



ECONOMIC IMPACTS ASSOCIATED WITH GUIDED ANGLING

LOWER SKEENA REGION

PREPARED FOR



PREPARED FOR

Skeena Angling Guides Association (SAGA)

PREPARED BY

**Hannes Edinger & Spencer Britten
Big River Analytics Ltd.**

hannes@bigriveranalytics.com

spencer@bigriveranalytics.com

250.635.8653

| | |
|---|----|
| EXECUTIVE SUMMARY | 4 |
| INTRODUCTION | 5 |
| REFERENCE AREA | 6 |
| SEASONS IN THE LOWER SKEENA REGION | 8 |
| OVERVIEW OF PREVIOUS WORK | 9 |
| AGGREGATE IMPACTS | 16 |
| SPRING STEELHEAD SEASON | 19 |
| CHINOOK SEASON | 26 |
| COST OF A CLOSURE | 32 |
| SALMON SEASON | 36 |
| SUMMER STEELHEAD | 44 |
| KITIMAT RIVER | 51 |
| METHODS | 56 |
| CONCLUSION | 61 |
| WORKS CITED | 62 |

EXECUTIVE SUMMARY

The sport fishery in the Lower Skeena region is an ever-changing industry. From the heady, early days of filling coolers with salmon for tourists to today's largely catch-and-release based fishery catering to high-end clientele, guided angling on the Lower Skeena has, for a very long time, been a mainstay of the local and regional economy. Like the forestry, mining, and energy sectors, guided angling generates export income through the renewable sale of world-class angling experiences to visitors from outside the Lower Skeena region. The revenue brought into the region that is attributable to guided angling recirculates in the local economy, increasing the overall impact of the industry. Over the past two decades, guided angling on the Lower Skeena has shed its reputation as a "fill-the-cooler" salmon fishery and now rubs shoulders with the world's premier freshwater salmon fisheries: Norway, Russia, Alaska, and the more remote lodges of the Upper Skeena.

There are distinct guiding seasons in the Lower Skeena region that mirror the freshwater migration of targeted anadromous salmonids. The guiding season starts in earnest targeting spring steelhead in March and lasts until freshet (usually in May and lasting a few weeks to a month) or until rains dirty the waters such that they are unfishable. There is a lull during freshet and guides ready themselves for the chinook fishery which starts in June. The chinook fishery is focused in June and July, with some activity spilling over into the first week in August. In August, rivers in the Lower Skeena region are teeming with all five species of pacific salmon and a significant proportion of the summer steelhead run has made its way into the river. Because guided angling activity will be targeting multiple species throughout August and into the late fall, this period is divided into two seasons, summer steelhead and salmon season, each defined for the same timeframe but on different waterbodies.

This project employs a specialized Input/Output (I/O) model developed by Destination BC and Pacific Analytics to estimate economic impacts of tourism spending in smaller regions in British Columbia. We provide estimates for guided angling in the calendar years of 2013, 2014, 2015, and 2016 for each of the major seasons on the Lower Skeena: *spring steelhead*, *chinook*, *summer steelhead*, and *salmon season*. We examine the economic impacts of new salmon regulations on the North Coast in BC (recently put in place) and we provide estimates in terms of the economic impact per fish landed, released, or killed.

Overall, guided angling in the Lower Skeena region is of increasing importance to the local economy and BC's economy as a whole. The number of guided angler days is up 56% from 2013 to 2016, from 4,850 to 7,553. Direct angler expenditures totalled over \$10.5 million in 2016, producing \$16.5 million in total domestic output across BC and \$8.7 million in terms of GDP. Taken together, 2016 guided angling in the Lower Skeena region supported 190 local jobs and 224 jobs across BC, generating more than \$2.7 million in taxes province-wide.

In terms of economic impacts, the summer steelhead season is the most important, followed by the chinook season, salmon season, and finally the rapidly growing spring steelhead season.

INTRODUCTION

The sport fishery on the Lower Skeena is an ever-changing industry. From the heady, early days of filling coolers with salmon for tourists to today's largely catch-and-release based fishery catering to high-end clientele, guided angling on the Lower Skeena has long been a mainstay of the local and regional economy. Like the forestry, mining, and energy sectors, guided angling generates export income through the renewable sale of world class angling experiences to visitors from outside the Skeena region. The income generated in the Skeena region that is attributable to guided angling recirculates in the local economy, increasing the overall impact of the industry. Over the past two decades, guided angling on the Lower Skeena has shed its reputation as a "fill-the-cooler" salmon fishery and now rubs shoulders with the world's premier freshwater salmon fisheries: Norway, Russia, Alaska, and the more remote lodges of the Upper Skeena.

In the summer of 2017, for the first time, Fisheries and Oceans Canada ("DFO") closed recreational angling in the entire Skeena watershed—including tributaries—due to a predicted historically low return of sockeye salmon. Sockeye salmon are the preferred Food, Social and Ceremonial (FSC) fish for many First Nations in the Skeena region. After conservation, FSC fisheries, which are constitutionally protected (S.35), have priority access to Skeena salmon. In a negotiated agreement, First Nations in the Skeena region agreed not to harvest sockeye and to direct their FSC fishery at Skeena chinook. In order to avoid conflicts on the river and to allow First Nations to target the significantly less abundant chinook run, DFO announced a Skeena-wide closure for recreational angling.

