

**A Survey of Steelhead Anglers on the  
Bulkley, Kispiox, Zymoetz II and Skeena IV Classified Waters in 2015**

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## Executive Summary

### Effort

#### *Angler interviews and residency categories*

- A total of 2,186 steelhead anglers were observed and counted between August 19 and October 31, 2015 on the Bulkley, Kispiox, Zymoetz II and Skeena IV rivers during the entire or portion of the Classified Waters period. Of those, a total of 1,274 stream-side angler interviews were initiated representing 58% of the total number of anglers observed by the River Guardians.
- Of the 1,274 angler interviews initiated a total of 1,105 (87%) complete interviews and 169 (13%) incomplete interviews. Of the 1,105 completed interviews, 887 (80%) were full-length interviews (individual anglers) and 218 (20%) were anglers the River Guardians had approached a second or multiple time (repeat interviews). Of the total 169 incomplete interviews, 143 were terminated because the angler refused to complete an interview, and 26 were terminated because the angler didn't speak enough English.
- On the Bulkley River during the Classified Waters period, the River Guardians tallied a total of 873 anglers and initiated 597 interviews (corresponding to interviewing 68% of all observed anglers), resulting in 465 completed interviews conducted among 419 individuals. A total of 132 anglers declined an interview. Of the 419 individual steelhead anglers interviewed, 250 (60%) were BC residents, 52 (12%) were non-resident Canadian, and 117 (28%) were non-resident aliens.
- On the Kispiox River, during the Classified Waters period, the River Guardians tallied a total of 443 anglers and initiated 192 interviews (corresponding to interviewing 43% of all observed anglers), resulting in 168 complete angler interviews conducted among 167 individual anglers. A total of 24 anglers declined an interview. Of the 167 individual steelhead anglers interviewed, 57 (34%) were BC residents, 14 (8%) were non-resident Canadian, and 96 (58%) were non-resident aliens.
- On the Zymoetz II River, during the Classified Waters period, the River Guardians tallied a total of 778 anglers and initiated 434 interviews (interviewing 56% of all observed anglers), resulting in 422 completed angler interviews conducted among 270 individual anglers. A total of 12 anglers declined an interview. Of the 270 individual steelhead anglers interviewed, 137 (52%) were BC residents, 36 (13%) were non-resident Canadian, and 95 (35%) were non-resident aliens.
- For Skeena Region residents, from 2009/2010 to 2015/2016, there has been an increase in license sales – 12% for annual basic licenses, 26% for Classified Waters licenses, and 64% for Steelhead Stamps.

- On the Bulkley, Kispiox, and Zymoetz II rivers, 444 individual BC resident anglers agreed to complete an interview, and 439 provided their place (city or town) of origin. The majority of these anglers were from FLNRO Region 6 - Skeena (162 anglers, 37%), followed by Region 2 - Lower Mainland (144 anglers, 33%).
- On the Bulkley, Kispiox, and Zymoetz II rivers, each of the 102 individual non-resident anglers provided their province of origin, and each of the 308 individual non-resident alien anglers provided their country of origin. The majority of the non-residents interviewed were residents of Alberta (63%), followed by Ontario (29%). The majority of the non-resident aliens interviewed resided in USA (55%), followed by Italy (11%) with each of the other remaining countries representing less than 10%.

### *Spatial and temporal distribution of angler interviews*

- On the Bulkley River, the highest number of completed angler interviews occurred in the river segments Quick Bridge – Telkwa Bridge (19%), Telkwa Bridge – Smithers Bridge (19%), and Smithers Bridge – Chicken Creek (17%). The number of BC resident interviews was higher than non-residents and non-resident aliens in most river segments, except for river segment, Suskwa River – Skeena River where there were only angler interviews from non-resident alien anglers. Angler interviews were concentrated (i.e. clustered) around town centers (e.g. Smithers and Telkwa), river confluences and easy to access locations such as boat launches.
- On the Kispiox River, the highest numbers of complete angler interviews were conducted on the following river segments: Confluence with Skeena River – Rodeo Grounds (44% of the total interviews) and Rodeo Grounds – Upper Recreation Site (43%). The number of non-resident alien interviews was higher than BC resident and non-resident interviews in all river segments, with the exception of river segment Mitten Bridge – Sweetin Recreation. In this area, the number of angler interviews for BC residents and non-resident aliens were the same. Angler interview locations were heavily concentrated on the lower portion of the river, downstream from the Rodeo Grounds.
- The Zymoetz II River was not split into separate segments; however, angler interviews were distributed in clusters from the Clore River to the confluence with the Skeena River. However, the Zymoetz II River has a more even distribution of angler interviews compared to the Bulkley and Kispiox rivers. This is likely due to the ease of accessibility offered by the Copper River Main Forest Service Road, which runs parallel to the entire length of the Class II section of this system.
- On the Bulkley River, non-resident aliens purchased the greatest number of angler days during the last week of September and first week of October. The Kispiox River had the greatest number of non-resident alien angler-days purchased during the last two weeks of September. The angler days purchased by non-resident aliens on the Zymoetz II River was variable throughout the study period, however, a decline occurred following the second week in October.

- On the Bulkley River, 15% of the non-resident alien and 24% of the non-resident Canadian anglers who purchased a Classified Waters licence were interviewed. On the Kispiox River, 23% of non-resident alien anglers and 19% of non-resident Canadian anglers who purchased a Classified Waters license were interviewed. On the Zymoetz II River, 29% of non-resident alien anglers and 27% of non-resident Canadian anglers who purchased a Classified Waters licence were interviewed.

### ***Guided angler status***

- Guides are most commonly used by non-resident aliens than non-resident Canadians. On the Bulkley River, 99% of guided anglers were non-resident aliens and 1% were non-resident Canadians. On the Kispiox River, 97% of guided anglers were non-resident aliens and 3% were non-resident Canadians. On the Zymoetz II River, 88% of guided anglers were non-resident alien, and 12% were non-resident Canadians.

### ***Average number of interviews or angler days during restricted and unrestricted 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.
- On the Kispiox River, the average number of angler days purchased per day by guided non-residents was higher and statistically significant during unrestricted vs restricted times. This trend was not seen on the Bulkley and Zymoetz II rivers.
- The average number of angler-days purchased per day by guided non-resident aliens on the Bulkley and Kispiox rivers was higher during restricted times than unrestricted times, however, there was only a statistically significant difference on the Bulkley River. Interestingly, the opposite occurred on the Zymoetz II. Guided non-resident aliens actually purchased a statistically significantly number of guided rod days during the unrestricted time versus the restricted time. This purchasing behaviour also occurred in 2013 and is most likely attributed to the weekend guiding restriction in place on the Zymoetz II by the quality waters strategy.
- 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, however, provides limited insight as these anglers are not permitted to fish during restricted times.

### ***Trends in use for non-resident Canadian and non-resident alien angler use***

- Based on the number of anglers purchasing Classified Waters licenses, unguided non-resident alien anglers had the highest levels of use on all rivers.

- Between 2009 and 2015 on the Bulkley River, there has been a 12% decline in the number of unguided non-resident alien angler days, and a 6% increase in the number of guided non-resident alien angler days. And the number of days fished per individual (during the Classified Waters period) has decreased for both of these angler categories.
- On the Kispiox River the number of unguided non-resident alien angler days has declined by 7%, and guided non-resident alien days have increased by 68%. The number of days fished per individual has increased from 4.1 to 4.4 for guided non-resident aliens and declined from 4.6 to 4.4 for unguided non-resident aliens from 2009 to 2015.
- Interpretation of trends in licence sales 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 is important context when assessing trends in angler use on this section of river. Between 2009 and 2014 there was a 6% decline in the number of unguided non-resident alien angler days, however, between 2009 and 2015 there was a 28% increase. The percent change in the number of angler days purchased by guided non-resident alien anglers has slightly increased between the time periods 2009 – 2014 (124%) and 2009 – 2015 (153%). Large increases in the number of unguided non-residents angler days occurred between 2009 - 2014 (328%); however, that increase in angler days has increased to 546% between 2009 – 2015. While it is unknown why the number of angler days is increasing in such intensity in 2015, Zymoetz II has become an increasingly popular destination for non-residents anglers during the winter/spring seasons (Nov –May). The unpredictability of weather and water conditions during the winter/spring fishery makes trip planning for out of country anglers difficult. Non-resident anglers also have the ability to make multiple trips per season because of their proximity to the fishery. In comparison, non-resident alien anglers are more likely to travel greater distances to participate in the fishery, making the probability of multiple trips per season less likely. Finally, anglers are fishing approximately half the number of days per individual on the Zymoetz II in comparison to the Bulkley and Kispiox rivers. 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, Kispiox, and Zymoetz II rivers, there was a statistically significant difference in the number of guided non-resident alien before and after the regulation changes, where there were more of these anglers in the 2012-2015 period (i.e. post-regulation change) than between 2009-2011 (i.e. pre-regulation change).
- On the Bulkley and Zymoetz II rivers, there was a statistically significant difference in the number of unguided non-resident anglers before and after the regulation changes. In both cases, there were more of these anglers in the 2012-2015 period (i.e. post-regulation change) than between 2009-2011 (i.e. pre-regulation change).
- On the Kispiox River there was a statistically significant difference before and after the regulation changes for unguided non-resident alien anglers, where there were more unguided non-resident aliens pre-2012 than post-2012.

### ***Trends in use for non-resident Canadian and aliens during restricted and unrestricted times***

- On the Bulkley River during unrestricted times, the number of angler days purchased by unguided non-resident aliens has consistently increased since 2012. During restricted times, unguided non-resident alien angler days declined to zero, as expected given the implementation of restricted times in 2012. The number of angler days for guided non-resident aliens and unguided non-residents have also been increasing steadily during restricted and unrestricted times post-2012.
- On the Kispiox River during unrestricted times, the number of angler days purchased by unguided non-resident aliens have consistently increased between 2012 to 2014, with an 18% increase between 2014 and 2015. Effort by this class of angler declined to zero during restricted times. Effort by guided non-resident aliens and unguided non-residents remained relatively flat during unrestricted and restricted times post-2012.
- On the Zymoetz II River, unguided non-resident alien angler days have increased during the unrestricted times, largely owing to a 35% percent increase in overall angler days purchased by this residency category between 2014 and 2015. Angler days purchased by this class of angler has declined to zero during the restricted times. Since 2012, angler days for unguided non-residents have consistently increased during restricted and unrestricted periods.

### **Angler satisfaction**

#### ***Factors attributing to a quality angling experience***

- On the Bulkley River, most commonly ‘High Fish Abundance/Catching Fish’ were factors mentioned by anglers that contributed to a quality angling experience. This was followed by ‘Number of Anglers/Crowding’, with BC residents/non-residents (19%) providing this response at a higher percentage than non-resident aliens (11%). Thirdly, ‘Beauty/Scenery/Esthetic Attributes’ was mentioned as a factor that contributed to a high-quality angling experience.
- On the Kispiox River, most commonly ‘Quality of Fish/Wild Fish’ was mentioned by all anglers as a factor that contributed to a quality angling experience, which may owe to this river’s reputation for large bodied steelhead. ‘High Fish Abundance/Catching Fish’ was also a frequently mentioned factor. ‘Number of Anglers/Crowding’ was mentioned at similar percentages among BC resident/non-residents (15%) and non-resident alien anglers (12%), indicating this factor is important to all classes of anglers on this river.
- On the Zymoetz II River, the first and second most commonly mentioned factors on this river were ‘Quality of Fish/Wild Fish’ and ‘Beauty/Scenery/Esthetic Attributes’, both being raised more often by non-resident alien anglers than BC residents and non-residents. The next most frequently raised factors by BC residents/non-residents were ‘High Fish Abundance/Catching Fish’ and ‘Number of Anglers/Crowding’.

### ***Median rating of quality angling experience***

- There were 1,050 out of 1,055 complete (repeat and full-length) interviews (99%) on the Bulkley, Kispiox, Zymoetz II rivers where an angler provided a quality angling experience rating. The overall median rating was ‘good’ (4), with 36% of anglers rating their experience as ‘excellent’, 28% rated it as ‘good’, and 22% rated it as ‘fair’. Few anglers rated their experience as ‘poor’ (8%) or ‘very poor’ (6%).
- Although there are many factors that contribute to a quality angling experience, 86% of anglers generally appear to be having a ‘fair’ to ‘excellent’ experience fishing the Bulkley, Kispiox, and Zymoetz II rivers in 2015.

### ***Issues of crowding***

- During unrestricted and restricted times and on all rivers, the greatest percent of responses from anglers said that they didn’t feel crowded at all.
- A total of 49% of anglers felt ‘not crowded at all’, 19% felt ‘slightly crowded’, 18% felt ‘moderately crowded’, 8% felt ‘quite crowded’, and 5% felt ‘extremely crowded’. Of all residency categories, BC residents mentioned that they felt “not crowded at all” the most frequently, closely followed by non-resident aliens. In 2015, there was no difference in the frequency of crowding ratings provided by BC residents and Skeena Region (FLNRO Region 6) residents respectively.
- In general, individuals who felt ‘extremely crowded’ observed more anglers on the river, and individuals who felt ‘not crowded at all’ observed fewer anglers. The ‘number of anglers seen’ when an angler feels ‘extremely crowded’ is highly variable, with the number of anglers seen ranging from 0 to 59. The ‘number of anglers seen’ when anglers felt ‘not crowded at all’ is much less variable, with the number of anglers seen ranging between 0 and 12.
- On the Bulkley River, anglers responded with ‘slightly crowded’, ‘moderately crowded’ etc, regardless of whether it was during a restricted or unrestricted time. This differs from the Kispiox and Zymoetz II rivers, where anglers responding from ‘moderately crowded’ to ‘extremely crowded’ did so more often during the unrestricted times than the restricted times.

### ***Impact of regulation changes made on April 1, 2012***

- On the Bulkley, Kispiox, Zymoetz II, and Skeena IV rivers, a total of 446 (50%) individual anglers responded ‘yes’ to fishing during the Classified Waters period between 2007 and 2011 and 441 (50%) responded ‘no’.
- Only anglers who had fished prior to regulation changes were considered for further questioning regarding crowding conditions on the river. Of these anglers, 157 (35%) thought

that crowding had stayed the same, 157 anglers (35%) thought that the regulation change reduced crowding, 88 anglers (20%) thought that crowding had increased, and 44 (10%) did not know. BC residents predominantly thought that the regulation change reduced crowding on the rivers (71%), whereas most anglers who thought that the regulation changes increased crowding on the rivers were non-resident aliens (54%).

- A total of 189 anglers (43%) thought that the quality of their angling experience had stayed the same following the changes in regulation, while 141 anglers (31%) thought it had improved, 95 anglers (22%) thought it had declined, and 16 anglers (4%) did not know. Most anglers who thought that the regulation changes improved their angling experience were BC residents (79%) while non-resident aliens indicated their quality angling experience had declined (83%).
- The percent of anglers who mentioned that the regulation change had reduced crowding on the river has declined over the three year of study, from 47% in 2013, to 39% in 2014, to 35% in 2015. Similarly, fewer anglers felt the restrictions improved their quality angling experience, from 37% in 2013, to 32% in 2014, to 31% in 2015.
- After September 23, 2015 on all rivers included in this study, the River Guardians modified the second question to differentiate crowding and quality angling experiences during either restricted times or unrestricted times. This was done to determine if anglers were finding a particular time period more or less crowded. During the restricted times, majority of anglers (44%) thought that the crowding had reduced and during the unrestricted times, majority of anglers (45%) thought that the crowding had stayed the same.

### ***Angler comments on regulation changes***

- A total of 650 out of the 887 individual anglers (73%) made comments during their angler interview on the Bulkley, Kispiox, Zymoetz II, and Skeena IV rivers.
- Most frequently, comments by anglers were made in regards to a support or dislike of the regulation changes that restrict non-resident alien anglers. A total of 52% of BC residents/non-residents who were interviewed indicated they support these regulation changes, whereas 56% of non-resident aliens indicated they dislike these regulations.
- Comments on other topics were fewer and related to additional regulations to manage angler demand, concerns about crowding, or comments about the Classified Waters licencing system and the need for more flexibility in the way classified days are purchased.

### **Angler Compliance**

- Seventy-two out of the 1,105 complete angler interviews (7%) had some type of licence infraction. Forty-two (58%) were from BC residents, 11 (15%) were from non-residents, and 18 (25%) were from non-resident aliens.

- ‘No Classified Waters licence’ was the most frequent infraction (e.g. anglers who failed to purchase this licence; 34 anglers), the majority of these anglers being BC residents. BC residents had the highest percentage of overall licence violations (59%).
- Non-compliance rate observed during this study reduced from 12% in 2013 to 7% in 2014 and 2015.
- Over the study period on the Bulkley River, there was increased non-compliance in September, which declined in the second week of October. The Zymoetz II River had elevated non-compliance in the middle of the study period, which peaked during week 10-1 and corresponded to the peak number of angler interviews that were conducted by the River Guardians. Relative to the Bulkley and Zymoetz II, the Kispiox River had a low non-compliance rate in 2015.

### **Catch Estimates**

- Of the anglers that self-reported catching a fish in 2015, the majority caught a steelhead. Based on the 1,105 complete angler interviews, a total of 469 steelhead were landed on the Bulkley, Kispiox and Zymoetz II rivers.
- On the Bulkley River, of the 465 anglers interviewed, 95 anglers reported landing 183 steelhead. On the Kispiox River, of the 168 anglers interviewed, 52 anglers reported landing 94 steelhead. On the Zymoetz II River, of the 422 anglers interviewed, 138 anglers reported landing 192 steelhead.

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## 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 of 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 Class 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 2015 (the final year of this study) and builds on information collected in 2013 (year 1) and 2014 (year 2). Some changes were made to the methodology from 2013 and 2014, to include the use of boats to survey anglers on the Bulkley and Kispiox rivers. This was intended to increase River Guardian presence on all river sections, increase the ability to intercept boat based anglers, and potentially increase the number of interviews per day.

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 demographics, 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 the regulations prescribed by the Angling Management Plans 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. Three types of licences exist, 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:** 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:** 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 km<sup>2</sup>). The Skeena River extends through the Coast Mountains 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 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.

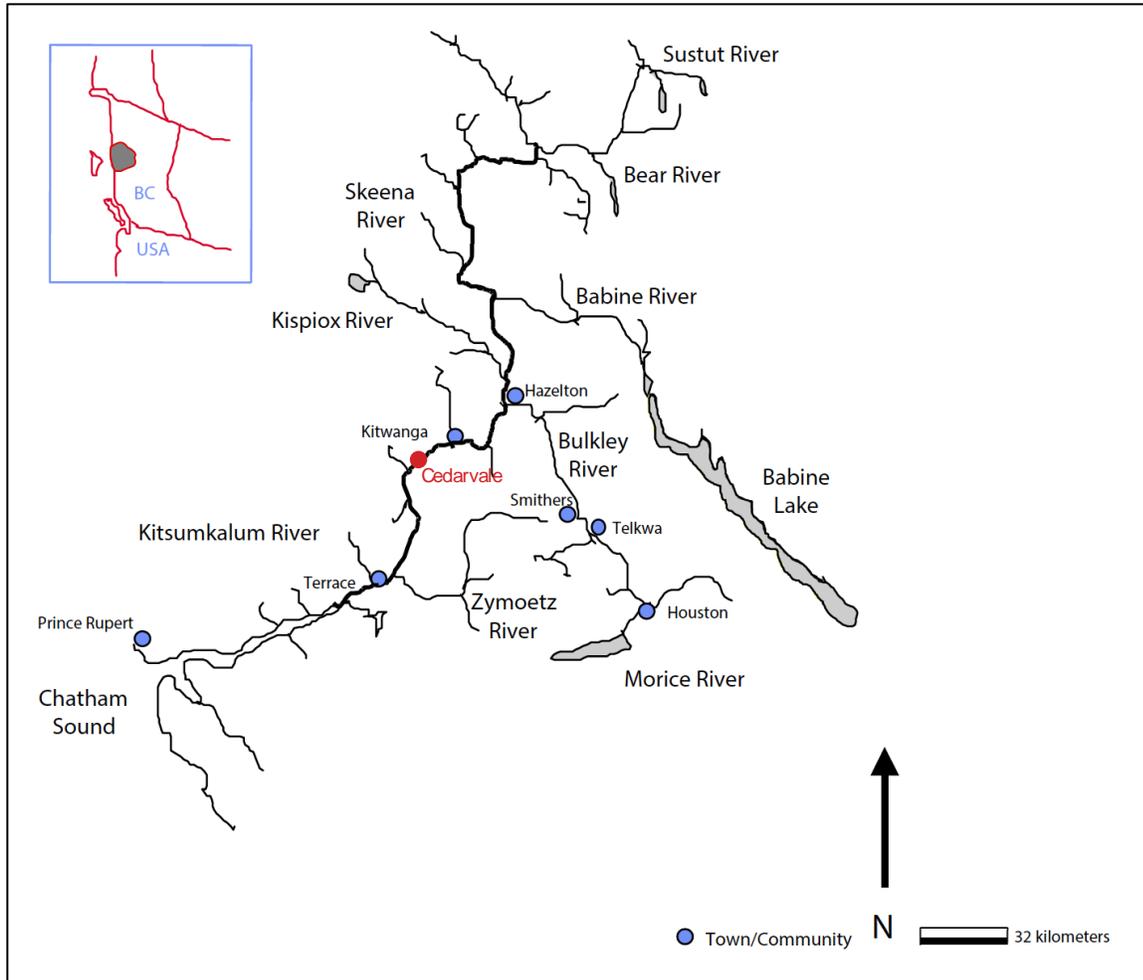


Figure 1: The Skeena Watershed (Morten and Giroux, 2006).

