

A Survey of Steelhead Anglers on the Bulkley, Kispiox, Zymoetz II and Skeena IV Classified Waters in 2014

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Executive Summary

Angler effort

Roving survey and angler interviews

- Between August 19 and October 31, 2014, a total of 2,227 steelhead anglers were observed by River Guardians on the Bulkley, Kispiox, Zymoetz II and Skeena IV rivers.
- A total of 1,427 angler interviews were initiated (1,403 streamside interviews, and 24 interview forms from angling guide lodges) of which 1,247 (87%) were complete and 180 (13%) were incomplete. Of the completed interviews, 1,062 (85%) were full-length (individual anglers) and 185 (15%) were repeat interviews. Of the interviews that were incomplete, 167 were terminated because the angler refused to complete an interview, and 13 were terminated because the angler did not speak enough English.
- On the Bulkley River between September 2 and October 30 the River Guardians spent 43 days roving the river. They tallied 1,027 anglers and initiated 696 interviews (68% of all observed anglers) with 145 (21%) anglers declining an interview. This resulted in 551 complete angler interviews conducted among 499 individual anglers.
- On the Kispiox River between September 2 and October 31, the River Guardians spent 43 days roving the river. They tallied 591 anglers and initiated 318 interviews (54% of all observed anglers) with 35 (11%) anglers declining an interview. This resulted in 283 complete angler interviews conducted among 264 individual anglers.
- On the Zymoetz II River between August 18 to October 31, the River Guardians spent 53 days roving the river. They tallied 478 anglers and initiated 374 angler interviews (78% of all observed anglers) among 271 individual anglers. Zero anglers declined an interview on this river.
- The River Guardians surveyed Cedarvale (Skeena IV) between August 19 to October 27 and observed 48 anglers. A total of 39 angler interviews were conducted among 28 individual anglers. The total number of angler interviews was split almost equally in half between BC residents (49%) and non-resident aliens (51%) with most interviews occurring during the weekend (62%).

Angler residencies and origins

- Of the 1,028 individual anglers who agreed to complete an interview on the Bulkley, Kispiox and Zymoetz II rivers, 550 (53%) were BC residents, 100 (10%) were non-residents, and 378 (37%) were non-resident aliens. The majority of individual anglers interviewed on the Bulkley and Zymoetz II rivers were BC residents (58% and 61% respectively), whereas the majority were non-resident aliens (54%) on the Kispiox River.
- Most BC resident anglers were from the FLNRO Region 6 - Skeena (252 anglers, 46%), followed by Region 2 - Lower Mainland (143 anglers, 26%). The majority of the non-residents interviewed resided in Alberta (64%), followed by Ontario (19%), and Quebec (12%). The majority of the non-resident aliens interviewed resided in USA (54%) with each other country representing less than 10%.

Spatial distribution of angler interviews

- On the Bulkley River, the highest number of complete angler interviews occurred between the river segments Quick Bridge – Telkwa Bridge (127 interviews, 24% of the total interviews), Trout Creek – Moricetown (103 interviews, 19% of the total interviews), and between Smithers Bridge – Chicken Creek (99 interviews, 18% of the total interviews).
- On the Kispiox River, the highest number of complete angler interviews were conducted between the river segments Confluence with Skeena River – Rodeo Grounds (126 interviews, 48% of the total interviews) and Rodeo Grounds – Upper Recreation Site (85 interviews, 33% of the total interviews). This indicates that 81% of all interviews on the Kispiox River were conducted between the confluence with the Skeena River and Upper Recreation Site a distance of approximately 30km.

Temporal distribution of angler days over Classified Waters period

- On the Bulkley River, non-resident aliens purchased the greatest number of angler days during the first and second week of October. The Kispiox River had the greatest number of non-resident alien angler days purchased during the last week of September and first two weeks of October. The Zymoetz II River had the greatest number of non-resident alien angler days purchased during the second week of September.
- The correlative relationship between the number of angler interviews and non-resident and non-resident alien angler days purchased over one week periods was strong for the Bulkley ($r=0.95$), Kispiox ($r=0.91$), and Zymoetz II ($r=0.92$) rivers. This indicates that the number of days purchased by these anglers (summarized by one-week periods) generally trended together over the study period.
- River Guardians interviewed 29% of the individual non-resident and 27% non-resident alien anglers on the Bulkley, Kispiox and Zymoetz II rivers during the study period.
- Temporal distribution of BC resident angler days could not be assessed using the electronic licence system as it does not require this class of angler to declare the number of days or river they intend to fish.

Average guided and unguided angler days purchased

- On the Bulkley, Kispiox, and Zymoetz II rivers, unguided non-residents purchased a higher average number of angler days per day during restricted times than during unrestricted times, however, there was no statistically significant difference.
- The average number of angler-days purchased per day by guided non-resident aliens on the Bulkley, Kispiox and Zymoetz II rivers was higher during restricted times than unrestricted times, however, the only a statistically significant difference was on the Bulkley River.

Trends in angler use from 2009 to 2014

- For Skeena Region residents specifically, between 2009/2010 to 2014/2015, annual basic licence sales increased 16%, Classified Waters licence sales increased 25%, and Steelhead Stamps increased 62%. Rising angler licence sales in the rest of the province have also occurred from 2009/2010 to 2014/2015. Classified Waters licences among non-Skeena BC residents increased 32% and the sale of Steelhead Stamps among non-Skeena BC residents increased 36%.

- On the Bulkley, Kispiox and Zymoetz II rivers, there was a greater number of non-resident alien anglers who fished more angler days than non-resident anglers from 2009 to 2014.
- On the Bulkley River since 2009, there was a 14% decline in the number of unguided non-resident alien angler days and a 65% increase in the number of guided non-resident alien angler days. The number of unguided non-resident angler days also increased by 79%, and the number of days fished per individual (during the Classified Waters period) increased from 4.0 to 5.3 since 2009 for this residency category.
- On the Kispiox River since 2009, the number of unguided non-resident alien angler days declined by 21%, and guided non-resident alien days increased by 53%. For the latter, the number of days fished per individual increased from 4.1 in 2009 to 5.4 in 2014.
- On the Zymoetz II River since 2009, there has been an increase in the number of guided non-resident alien anglers (150%) and angler days purchased by this class of angler (118%). Large increases in the number of individual unguided non-residents (141%) and days (328%) have also occurred since 2009. As a caveat, these trends are likely influenced by the extension of the Classified Waters period on this river.
- In comparison to the Bulkley and Kispiox rivers, anglers are fishing approximately half the number of days per individual on the Zymoetz II River during the classified period. The reason for this is unknown, however, it may be due to the number of alternate river fishing options in the Terrace area, allowing anglers to spread out their effort among more rivers.
- On the Bulkley and Zymoetz II rivers, there was a statistically significant difference in the number of guided non-resident alien and unguided non-resident anglers before and after the regulation changes. In both cases, there were more of these anglers in the 2012-2014 period than before.
- On the Kispiox River, similar to the Bulkley and Zymoetz II rivers, there was a statistically significant difference in the number of guided non-resident alien anglers before and after the regulation changes. There were more anglers who purchased licences after the regulation changes.

Satisfaction

Factors contributing to a quality angling experience

- On the Bulkley River, the most frequently mentioned factors contributing to a quality angling experience were ‘High Fish Abundance/Catching Fish’, ‘Number of Anglers/Crowding’, and ‘Beauty/Scenery/Esthetic Attributes’.
- On the Kispiox River, the most frequently mentioned factors contributing to a quality angling experience were ‘Quality of Fish/Wild Fish’, ‘Beauty/Scenery/Esthetic Attributes’ and ‘High Fish Abundance/Catching Fish’.
- On the Zymoetz II River, the most frequently mentioned factors contributing to a quality angling experience were ‘Quality of Fish/Wild Fish’, ‘Beauty/Scenery/Esthetic Attributes’ and ‘Good Accessibility/Closer to Home’.

Median ratings of a quality angling experience

- BC resident, non-resident, and non-resident alien anglers generally appear to be having a good to excellent experience fishing the Bulkley, Kispiox, and Zymoetz II rivers in 2014. Overall, 38% of anglers rated their experience as excellent, 30% rated it as good, 21% rated it as fair, and few anglers rated their experience as poor (7%) or very poor (4%).
- On the Bulkley River, most anglers rated their experience as fair (3), good (4), or excellent (5), with less than 15% of anglers rating their day as poor or very poor.
- On the Kispiox River, most anglers rated their angling experience as good (4) or excellent (5), with fewer than 20% rating it as fair to very poor.
- On the Zymoetz II River, BC residents, non-residents and non-resident aliens rated their day most frequently as excellent (50%, 42%, and 59% of responses respectively).

Median ratings of crowding

- Overall, the majority of anglers on all rivers provided a median rating of ‘not crowded at all’. There was no difference between the frequency of crowdedness mentioned by BC residents and Skeena Region 6 residents.
- On the Bulkley River, BC residents and non-residents responded with ‘not crowded at all’ at the same frequency between unrestricted and restricted times. On the Kispiox River, BC residents and non-residents indicated they felt ‘not crowded at all’ more frequently during restricted times, which could be a result of fewer anglers on the river.
- Instances where anglers felt extremely crowded during either the restricted or unrestricted times were rare and accounted for less than 10% of responses for each river. These results indicate that the timing of non-resident alien restrictions does not dramatically influence the day-specific crowded rating of anglers who were interviewed in 2014.

Angler crowding and regulations

- Of all applicable interviews, 296 anglers (39%) thought the restricted times reduced crowding, 194 anglers (26%) thought that crowding had stayed the same, 172 anglers (23%) did not know how the crowding had been affected, 88 anglers (12%) thought that crowding had increased since the restrictions were implemented, and three anglers provided no answer to this question.
- BC residents predominantly thought that the restrictions reduced crowding on the rivers, whereas the majority of anglers who thought that the regulation changes increased crowding on the rivers were non-resident aliens.
- A total of 241 anglers (32%) thought that their quality angling experience had improved since the restrictions, 234 anglers (31%) thought that it had stayed the same, 142 anglers (19%) thought it had declined, 132 anglers (18%) did not know.

- The majority of anglers who thought that the restrictions improved their angling experience were BC residents (77%), while non-resident aliens indicated that the new regulations reduced their quality angling experience (87%).
- The number of anglers who thought the restricted times had reduced crowding on the river declined from 47% in 2013 to 39% in 2014. Similarly, fewer anglers felt the restrictions improved their quality angling experience from 2013 (37%) to 2014 (32%).

Angler comments on regulation changes

- Most frequently, comments by anglers were made in regards to a support or dislike of the regulation changes that restrict non-resident alien anglers. For example, 56% of BC residents/non-residents indicated they support the regulation changes, whereas only 15% of non-resident aliens made this comment. Meanwhile, 48% of non-resident aliens suggested they dislike these regulations, whereas 8% of BC resident/non-residents made this comment.

Angler compliance

- A total of 89 out of the 1,247 complete individual angler interviews (7%) had some type of licence infraction on all rivers studied. Forty-seven (53%) were BC residents, 14 (16%) were non-residents, and 28 (31%) were non-resident aliens. Failure to carry/produce a licence was the most frequent infraction and included anglers who refused to show their basic angling licence (38 anglers, 43%); the majority of these anglers were BC residents.
- The non-compliance rate in 2014 of 7% (89 infractions and 1,247 interviews) was just over half of the rate of 12% observed in 2013.
- On the Bulkley River, there was a high non-compliance rate in September which declined in October. Relative to other rivers, the Kispiox River had a low non-compliance rate throughout the entire study period. The Zymoetz II River had a high non-compliance rate at the beginning of the study period, which declined in the third week of September and then increased again in late October.

Table of Contents

Executive Summary	i
Table of Contents	vi
List of Tables	viii
List of Figures	ix
1.0 Introduction.....	1
1.1 Rationale.....	2
1.2 Relevant definitions.....	2
2.0 Study Area	3
2.1 Bulkley River	4
2.2 Kispiox River	5
2.3 Zymoetz River Class II (Zymoetz II).....	6
2.4 Skeena River section 4 (Skeena IV).....	7
3.0 Study design and data	8
3.1 Roving survey	8
3.2 Interview form.....	8
3.3 Sampling protocol	8
3.4 Electronic licence sales database.....	10
4.0 Analysis methods	11
4.1 Effort	11
4.1.1 River Guardian roving survey and angler interview effort.....	11
4.1.2 Angler interview residency categories	11
4.1.3 Angler residency origin	11
4.1.4 Spatial distribution of angler interviews among rivers.....	11
4.1.5 Temporal distribution of anglers during the Classified Waters period	12
4.1.6 Residency category and guided angler status	12
4.1.7 Average guided and unguided angler days purchased during restricted and unrestricted times.....	12
4.1.8 Non-resident and non-resident alien angler use before and after regulation changes ..	13
4.1.9 Non-resident and non-resident alien angler use during unrestricted and restricted times before and after regulation changes.....	13
4.2 Angler satisfaction.....	13
4.2.1 Factors contributing to a quality angling experience.....	13
4.2.2 Quality angling experience ratings	13
4.2.3 Crowdedness ratings.....	14
4.2.4 Impact of regulation changes on anglers and crowding	14
4.2.5 Angler comments.....	14
4.3 Angler compliance	14
4.4 Catch summary.....	15
5.0 Results and Discussion	15
5.1 Effort	15
5.1.1 River Guardian roving survey and angler interview effort.....	15
5.1.1.1 Bulkley River	16
5.1.1.2 Kispiox River	16
5.1.1.3 Zymoetz II River.....	17

5.1.1.4 Skeena IV River	18
5.1.2 Angler interview residency categories	18
5.1.3 Angler residency origin	19
5.1.3.1 Skeena Region 6 licence purchases	19
5.1.3.2 BC resident angler origins	20
5.1.3.3 Non-resident and non-resident alien angler origins	21
5.1.4 Spatial distribution of angler interviews among rivers.....	22
5.1.5 Temporal distribution of angler days over Classified Waters period.....	27
5.1.5.1 River Guardian sampling rate	28
5.1.6 Guided angler status by residency	29
5.1.7 Average guided and unguided angler days purchased by non-resident and non-resident aliens during unrestricted and restricted times	29
5.1.8 Trends in non-resident and non-resident alien angler use from 2009 to 2014	30
5.1.9 Non-resident and non-resident alien angler use during either restricted or unrestricted times.....	35
5.2 Angler satisfaction.....	37
5.2.1 Factors contributing to a quality angling experience.....	37
5.2.2 Quality angling experience ratings	40
5.2.3 Crowdedness ratings.....	41
5.2.4 Impact of regulation changes on anglers and crowding	42
5.2.5 Angler comments.....	44
5.3 Angler licence and regulation compliance	45
5.4 Catch summary.....	46
6.0 Limitations	47
7.0 Recommendations.....	48
8.0 Acknowledgments.....	50
9.0 References.....	51
10.0 Appendix.....	53

List of Tables

Table 1: Date ranges for each time-period used for data analysis (one-week blocks).	9
Table 2: Number (%) of days River Guardians spent roving each river.	16
Table 3: Number of complete angler interviews and number of individual anglers interviewed on the Bulkley River during unrestricted and restricted times, stratified by one-week periods.....	16
Table 4: Number of complete angler interviews and number of individual anglers interviewed on the Kispiox River during unrestricted and restricted times, stratified by one-week periods.....	17
Table 5: Number of complete angler interviews and number of individual anglers interviewed on the Zymoetz II River during unrestricted and restricted times, stratified by one-week periods...	18
Table 6: Number (%) of individual anglers interviewed on the Bulkley, Kispiox, and Zymoetz II rivers by residency category.	19
Table 7: Number (%) of interviews conducted in each segment of the Kispiox and Bulkley rivers.	23
Table 8: Interview sampling rate for non-resident and non-resident alien anglers in 2014.	29
Table 9: Number (%) of guided and unguided non-resident and non-resident alien anglers on the Bulkley, Kispiox, and Zymoetz II rivers during the River Guardian study period, 2014.	29
Table 10: Average (CV) number of guided and unguided non-resident and non-resident alien angler days purchased per day during unrestricted and restricted times in 2014.	30
Table 11: Number (%) of fishing licence infractions by type and residency category.....	45
Table 12: Catch summary for interviewed anglers by species and river in 2014.	47

List of Figures

Figure 1: The Skeena Watershed (Morten and Giroux, 2006).....	4
Figure 2: The Bulkley River. River segments for analysis (Morten, 1999).	5
Figure 3: The Kispiox River. Segments used for analysis (Morten and Giroux, 2006).	6
Figure 4: The Zymoetz River. Showing Class I and Class II sections (Morten, 2000).	7
Figure 5: Number of basic licences, Classified Waters licences, and Steelhead Stamps purchased by Skeena Region residents and non-Skeena BC residents. Skeena resident licence sales are on the left axis, Non-Skeena BC residents are on the right axis.	20
Figure 6: Place of origin for BC residents interviewed as per FLNRO management regions.....	21
Figure 5: Province or country of origin for interviewed non-residents (a) and non-resident aliens (b) in 2014.	22
Figure 8: The number of angler interviews by river segment and angler residency for (a) Bulkley River and (b) Kispiox River. Segment 10 on the Bulkley River was not included as there were only two interviews conducted in this zone.	24
Figure 9: Location of River Guardian interviews on the Bulkley River in 2014.	25
Figure 10: Location of River Guardian interviews on the Kispiox River in 2014. Note that in river segment 2 there are two bubbles almost overlapping. These could not be combined due to analysis methods.	26
Figure 11: Location of River Guardian interviews on the Zymoetz II River in 2014. Note that in lower river there are two bubbles almost overlapping. These could not be combined due to analysis methods.	27
Figure 12: Summary of the non-resident and non-resident alien angler days purchased over one-week periods during the study period. Dashed lines represent the sum of angler interviews conducted over week periods on the Bulkley, Kispiox, and Zymoetz II rivers.	28
Figure 13: Number of anglers and number of angler days during the Classified Waters period on the Bulkley (a), Kispiox (b), and Zymoetz II (c) rivers from 2009 to 2014. The dashed line is for illustrative purposes to represents when the non-resident alien restrictions were implemented. .	32
Figure 14: Box plot showing the total number of anglers who purchased a Classified Waters licence pre- and post- regulation change for the Bulkley (a), Kispiox (b), and Zymoetz II (c) rivers. Note that the y-axes vary by plot. Residency categories bolded and with an * indicate statistically significant difference between the number of anglers pre- and post- regulation change.	34
Figure 15: Number of angler days purchased during unrestricted and restricted times on the Bulkley River. The dashed line is for illustrative purposes to represents when the non-resident alien restrictions were implemented.	35
Figure 16: Number of angler days purchased during unrestricted and restricted times on the Kispiox River. The dashed line is for illustrative purposes to represents when the non-resident alien restrictions were implemented.	36

Figure 17: Number of angler days purchased during unrestricted and restricted times on the Zymoetz II River. The dashed line is for illustrative purposes to represents when the non-resident alien restrictions were implemented. 37

Figure 18: Factors contributing to a quality experience for BC residents/non-residents, and non-resident alien anglers on the Bulkley River in 2014. 38

Figure 19: Factors contributing to a quality experience for BC residents, non-residents and non-resident alien anglers on the Kispiox River in 2014. 39

Figure 20: Factors contributing to a quality experience for BC residents, non-residents and non-resident alien anglers on the Zymoetz II River in 2014. 40

Figure 21: Percent of BC residents, non-resident, and non-resident alien responses to their quality angling experience ratings for the Bulkley, Kispiox, and Zymoetz II rivers. Note the y-axis vary by river. 41

Figure 22: Percent of BC residents, non-resident, and non-resident alien responses to crowded ratings for the Bulkley, Kispiox, and Zymoetz II rivers. Note the y-axis vary by river. 41

Figure 23: Percent of BC resident and non-resident responses to their Crowded Rating during restricted and unrestricted times on the Bulkley, Kispiox, and Zymoetz II rivers. Note the y-axis vary by river. 42

Figure 24: Summary of angler responses to questions related to crowding and changes and quality of angling experience. For (1) Angler residency was not collected from three angler interviews. For (2) Angler residency was not collected from three angler interviews, and one angler didn't answer this question. 44

Figure 25: Comments reported to the River Guardians during angler interview surveys in 2014. 45

Figure 26: Number of violations over the periods when surveys were conducted in 2014. Infractions included are listed in Table 10. 46

1.0 Introduction

The Skeena River watershed in northwestern British Columbia (BC) is recognized for providing a high-quality recreational fishery for steelhead (*Oncorhynchus mykiss*). In 1990, the province implemented a Classified Waters system to enhance the quality experience for anglers and improve regulation of the angling guide industry. Rivers or sections of rivers were classified during periods of elevated angling effort, most commonly associated with steelhead pre-spawning migrations. In the Skeena Region on April 1, 2012, Angling Management Plans were implemented for twelve of the Classified Waters. These plans included a number of new regulations, the most significant being temporal and spatial restrictions limiting access for non-resident alien anglers and in some cases angling guides. These measures were intended to address social issues during the recreational steelhead fishery such as crowding and conflict amongst anglers. Due to their nature, these regulations have been the subject of controversy given the importance of visiting anglers (e.g. tourism) in the regional economy.

To monitor how anglers are responding to the non-resident alien restrictions, the Ministry of Forests, Lands and Natural Resource Operations (FLNRO) implemented the Skeena River Guardian project, a three-year initiative from 2013-2015 to conduct angler surveys on the Bulkley, Kispiox and Zymoetz II Classified Waters primarily during peak angler season (September and October) (Figure 1). These rivers were selected as indicators because they receive high levels of use from all anglers and crowding is perceived to be a major issue. Additionally, these rivers are easily accessible from the communities of Smithers, Hazelton, and Terrace offering logistical benefits for this project. The Skeena River Section 4 Classified Water, was also monitored at Cedarvale (Figure 1) as concerns have been raised regarding angler crowding, non-compliance and etiquette in this area.

The intent of this project was to collect information about steelhead angler demographics, effort, satisfaction, and compliance. The River Guardians were not officers under the *BC Wildlife Act* and therefore did not have any enforcement powers. Their presence was primarily to perform data collection and provide information to anglers. This project has three main objectives, including:

1. Assessment of trends in angler effort
2. Measurement of angler satisfaction, and
3. Evaluation of angler compliance.

These objectives were designed to provide key insights into how anglers perceive the new regulations, whether they are complying with them, and how their behaviour has changed in response. This report provides data from 2014, which is the second of this study, building on data collected in 2013 and adding to data that will be collected in 2015. Only minor changes were made to the methodology from 2013, involving the addition of a third crew to focus solely on the Kispiox River, to increase the number of angler interviews (sample size) on this system.

This project is funded by the Habitat Conservation Trust Foundation (HCTF) and is a collaborative effort between the BC Conservation Foundation, HCTF and FLNRO.

1.1 Rationale

Opportunities to engage with anglers on the river are rare. The last series of River Guardian studies in the Skeena Region were implemented between 1997 and 2004 for the Babine, Bulkley, Kispiox, Morice and Zymoetz rivers. This project intends to build on these efforts by updating knowledge of angler effort, satisfaction, and compliance during the Skeena River steelhead fishery in light of the regulatory changes introduced in 2012. Species specific catch information was also collected to inform conservation based angling regulations. This project will be successful if it increases understanding for FLNRO, First Nations, angling stakeholders and the public regarding how Angling Management Plans (and the regulations they prescribe) are working on the Bulkley, Kispiox and Zymoetz II rivers.

1.2 Relevant definitions

Basic angling licence: Anglers are required to purchase a basic freshwater angling licence before they fish for any species in British Columbia. Various types exist including 1-day, 8-day or annual licences.

Classified Waters: The Classified Waters of BC are highly productive trout streams. These streams are classified as either Class I or Class II during certain times of the year. The Classified Waters licensing system was created to protect the unique fishing opportunities provided by these waters, which contribute significantly to province's reputation as a world-class fishing destination.

Classified Waters licence: When fishing a stream designated as a Classified Water, all anglers must purchase a Classified Waters licence during the period when it is classified, in addition to the basic angling licence. For BC residents, Classified Waters licences are valid for the licensing year (April 1 to March 31). For non-residents or non-resident aliens, Classified Waters licences are sold on a per diem basis and are date and water-specific. Although anglers may purchase as many Classified Waters licences as they wish, each licence may not exceed eight consecutive days.

Classified Waters period: The period of time when anglers must purchase a Classified Waters licence on a Classified Water.

Steelhead Stamp: Anglers must purchase a Steelhead Stamp (also known as a Steelhead Conservation Surcharge) if they intend to fish for steelhead in BC. A Steelhead Stamp may be mandatory on specific Classified Waters, even if anglers are targeting species other than steelhead.

Angler day or Rod day: Represents the effort of one angler fishing for one day.

BC resident: means your primary residence is in BC, AND (a) you are a Canadian citizen or landed immigrant, AND have been physically present in BC for the greater portion of each of six calendar months out of the immediately preceding 12 calendar months, OR (b)

you are NOT a Canadian citizen or landed immigrant, but have been physically present in BC for the greater portion of each of the immediately preceding 12 calendar months.

Non-resident: means you are not a “BC resident”, but (a) you are a Canadian citizen or landed immigrant, OR (b) your primary residence is in Canada, AND you have resided in Canada for the immediately preceding 12 months.

Non-resident aliens: means you are neither a “BC resident” nor a “non-resident”.

Unrestricted non-resident alien times (unrestricted times): A period of time specific to a Classified Water where non-resident aliens are permitted to fish. This generally applies to unguided non-resident alien anglers and occurs when Canadian resident-only times and zones do not apply.

Restricted non-resident alien times (restricted times): A period of time specific to a Classified Water, or zone on a Classified Water, where non-resident aliens are not permitted to fish. This restriction is synonymous with Canadian resident-only times and zones. On some rivers, this restriction does not apply if a non-resident alien angler hires a licenced angling guide.

2.0 Study Area

Angler surveys were conducted in the Skeena River watershed on the Bulkley, Kispiox, and Zymoetz Class II rivers (Figure 1). This watershed is located in northwestern BC and is the second largest in the province (54,432 km²). The Skeena River extends through the Coast Mountain range draining part of the Nechako Plateau. Owing to its size, climate and hydrological patterns vary throughout this watershed (Gottesfeld and Rabnett, 2008).