The economic impacts of recreational angling on the Lower Skeena have been estimated in the past, but those estimates are dated and do not focus on guided angling or specific fishing seasons on the Lower Skeena. The negative economic impacts of the 2017 closure were widely discussed among Lower Skeena locals and in the media. Speculation about the magnitude of the impact varied widely. This study serves to update the existing estimates in terms of economic impacts, and it extends the scope of previous studies to examine the impacts of specific fisheries in the Lower Skeena to deepen our understanding of the contribution to the local economy that guided angling provides. Further, given an environment of reduced salmonid abundance in the Lower Skeena, this study endeavours to provide context in terms of resource utilization and economic benefits. In May of 2018, for a second year in a row, in response to historically low chinook abundance, DFO has closed recreational angling in the entire Skeena watershed, closed chinook fishing in the Nass watershed, and limited all other rivers draining into Areas 1 – 6 to a non-retention fishery. We estimate the economic impact of this regulation change relative to two other regulatory approaches.

This project provides economic impact estimates in the calendar years of 2013, 2014, 2015, and 2016 for the guided angling on the Lower Skeena, a set of relevant tributaries, and a few additional regional freshwater fisheries. The remainder of this report is organized in the following way: we first define the reference area ("Lower Skeena") and provide an overview of the timing and effort of guided angling over the course of a calendar year. We then examine the economic impacts of the industry as a whole over our reference years (2013–2016), followed by a more detailed look at each guiding season, including the economic impacts per landed and/or killed fish in each of the fisheries.

REFERENCE AREA

Our reference area is intended to capture guided angling that is based in the Terrace and Kitimat region or on the classified rivers in and around Terrace and Kitimat. Geographically, these guiding businesses are all based west of Kitwanga, north of Kitimat, and south of the Nass Valley. Our study includes some of the guiding activity from upriver businesses that have “rod days” on classified rivers around Terrace and Kitimat. Strictly speaking, our reference area includes the waterbodies listed in Table 1 plus a selection of smaller waterbodies. **Figure 1**

Table 1: Major waterbodies defining our reference area

| | |
|--------------------|----------------------------|
| Bell-Irving River | Kitimat River |
| Cranberry River | Kitsumkalum River |
| Ecstall River | Nass River |
| Exchamsiks River | Skeena River |
| Exstew River | Zymagotitz River |
| Ishkheenickh River | Zymoetz River (upstream) |
| Kasiks River | Zymoetz River (downstream) |
| Kemano River | Gitnadoix River |
| Kincolith River | Kitlope River |

Source: Skeena Angling Guides Association members' guide reports

Figure 1 is a map of the watershed that defines our area of interest, the Lower Skeena region. The guiding businesses that are members of the Skeena Angling Guide Association are primarily located in the Terrace-Kitimat area, and their guiding activities take them throughout the geographic area depicted in Figure 1.

Throughout this report economic impacts are presented at two different geographies: “local impacts” or those that are said to accrue to the Lower Skeena region are, more precisely, those impacts that accrue to the Regional District of Kitimat-Stikine. Our reference area and the Regional District of Kitimat-Stikine overlap almost entirely. The second geography is the Province of British Columbia as a whole which includes the Regional District of Kitimat-Stikine.

Figure 1: Map of the watershed that defines our area of interest, the Lower Skeena region.



Source: D. Kahle and H. Wickham. ggmap: Spatial Visualization with ggplot2. The R Journal, 5(1), 144-161.

SEASONS IN THE LOWER SKEENA REGION

There are distinct guiding seasons in the Lower Skeena region that mirror the freshwater migration of targeted anadromous salmonids. The guiding season starts in earnest targeting spring steelhead in March and lasts until freshet (usually in May and lasting a few weeks to a month) or until rains dirty the waters such that they are unfishable. This spring steelhead fishery has doubled in terms of the number of guided angler days over our reference period (2013–2016). There is a lull during freshet and guides ready themselves for the chinook fishery in June. The chinook fishery is focused in June and July, with some activity spilling over into the first week in August. Guided angling in the chinook season has also increased significantly (32%) over our reference period. In August, rivers in the Lower Skeena region are teeming with all five species of pacific salmon and a significant proportion of the summer steelhead run has made its way into the river. Because guided angling activity will target multiple species throughout August and into the late fall, this period is divided into two seasons, summer steelhead and salmon season, each defined for the same timeframe but on different waterbodies. Table 2 presents our definitions, by major waterbody and month, of the respective seasons that make up the guided angling year on the Lower Skeena.

Table 2: Definition, by waterbody and time period, of our respective guiding season in the Lower Skeena region

| <i>Season</i> | <i>Timing</i> | <i>Waterbodies</i> |
|-------------------------|-----------------|---|
| <i>Spring steelhead</i> | January–May | All waterbodies in the Lower Skeena region |
| <i>Chinook</i> | June–July | All waterbodies in the Lower Skeena region |
| <i>Summer steelhead</i> | August–December | Kitsumkalum River Zymoetz River Skeena River Nass River and select tributaries |
| <i>Salmon</i> | August–December | Kitimat River Exstew River Kasiks River Exchamsiks River Area 6 ¹ rivers |

Salmon season is the only reference season in which multiple species are targeted, though the primary target species are either chum salmon in August (Kitimat River and Area 6 rivers) or coho in late August–October (Kitimat, Exstew, Kasiks, and Exchamsiks Rivers; Area 6 rivers).

¹ Area 6 rivers refer to all rivers draining into the Douglas Channel or Gardiner Canal

OVERVIEW OF PREVIOUS WORK

Previous research into the economic impact of the fisheries in the Skeena watershed include a 1973 Environment Canada study and a 2008 report by Counterpoint Consulting commissioned by the Pacific Salmon Foundation. The 1973 study does not estimate the total economic impact of guided angling or break down the fishing seasons in its assessment, but it does discuss the preferred fishing species and catches per angler day. The second report looks at business profiles of lodges, guides, and anglers and separates upper and lower freshwater fisheries in the Skeena, allowing for comparable estimates to our current study.