## 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 km<sup>2</sup>. 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 to Smithers Bridge (~13 km), Smithers Bridge to Kathlyn Creek confluence (~4 km), Kathlyn Creek to Trout Creek (~26 km), and Trout Creek to 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, 1996). 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 (segments 1-4 in Figure 2; Morten, 1999).

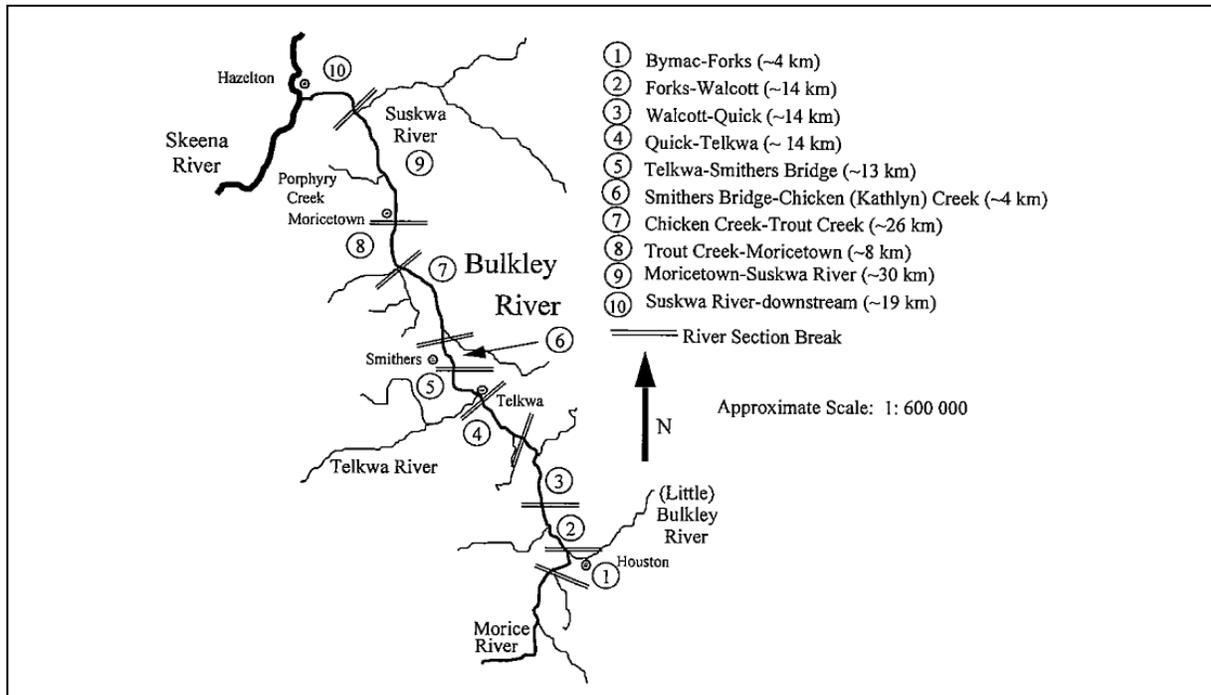


Figure 2: The Bulkley River. Segments used for analysis (Morten, 1999).

## 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 km<sup>2</sup> 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; segments 1-4 in 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, 1996). 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, 1996). Water clarity can be reduced during these times, in turn producing unfavourable fishing conditions.

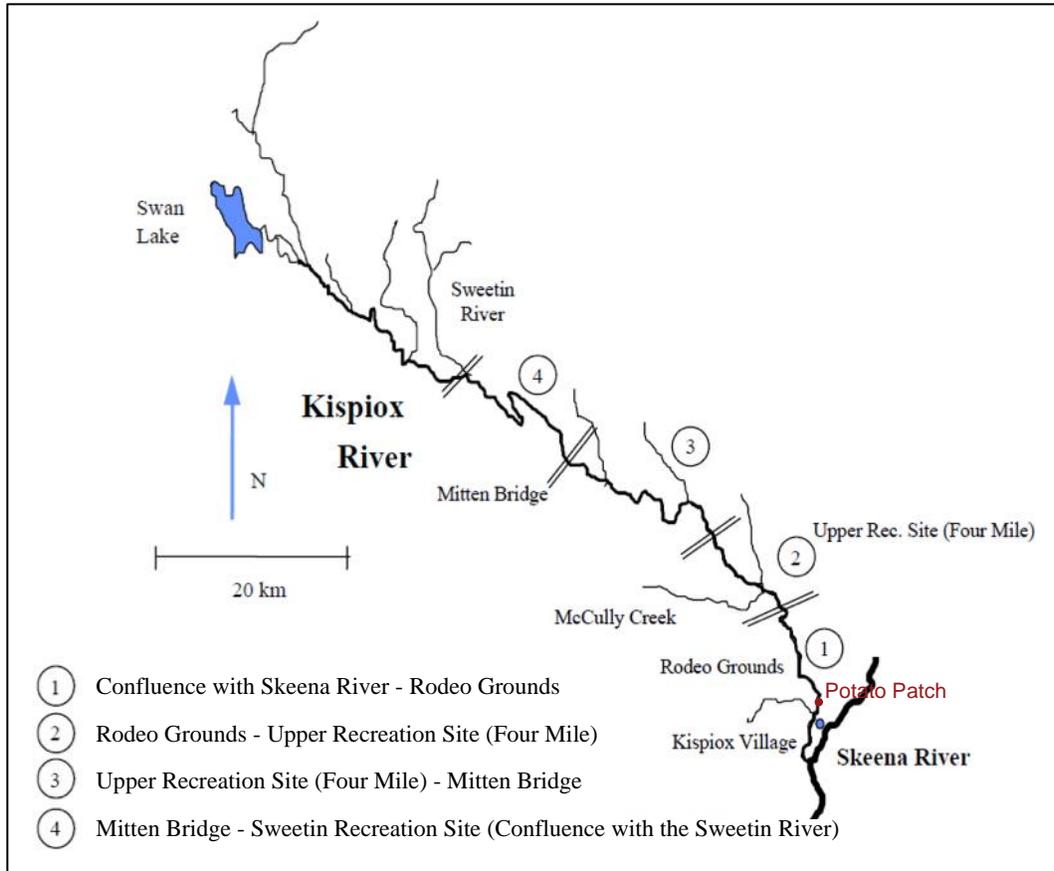


Figure 3: The Kispiox River. Segments used for analysis (Morten and Giroux, 2006).

### 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 km<sup>2</sup> 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 reduces water clarity. In turn, this negatively impacts angler success, especially below the Clore River (the major contributor of sediment).

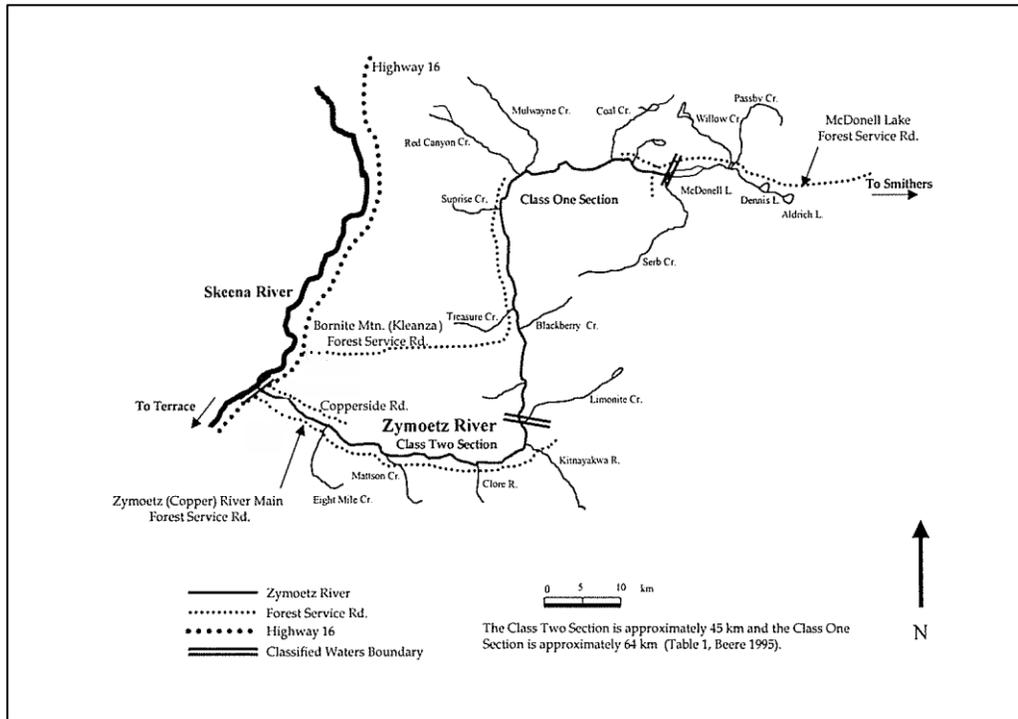


Figure 4: The Zymoetz River. Showing Class I and Class II sections (adapted from Morten, 2000).

## 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, which extends 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 31 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 19 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). 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 when foot patrols were employed.

#### **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 non-resident alien times. The restricted non-resident alien times for the Zymoetz II River included Fridays, Saturdays, and Sundays. The restricted non-resident alien 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 13 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. Between two and three of these days were during the restricted or unrestricted 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 19 – Aug 23
8-4	Aug 24 – Aug 30
9-1	Aug 31 – Sept 06
9-2	Sept 7 – Sept 13
9-3	Sept 14 – Sept 20
9-4	Sept 21 – Sept 27
10-1	Sept 28 – Oct 4
10-2	Oct 5 – Oct 11
10-3	Oct 12 – Oct 18
10-4	Oct 19 – Oct 25
10-5	Oct 26 – 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 sampled 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 representative information from all segments of each river randomly and to allow spatial trends to be identified.

Similar to previous years of study (2013 and 2014), the River Guardians intercepted anglers by accessing known angling locations. Unlike previous years, boat access was used in addition to vehicles and/or foot patrols on the Bulkley and Kispiox rivers. The rationale for this change was to increase the number of angler interviews particularly from guided and boat based anglers. A16 foot Ali-Craft “fisherman” model jet boat was introduced on the Bulkley River on September 25,

and a 12 foot Aire Puma raft was introduced on the Kispiox River on October 8. The delayed use of boats for this project was associated with crew availability as both staff must be present to safely operate the boats, and low water. When the boats were in use, persisting low water conditions restricted navigability and access to some river segments. On the Bulkley River, the jet boat was used 17 out of 43 roving days and was restricted to river segments 1-6 (Figure 2). On the Kispiox River, the raft was used 2 out of 41 roving days, and was restricted to river segments 2-4 (Figure 3). Other segments of these rivers were accessed by truck and/or foot.

Upon arriving at a site, the River Guardians initiated the roving survey form, interviewed all accessible anglers, then closed the roving survey by recording the time and location. Any anglers that were inaccessible (i.e. on the other side of the river or would not come out of the water) were not interviewed but were counted 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 asked.

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 or 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 aliens as these classes of anglers are required to purchase a river and day specific Classified Waters licence. BC residents purchase an annual Classified Waters license for all classified rivers. Therefore, daily angler effort cannot be measured, a limitation of this data set. Non-resident and non-resident aliens also must declare on their licence if they used a guide and if applicable, the guide's name (i.e. the tenure holder). 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. In many cases the electronic licence sales database was used for non-resident and non-resident alien anglers, and the 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 number and percent of days the River Guardians conducted roving surveys either by foot or boat were recorded during either unrestricted or restricted times. As well, 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. During each interview, city and postal code was recorded for BC resident anglers, province of residency for non-residents, and the country of origin 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 license year from 2009/2010 to 2014/2015 using the electronic licence sales database, implemented in 2009. The number of Classified Waters and Steelhead Stamp sales were also calculated for non-Skeena BC residents to compare purchasing trends. 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 licenses 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 (as shown in 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. These data 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 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 angler interviews by the number of anglers who purchased a Classified Waters license 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 are hiring 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 guided and unguided non-resident and non-resident alien anglers 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 unit less, 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 purchased on the Bulkley, Kispiox, and Zymoetz II rivers for each year. The total number of anglers and angler days are displayed in a line plot by year and river from 2009 to 2015 for non-resident and non-resident alien anglers. This spans three years (2009-2011) prior to regulations changes and four years (2012-2015) after them. 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 or after the regulation changes. 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 either unrestricted and restricted times before and after regulation changes***

To assess trends in angler activity before and after the 2012 regulation changes, the total number of angler days during either restricted times or unrestricted times for the Bulkley, Kispiox, and Zymoetz II rivers were summed. This information was displayed in a line plot from 2009 to 2015 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 rating***

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 3.0, question 2). Median ratings of the quality angling experience were summarized for the Bulkley, Kispiox and Zymoetz II by residency category. Unlike the aforementioned question regarding factors affecting quality angling experiences, 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 due to a small sample size.

### ***4.2.3 Crowding rating***

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. Complete individual angler interviews were used in this analysis. 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.

Anglers were asked “*How many anglers do you remember seeing today?*”. This question was asked in conjunction with the crowded rating question to determine if there was any relationship between the number of anglers seen and how crowded anglers felt. A boxplot and Pearson’s R correlation was used to test this relationship.

An additional assessment was conducted to determine if there was a difference in BC resident and non-resident crowding ratings during the unrestricted versus restricted times, as these classes of anglers can fish during both periods. Given that non-resident alien anglers are prohibited from

fishing during restricted times, interviews from these anglers were not included in this analysis. 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.

From September 23 to October 31, the River Guardians asked an additional set of questions pertaining to the impact the regulation change had on crowding on the river. They asked, “*What impact has the regulation change had on crowding on the river during the weekend?*” followed by “*What impact has the regulation change had on crowding on the river during the weekday?*” (Appendix 3.0, questions 6). This was used to test if anglers felt more or less crowded during either restricted and unrestricted times. These results were summarized by river and residency category.

#### ***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 the number of interviews collected by each residency category 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 by one-week blocks over the study period on the Bulkley, Kispiox and Zymoetz II rivers to determine if there was a change in the number of infractions over time.

### **4.4 Catch summaries**

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.

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, 2015, a total of 2,186 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 1,274 stream-side angler interviews were initiated, representing 58% of the total number of anglers observed by the River Guardians.

Of the total 1,274 angler interviews initiated, 1,105 (87%) were complete interviews and 169 (13%) were incomplete interviews. Of the 1,105 completed interviews, 887 (80%) were full-length interviews (individual anglers) and 218 (20%) were anglers the River Guardians had approached a second or multiple time (repeat interviews). Of the total 169 incomplete interviews, 143 were terminated because the angler refused to complete an interview, and 26 were terminated because the angler didn't speak enough English. These 169 interviews were counted as initiated interviews (i.e. not 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 scheduling sampling plan as discussed in Section 3.0 of this report. As there are a greater number of unrestricted days each week, there were a greater number of interviews collected during these times. For example, on the Bulkley River the River Guardians roved 65% of their time during unrestricted times (Monday through Friday), and 35% 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 on each river in 2015.

	<b>Bulkley<sup>1</sup></b>	<b>Kispiox<sup>1</sup></b>	<b>Zymoetz II<sup>2, 3</sup></b>	<b>Skeena IV<sup>3, 4</sup></b>
<b>Unrestricted non-resident alien times</b>	28 (65)	26 (63)	27 (49)	-
<b>Restricted non-resident alien times</b>	15 (35)	15 (37)	28 (51)	-
<b>Total Days</b>	<b>43 (100)</b>	<b>41 (100)</b>	<b>55 (100)</b>	<b>30 (100)</b>

<sup>1</sup> Restricted times on the Bulkley and Kispiox rivers include Saturdays and Sundays.

<sup>2</sup> Restricted times on the Zymoetz II River include Fridays, Saturdays and Sundays.

<sup>3</sup> Zymoetz II and Skeena IV were sampled twice a week on the same day.

<sup>4</sup> Skeena IV does not have non-resident alien restricted times.

### 5.1.1.1 Bulkley River

The River Guardians accessed survey segments on the Bulkley River by foot and/or boat. Segments 1-6 were accessed by jet boat and segments 7-10 were accessed by foot due to navigation and low water conditions in this area. At times, segments 1-6 were accessed by foot rather than boat (i.e. when only one crew member were available to work, or when water levels were low). The jet boat was used 17 out of 43 (40%) roving days starting on September 25. Boats were not used until this time primarily due to low water conditions in the fall of 2015 which made river navigation a challenge. There were more unrestricted days spent roving by foot, and more restricted days spent roving by boat (Table 3).

Table 3: Number (%) of days spent roving the Bulkley River by foot or boat in 2015.

	<b>Foot access</b>	<b>Boat access</b>
<b>Unrestricted non-resident alien times</b>	20 (77)	8 (47)
<b>Restricted non-resident alien times</b>	6 (23)	9 (53)
<b>Total Days</b>	<b>26 (100)</b>	<b>17 (100)</b>

The River Guardians spent 43 days roving the Bulkley River (Table 2), tallying 873 anglers and initiating 597 interviews (corresponding to interviewing 68% of all observed anglers), resulting in 465 complete interviews conducted among 419 individual anglers. A total of 132 anglers declined an interview. Twenty-eight days (65% of survey effort) were spent roving during unrestricted times, with 278 complete angler interviews conducted among 250 individual anglers. Fifteen days (35% of survey effort) were spent roving during restricted times, with 187 complete angler interviews conducted among 169 individual anglers (Table 4). The number of angler interviews peaked during weeks 9-4 and 10-1 (Table 4).

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

<b>Week period</b>	<b>Number of complete angler interviews</b>			<b>Number of individual anglers interviewed</b>		
	<b>Unrestricted times</b>	<b>Restricted times</b>	<b>Total (%)</b>	<b>Unrestricted times</b>	<b>Restricted times</b>	<b>Total (%)</b>
9-1	29	0	29 (6)	29	0	29 (7)
9-2	32	25	57 (12)	32	22	54 (13)
9-3	34	38	72 (15)	28	35	63 (15)
9-4	43	40	83 (19)	38	36	74 (18)
10-1	40	41	81 (17)	37	37	74 (18)
10-2	47	13	60 (13)	44	11	55 (13)
10-3	11	14	25 (5)	8	13	21 (5)
10-4	29	14	43 (9)	25	13	38 (9)
10-5	13	2	15 (4)	9	2	11 (2)
<b>Total</b>	<b>278</b>	<b>187</b>	<b>465 (100)</b>	<b>250</b>	<b>169</b>	<b>419 (100)</b>

### 5.1.1.2 Kispiox River

The River Guardians spent 41 days roving the Kispiox River (Table 2), tallying 443 anglers and initiating 192 interviews (corresponding to interviewing 43% of all observed anglers), resulting in 168 completed angler interviews conducted among 167 individual anglers. A total of 24 anglers declined an interview. Twenty-six days (63% of the roving effort) were spent roving during unrestricted times, with 121 complete angler interviews conducted among 120 individual anglers. Fifteen days (37% of the roving effort) were spent roving during restricted times, with 47 complete angler interviews conducted among all individual anglers (Table 5). The number of angler interviews peaked in weeks 9-2 and 9-3 and again in weeks 10-1 and 10-2 (Table 5). Due to unforeseen issues associated with crew availability, only 2 out of 41 roving days (5%) were spent roving by raft which was introduced on October 8.