Rivers within the Skeena River watershed support Pacific salmon species including sockeye (*O. nerka*), pink (*O. gorbuscha*), chum (*O. keta*), Chinook (*O. tshawytscha*), and coho (*O. kitsch*) salmon. Steelhead and cutthroat (*O. clarkii*) trout are also found here, in addition to the char species Dolly Varden (*Salvelinus malma*) and bull trout (*S. confluentus*). The target species for many anglers on these rivers in the fall season are steelhead and coho salmon.

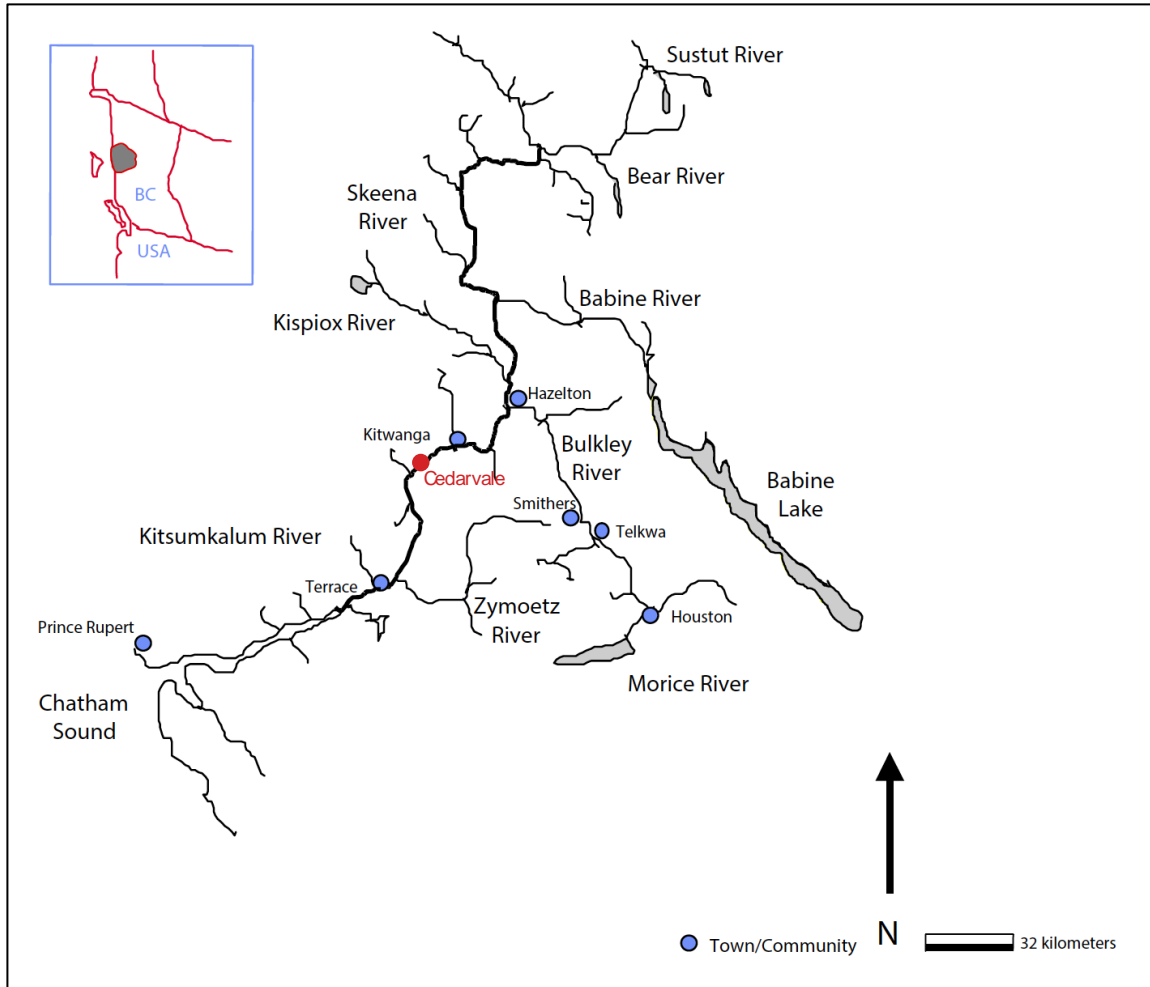


Figure 1: The Skeena Watershed (Morten and Giroux, 2006).

2.1 Bulkley River

The Bulkley River is a Class II Classified Water from September 1 to October 31. Originating at Morice Lake, it flows for 74 km as the Morice River until its confluence with the Little Bulkley River near Houston (Figure 2). From this point, it becomes the Bulkley River and flows for 146 km until it reaches the Skeena River confluence near Hazelton, BC (Figure 2). The Bulkley River is the largest of the Skeena River tributaries and drains 12,173 km². This study includes the Bulkley River downstream from its confluence with the Morice River until its confluence with the Skeena River.

Along Highway 16, the communities of Houston, Telkwa, Smithers, Moricetown, and Hazelton are adjacent to the Bulkley River, leading to high accessibility for foot and boat-based anglers. Historical angler surveys indicate that most angling occurs in the following segments of river: Telkwa Bridge – Smithers Bridge (~13 km), Smithers Bridge – Kathlyn Creek confluence (~4 km), Kathlyn Creek – Trout Creek (~26 km), and Trout Creek – Moricetown (~8 km) (segments 5 to 8 in Figure 2, respectively; Morten, 1999).

The Bulkley River typically has good water clarity throughout most of the steelhead angling season (Anonymous, 1996a). The Telkwa River contributes the majority of suspended sediments during warmer periods or times of high runoff resulting in increased turbidity, at which time anglers move upstream of the Bulkley-Telkwa River confluence in search of more favorable fishing conditions (Figure 2; Morten, 1999).

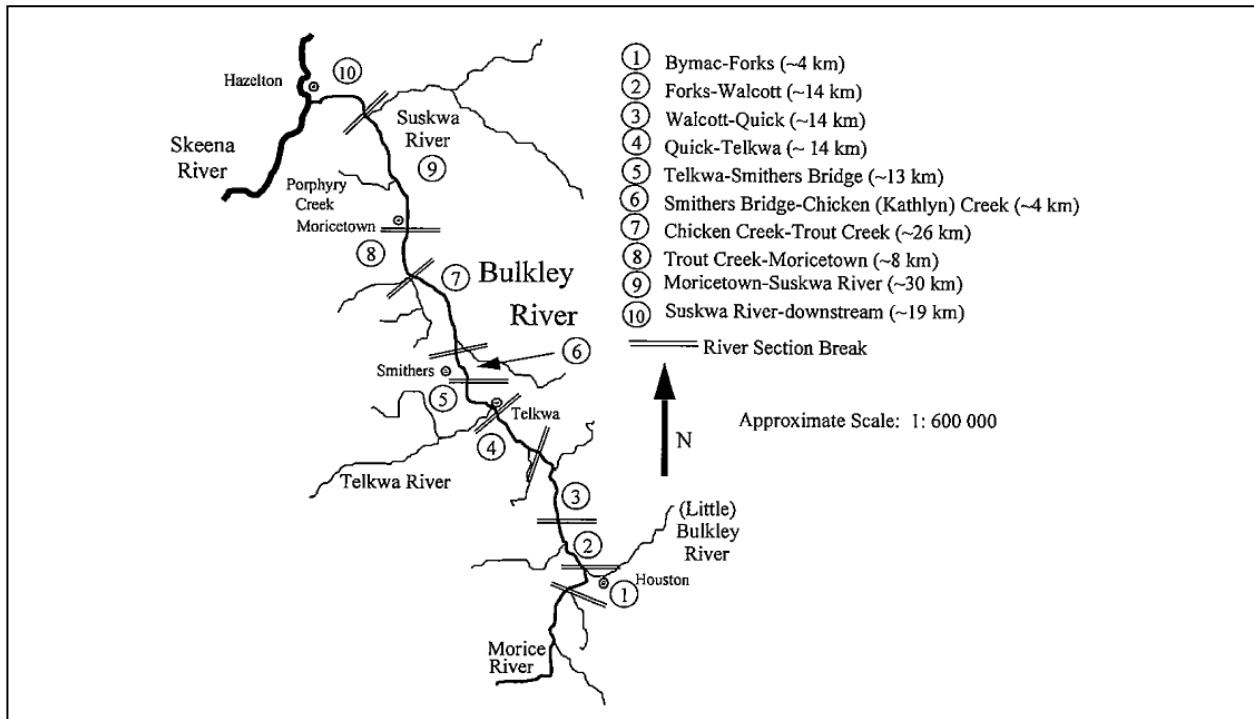


Figure 2: The Bulkley River. River segments for analysis (Morten, 1999).

2.2 Kispiox River

The Kispiox River is a Class II Classified Water from September 1 to October 31. This river flows for approximately 140 km before entering the Skeena River (Figure 3). The Kispiox River drains a total area of 2,086 km² and has a minimal amount of lake influence (Morten and Giroux, 2006). This study includes the Kispiox River from its confluence with the Sweetin River downstream to the confluence with the Skeena River (approximately 80 km; Figure 3).

The Kispiox River is accessible by road for most of its length. Angler effort is generally concentrated within the lower 30 km (segments 1, 2 in Figure 3; Anonymous, 1997). Power boats are prohibited on the river, but drift boats or rafts are permitted and are commonly used by anglers.

In the Kispiox Valley, extensive road networks from forest harvesting contribute to significant runoff and siltation during large precipitation events (Anonymous, 1996b). Water clarity can be reduced during these times, in turn producing unfavourable fishing conditions.

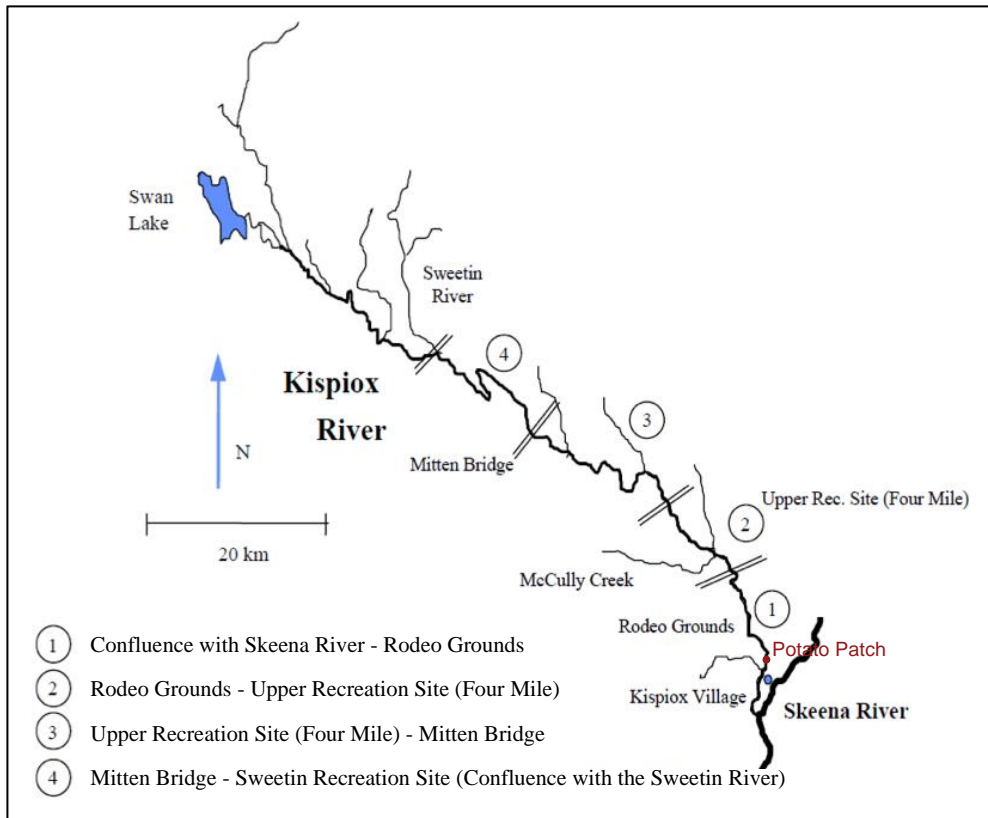


Figure 3: The Kispiox River. Segments used for analysis (Morten and Giroux, 2006).

2.3 Zymoetz River Class II (Zymoetz II)

The Zymoetz River is 109 km in length, flowing from the McDonnell Lake chain to its confluence with the Skeena River (Figure 4). This watershed has a drainage area of 3,080 km² and the Clore and Kitnayakwa rivers are its major tributaries (Beere, 1995).

The Zymoetz River has separate Class I and Class II sections. The Class II section (Zymoetz II) is classified for approximately ten months between July 24 to May 31. Prior to 2012, this section was classified for two months, from September 1 to October 31. The classified period extension was implemented to include the fall and spring run timing of steelhead and to cap growth in angling guide activity. The start date of July 24 corresponds to one day after the Chinook closure (thereby not requiring anglers targeting this species to purchase a classified licence) and the May 31 end date was selected as it includes the winter/spring steelhead sport fishery (FLNRO, 2013).

The Class II mainstem section was sampled for this study, which extends 47 km from Limonite Creek downstream to the Skeena River (Figure 4). The main access to this area is from the Copper River Main Forest Service Road, although anglers also use the Copperside Road to access a limited portion of the North side of the river.

Weather events causing unfavourable fishing conditions are common on the Zymoetz River (Morten, 2000). Large amounts of rainfall and/or fast snowmelt cause high runoff, which

significantly reduces water clarity. In turn, this negatively impacts angler success, especially below the Clore River (the major contributor of sediment).

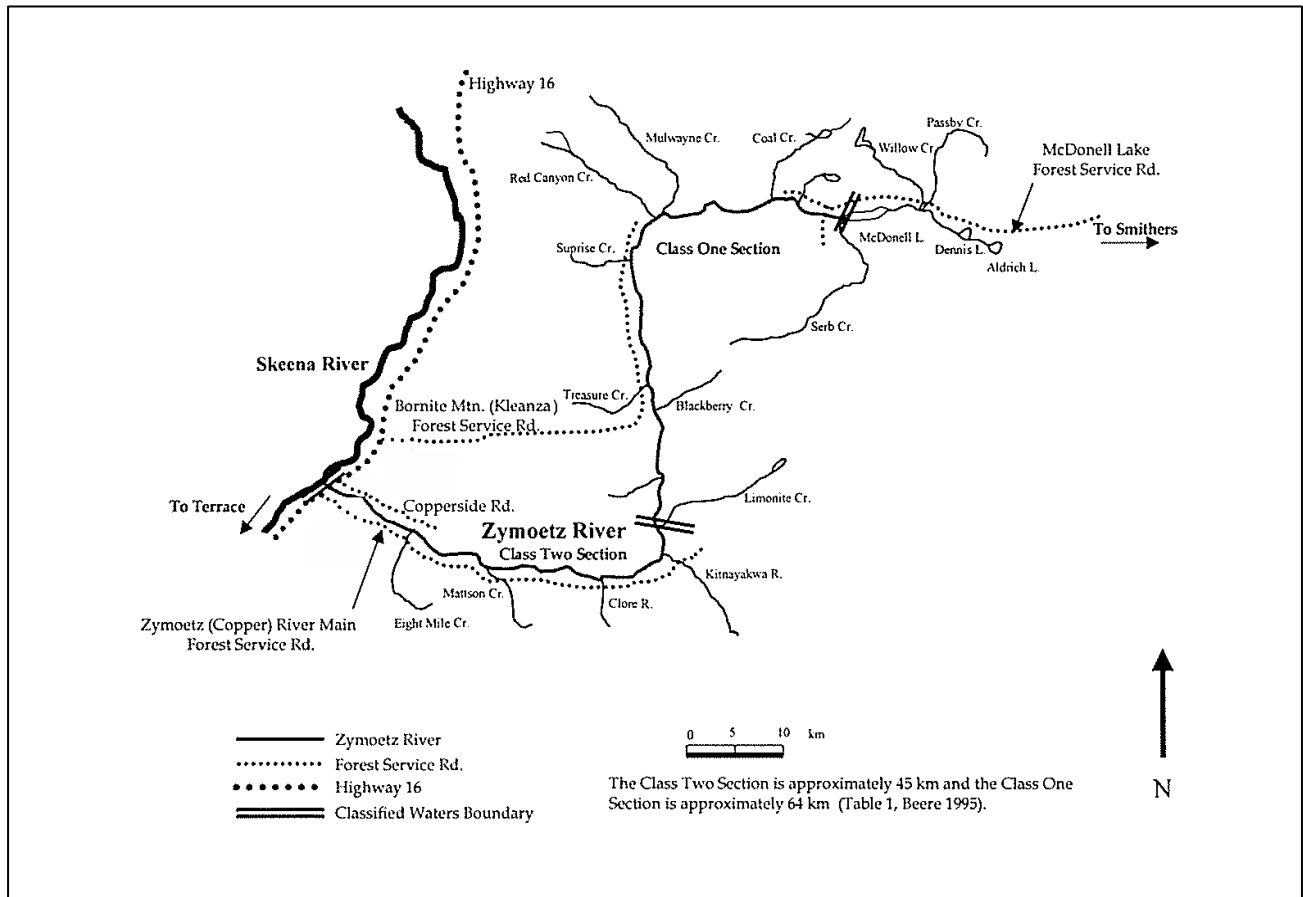


Figure 4: The Zymoetz River. Showing Class I and Class II sections (Morten, 2000).

2.4 Skeena River section 4 (Skeena IV)

The Skeena River section 4 (Skeena IV) Classified Water was surveyed in the area known as Cedarvale (Figure 1), which is approximately 75 km northeast of Terrace, BC. Skeena IV is classified from July 1 to December 31. At Cedarvale, anglers can access a large gravel bar on river left, providing one of the few river-access points on this section of the river. Unlike the Bulkley, Kispiox and Zymoetz II rivers, non-resident alien restrictions do not apply to the entire length of Skeena IV and two ‘open’ zones exist (Appendix 1.0). These zones were intentionally created to provide unrestricted opportunities for non-resident aliens on the weekends when other rivers are restricted. Cedarvale is located within the lower open zone, extending from Sedan Creek to Chindemash Creek. Concerns have been raised that the lack of non-resident alien restrictions in this zone has led to increased crowding on weekends, speeding vehicles, littering, poor etiquette, angler non-compliance, and general disturbance to residents in the area. Due to these concerns, the River Guardians monitored Skeena IV at Cedarvale to increase understanding of these angler-use and related issues.

3.0 Study design and data

Angler interviews and roving surveys were conducted by River Guardians on the Bulkley, Kispiox, Zymoetz II and Skeena IV rivers. Angler interviews involved a set of predetermined questions the River Guardians asked to anglers, and roving surveys were used to collect information on environmental conditions and number of anglers observed. Interviews and roving surveys were conducted on the Bulkley and Kispiox rivers from September 2 to October 30 spanning the majority of the Classified Waters period (September 1 to October 31). On the Zymoetz II and Skeena IV rivers, angler interviews and roving surveys were conducted from August 18 to October 31 spanning the busiest portion of the Classified Waters period of both river sections.

Three crews of two River Guardians were employed to conduct angler interviews and roving surveys. The River Guardians surveying and interviewing on the Zymoetz II River also interviewed and surveyed anglers on Skeena IV, however, with less frequency (see Section 3.3). The River Guardians accessed known angling locations and approached anglers by foot to initiate interviews. Apple iPads® with the FileMaker Pro® app were used to collect angler interview and roving survey data, and the Avenza Maps® app was used to navigate to known fishing locations. In addition to the onsite angler interviews, interview forms were distributed to local fly-fishing lodges to collect information from guided anglers.

3.1 Roving survey

A roving survey was completed each time the River Guardians visited a specific river or river segment (Appendix 2.0). The purpose of the roving survey was to collect environmental data on weather, water level, water clarity and general route descriptions of where and how the River Guardians accessed the river. In addition, the River Guardians recorded the number of anglers observed.

3.2 Interview form

The River Guardians initiated the interview process upon approaching an angler (Appendix 3.0). For anglers who agreed to participate, interview questions focused on angler demographics, satisfaction (e.g. quality angling experience, crowding concerns), catch, and licence compliance. The time and location of the interview were recorded to account for spatial and temporal distribution of anglers. If the angler refused an interview or did not speak English, limited or no data were collected and these interviews were considered incomplete. If the angler was not in possession of their fishing licence, the interview was completed and the licence infraction was recorded.

3.3 Sampling protocol

Crew scheduling for this study was based on a stratified random sampling design (Zar, 1984, Schafer *et al.*, 1990, Pollock *et al.*, 1994), whereby the study period was temporally divided into one week periods (as per recommendations in Morten, 1999, Morten and Giroux, 2006; Table 1) and sampling effort was further stratified by restricted and unrestricted times. The restricted

times for the Zymoetz II River included Fridays, Saturdays, and Sundays. The restricted times for the Bulkley and Kispiox rivers included Saturdays and Sundays. River Guardians surveyed the rivers in daylight hours, during either early (830 until 1630) or late (1100 until 1900) shifts. As daylight hours shortened, the late shift was modified to 1030 to 1830 from October 20 onward. This schedule was employed to allow the River Guardians to intercept anglers at different times and to ensure a representative sample was collected throughout the study period. Sampling effort was stratified each week starting on Mondays and ending on Sundays as follows:

- On the Bulkley and Kispiox rivers, three weekdays (unrestricted times) and two weekend days (restricted times)
- On the Zymoetz II River, three weekdays and two weekend days were sampled each week. Between two and three of these days were during the restricted times, and between two and three days were during the restricted times due to the Zymoetz II having Fridays, Saturdays and Sundays as restricted times.
- Skeena IV at Cedarvale was monitored twice per week. This occurred once during the week and once during the weekend. This area does not have restricted times.

Table 1: Date ranges for each time-period used for data analysis (one-week blocks).

Week	Dates
8-3	Aug. 18 – Aug. 24
8-4	Aug. 25 – Sept. 1
9-1	Sept. 1 – Sept. 7
9-2	Sept. 8 – Sept. 14
9-3	Sept. 15 – Sept. 21
9-4	Sept.22 – Sept. 28
10-1	Sept. 29 – Oct. 5
10-2	Oct. 6 – Oct. 12
10-3	Oct. 13 – Oct. 19
10-4	Oct. 20 – Oct. 26
10-5	Oct. 27 – Oct. 31

The Bulkley River was divided into ten sampling segments (Figure 2; Morten 1999), and the Kispiox River was divided into four sampling segments consistent with previous steelhead angler surveys (Figure 3; Morten and Giroux, 2006). The Kispiox and Bulkley River Guardians were directed to sample either the upper or lower river each day at random. On the Bulkley River, the lower river included segments 1-5, and the upper river included segments 6-10 (Figure 2). On the Kispiox River, the lower river included segments 1 and 2, and the upper river included segments 3 and 4 (Figure 3). On the Zymoetz River, only the Class II Classified Water was sampled. To be consistent with historical reports, the Zymoetz II River was not divided into river segments, as the entire Class II section can be sampled in a day. This study design was employed to collect data from all segments of each river randomly, to collect representative information, and to allow spatial trends to be identified.

Similar to last year’s study (Pitman and Hirshfield, 2015), the River Guardians intercepted anglers by driving and/or hiking to known angling locations. Upon arriving at a site, the River Guardians initiated the roving survey form and interviewed all accessible anglers. Any anglers

that were inaccessible (on the other side of the river or would not come out of the water) were not interviewed but were tallied in the roving survey. If an angler refused to conduct an interview or there was a language barrier, the River Guardians recorded as much data as possible, but interviews were considered incomplete. Anglers were interviewed regardless if they were required to purchase a fishing licence or not (i.e. First Nations). Anglers approached more than once were interviewed, but only licence information and a subset of day specific questions were obtained.

The River Guardians were not designated as officers under the *BC Wildlife Act* and therefore did not have enforcement authority. Their roles were primarily data collection and to provide information to anglers. Although anglers were requested to provide their angling licence during each interview, participation was voluntary. The River Guardians observed and recorded licence infractions and reported all violations. If the licence violation was considered minor (e.g. failed to purchase Classified Waters licence, failed to purchase Steelhead Stamp, or not in possession of fishing licence) it was submitted to the *Report all Poachers and Polluters* website. If the infraction was major (e.g. anglers using bait, anglers retaining steelhead) the Conservation Officer Service was contacted immediately. Anglers found to be in violation of regulations were informed of this after their angler interview.

3.4 Electronic licence sales database

In addition to the angler interview and roving survey data collected by the River Guardians, information was also obtained from the electronic licence sales database. This database holds information for all angling licences sold in the province. Angler effort (i.e. angler days) can be assessed for non-resident and non-resident alien anglers as these classes of anglers are required to purchase a river and day specific Classified Waters licence. BC residents purchase an annual Classified Waters licence for all classified rivers, so daily angler effort cannot be measured (which is a limitation of this data set). Non-resident and non-resident alien anglers also must declare on their licence if they used a guide and if applicable, the guide's name (e.g. the tenure holder) must be provided. In using the licence sales information, it is important to acknowledge that it reflects licences sold and not actual angling effort. In some cases, licences may be purchased but not used (e.g., due to water conditions, trip logistics) causing the database to overestimate angler effort. Also, given that guided status is self-declared by the angler, it is subject to incompleteness and inaccuracy issues. Common errors include not identifying guided status or incorrectly listing the assistant angling guide on the licence instead of the angling guide holding angler day quota on the river.

For the purposes of this report, the best source of data was relied upon for determining angler characteristics (e.g., demography, guided status) and effort. For example, in many cases the electronic licence sales database was used for non-resident and non-resident alien anglers, and River Guardian database for BC resident anglers.

4.0 Analysis methods

4.1 Effort

4.1.1 River Guardian roving survey and angler interview effort

The total number of days the River Guardians conducted roving surveys as well as the weekly number of interviews collected on each river during either unrestricted or restricted times were recorded and summed over one-week periods. Dates of the one-week periods are presented in Table 1.

