catch rate was calculated by summing the steelhead caught for interviews of 0.5 hr (30 minutes) or more. Three percent of interviews (6 interviews) were eliminated because they had been on the river for less than 30 minutes. The catch rate for all angler interviews was 0.144 steelhead/hour or 1.15 steelhead/rod day.

Catch rates were estimated for all weeks during the classified waters period by grouping all river sections together (Table 25). Week 10-3 produced the highest catch rate on the upper Babine River (3.00 steelhead/rod day) followed by week 10-1 (2.02 steelhead/rod day) and week 9-5 (1.62 steelhead/rod day; Table 25). Weeks 9-2 and 9-1 had the lowest catch rate (0.11 and 0.34 steelhead/rod day, respectively). Weeks 9-2, 9-3, 10-2 and 10-3 had at least one day when the river was 'out' or turbid below Nichyeskwa River. In week 10-3, only 5 anglers were interviewed of 59 observed anglers on October 19 before poor fishing conditions started on October 21. In week 10-2, the Bulkley River was 'out' and the Interview Team noted many anglers that would have fished the Bulkley River were displaced to the Babine River. Higher catch rates in the last four weeks of interviewing were probably due to the change from only fly anglers to fly and gear anglers, since the fly fishing only restriction between the DFO weir and Nichyeskwa River ended on October 1. Also, the DFO weir affected steelhead migration, causing some of them to accumulate in areas downstream of the weir as the season progressed.

Table 25. The steelhead caught, hours fished, catch rate and steelhead per rod day within each week.

Week	Steelhead Caught	Total Hours Fished	Catch Rate (SD) <sup>1</sup>	Steelhead per Rod Day
9-1	2	29.0	0.042 (0.090)	0.34
9-2	2	64.0	0.014 (0.048)	0.11
9-3	17	130.25	0.137 (0.233)	1.10
9-4	4	45.0	0.080 (0.797)	0.64
9-5	38	194.0	0.203 (0.403)	1.62
10-1	19	60.0	0.253 (0.327)	2.02
10-2	14	114.75	0.106 (0.255)	0.85
10-3	10	26.0	0.374 (0.221)	3.00
<b>Total</b>	<b>106</b>	<b>663</b>	<b>0.144 (0.297)</b>	<b>1.15</b>

1. The average of the individual catch rates for each angler and we ignore all short trips (less than 0.5 hour).
2. Estimated total anglers observed because data was incomplete

Catch rates were estimated for river sections during the classified waters period by grouping all weeks together. The highest catch rate was in the Nilkitkwa River section (2.00 steelhead/rod day) where the second lowest amount of effort was expended (Table 26). The catch rate for the Boucher Creek river section was the second highest of all those calculated (1.42 steelhead/rod day). The lowest catch rate was in the bridge area (0.99 steelhead/rod day), due to the large amount of angling effort expended there. From these results, catch rate appears to be inversely proportional to effort.

Table 26. The steelhead caught, hours fished, catch rate and steelhead per rod day within each river section

Babine River Section	Steelhead Caught	Total Hours Fished (%)	Catch Rate (SD)	Steelhead per Rod Day
Boucher Creek	9	60.5	0.178 (0.431)	1.42
Bridge Area	53	365	0.124 (0.283)	0.99
Nichyeskwa River	15	119	0.132 (0.236)	1.06
Nilkitkwa River	25	96.5	0.250 (0.302)	2.00

Among residence categories, B.C. residents interviewed had the highest catch rate (1.91 steelhead/rod day), followed by Non-Canadian residents (0.59 steelhead/rod day) and Canadian residents (0.42 steelhead/rod day; Table 27). Guided and non-guided catch rates were similar (1.15, 1.16 steelhead/rod day, respectively). Jet boat and shore-access anglers had similar catch rates (1.12 and 1.10 steelhead/rod day, respectively), while drift boat-access anglers had a higher catch rate (1.50 steelhead/rod day). Although only two drift boat anglers were interviewed and thus, the low sample size could inflate the actual catch rate of drift boat-access anglers.

Table 27. The steelhead caught, hours fished, catch rate and steelhead per rod day within each residence, guided status, access method and angling method category.

	Steelhead Caught	Total Hours Fished (%)	Catch Rate (SD) <sup>1</sup>	Steelhead per Rod Day
<b>Residence</b>				
B.C. Resident	77	291.75	0.239 (0.380)	1.91
Cdn. Resident	5	76.75	0.052 (0.157)	0.42
Non-Cdn. Resident	24	292.5	0.074 (0.172)	0.59
<b>Guided</b>				
Guided	21	148	0.144 (0.228)	1.15
Non-Guided	84	508	0.145 (0.308)	1.16
<b>Access Method</b>				
Jet-Boat	34	194	0.140 (0.241)	1.12
Drift Boat	3	11	0.188 (0.262)	1.50
Shore	63	440	0.137 (0.309)	1.10
<b>Angling Method</b>				
Fly fishing	44	466.5	0.071 (0.164)	0.57
Gear fishing	62	190.5	0.298 (0.421)	2.38

<sup>1</sup> The average of the individual catch rates for each angler for each week and we ignore all short trips (less than 0.5 hour).