Table 5: Number (%) of complete angler interviews and 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	6	12	18 (11)	6	12	18 (11)
9-2	25	8	33 (20)	25	8	33 (20)
9-3	23	6	29 (17)	23	6	29 (17)
9-4	12	3	15 (9)	12	3	15 (9)
10-1	18	8	26 (15)	18	8	26 (16)
10-2	28	0	28 (17)	27	0	27 (16)
10-3	4	4	8 (5)	4	4	8 (5)
10-4	0	5	5 (3)	0	5	5 (3)
10-5	5	1	6 (3)	5	1	6 (3)
<b>Total</b>	<b>121</b>	<b>47</b>	<b>168 (100)</b>	<b>120</b>	<b>47</b>	<b>167 (100)</b>

### 5.1.1.3 Zymoetz II River

The River Guardians spent 55 days roving the Zymoetz II River (Table 2), tallying 778 anglers and initiating 434 interviews (interviewing 56% of all observed anglers), resulting in 422 completed angler interviews conducted among 270 individual anglers. A total of 12 anglers declined an interview. Twenty-seven days (49% of the roving effort) were spent roving during unrestricted times, with 256 complete angler interviews conducted among 171 individual anglers. Twenty-eight (51% of the roving effort) were spend roving during restricted times, with 166 complete angler interviews conducted among 99 individual anglers (Table 6). The number of angler interviews peaked in week 10-1 with the number of interviews generally declining until the end of the study period (Table 6).

Table 6: Number (%) of complete angler interviews and 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	1	20	21 (4)	1	14	15 (5)
8-4	17	24	41 (10)	16	10	26 (10)
9-1	8	0	8 (2)	5	0	5 (2)
9-2	11	5	16 (4)	6	3	9 (3)
9-3	58	0	58 (14)	43	0	43 (16)
9-4	19	35	54 (13)	13	25	38 (14)
10-1	56	31	87 (20)	37	19	56 (21)
10-2	30	2	32 (8)	22	2	24 (9)
10-3	9	15	24 (6)	5	9	14 (5)
10-4	22	25	47 (11)	14	13	27 (10)
10-5	25	9	34 (8)	9	4	13 (5)
<b>Total</b>	<b>256</b>	<b>166</b>	<b>422 (100)</b>	<b>171</b>	<b>99</b>	<b>270 (100)</b>

#### 5.1.1.4 Skeena IV River

Between August 20 to October 31, the River Guardians surveyed the Cedarvale area on 30 separate days tallying 62 anglers (Appendix 4.0). A total of 51 interviews were conducted among 32 individual anglers (Appendix 4.0). The total number of angler interviews were made up by 33% BC resident 12% non-residents, 53% non-resident aliens, and 2% had an unrecorded angler residency. Of these interviews, 53% occurred on weekdays, and 47% occurred during the weekends. During the weekends, 16% of the interviews were from BC residents, 4% were from non-residents, and 79% were from non-resident aliens. During the weekdays, 48% were from BC residents, 19% were from non-residents and 30% were from non-resident aliens.

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

#### 5.1.2 Angler interview residency categories

There were 856 individual anglers who agreed to complete an interview on the Bulkley, Kispiox and Zymoetz II rivers. A total of 444 (52%) were BC residents, 102 (12%) were non-residents, and 308 (36%) were non-resident aliens. Angler residency was not collected from two individual anglers on the Zymoetz II River. The majority of individual anglers interviewed on the Bulkley and Zymoetz II rivers were BC resident (60% and 52% respectively; Table 7), whereas the majority were non-resident aliens (58%) on the Kispiox River. These findings are consistent with previous years (Pitman and Hirshfield, 2018), and it is possible that the higher proportions of BC residents on the Bulkley and Zymoetz II rivers may be linked to their proximity to the regional population centers of Smithers and Terrace respectively.

Table 7: Number (%) of individual anglers interviewed on the Bulkley, Kispiox, and Zymoetz II rivers by residency category.

River	Residency category	Number (%) of individual anglers interviewed
<b>Bulkley</b>	BC resident	250 (60)
	Non-resident	52 (12)
	Non-resident alien	117 (28)
<b>Kispiox</b>	BC resident	57 (34)
	Non-resident	14 (8)
	Non-resident alien	96 (58)
<b>Zymoetz II<sup>1</sup></b>	BC resident	137 (52)
	Non-resident	36 (13)
	Non-resident alien	95 (35)

<sup>1</sup>Angler residence was not collected from two 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 2015/2016, increases in sales have occurred for these anglers; 12% for annual basic licences, 26% for Classified Waters licences and 64% for Steelhead Stamps (Appendix 5.0; Figure 5).

From 2012/2013 to 2015/2016, 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 2015/2016, the sale of Classified Waters licences among non-Skeena BC residents increased 31% (Figure 5; Appendix 5.0) and the sale of Steelhead Stamps among non-Skeena BC residents increased 26% (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.

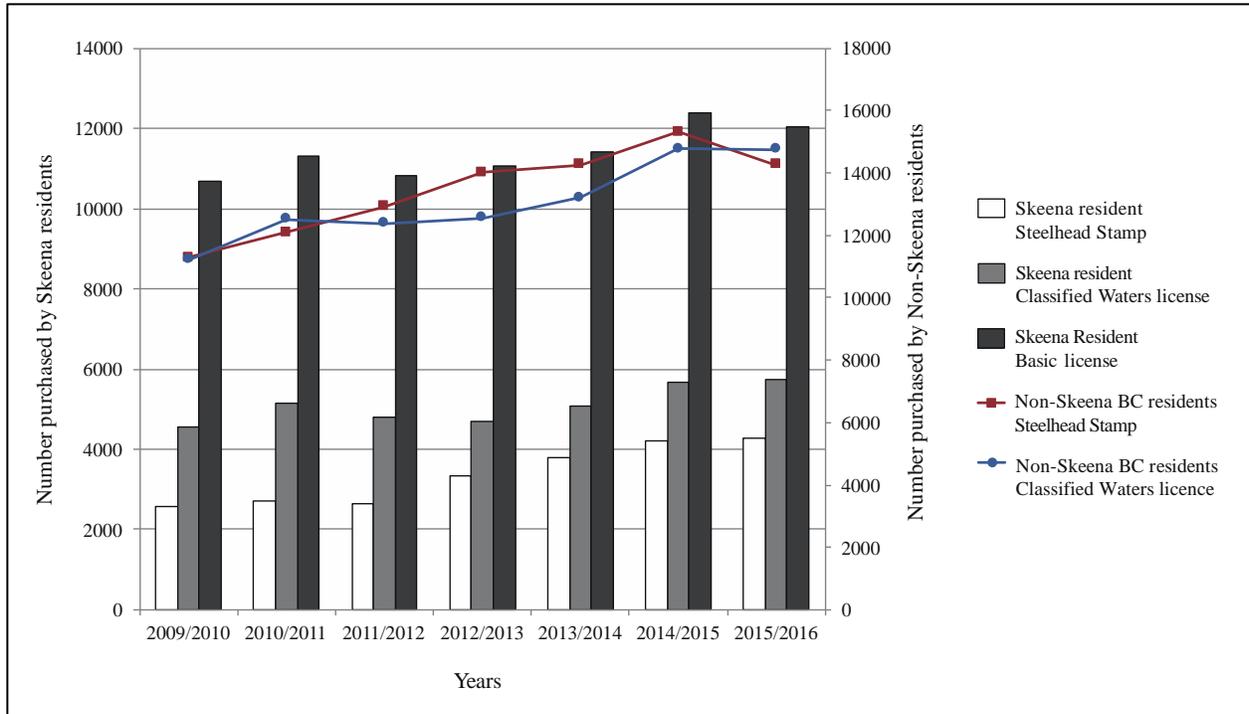


Figure 5: Number of basic licences, Classified Waters licenses, and Steelhead Stamps purchased by anglers having a postal code address in Region 6.

### 5.1.3.2 BC Residents origins

On the Bulkley, Kispiox, and Zymoetz II rivers, 444 individual BC resident anglers agreed to complete an interview, and 439 provided their place (city or town) of origin. The majority of these anglers were from FLNRO Region 6 - Skeena (162 anglers, 37%), followed by Region 2 - Lower Mainland (144 anglers, 33%; Figure 6).

In the 2014 River Guardian Program, 46% of individual BC resident anglers were from Region 6 – Skeena, and 26% from Region 2 – Lower Mainland. In the 2013 River Guardian Program BC resident anglers were not asked their place of origin, therefore comparison to this year can't be made. 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).

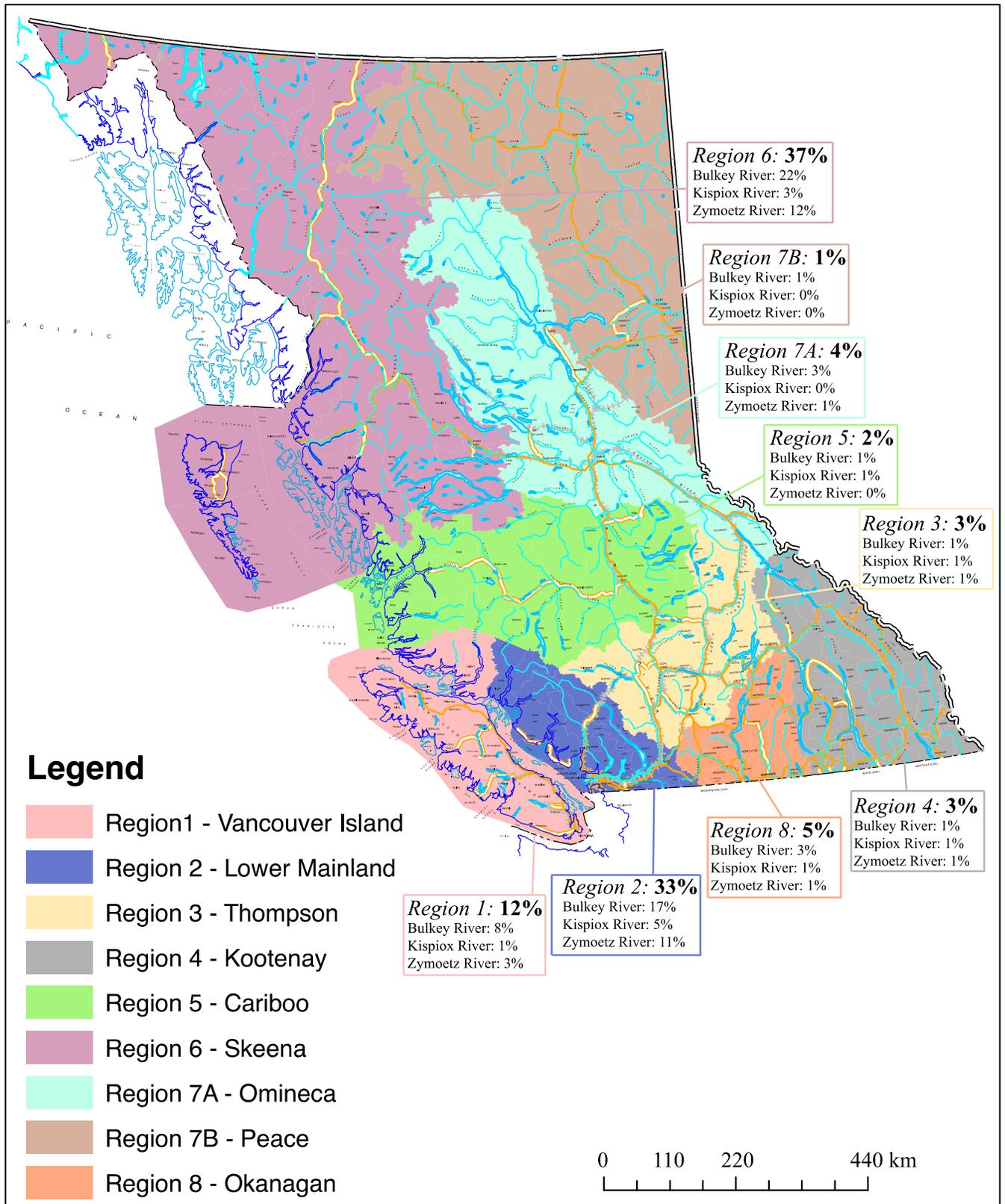


Figure 6: Place of origin for individual BC residents interviewed in 2015 as per FLNRO management regions.

### 5.1.3.3 Non-resident and non-resident alien origins

On the Bulkley, Kispiox, and Zymoetz II rivers, each of the 102 individual non-resident anglers provided their province of origin, and each of the 308 individual non-resident alien anglers provided their country of origin. The majority of the non-residents interviewed were residents of Alberta (63%), followed by Ontario (29%; Figure 7). The majority of the non-resident aliens interviewed resided in USA (55%), followed by Italy (11%) with each of the other remaining countries representing less than 10% (Figure 7). This is consistent with the 2013 and 2014 years of this study, which reported that for non-residents 66% resided in Alberta in 2013 and 64% in 2014. For non-resident aliens, 51% resided in USA in 2013 and 54% in 2014.

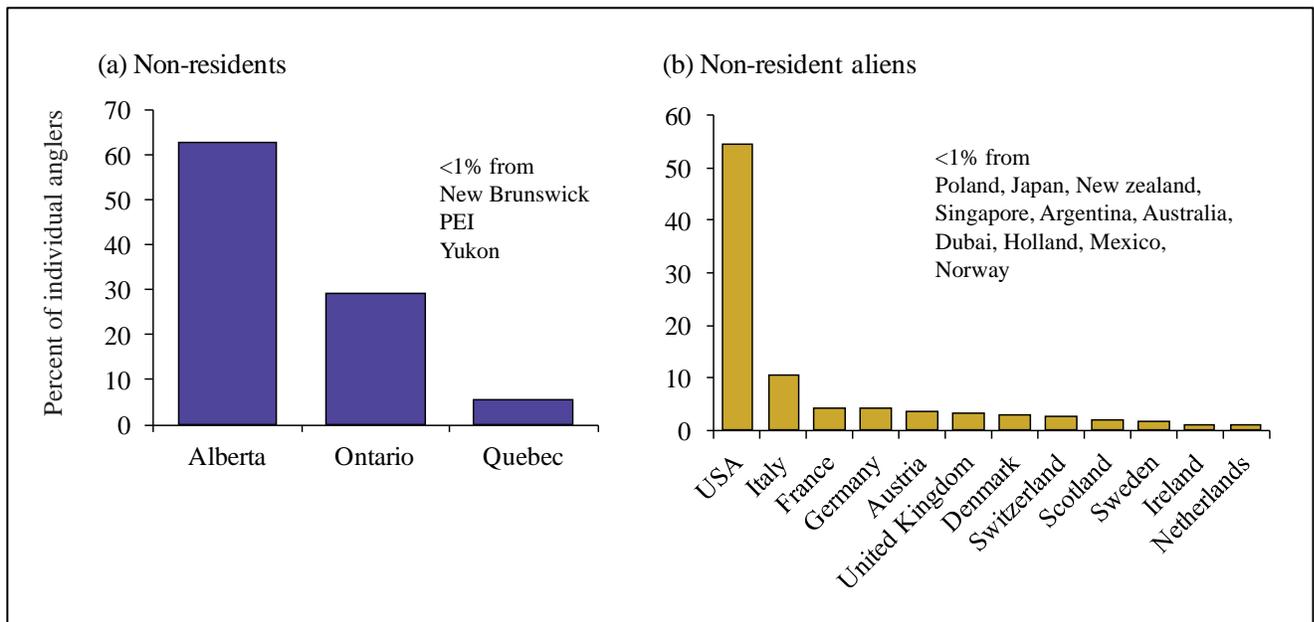


Figure 7: Province and country of origin for non-residents and non-resident aliens who were interviewed by the River Guardians.

### 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 (19%), Telkwa Bridge – Smithers Bridge (19%), and Smithers Bridge – Chicken Creek (17%; Table 8; Figure 2 and 8). These trends are similar to those in 2013 (Pitman and Hirshfield, 2015). Dissimilarity, in 2014 the number of completed angler interviews in the Telkwa Bridge – Smithers Bridge river segment was much lower (7% of the total interviews; Pitman and Hirshfield, 2018), possibly attributed to low water levels and challenging navigability at that time. The number of BC resident interviews was higher than non-residents and non-resident aliens in most river segments, except for between Suskwa River – Skeena River where there were only angler interviews from non-resident alien anglers (Figure 8).

On the Kispiox River, the highest number of complete angler interviews were conducted on the following river segments: Confluence with Skeena River – Rodeo Grounds (44% of the total interviews; Figure 3) and Rodeo Grounds – Upper Recreation Site (43%; Figure 3 and 8; Table

8), meaning that 87% of the Kispiox River interviews were conducted between the confluence with the Skeena River and Upper Recreation Site (lower 33 km of river). Unlike the Bulkley River, the number of non-resident alien interviews was higher than BC resident and non-resident interviews in all river segments, with the exception of between the Mitten Bridge – Sweetin Recreation. In this area, the number of angler interviews for BC residents and non-resident aliens were the same (Figure 8).

A factor influencing the spatial distribution of anglers on the Kispiox River during this project 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 to the confluence with the Skeena River (Figure 3), and accounts for the lower 8.5 km (11% of the total survey area) of the Kispiox River. While it is likely 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 8: Number (%) of interviews conducted in each river segment on the Kispiox and Bulkley rivers.

<b>River segment</b>	<b>River segment distance (~km)</b>	<b>Number (%) of complete angler interviews</b>
<b>Bulkley River<sup>1</sup></b>		
1. Bymac – The Forks	4	13 (3)
2. The Forks – Walcott Bridge	14	59 (13)
3. Walcott Bridge – Quick Bridge	14	51 (11)
4. Quick Bridge – Telkwa Bridge	14	89 (19)
5. Telkwa Bridge – Smithers Bridge	13	89 (19)
6. Smithers Bridge – Chicken Creek	4	78 (17)
7. Chicken Creek – Trout Creek	26	7 (2)
8. Trout Creek – Moricetown	8	53 (11)
9. Moricetown – Suskwa River	30	20 (4)
10. Suskwa River – Skeena River	19	3 (1)
<b>Total</b>	<b>146</b>	<b>462 (100)</b>
<b>Kispiox River<sup>2</sup></b>		
1. Confluence with Skeena River – Rodeo Grounds	14	72 (44)
2. Rodeo Grounds – Upper Recreation Site	19	69 (43)
3. Upper Recreation Site – Mitten Bridge	22	16 (10)
4. Mitten Bridge – Sweetin Recreation Site	25	5 (3)
<b>Total</b>	<b>80</b>	<b>162 (100)</b>

<sup>1</sup>River segment was not collected from three interviews on the Bulkley River.

<sup>2</sup>River segment was not collected from six interviews on the Kispiox River.

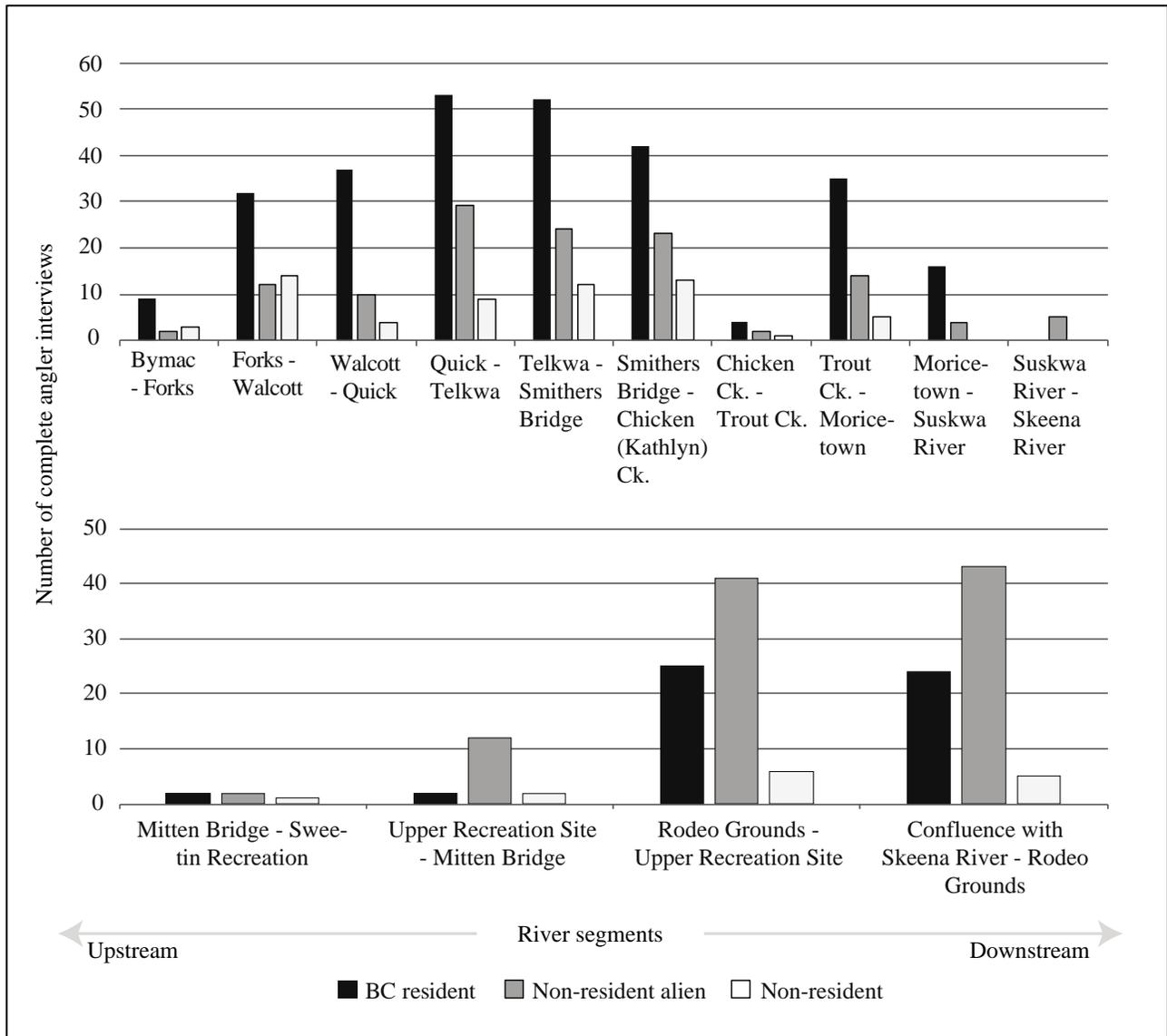


Figure 8: The number of angler interviews by river segment and angler residency for (a) Bulkley River and (b) Kispiox River.