ECONOMIC IMPACT IN 1972-73

In 1974, Environment Canada examined the sport fishery in the Lower Skeena region (Reid 1974). At the time, the sport fishery was one of the main draws for tourists to the region, along with the “Totem Circle Tour”, Ksan Historical Village, alpine scenery and outdoor recreation, and the reconstructed Kitimat smelter (Reid 1974, 58).

In 1972 and 1973 the region’s fisheries supported an average of 127,444 salmon and trout angler days and 20,536 steelhead angler days. “Residents accounted for almost 90 percent of the total effort on salmon and trout stocks. They also were responsible for over two-thirds of the effort on steelhead stocks” (Reid 1974, 61). About a fifth of the populations of Terrace and Kitimat were active anglers. During the time of the study, 59 percent of the 27,117 non-resident fishing party days in the region could be attributed directly to the sports fishery; 58 percent of these were non-resident Canadians (61), and 50 percent of non-resident Canadians were from British Columbia (67).

The fish available in the Lower Skeena region affected the activities of tourists in the region. No restrictions on the size or number of fish that could be harvested from the watershed were discussed in the Reid report. Table 3 describes the average angler days seeking salmon and trout or steelhead,

Table 4 describes the preferred species of fish for anglers based on their residence, and

Table 5 describes the success of anglers’ fishing by species. All three tables use average figures from the years 1972–73.

Table 3: Average angler days by resident category, 1972–73 season

| | <i>Salmon and Trout</i> | <i>Steelhead</i> |
|-------------------------------|-------------------------|------------------|
| <i>BC Residents</i> | 114,271 | 13,813 |
| <i>Non-resident Canadians</i> | 8,088 | 3,676 |
| <i>Non-Canadians</i> | 5,085 | 3,047 |
| Total | 127,444 | 20,536 |

Source: Reid 1974, p. 63.

Table 4: Preferred species by resident category, 1972–73 season

| | <i>Salmon (%)</i> | <i>Trout (%)</i> | <i>Steelhead (%)</i> | <i>No Preference (%)</i> |
|-------------------------------|-------------------|------------------|----------------------|--------------------------|
| <i>BC Residents</i> | 48 | 29 | 18 | 5 |
| <i>Non-resident Canadians</i> | 42 | 34 | 15 | 10 |
| <i>Non-Canadians</i> | 32 | 40 | 21 | 9 |
| Total | 43 | 32 | 17 | 7 |

Source: Reid 1974, p. 73.

Table 5: Sport fishing effort, total catch, and catch by angler day, 1972–73 season

| | <i>Angler days</i> | <i>Catch</i> | <i>Catch per angler day</i> |
|-------------------------------|--------------------|---------------|-----------------------------|
| Salmon | | | |
| <i>BC Residents</i> | 64,103 | 10,256 | 0.16 |
| <i>Non-resident Canadians</i> | 5,212 | 1,616 | 0.31 |
| <i>Non-Canadians</i> | 2,658 | 1,967 | 0.74 |
| Total | 71,973 | 13,839 | 0.19 |
| Trout | | | |
| <i>BC Residents</i> | 50,168 | 89,575 | 1.79 |
| <i>Non-resident Canadians</i> | 2,876 | 3,681 | 1.28 |
| <i>Non-Canadians</i> | 2,427 | 6,407 | 2.64 |
| Total | 55,471 | 99,663 | 1.80 |
| Steelhead | | | |
| <i>BC Residents</i> | 13,813 | 2,624 | 0.19 |
| <i>Non-resident Canadians</i> | 3,676 | 790 | 0.21 |
| <i>Non-Canadians</i> | 3,047 | 557 | 0.18 |
| Total | 20,536 | 3,971 | 0.19 |

Source: Reid 1974, pp. 76-77, 79.

Sports fishing opportunities played an important role in attracting tourists to the region. 63 percent of non-resident Canadians and 77 percent of non-Canadians reported that they would either not have visited the region or would have cut their trip to the region short without the opportunity for sport fishing (Reid 1974, 81). These results are detailed in Table 6.

Table 6: Draw of sport fishing for tourists to the Lower Skeena Valley region, 1972–73 season

| | <i>Non-resident Canadians (%)</i> | <i>Non-Canadians (%)</i> |
|--|-----------------------------------|--------------------------|
| <i>Would not have made trip</i> | 35.6 | 41.6 |
| <i>Would have cut trip short</i> | 27.4 | 36.0 |
| <i>Would have substituted other activity</i> | 37.0 | 22.4 |

Source: Reid 1974, p. 81.

The species of fish available for fishing had an impact on the willingness of tourists to fish in the region. As detailed in Table 7, salmon and steelhead were the largest draws for sport fishing party days in 1972–73 (Reid 1974, 82).

Table 7: Percentage decline in sport fishing party trips in the absence of sport fishing opportunities by species, 1972–73 season

| | <i>Salmon</i> | <i>Trout</i> | <i>Steelhead</i> | <i>No pref.</i> | <i>All parties</i> |
|-------------------------------|---------------|--------------|------------------|-----------------|--------------------|
| <i>Residents</i> | 35 | 33 | 40 | 17 | 34 |
| <i>Non-resident Canadians</i> | 43 | 19 | 50 | 0 | 36 |
| <i>Non-Canadians</i> | 63 | 19 | 58 | 0 | 42 |

| | | | | | |
|---------------------------------|-----------|-----------|-----------|----------|-----------|
| <i>All residence categories</i> | 45 | 24 | 48 | 6 | 37 |
|---------------------------------|-----------|-----------|-----------|----------|-----------|

Source: Reid 1974, p. 82.