The total effort estimate for the upper Babine River area which included the Nichyeskwa River section, the bridge area and the Boucher Creek river section was 642 rod days (Table 28; see Appendix 6 for complete calculations). Effort estimates were highest in week 9-5 and 10-2 whereas effort estimates were relatively low in week 9-1. Effort estimates were high in week 10-2 because the Bulkley River was 'out' and the Interview Team noted many anglers that would have fished the Bulkley River were displaced to the Babine River. High effort was also estimated in week 9-5 which was a reflection of the opening of the river to gear anglers between the DFO weir and Nichyeskwa River. The total estimated catch for the classified waters period in the upper Babine River was 1,054 steelhead. The majority of the estimated catch (70 percent) was from weeks in October when the fishery was opened to gear angling.

Table 28. A summary of estimated total effort, catch rates and catch with confidence intervals by week.

Week	Total Effort (rod days)	95% Confidence Interval for Effort	Catch Rate (sthd/rod day)	95% Confidence Interval for Catch Rate	Total Catch (sthd)	95% Confidence Interval for Total Catch
9-1	19	± 7	0.34	± 1.44	6	± 28
9-2	22	± 9	0.11	± 0.77	3	± 18
9-3	44	± 28	1.10	± 3.73	49	± 176
9-4	59	± 15	0.64	± 12.75	38	± 756
9-5	121	± 12	1.62	± 6345	197	± 784
10-1	91	± 66	2.02	± 5.23	184	± 524
10-2	129	NA	0.85	± 4.08	109	± 526
10-3	78	± 13	3.00	± 3.54	234	± 280
10-4	78	± 13	3.00 <sup>1</sup>	± 3.54	234	± 280
<b>Total</b>	<b>642</b>	<b>± 77</b>	<b>1.15</b>	<b>± 4.75</b>	<b>1054</b>	<b>± 1388</b>

1. No interviews were conducted in week 10-4, and therefore catch rate and effort from week 10-3 were used for 10-4.

Sixty-six Dolly Varden/bull trout were caught and of those, 65 were released and one was kept. The catch rate for all anglers interviewed was 0.93 Dolly Varden/bull trout/rod day. Steelhead anglers caught eight other species of fish, 104 sockeye salmon (*O. nerka*), 11 coho salmon (*O. kisutch*), 26 chinook salmon (*O. tshawytscha*), 5 pink salmon (*O. gorbuscha*), 115 rainbow trout (*O. mykiss*), 17 cutthroat trout (*O. clarki*), 90 whitefish (*Prosopium* sp.) and one northern squawfish (*Ptychocheilus oregonensis*).

Catch rates were highly variable between species (Table 29). Sockeye salmon had the highest catch rate (1.35 fish/rod day) followed by rainbow trout (1.18 fish/rod day) and whitefish (1.02 fish/rod day). Comparatively, coho salmon, pink salmon and northern squawfish had low catch rates (0.14, 0.07 and 0.021, respectively).

Table 29. The number caught, catch rate and fish per rod day by species.

Species	Number Caught	Catch Rate (fish/hr)	Fish per Rod Day
Sockeye	104	0.169	1.35
Coho	11	0.017	0.14
Chinook	26	0.048	0.38
Pink	5	0.009	0.07
Rainbow	115	0.147	1.18
Cutthroat	17	0.027	0.22
Dolly Varden/bull trout	66	0.116	0.93
Whitefish	90	0.127	1.02
Squawfish	1	0.003	0.021

## **5.0.0 Discussion**

### **5.1.0 Interviews**

On-site interviews using a roving design were used to examine upper Babine River angler characteristics, angling methods, perceptions of problems on the river and steelhead catch rates.

As many anglers as possible were interviewed and accordingly, the Interview Teams were on the river as much as possible. Therefore, most interviews were conducted in the bridge area river section (62 percent), while less were conducted in the Nichyeskwa River section (18 percent), the Boucher Creek river section (9 percent) and the Nilkitkwa River section (11 percent). Most interviews were conducted in weeks 9-5 (27 percent, 57 interviews) and 10-2 (23 percent, 48 interviews) whereas only a few were conducted in weeks 9-1 (5 percent, 10 interviews) and 10-3 (2 percent, 5 interviews). On October 1, in week 9-5 a number of gear anglers were interviewed because the river was opened to gear anglers between the DFO and Nichyeskwa River. In week 10-2, the Interview Team noted that the Bulkley River was 'out' which displaced more anglers to fish on then upper Babine River. No interviews were conducted during the last week of the classified waters period.