4.1.2 Angler interview residency categories

To determine the distribution of anglers along and among rivers, the total number of anglers and percentage of each residency category (BC resident, non-resident, and non-resident alien) were compared for the Bulkley, Kispiox, and Zymoetz II rivers.

4.1.3 Angler residency origin

To determine trends in angler demographics, the River Guardians asked individual anglers to specify their city, province or country of origin. City and postal code was recorded for BC resident anglers, province for non-residents, and the country for non-resident aliens.

The number of basic licences, Classified Waters licences, and Steelhead Stamps sold to anglers with a FLNRO Skeena Region address were summed for each licence year from 2009/2010 to 2014/2015 using the electronic licence sales database (the electronic licencing system was implemented in 2009). The number of Classified Waters and Steelhead Stamp sales were also calculated for non-Skeena BC residents to compare purchasing trends over time. These data provide information on how Skeena residents purchase licence products over time. As a caveat, an angling licence purchased by a Skeena Region resident does not mean they fished in the region, although there is a high probability this occurs in most cases. Inferences from licence sales to angler effort must be considered accordingly. Additionally, residents under the age of 16 and First Nations are not required to purchase licences and are therefore not accounted for in the database.

4.1.4 Spatial distribution of angler interviews among rivers

The River Guardians recorded the river segment (Figures 2 and 3) of each angler interview on the Bulkley and Kispiox rivers. River segments were defined as per previous studies (Morten, 1999; Morten and Giroux, 2006) to maintain consistency. The Zymoetz II and Skeena IV rivers were not spatially stratified into segments. The number of angler interviews collected in each river segment are presented as totals and percentages for each angler residency on the Bulkley and Kispiox rivers.

The River Guardians recorded the latitude and longitude for each angler interview, which were inputted into ArcGIS 10 software. Interview latitude and longitude locations were summed over 5 km reaches for the Bulkley, and 2 km reaches for Kispiox and Zymoetz II rivers and presented as proportional points (i.e. bubble plots) overlaid on a digital elevation model (DEM). These data

present the spatial distribution of anglers among the rivers and rivers segments of this study. The Skeena IV River was not included in this analysis as angler surveys on this water were limited to Cedarvale (Figure 1).

4.1.5 Temporal distribution of anglers during the Classified Waters period

To assess the temporal distribution of anglers fishing on the Bulkley, Kispiox, and Zymoetz II rivers, the number of Classified Waters licence sales (angler days) was summed by one-week periods for non-residents and non-resident aliens in accordance with the one-week stratified sampling schedule used for this project.

The total number of completed angler interviews were summed for each one-week period of the study and correlated to the number of angler days over the same one-week period using Pearson's r correlation analysis. This assessment provided the overall sampling effort by the River Guardians in comparison to the number of angler days purchased on each river.

A sampling rate was calculated by dividing the total number of completed interviews by the number of anglers who purchased a Classified Waters licence on either the Bulkley, Kispiox or Zymoetz II rivers over one-week periods. This summary statistic reflected the number of angler interviews (n) compared to the pool of anglers available to interview (N). Skeena IV was excluded from these analyses due to its limited sample size.

4.1.6 Residency category and guided angler status

The number and percent of guided and unguided non-resident and non-resident alien anglers on the Bulkley, Kispiox and Zymoetz II rivers was assessed using the Classified Waters licence sales data. Guided BC residents could not be assessed for this analysis as they are not required to select whether they hired a guide through the electronic licence database.

4.1.7 Average guided and unguided angler days purchased during restricted and unrestricted times

Classified Waters licence sales (angler days) were used to determine the daily average and coefficient of variation (CV) of angler days purchased by unguided and guided non-resident and non-resident aliens during unrestricted and restricted times on the Bulkley, Kispiox and Zymoetz II rivers over the study period. The CV was used to describe the amount of variability relative to the mean. As the CV is relative to the mean it is unitless, making it possible to compare variability amongst data sets that have different units or different means. The CV was calculated by dividing the standard deviation by the mean as follows:

$$CV = \frac{\text{standard deviation}}{\text{mean}}$$

An independent-samples t-test was conducted to compare the average number of angler days purchased by guided and unguided non-resident and non-resident aliens during unrestricted and restricted times. This was done to understand when anglers were purchasing angler days throughout the study period and to measure angler patterns following the implementation of the non-resident alien restricted times and zones. Data for BC resident anglers was not available for

this analysis, as angler day information for this residency category was not collected through the electronic licence sales database. Skeena IV at Cedarvale was excluded from this analysis (and through to section 4.1.9) as the restricted non-resident alien times do not occur in this area.

4.1.8 Non-resident and non-resident alien angler use before and after regulation changes

Electronic licence sales data was used to assess annual trends in the number of anglers and the number of angler days on the Bulkley, Kispiox, and Zymoetz II rivers. Angler participation was based on each individual angler who bought at least one Classified Waters licence for each year, and angler effort was based on the total number of Classified Waters licence sales (angler days) purchased each year. The total number of anglers and angler days are displayed in a line plot by year and river from 2009 to 2014 for non-resident and non-resident alien anglers. This spans three years (2009-2011) prior to regulation changes and three years (2012-2014) after. An independent samples t-test and box plot were used to test if there was a statistical difference in the number of guided and unguided non-resident and non-resident alien anglers purchasing a Classified Waters licences before compared to after the regulation changes that were made in 2012. Data for BC resident anglers was not available for this analysis, as angler day information for this residency category is not collected through the electronic licence sales database.

4.1.9 Non-resident and non-resident alien angler use during unrestricted and restricted times before and after regulation changes

To assess trends in angler activity before and after the 2012 regulation changes, electronic licence sales data was summarized and the total number of angler days were calculated by either restricted times or unrestricted times for the Bulkley, Kispiox, and Zymoetz II rivers. This information was displayed in a line plot by year and river from 2009 to 2014 for guided and unguided non-resident and non-resident alien anglers.

4.2 Angler satisfaction

4.2.1 Factors contributing to a quality angling experience

Anglers were asked during the interview: “*Past research has shown that a number of factors contribute to quality angling experiences. In order of importance, what factors contribute to your quality angling experience on this river?*” (Appendix 3.0, question 1). For the Bulkley, Kispiox and Zymoetz II rivers, three factors were obtained from the anglers in order of priority and assigned to a response category by the River Guardians. For data analysis, these factors were treated equally and order of priority was not considered due to the bias issues this would create (Zale *et al.*, 2012). The individual angler was used for the unit of analysis (i.e. not the number of angler interviews) as repeat interviews did not include this set of questions. For each river, the data were combined for BC residents and non-residents, due to the small sample size of the latter group. The number of responses per quality experience factor were divided by the total number of responses for all factors providing a percent for each quality experience factor by residency. Skeena IV was excluded from this analysis due to a small sample size.

4.2.2 Quality angling experience ratings

When interviewed, anglers were asked “*How would you rate your quality angling experience today?*” based on the following scale: excellent (5), good (4), fair (3), poor (2) or very poor (1)

(Appendix 3, question 2). Median ratings of the quality angling experience were summarized for the Bulkley, Kispiox and Zymoetz II by residency category. All angler interviews were used for this analysis as the angler was asked to rate their experience on a day specific basis. Skeena IV was excluded from this analysis as the sample size was too small.

4.2.3 Crowdedness ratings

Anglers were asked “*Thinking about the total number of anglers you encountered today on a scale of 1 to 5, 1 being not crowded at all, and 5 being extremely crowded, how crowded did you feel?*” (Appendix 3.0, question 4). The responses to how crowded anglers felt per day were summarized by residency for the Bulkley, Kispiox, and Zymoetz II rivers. All angler interviews were used in this analysis as each angler was asked how crowded they felt each time they were interviewed. Angler responses were summarized as the percent of times anglers said they felt either not crowded at all (1), slightly crowded (2), moderately crowded (3), quite crowded (4), or extremely crowded (5). Skeena IV was excluded from this analysis as the sample size was too small.

An additional assessment was conducted to determine if there was a difference in BC resident and non-residents rating of crowding during the unrestricted versus restricted times as these classes of anglers can fish during both periods. Given that non-resident alien anglers were prohibited from fishing during restricted times, this was only assessed for BC resident and non-residents. BC resident and non-resident responses were summarized as percent of times anglers responded with the five aforementioned crowdedness ratings.

4.2.4 Impact of regulation changes on anglers and crowding

All anglers on all rivers (including Skeena IV) were asked: “*Did you fish this river during the Classified Waters period between 2007 and 2011?*”. If the angler answered yes, they were also asked, (1) “*What impact has the regulation change had on crowding on the river? Has the level of crowding been reduced, stayed the same or has it increased?*”, and (2) “*Overall, has your quality angling experience improved, stayed the same or declined as a result of this regulation change?*” (Appendix 3.0, question 5 and 6). The angler’s opinion of the regulation changes were summarized by river and residency category. The 2007-2011 reference period was selected for the initial questions as it represents five years preceding the regulation changes.

4.2.5 Angler comments

At the end of the interview, anglers were asked if they had any other comments regarding the regulation changes or otherwise (Appendix 3.0, question 7). This question was not asked during repeat interviews. Comments received were summarized and organized into broad groups for each river included in this study (including Skeena IV). Comments were assessed relative to residency categories to identify similarities or differences among anglers of different origins.

4.3 Angler compliance

Based on licence check information collected by the River Guardians, the number of infractions were summarized by type and residency category. In addition, the number of infractions were

assessed over time during the Classified Waters period on the Bulkley, Kispiox and Zymoetz II rivers to determine if there was a change in the number of infractions over the study period.

4.4 Catch summary

This study was not designed to estimate total catch or catch per unit effort over the study period, however, catch information was opportunistically collected during angler interviews. River Guardians asked anglers “*What species of fish have you landed today? How many did you catch and release? What was the condition of the fish*” (Appendix 3.0). If anglers landed a fish, they were asked what section of river they caught it in and the gear type they were using at that time. If the angler had landed a fish, the number of each species kept or released was summarized by river and residency category.

5.0 Results and Discussion

5.1 Effort

5.1.1 River Guardian roving survey and angler interview effort

Between August 19 and October 31, 2014, a total of 2,227 steelhead anglers were observed and tallied by River Guardians on the Bulkley, Kispiox, Zymoetz II and Skeena IV rivers. The tallied number of anglers does not represent individual anglers, as the same angler could have been counted multiple times. A total of 1,403 stream-side angler interviews were initiated, representing 63% of the total number of anglers observed by the River Guardians. Additionally, 24 angler interview forms that were distributed to fly fishing lodges were completed by anglers. Combined, a total of 1,427 angler interviews were initiated. Due to the low number of interviews filled out by anglers at fly fishing lodges, for ease of interpretation, these data are hereafter pooled together with the stream-side angler interviews.

Of the total 1,427 angler interviews initiated, 1,247 (87%) were complete interviews and 180 (13%) were incomplete interviews. Of the 1,247 completed interviews, 1,062 (85%) were full-length interviews (individual anglers) and 185 (15%) were anglers the River Guardians had approached a second or multiple time (repeat interviews). Of the 180 incomplete interviews, 167 were terminated because the angler refused to complete an interview, and 13 were terminated because the angler did not speak enough English. These 180 interviews were counted as initiated interviews, but not as complete interviews.

The River Guardians spent more days roving rivers during unrestricted times than restricted times (Table 2), with the exception of Zymoetz II, due to the sampling plan as discussed in Section 3.0 of this report. There are a greater number of unrestricted days during the week, and as a result there was a greater number of interviews collected during these periods. For example, on the Bulkley River, the River Guardians roved 63% of their time during unrestricted times (Monday through Friday), and 37% of their time during restricted times (Saturday and Sunday) (Table 2). This led to a disproportionate number of days the River Guardians spent roving during these separate time periods.

Table 2: Number (%) of days River Guardians spent roving each river.

	Bulkley¹	Kispiox¹	Zymoetz II^{2, 3}	Skeena IV^{3,4}
Unrestricted non-resident alien times	27 (63)	27 (63)	26 (49)	-
Restricted non-resident alien times	16 (37)	16 (37)	27 (51)	-
Total Days	43 (100)	43 (100)	53 (100)	21 (100)

¹ Restricted times on the Bulkley and Kispiox rivers include Saturdays and Sundays.

² Restricted times on the Zymoetz II River include Fridays, Saturdays and Sundays.

³ Two times a week, the Zymoetz II and Skeena IV were sampled on the same day.

⁴ Skeena IV does not have non-resident alien restricted times, no data provided for these times.

5.1.1.1 Bulkley River

The River Guardians spent 43 days roving the Bulkley River between September 2 and October 30 (Table 2). They tallied 1,027 anglers and initiated 696 interviews (corresponding to interviewing 68% of all observed anglers) with 145 anglers declining an interview. A total of 551 completed interviews were conducted among 499 individual anglers. Twenty-seven days (63% of survey effort) were spent roving during unrestricted times, resulting in 369 complete angler interviews among 331 individual anglers. Sixteen days (37% of survey effort) were spent roving during restricted times, resulting in 182 complete angler interviews among 168 individual anglers (Table 3). The number of angler interviews peaked during week 9-3 and stayed at this level until week 10-2 (Table 3).

Table 3: Number of complete angler interviews and number of individual anglers interviewed on the Bulkley River during unrestricted and restricted times, stratified by one-week periods.

Week period	Number (%) of complete angler interviews			Number (%) of individual anglers interviewed		
	Unrestricted times	Restricted times	Total (%)	Unrestricted times	Restricted times	Total (%)
9-1	26	27	53 (10)	26	27	53 (11)
9-2	32	22	54 (10)	30	21	51 (10)
9-3	63	36	99 (18)	56	32	88 (17)
9-4	61	24	85 (15)	56	23	79 (16)
10-1	51	27	78 (14)	42	25	67 (13)
10-2	67	22	89 (16)	60	18	78 (16)
10-3	29	12	41 (7)	25	11	36 (7)
10-4	26	12	38 (7)	22	11	33 (7)
10-5	14	0	14 (3)	14	0	14 (3)
Total	369	182	551 (100)	331	168	499 (100)

5.1.1.2 Kispiox River

Between September 2 and October 30, the River Guardians spent 43 days roving the Kispiox River (Table 2). They tallied 591 anglers and initiated a total of 318 interviews (corresponding to

interviewing 54% of all observed anglers) with 35 anglers declining an interview. A total of 283 completed angler interviews were conducted among 264 individual anglers. Twenty-seven days (63% of survey effort) were spent roving during unrestricted times, resulting in 198 complete angler interviews among 185 individual anglers. Correspondingly, a total of 16 days (37% of survey effort) was spent roving during restricted times, resulting in 85 complete angler interviews among 79 individual anglers (Table 4). The number of angler interviews peaked during weeks 9-2, 9-4 and 10-2 (Table 4).

Table 4: Number of complete angler interviews and number of individual anglers interviewed on the Kispiox River during unrestricted and restricted times, stratified by one-week periods.

Week period	Number (%) of complete angler interviews			Number (%) of individual anglers interviewed		
	Unrestricted times	Restricted times	Total (%)	Unrestricted times	Restricted times	Total (%)
9-1	10	10	20 (7)	9	10	19 (7)
9-2	29	17	46 (16)	28	14	42 (16)
9-3	17	16	33 (12)	17	15	32 (12)
9-4	39	11	50 (18)	35	11	46 (17)
10-1	21	8	29 (10)	18	8	26 (10)
10-2	41	4	45 (16)	40	4	44 (17)
10-3	25	14	39 (14)	23	14	37 (14)
10-4	8	5	13 (5)	8	3	11 (4)
10-5	8	0	8 (2)	7	0	7 (3)
Total	198	85	283 (100)	185	79	264 (100)

5.1.1.3 Zymoetz II River

On the Zymoetz II River between August 18 to October 31, the River Guardians spent a total of 53 days roving the river (Table 2). They tallied 478 anglers and completed 374 interviews among 271 individual anglers (corresponding to interviewing 78% of all observed anglers). Zero anglers declined an interview. A total of 26 days (49% of effort) were spent roving during unrestricted times, which led to the collection of 220 complete angler interviews among 156 individual anglers. A total of 27 days (51% of effort) were spent roving during restricted times, yielding 154 complete angler interviews among 115 individual anglers (Table 5).

Table 5: Number of complete angler interviews and number of individual anglers interviewed on the Zymoetz II River during unrestricted and restricted times, stratified by one-week periods.

Week period	Number (%) of complete angler interviews			Number (%) of individual anglers interviewed		
	Unrestricted times	Restricted times	Total (%)	Unrestricted times	Restricted times	Total (%)
8-3	14	33	47 (13)	14	31	45 (16)
8-4	16	29	45 (12)	13	16	29 (11)
9-1	27	17	44 (12)	19	13	32 (12)
9-2	35	15	50 (13)	23	11	34 (13)
9-3	27	17	44 (12)	22	12	34 (13)
9-4	21	13	34 (9)	20	11	31 (11)
10-1	18	0	18 (4)	11	0	11 (4)
10-2	20	5	25 (7)	11	3	14 (5)
10-3	12	0	12 (3)	9	0	9 (3)
10-4	3	22	25 (7)	1	17	18 (7)
10-5	27	3	30 (8)	13	1	14 (5)
Total	220	154	374 (100)	156	115	271 (100)

5.1.1.4 Skeena IV River

Between August 19 to October 27, the River Guardians surveyed the Cedarvale area on 22 occasions (each a separate day) and observed 48 anglers (Appendix 4.0). A total of 39 interviews were conducted among 28 individual anglers (this includes anglers who were interviewed more than once; Appendix 4.0). In total, the number of angler interviews was split almost equally in half between BC residents (49%) and non-resident aliens (51%, Appendix 4.0). Of these interviews, the majority occurred on the weekends (62%). During weekends, 37% of the interviews were from BC residents, and 63% were from non-resident aliens. For BC residents, this may reflect when they have more time off, and effort by non-resident aliens may be attributable to a lack of other weekend fishing opportunities nearby (i.e. Bulkley, Kispiox, Zymoetz II rivers). Aside from concerns raised from Cedarvale residents, there is a lack of background data to know how many non-resident aliens fished this location prior to 2012.

The main purpose of Skeena IV interviews at Cedarvale was to investigate concerns raised by residents of the area. Therefore, angler interviews and roving data were excluded from the rest of the report, unless noted, due to the small sample size and limited sample days spent on this river.

5.1.2 Angler interview residency categories

There were 1,034 individual anglers who agreed to complete an interview on the Bulkley, Kispiox and Zymoetz II rivers. A total of 550 (53%) were BC residents, 100 (10%) were non-residents, and 378 (37%) were non-resident aliens. Angler residency was not collected from six individual anglers. The majority of individual anglers interviewed on the Bulkley and Zymoetz II rivers were BC residents (58% and 61% respectively; Table 6), whereas on the Kispiox River, the majority were non-resident aliens (54%). The Bulkley and Zymoetz II rivers are easily accessible from the respective towns of Smithers and Terrace, and owing to their population size

relative to the Hazelton's (Figure 9) is likely one of the factors causing higher BC resident use on these rivers compared to the Kispiox River.

Table 6: Number (%) of individual anglers interviewed on the Bulkley, Kispiox, and Zymoetz II rivers by residency category.

River	Residency category	Number (%) of individual anglers interviewed
Bulkley¹	BC resident	286 (58)
	Non-resident	44 (9)
	Non-resident alien	166 (33)
Kispiox¹	BC resident	100 (38)
	Non-resident	20 (8)
	Non-resident alien	141 (54)
Zymoetz II	BC resident	164 (61)
	Non-resident	36 (13)
	Non-resident alien	71 (26)

¹Angler residence was not collected from three individual anglers.

5.1.3 Angler residency origin

5.1.3.1 Skeena Region 6 licence purchases

Using the electronic licence sales data, the number of basic annual angling licences, Classified Waters, and Steelhead Stamp purchases were summarized by licence year for Skeena Region residents. From 2009/2010 to 2014/2015, increases in sales have occurred for these anglers; 16% for annual basic licences, 25% for Classified Waters licences and 62% for Steelhead Stamps (Appendix 5.0; Figure 5).

From 2012 to 2015, a factor contributing to increases in Classified Waters and Steelhead Stamp sales are the outcomes of the Angling Management Planning process, particularly instances where a Steelhead Stamp became mandatory (e.g. Skeena IV) or where the Classified Waters period was extended (i.e. Zymoetz II River). It is also possible that increases in licence sales are due to the benefits the Angling Management Plans provide for Skeena Region residents (e.g. increased angling opportunity during restricted times). Although these factors have an influencing role regionally, rising sales trends in the rest of the province are also occurring. For example, from 2009/2010 to 2014/2015, the sale of Classified Waters licences among non-Skeena BC residents increased 32% (from 11,212 to 14,773; Figure 5; Appendix 5.0) and the sale of Steelhead Stamps among non-Skeena BC residents increased 36% (from 11,280 to 15,310; Figure 5; Appendix 5.0). While overlap does occur (i.e. non-Skeena BC residents fishing on Skeena Region waters), this provides important context when evaluating trends in the Skeena Region versus broader trends that are occurring provincially.

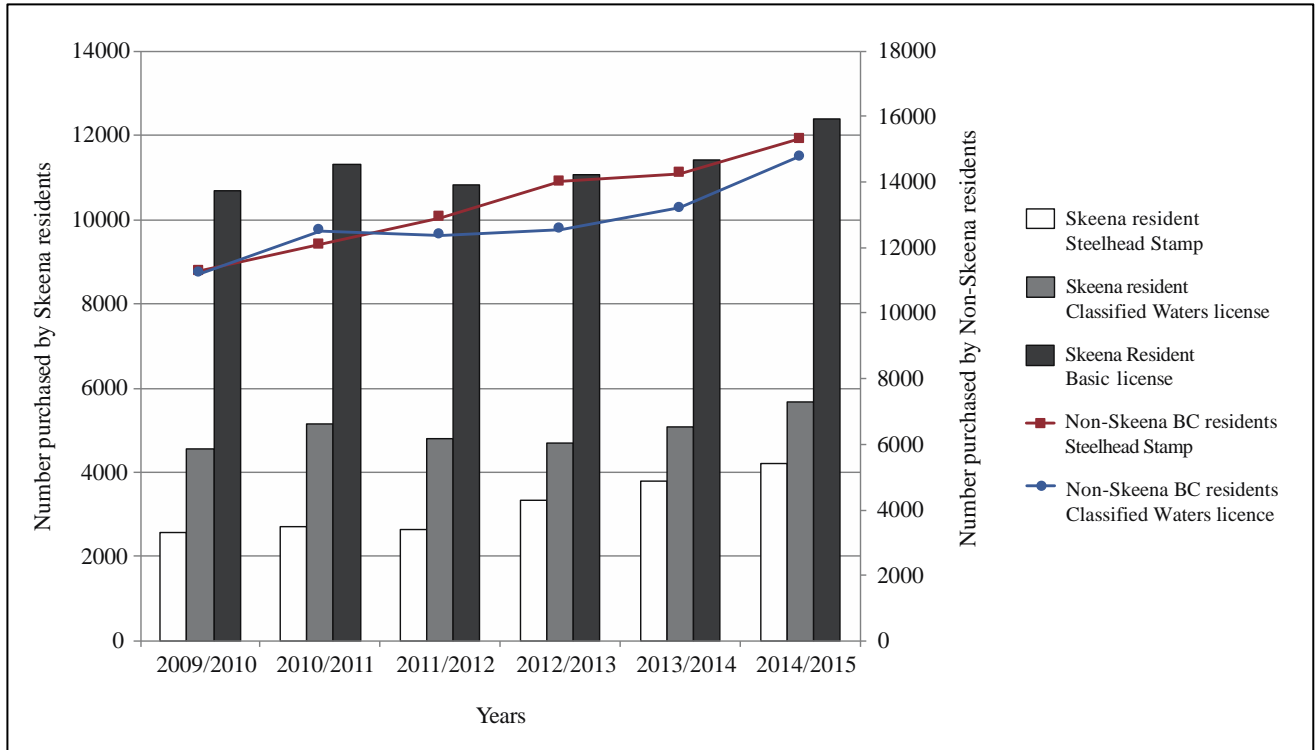


Figure 5: Number of basic licences, Classified Waters licences, and Steelhead Stamps purchased by Skeena Region residents and non-Skeena BC residents. Skeena resident licence sales are on the left axis, Non-Skeena BC residents are on the right axis.

5.1.3.2 BC resident angler origins

On the Bulkley, Kispiox, and Zymoetz II rivers, 550 individual BC resident anglers agreed to complete an interview, and 542 provided their place (city or town) of origin. Most of these anglers were from the FLNRO Region 6 - Skeena (252 anglers, 46%), followed by Region 2 - Lower Mainland (143 anglers, 26%; Figure 6). In the 2013 River Guardian report BC resident anglers were not asked their place of origin. In 1998 on the Bulkley River, 58% individual BC resident anglers were from the Skeena region, and 17% from the Lower Mainland (Morten, 1999). On the Zymoetz II River in 1999, 69% were from the Skeena Region, followed by 17% from the Lower Mainland (Morten, 2000). On the Kispiox River in 2001, 54% were from the Skeena Region, followed by the 25% from the Lower Mainland (Morten and Giroux, 2006).