On the Bulkley River, the locations of angler interviews were concentrated (i.e. clustered) around town centers (e.g. Smithers and Telkwa), river confluences and easy to access locations such as boat launches. Interviews were obtained from anglers accessing the river by foot or boat. The distribution pattern in Figure 9 highlights that anglers were intercepted more frequently upstream of Smithers, which has generally better access than downstream of Smithers. This result is also likely the result of the sampling design for this study whereby only foot patrols were conducted downstream of the Smithers bridge.

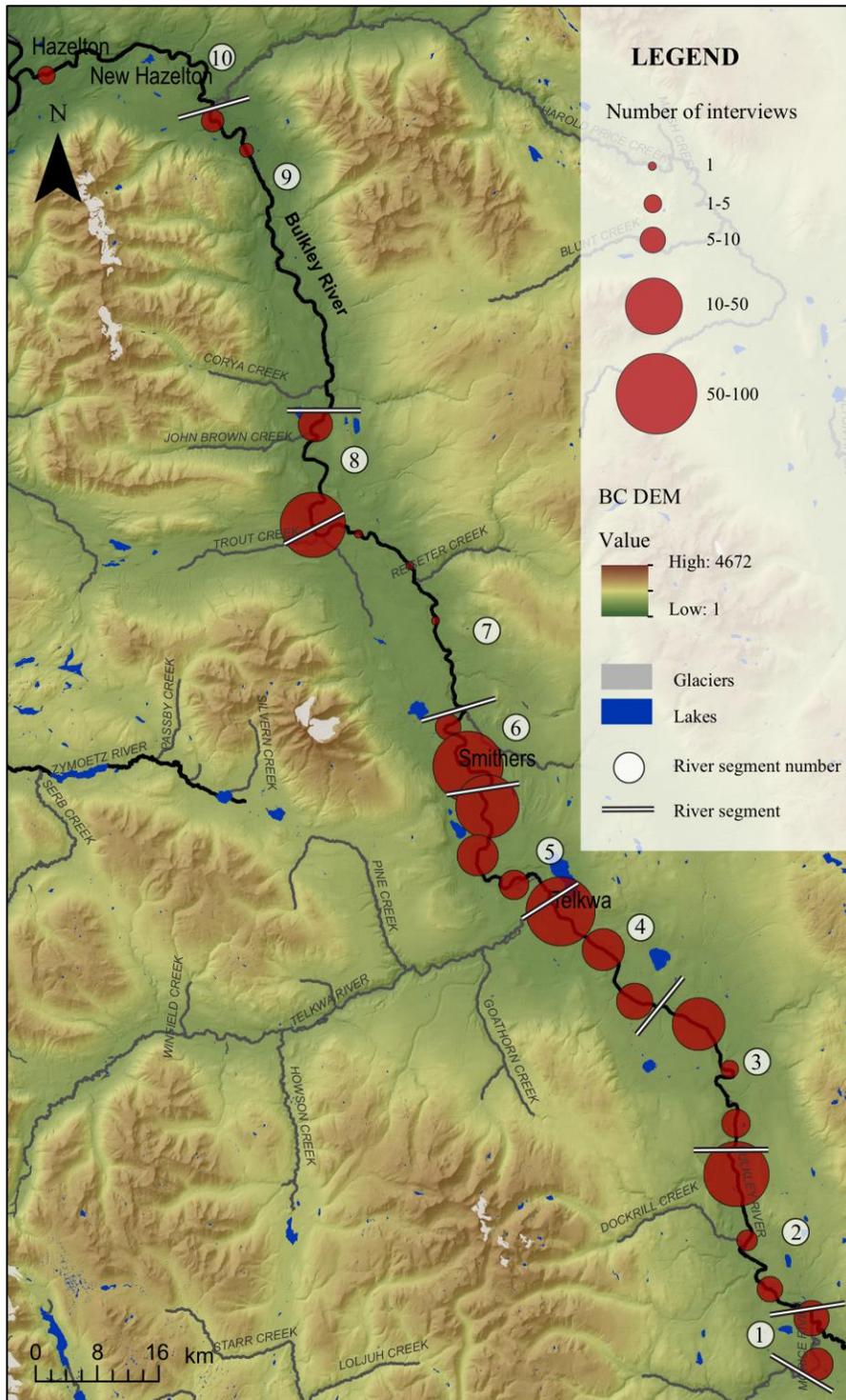


Figure 9: Location of River Guardian interviews on the Bulkley River.

On the Kispiox River, angler interview locations were heavily concentrated on the lower portion of the river, downstream from the Rodeo Grounds, consistent with the 2013 (Pitman and Hirshfield, 2015) and 2014 (Pitman and Hirshfield, 2018) reports. As this area is closer to Hazelton and the Village of Kispiox, ease of access may be a driver influencing this unequal

spatial distribution. In the fall of 2014 and 2015, there were also anecdotal reports that steelhead were holding in the lower reaches (and off the mouth) of the Kispiox River due to low water conditions, which may also explain why anglers were concentrated in this area.

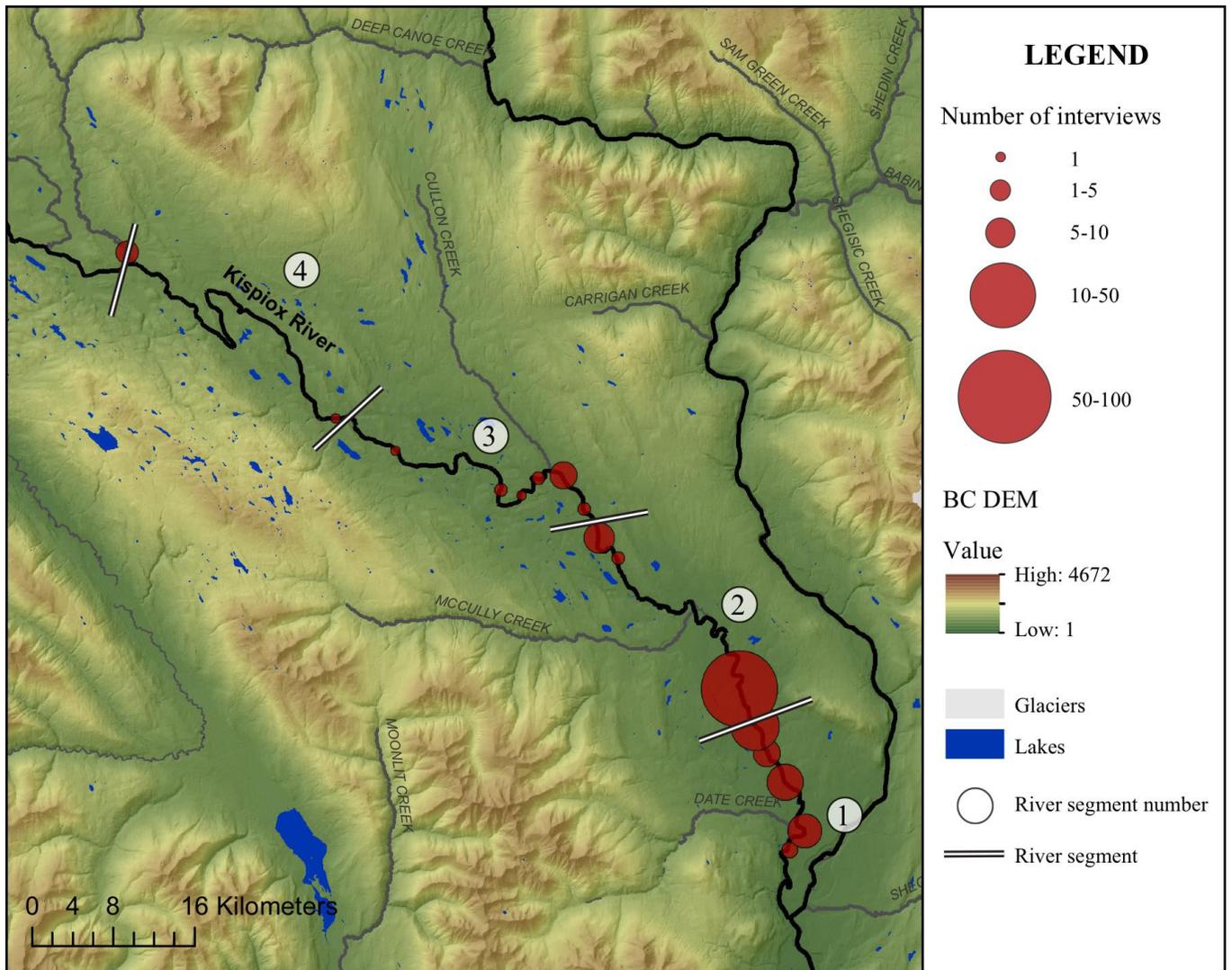


Figure 10: Location of River Guardian interviews on the Kispiox River.

On the Zymoetz II River, angler interviews were distributed in clusters from the Clore River to the confluence with the Skeena River (Figure 11). However, the Zymoetz II River has a more even distribution of angler interviews compared to the Bulkley and Kispiox rivers. This is likely due to the ease of accessibility offered by the Copper River Main Forest Service Road, which runs parallel to the entire length of the Class II section of this system. On Zymoetz II above the Kitnayakwa River there is no foot access, resulting in the River Guardians not survey beyond this point.

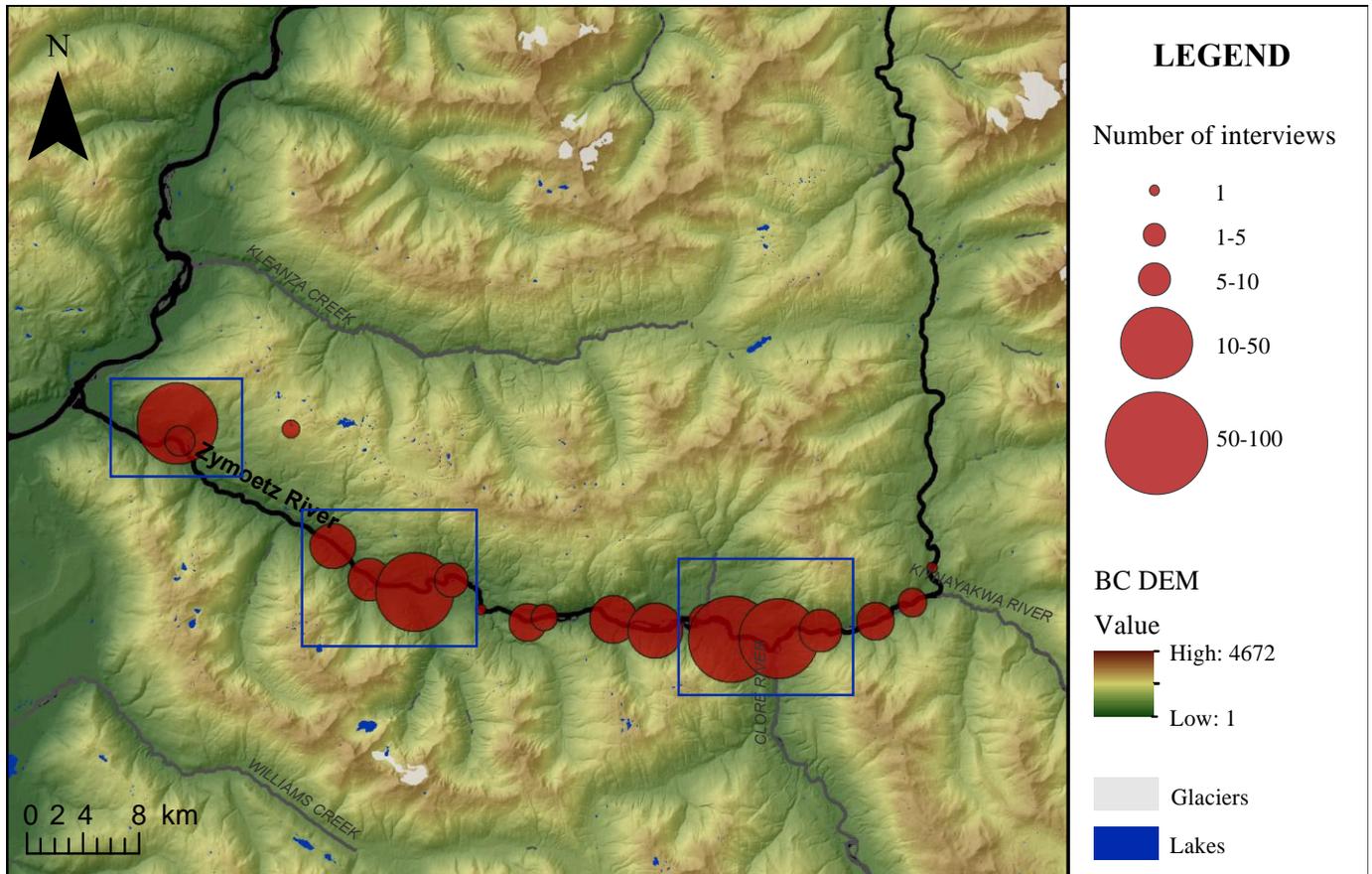


Figure 11: Location of River Guardian interviews on the Zymoetz II River. Note that in the lower river there are two bubbles overlapping. These could not be combined due to analysis methods used. Blue boxes represent clusters of interviews.

### 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 last week of September and first week of October (Figure 12). The Kispiox River had the greatest number of non-resident alien angler-days purchased during the last two weeks of September (Figure 12). The angler days purchased by non-resident aliens on the Zymoetz II River was variable throughout the study period, however, a decline occurred following the second week in October. Contrarily, in 2014 the number of non-resident alien angler days peaked during the second week of September followed by a steady decline (Pitman and Hirshfield, 2018). Non-resident anglers purchased fewer angler days than non-resident aliens; however, their trends in use were similar over the study period (Figure 12).

The correlative relationship between the number of angler interviews and angler-days purchased by non-resident and non-resident aliens over one week periods was strong for the Bulkley ( $r=0.80$ ); however, less so for the Kispiox ( $r=0.59$ ) and Zymoetz II ( $r=0.62$ ; Figure 12). Generally, 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 capacity 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 throughout the study period).

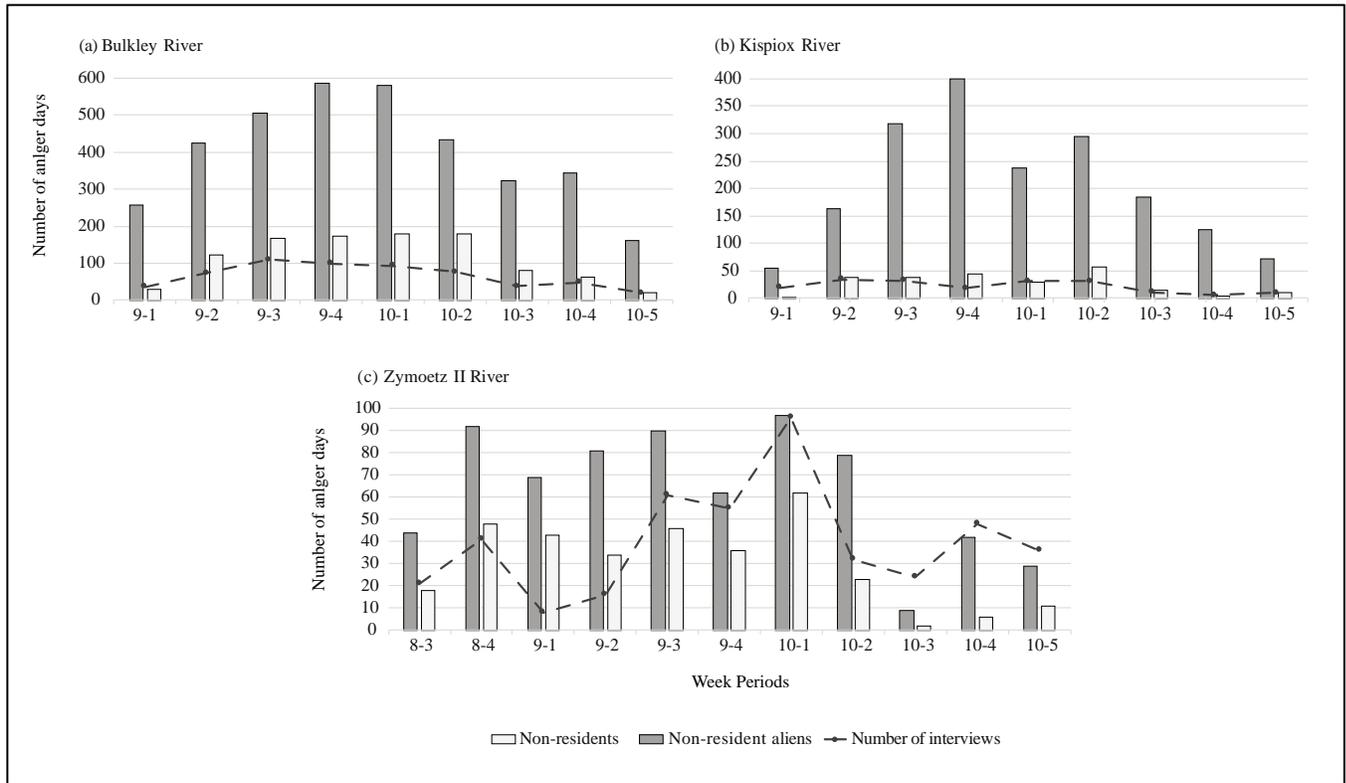


Figure 12: Summary of the non-resident and non-resident alien angler days purchased over one-week periods during the study period. Dashed lines represent the sum of angler interviews conducted over week periods on each river.

### 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 9). Sampling rates ranged from 15% to 29% depending on the river and angler residency. In total, the River Guardians interviewed 24% of the non-resident and 20% of the non-resident alien anglers on the Bulkley, Kispiox and Zymoetz II rivers during the study period (Table 9). 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 9: Interview sampling rate for non-resident and non-resident alien anglers in 2015.

	Number of individual anglers interviewed	Classified Waters purchases (number of anglers)	Percent interviewed
<b>Bulkley River</b>			
<b>Non-resident</b>	52	214	24%
<b>Non-resident alien</b>	117	800	15%
<b>Kispiox River</b>			
<b>Non-resident</b>	14	75	19%
<b>Non-resident alien</b>	96	418	23%
<b>Zymoetz II River</b>			
<b>Non-resident</b>	36	135	27%
<b>Non-resident alien</b>	95	326	29%
<b>Total</b>			
<b>Non-resident</b>	<b>102</b>	<b>424</b>	<b>24%</b>
<b>Non-resident alien</b>	<b>308</b>	<b>1,544</b>	<b>20%</b>

### 5.1.6 Guided angler status by residency

The number and percent of non-resident and non-resident aliens that used angling guide services was assessed for the Bulkley, Kispiox, and Zymoetz II rivers during the study period (Table 10). 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 10).