The non-response bias check indicated that Non-Canadian resident anglers were more likely not to complete the interview than Canadian or B.C. residents. This was indicative of the language barrier as more Non-Canadians could not understand English enough to complete the whole interview. Because the Interview Team still collected license details and catch (when possible), those data were relatively free of non-response bias. Therefore, the perceptions of problems on the river could therefore under-represent Non-Canadian resident perceptions. Generally, the data were representative of the anglers that were interviewed on the upper Babine River in the classified waters period of 1997.

### **5.2.0 Angler Characteristics**

Non-Canadian residents have traditionally been the dominant group of anglers on the Babine River. In 1997, 45 percent of all anglers interviewed were B.C. residents, nine percent were Canadian residents and 46 percent were Non-Canadian residents. The Steelhead Harvest Analysis (SHA) estimates from 1983 through 1992 indicated B.C. residents consisted of 29 to 49 percent of all anglers fishing the Babine River (average 40 percent; Anonymous 1996). The Canadian resident component has been low and stable between 1983 and 1995 (1-11 percent, averaged 4.7 percent). The level of Non-Canadian resident participation in the fishery has ranged from 49 to 68 percent (average 55 percent) between 1983 and 1995 (Anonymous 1996). The percentage of B.C. residents interviewed in 1997 was slightly higher than past estimates from the SHA whereas the percentage of Non-Canadian residents was slightly lower than past estimates from the SHA. This higher estimate of B.C. resident interviews reflected that most interviews were conducted in the bridge area river section whereas few interviews were completed in the Nilkitkwa River section which was dominated by Non-Canadian guided anglers.

In 1997, 18 percent of anglers interviewed were guided. Of those guided anglers, 21 percent were B.C. residents, 3 percent were Canadian residents and 76 percent were Non-Canadian residents (79 percent non-residents). Similarly, in October of 1968, a survey of guided anglers on the river resulted in 86 percent of anglers (47 anglers) that were non-residents and 14 percent (8 anglers) that were B.C. residents (8 anglers; Seredick 1968). In September and October of 1968, lodge owners reported that of 129 visiting anglers, 127 anglers (98 percent) were Non-Canadians and two anglers were Canadian residents (Seredick 1969). Ninety-five percent of the anglers that fished the Babine River in 1968 were estimated to be guided anglers (Cox 1969).

Almost half of angling infractions were committed by Non-Canadian residents (47 percent, 8 infractions) followed by B.C. residents (35 percent, 6 infractions) and Canadian residents (6 percent, 1 infraction). The residence and type of infraction of the remainder were unknown (12 percent, 2 infractions). Half of the Non-Canadian resident citations were for not having a classified waters license (4 of 8 citations) and just one citation was for not having a steelhead stamp. B.C. residents received citations for not having a steelhead stamp (2 of 6 citations), not having a classified waters license (1 of 6 citations), failure to produce a license (1 of 6 citations), retention of illegal fish (1 of 6 citations) and one warning for littering. No infractions were cited for illegal guiding.

In the past several years, there were concerns that steelhead anglers did not buy a steelhead conservation stamp and had been angling for steelhead (Anonymous 1996). Only 2.2 percent (2 citations) of all B.C. residents and 1.0 percent (1 citations) of Non-Canadian residents were cited for not having a steelhead stamp. None of the Canadian residents interviewed were cited for not having a steelhead stamp. The effort estimates for the 1997 SHA (not yet released) should be accurate for the Babine River because of the low numbers of anglers cited for not having a steelhead stamp. This result cannot be generalized to past years because of the increased publicity regarding enforcement effort on the Babine River. The knowledge of increased enforcement may have caused anglers who may not have purchased a steelhead stamp in the past to purchase a steelhead stamp in 1997 and comply with the regulations.

There were seven anglers cited with eight infractions in the first four weeks of the classified waters period and nine anglers cited with nine infractions in the last four weeks the River Guardian interviewed of the classified waters period. Spatially, eight infractions were cited to seven anglers in the bridge area, while four anglers were given citations in the Boucher Creek river section. Three anglers were given citations in the Nichyeskwa River section and two anglers were given citations in the Nilkitkwa River section. No anglers were cited for illegal guiding.

### ***5.3.0 Angler Perceptions of Problems and Preferences for Management Strategies***

Anglers perceptions of problems with the number of other anglers on the river are indicative of crowding concerns. Density is a physical concept relating the number of

people in a certain amount of space. Crowding has psychological meaning; it is a negative and a subjective evaluation of density level (Manning 1996). Thus, density may increase to a point where it is perceived to interfere with one's activities and at that point crowding occurs (Manning 1986). In the case of anglers on the Babine River, the perception of a major problem or a specific concern was indicative of that problem interfering with an anglers activities. After an angler has perceived a major problem they may employ a coping mechanism. The angler could change their perception of the area (product shift) or change the way they use the area (displacement; Shelby *et al.* 1988).