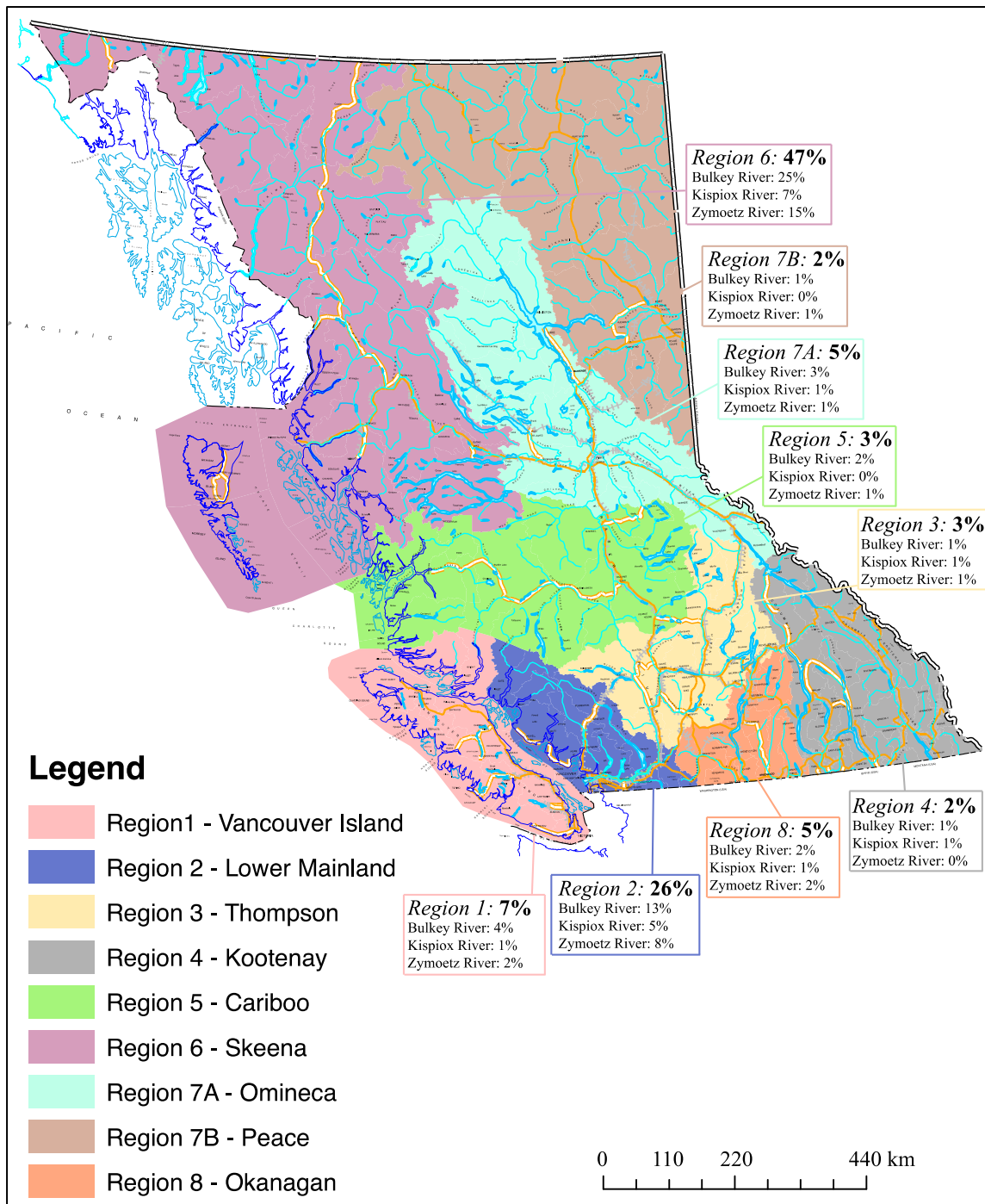


Figure 6: Place of origin for BC residents interviewed as per FLNRO management regions.

5.1.3.3 Non-resident and non-resident alien angler origins

On the Bulkley, Kispiox, and Zymoetz II rivers, of the 100 non-resident anglers interviewed, 97 provided their province of residence. Of the 378 individual non-resident alien anglers interviewed, 371 provided their country of origin. The majority of the non-residents interviewed resided in Alberta (64%), followed by Ontario (19%), and Quebec (12%; Figure 7). The majority of the non-resident aliens interviewed resided in USA (54%) with each of the other countries

representing less than 10% (Figure 5). This is consistent with Pitman and Hirshfield (2015), which reported that 66% of the non-residents resided in Alberta, and 51% of the non-resident aliens resided in USA.

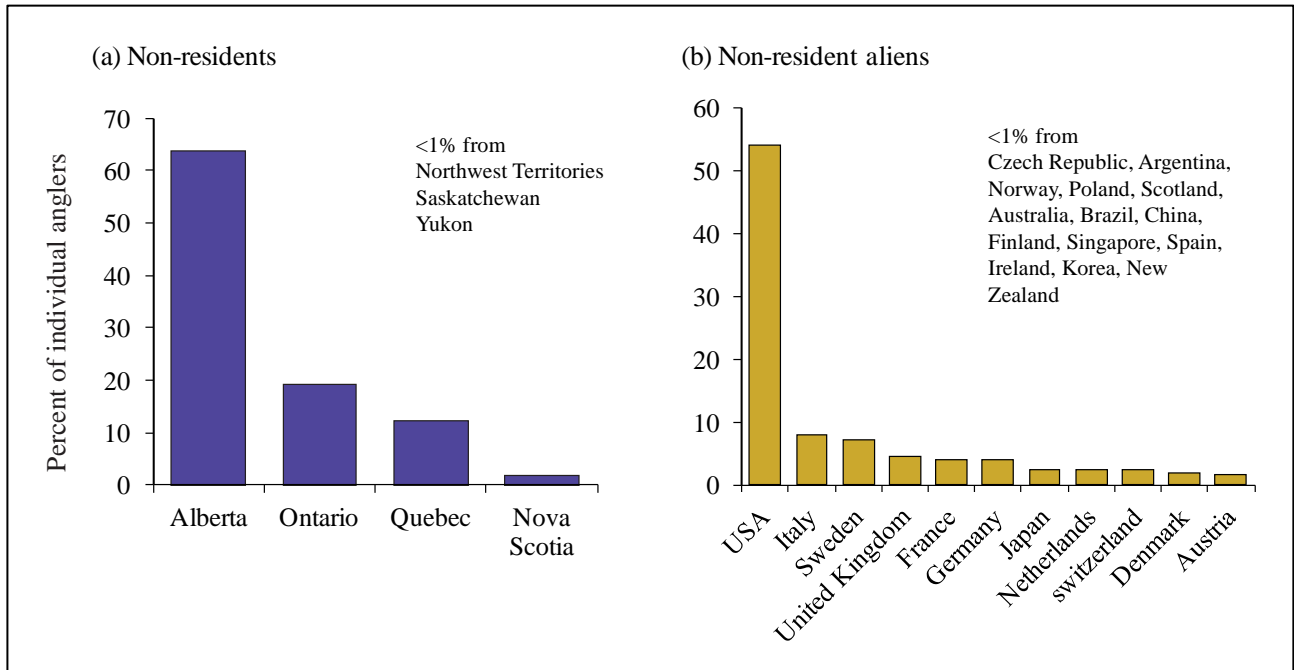


Figure 5: Province or country of origin for interviewed non-residents (a) and non-resident aliens (b) in 2014.

5.1.4 Spatial distribution of angler interviews among rivers

On the Bulkley River, the highest number of completed angler interviews occurred in the river segments Quick Bridge – Telkwa Bridge (127 or 24% of the total interviews; Table 7), Trout Creek – Moricetown (103 or 19% of the total interviews; Table 7), and Smithers Bridge – Chicken Creek (99 or 18% of the total interviews; Table 7; Figure 2 and 8). The low number of interviews between Telkwa and Smithers was surprising as this is commonly a high use area, however, it likely reflects the Guardians limited ability to intercept boat based anglers using foot access methods. Further, extremely low water conditions on the Bulkley River in the fall of 2014 may have also limited angler effort in this area. The number of BC resident interviews was higher than non-residents and non-resident aliens in most river segments, except for between Telkwa Bridge and Smithers Bridge (Figure 8).

On the Kispiox River, the highest number of complete angler interviews were conducted in the river segments Confluence with the Skeena River – Rodeo Grounds (126 or 48% of the total interviews; Figure 3) and between the Rodeo Grounds – Upper Recreation Site (85 or 33% of the total interviews; Table 7; Figure 3 and 8). Eighty-one percent of all Kispiox River interviews were conducted between the confluence with the Skeena River and the Upper Recreation Site (lower 33 km of river). Unlike the Bulkley, the number of non-resident alien interviews was higher than BC resident and non-resident interviews in most river segments, with the exception of the segment between the Skeena River confluence and the Rodeo Grounds (Figure 8).

A factor influencing the spatial distribution of anglers on the Kispiox River in 2014 was an access fee program implemented by the Kispiox Band Council (part of the Gitksan First Nation). This initiative charges anglers a fee (\$25/day for BC residents, \$100/day for non-residents and non-resident aliens) to access the river in cases where they must first cross reserve lands. This initiative extends from the Potato Patch (Figure 3) to the confluence with the Skeena River and accounts for the lower 8.5 km (11% of the total survey area) of the Kispiox River that is open to fishing. While it is probable that anglers seeking to avoid paying these fees chose to fish above the Potato Patch, other data to verify the extent of this were not collected.

Table 7: Number (%) of interviews conducted in each segment of the Kispiox and Bulkley rivers.

River segment	River segment distance (~km)	Number (%) of complete angler interviews initiated
Bulkley River¹		
1. Bymac – The Forks	4	34 (6)
2. The Forks – Walcott Bridge	14	29 (5)
3. Walcott Bridge – Quick Bridge	14	42 (8)
4. Quick Bridge – Telkwa Bridge	14	127 (24)
5. Telkwa Bridge – Smithers Bridge	13	39 (7)
6. Smithers Bridge – Chicken Creek	4	99 (18)
7. Chicken Creek – Trout Creek	26	13 (2)
8. Trout Creek – Moricetown	8	103 (19)
9. Moricetown – Suskwa River	30	53 (10)
10. Suskwa River – downstream	19	2 (1)
Total	146	541 (100)
Kispiox River²		
1. Confluence with Skeena River – Rodeo Grounds	14	126 (48)
2. Rodeo Grounds – Upper Recreation Site	19	85 (33)
3. Upper Recreation Site – Mitten Bridge	22	38 (15)
4. Mitten Bridge – Sweetin Recreation Site	25	10 (4)
Total	80	259 (100)

¹River segment was not collected from 10 interviews on the Bulkley River.

²River segment was not collected from 24 interviews on the Kispiox River.

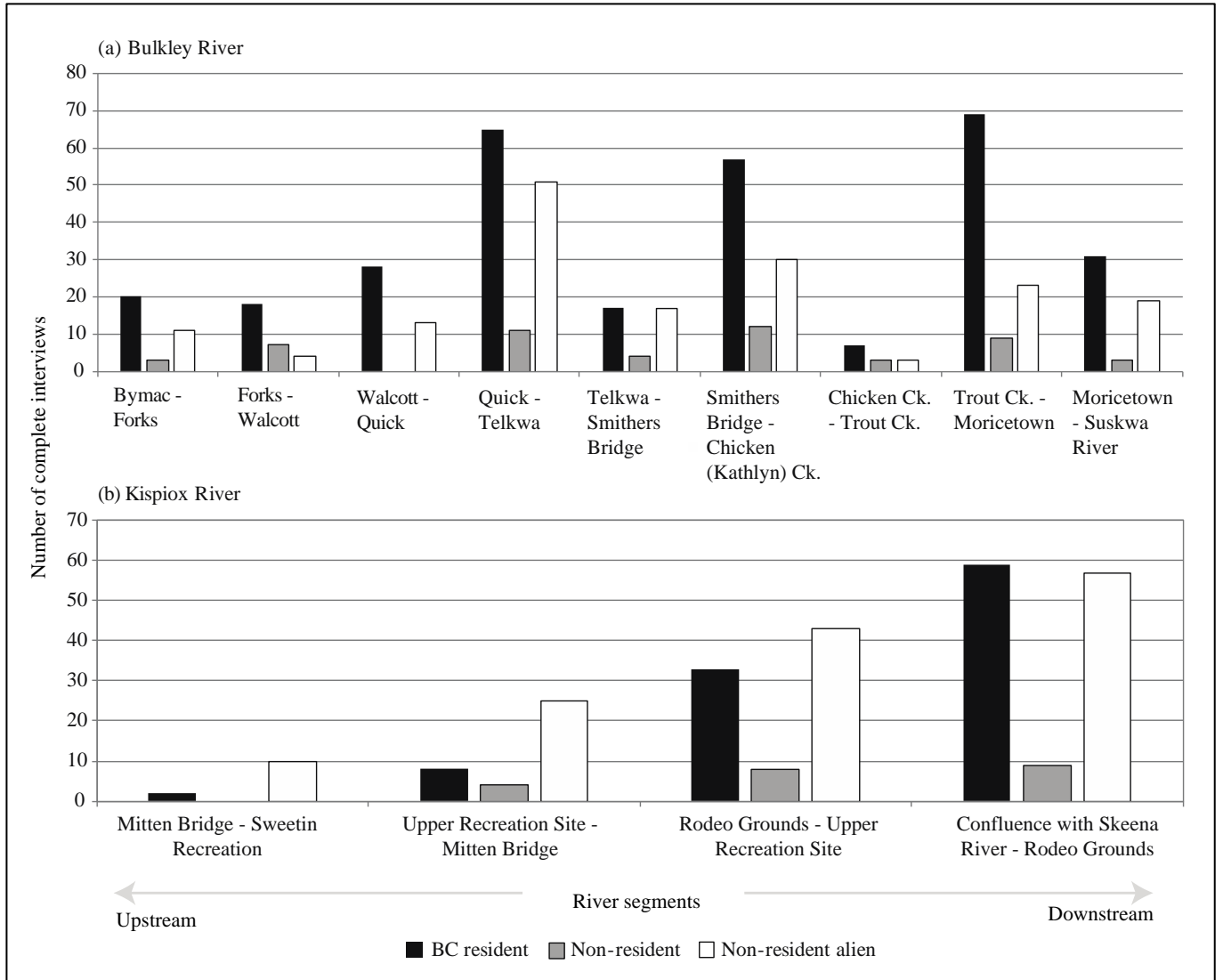


Figure 8: The number of angler interviews by river segment and angler residency for (a) Bulkley River and (b) Kispiox River. Segment 10 on the Bulkley River was not included as there were only two interviews conducted in this zone.

On the Bulkley River, the latitude and longitude data demonstrate that the angler interviews were spatially concentrated (i.e. clustered) around the town centers (Smithers, Telkwa, and Houston), at easy to access confluences (i.e. Trout Creek; Figure 9), or at put in/take out boat launch locations. Most interviews were obtained from anglers accessing the river on foot, and the distribution pattern in Figure 9 may have differed substantially if the River Guardians had accessed the river by boat.

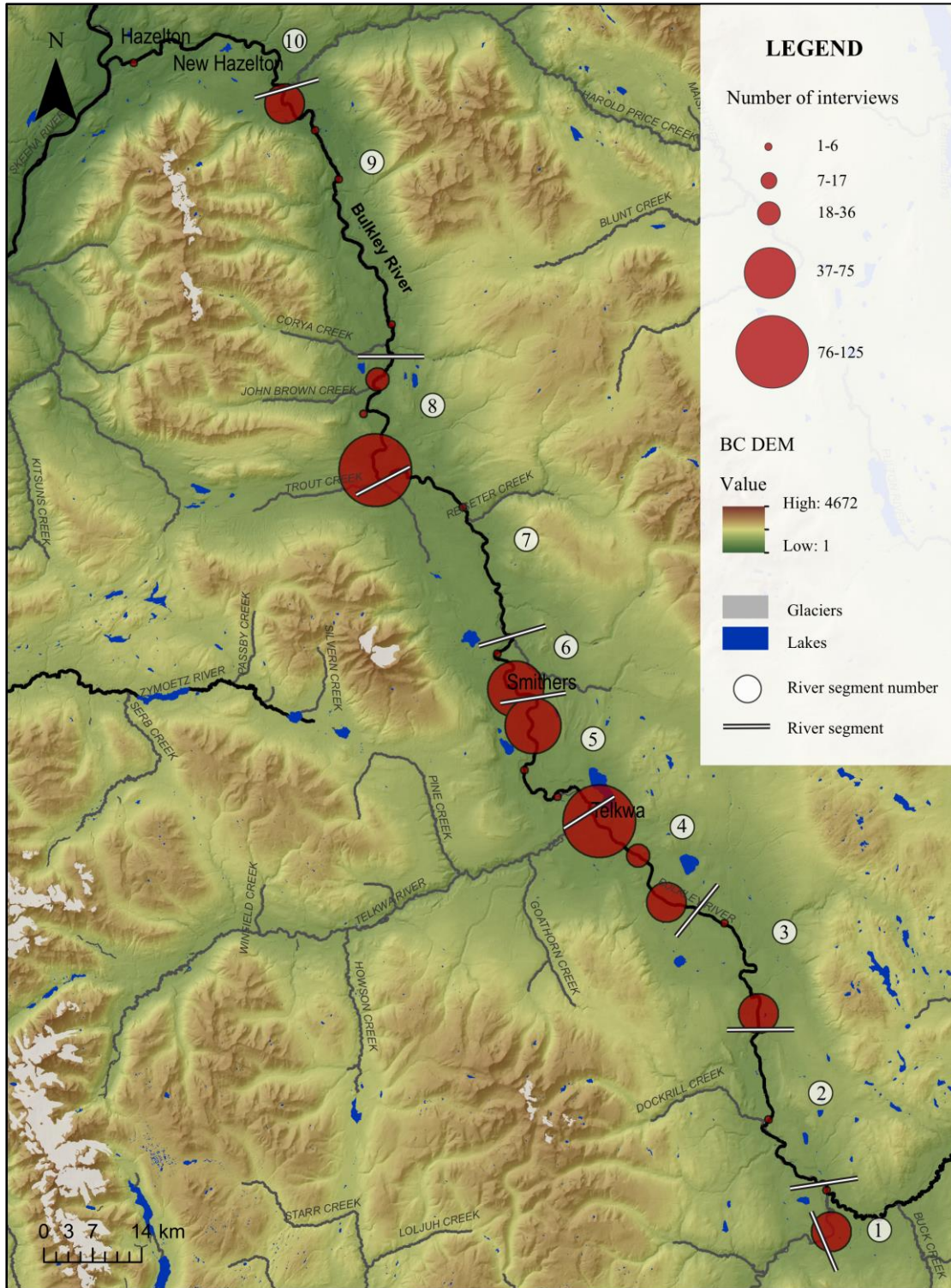


Figure 9: Location of River Guardian interviews on the Bulkley River in 2014.

On the Kispiox River, the locations of angler interviews were heavily concentrated on the lower portion of the river, downstream from the Rodeo Grounds. Fewer clusters of interviews occurred outside of this zone (Figure 10). As the lower portion of the Kispiox River is closer to Hazelton

and the Village of Kispiox, this may be a driver for the unequal distribution of angler interviews. Due to the generally low water levels in 2014, it is also possible that steelhead in the Kispiox River held in the lower portions of the river, causing anglers to remain in this area as well.

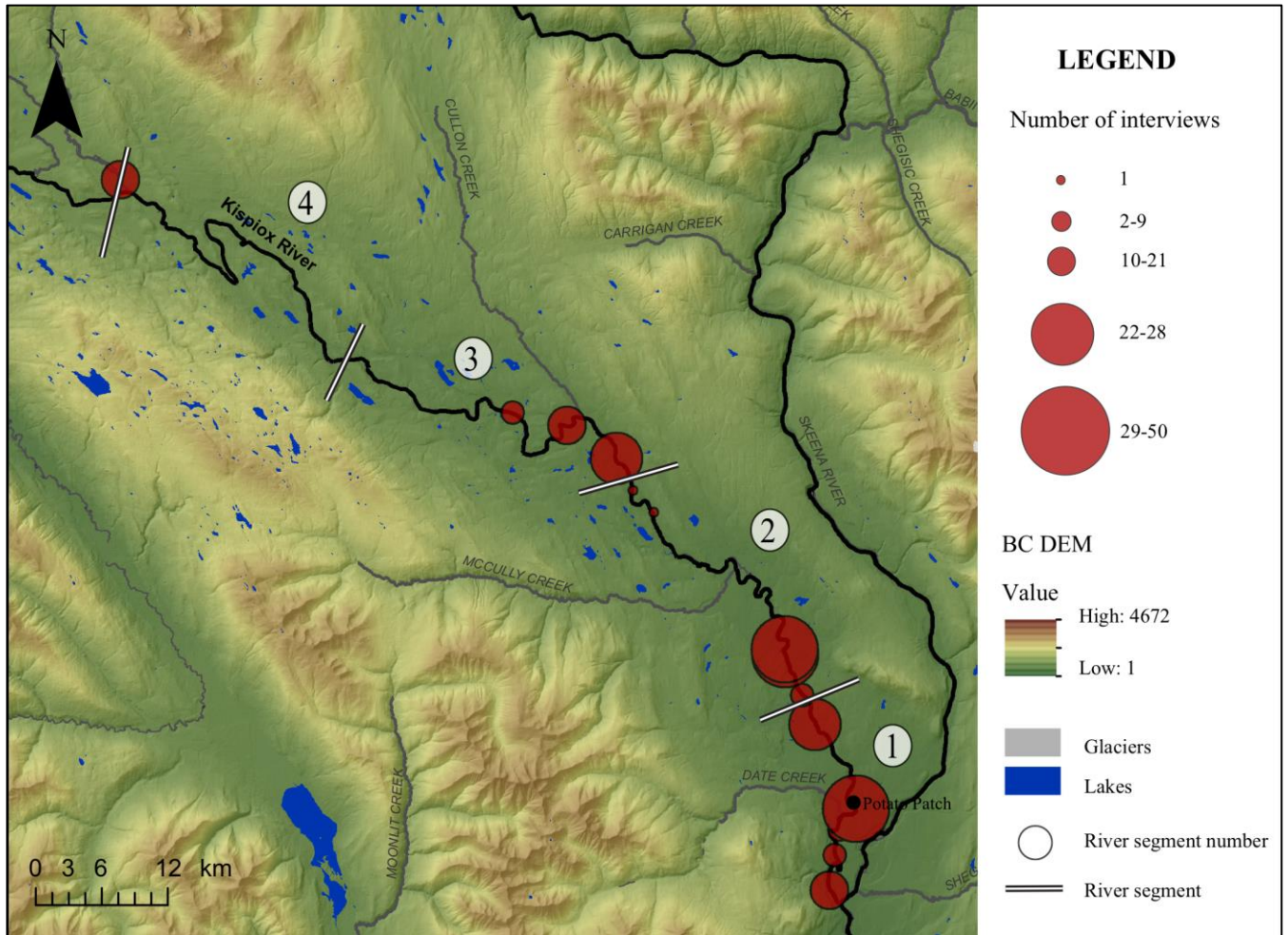


Figure 10: Location of River Guardian interviews on the Kispiox River in 2014. Note that in river segment 2 there are two bubbles almost overlapping. These could not be combined due to analysis methods.

On the Zymoetz II River, angler interviews were evenly distributed from the Clore River to the confluence with the Skeena River (Figure 11). Areas upstream of the Clore River confluence, where no interviews were conducted, are sections that were not accessible by foot. The Zymoetz II River has a more even distribution of angler interviews compared to the Bulkley and Kispiox rivers potentially due to the rivers ease of accessibility.

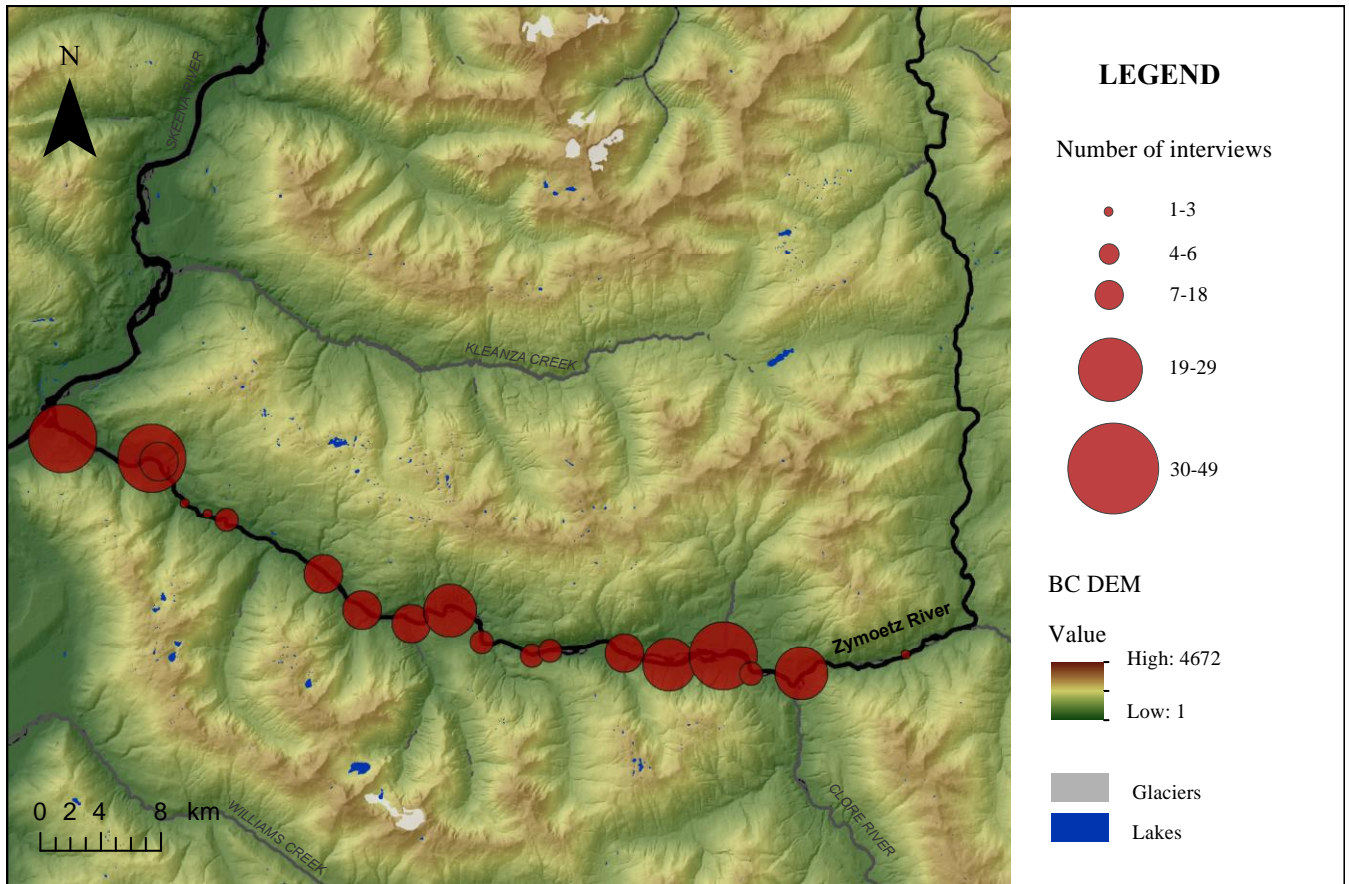


Figure 11: Location of River Guardian interviews on the Zymoetz II River in 2014. Note that in lower river there are two bubbles almost overlapping. These could not be combined due to analysis methods.