Table 10: 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.

River	Resident category	Guided <sup>1</sup>	Unguided <sup>1</sup>
<b>Bulkley</b>	Non-resident	10 (1)	204 (30)
	Non-resident alien	330 (99)	470 (70)
	<b>Total</b>	<b>341(100)</b>	<b>674 (100)</b>
<b>Kispiox</b>	Non-resident	4 (3)	71 (18)
	Non-resident alien	118 (97)	300 (82)
	<b>Total</b>	<b>122 (100)</b>	<b>371 (100)</b>
<b>Zymoetz II</b>	Non-resident	15 (12)	120 (36)
	Non-resident alien	108 (88)	218 (64)
	<b>Total</b>	<b>123 (100)</b>	<b>338 (100)</b>

<sup>1</sup>Data 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 restricted and unrestricted times

In an attempt to determine relative angler use during the restricted versus unrestricted times, a river specific analysis (as per the licence sales database) was conducted. 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 (Table 11). 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 statistically significant difference on the Bulkley and Zymoetz II rivers (Table 11).

Although some of these data are not statistically significant, both unguided non-residents and guided non-resident alien anglers fished on average more during restricted times (typically weekends) than unrestricted times (weekdays). Note that grey shaded areas in Table 11 represent statistically significant differences in results from the independent two-sample t-test between guided and unguided anglers by river and residency. On the Kispiox River, the average number of angler days purchased per day by guided non-residents was higher and statistically significant during unrestricted vs restricted times. This trend was not seen on the Bulkley and Zymoetz II rivers.

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, however, provides limited insight as these anglers are not permitted to fish during restricted times. In some cases, unguided non-resident alien anglers purchased angler days during the restricted times (Table 11). Given the scope of this study, follow up was not conducted to determine whether these days were mistakenly purchased or if they were used in non-compliance.

Table 11: Average number (CV) of guided and unguided non-resident and non-resident alien angler days purchased per day during restricted and unrestricted times. Grey shading represents statistically significant results.

Angler residency	Average number (CV) of guided and unguided non-resident alien and non-resident angler days purchased per day		Independent sample t-test*
	Unrestricted times	Restricted times	
<b>Bulkley River<sup>1</sup></b>			
<b>Guided non-resident</b>	0.4 (1.4)	0.8 (1.3)	t=1.413, df=20, p=0.17
<b>Unguided non-resident</b>	15.5 (0.6)	17.8 (0.6)	t=0.789, df=29, p=0.44
<b>Guided non-resident alien</b>	21.3 (0.3)	28.1 (0.2)	t=3.567, df=27, p=0.00
<b>Unguided non-resident alien</b>	49.5 (0.4)	1.4 (1.4)	t=-15.313, df=45, p=0.00
<b>Kispiox River<sup>1</sup></b>			
<b>Guided non-resident</b>	0.3 (2.4)	0.0 (-)	t=-2.746, df=42, p=0.00
<b>Unguided non-resident</b>	3.6 (1.0)	4.4 (0.9)	t=0.705, df=26, p=0.49
<b>Guided non-resident alien</b>	8.0 (0.6)	10.2 (0.5)	t=1.490, df=26, p=0.15
<b>Unguided non-resident alien</b>	30.9 (0.6)	0.2 (2.4)	t=-10.362, df=42, p=0.00
<b>Zymoetz II River<sup>2</sup></b>			
<b>Guided non-resident</b>	0.2 (2.9)	0.1 (5.2)	t=-1.180, df=64, p=0.24
<b>Unguided non-resident</b>	4.4 (0.8)	5.3 (0.6)	T=1.163, df=54, p=0.25
<b>Guided non-resident alien</b>	2.9 (0.8)	1.4 (1.6)	t=-2.551, df=58, p=0.01
<b>Unguided non-resident alien</b>	13.1 (0.6)	0.6 (2.4)	t=-10.061, df=42, p=0.00

<sup>1</sup>Restricted 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.

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

\*Significance is tested at a 95% Confidence interval.

### **5.1.8 Trends in non-resident and non-resident alien angler use from 2009 to 2015**

The following section compares non-resident and non-resident alien effort from 2009 to 2015 (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). 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 on these seven years of data without reference to broader trends regionally, provincially and over time. The annual steelhead questionnaire results were not available for comparison when this report was drafted.

In general, there was a greater number of non-resident alien anglers (guided and unguided) fishing more angler days than non-resident anglers from 2009 to 2015 on all rivers (Figure 13). However, recently on the Zymoetz II River, the number of unguided non-resident anglers and angler days have been increasing since 2011 and exceeded that of guided non-resident aliens in 2015.

Between 2009 and 2015 on the Bulkley River, there has been a 12% decline in the number of unguided non-resident alien angler days, and a 6% increase in the number of guided non-resident alien angler days (Figure 13, Appendix 6.0 and 7.0). And the number of days fished per individual (during the Classified Waters period) has decreased for both of these angler categories (Appendix 8.0).

On the Kispiox River the number of unguided non-resident alien angler days has declined by 7%, and guided non-resident alien days has increased by 68% (Figure 13, Appendix 6.0 and 7.0). The number of days fished per individual has increased from 4.1 to 4.4 for guided non-resident aliens and declined from 4.6 to 4.4 for unguided non-resident aliens from 2009 to 2015 (Appendix 8.0).

Interpretation of trends in licence sales 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. Between 2009 and 2014 there was a 6% decline in the number of unguided non-resident alien angler days (Pitman and Hirshfield, 2018), however, between 2009 and 2015 there was a 28% increase (Figure 13; Appendix 6.0 and 7.0). The percent change in the number of angler days purchased by guided non-resident alien anglers has slightly increased between the time periods 2009 – 2014 (124%) and 2009 – 2015 (153%). Large increases in the number of unguided non-residents angler days occurred between 2009 - 2014 (328%); however, that increase in angler days has increased to 546% between 2009 – 2015 (Pitman and Hirshfield, 2018). While it is unknown why the number of angler days is increasing in such intensity in 2015, Zymoetz II has become an increasingly popular destination for non-residents anglers during the winter/spring seasons (Nov –May). The unpredictability of weather and water conditions during the winter/spring fishery makes trip planning for out of country anglers difficult. Non-resident anglers also have the ability to make multiple trips per season because of their proximity to the fishery. In comparison, non-resident alien anglers are more likely to travel greater distances to participate in the fishery, making the probability of multiple trips per season less likely. Finally, anglers are fishing approximately half the number of days per individual on the Zymoetz II in comparison to the Bulkley and Kispiox rivers (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.

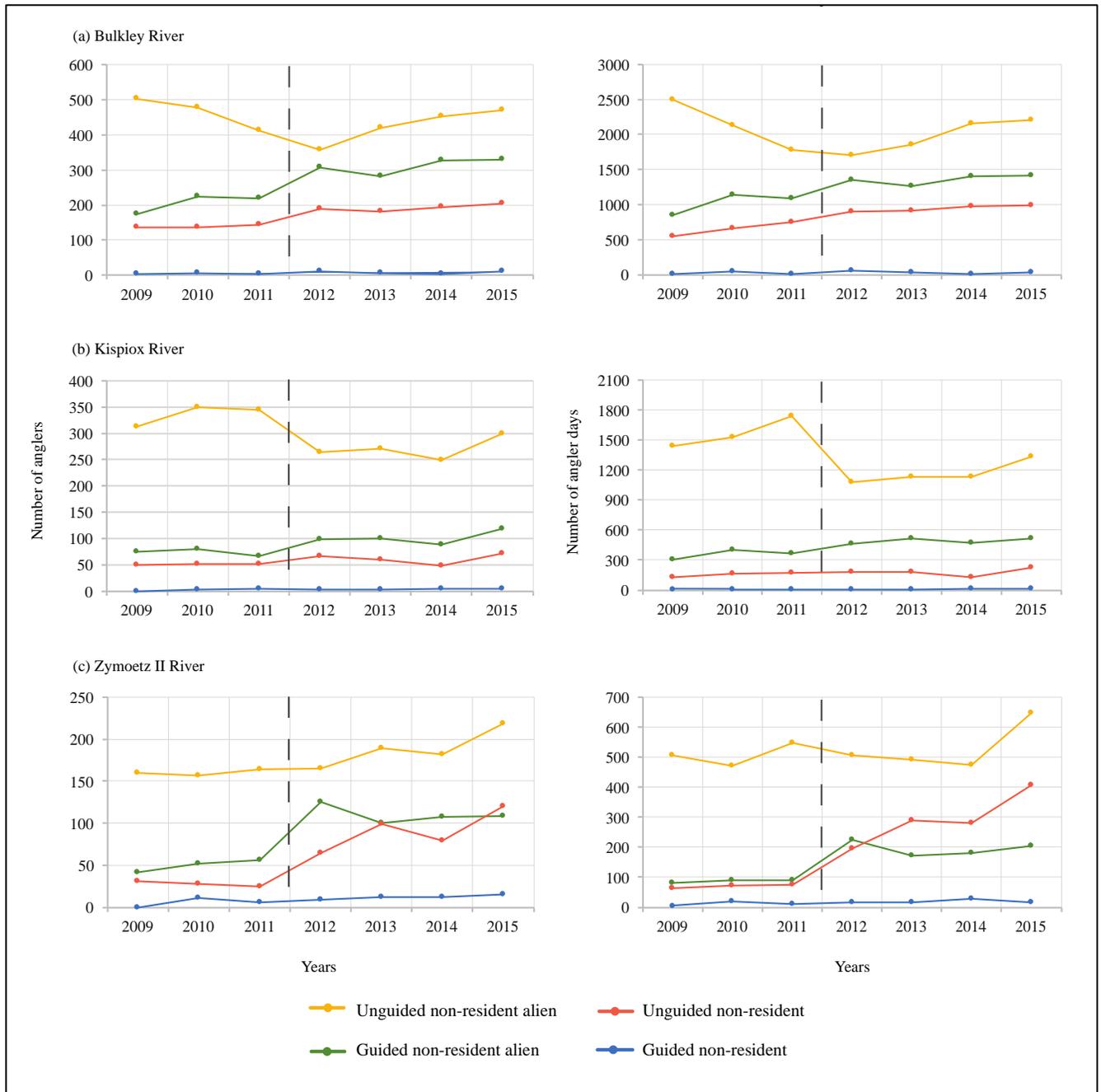


Figure 13: Number of anglers and number of angler days during Classified Waters period on the Bulkley (a), Kispiox (b), and Zymoetz II (c) rivers from 2009 to 2015. The dashed line is for illustrative purposes to represent when the non-resident alien restrictions were implemented.

The following boxplot analysis provides a visual depiction 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, 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 2012-2015 period (i.e. post-regulation change) than between 2009-2011 (i.e. pre-regulation change; Figure 14). Other angler residency categories did not have statistically significant differences (Appendix 9.0).

On the Kispiox River, similar to the Bulkley and Zymoetz II rivers, there was a statistically significant difference before and after the regulation changes for guided and unguided non-resident alien anglers (Figure 14). More specifically, there were more guided non-resident aliens post-2012 and there were fewer unguided non-resident aliens fishing the Kispiox River post-2012. This could be owing to non-resident aliens being the largest user group on this river and declines in unguided angler use could be responsible for increases in guided anglers as individuals seek opportunities to fish during the restricted times on this river.

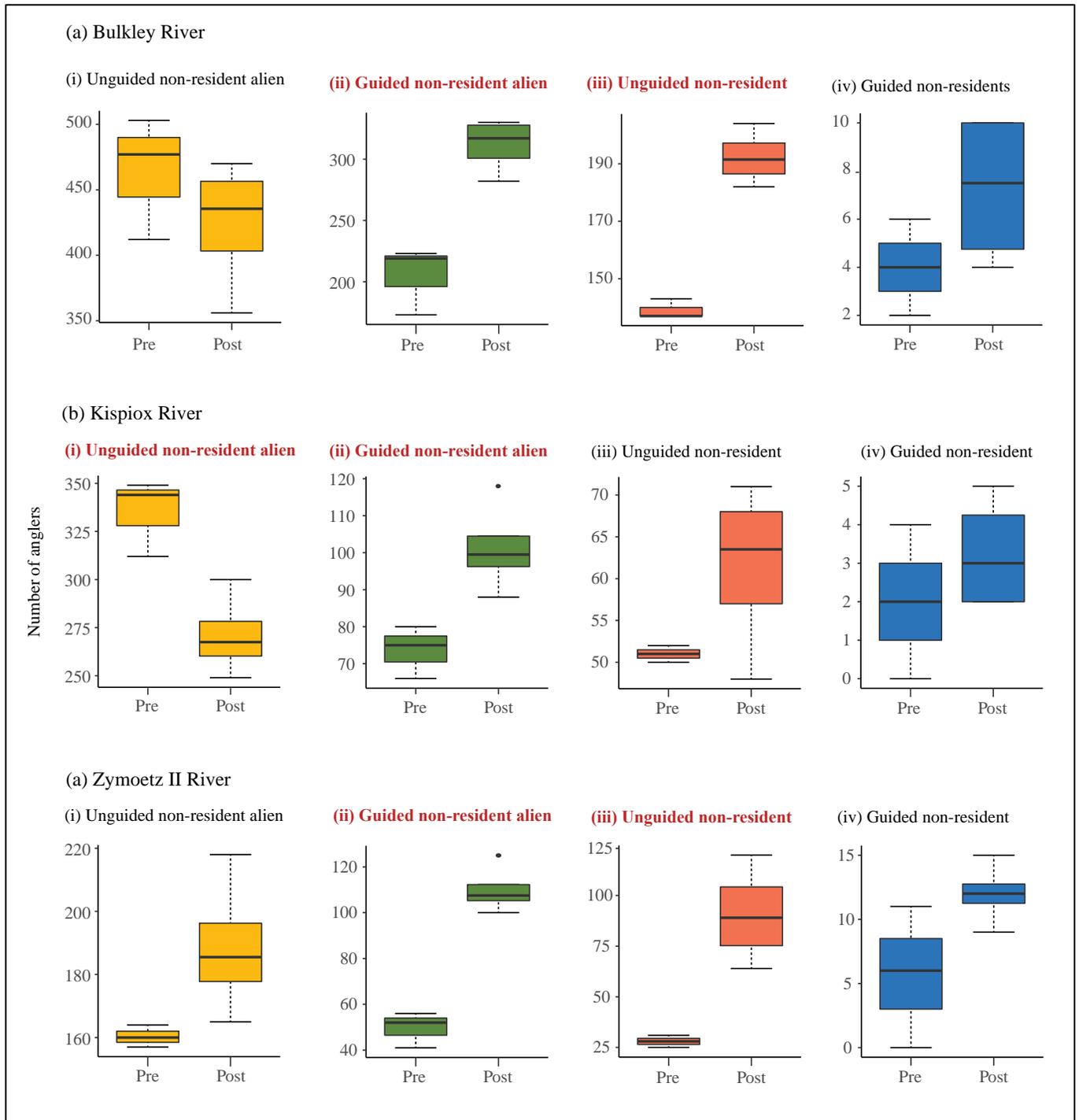


Figure 14: Box plot showing the total number of anglers who purchased a Classified Waters license pre- and post- regulation change for the Bulkley (a), Kispiox (b), and Zymoetz II (c) rivers. Note that the y-axes vary by plot. Residency categories **bolded** and with an \* indicate statistically significant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

### ***5.1.9 Non-resident and non-resident alien angler use during restricted and unrestricted times***

On the Bulkley River during unrestricted times, the number of angler days purchased by unguided non-resident aliens has consistently increased since 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. The number of angler days for guided non-resident aliens and unguided non-residents have also been increasing steadily during restricted and unrestricted times post-2012.

On the Kispiox River during unrestricted times, the number of angler days purchased by unguided non-resident aliens have consistently increased between 2012 to 2014, with an 18% increase between 2014 and 2015 (Figure 15; 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 remained relatively flat during unrestricted and restricted times post-2012.

On the Zymoetz II River, unguided non-resident alien angler days have increased during the unrestricted times, largely owing to a 35% percent increase in overall angler days purchased by this residency category between 2014 and 2015 (Figure 13 and 15, Appendix 10.0). Angler days purchased by this class of angler have declined to zero during the restricted times (Figure 15; Appendix 10.0). Since 2012, angler days for unguided non-residents have consistently increased during restricted and unrestricted periods, which is consistent with findings presented in Figure 14. As these changes have occurred during both periods, increases in effort by this class of angler may be driven less by the non-resident alien restrictions and influenced more by overall increases in use coinciding with the extension of the Classified Waters period, 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 (unrestricted 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.

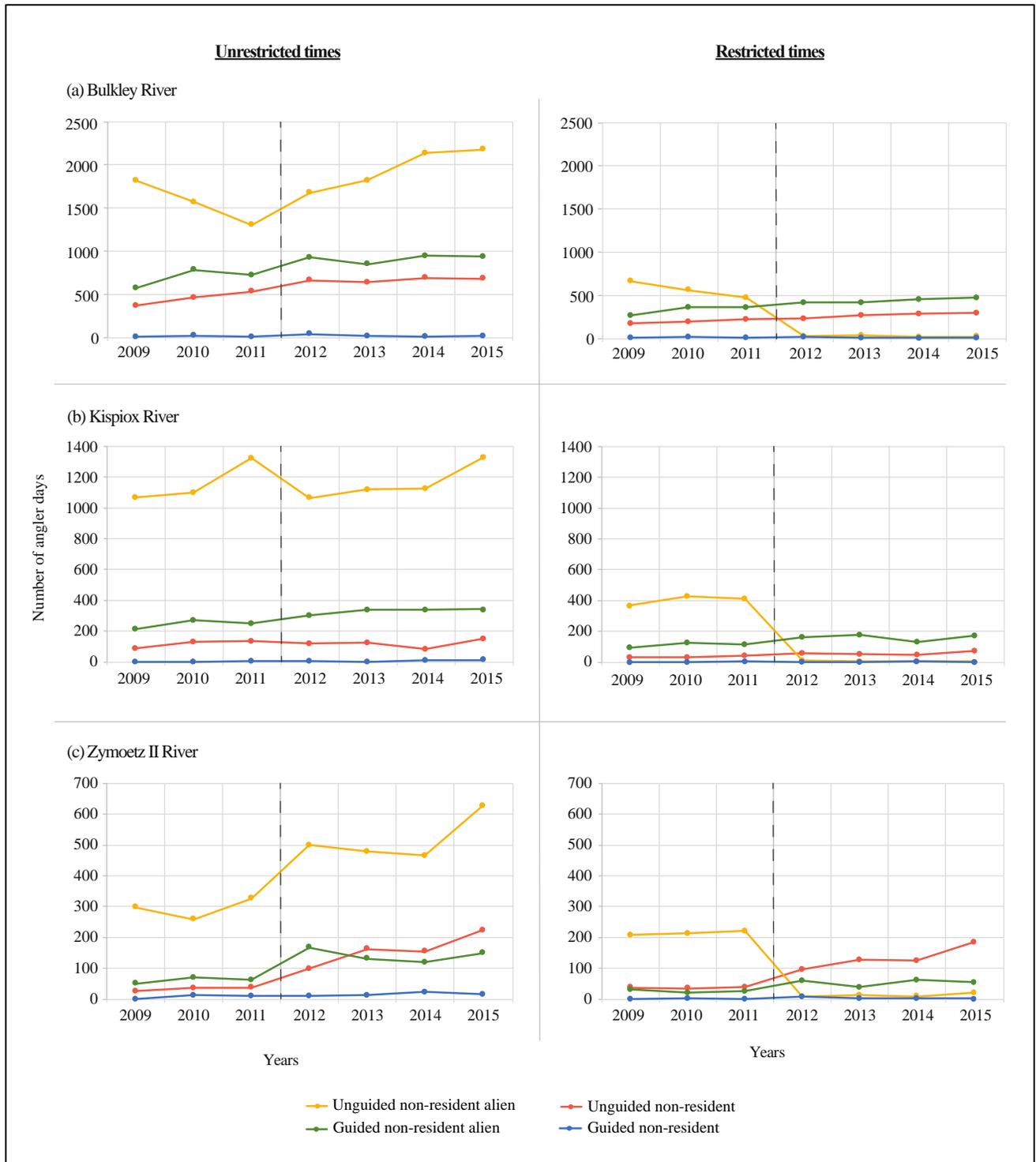


Figure 15: Number of angler days purchased during unrestricted and restricted times on the Bulkley, Kispiox, and Zymoetz II rivers. The dashed line is for illustrative purposes to represent when the non-resident alien restrictions were implemented. Unrestricted times are Monday-Friday for the Bulkley and Kispiox, Monday-Thursday for the Zymoetz II River. Restricted times are Saturday and Sunday for the Bulkley and Kispiox, Friday-Sunday for the Zymoetz II River.