A variety of factors could affect an angler's perception of problems on the Babine River: motivations for angling, preferences for angling, expectations of the trip, experience angling, attitudes of the angler, angler demographics, characteristics of other anglers encountered, and other situational variables (Manning 1986). Residence groups, guided status, access method and angling method are ways to group anglers into categories that may share some of the above factors that could affect an angler's perception of problems on the river.

The majority of anglers had no concerns with any of the issues investigated. Sixty-four percent of B.C. residents interviewed, 88 percent of Canadian residents and 84 percent of Non-Canadian residents had no problems with the overall number of anglers on the river. Seventy-six percent, 77 percent and 84 percent of B.C. residents, Canadian residents and Non-Canadian residents, respectively had no problems with the number of boat-based anglers. Similarly, 64 percent of B.C. residents, 83 percent of Canadian residents and 84 percent of Non-Canadian residents had no problems with the number of shore-based anglers. The overwhelming majority of anglers did not perceive problems with the overall number of anglers, the number of boat-access anglers or the number of shore-access anglers.

Considering all concerns investigated, similar numbers of anglers perceived a major problem with the overall number of anglers (6 percent of all anglers, 11 responses), the number of boat-based anglers (6 percent of all anglers, 10 responses) and the number of shore-based anglers (6 percent of all anglers, 10 responses). More anglers perceived a minor problem with the number of shore-based anglers (20 percent, 34 anglers) and the overall number of anglers (19 percent, 34 anglers) than the number of boat-based anglers (14 percent, 24 anglers) Together, more anglers perceived at least a minor problem with the number of shore-based anglers (26 percent) and the overall number of anglers (25 percent) than the number of boat-based anglers (19 percent).

The percentage of minor problems relative to all anglers interviewed in each week was higher for weeks in October than September. More anglers fished the small bridge area during October, when gear angling was permitted between the DFO weir and Nichyeskwa River, than in September. The increase in angler numbers around the bridge coincided with the increase in the relative number of problems. Furthermore, the number of minor and major problems relative to all anglers interviewed was higher in the bridge area river



section than the Boucher Creek, Nichyeskwa River or Nilkitkwa River sections. Most shore-access anglers were interviewed in the bridge area river section.

B.C. residents perceived more problems on the Babine River than Canadian or Non-Canadian residents. Nine percent of B.C. residents had at least one major problem with the concerns (overall number of anglers, the number of boat-based anglers, the number of shore-based anglers). In contrast, none of the Canadian residents and six percent of Non-Canadian residents had at least one major problem with the three concerns. More B.C. residents considered the overall number of anglers to be a problem (10 percent) than Canadian residents (0 percent) or Non-Canadian residents (4 percent). Eight percent of B.C. residents had a problem with the number of boat-based anglers, while none of the Canadian residents and six percent of Non-Canadian residents perceived problems with the number of shore-based anglers. More B.C. residents perceived a problem with the number of shore-based anglers than Non-Canadian residents (9 and 4 percent, respectively).

The contribution of additional concerns varied by residence category. Fifty-four percent of the additional concerns were suggested by B.C. residents (48 percent of all B.C. residents had at least one other concern). In contrast, 27 percent were suggested by Non-Canadian residents (26 percent of all Non-Canadian residents had at least one other concern) and twenty percent of additional concerns were suggested by Canadian residents (71 percent of Canadian residents). Of all anglers, 45 percent (52 responses) of concerns mentioned regarded regulations, 30 percent (36 responses) regarded fees/licenses, 14 percent (16 responses) regarded angler numbers nine percent (11 responses) regarded access and 2 percent (2 responses) regarded guiding issues.

Forty-eight percent of B.C. resident concerns regarded regulations. Most B.C. residents had concerns with the regulations in general, gear restrictions, the licensing system, enforcement and the lack of a fly only section. Forty percent of Canadians were concerned with regulations and specifically, the licensing system and the lack of a fly only section. Forty-one percent of Non-Canadian resident concerns were about regulations and most responses concerned the licensing system and the lack of a fly only section. Only 19 percent of B.C. resident concerns regarded fees, in contrast to 50 percent of Canadian concerns and 41 percent of Non-Canadian resident concerns. More specifically, the majority of Canadian and Non-Canadian residents concerns with fees regarded the proposed license fees increase.

Sixteen percent of B.C. resident concerns regarded the number of anglers on the river whereas 13 percent of Non-Canadian angler concerns and nine percent of the Canadian angler concerns considered the number of anglers as a problem. Three percent of B.C. residents (2 concerns) regarded guiding issues. One response stated there were too many guides and the other response was concerned with illegal guides.