5.1.5 Temporal distribution of angler days over Classified Waters period

On the Bulkley River, non-resident aliens purchased the greatest number of angler days during the first and second week of October (Figure 12). The Kispiox River had the greatest number of non-resident alien angler days purchased during the last week of September followed by the first two weeks of October (Figure 12). The Zymoetz II River had the greatest number of non-resident alien angler days purchased during the second week of September (Figure 12).

The correlative relationship between the number of angler interviews and non-resident and non-resident alien angler days purchased over one week periods was strong for the Bulkley ($r=0.95$), Kispiox ($r=0.91$), and Zymoetz II ($r=0.92$) rivers (Figure 12). The number of angler interviews increased and decreased concurrently with the number of angler days purchased. On the Bulkley and Kispiox rivers, there were a lower number of interviews per angler days purchased. This is due to the River Guardians fixed ability to interview anglers relative to the scale of angler effort on these rivers (i.e. the crew had a fixed staff size and work hours).

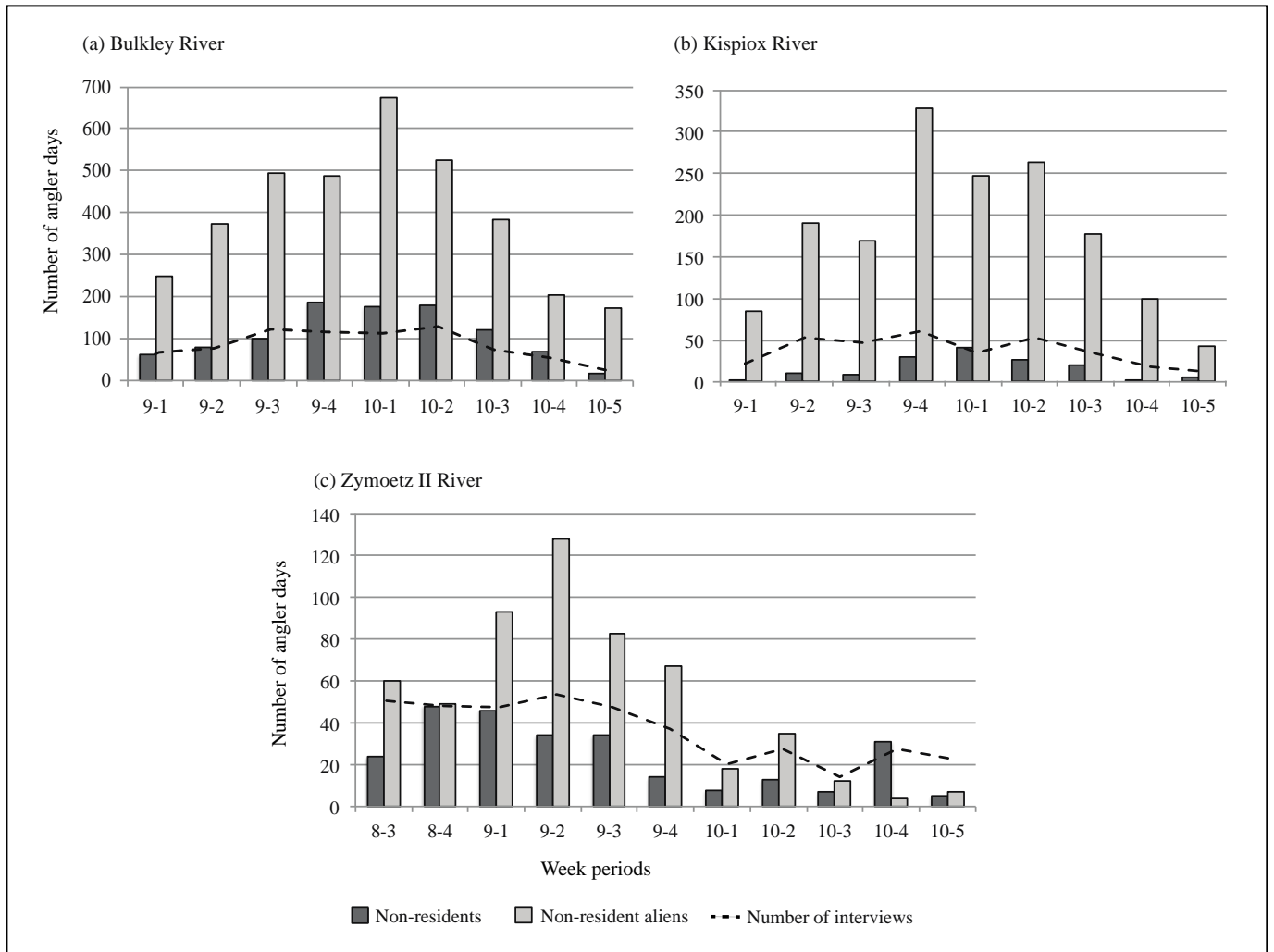


Figure 12: Summary of the non-resident and non-resident alien angler days purchased over one-week periods during the study period. Dashed lines represent the sum of angler interviews conducted over week periods on the Bulkley, Kispiox, and Zymoetz II rivers.

5.1.5.1 River Guardian sampling rate

A sampling rate was determined by comparing the number of individual anglers interviewed (by residency) to the number of anglers who purchased a Classified Waters licence on a river specific basis (Table 8). Sampling rates ranged from 21% to 40% depending on the river. On average, the River Guardians interviewed 29% of the total non-resident and 27% of the total non-resident alien anglers on the Bulkley, Kispiox and Zymoetz II rivers during the study period (Table 8). Individual anglers interviewed and the number of individual anglers who purchased a Classified Waters licence were the units used to measure the sampling rate as the majority of questions asked by the River Guardians focussed on their overall perceptions as individuals, as opposed to their opinions on a day specific basis.

Table 8: Interview sampling rate for non-resident and non-resident alien anglers in 2014.

	Number of individual anglers interviewed	Classified Waters purchases (number of anglers)	Percent interviewed
Bulkley River			
Non-resident	44	199	22%
Non-resident alien	166	779	21%
Kispiox River			
Non-resident	20	53	38%
Non-resident alien	141	337	42%
Zymoetz II River			
Non-resident	36	91	40%
Non-resident alien	71	297	24%
Total			
Non-resident	100	343	29%
Non-resident alien	378	1,413	27%

5.1.6 Guided angler status by residency

The number and percent of non-residents and non-resident aliens that used angling guide services was assessed for the Bulkley, Kispiox, and Zymoetz II rivers during the study period (Table 9). Non-resident alien anglers were the dominant user of angling guides. However, the majority of non-resident and non-resident alien anglers were unguided on all rivers (Table 9).

Table 9: Number (%) of guided and unguided non-resident and non-resident alien anglers on the Bulkley, Kispiox, and Zymoetz II rivers during the River Guardian study period, 2014.

River	Residency category	Guided ¹	Unguided ¹
Bulkley	Non-resident	4 (1)	195 (30)
	Non-resident alien	327 (99)	452 (70)
	Total	331 (100)	647 (100)
Kispiox	Non-resident	5 (5)	48 (16)
	Non-resident alien	88 (95)	249 (84)
	Total	93 (100)	297 (100)
Zymoetz II	Non-resident	12 (10)	75 (29)
	Non-resident alien	103 (90)	182 (71)
	Total	115 (100)	257 (100)

¹Data for this assessment was obtained from the Classified Waters sales electronic database.

5.1.7 Average guided and unguided angler days purchased by non-resident and non-resident aliens during unrestricted and restricted times

On the Bulkley, Kispiox, and Zymoetz II rivers, unguided non-residents purchased a higher average number of angler-days per day during restricted times than during unrestricted times, however, there was no statistically significant difference. Similarly, the average number of angler-days purchased per day by guided non-resident aliens on the Bulkley, Kispiox and Zymoetz II rivers was higher during restricted times than unrestricted times, however, there was

only a statistical difference on the Bulkley River (Table 10). Although not all data possess statistically significant differences, both unguided non-residents and guided non-resident alien anglers fished on average more during restricted times (typically weekends) than unrestricted times (week days; Table 10). Note that grey shaded areas in Table 10 represent statistically significant differences in results from the independent two-sample t-test between guided and unguided anglers by river and residency.

There was a statistically significant difference in the average number of angler days purchased per day between unrestricted and restricted times for unguided non-resident alien anglers on all three rivers. This result is expected and provides little insight as these anglers are not permitted to fish during restricted times. In some cases, unguided non-resident alien anglers purchased angler days during restricted times (Table 10). It is not possible to determine whether these days were mistakenly purchased or if they were used in non-compliance.

Table 10: Average (CV) number of guided and unguided non-resident and non-resident alien angler days purchased per day during unrestricted and restricted times in 2014.

Angler residency	Average (CV) number of guided and unguided non-resident alien and non-resident angler days purchased per day		Independent sample t-test*
	Unrestricted times	Restricted times	
Bulkley River¹			
Guided non-resident	1.0 (0.0)	1.0 (0.0)	–
Unguided non-resident	16.3 (0.5)	18.3 (0.5)	t(56)=-0.790, p=0.43
Guided non-resident alien	21.1 (0.3)	28.8 (0.3)	t(58)=-3.758, p=0.00
Unguided non-resident alien	48.3 (0.5)	1.6 (0.6)	t(53)=5.913, p=0.00
Kispiox River¹			
Guided non-resident	1.5 (0.4)	1.7 (0.3)	t(7)=-0.424, p=0.68
Unguided non-resident	2.8 (0.6)	4.3 (0.7)	t(12.6)=-1.498, p=0.16
Guided non-resident alien	8.5 (0.4)	8.7 (0.4)	t(53)=-0.130, p=0.90
Unguided non-resident alien	26.1 (0.6)	1.2 (0.3)	t(42.4)=10.063, p=0.00
Zymoetz II River²			
Guided non-resident	1.4 (0.5)	1.0 (0.0)	t(11)=2.159, p=0.05
Unguided non-resident	3.8 (0.7)	4.1 (0.9)	t(60)=-0.386, p=0.70
Guided non-resident alien	3.3 (0.6)	3.8 (0.7)	t(41)=-0.608, p=0.55
Unguided non-resident alien	10.8 (0.3)	1.1 (0.3)	t(36.6)=6.416, p=0.00

¹Restricted to unguided non-resident alien anglers on Saturdays and Sundays from September 1 to October 31. This weekend restriction does not apply to guided non-resident alien anglers.

²Restricted to non-resident alien anglers on Fridays, Saturdays, and Sundays from July 24 to May 31. These data only reflect when River Guardians were present on the river (Aug 18 – Oct 31, 2014).

*Significance is tested at a 99% Confidence interval.

5.1.8 Trends in non-resident and non-resident alien angler use from 2009 to 2014

The following section compares non-resident and non-resident alien effort from 2009 to 2014 (Figure 13). This includes reference to the number of anglers and number of angler days on the

Bulkley, Kispiox and Zymoetz II rivers (Appendix 6.0 and 7.0). Given that the non-resident alien restrictions were implemented in 2012, this year is used as a reference to describe periods before and after these changes. These data are from the electronic licence sales database, which does not include comparable information for BC residents. Caution should be applied when interpreting trends based only on these six years of data without reference to broader trends over time (such as the annual steelhead questionnaire which was not available when this report was drafted).

In general, there were a greater number of non-resident alien anglers fishing more angler days than non-resident anglers from 2009 to 2014 (Figure 13). Also, the number of unguided non-resident alien angler days generally declined between 2011 and 2012 and over the same period, the number of days purchased by guided non-resident aliens increased (Figure 13; Appendix 6.0 and 7.0). These opposing trends suggest the implementation of restrictions upon unguided non-resident aliens in 2012 may be leading this class of angler to hire the services of an angling guide as a means of increasing fishing opportunity on these rivers.

On the Bulkley River since 2009 there has been a 14% decline in the number of unguided non-resident alien angler days, and a 65% increase in the number of guided non-resident alien angler days. The number of unguided non-resident angler days has increased by 79% (Figure 13) and it appears the number of angler days fished per individual has increased from 4.0 to 5.3 since 2009 for this residency category (Appendix 8.0). On the Kispiox River since 2009, the number of unguided non-resident alien angler days has declined by 21%, and guided non-resident alien angler days has increased by 53%. For the latter, the number of angler days fished per individual angler has increased from 4.1 in 2009 to 5.4 in 2014 (Appendix 8.0).

Interpretation of licence sale trends before and after the regulation changes on the Zymoetz II River warrants caution as the Classified Waters period was extended from a two-month period (Sept 1 – Oct 31) to a ten-month period (July 24 – May 31). This change required non-resident and non-resident alien anglers to purchase a day-specific Classified Waters licence at times when they formerly did not have to (Appendix 1.0). This is important context when assessing trends in angler use on this section of river. Since 2009, the individual number of unguided non-resident aliens and their angler days has remained relatively flat (14% increase in anglers, 6% decline in angler days; Figure 13; Appendix 6.0 and 7.0). However, since 2009 there has been an increase in the number of guided non-resident aliens (150%) and angler days purchased by this class of angler (118%; Figure 13; Appendix 6.0 and 7.0), a trend which is likely driven in part by the restrictions upon unguided non-resident alien anglers as discussed above. Large increases in the number of unguided non-resident anglers (141%) and angler days (328%) have also occurred since 2009 (Figure 13; Appendix 6.0 and 7.0). Finally, in comparison to the Bulkley and Kispiox rivers, anglers are fishing approximately half the number of days per angler on the Zymoetz II (Appendix 8.0). The reason for this is unknown, however, it may be due to the number of alternate river fishing options in the Terrace area, allowing anglers to spread out their effort among more rivers.

Licence sales are a good surrogate for effort by non-residents and non-resident alien anglers. In some cases, days purchased may not be used (i.e. fished) in response to changes in river conditions or other events, which results in an overestimation of effort. Presumably, few anglers purchase angler days without using them due to the cost of the licences. Other licencing errors

may assign angler days to the wrong category. For example, in some cases guided anglers do not accurately identify their guided status on their licence, leading to an underestimation of guided anglers.

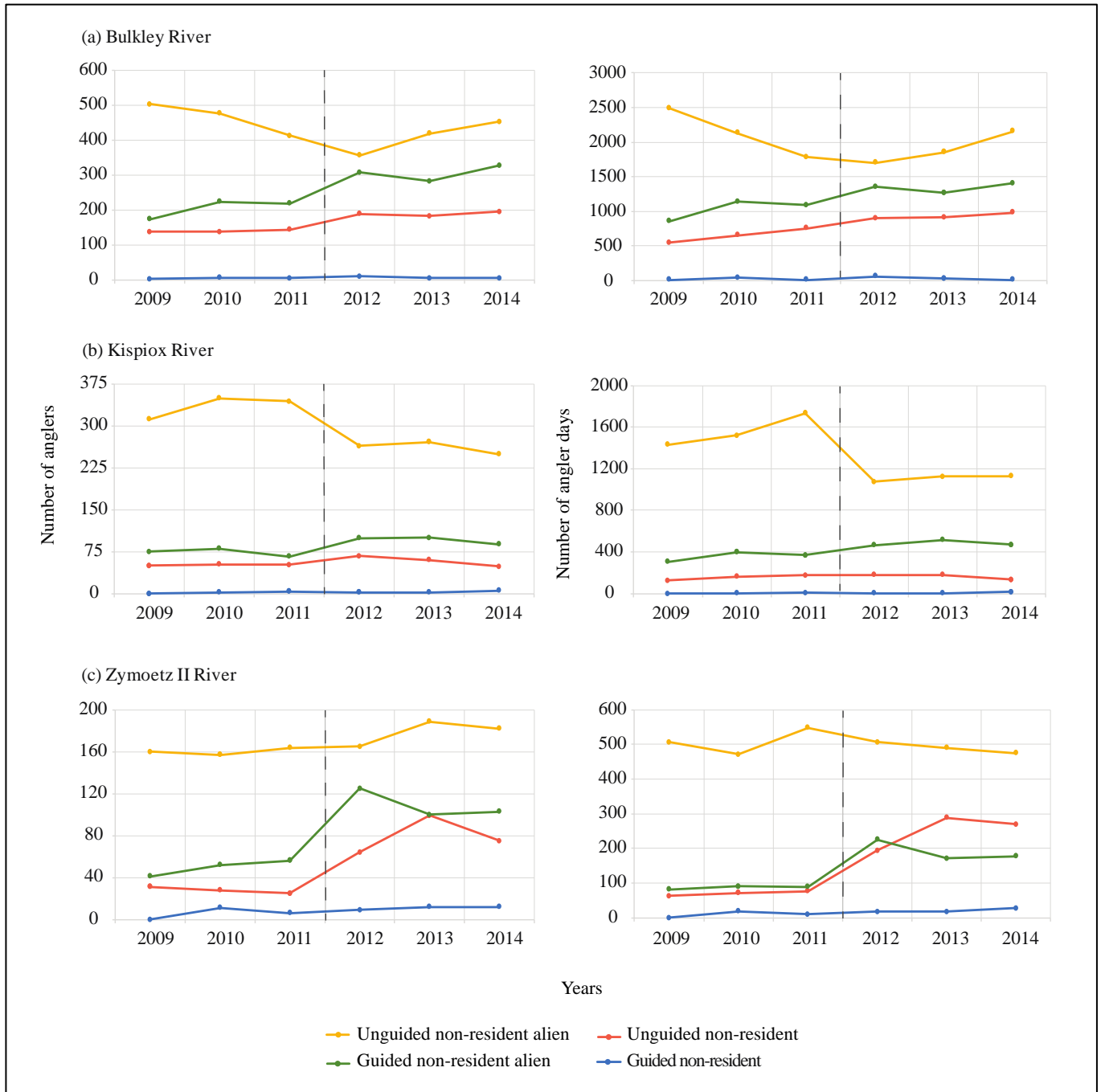


Figure 13: Number of anglers and number of angler days during the Classified Waters period on the Bulkley (a), Kispiox (b), and Zymoetz II (c) rivers from 2009 to 2014. The dashed line is for illustrative purposes to represent when the non-resident alien restrictions were implemented.

The following boxplot analysis provides a visual depiction in the distribution for the number of anglers on the Bulkley, Kispiox and Zymoetz II rivers before and after the 2012 regulation changes. Similar to above, these data are from the licence sales database and include all non-residents and non-resident aliens, excluding BC Residents. This method of analysis is an extension of the trends discussed above and together with the analysis presented in Appendix 9.0, which provides a means to test for statistically significant differences pre- and post- 2012.

The bolded line in each “box” represents the median value (a measure of central tendency) whereby 50% of data is above this line and 50% is below. The lines representing the bottom and top of the box indicate the lower and upper quartiles respectively. This means that the lowest quartile extends from the end of the lower dashed line to the bottom of the box and the uppermost quartile extends from the top of the box to the end of the upper dashed line. The dashed lines (i.e. whiskers) below and above each box represent the minimum and maximum values (Figure 14) and the difference in these values represents the range in the data.

On the Bulkley and Zymoetz II rivers, there was a statistically significant difference in the number of guided non-resident alien and unguided non-resident anglers before and after the regulation changes. In both cases, there were more of these anglers in the 2012-2014 period than before it (Figure 14). Other angler residency categories did not possess statistically significant differences (Appendix 9.0).

On the Kispiox River, similar to the Bulkley and Zymoetz II rivers, there was a statistically significant difference in the number of guided non-resident alien anglers before and after the regulation changes (Figure 14). There were more guided non-resident alien anglers who purchased licences after the regulation changes. Different from the Bulkley and Zymoetz II rivers is the statistically significant difference in the number of unguided non-resident aliens on the Kispiox River. The number of anglers significantly declined after the regulation changes, a trend which is supported in Figure 13 above. Non-resident aliens are the largest user on this river (Table 6; Morten, 1998; Morten and Giroux, 2006), this statistically significant difference shows the impact of the 2012 regulation change that restricted unguided non-resident alien anglers, and is perhaps one of the reasons why the number of unguided non-resident aliens significantly declined following implementation of the restrictions that apply to them. Other angler residency categories on the Kispiox River did not have statistically significant differences (Appendix 9.0).

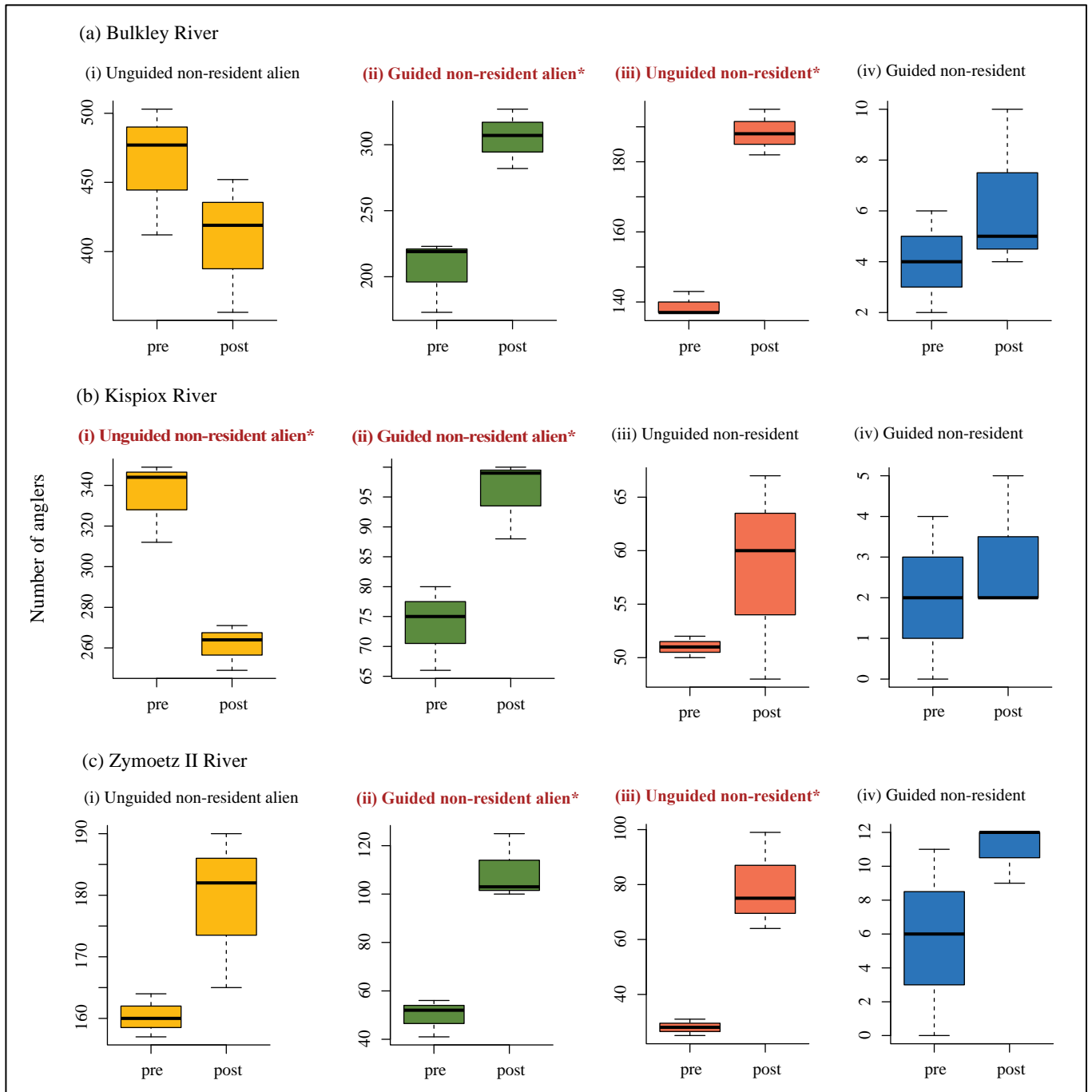


Figure 14: Box plot showing the total number of anglers who purchased a Classified Waters licence pre- and post- regulation change for the Bulkley (a), Kispiox (b), and Zymoetz II (c) rivers. Note that the y-axes vary by plot. Residency categories **bolded** and with an * indicate statistically significant difference between the number of anglers pre- and post- regulation change.

5.1.9 Non-resident and non-resident alien angler use during either restricted or unrestricted times

On the Bulkley River during unrestricted times, the number of angler days purchased by unguided non-resident aliens increased by 27% since the 2012 (Figure 15; Appendix 10.0). During restricted times, unguided non-resident alien angler days declined to zero, as expected given the implementation of restricted times in 2012. This information suggests that unguided non-resident aliens are fishing more during the week (i.e. concentrating their effort) to offset for lost opportunity on weekends. Guided non-resident alien and unguided non-resident angler days have increased steadily since 2012 during unrestricted and restricted times.