## 5.2 Angler satisfaction

### 5.2.1 Factors contributing to a quality angling experience

On the Bulkley River, 417 out of 419 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’ were factors mentioned by anglers. This was followed by ‘Number of Anglers/Crowding’, with BC residents/non-residents (19%) providing this response at a higher percentage than non-resident aliens (11%). Thirdly, ‘Beauty/Scenery/Esthetic Attributes’ was mentioned as a factor that contributed to a high-quality angling experience (Figure 16).

Similar to the 2013 and 2014 years for this project, BC residents/non-residents mentioned ‘Number of Anglers/No Crowding’ more frequently than non-resident alien anglers, highlighting the relative importance of this factor to these anglers. In 2015, non-resident aliens mentioned ‘Quality of Fish/Wild Fish’ more frequently than BC residents/non-residents on the Bulkley, Kispiox and Zymoetz II rivers (Figure 16-18). This may indicate the level of appreciation anglers from out of country have regarding the wild steelhead fisheries in the Skeena Region.

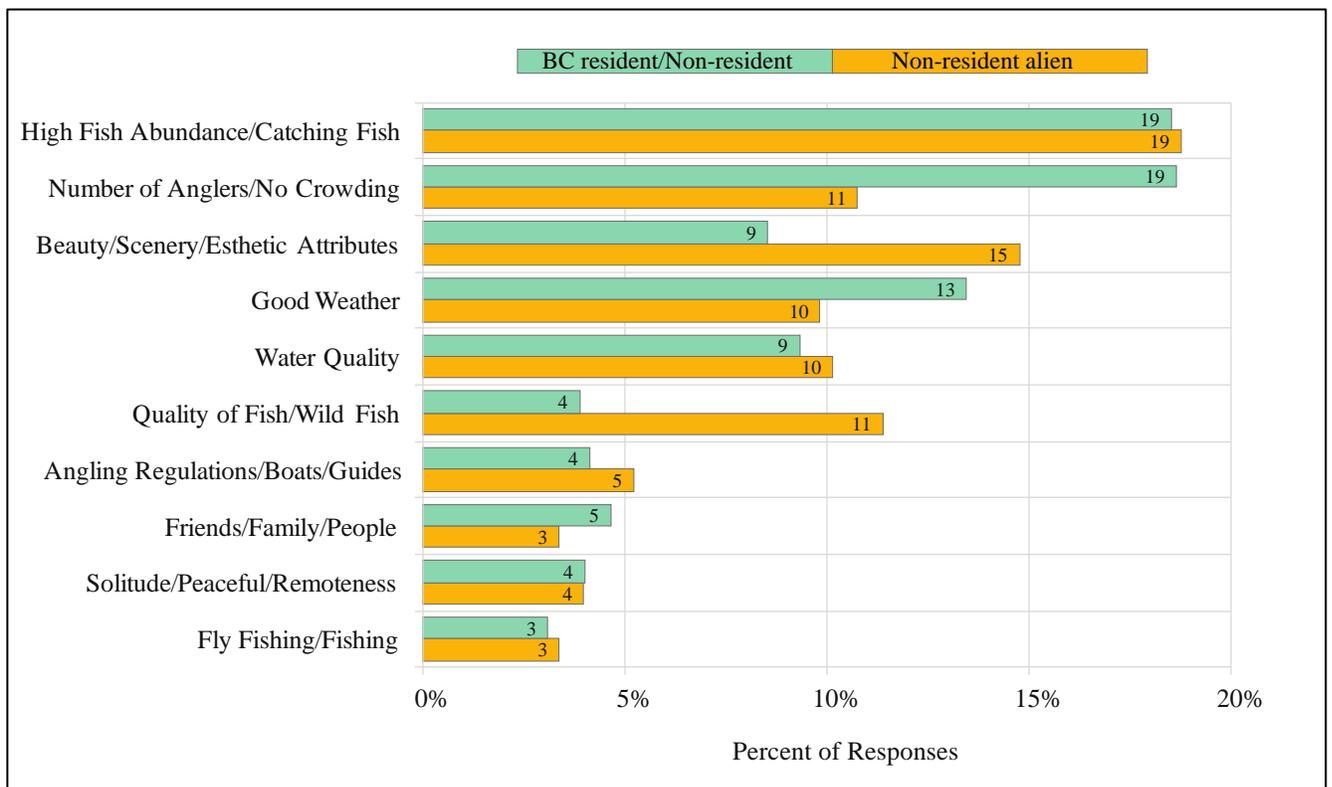


Figure 16: Factors contributing to a quality experience for BC residents/non-residents and non-resident alien anglers on the Bulkley River in 2015.

On the Kispiox River, all 167 individual anglers 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 17), which may owe to this river’s

reputation for large bodied steelhead. ‘High Fish Abundance/Catching Fish’ was also a frequently mentioned factor. Similar to the Bulkley River, ‘Number of Anglers/Crowding’ was mentioned at similar percentages among BC resident/non-residents (15%) and non-resident alien anglers (12%), indicating this factor is important to all classes of anglers on this river.

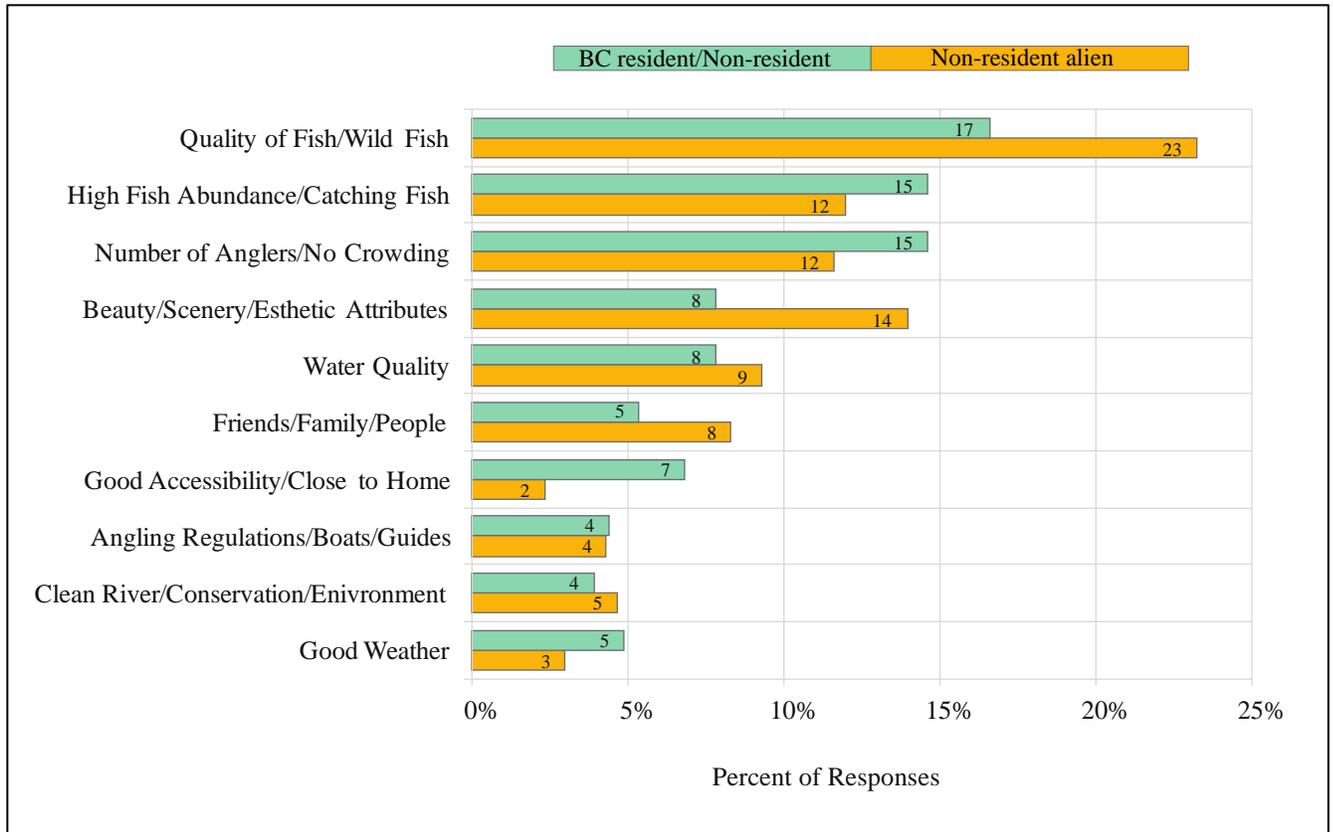


Figure 17: Factors contributing to a quality experience for BC residents/non-residents and non-resident alien anglers on the Kispiox River in 2015.

On the Zymoetz II River, 268 out of 270 individual anglers (99%) that had a complete angler interview reported factors that contributed to a high-quality angling experience. The first and second most commonly mentioned factors on this river were ‘Quality of Fish/Wild Fish’ and ‘Beauty/Scenery/Esthetic Attributes’, both being raised more often by non-resident alien anglers than BC residents and non-residents. The next most frequently raised factors by BC residents/non-residents were ‘High Fish Abundance/Catching Fish’ and ‘Number of Anglers/Crowding’. Similarly, the previous two factors were raised as frequently or more frequently by BC residents and non-residents on the Kispiox and Bulkley rivers in 2015 as well.

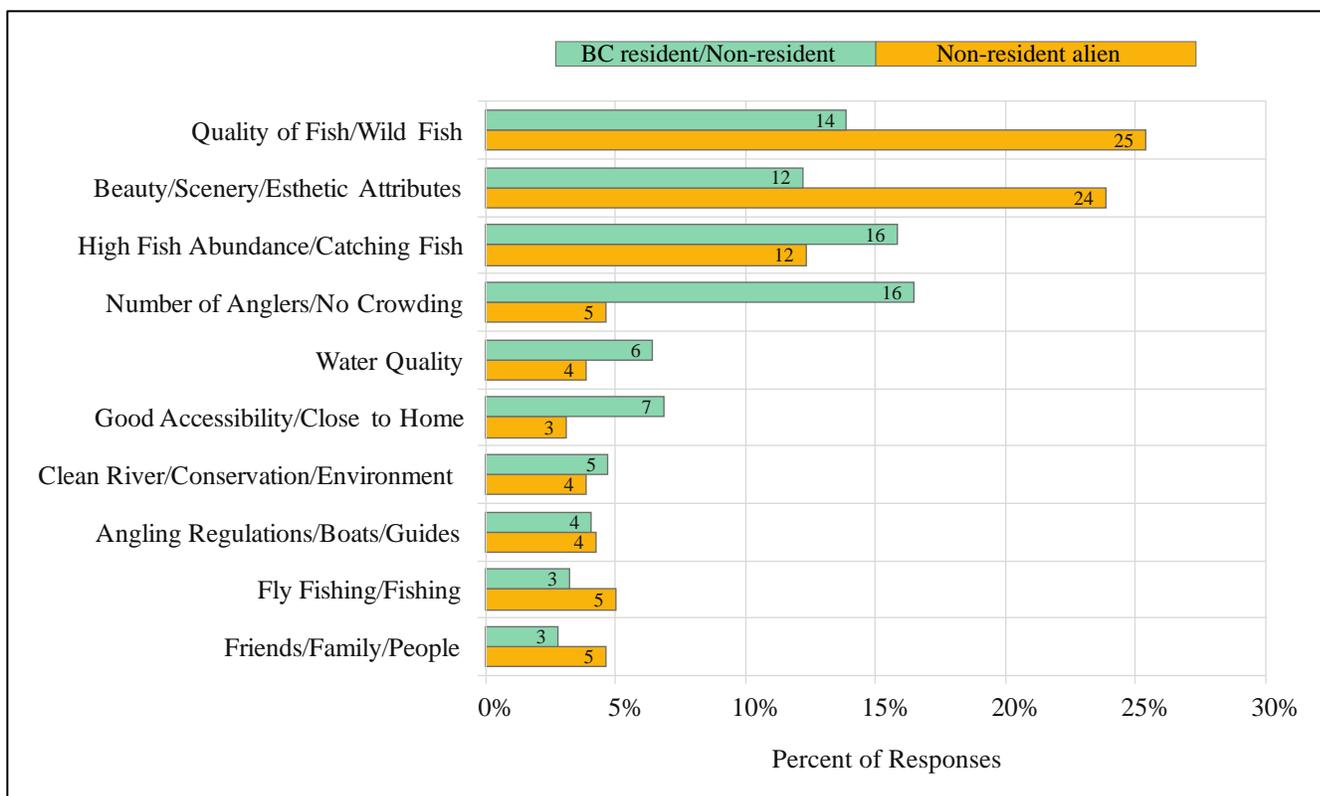


Figure 18: Factors contributing to a quality experience for BC residents/non-residents and non-resident alien anglers on the Zymoetz II River in 2015.

### 5.2.2 Quality angling experiences rating

There were 1,050 out of 1,055 complete (repeat and full-length) interviews (99%) on the Bulkley, Kispiox, Zymoetz II rivers where an angler provided a quality angling experience rating. The overall median rating was ‘good’ (4), with 36% of anglers rating their experience as ‘excellent’, 28% rated it as ‘good’, and 22% rated it as ‘fair’ (Figure 19). Few anglers rated their experience as ‘poor’ (8%) or ‘very poor’ (6%).

Although there are many factors that contribute to a quality angling experience (Figures 16-18), 86% of anglers generally appear to be having a ‘fair’ to ‘excellent’ experience fishing the Bulkley, Kispiox, and Zymoetz II rivers in 2015. The rating does, however, vary by angler residency status (Figure 19).

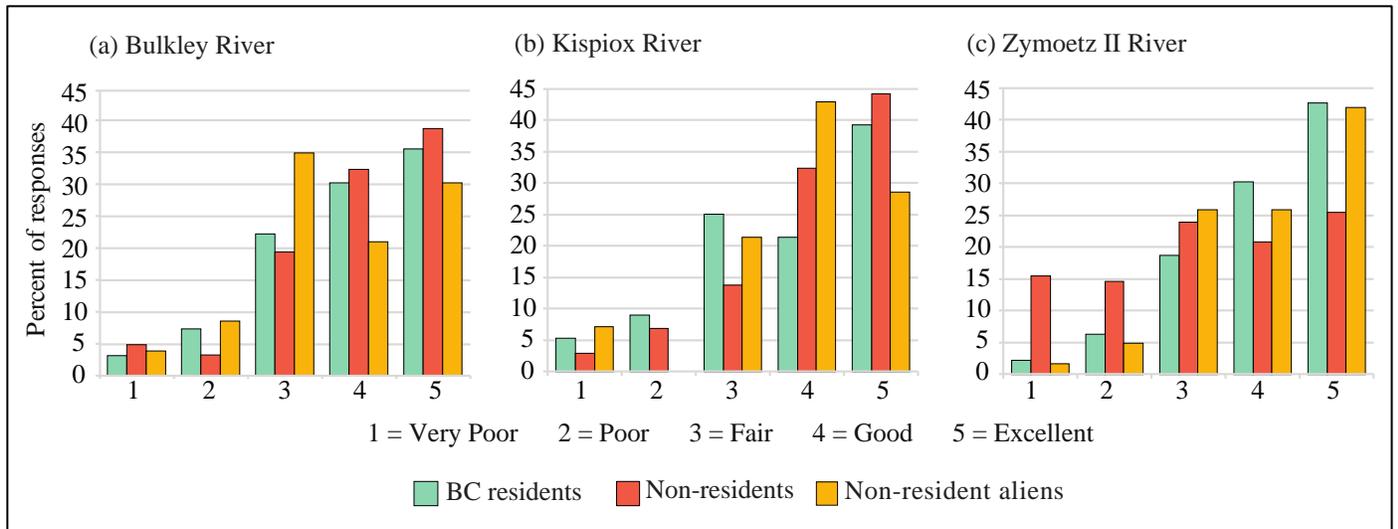


Figure 19: Percent of BC residents, non-resident, and non-resident alien responses to their quality angling experience ratings for the Bulkley, Kispiox, and Zymoetz II rivers.

### 5.2.3 Crowding rating

There were 851 out of 856 individual anglers (99%) that completed an interview on the Bulkley, Kispiox, Zymoetz II rivers. These anglers indicated how crowded they felt on a scale of ‘not crowded at all’ (1) to ‘extremely’ crowded (5). A total of 49% of anglers felt ‘not crowded at all’, 19% felt ‘slightly crowded’, 18% felt ‘moderately crowded’, 8% felt ‘quite crowded’, and 5% felt ‘extremely crowded’. Of all residency categories, BC residents mentioned that they felt “not crowded at all” the most frequently, closely followed by non-resident aliens (Figure 20). In 2015, there was no difference in the frequency of crowding ratings provided by BC residents and Skeena Region (FLNRO Region 6) residents respectively.

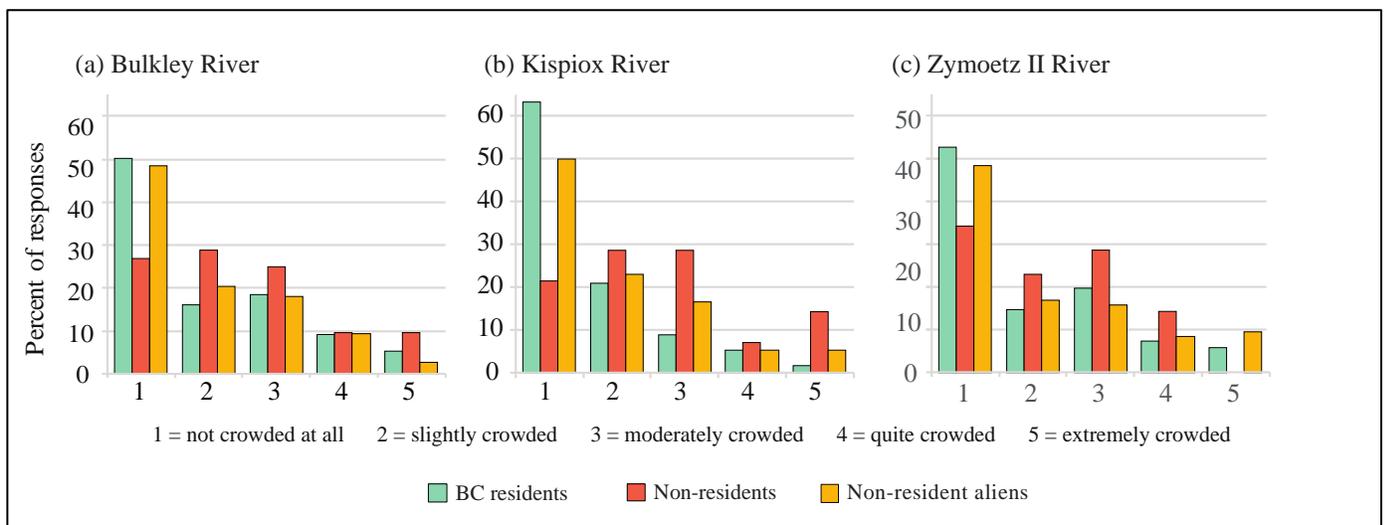


Figure 20: Percent of BC residents, non-resident, and non-resident alien responses to crowded ratings for the Bulkley, Kispiox, and Zymoetz II rivers.

A Pearson’s R correlation was used to test if there was a relationship between the number of anglers seen by an individual and their crowded rating. In 2015, there was a positive significant relationship ( $r = 0.50$ ; Figure 21). In 2013 and 2014, there was no statistical relationship between these two questions.

The boxplot below highlights the median value for number of anglers seen per crowded rating (50% of the data is above the bold line, and 50% is below, Figure 21). The boxes around the median (i.e. the bold line) represent the upper and lower 25% quartiles (25% of the data is greater than or lesser than these lines). The dashed lines followed by a flat line represent the minimum and maximum values, excluding the outliers. The round open dots represent outliers (Figure 21).

In general, individuals who felt ‘extremely crowded’ observed more anglers on the river, and individuals who felt ‘not crowded at all’ observed fewer anglers. The ‘number of anglers seen’ when an angler feels ‘extremely crowded’ is highly variable, with the number of anglers seen ranging from 0 to 59 (Figure 21). Contrarily, the ‘number of anglers seen’ when anglers felt ‘not crowded at all’ is much less variable, with the number of anglers seen ranging between 0 and 12 (Figure 21).