The additional concerns question added some insight to the perceptions of problems within each residence category. In 1997, B.C. residents were concerned with a number issues (general regulations, gear restrictions, fees and angler numbers) while over half (56

percent) of Non-Canadian resident concerns regarded the licensing system or fees. Most Canadian residents concerns regarded the licensing system and fees (64 percent). This could explain why B.C. residents perceived the most major problems regarding the overall number of anglers on the river and the number of boat-based anglers on the river. These problems were specific to 1997 because during the classified waters period there was an impending increase in fees from \$20 per day to \$40 per day for Canadian and Non-Canadian residents to purchase classified waters licenses. Since then, the fee increase has been canceled and will not be implemented in the near future.

The results presented here represent mostly non-guided, shore-access anglers as the majority of interviews were conducted in the bridge area. The perceptions of problems with boat-based anglers was low because very few boat-based anglers use the bridge area river section due to the presence of the DFO weir. Guided anglers were not likely to perceive a significant number of problems because they do not visit the bridge area where the majority of anglers fish (non-guided, shore access anglers). Also, guided anglers in the Nilkitkwa River section were not likely to encounter many anglers outside of their own group and thus, would probably not perceive problems with the overall number of anglers on the river, the number of boat-based anglers or the number of shore-based anglers.

The overall number of problems with the concerns investigated was small in comparison to those anglers that had no problems. For the overall number of anglers and the number of shore-based anglers perceptions of problems differed by residence category. The perceptions of problems with the overall number of anglers differed by access method. Anglers within the guided status or angling method categories were similar in their perception of problems with the overall number of anglers, the number of boat-based anglers or the number of shore-based anglers. Therefore, residence categories and in a limited way, access method may have shared some of the factors, such as angler experience and angling preferences, that affected the angler's perception of problems on the river.

#### ***5.4.0 Angler Catch and Effort***

In 1997, a total of 106 steelhead were caught and released. The catch rate for all anglers interviewed was 0.144 steelhead/hour or 1.15 steelhead/rod day. Guided anglers had a catch rate of 1.15 steelhead/rod day. In 1968, guided anglers had a lower catch rate of 0.973 steelhead per rod day (8 hours) although it was not known what kind of angling methods were used then (Seredick 1968).

The total estimated effort for the upper Babine River (642 rod days) was considerably lower than SHA effort estimates from past years for the whole Babine River. The SHA mean effort estimate from 1991/92 through 1995/96 was 2,496 rod days and the mean effort estimate from 1986/87 through 1990/91 was 3,092 rod days. The total catch estimate for the upper Babine River (1,054 steelhead) was also considerably lower than the total catch estimates from past years for the whole Babine River. The SHA mean catch from 1991/92 through 1995/96 was 4,207 steelhead and the mean catch estimate from 1986/87 through 1990/91 was 3,458 steelhead. The guide reports for total effort and catch for 1997

(not yet compiled) can be added to the upper Babine River effort and catch estimates and compared to the SHA (not yet compiled).

### ***5.5.0 Limitations of the Survey***

The large majority of interview effort occurred in the area where use was dominated by non-guided, shore access anglers. Therefore, guided anglers were known to be under-represented in the survey because almost all guided angler activity occurred downstream from Nilkitkwa River where sampling effort was minimal due to access constraints.

As with any on-site survey the results presented here must be used with caution. These results were only representative of the anglers interviewed during the classified waters period of 1997. The actual interviewing could have caused some reactivity by the Babine River anglers, causing them to give responses that were not indicative of their actual perceptions. For example, survey research conducted during law enforcement activities could jeopardize the quality of data collected (Pollock *et al.* 1994). However, this bias was unavoidable due the objectives of the River Guardian program. Improper sample selection bias (Pollock *et al.* 1994) may have occurred because interviews were conducted opportunistically and when large numbers of anglers were known to be on the river.

Some anglers had a higher probability of being contacted due to the nature of a roving survey. Avidity bias may occur for anglers who fish more often and were therefore more likely to be interviewed (Schubert 1988; Pollock *et al.* 1994). Thus, anglers who fished more frequently than average anglers had a higher than average probability of being interviewed. Length of stay bias may occur for anglers when the probability of being interviewed increases with their trip length (Schubert 1988; Pollock *et al.* 1994). Thus, anglers who fished longer than average had a higher than average probability of being interviewed. Also, successful anglers may have left the Babine River before being contacted. Alternatively, contacting anglers when their trip was incomplete may bias the catch rate estimation if steelhead catchability changes throughout the day.

Response errors may also have biased the survey results. It was possible that anglers may have exaggerated the number of steelhead landed for prestige purposes (Pollock *et al.* 1994). In addition, question misinterpretation could have occurred with the long and complex nature of the questions regarding perceived problems. For example, a number of the responses to the other concerns with steelhead angler management question were about fisheries management in general or were unrelated to the question asked.