The direct economic impact of sport fishing in the region has increased dramatically. In 1972–73, non-residents paid as little as \$98.09² per party day on a trip and \$86.75 per angler day on a trip in the region. Average expenditures for the season are detailed in Table 8. As a result, the direct economic impact of the summer and steelhead fisheries in 1972–73 was \$2.1 million. This number is broken down by fishery in Table 9.

Table 8: Average non-resident expenditures, 1972–73 season

| | <i>Non-resident Canadians</i> | <i>Non-Canadians</i> |
|------------------------------|-------------------------------|----------------------|
| <i>Per party day on trip</i> | \$98.09 | \$121.03 |
| <i>Per angler day</i> | \$86.75 | \$125.78 |

Source: Reid 1974, p. 84, adjusted to 2018 dollars using Bank of Canada Inflation Calculator.

Table 9: Expenditure attributable to non-residents in the summer (1972–73) and steelhead (average 1971–72, 1972–73) sport fisheries in the Lower Skeena region

| | <i>Non-resident Canadian</i> | | <i>Non-Canadian</i> | | <i>Total non-resident</i> |
|---|------------------------------|------------------|---------------------|------------------|---------------------------|
| | <i>Summer</i> | <i>Steelhead</i> | <i>Summer</i> | <i>Steelhead</i> | <i>Total</i> |
| <i>Total expenditure in Lower Skeena Valley by sport fish parties</i> | \$527,587 | \$814,830 | \$755,220 | \$696,048 | \$2,793,685 |
| <i>Expenditure attributable to sport fishing</i> | \$527,587 | \$416,768 | \$755,220 | \$475,138 | \$2,174,713 |

Source: Reid 1974, p. 85, adjusted to 2018 dollars using Bank of Canada Inflation Calculator.

ECONOMIC IMPACT IN 2008

Counterpoint Consulting examined the sport fishery in their 2008 study, *Economic Dimensions of the Skeena Watershed Salmonid Fisheries* (2008). They measured the impacts on the region differently than did Environment Canada three decades earlier, breaking down findings between three fisheries and examining the business profiles of guides and lodges.

Counterpoint Consulting’s report differentiates not by fish species but by fisheries: the saltwater fishery in Chatham Sound, freshwater on the lower river (comparable to our reference region), and the upriver freshwater fisheries; and by the type of sport fishing: independent angling, with a fishing guide or charter boat, and visiting a fishing lodge (Counterpoint Consulting 2008, 80). This creates nine component parts to the region’s sports fisheries, since all three types of fishing exist in each of the fisheries.

The saltwater fishery, which operates from late May to early September, supports mostly fishing for consumption rather than catch-and-release, with chinook and coho salmon as well as ground fish, such as halibut, as anglers’ main targets (Counterpoint Consulting 2008, 80–81).

² All dollar figures in this section are 2018 dollars, calculated from 1974 dollars using the Bank of Canada’s Inflation Calculator and figures from Reid 1974.

In the freshwater fisheries, the lower river is described as primarily consumptive while the upper river is largely catch-and-release. As we demonstrate in this report, this has largely changed and both lower river and upper river fisheries are now essentially all catch-and-release. Fishing on the lower river ranges from March through November with a peak in July and early August, during which time angler crowding can become an issue. The upper river season begins in late August and lasts through October or early November and provides more of a wilderness experience emphasizing remoteness (Counterpoint Consulting 2008, 82–83). The freshwater fisheries contain “Classified Waters”, a sport fishery management system introduced in 1990 that limits the number of rod days per fishery per season to ensure a high quality angling experience and limit the impacts of crowding. In both the lower and upper river fisheries, guided angling primarily targets steelhead (82–83). Since 2007, all wild steelhead caught in the Skeena region must be released, but hatchery steelhead may be retained (84). Hatchery steelhead are only present on the Kitimat river.

The Counterpoint Consulting report emphasizes the “brand” of world-renowned Skeena sport fishing, which combines angling with a pristine wildlife experience. Guides and lodges in the Skeena watershed average a base of 70 percent repeat customers who value not only the fishing experience but conservation efforts and competent management of the fisheries (Counterpoint Consulting 2008, 94), which they are able to demand in part because of the high price paid per trip. Because of the cost of a vacation on the Skeena, many clients are older, with an average age of 60 years (95).

The appreciation of the Canadian dollar in 2008 against the U.S. dollar presented problems for guides and lodges who charge in U.S. dollars, as does the increased price of fuel (Counterpoint Consulting 2008, 94), but the most significant problem explored in the report was angler crowding, which has an impact on both the wilderness experience and the fish encounters available.

Saltwater angling in Chatham Sound generated 11,700 boat trips, of which 2,400 were on lodge boats and 3,100 were charter boat trips. Nearly one-quarter of these trips aimed at fishing Skeena salmon (Counterpoint Consulting 2008, 82). On the lower Skeena River, there were 14,500³ guided angler days and 63,800 independent angler days; on the upper Skeena River, there were 6,200 guided angler days and 10,400 independent angler days. Independent angler days on the lower Skeena represented the largest component of recreational fishing in the Skeena watershed (87). This resulted in a total of 132,900 angler days in the three fisheries. These data are summarized in Table 10.