There was no statistically significant relationship between the number of anglers seen and the Quality Angling Experience rating. This is likely due to the number of factors that contribute to quality angling experience, of which crowding (e.g. number of anglers observed) is only one (Figure 16-18).

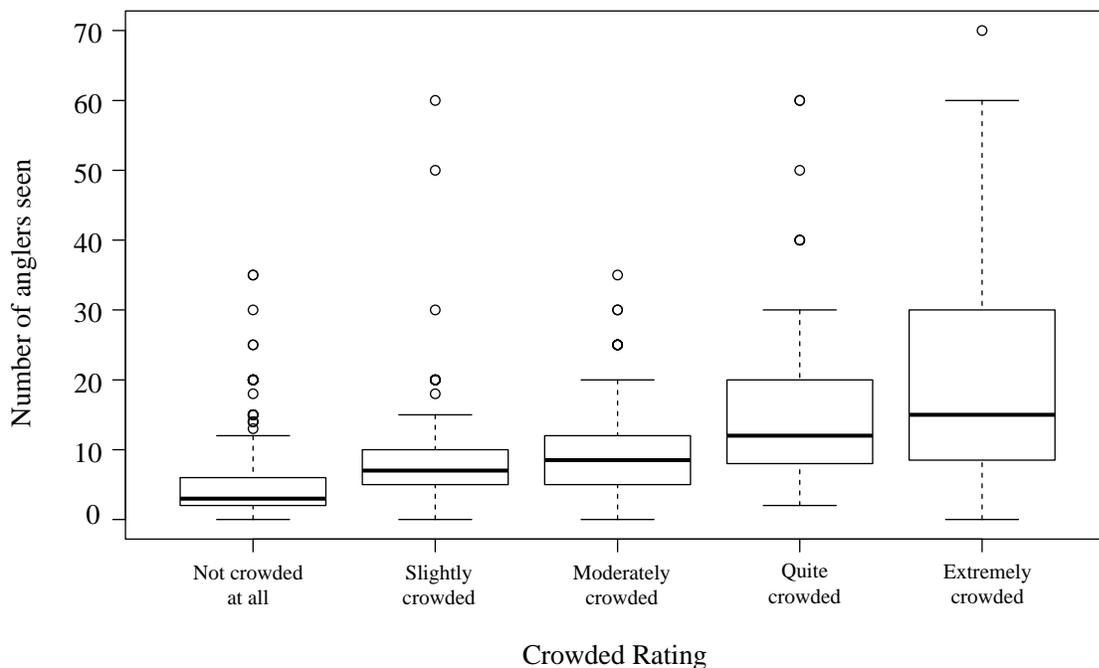


Figure 21: Boxplot displaying the number of anglers seen at different Crowded Ratings.

### 5.2.3 Crowding rating relative to restricted and unrestricted times

On the Bulkley River, there were relatively small percentage differences between restricted times and unrestricted times for each crowding rating. For example, anglers responded with ‘slightly crowded’, ‘moderately crowded’ etc, regardless of whether it was during a restricted or unrestricted time. This differs from the Kispiox and Zymoetz II rivers, where anglers responding from ‘moderately crowded’ to ‘extremely crowded’ did so more often during the unrestricted times than the restricted times (Figure 22). This may suggest that the restricted times are having an impact on how crowded anglers feel.

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.

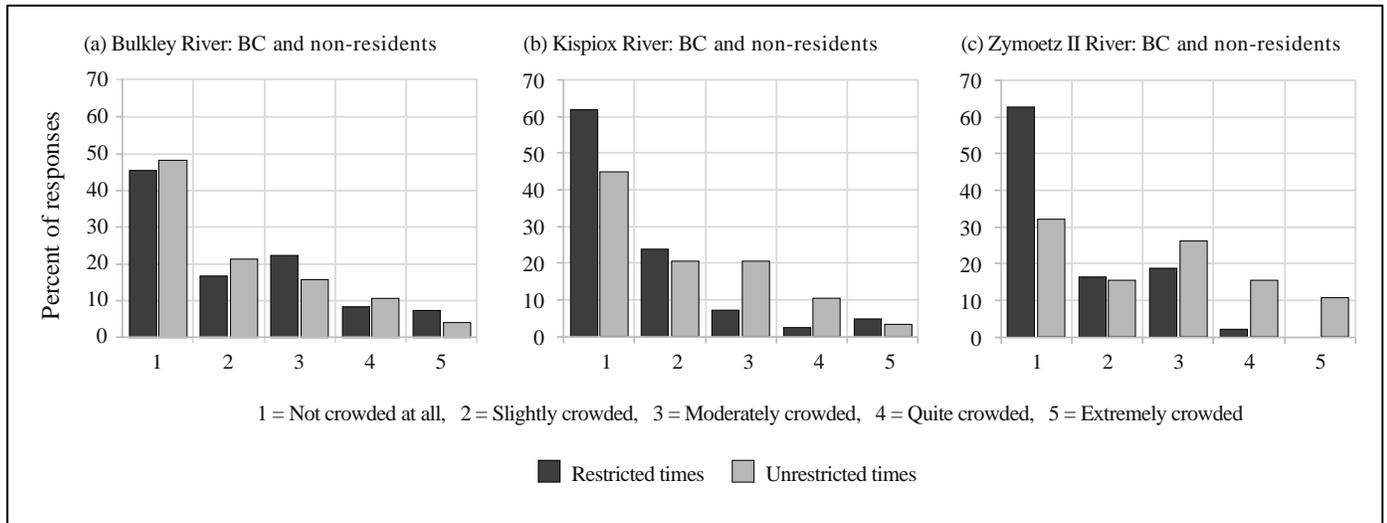


Figure 22: Percent of BC and non-resident angler responses to their Crowded Rating during restricted and unrestricted times on the Bulkley, Kispiox, and Zymoetz II rivers.

### 5.2.4 Impact of regulation changes on anglers and crowding

A total of 446 (50%) individual anglers responded ‘yes’ to fishing during the Classified Waters period between 2007 and 2011, 441 (50%) responded ‘no’ (Figure 23). 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, 157 (35%) thought that crowding had stayed the same, 157 anglers (35%) thought that the regulation change reduced crowding, 88 anglers (20%) thought that crowding had increased, and 44 (10%) did not know. 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 (71%; Figure 23), whereas most anglers who thought that

the regulation changes increased crowding on the rivers were non-resident aliens (54%; Figure 23).

To the question '*Has your quality angling experience improved as a result of the regulation change?*' 189 anglers (42%) thought it had stayed the same, 141 anglers (32%) thought that it had improved, 95 anglers (21%) thought it had declined, 16 anglers (4%) did not know, and 5 anglers (1%) provided no answer to this question. Most anglers who thought that the regulation changes improved their angling experience were BC residents (79%; Figure 23), while non-resident aliens indicated their quality angling experience had declined (83%; Figure 23).

The percent of anglers who mentioned that the regulation change had reduced crowding on the river has declined over the three year of study, from 47% in 2013, to 39% in 2014, to 35% in 2015. Similarly, fewer anglers felt the restrictions improved their quality angling experience, from 37% in 2013, to 32% in 2014, to 31% in 2015. The rationale for these patterns could be due to anglers becoming more familiar with these regulation changes over the past three years and developing a better sense of how they are working (i.e. effectiveness). It is also possible that broader factors, such as increased angler effort to the region are driving these trends (Figure 13; Appendix 7.0) and the increased resident or non-resident angler effort negatively influences the effectiveness of the non-resident alien restrictions.

Interestingly, 50% of anglers responded 'no' to fishing this region between 2007 and 2011. This potentially highlights the level of new entrants to the steelhead fisheries included in this study.

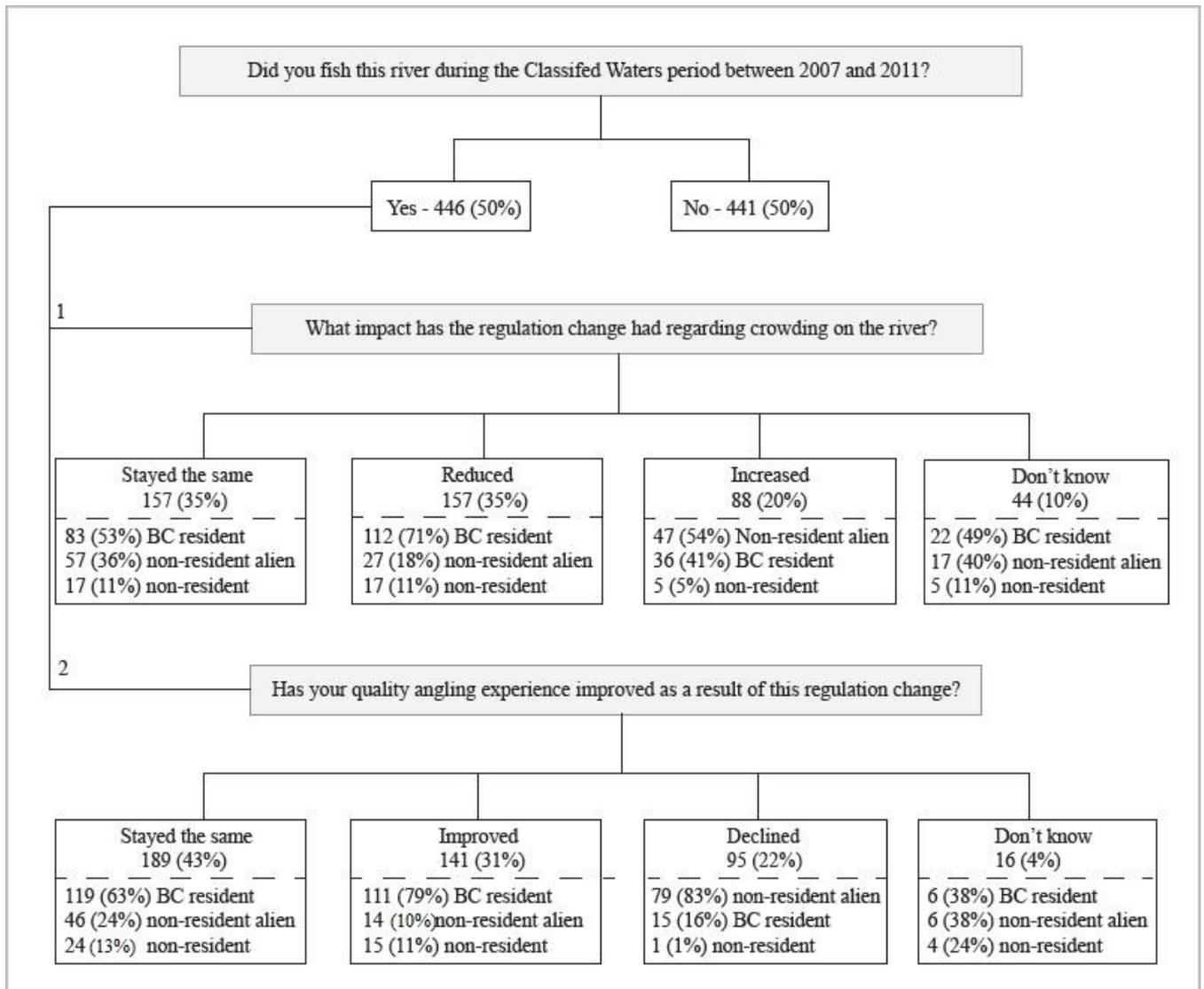


Figure 23: Summary of angler responses in 2015 to questions related to crowding and changes and quality of angling experience. For (1) angler residency was not collected from one angler. For (2) five anglers didn't provide an answer to this question, and one angler residency was not collected.

After September 23 on all rivers included in this study, the River Guardians modified the second question in Figure 23 to differentiate crowding and quality angling experiences during either restricted times or unrestricted times (Figure 24). This was done to determine if anglers were finding a particular time period more or less crowded. During the restricted times, majority of anglers (44%) thought that the crowding had reduced and during the unrestricted times, majority of anglers (45%) thought that the crowding had stayed the same.

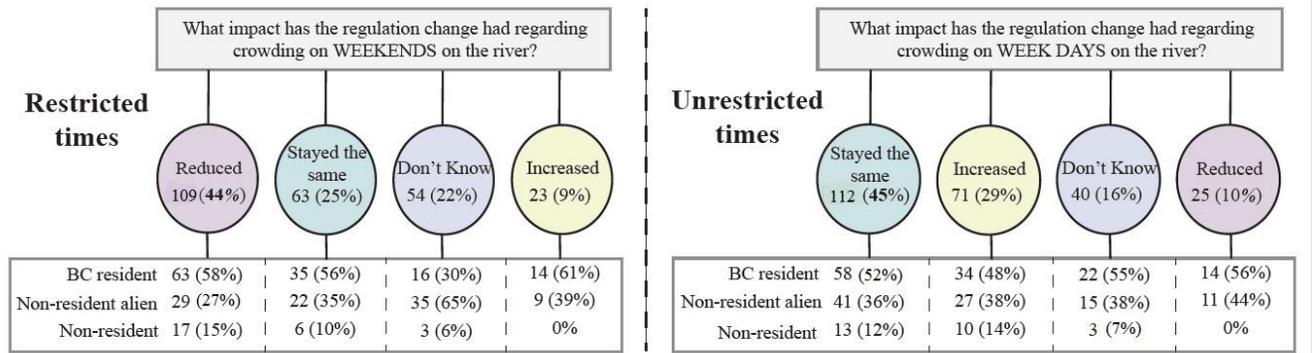


Figure 24: Summary of angler responses in 2015 to questions related to crowding during either weekends or weekdays.

### 5.2.5 Angler comments

A total of 650 out of the 887 individual anglers (73%) made comments during their angler interview on the Bulkley, Kispiox, Zymoetz II, and Skeena IV rivers. 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, 52% of BC residents/non-residents who were interviewed indicated they support these regulation changes, whereas 56% of non-resident aliens indicated they dislike these regulations. A similar angler residency split was found in 2013 and 2014 regarding the opinions surrounding the regulations changes in 2012. Comments on other topics were fewer and related to additional regulations to manage angler demand, concerns about crowding, or comments about the Classified Waters licencing system and the need for more flexibility in the way classified days are purchased (Figure 25).

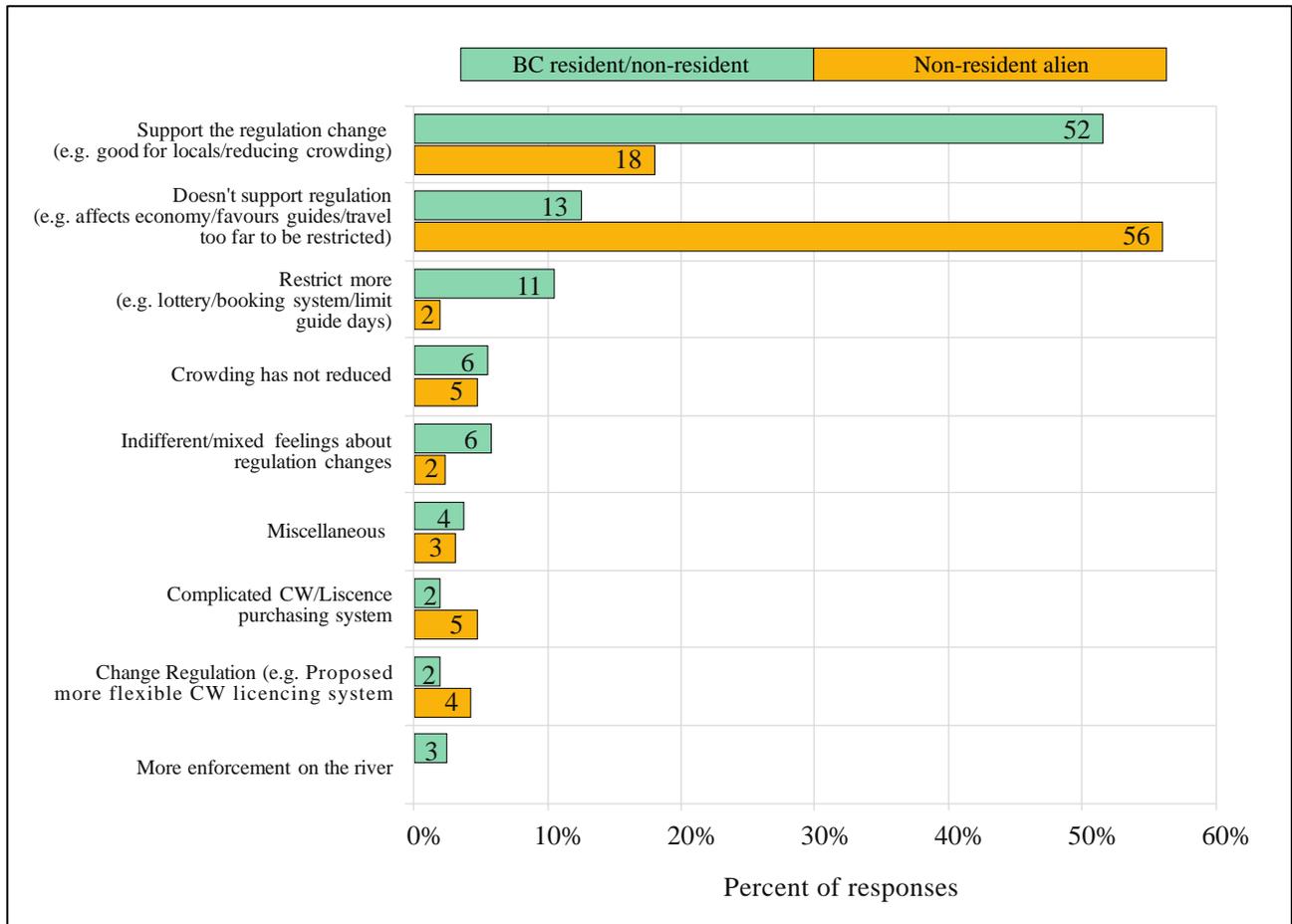


Figure 25: Comments reported to the River Guardians during angler interviews in 2015.

### 5.3 Angler licence and regulation compliance

Seventy-two out of the 1,105 complete angler interviews (7%) had some type of licence infraction. Forty-two (58%) were from BC residents, 11 (15%) were from non-residents, and 18 (25%) were from non-resident aliens (Table 12). ‘No Classified Waters licence’ was the most frequent infraction (e.g. anglers who failed to purchase this licence; 34 anglers), the majority of these anglers being BC residents (Table 12). BC residents had the highest percentage of overall licence violations, a trend that was noted 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 observed during this study reduced from 12% in 2013 to 7% in 2014 and 2015 (Pitman and Hirshfield, 2015 and 2017).

Table 12: Number (%) of fishing licence infractions by type and residency category.

Type of infractions	Number (%) of anglers with infractions on all rivers <sup>1</sup>			
	All infractions	Residency category		
		BC resident	non-resident	non-resident alien
No Classified Waters licence	34 (47)	16 (22)	6 (8)	12 (17)
Failure to carry/produce a licence	31 (43)	20 (28)	5 (7)	6 (8)
No Steelhead Stamp	6 (8)	6 (8)	0 (0)	0 (0)
Non-resident alien fishing during restricted times	1 (1)	0 (0)	0 (0)	1 (1)
<b>Total</b>	<b>72 (100)</b>	<b>42 (59)</b>	<b>11 (15)</b>	<b>19 (26)</b>

Over the study period on the Bulkley River, there was increased non-compliance in September, which declined in the second week of October. In comparison, previous studies on the Bulkley noted that infractions were distributed throughout the study period (Morten, 1999; Morten, 2000). The Zymoetz II River had elevated non-compliance in the middle of the study period, which peaked during week 10-1 and corresponded to the peak number of angler interviews that were conducted by the River Guardians (Figure 12). This trend differs from 2013 and 2014 where non-compliance was elevated until week 9-2 on this river and declined thereafter. Relative to the Bulkley and Zymoetz II, the Kispiox River had a low non-compliance rate in 2015 (Figure 26).