## **6.0.0 Recommendations**

1. The Fisheries Branch should continue to administer a survey of Babine River anglers to monitor any trends in angler effort, demographics, angling characteristics, catch and compliance with regulations. Additional information will aid the Fisheries Branch in the planning necessary to protect the quality of angling experiences offered by the classified waters designation. However, future surveys must be designed to adequately sample all areas of the river in proportion to effort that occurs in each.
2. Angler effort and catch estimates should be compared with similar data derived from angling guide reports and the SHA.
3. In 1997, anglers that fished for more than one day were not interviewed more than once on the Babine River. The Interview Team should collect the repeat anglers catch and effort data on all days they fish after their initial interview.
4. The Interview Teams should record the location of anglers observed and interviewed according to the pre-determined river section boundaries. The river sections could be subdivided to reflect effort from the fishing lodges and satellite camps.
5. Aerial counts are recommended to determine effort within each pre-determined river section for the classified waters period. If aerial counts cannot be conducted, progressive counts by the Interview Team could be used to estimate daily effort within the river section, provided a pre-determined schedule with timed check points is adhered to. The sampling should occur on a random sample of days and random directions of travel, when possible.
6. Surveys should be conducted in week 10-4 to be representative of the whole classified waters period.
7. Future sampling efforts should include a higher proportion of surveys in the Babine River in areas downstream of Nilkitkwa River. The area downstream of Nilkitkwa River received more guided Non-Canadian resident anglers.
8. Anglers should also be contacted at the end of their trip to compare catch rate estimates between complete and incomplete trips. This would assess the amount of incomplete trip interview bias in catch rate estimation. One road leading to the upper Babine River area and the proximity of the camping area provides an ideal opportunity to contact anglers after their day of fishing.

### **7.0.0 Acknowledgments**

I thank the River Guardians, Terry Myroniuk, Mike Richardson, Darryl Struthers and Christine Turlet and the Conservation Officers, Frank Guillon, Brad Lacey, Kevin Nixon, and Tobe Sprado for data collection. I thank Peter Kalina for input on planning and operational considerations with the Interview Teams and data collection. I thank Dana Atagi for assistance with the proposal preparation, questionnaire and interview form design and advice on data analysis. I thank Charles Parken for critical reviews. This project was conceived by Bob Hooton whose assistance with planning, liaison with the Interviews Teams, direction, data analysis, and statistical advise were invaluable throughout the project. I thank Dr. Ted Down and Bob Hooton for securing funding for the preparation of this report through B.C. Environment's Habitat Conservation Trust Fund. Hunters, anglers, trappers and guides contribute to HCTF enhancement projects through license surcharges.



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## **9.0.0 Appendices**

**Appendix 1.0 The angler interview form and angler count data form.**







**Appendix 2.0 The conservation clubs mentioned.**

A total of 202 Babine River anglers answered the question and 94 anglers were a member of at least one conservation club.

Table A1. The type of conservation club anglers were a member with the percentage and number of responses.

Conservation Club	Percentage of Anglers that were a member of at least one conservation club (n)	Percentage of Anglers that answered the question (n)
Foreign Country Fishing Club	25.5 (24)	11.9 (24)
Other angling club	18.1 (17)	8.4 (17)
Trout Unlimited	17.0 (16)	7.9 (16)
Steelhead Society	14.9 (14)	6.9 (14)
B.C. Wildlife Federation	6.4 (6)	2.9 (6)
Federation of Fly Fishers	5.3 (5)	2.4 (5)
Ducks Unlimited	3.2 (3)	1.5 (3)
North Atlantic Salmon Federation	3.2 (3)	1.5 (3)
Work Related Group	2.1 (2)	1.0 (2)
Polar Coachmen	2.1 (2)	1.0 (2)
World Wildlife Fund	2.1 (2)	1.0 (2)
Other Environmental Group	2.1 (2)	1.0 (2)
Nature Conservancy	1.1 (1)	0.5 (1)
American Fisheries Society	1.1 (1)	0.5 (1)
Rod and gun club	1.1 (1)	0.5 (1)

**Appendix 3.0 A summary of weather and water conditions during the classified waters period.**

Each 'X' represents what at least one Interview Team member recorded that the weather or water conditions were for that day. For example, on September 6, the Interview Team recorded that it was mixed weather conditions. The river was flowing at moderate height and was clear.

Table A2. A summary of weather and water conditions that were observed by the Interview Team by date.