Table 10: Summary of angler days by fishery in Counterpoint Consulting 2008

| | <i>Guided</i> | <i>Anglers</i> | <i>Total</i> |
|---------------------|---------------|----------------|----------------|
| <i>Salt Water</i> | 20,500 | 16,000 | 36,400 |
| <i>Lower Skeena</i> | 14,500 | 65,400 | 79,900 |
| <i>Upper Skeena</i> | 6,100 | 10,400 | 16,600 |
| <i>Total</i> | 41,100 | 91,800 | 132,900 |

Source: Counterpoint Consulting 2008, p. 88.

Skeena salmon are not the only fish sought in the sports fisheries, especially in Chatham Sound. Adjusting for this, the total angler days attributable to salmonid fishing in the Skeena was 112,400, as detailed in Table 11.

³ It's unclear how an estimate of 14,500 guided angler days on the lower river was obtained. It is possible it is a typo and the measured estimate is 4,500 which is in line with the number of guided angler days reported by the Province in the first year of our reference period (2013). There was no significant decline observed between 2008 and 2013.

Table 11: Summary of angler days attributable to Skeena salmonids by fishery in Counterpoint Consulting 2008

| | <i>Guided</i> | <i>Anglers</i> | <i>Total</i> |
|---------------------|---------------|----------------|----------------|
| <i>Salt Water</i> | 9,000 | 7,000 | 15,900 |
| <i>Lower Skeena</i> | 14,500 | 65,400 | 79,900 |
| <i>Upper Skeena</i> | 6,100 | 10,400 | 16,600 |
| <i>Total</i> | 29,600 | 82,800 | 112,400 |

Source: Counterpoint Consulting 2008, p. 89.

Businesses in these fisheries generate significant income. Saltwater fishery businesses generated \$824,000⁴ in income, while the businesses on the lower Skeena generated \$430,000 and \$580,000 on the upper Skeena. Small businesses in the freshwater fisheries were not generally profitable, losing \$25,000 and \$21,000 in the lower and upper Skeena fisheries, respectively. Income overviews are detailed in Table 12 and Table 13.

Table 12: Skeena salmon saltwater sport sector business profiles from Counterpoint Consulting 2008, thousands of dollars

| | <i>Charter boats</i> | <i>Saltwater lodges</i> | <i>Business total</i> |
|-----------------|----------------------|-------------------------|-----------------------|
| <i>Revenue</i> | \$3,963 | \$4,386 | \$8,349 |
| <i>Expenses</i> | \$3,759 | \$3,766 | \$7,525 |
| <i>Income</i> | \$204 | \$620 | \$824 |

Source: Counterpoint Consulting 2008, p. 90. Adjusted from 2008 dollars to 2018 dollars using the Bank of Canada's Inflation Calculator.

Table 13: Skeena river sport sector business profiles from Counterpoint Consulting 2008, thousands of dollars

| | <i>Large</i> | <i>Medium</i> | <i>Small</i> | <i>Total</i> |
|---------------------|--------------|---------------|--------------|----------------|
| Lower Skeena | | | | |
| <i>Revenue</i> | \$2,145 | \$1,487 | \$536 | \$4,168 |
| <i>Expenses</i> | \$1,841 | \$1,336 | \$561 | \$3,738 |
| <i>Income</i> | \$304 | \$151 | \$-25 | \$430 |
| Upper Skeena | | | | |
| <i>Revenue</i> | \$1,950 | \$3,187 | \$446 | \$5,583 |
| <i>Expenses</i> | \$1,674 | \$2,862 | \$467 | \$5,003 |
| <i>Income</i> | \$276 | \$325 | \$-21 | \$580 |

Source: Counterpoint Consulting 2008, pp. 91-92. Adjusted from 2008 dollars to 2018 dollars using the Bank of Canada's Inflation Calculator.

The direct economic impact of the Skeena fisheries accrues not only in the Skeena watershed, but elsewhere in British Columbia when gear or transportation to the Skeena are purchased. The total direct

⁴ All dollar figures in this section are in 2018 dollars, adjusted from 2008 dollar figures in Counterpoint Consulting 2008 using the Bank of Canada's inflation calculator.

economic impact of salmon fishing in the Skeena watershed is \$36 million and the direct economic impact on British Columbia is \$40 million. (Counterpoint Consulting 2008, 98-99) A detailed breakdown is presented in Table 14.

Table 14: Direct economic impact of Skeena salmonid sport fishing in the region (and in British Columbia) from Counterpoint Consulting 2008, thousands of dollars

| | <i>Guided</i> | <i>Anglers</i> | <i>Total</i> |
|---------------------------|---------------|----------------|-----------------|
| <i>Salt Water salmon</i> | 8,989 | 3,271 | 12,260 |
| <i>(for all BC)</i> | (10,241) | (3,417) | (13,658) |
| <i>Lower Skeena River</i> | 5,390 | 10,290 | 15,680 |
| <i>(for all BC)</i> | (6,551) | (11,075) | (17,773) |
| <i>Upper Skeena River</i> | 6,195 | 1,920 | 8115 |
| <i>(for all BC)</i> | (6,698) | (2,089) | (8,787) |
| <i>Total</i> | 20,574 | 15,481 | 36,055 |
| <i>(for all BC)</i> | (23,490) | (16,581) | (40,218) |

Source: Counterpoint Consulting 2008, pp. 98-99. Adjusted from 2008 dollars to 2018 dollars using the Bank of Canada's Inflation Calculator.