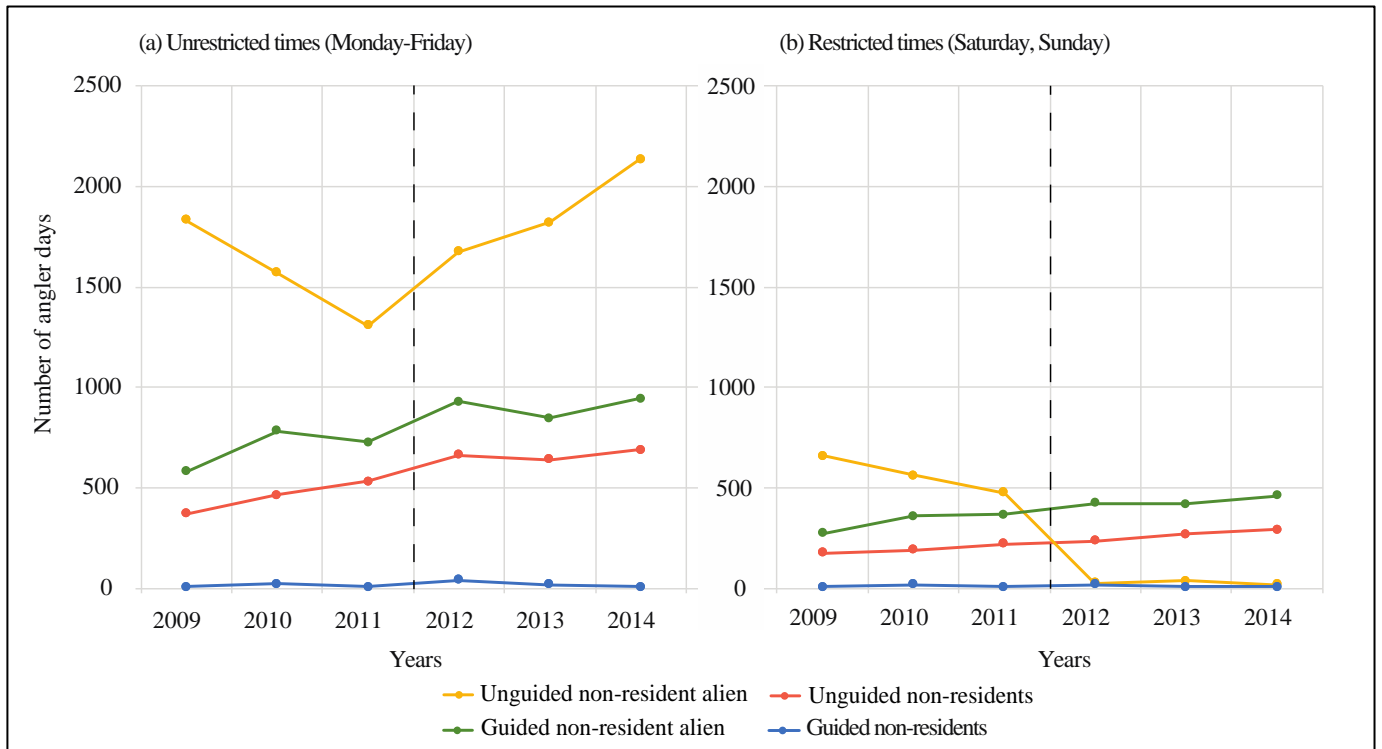


Figure 15: Number of angler days purchased during unrestricted and restricted times on the Bulkley River. The dashed line is for illustrative purposes to represents when the non-resident alien restrictions were implemented.

On the Kispiox River during unrestricted times, the number of angler days purchased by unguided non-resident aliens remained relatively stable between 2011 to 2014 (Figure 16; Appendix 10.0). Similar to the Bulkley River, effort by this class of angler declined to zero during restricted times. Effort by guided non-resident aliens and unguided non-residents has remained relatively flat since 2012 during unrestricted and restricted times, although a small decline was observed in 2014 for unguided non-residents.

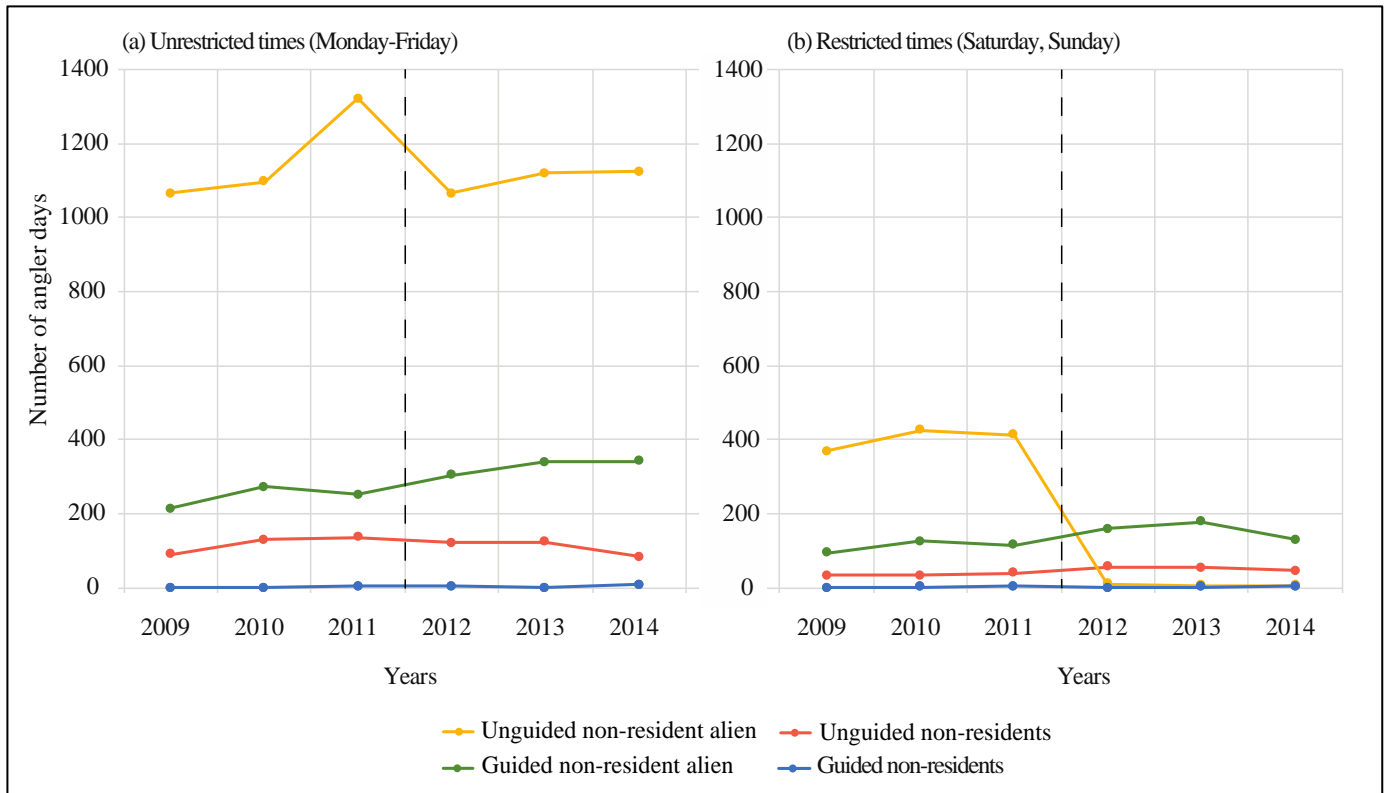


Figure 16: Number of angler days purchased during unrestricted and restricted times on the Kispiox River. The dashed line is for illustrative purposes to represents when the non-resident alien restrictions were implemented.

On the Zymoetz II River, unguided non-resident alien effort has been on a decreasing trend from 2012 to 2014 during the unrestricted times and declined to near-zero during the restricted times (except for instances of non-compliance; Figure 17). Over the same period, effort by unguided non-resident anglers increased by 58% and 29% during the unrestricted and restricted times respectively (Appendix 10.0). Given the timing of when these increases initiated (i.e. 2012), it appears effort by this class of angler may be driven by the non-resident alien restrictions on this water (Figure 13), in combination with its increased popularity and the effects from the classified period extension, as discussed in Section 5.1.8.

As an interesting observation, in the transition period from 2011 to 2012, changes in angler days between the restricted and unrestricted times for unguided non-resident alien anglers occurred at the same ratio for the Bulkley and Zymoetz II rivers. For example, on the Bulkley River, effort increased by 370 days (unrestricted times) and decreased by 475 days (restricted times) and on the Zymoetz II effort increased by 173 days (unrestricted times) and decreased by 222 days (restricted times). This results in a ratio of 0.78:1 for both systems, whereby the increases in effort during unrestricted times were offset by a larger decline in effort due to the mandatory restrictions. As discussed in Section 5.1.8, the total number of angler days on the Bulkley has increased since 2012 and has been declining slightly on the Zymoetz II River for this class of angler.

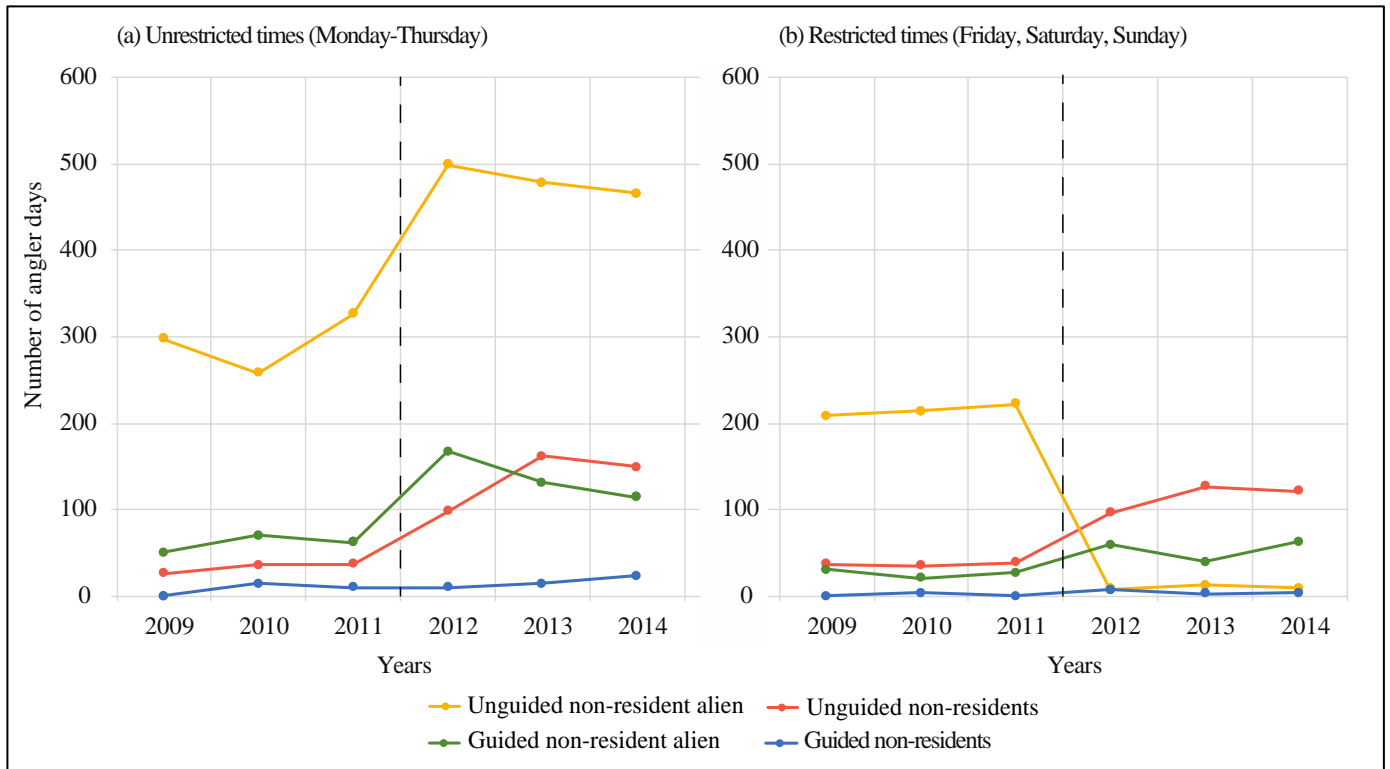


Figure 17: Number of angler days purchased during unrestricted and restricted times on the Zymoetz II River. The dashed line is for illustrative purposes to represent when the non-resident alien restrictions were implemented.

5.2 Angler satisfaction

5.2.1 Factors contributing to a quality angling experience

On the Bulkley River, 494 out of 499 individual anglers (99%) that had a complete angler interview reported factors that contributed to a high-quality angling experience. Most commonly, ‘High Fish Abundance/Catching Fish’ was mentioned by all anglers. Secondly, ‘Number of Anglers/Crowding’ was mentioned. However, more BC residents/non-residents (20%) mentioned this factor than non-resident aliens (11%). This implies that BC residents/non-residents find crowding on rivers to be of more importance than non-resident aliens. Thirdly, all anglers mentioned ‘Beauty/Scenery/Esthetic Attributes’ as a factor that contributed to a high-quality angling experience (Figure 18).

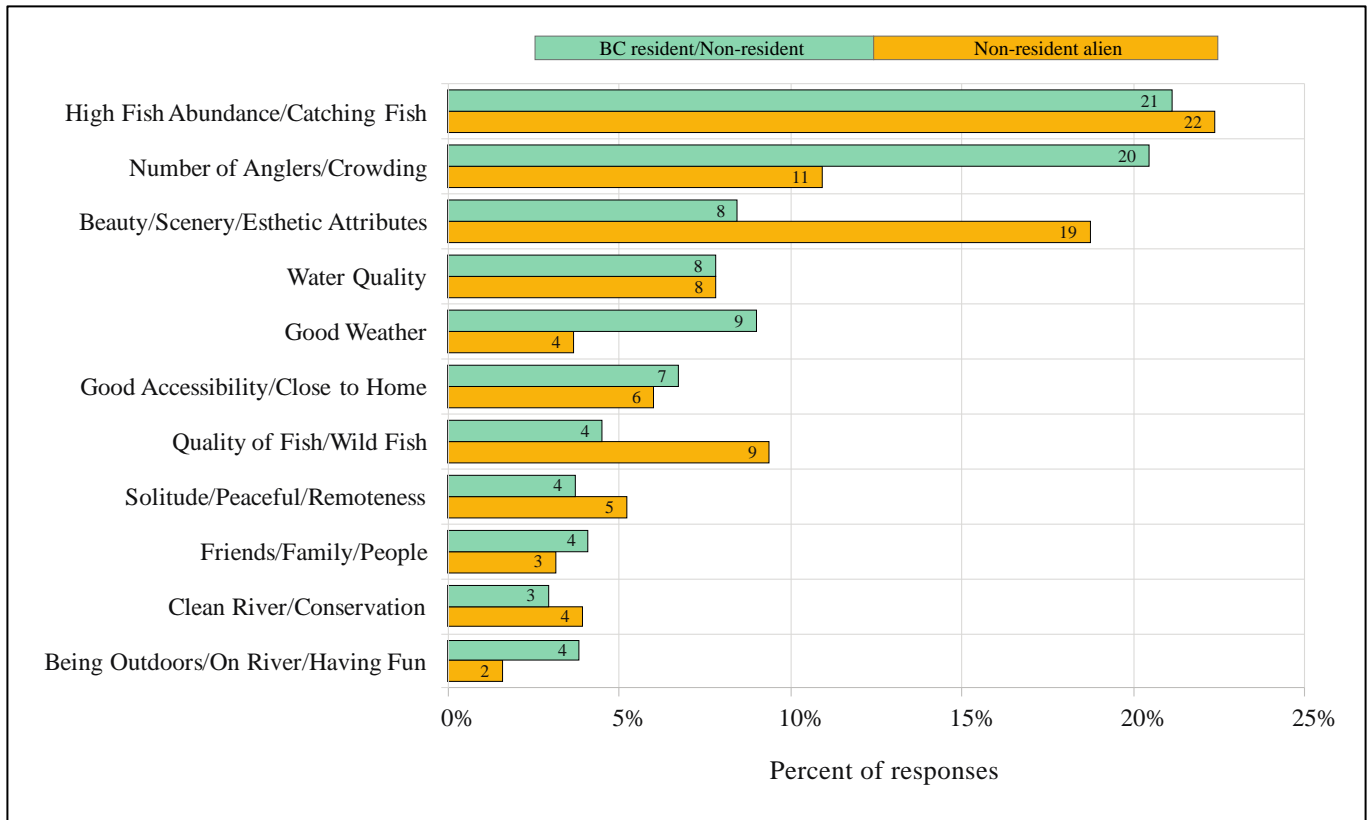


Figure 18: Factors contributing to a quality experience for BC residents/non-residents, and non-resident alien anglers on the Bulkley River in 2014.

On the Kispiox River, 261 out of 264 individual anglers (99%) that had a complete angler interview reported factors that contributed to a high-quality angling experience. Most commonly, ‘Quality of Fish/Wild Fish’ was mentioned by all anglers (Figure 19), which may owe to this river’s reputation for large bodied steelhead. ‘Beauty/Scenery/Esthetic Attributes’ and ‘High Fish Abundance/Catching Fish’ were also frequently mentioned factors contributing to a high-quality angling experience by all anglers (Figure 19). Similar to the Bulkley River, ‘Number of Anglers/Crowding’ was mentioned more frequently by BC resident/non-residents (14%) than non-resident alien anglers (10%).

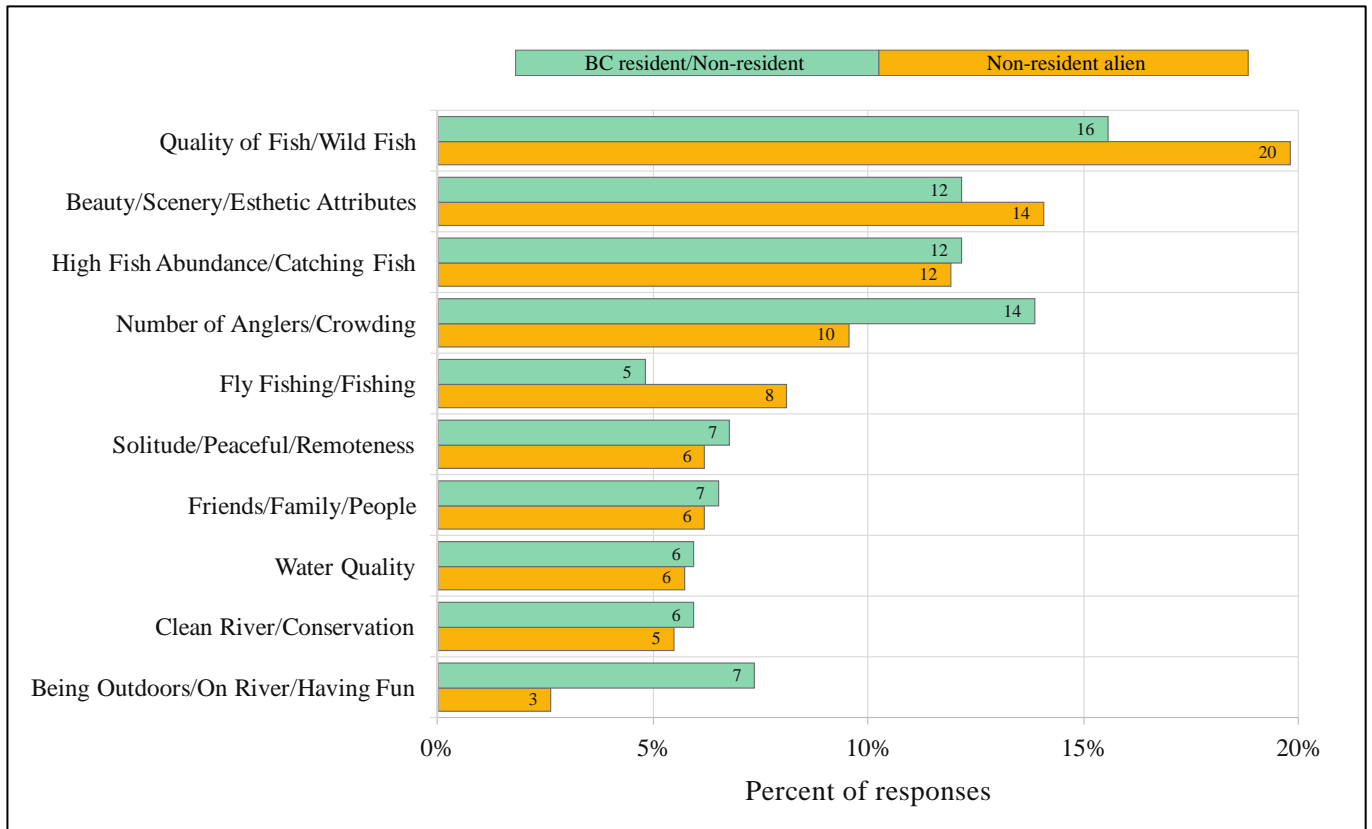


Figure 19: Factors contributing to a quality experience for BC residents, non-residents and non-resident alien anglers on the Kispiox River in 2014.

On the Zymoetz II River, 269 out of 271 individual anglers (99%) that had a complete angler interview reported factors that contributed to a high-quality angling experience. Most commonly, ‘Quality of Fish/Wild Fish’ was mentioned (Figure 20) followed by ‘Beauty/Scenery/Esthetic Attributes’ and ‘Great Accessibility/Close to Home’. For ‘Number of Anglers/Crowding’, this factor was mentioned less often in 2014 than in 2013 where it was the most commonly mentioned factor by BC residents and non-residents (Figure 20; Pitman and Hirshfield, 2015).

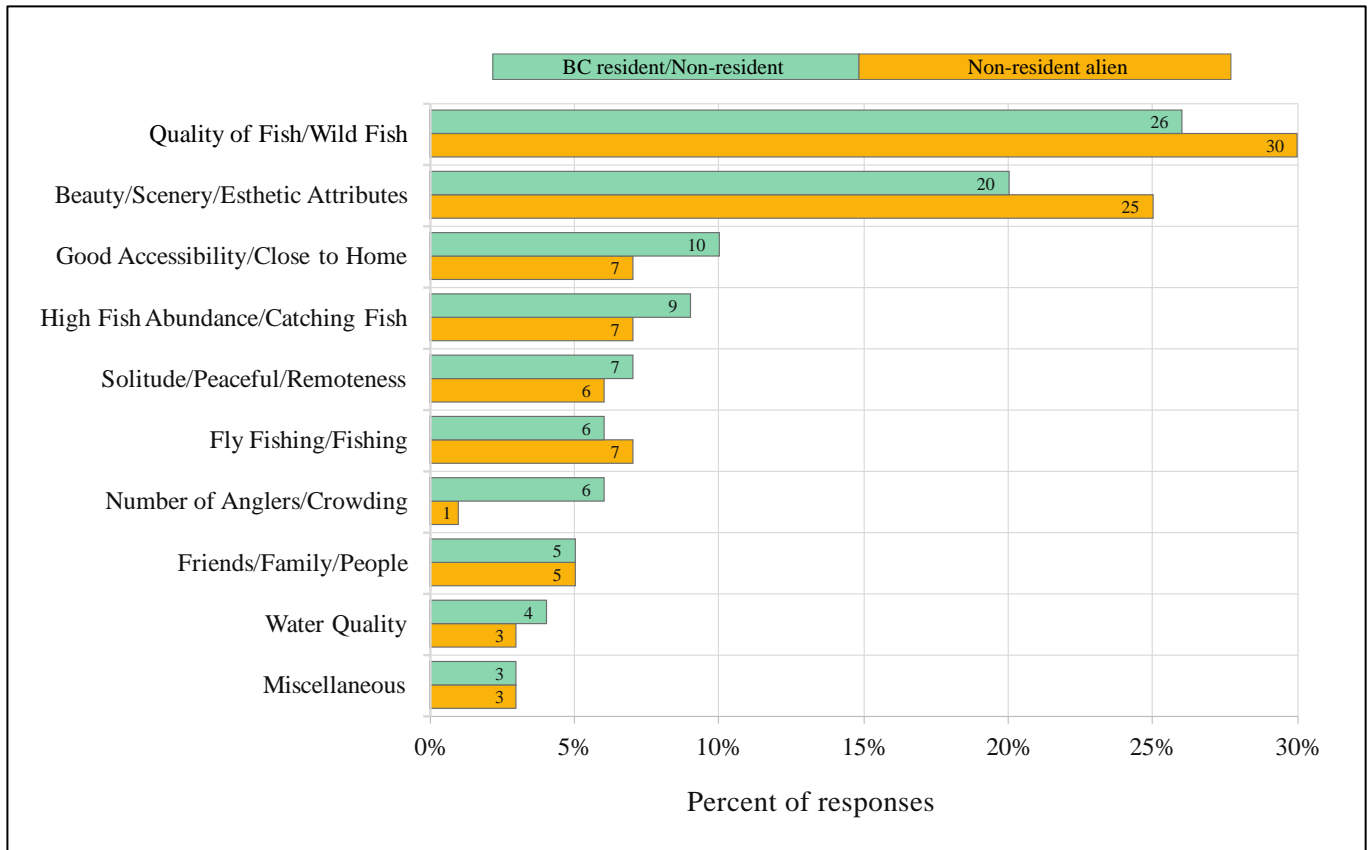


Figure 20: Factors contributing to a quality experience for BC residents, non-residents and non-resident alien anglers on the Zymoetz II River in 2014.

5.2.2 Quality angling experience ratings

There were 1,185 out of 1,208 complete (repeat and full-length) interviews (98%) on the Bulkley, Kispiox and Zymoetz II rivers where anglers of the three survey classes provided a quality angling experience rating. The overall median rating was ‘good’ (4), with 38% of anglers rating their experience as ‘excellent’, 30% rated it as ‘good’, and 21% rated it as ‘fair’. Few anglers rated their experience as ‘poor’ (7%) or ‘very poor’ (4%).

On the Bulkley River, most anglers rated their experience as ‘fair’ (3), ‘good’ (4), or ‘excellent’ (5), with less than 15% of anglers rating their day as ‘poor’ or ‘very poor’. On the Kispiox River, most anglers rated their experience as ‘good’ (4) or ‘excellent’ (5), with fewer than 20% rating it as ‘fair’ to ‘very poor’. On the Zymoetz II River, BC residents, non-residents and non-resident aliens rated their day most frequently as ‘excellent’ (50%, 42%, and 59% of responses respectively; Figure 21). Instances where anglers had a ‘poor’ or ‘very poor’ experience were minimal (less than 10%). Although there are many factors that contribute to a quality angling experience (Figures 18-20), BC resident, non-resident, and non-resident alien anglers generally appear to be having a ‘good’ to ‘excellent’ experience fishing the Bulkley, Kispiox, and Zymoetz II rivers.