Week	Date	Weather				Water					Comments
		Sun	Mixed	Overcast	Rain	High	Mod.	Low	Turbid	Clear	
9-1	905				X		X			X	
9-2	906		X				X			X	908-River 'out' below Nichyeskwa
	909		X				X			X	
	910		X	X			X			X	
	911		X	X			X			X	
	913		X				X			X	
9-3	915				X		X			X	
	917		X				X			X	
	918	X	X				X			X	
	920			X			X		X	X	
9-4	923		X	X			X	X		X	
	926			X	X		X	X		X	
9-5	928			X	X		X			X	928- Rain in am
	930			X	X		X			X	
	1001			X			X			X	
	1002		X	X	X		X	X		X	
	1003	X	X	X			X			X	
1004		X					X		X	1004-Sunny	
10-1	1005		X	X			X			X	1005-Cold snow in am, warm in PM
	1009			X			X			X	1010, 1011-Cold and snowy
	1010			X			X			X	
10-2	1012			X			X			X	1012-12 inches of snow
	1013			X			X			X	1013-Slushy and slick roads
	1014			X			X			X	1014-Poor road conditions
	1015	X		X	X		X		X	X	1015-Road better, Bulkley 'out', more displaced anglers
	1016	X					X			X	1016-Lower river 'out'
	1017		X	X			X		X		
1018		X					X		X		
10-3	1019			X			X		X	X	1021-Poor fishing, high water 1023-Fishing success low
	1021										
	1023										

**Appendix 4.0 The method of grouping 'other issues' mentioned by Babine River anglers.**

The five broad categories of management issues were numbered below, with the bulleted items representing each of the twenty-three response groups that were included within each of those five issues.

1. Regulations issues included:
  - Gear use-should be barbless hooks only.
  - Regulations
  - Lack of fly only section
  - Licensing system
  - Enforcement
  - Fly/gear conflicts
  
2. Access issues included:
  - Access issues (in general)
  - Boats
  
3. Fee issues included:
  - Proposed license fee increase
  - Licenses are too expensive
  
4. Guiding issues included:
  - Too many guides
  - Fisheries managers are eliminating guides
  - Illegal guides
  
5. People/Density issues included:
  - Fly/gear conflicts
  - Non-Resident anglers
  - Angler education/etiquette
  - Crowding
  - Garbage/littering
  
6. Other issues included:
  - Native fishing
  - Commercial fishing
  - Habitat
  - Enhancement
  - Low numbers of fish

## Appendix 5.0 A summary of the time spent interviewing by the Interview Teams.

Table A3. The date, week, time at start of interviewing stint, time at finish of interviewing stint, minutes interviewing, reach location at start, reach location at finish, the total anglers interviewed and observed and comments on the time estimation in minutes summarized from the angler count data forms.

Date	Week	Time @ Start	Time @ Finish	Min.	Reach @ Start	Reach @ Finish	Total Anglers Interviewed (n)/Observed (n)	Comments
902	9-1	930	1800	510	DFO fence	Stroms	0/1	2 anglers not allowed to start fishing due to improper licence
903		1100	1800	420	DFO fence	Nichyeskwa Cr.	3/4	1 person charged
904		1900	2100	120	DFO fence	Nichyeskwa Cr.	1/2	1 suspected violator (residency)
905		1100	1300	120	DFO fence	Nichyeskwa Cr.	4/4	1 angler charged
<b>Total Week 1</b>				<b>1170</b>			<b>8/11</b>	
908	9-2	930	1800	510	DFO fence	Nichyeskwa Cr.	5/8	river blown below Nichyeskwa
909		1600	1700	60	DFO fence	Nichyeskwa Cr.	2/2	
910		1100	1800	420	DFO fence	Silver Hilton Lodge	13/25	surveyed all accessible anglers- helicopter/drift
911		930	1700	450	DFO fence	Nichyeskwa Cr.	2/2	rainy afternoon
912		2030	2230	120	DFO fence	Nichyeskwa Cr.	0/3	anglers in hurry to leave before dark
913		1000	1300	1810	DFO fence	Nichyeskwa Cr.	1/1	
<b>Total Week 2</b>				<b>3370</b>			<b>23/41</b>	
914	9-3	1500	2000	300	DFO fence	Nichyeskwa Cr.	0/2	boat with anglers observed upstream of weir-inaccessible
915		1030	1800	450	DFO fence	Grizzly	19/25	jet boat patrol
917		900	1800	540	U/S of DFO fence	Nichyeskwa Cr.	6/6	all anglers located in Babine lodge
918		900	1800	540	U/S of DFO fence	Nichyeskwa Cr.	7/11	4 anglers that weren't surveyed were previously surveyed
<b>Total Week 3</b>				<b>1830</b>			<b>32/44</b>	
923	9-4	1100	1800	420	U/S of DFO fence	Stroms	13/13	4 anglers were stopped prior to committing offense
924		1100	1645	465	U/S of DFO fence	Stroms	0/6	4 anglers surveyed yesterday, 2 anglers on boat inaccessible
925		1030	1745	435	U/S of DFO fence	Nichyeskwa Cr.	0/7	same group of 7 surveyed on the 25th
926		1100	1900	480	U/S of DFO fence	Nichyeskwa Cr.	7/13	6 anglers from same group surveyed on the 25th
927		930	1900	570	U/S of DFO fence	Nichyeskwa Cr.	0/3	3 anglers written warning, had prohibited gear, 1 anglers not allowed to start angling- no licence
<b>Total Week 4</b>				<b>2370</b>			<b>20/42</b>	
928	9-5	1100	1900	480	U/S of DFO fence	Stroms	11/15	1 angler written warning, prohibited gear, rain in am