The total economic impact of salmon fishing in the Skeena watershed sport fisheries in British Columbia was \$62.3 million, comprising \$40.2 million in direct impacts plus \$22.3 million in secondary (indirect and induced) impacts (Counterpoint Consulting 2008, 100).

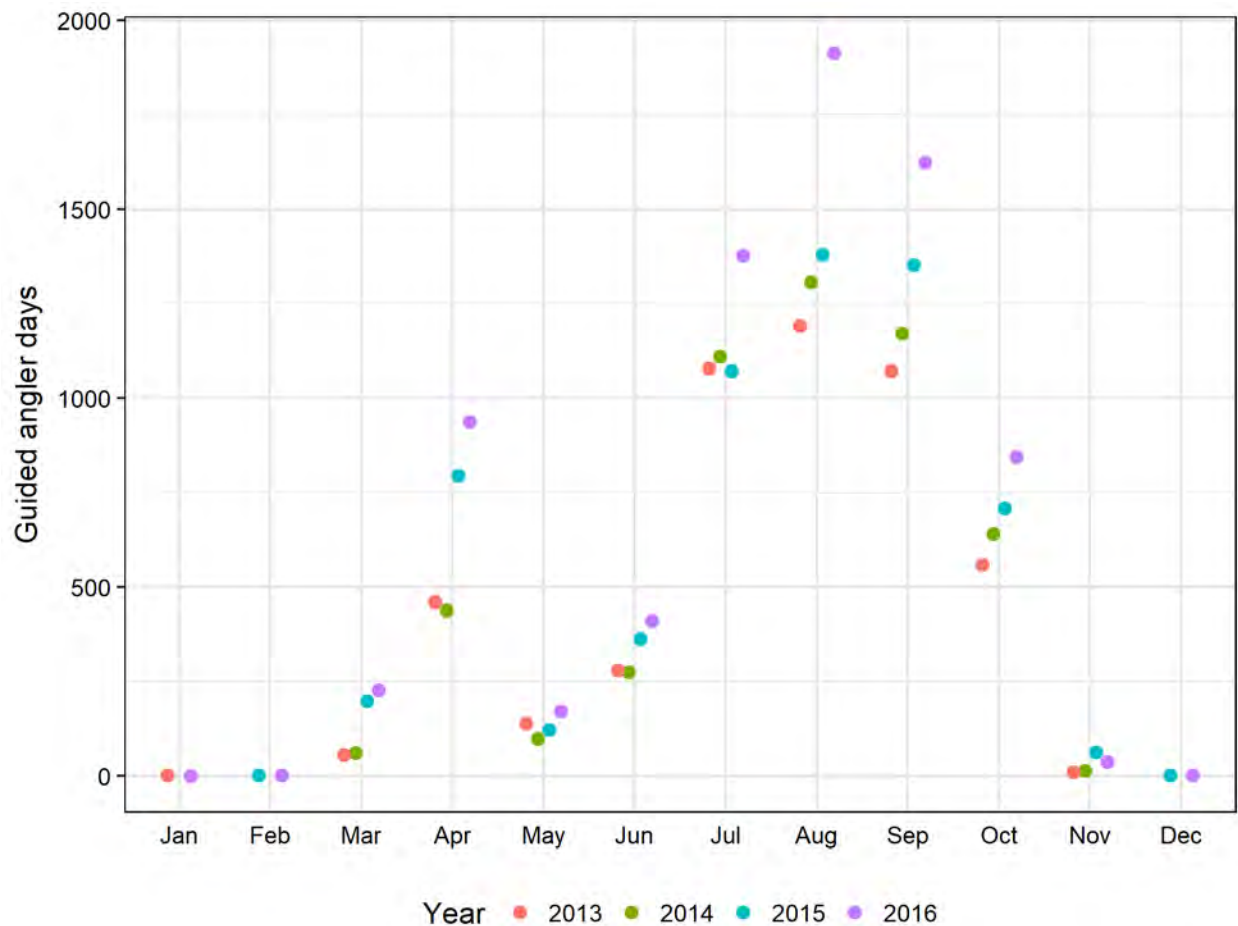
AGGREGATE IMPACTS

This section of the report presents aggregate results for all four of our reference seasons combined, representing all guided angling that takes place in the Lower Skeena region over the calendar years of 2013, 2014, 2015, and 2016.

EFFORT & TIMING

The reference seasons defined in the previous section are identifiable in Figure 2, showing the number of guided angler days in each month for each of our reference years. Significant growth in guided angling days is evident, particularly for the peak months of July, August and September and a notable increase in the month of April directed at spring steelhead.

Figure 2: Guided angling activity based in the Lower Skeena region, by month, 2013–2016



Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Table 15 presents the same information displayed in Figure 2, aggregated for each reference year, along with year over year percentage growth in the number of guided angling days.

Table 15: Guided angler days and year over year growth in the Lower Skeena region, 2013–2016

| | 2013 | 2014 | 2015 | 2016 |
|---------------------------|-------|-------|-------|-------|
| <i>Guided Angler Days</i> | 4,850 | 5,115 | 6,061 | 7,553 |
| <i>Growth (%)</i> | | 5% | 18% | 25% |

Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

IMPACTS OVERVIEW

The economic impacts in this report are measured in terms of domestic output, GDP, employment, and taxation revenues. Loosely, domestic output is equal to the total spending attributable to guided angling that takes place in our reference area minus imports and indirect taxes paid on consumption. GDP in this context measures the final value of the goods and services produced in the guided angling economy, from guides, retail shops, restaurants and hotels, and other participants in the value-chain. Employment is measured in terms of total jobs, not full-time equivalent (FTE) jobs. Total jobs need not be full-time (for example, seasonal employment is included), while FTE jobs are normalized to represent a year-round full-time job at full-time hours. Total jobs are used as our measure of employment because guided angling is essentially a seasonal business. Finally, taxation is presented in terms of federal and provincial taxes.