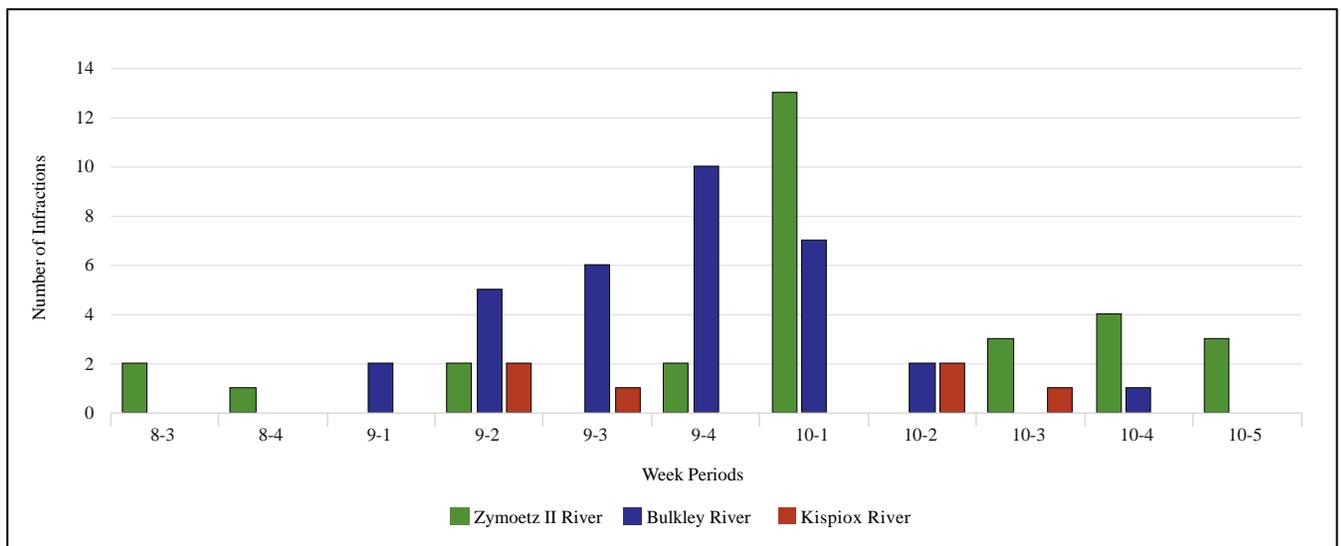


Figure 26: Number of violations per one-week period in 2015. Specific infractions are listed in Table 12.

## 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 2015, the majority caught a steelhead (Table 13). Based on the 1,105 complete angler interviews, a total of 469 steelhead were landed on the Bulkley, Kispiox and Zymoetz II rivers (Table 13). On the Bulkley River, of the 465 anglers interviewed, 95 anglers reported landing 183 steelhead. On the Kispiox River, of the 168 anglers interviewed, 52 anglers reported landing 94 steelhead. On the Zymoetz II River, of the 422 anglers interviewed, 138 anglers reported landing 192 steelhead.

Table 13: Total catch summary for interviewed anglers by species and river in 2015.

River	steelhead <sup>1</sup>		Coho		Cutthroat trout		Pink		Dolly Varden/ Bull Trout		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>
<b>Bulkley</b>	0	183	9	4	0	1	0	7	0	6	0	0
<b>Kispiox</b>	0	94	2	6	0	1	0	2	0	6	0	1
<b>Zymoetz II</b>	1	192	0	17	0	0	0	0	0	54	0	0
<b>Total</b>	<b>1</b>	<b>469</b>	<b>11</b>	<b>27</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>66</b>	<b>0</b>	<b>1</b>

*K* = kept, *R* = Released

<sup>1</sup>All retained steelhead were kept by First Nation anglers.

## 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: assessment of trends in angler effort, measurement of angler satisfaction, and evaluation of angler compliance. These objectives were specifically selected to provide 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) Challenges associated with boat use.** In the fall of 2015, low water conditions occurred on the Bulkley River. During this time, jet boat use by the guardians was not possible due to safety issues. As a result, the jet boat was used 17 out of the 43 survey days. On the Kispiox River, a raft was used 2 out of the 41 roving days due to one or both members on this crew being unavailable. These events limited the River Guardian's ability to reach boat based anglers. This said, even though boat use was limited, it did improve data collection in 2015. For example, BC residents interviewed using boats increased from 17% in 2014 to 32% 2015 and similar increases occurred for non-residents (39% to 61%) and non-resident aliens (27% to 74%). The use of boats enhanced the guardian's ability to collect sampling information which is a closer

representation of actual angler activity and opinions during the steelhead fishery. It also limits issues associated with skewed data when only foot patrols were used to intercept 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 (including 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 alien anglers.

**6.6) Non-response error.** Of all the anglers approached to be interviewed (n=1,274), 13% could not be completed as anglers were unwilling to participate (n=143) or they did not speak sufficient English (n=26). River specific non-response rates ranged from 3% on Zymoetz II to 9% on the Kispiox and 19% on the Bulkley. Bias toward non-English speaking anglers is considered low at 2%, however, the number of anglers who refused to be interviewed on the Bulkley River is considered high. In comparison, <1% and 2% of anglers surveyed on the Bulkley River in 1997 and 1998 refused to participate (Morten, 1999; Morten and Parken, 1998). The rationale for the elevated non-response bias is unknown, although it could be due to the multi-year nature of this study and apathy towards the River Guardian surveys. 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, however, it is recognized that this line of questioning during an on-site angler interview may suffer from recollection bias. For example, it is a challenge for an angler interviewed in 2015 to recall angling conditions in 2007 (nine years prior). Furthermore, anglers may not be afforded sufficient time to reflect on the intricacies of the requested information, adding to this form of bias.

## 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 (e.g. launching, loading, repairing, fueling, etc.) 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
- Reduction of guided angler-day quota (long term)
- Regional Manager to resolve 80 angler-day discrepancy

#### **Kitwanga and Kitsequecla Rivers**

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

#### **Suskwa River**

- Change from Class II to 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 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) What impact has this regulation change had on crowding on the river during the Weekend?

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

c) What impact has this regulation change had on crowding on the river during the weekday?

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

d) \*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 from August 20-October 31, 2015

Date	Time (hrs)	Day	Residency Class	Residency Location	Target species	Number of interviews	Number of anglers observed
2015-08-20	12:53 PM	Thursday	BC Resident	Prince George	Coho	2	Not available
2015-08-20	1:03 PM	Thursday	BC Resident	Prince George	Coho		
2015-08-21	10:26 AM	Friday	Non-Resident Alien	Germany	Steelhead	3	3
2015-08-21	10:28 AM	Friday	BC Resident	Kitwanga	Coho		
2015-08-21	10:39 AM	Friday	BC Resident	Not available	Sockeye		
2015-08-22	9:33 AM	Saturday	BC Resident	Kamloops	Steelhead	1	1
2015-08-25	9:35 AM	Tuesday	BC Resident	Kitwanga	Coho	5	8
2015-08-25	9:40 AM	Tuesday	BC Resident	Not available	Coho		
2015-08-25	9:47 AM	Tuesday	BC Resident	Smithers	Steelhead, coho, sockeye		
2015-08-25	9:49 AM	Tuesday	BC Resident	Kelowna	All species		
2015-08-25	10:00 AM	Tuesday	BC Resident	Westwold	Salmon		
2015-08-30	10:17 AM	Sunday	-	-	-	0	0
2015-08-31	12:32 PM	Monday	-	-	-	0	0
2015-09-02	9:49 AM	Wednesday	Non-Resident Alien	USA	Steelhead	1	1
2015-09-06	10:29 AM	Sunday	-	-	-	0	0
2015-09-08	2:42 PM	Tuesday	Not available	Not available	Steelhead	5	6
2015-09-08	2:43 PM	Tuesday	Non-Resident Alien	USA	Steelhead		
2015-09-08	2:47 PM	Tuesday	Non-Resident Canadian	Alberta	Steelhead		
2015-09-08	2:50 PM	Tuesday	Non-Resident Canadian	Ontario	Steelhead		
2015-09-08	2:55 PM	Tuesday	BC Resident	Terrace	Steelhead		
2015-09-09	12:52 PM	Wednesday	Non-Resident Canadian	Alberta	Steelhead	3	3
2015-09-09	12:52 PM	Wednesday	BC Resident	Vancouver	Steelhead		
2015-09-09	12:52 PM	Wednesday	Non-Resident Canadian	Ontario	Steelhead		
2015-09-10	12:11 PM	Thursday	Non-Resident Canadian	Ontario	Steelhead	2	2
2015-09-10	12:12 PM	Thursday	Non-Resident Alien	USA	Steelhead		
2015-09-12	11:59 AM	Saturday	Non-Resident Canadian	Not available	Steelhead	6	6
2015-09-12	12:23 PM	Saturday	BC Resident	Cumberland	Steelhead		
2015-09-12	12:21 PM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-12	12:30 PM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-12	12:33 PM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-12	12:39 PM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-13	3:59 PM	Sunday	BC Resident	Prince George	Sockeye	4	4
2015-09-13	4:00 PM	Sunday	BC Resident	Prince George	Steelhead		
2015-09-13	4:10 PM	Sunday	Non-Resident Alien	USA	Steelhead		
2015-09-13	4:39 PM	Sunday	Non-Resident Alien	USA	Steelhead		
2015-09-16	9:38 AM	Wednesday	Non-Resident Alien	USA	Steelhead		
2015-09-16	9:48 AM	Wednesday	Non-Resident Alien	USA	Steelhead	3	3
2015-09-16	10:03 AM	Wednesday	Non-Resident Alien	USA	Steelhead		
2015-09-19	10:06 AM	Saturday	Non-Resident Alien	Italy	Steelhead	7	7
2015-09-19	10:06 AM	Saturday	Non-Resident Alien	Italy	Steelhead		
2015-09-19	10:07 AM	Saturday	Non-Resident Alien	Italy	Steelhead		
2015-09-19	10:10 AM	Saturday	Non-Resident Alien	Italy	Steelhead		
2015-09-19	10:23 AM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-19	10:26 AM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-19	10:39 AM	Saturday	Non-Resident Alien	USA	Steelhead		
2015-09-20	10:14 AM	Sunday	-	-	-	0	0
2015-09-22	10:14 AM	Tuesday	BC Resident	Not available	Steelhead	1	1
2015-09-27	9:46 AM	Sunday	Non-Resident Alien	Italy	Steelhead	4	4
2015-09-27	9:51 AM	Sunday	Non-Resident Alien	Italy	Steelhead		
2015-09-27	9:53 AM	Sunday	Non-Resident Alien	Italy	Steelhead		
2015-09-27	9:56 AM	Sunday	Non-Resident Alien	Chillie	Steelhead		
2015-09-28	12:12 PM	Monday	Non-Resident Alien	Chillie	Steelhead	2	2
2015-09-28	12:22 PM	Monday	BC Resident	Not available	Steelhead		
2015-10-03	12:12 PM	Saturday	Non-Resident Alien	Netherlands	Steelhead	2	2
2015-10-03	12:13 PM	Saturday	Non-Resident Alien	Holland	Steelhead		
2015-10-07	12:13 PM	Wednesday	-	-	-	0	0
2015-10-09	2:34 PM	Friday	-	-	-	0	0
2015-10-10	12:21 PM	Saturday	-	-	-	0	0
2015-10-14	2:40 PM	Wednesday	-	-	-	0	0
2015-10-16	12:14 PM	Friday	-	-	-	0	0
2015-10-19	11:40 AM	Monday	-	-	-	0	0
2015-10-23	3:34 PM	Friday	-	-	-	0	0
2015-10-28	11:30 AM	Wednesday	-	-	-	0	0
2015-10-29	11:27 AM	Thursday	-	-	-	0	0
2015-10-31	10:22 AM	Saturday	-	-	-	0	0

**Appendix 5.0 – The number of basic licence, Classified Waters and Steelhead stamps purchased by Skeena Region residents since 2009 until 2015.**

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
2015/2016	12020	5730	14743	4265	14248

**Appendix 6.0 – Number of anglers for non-residents and non-resident aliens from 2009 to 2015.**

Year	Unguided non-resident	Guided non-resident	Unguided non-resident alien	Guided non-resident alien	Total
<b>Bulkley River</b>					
2009	137	2	503	173	<b>815</b>
2010	137	6	477	223	<b>843</b>
2011	143	4	412	219	<b>778</b>
2012	188	10	356	307	<b>861</b>
2013	182	5	419	282	<b>888</b>
2014	195	4	452	327	<b>978</b>
2015	204	10	470	330	<b>1,014</b>
<b>Kispiox River</b>					
2009	50	0	312	75	<b>437</b>
2010	52	2	349	80	<b>483</b>
2011	51	4	344	66	<b>465</b>
2012	67	2	264	99	<b>432</b>
2013	60	2	271	100	<b>433</b>
2014	48	5	249	88	<b>390</b>
2015	71	4	300	118	<b>493</b>
<b>Zymoetz II River</b>					
2009	31	0	160	41	<b>232</b>
2010	28	11	157	52	<b>248</b>
2011	25	6	164	56	<b>251</b>
2012	64	9	165	125	<b>363</b>
2013	99	12	190	100	<b>401</b>
2014	75	12	182	103	<b>372</b>
2015	120	15	218	108	<b>461</b>

**Appendix 7.0 – Number of angler days for non-residents and non-resident aliens from 2009 to 2015.**

<b>Year</b>	<b>Unguided non-resident</b>	<b>Guided non-resident</b>	<b>Unguided non-resident alien</b>	<b>Guided non-resident alien</b>	<b>Total</b>
<b>Bulkley River</b>					
2009	548	13	2,492	854	<b>3,907</b>
2010	656	41	2,132	1,143	<b>3,972</b>
2011	754	12	1,781	1,091	<b>3,638</b>
2012	900	60	1,701	1,352	<b>4,013</b>
2013	910	27	1,855	1,267	<b>4,059</b>
2014	981	13	2,153	1,406	<b>4,553</b>
2015	985	33	2,204	1,415	<b>4,637</b>
<b>Kispiox River</b>					
2009	125	0	1,435	307	<b>1,867</b>
2010	163	2	1,523	398	<b>2,086</b>
2011	176	8	1,736	367	<b>2,287</b>
2012	178	4	1,075	464	<b>1,721</b>
2013	179	2	1,128	517	<b>1,826</b>
2014	132	14	1,131	471	<b>1,748</b>
2015	228	12	1,334	516	<b>2,090</b>
<b>Zymoetz II River</b>					
2009	63	0	507	81	<b>651</b>
2010	71	18	472	91	<b>652</b>
2011	76	10	548	89	<b>723</b>
2012	194	17	507	226	<b>944</b>
2013	289	17	491	171	<b>968</b>
2014	270	28	475	182	<b>955</b>
2015	407	17	648	205	<b>1,277</b>

**Appendix 8.0 – Number of angler days per angler for non-residents and non-resident aliens from 2009 to 2015.**

<b>Year</b>	<b>Unguided non-resident</b>	<b>Guided non-resident</b>	<b>Unguided non-resident alien</b>	<b>Guided non-resident alien</b>	<b>Total</b>
<b>Bulkley River</b>					
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
2015	4.8	3.3	4.7	4.3	4.6
<b>Kispiox River</b>					
2009	2.5	0.0	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
2015	3.2	3.0	4.4	4.4	4.2
<b>Zymoetz II River</b>					
2009	2.0	0.0	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
2015	3.4	1.1	3.0	1.9	2.8

**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	
<b>Bulkley River<sup>1</sup></b>			
<b>Unguided non-resident alien</b>	464 (0.1)	424 (0.1)	t=1.077, df=5, p=0.33
<b>Guided non-resident alien</b>	205 (0.1)	312 (1.0)	t=-5.462, df=4, p=0.01
<b>Unguided non-resident</b>	139 (0.0)	192 (0.0)	t=-10.365, df=4, p=0.00
<b>Guided non-resident</b>	4 (0.5)	7 (0.4)	t=-1.647, df=5, p=0.16
<b>Kispiox River<sup>1</sup></b>			
<b>Unguided non-resident alien</b>	335 (0.1)	271 (0.1)	t=4.057, df=5, p=0.01
<b>Guided non-resident alien</b>	74 (0.1)	101 (0.1)	t=-3.708, df=5, p=0.01
<b>Unguided non-resident</b>	51 (0.0)	62 (0.2)	t=-2.070, df=3, 0.13
<b>Guided non-resident</b>	2 (1.0)	3 (0.5)	t=-0.908, df=4, p=0.42
<b>Zymoetz II River<sup>2</sup></b>			
<b>Unguided non-resident alien</b>	160 (0.0)	189 (0.1)	t=-2.507, df=3, p=0.09
<b>Guided non-resident alien</b>	50 (0.2)	110 (0.1)	t=-8.683, df=5, p=0.00
<b>Unguided non-resident</b>	28 (0.1)	91 (0.3)	t=-5.084, df=3, p=0.02
<b>Guided non-resident</b>	6 (1.0)	12 (0.2)	t=-1.859, df=3, p=0.16

\*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
<b>Bulkley River</b>								
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
2015	302	683	14	19	24	2,180	478	937
<b>Kispiox River</b>								
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
2015	74	154	0	12	4	1,330	173	343
<b>Zymoetz II River</b>								
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
2015	184	223	2	15	21	627	56	149

**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
<b>Bulkley</b>	61	83	15	32	52	83
<b>Kispiox</b>	20	35	7	11	57	128
<b>Zymoetz II<sup>1</sup></b>	80	150	24	53	33	66
<b>Total</b>	<b>161</b>	<b>268</b>	<b>46</b>	<b>96</b>	<b>142</b>	<b>277</b>

<sup>1</sup>Residency was not collected from one angler who landed a steelhead

## Appendix 12.0 – River access method

Residency category	Number (%) of individual anglers			
	Drift boat or Raft	Jet boat	Foot	Total
<b>Bulkley River<sup>1</sup></b>				
<b>BC resident</b>	43 (15)	48 (17)	192 (68)	<b>283 (61)</b>
<b>Non-resident</b>	18 (30)	19 (31)	24 (9)	<b>61 (13)</b>
<b>Non-resident alien</b>	33 (26)	29 (48)	58 (21)	<b>120 (26)</b>
<b>Total</b>	<b>94 (20)</b>	<b>96 (21)</b>	<b>274 (59)</b>	<b>464 (100)</b>
<b>Kispiox River</b>				
<b>BC resident</b>	7 (12)	N/A	50 (46)	<b>57 (34)</b>
<b>Non-resident</b>	5 (8)	N/A	9 (8)	<b>14 (8)</b>
<b>Non-resident alien</b>	47 (80)	N/A	50 (46)	<b>97 (58)</b>
<b>Total</b>	<b>59 (100)</b>	<b>N/A</b>	<b>109 (100)</b>	<b>168 (100)</b>
<b>Zymoetz II River<sup>2</sup></b>				
<b>BC resident</b>	15 (46)	0 (0)	209 (55)	<b>224 (54)</b>
<b>Non-resident</b>	8 (24)	0 (0)	53 (14)	<b>61 (15)</b>
<b>Non-resident alien</b>	10 (30)	0 (0)	117 (31)	<b>127 (31)</b>
<b>Total</b>	<b>33 (100)</b>	<b>0 (0)</b>	<b>379 (100)</b>	<b>412 (200)</b>
<b>All rivers, all residency categories</b>	<b>186 (18)</b>	<b>96 (9)</b>	<b>762 (73)</b>	<b>1,044 (100)</b>

<sup>1</sup>River access method was not collected from one angler interview

<sup>2</sup>River access method was not collected for six anglers interviews

## Appendix 13.0 – Angling gear type

Residency category	Number (%) of complete angler interviews		
	Fly	Gear	Total
<b>Bulkley River<sup>1</sup></b>			
<b>BC resident</b>	214 (56)	68 (80)	<b>282 (61)</b>
<b>Non-resident</b>	55 (15)	6 (7)	<b>61 (13)</b>
<b>Non-resident alien</b>	109 (29)	11 (13)	<b>120 (26)</b>
<b>Total</b>	<b>378 (100)</b>	<b>85 (100)</b>	<b>463 (100)</b>
<b>Kispiox River</b>			
<b>BC resident</b>	45 (34)	12 (35)	<b>57 (34)</b>
<b>Non-resident</b>	14 (10)	0 (0)	<b>14 (8)</b>
<b>Non-resident alien</b>	75 (56)	22 (65)	<b>97 (58)</b>
<b>Total</b>	<b>134 (100)</b>	<b>34 (100)</b>	<b>168 (100)</b>
<b>Zymoetz II River<sup>2</sup></b>			
<b>BC resident</b>	181 (50)	42 (82)	<b>223 (54)</b>
<b>Non-resident</b>	56 (16)	6 (12)	<b>62 (15)</b>
<b>Non-resident alien</b>	124 (34)	3 (6)	<b>127 (31)</b>
<b>Total</b>	<b>361 (100)</b>	<b>51 (100)</b>	<b>412 (100)</b>
<b>All rivers, all residency categories</b>	<b>873 (84)</b>	<b>170 (16)</b>	<b>1,043 (100)</b>

<sup>1</sup>Gear method or angler residency was not obtained from two angler interviews.

<sup>2</sup> Gear method or angler residency was not obtained from 10 angler interviews.