Date	Week	Time @ Start	Time @ Finish	Min.	Reach @ Start	Reach @ Finish	Total Anglers Interviewed (n)/Observed (n)	Comments
930		1100	1800	420	Boucher Creek	Stroms	7/12	unsurveyed anglers either inaccessible or already surveyed
1001		1030	1215	105	U/S of DFO fence	Nichyeskwa Cr.	7/14	
1002		1030	1800	450	U/S of DFO fence	Stroms	9/14	1 time to produce issued
1003		930	1830	540	U/S of DFO fence	Nichyeskwa Cr.	17/25	
1004		900	1500	360	U/S of DFO fence	Nichyeskwa Cr.	7/24	1 charge, sunny
<b>Total Week 5</b>				<b>2355</b>			<b>58/104</b>	
1005	10-1	900	1700	480	U/S of DFO fence	Nichyeskwa Cr.	8/25	cold, snow am-warm, p.m.
1008		1430	1900	210	weir	Nichyeskwa Cr.	0/4	anglers interviewed already
1010		1000	1800	480	weir	deep rocks (Stewarts)	6/8	cold and snowy
1011		1000	1800	480	weir	Nichyeskwa Cr.	0/10	cold and snowy
<b>Total Week 6</b>				<b>1650</b>			<b>14/47</b>	
1012	10-2	930	1700	450	weir	halfway run	5/20	cold and snowy (12 inches)
1013		930	1730	480	weir	Stroms	8/9	slushy and slick roads
1014		900	1745	525	weir	Stroms	8/13	poor road conditions
1015		945	1900	555	weir	Nichyeskwa Cr.	8/24	roads better, Bulkley blew out, displaced anglers to Babine (1 charge)
1016		1430	1900	330	weir	Stroms	5/27	4 charges, Lower River blown out, very busy
1017		900	1700	480	weir	Nichyeskwa Cr.	9/17	2 warnings, many regulars
1018		1000	1730	450	weir	Nichyeskwa Cr.	6/19	many regulars
<b>Total Week 7</b>				<b>3270</b>			<b>49/129</b>	
1019	10-3	900	1700	480	u/s weir	Nilkitkwa R.	4/23	only 3 new anglers
1020		930	1730	480	weir	Stroms	0/8	no new anglers
1021		930	1800	510	weir	Nichyeskwa Cr.	0/8	poor fishing, high water
1022		1430	1830	240	weir	Stroms	0/12	2 charges (1 fish with bait, 1 no licence)
1023		800	1800	600	u/s weir	Nichyeskwa Cr.	0/8	fishing success low
<b>Total Week 8</b>				<b>2310</b>			<b>4/59</b>	1 left DFO compound, still 3 camping units and approx. 8 anglers
<b>Total All Weeks</b>				<b>18325</b>			<b>208/477</b>	

## Appendix 6.0 A summary of the estimated total effort and catch results.

Table A4. The count estimation of total effort and catch with approximate 95 percent confidence intervals for each week.

Week	Mean Daily Effort (hr) $\bar{e}_{week}$	Total Effort (hr) $\hat{E}_{week}$	Variance of the total effort (hr) $Var(\hat{E}_{week})$	Approximate 95% CI for Total Effort (hr)	Mean Daily Catch Rate (sthd/hr) $\hat{R}_{week}$	Variance of the mean daily catch rate (sthd/hr) $Var(\hat{R}_{week})$	Total Catch (sthd) $\hat{C}_{week}$	Variance of the total catch (sthd) $Var(\hat{C}_{week})$	Approximate 95% CI for Total Catch (sthd)
9-1	22	154	756	± 55	0.042	0.008	6	200	± 28
9-2	25.6	383	1380	± 74	0.014	0.002	3	77	± 18
9-3	50.7	535	12145	± 220	0.137	0.054	49	7716	± 176
9-4	67	470	3548	± 160	0.080	0.635	38	142833	± 756
9-5	139	971	2379	± 98	0.203	0.162	197	153505	± 784
10-1	104	658	69885	± 529	0.253	0.107	184	68617	± 524
10-2	147	1032	0	± 0	0.106	0.065	109	69253	± 526
10-3	89	625	2700	± 104	0.374	0.049	234	19608	± 280
10-4 <sup>1</sup>	89	625	2700	± 104	0.374	0.049	234	19608	± 280
<b>Total</b>				<b>± 618</b>	<b>0.144</b>	<b>0.090</b>	<b>1054</b>	<b>481418</b>	<b>± 1388</b>

1. No interviews were conducted in week 10-4, and therefore catch rate and effort from week 10-3 were used for 10-4.