The total economic impact comprises three components: the direct component, which is largely payments to guiding businesses net of their expenditures; the indirect component, which captures the demand created by guided angling for inputs (e.g. fuel for boats, rods and fishing gear, food for lunches); and the induced component, which measures the spillover impact when industry participants (guides, lodge owners) spend the money they have earned in the local economy. In the body of this report, unless otherwise noted, total impacts (direct, indirect, and induced impacts) are presented. A detailed breakdown of the components of total impacts is included in the appendix.

The roughly 6,000 guided angling days per year in the Lower Skeena region generate significant economic impacts in the local area and in BC as a whole.

Table 16 presents those local impacts in terms of direct angler spending (direct expenditures), domestic output, GDP, employment, and taxation.

Table 16: Economic impacts in the Lower Skeena region associated with guided angling in the Lower Skeena region

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|--------------|-------------|
| <i>Direct Expenditures</i> | \$6,750,907 | \$7,119,771 | \$8,436,546 | \$10,513,320 | \$8,205,082 |
| <i>Domestic Output</i> | \$6,840,871 | \$7,214,650 | \$8,548,973 | \$10,653,422 | \$8,314,424 |
| <i>GDP at Basic Prices</i> | \$3,428,872 | \$3,616,222 | \$4,285,029 | \$5,339,849 | \$4,167,466 |
| <i>Employment (jobs)</i> | 122 | 129 | 153 | 190 | 148 |
| <i>Total Taxes</i> | \$1,294,046 | \$1,364,752 | \$1,617,158 | \$2,015,244 | \$1,572,790 |
| <i>Total Federal Taxes</i> | \$632,845 | \$667,423 | \$790,861 | \$985,542 | \$769,163 |
| <i>Total Provincial Taxes</i> | \$661,201 | \$697,329 | \$826,297 | \$1,029,701 | \$803,627 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling in the Lower Skeena region amounted to over \$8 million in terms of direct angler expenditures and domestic output, and just over \$4 million in terms of GDP in the Lower Skeena region. On average, 148 local jobs are attributable to guided angling, and just under \$1.6 million dollars in tax revenue are generated by the industry in the Lower Skeena region.

The economic impacts of guided angling in the Lower Skeena region extend beyond the local region. Flights, car rentals, hotels, restaurants, and other service providers across BC benefit from anglers making their trip to the Skeena and from Skeena guides procuring the inputs for their businesses. Table 17 extends the geographic scope of included economic impacts to include the rest of BC.

Table 17: Economic impacts in all of BC (including the Lower Skeena region) associated with guided angling in the Lower Skeena Region

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|--------------|--------------|--------------|--------------|--------------|
| <i>Direct Expenditures</i> | \$6,750,907 | \$7,119,771 | \$8,436,546 | \$10,513,320 | \$8,205,082 |
| <i>Domestic Output</i> | \$10,623,612 | \$11,204,077 | \$13,276,229 | \$16,544,359 | \$12,911,985 |
| <i>GDP at Basic Prices</i> | \$5,559,592 | \$5,863,364 | \$6,947,771 | \$8,658,062 | \$6,757,153 |
| <i>Employment (jobs)</i> | 144 | 151 | 179 | 224 | 175 |
| <i>Total Taxes</i> | \$1,740,322 | \$1,835,411 | \$2,174,864 | \$2,710,237 | \$2,115,195 |
| <i>Total Federal Taxes</i> | \$839,391 | \$885,255 | \$1,048,979 | \$1,307,200 | \$1,020,200 |
| <i>Total Provincial Taxes</i> | \$900,931 | \$950,157 | \$1,125,885 | \$1,403,037 | \$1,094,995 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts in the Lower Skeena region amount to just under \$13 million in terms of domestic output (direct + indirect + induced impacts) and \$6.8 million in terms GDP. On average, 175 jobs are attributable to guided angling in the Lower Skeena region, and over \$2 million in tax revenue are generated by the industry.

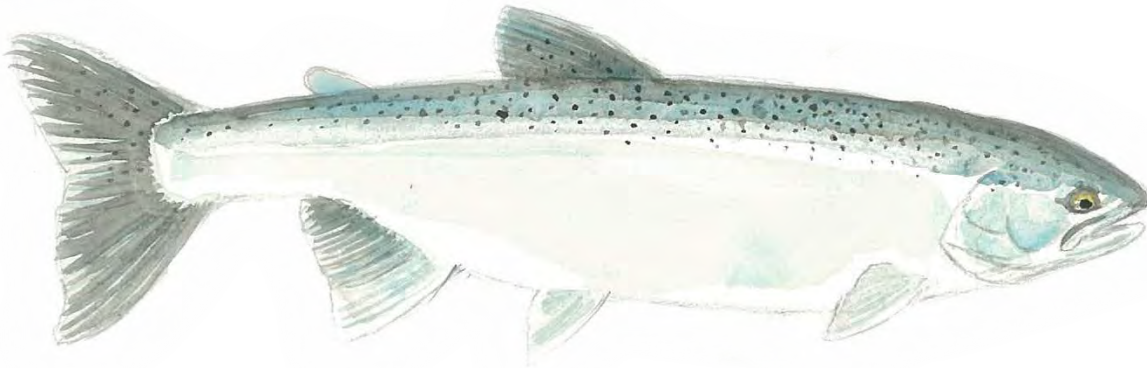


Image Credit: Rod Brown – Cohowood Studio

SPRING STEELHEAD SEASON

This section of the report presents results for the spring steelhead season (January–May, all waterbodies). Steelhead enter the Skeena and her tributaries in two distinct runs.