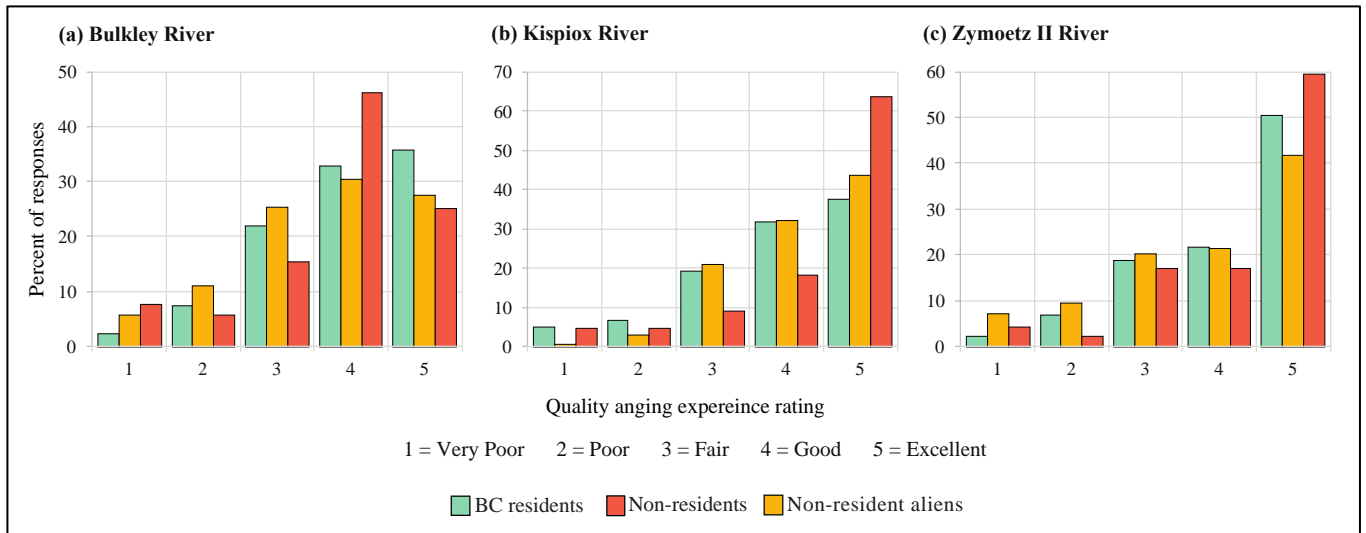


Figure 21: Percent of BC residents, non-resident, and non-resident alien responses to their quality angling experience ratings for the Bulkley, Kispiox, and Zymoetz II rivers. Note the y-axis vary by river.

5.2.3 Crowdedness ratings

Overall, the largest percent of anglers said they felt ‘not crowded at all’ on the Bulkley, Kispiox and Zymoetz II rivers (median rating of 1; Figure 22). On the Bulkley, Kispiox and Zymoetz II rivers, less than 25% of anglers (of all residency categories) indicated they felt ‘moderately’ (3) to ‘extremely’ crowded (5; Figure 22). As anglers felt ‘not crowded at all’ in such a high frequency, the difference in crowdedness ratings by week periods, river section or river were not assessed. In addition, there was no difference between the frequency of crowdedness ratings mentioned by BC residents and residents of the Skeena Region (FLNRO Region 6).

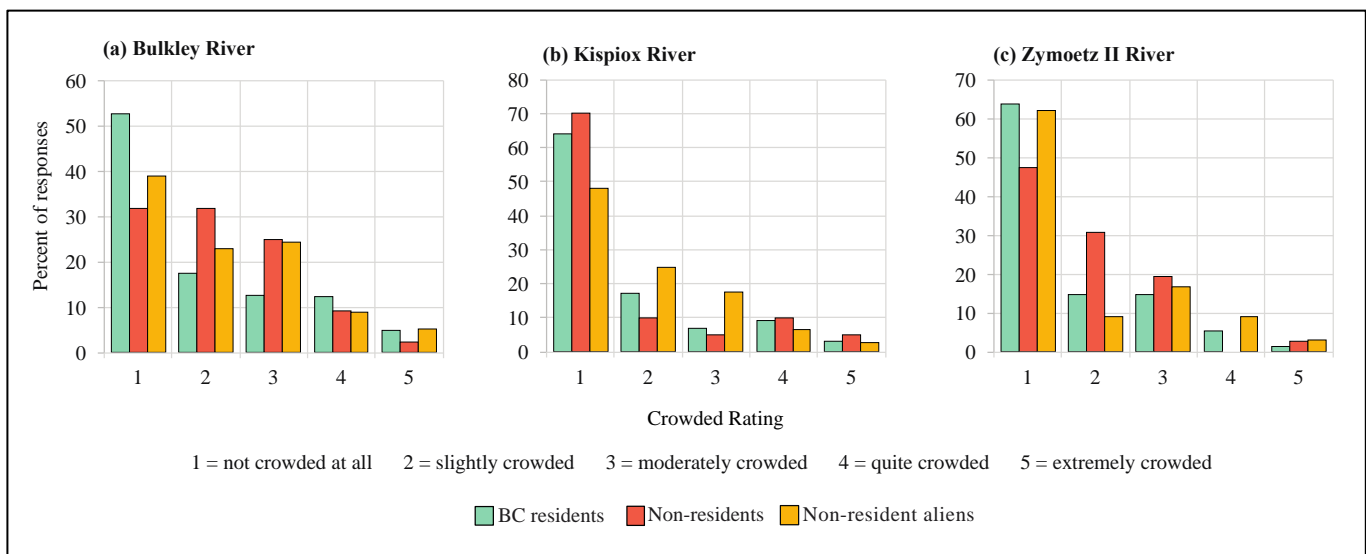


Figure 22: Percent of BC residents, non-resident, and non-resident alien responses to crowded ratings for the Bulkley, Kispiox, and Zymoetz II rivers. Note the y-axis vary by river.

On the Bulkley River, BC residents and non-residents responded with ‘not crowded at all’ at the same frequency between unrestricted and restricted times (Figure 23). On the Kispiox River, BC residents and non-residents indicated they felt ‘not crowded at all’ more frequently during restricted times, which could be a result of fewer anglers on the river (Figure 23). On the Zymoetz II River, marginally more BC resident and non-residents responded with ‘not crowded at all’ during unrestricted times (Figure 23). Instances where BC resident/non-resident anglers felt ‘extremely crowded’ during either the restricted or unrestricted times were rare and accounted for less than 10% of responses for each river. These results indicate that the timing of non-resident alien restrictions does not dramatically influence the day-specific crowded rating of BC resident/non-resident anglers who were interviewed in 2014. Non-resident aliens are not included in this analysis as the majority that were interviewed by the River Guardians were unguided, and unguided non-resident aliens are not permitted to angle during restricted times. Therefore, crowded rating comparison during restricted and unrestricted times was not possible for non-resident aliens.

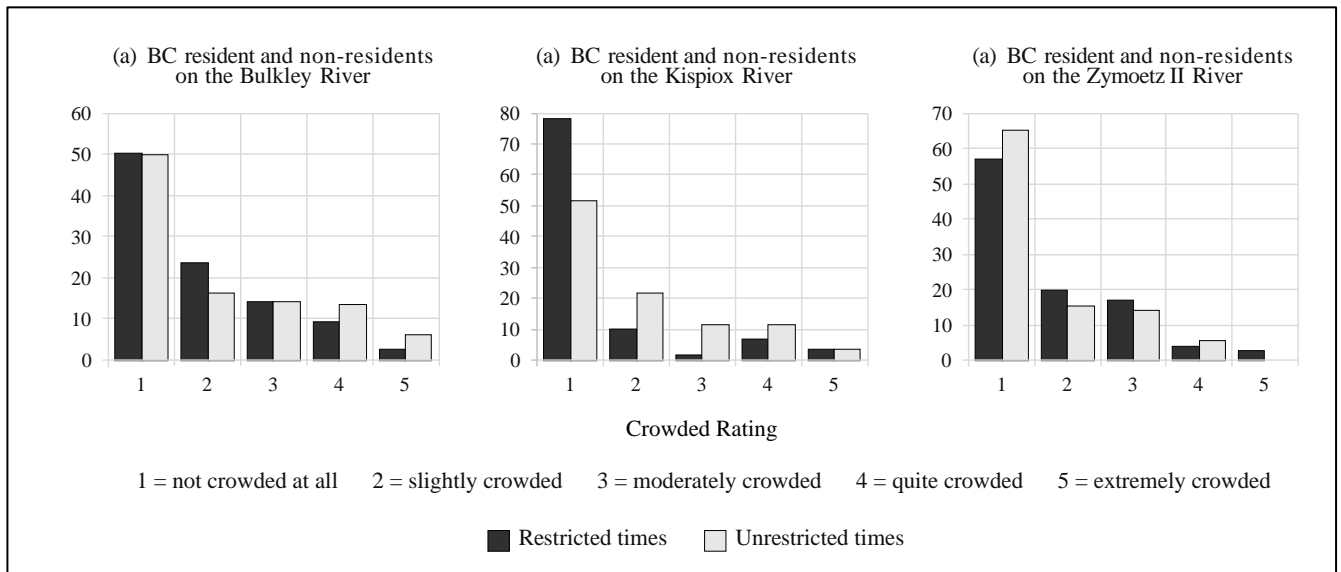


Figure 23: Percent of BC resident and non-resident responses to their Crowded Rating during restricted and unrestricted times on the Bulkley, Kispiox, and Zymoetz II rivers. Note the y-axis vary by river.

5.2.4 Impact of regulation changes on anglers and crowding

A total of 753 (71%) individual anglers responded ‘yes’ to fishing during the Classified Waters period between 2007 and 2011, 289 (27%) responded ‘no’ and 20 anglers didn’t respond to this question (Figure 24). The Bulkley, Kispiox, Zymoetz II, and Skeena IV rivers are included in this analysis. If an angler responded ‘yes’ to having fished prior to regulation changes, they were asked ‘What impact has the regulation change had regarding crowding on the river?’. Of these anglers, 296 (39%) thought that the regulation change reduced crowding, 194 anglers (26%) thought that crowding had stayed the same, 172 anglers (23%) did not know, 88 anglers (12%) thought that crowding had increased since the regulation change, and 3 anglers provided no

answer to this question. The response to this question varied considerably depending on the residency category of the angler. For example, BC residents predominantly thought that the regulation change reduced crowding on the rivers (73%; Figure 24), whereas the majority of anglers who thought that the regulation changes increased crowding on the rivers were non-resident aliens (64%; Figure 24).

To the question '*Has your quality angling experience improved as a result of the regulation change?*' 241 anglers (32%) thought it had improved, 234 anglers (31%) thought that it had stayed the same, 142 anglers (19%) thought it had declined, 132 anglers (18%) did not know, and 4 anglers provided no answer to this question. Most anglers who thought that the regulation changes improved their angling experience were BC residents (77%; Figure 24), while non-resident aliens indicated that the new regulations reduced their quality angling experience (87%; Figure 24).

The percent of anglers who thought the regulation change reduced crowding on the river declined from 47% in 2013 to 39% in 2014 (Pitman and Hirshfield, 2015). Similarly, fewer anglers felt the restrictions improved their quality angling experience from 2013 (37%) to 2014 (32%;(Pitman and Hirshfield, 2015). The rationale for these patterns are unclear, however, it could be due to anglers becoming more familiar with these regulation changes, providing a better sense of how they are working (i.e. their effectiveness). It is also possible that broader factors, such as increased angler effort to the region (Figure 13) are driving these trends. It is likely that the increased angler effort negatively influences the effectiveness of the non-resident alien restrictions.

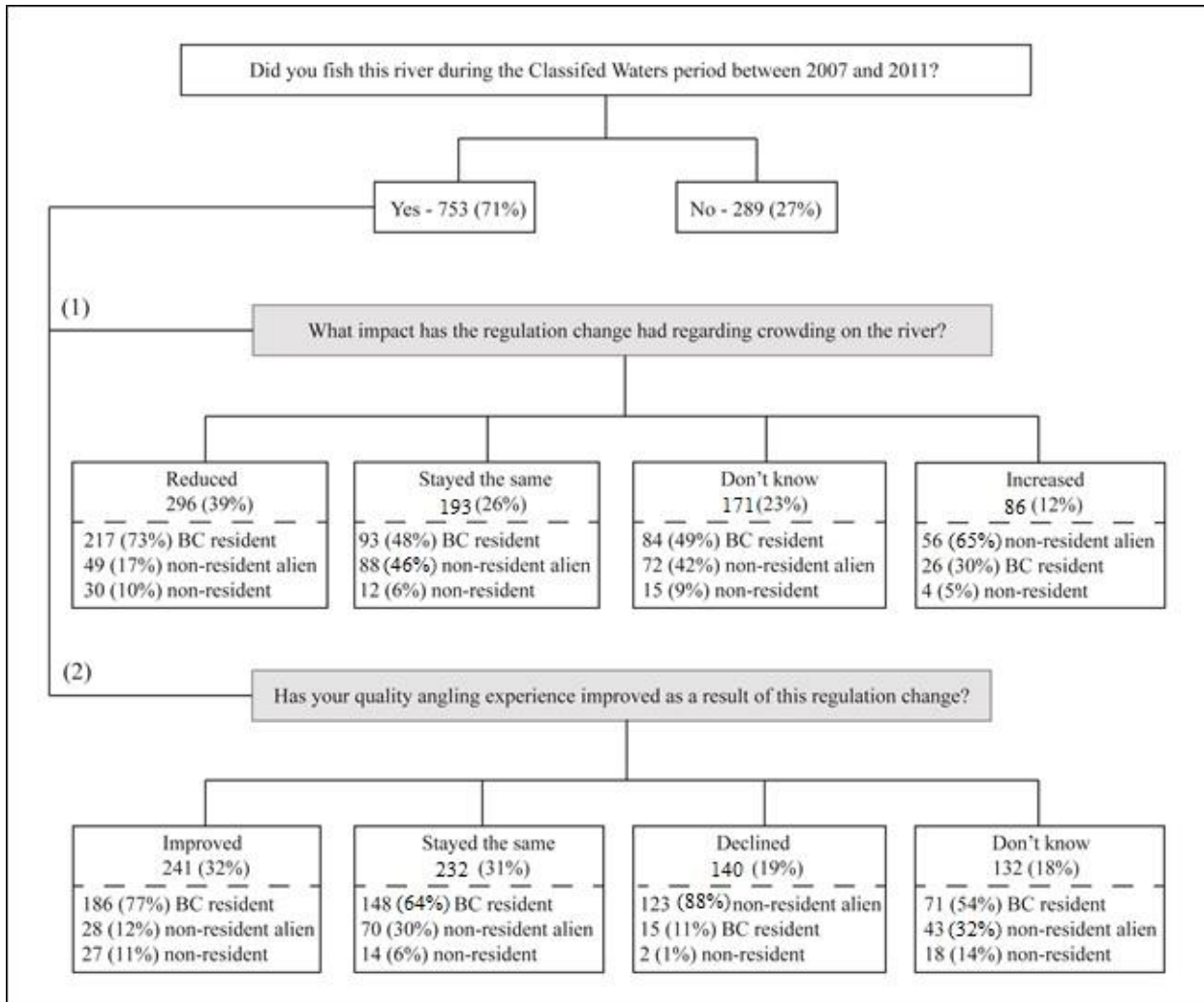


Figure 24: Summary of angler responses to questions related to crowding and changes and quality of angling experience. For (1) Angler residency was not collected from three angler interviews. For (2) Angler residency was not collected from three angler interviews, and one angler didn't answer this question.

5.2.5 Angler comments

A total of 647 out of the 1,062 individual anglers (61%) made comments during an angler interview. Most frequently, comments by anglers were made in regards to a support or dislike of the regulation changes that restrict non-resident alien anglers (Figure 25). For example, 56% of BC residents/non-residents indicated they support the regulation changes, whereas only 15% of non-resident aliens made this comment. Meanwhile, 48% of non-resident aliens suggested they dislike these regulations, whereas 8% of BC resident/non-residents made this comment. Pitman and Hirshfield (2015) found a similar split in opinions regarding these regulations changes in 2012. Comments on other topics were much fewer and related to further regulations: to manage angler demand, concerns about the Classified Waters system, or comments on how the regulation changes may affect the local economy (Figure 25).

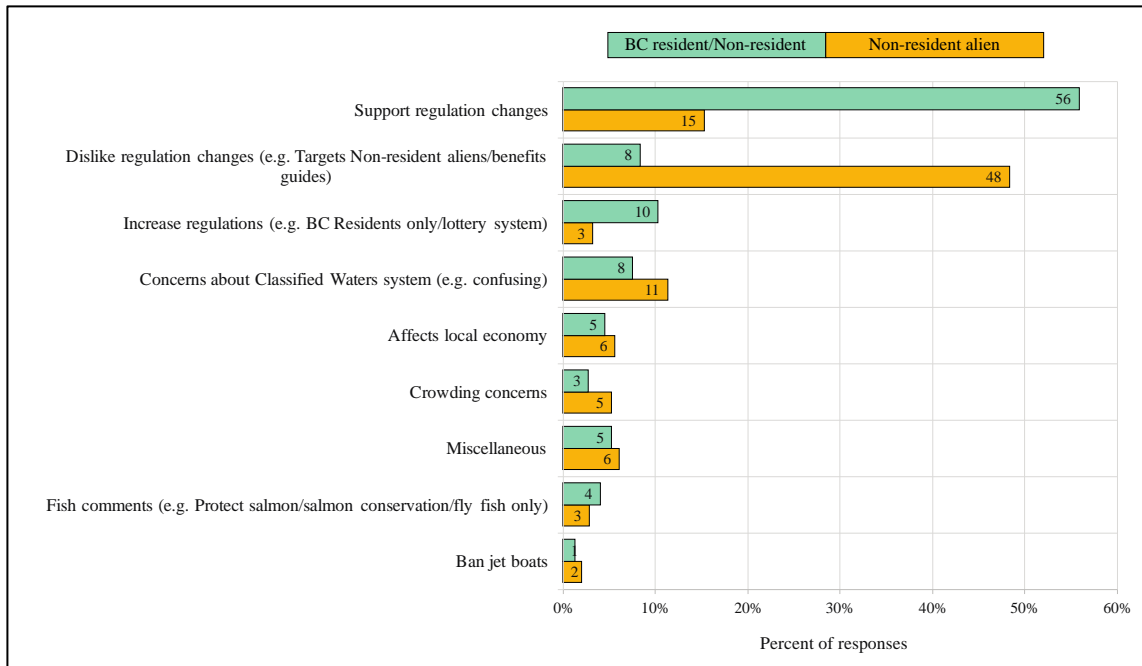


Figure 25: Comments reported to the River Guardians during angler interview surveys in 2014.

5.3 Angler licence and regulation compliance

Eighty-nine out of the 1,247 complete angler interviews (7%) had some type of licence infraction. Forty-seven (54%) were from BC residents, 14 (15%) were from non-residents, and 28 (31%) were from non-resident aliens (Table 11). Failure to carry/produce a licence was the most frequent infraction and included anglers who refused to show their basic angling licence (38 anglers, 43%), the majority of these anglers were BC residents (Table 11). It stands out that BC residents had the highest percentage of overall licence violations, which is a trend that has been observed in previous angler surveys conducted on Classified Waters in the Skeena Region (Morten, 1998; Morten, 1999; Morten, 2000; Morten and Giroux, 2006). Overall, the non-compliance rate reduced from 12% in 2013 to 7% in 2014 (Pitman and Hirshfield, 2015).

Table 11: Number (%) of fishing licence infractions by type and residency category.

Type of infractions	Number (%) of anglers with infractions on all rivers			
	All infractions	Residency category		
		BC residents	non-residents	non-resident aliens
Failure to carry/produce licence	38 (43)	24 (27)	2 (2)	12 (13)
No Classified Waters licence	33 (38)	13 (16)	9 (10)	11 (12)
No Steelhead Stamp	13 (14)	10 (11)	2 (2)	1 (2)
Purchased Classified Waters licence for wrong river	4 (4)	0 (0)	1 (1)	3 (3)
Non-resident alien fishing during restricted times	1 (1)	0 (0)	0 (0)	1 (1)
Total	89 (100)	47 (54)	14 (15)	28 (31)

Over the study period on the Bulkley River, there was a high non-compliance rate in September which declined in October. Relative to other rivers, the Kispiox River had a low non-compliance rate throughout the entire study period (Figure 26). In comparison, previous studies on the Bulkley and Kispiox rivers noted that infractions were distributed throughout the study periods (Morten, 1999; Morten, 2000). The Zymoetz II River had a high non-compliance rate at the beginning of the study period, which declined in the third week of September and then increased again in late October (Figure 26). This trend is consistent with noncompliance observations in 2013 for this system (Pitman and Hirshfield, 2015).

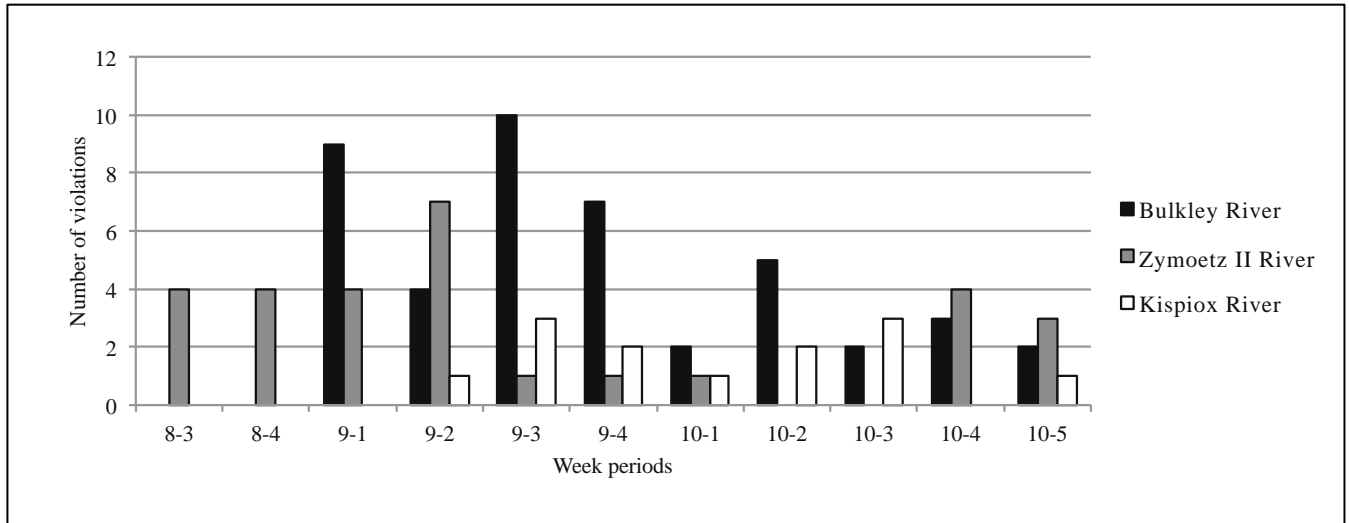


Figure 26: Number of violations over the periods when surveys were conducted in 2014. Infractions included are listed in Table 10.

5.4 Catch summary

The total number of anglers who landed a steelhead and the total number of steelhead landed by those anglers are presented by river and residency in Appendix 11.0. Fishing and access methods used by anglers are also reported in Appendix 12.0 and 13.0.

Of the anglers that self-reported catching a fish in 2014, the majority caught a steelhead (Table 12). Based on the 1,208 complete angler interviews, a total of 666 steelhead were landed between August 20 and October 31, 2014 on the Bulkley, Kispiox and Zymoetz II rivers (Table 12). On the Bulkley River, of the 551 anglers interviewed, 130 anglers reported landing 201 steelhead. On the Kispiox River, of the 283 anglers interviewed, 82 anglers reported landing 189 steelhead. On the Zymoetz II River, of the 374 anglers interviewed, 135 anglers reported landing 276 steelhead.

Table 12: Catch summary for interviewed anglers by species and river in 2014.

River	Steelhead ¹		Coho		Cutthroat trout		Pink		Dolly Varden ²		Rainbow trout	
	<i>K</i>	<i>R</i>	<i>K</i>	<i>R</i>	<i>K</i>	<i>R</i>	<i>K</i>	<i>R</i>	<i>K</i>	<i>R</i>	<i>K</i>	<i>R</i>
Bulkley	2	201	14	7	0	2	0	0	2	8	0	0
Kispiox	0	189	4	17	0	5	0	7	0	25	0	3
Zymoetz II	0	276	0	41	0	0	0	0	0	28	0	7
Total	2	666	18	65	0	7	0	7	2	61	0	10

K = kept, *R* = Released

¹All retained steelhead were kept by First Nation anglers.

² Includes Bull Trout

6.0 Limitations

The intent of the study was to collect information about steelhead angler demographics, effort, satisfaction, and compliance primarily on the Bulkley, Kispiox and Zymoetz II rivers. This work was guided by three objectives including assessment of trends in angler effort, measurement of angler satisfaction, and evaluation of angler compliance. These objectives were specifically selected to provide key insights into how anglers perceive the new regulations, whether they are complying with them, and how their behaviour has changed as a result. In doing so, trade-offs were made and combined with available financial resources, this study had a number of limitations which are discussed below.

6.1) Foot patrols to intercept anglers. In 2014, the River Guardians used foot patrols to intercept anglers on the river. As a result, anglers using this access method had a higher probability of being interviewed. Given the high proportion of guided anglers that use boats, intercepting anglers by foot limited the feedback from guided and boat based anglers.

6.2) Sampling frame. This study was conducted during the majority of the Classified Waters period for the Bulkley and Kispiox rivers, however, only a portion of the Classified Waters period was covered for Zymoetz II River (e.g. mid-August to the end of October; 10 weeks out of 45 weeks). As a result, comparison of trends (e.g. satisfaction, compliance) throughout the entire classified period on this water was not possible.

6.3) Catch estimates. The field component for this study included roving on-site angler surveys. On rivers such as the Bulkley, Kispiox and Zymoetz II where angler effort is spatially diffuse, aerial surveys are required to estimate total catch by species. Due to budget limitations, aerial surveys were considered out of scope and total catch estimates (catch per unit effort) were not generated for this study. This limitation restricts comparison of catch estimates and other metrics to historical studies conducted in the region. The catch information in this report was opportunistically collected on a day-specific basis and represents the catch of anglers who were interviewed.

6.4) Sampling effort. The River Guardians worked 8 hours/day and 40 hours/week. This limited their ability to conduct additional interviews during times of elevated angler effort.

6.5) Data limitations for BC residents. The electronic licencing system was used to assess trends in angler effort for non-resident and non-resident alien anglers on a river specific basis, however, these data are not available for BC residents. This limited comparison of BC resident effort to that of non-residents and non-resident aliens.

6.6) Non-response error. Of all the anglers approached to be interviewed (n=1,427), 13% could not be completed, as some anglers were unwilling to participate (n=167) or they did not speak sufficient English (n=13). River specific non-response rates ranged from 0% on Zymoetz II to 11% on the Kispiox and 21% on the Bulkley. Bias toward non-English speaking anglers is considered low, and the number of anglers who did not agree to be interviewed on the Kispiox and Bulkley rivers is considered high (e.g. in comparison 95% of anglers agreed to be interviewed on the Kispiox in 2001; Morten and Giroux, 2006). The rationale for the elevated non-response bias is unknown. Non-response rates ranging from 10-35% have been considered adequate in other angler surveys (Zale *et al.*, 2012).

6.7) Response error. Response errors may have biased the results of this study. For example, the interview process may have caused some anglers to respond negatively and provide responses not representative of their actual perceptions and opinions. Other sources of response errors may have included intentional deception (strategic bias), question misinterpretation and species misidentification (Pollock *et al.* 1994). In general, recall bias is expected to be low as anglers were primarily asked questions pertaining to the day of their interview. As an exception, anglers who fished from 2007-2011 on the rivers included in this study were asked to comment on how crowding and their quality angling experience had changed as a result of the regulatory measures that were implemented in 2012. The intent was to compare past to present conditions. It is recognized that this line of questioning during an on-site angler interview may suffer from recollection bias and anglers may not be afforded sufficient time to reflect on the requested information.

7.0 Recommendations

- 1) Future River Guardian studies on the Bulkley River are recommended to use boat based methods to intercept anglers. A combination of drift boat and foot patrols are recommended on the Kispiox River. Although the use of boats takes time that could otherwise be used to conduct angler surveys, it provides the only means of collecting representative information on spatially diffuse systems.
- 2) In pursuit of human dimensions (HD) data such as angler satisfaction, future River Guardian projects should investigate off-site methods to gather this information. Zale *et al.* (2012) discusses the merits of separating HD information collection from field based studies. Fisheries staff may consider working with an appropriate specialist to develop such a methodology.
- 3) Aerial surveys should be a component of River Guardians studies to complement roving and access point surveys. This will provide the necessary spatial and temporal coverage to allow catch and effort estimates (catch per unit effort) to be determined for the fisheries in question.

In turn, this will enable a more effective evaluation of both conservation and socially based angling regulations.

- 4) For the question “*How would you rate your quality angling experience today?*” where anglers responded with ‘poor’ or ‘very poor’, follow up questioning could improve understanding of why such answers were provided.
- 5) Future investigations regarding potential differences between restricted times and non-restricted times on the Bulkley and Kispiox rivers may consider a sampling plan that captures an even number of days during both periods e.g. a 4 days/week at 10 hours/day.
- 6) Photographs and videos provide useful information during and after angler surveys. It is recommended that River Guardians continue to use iPads or similar devices and take photos of infractions, crowding observations, conservation issues, etc.
- 7) The Kispiox River below the Rodeo Grounds should be divided into two sections, from 1) the confluence with Skeena River to the Potato Patch, and 2) the Potato Patch to Rodeo Grounds. This change may allow for spatial differences in angler effort to be measured as a result of the Kispiox Band Council’s annual access fee initiative.

8.0 Acknowledgments

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10.0 Appendix

Appendix 1.0 Summary of Regulation Changes

Bulkley River

- Canadian resident-only on Saturday and Sunday from September 1 to October 31; guiding permitted

Telkwa River

- Canadian resident-only all week from September 1 to October 31; guiding not permitted
- Regional Manager to resolve 53 Permit Days upstream of CN railway bridge

Morice River

- Canadian resident-only on Saturday and Sunday from September 1 to October 31; guiding permitted

Babine River

- Canadian resident-only Saturday and Sunday from September 1 to October 31 in a zone from the outlet of Nilkitkwa Lake (smolt fence) downstream to the Nilkitkwa River confluence; guiding not permitted

Kitwanga and Kitseguecla Rivers

- Canadian residents-only on Saturday and Sunday from April 1 to March 31; guiding not permitted

Suskwa River

- Class I designation from April 1 to March 31
- Canadian resident-only on Saturday and Sunday from April 1 to March 31; guiding not permitted

Kispiox River

- Canadian resident-only Saturday and Sunday from September 1 to October 31; guiding permitted

Lakelse River

- Change from Class II to Class I designation
- Extension of mandatory Steelhead Stamp from September 1 to May 31
- Canadian resident-only zone April 1 to March 31 from outlet of Lakelse Lake downstream to powerline crossing located 3.5 km upstream of the Lakelse River confluence with the Skeena River; guiding not permitted.

Zymoetz River Class I Section

- Extension of Classified Waters period from July 24 to December 31
- Extension of mandatory Steelhead Stamp from July 24 to December 31
- Guide restrictions: maximum 3 anglers/group and 1 group/guide/day
- Increase allocation of guided angler-days from 58 to 100
- Decrease guided angler-day allocation from 250 to 100 in Schedule A of B.C. Regulation 125/90
- Canadian resident-only on Friday, Saturday and Sunday from July 24 to December 31; guiding permitted

Zymoetz River Class II Section

- Extension of mandatory Steelhead Stamp from July 24 to May 31
- Extension of Classified Waters period from July 24 to May 31
- Canadian resident-only on Friday, Saturday and Sunday from July 24 to May 31
 - Guiding allowed on Friday and in a zone on Saturday from Mattson Creek confluence downstream to the Skeena River confluence
- Guide restrictions: maximum 3 anglers/group and 1 group/guide/day
- Modify guided angler-day allocation to accommodate Classified Waters period extension
 - Maintain allocation of 117 days from September 1 to October 31
 - Allocate 100 days from July 24 to August 31

- Allocate 50 days from November 1 to May 31

Kitsumkalum River

- Extension of mandatory Steelhead Stamp from August 7 to May 31
- Guide restrictions: maximum 3 anglers/group; 1 group/guide/day in upper river and 1 group/guide/day in lower river
- Reduce total number of angling guides from 13 to 11
- Ministry decision to alter no guiding period to November 1 to April 1
- Canadian resident-only from April 1 to March 31 on:
 - Saturday in zone from Kitsumkalum Lake outlet downstream to Glacier Creek confluence; guiding not permitted
 - Sunday on the entire river; guiding not permitted

Skeena River Section IV

- Extension of Classified Waters period from July 1 to December 31
- Extension of mandatory Steelhead Stamp from July 1 to December 31
- Increase guided angler-day allocation by 586 days amongst 12 new guide licences in a zone from Flint Creek confluence to the Chindemash Creek confluence
 - Concern was expressed that allocation may be too high. Accordingly, these days will be offered on a limited term opportunity, such as 20 years or less.
- Canadian resident-only on Saturday and Sunday from July 1 to December 31 in the following areas:
 - a) Shegunia River confluence downstream to Sedan Creek confluence; guiding permitted
 - b) Chindemash Creek confluence downstream to 1.5 km upstream from Zymoetz River confluence; guiding not permitted

Appendix 2.0: The Roving Survey Form

DAILY COMMENTS	
Date and time: _____	Interviewer: _____
River: _____	Day type: _____
Weather (<i>circle one</i>): SUN PARTIAL CLOUD 100% OVERCAST RAIN SNOW	
Start time: _____	End time: _____

ZONE SPECIFIC COMMENTS	
1) River section: _____	Water level: FALLING RISING HIGH LOW FLOOD
Water clarity (<i>circle one</i>):	
POOR (0-10 cm visibility) MURKY (10-25 cm) CLOUDY (25-75 cm) CLEAR (75-100 cm)	
# Anglers observed: _____	Time entered: _____ Time exited: _____
Route description and general comments:	

2) River section: _____	Water level: FALLING RISING HIGH LOW FLOOD
Water clarity (<i>circle one</i>):	
POOR (0-10 cm visibility) MURKY (10-25 cm) CLOUDY (25-75 cm) CLEAR (75-100 cm)	
# Anglers observed: _____	Time entered: _____ Time exited: _____
Route description and general comments:	

3) River section: _____	Water level: FALLING RISING HIGH LOW FLOOD
Water clarity (<i>circle one</i>):	
POOR (0-10 cm visibility) MURKY (10-25 cm) CLOUDY (25-75 cm) CLEAR (75-100 cm)	
# Anglers observed: _____	Time entered: _____ Time exited: _____
Route description and general comments:	

Appendix 3.0: The Interview Form

Angler Interview Form

Date and time: _____ River: _____

Thank you for completing this survey form. The Skeena River Guardian Project is funded by the Habitat Conservation Trust Foundation. We are collecting information from anglers to monitor recent regulation changes and would like to know about yourself, your catch, and your views regarding the Skeena Steelhead fishery. This survey is voluntary and will take approximately 5 minutes.

Have you been interviewed before? NO YES (if YES, only completed bolded and * questions below)

*Angler Name: _____ *Angler Gender: M F *Angler #: _____

*Year of Birth _____

*Angler Residency: BC RESIDENT NON-RESIDENT NON-RESIDENT ALIEN

*Residence: BC postal code _____, BC City _____, CDN province _____,
NON-CDN _____, Country _____

*Basic Licence #: _____ *Basic Licence Class: 1 DAY 8 DAY ANNUAL

*Classified Waters Licence # _____ *Classified Days Purchased _____

*Steelhead Stamp: YES NO

*Guided YES NO If yes, Licenced Angling Guide Name _____

How did you access the river today? DRIFT BOAT JET BOAT FOOT

What gear type are you using? GEAR FLY

What fish are you angling for? STEELHEAD COHO PINK SOCKEYE CUTTHROAT DOLLY VARDEN
OTHER _____

How many years have you fished this river? _____

How many days have you already fished for steelhead on this river this year? _____

How many *more* days do you plan to fish for steelhead on this river this year? _____

*What species of fish have you landed today? How many did you keep or release?

Species	Rivers Section	# Rel./Kept	Fly or Gear	Release Condition

1. Past research has shown that a number of factors contribute to quality angling experiences. In order of importance, what factors contribute to your quality angling experience on this river?

- (1) _____
- (2) _____
- (3) _____

2. *Overall, taking all factors into consideration, on a scale of 1-5, where 1=very poor and 5=excellent, how would you rate your quality angling experience today?

1=VERY POOR, 2=POOR, 3=FAIR, 4=GOOD, 5=EXCELLENT, 6= DON'T KNOW

3. *How many other anglers do you remember seeing today? _____

4. Thinking about the total number of anglers that you encountered today, on a scale of 1 to 5, where 1=not at all crowded and 5=extremely crowded, how crowded did you feel?

Select one response. 1 2 3 4 5 DON'T KNOW

5. Did you fish this river during the classified waters period between 2007 and 2011? Y or N

6. If No to #5, proceed to #7. If Yes to #5, in an attempt to reduce crowding on the river and improve angling experiences, new classified waters angling regulations were implemented in April 2012. One significant regulation change was the implementation of Canadian resident-only times and zones.

a)! What impact has this regulation change had on crowding on the river? Has the level of crowding been reduced, stayed the same or has it increased? Select one response.

REDUCED, STAYED THE SAME, INCREASED, DON'T KNOW

b)! *Overall, has your quality angling experience improved, stayed the same or declined as a result of this regulation change?

IMPROVED, STAYED THE SAME, DECLINED, DON'T KNOW

7. Do you have any other comments regarding recent regulation changes on this river?

Response: _____

Thank you for your time.

Appendix 4.0 – Summary of River Guardian observations at Cedarvale (Skeena IV) from August 19-October 27, 2014

Date	Time (hrs)	Day	Residency	Town	Target species	Number of interviews	Number of anglers observed
2014-08-19	12:48	Tuesday	BC Resident	Nelson	Coho	6	7
2014-08-19	14:14	Tuesday	BC Resident	Prince George	Sockeye		
2014-08-19	14:03	Tuesday	BC Resident	Prince George	Sockeye		
2014-08-19	12:35	Tuesday	BC Resident	Smithers	Sockeye		
2014-08-19	12:57	Tuesday	BC Resident	Smithers	Sockeye		
2014-08-19	12:23	Tuesday	BC Resident	Smithers	Sockeye		
2014-08-23	13:26	Saturday	BC Resident	Smithers	Sockeye	3	4
2014-08-23	13:34	Saturday	BC Resident	Telkwa	Sockeye		
2014-08-23	13:46	Saturday	BC Resident	Telkwa	Sockeye		
2014-08-28	12:24	Thursday	BC Resident	Smithers	Sockeye	2	Not available
2014-08-28	12:24	Thursday	BC Resident	Telkwa	Sockeye		
2014-08-31	11:38	Sunday	BC Resident	Unknown	Sockeye	5	10
2014-08-31	11:35	Sunday	BC Resident	Unknown	Sockeye		
2014-08-31	11:28	Sunday	BC Resident	Fort St John	Sockeye		
2014-08-31	11:27	Sunday	BC Resident	Kamloops	Steelhead		
2014-08-31	12:24	Sunday	Non-Resident Alien	USA	Steelhead		
2014-09-05	14:09	Friday	BC Resident	Unknown	Steelhead	2	2
2014-09-05	14:12	Friday	BC Resident	Prince George	Steelhead		
2014-09-06	10:57	Saturday	BC Resident	Unknown	Steelhead	3	3
2014-09-06	11:50	Saturday	BC Resident	Kitwanga	Coho		
2014-09-06	10:57	Saturday	Non-Resident Alien	Unknown	Steelhead		
2014-09-10	10:52	Wednesday	Non-Resident Alien	USA	Steelhead	2	2
2014-09-10	10:53	Wednesday	Non-Resident Alien	USA	Steelhead		
2014-09-14	12:59	Sunday	Non-Resident Alien	USA	Steelhead	4	4
2014-09-14	13:07	Sunday	Non-Resident Alien	USA	Steelhead		
2014-09-14	12:56	Sunday	Non-Resident Alien	USA	Steelhead		
2014-09-14	13:09	Sunday	Non-Resident Alien	USA	Steelhead		
2014-09-15	12:23	Monday	Non-Resident Alien	Unknown	Steelhead	1	1
2014-09-20	10:34	Saturday	Non-Resident Alien	USA	Steelhead	5	5
2014-09-20	10:18	Saturday	Non-Resident Alien	USA	Steelhead		
2014-09-20	10:24	Saturday	Non-Resident Alien	USA	Steelhead		
2014-09-20	11:06	Saturday	Non-Resident Alien	Unknown	Steelhead		
2014-09-20	10:12	Saturday	Non-Resident Alien	Unknown	Steelhead		
2014-09-24	09:43	Wednesday	Non-Resident Alien	USA	Steelhead	2	6
2014-09-24	09:37	Wednesday	Non-Resident Alien	USA	Steelhead		
2014-09-28	10:15	Sunday	Non-Resident Alien	USA	Steelhead	4	4
2014-09-28	09:56	Sunday	Non-Resident Alien	Unknown	Steelhead		
2014-09-28	09:55	Sunday	Non-Resident Alien	United Kingdom	Steelhead		
2014-09-28	10:07	Sunday	Non-Resident Alien	Unknown	Steelhead		
2014-10-02	09:54	Thursday	-	-	-	0	0
2014-10-04	09:21	Saturday	-	-	-	0	0
2014-10-10	09:47	Friday	-	-	-	0	0
2014-10-12	08:30	Sunday	-	-	-	0	0
2014-10-14	09:33	Tuesday	-	-	-	0	0
2014-10-17	09:47	Friday	-	-	-	0	0
2014-10-18	09:36	Saturday	-	-	-	0	0
2014-10-22	09:39	Wednesday	-	-	-	0	0
2014-10-26	09:40	Sunday	-	-	-	0	0
2014-10-27	09:28	Monday	-	-	-	0	0

Appendix 5.0 – Number of annual basic licences, Classified Waters and Steelhead Stamps purchased by BC residents from 2009-2014.

Licence Year	Annual basic licence	Classified Waters		Steelhead Stamp	
	BC residents from Skeena Region	BC residents from Skeena Region	Non-Skeena Region BC residents	BC residents from Skeena Region	Non-Skeena Region BC residents
2009/2010	10688	4547	11212	2585	11280
2010/2011	11299	5153	12501	2722	12091
2011/2012	10825	4807	12384	2640	12912
2012/2013	11056	4686	12554	3334	14003
2013/2014	11423	5074	13207	3785	14248
2014/2015	12396	5667	14773	4199	15310

Appendix 6.0 – Number of anglers for non-residents and non-resident aliens from 2009 to 2014.

Year	Unguided non-resident	Guided non-resident	Unguided non-resident alien	Guided non-resident alien	Total
Bulkley River					
2009	137	2	503	173	815
2010	137	6	477	223	843
2011	143	4	412	219	778
2012	188	10	356	307	861
2013	182	5	419	282	888
2014	195	4	452	327	978
Kispiox River					
2009	50	0	312	75	437
2010	52	2	349	80	483
2011	51	4	344	66	465
2012	67	2	264	99	432
2013	60	2	271	100	433
2014	48	5	249	88	390
Zymoetz II River					
2009	31	0	160	41	232
2010	28	11	157	52	248
2011	25	6	164	56	251
2012	64	9	165	125	363
2013	99	12	190	100	401
2014	75	12	182	103	372

Appendix 7.0 – Number of angler days for non-residents and non-resident aliens from 2009 to 2014.

Year	Unguided non-resident	Guided non-resident	Unguided non-resident alien	Guided non-resident alien	Total
Bulkley River					
2009	548	13	2,492	854	3,907
2010	656	41	2,132	1,143	3,972
2011	754	12	1,781	1,091	3,638
2012	900	60	1,701	1,352	4,013
2013	910	27	1,855	1,267	4,059
2014	981	13	2,153	1,406	4,553
Kispiox River					
2009	125	0	1,435	307	1,867
2010	163	2	1,523	398	2,086
2011	176	8	1,736	367	2,287
2012	178	4	1,075	464	1,721
2013	179	2	1,128	517	1,826
2014	132	14	1,131	471	1,748
Zymoetz II River					
2009	63	0	507	81	651
2010	71	18	472	91	652
2011	76	10	548	89	723
2012	194	17	507	226	944
2013	289	17	491	171	968
2014	270	27	475	177	949

Appendix 8.0 – Number of angler days per angler for non-residents and non-resident aliens from 2009 to 2014.

Year	Unguided non-resident	Guided non-resident	Unguided non-resident alien	Guided non-resident alien	Total
Bulkley River					
2009	4.0	6.5	5.0	4.9	4.8
2010	4.8	6.8	4.5	5.1	4.7
2011	5.3	3.0	4.3	5.0	4.7
2012	4.8	6.0	4.8	4.4	4.7
2013	5.0	5.4	4.4	4.5	4.6
2014	5.0	3.3	4.8	4.3	4.7
Kispiox River					
2009	2.5	-	4.6	4.1	4.3
2010	3.1	1.0	4.4	5.0	4.3
2011	3.5	2.0	5.0	5.6	4.9
2012	2.7	2.0	4.1	4.7	4.0
2013	3.0	1.0	4.2	5.2	4.2
2014	2.8	2.8	4.5	5.4	4.5
Zymoetz II River					
2009	2.0	-	3.2	2.0	2.8
2010	2.5	1.6	3.0	1.8	2.6
2011	3.0	1.7	3.3	1.6	2.9
2012	3.0	1.9	3.1	1.8	2.6
2013	2.9	1.4	2.6	1.7	2.4
2014	3.6	2.3	2.6	1.7	2.6

Appendix 9.0 – Average (CV) number of anglers pre- and post- regulation change on the Bulkley, Kispiox and Zymoetz II rivers for or non-residents and non-resident aliens.

Angler residency	Average (CV) number of non-resident and non-resident alien anglers who purchased a CW licence		Independent sample t-test*
	pre	post	
Bulkley River¹			
Unguided non-resident alien	464 (0.1)	409 (0.1)	t(4)=1.408, p=0.23
Guided non-resident alien	205 (0.1)	305 (0.0)	t(4)=-4.857, p=0.01
Unguided non-resident	139 (0.0)	188 (0.0)	t(4)=-11.592, p=0.00
Guided non-resident	4 (0.5)	6 (0.5)	t(4)=-1.068, p=0.35
Kispiox River¹			
Unguided non-resident alien	335 (0.5)	261 (0.0)	t(4)=5.546, p=0.00
Guided non-resident alien	74 (0.1)	96 (0.1)	t(4)=-3.916, p=0.02
Unguided non-resident	51 (0.0)	58 (0.2)	t(4)=-1.315, p=0.26
Guided non-resident	2 (1.0)	3 (0.6)	t(4)=-0.655, p=0.55
Zymoetz II River²			
Unguided non-resident alien	160 (0.0)	179 (0.1)	t(4)=-2.442, p=0.07
Guided non-resident alien	50 (0.2)	109 (0.1)	t(4)=-6.580, p=0.01
Unguided non-resident	28 (0.1)	79 (0.2)	t(4)=-4.899, p=0.03
Guided non-resident	7 (1.0)	11 (0.2)	t(4)=-1.6, p=0.18

*Significance is tested at a 95% Confidence interval.

Appendix 10.0 – Number of angler days purchased during unrestricted and restricted times for unguided and guided non-resident and non-resident alien anglers.

Year	Unguided non-resident		Guided non-resident		Unguided non-resident alien		Guided non-resident alien	
	RES	UN	RES	UN	RES	UN	RES	UN
Bulkley River								
2009	178	370	6	7	661	1,818	274	575
2010	193	463	18	23	561	1,571	360	783
2011	223	531	6	6	475	1,306	366	725
2012	236	664	18	42	25	1,676	423	929
2013	268	642	9	18	36	1,819	420	847
2014	292	689	6	7	18	2,135	461	945
Kispiox River								
2009	34	91	0	0	369	1,066	94	213
2010	33	130	2	0	426	1,097	125	273
2011	40	136	4	4	414	1,322	116	251
2012	57	121	0	4	10	1,065	160	304
2013	55	124	2	0	7	1,121	178	339
2014	47	85	5	9	7	1,124	130	341
Zymoetz II River								
2009	37	26	0	0	209	298	31	50
2010	35	36	4	14	214	258	21	70
2011	39	37	0	10	222	326	27	62
2012	96	98	7	10	8	499	59	167
2013	127	162	3	14	13	478	40	131
2014	124	155	4	24	9	466	63	119

Appendix 11.0 – Number of anglers landing steelhead and total steelhead landed by residency and river

River	BC resident		Non-resident		Non-resident alien	
	# anglers who landed a steelhead	# steelhead landed	# anglers who landed a steelhead	# steelhead landed	# anglers who landed a steelhead	# steelhead landed
Bulkley¹	59	83	15	32	49	83
Kispiox²	20	35	7	11	57	128
Zymoetz II³	80	150	24	53	32	66
Total	159	268	46	96	138	277

¹Residency was not collected from three anglers who landed a steelhead

²Residency was not collected from 15 anglers who landed a steelhead

³Residency was not collected from seven anglers who landed a steelhead

Appendix 12.0 – River access method

Residency category	Number (%) of anglers			
	Drift boat	Jet boat	Foot	Total
Bulkley River¹				
BC resident	17 (5)	36 (12)	259 (83)	312 (100)
Non-resident	4 (8)	17 (31)	31 (61)	52(100)
Non-resident alien	16 (9)	32 (18)	131 (73)	179 (100)
Total	37 (6)	85 (16)	421 (78)	543 (100)
Kispiox River²				
BC resident	23 (21)	N/A	86 (79)	109 (100)
Non-resident	9 (39)	N/A	14 (61)	23 (100)
Non-resident alien	65 (45)	N/A	80 (55)	145 (100)
Total	97 (35)	N/A	180 (65)	277 (100)
Zymoetz II River³				
BC resident	4 (2)	1 (1)	229 (97)	234 (100)
Non-resident	0	0	48 (100)	48 (100)
Non-resident alien	2 (2)	0	83 (98)	85 (100)
Total	6 (1)	1	360 (99)	367 (100)
All rivers, all residency categories	140 (12)	86 (7)	961 (81)	1,187 (100)

¹River access method or angler residency was not obtained from nine angler interviews.

²River access method or angler residency was not obtained from six angler interviews.

³River access method or angler residency was not obtained from seven angler interviews.

Appendix 13.0 – Angling gear type

Residency category	Number (%) of anglers		
	Fly	Gear	Total
Bulkley River¹			
BC resident	194 (63)	115 (37)	309 (100)
Non-resident	42 (86)	7 (14)	49 (100)
Non-resident alien	167 (94)	11 (6)	178 (100)
Total	403 (75)	133 (25)	536 (100)
Kispiox River²			
BC resident	71 (65)	38 (35)	109 (100)
Non-resident	16 (70)	7 (30)	23 (100)
Non-resident alien	129 (88)	18 (12)	147 (100)
Total	216 (77)	63 (23)	279 (100)
Zymoetz II River³			
BC resident	172 (74)	61 (26)	233 (100)
Non-resident	42 (88)	6 (12)	48 (100)
Non-resident alien	76 (89)	9 (11)	85 (100)
Total	290 (79)	76 (21)	366 (100)
All rivers, all residency categories	909 (77)	272 (23)	1,181 (100)

¹Gear method or angler residency was not obtained from 15 angler interviews.

² Gear method or angler residency was not obtained from four angler interviews.

³Gear method or angler residency was not obtained from eight angler interviews.