Summer steelhead migrate into freshwater starting as early as June, though significant numbers do not appear until July. Those “summer” fish stay in and around their natal rivers until the following late spring or early summer when they spawn, before attempting to return to the ocean to repeat their cycle again. The Skeena region as a whole is famous for its summer steelhead for their size, abundance, and because they spend so long in freshwater during a period when rivers are often in a fishable condition. Additionally, summer steelhead migrate much further than their spring siblings, making their way to the world-famous upriver Skeena tributaries like the Babine, Bulkley, Morice, and Kispiox rivers.

Spring steelhead spend much less time in freshwater. Apart from a few waterbodies that see fresh steelhead trickle in throughout the winter, spring steelhead generally only spend a few weeks up to a couple months in freshwater before spawning. Until fairly recently the spring steelhead season in the Lower Skeena region was primarily a “locals only” fishery with very little guiding. Spring steelhead are significantly less abundant than their summer siblings, and their shorter migrations from the ocean limit the regional waterbodies that support a spring steelhead run to those that empty directly into the ocean and the Skeena main stem and tributaries around Terrace or downstream. Over our reference years, the guided spring steelhead season has exploded in terms of guided angler days, more than doubling over the four-year interval we studied. While angling opportunities still exist for this fishery to grow in more remote waterbodies that empty directly into the ocean, the easily accessible waterbodies in the Lower Skeena region that support a spring steelhead fishery are fully subscribed.

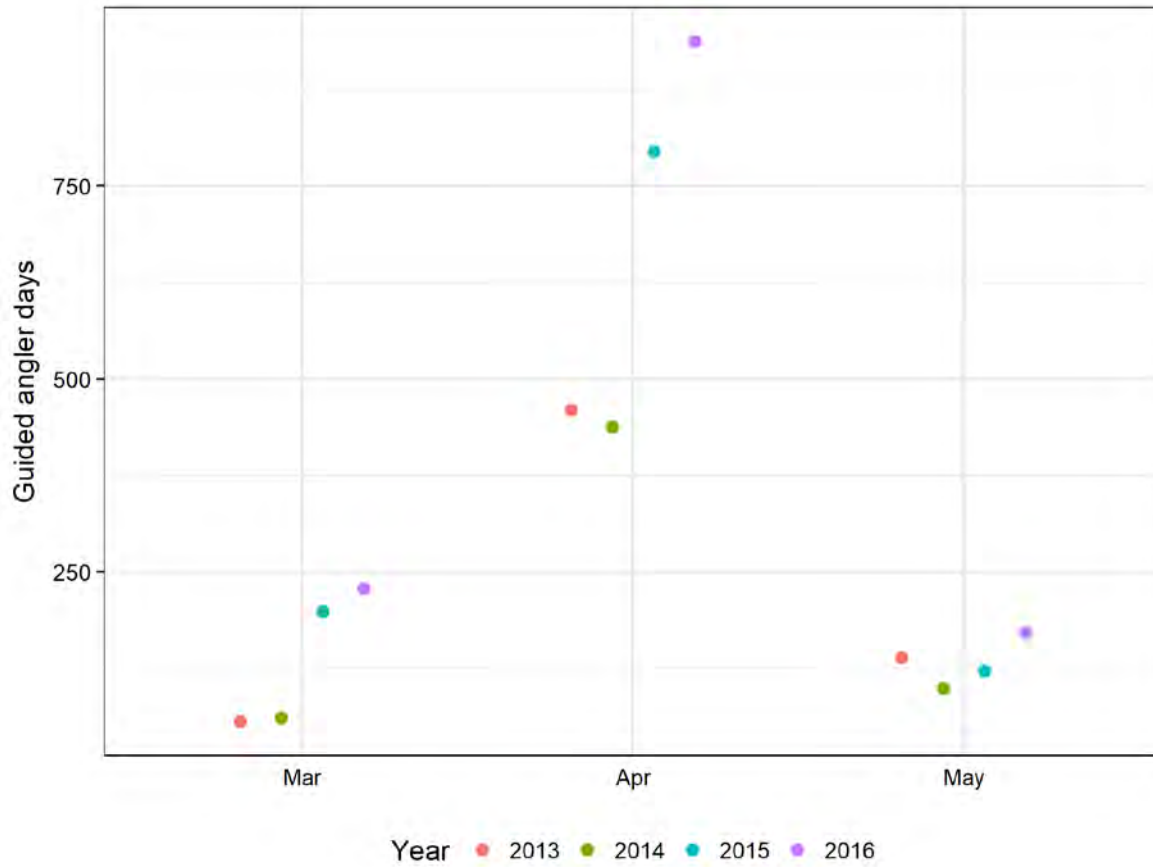
EFFORT & TIMING

Because the Tyee Test Fishery begins their daily reporting cycle on June 10th of each year in order to normalize the respective abundance indices, there is no comprehensive data source with which we can measure spring steelhead abundance or run timing like there is for the other target seasons and species. Our best data source for spring steelhead timing is to examine the guiding data—and those data suggest that spring steelhead in the Skeena start to trickle in during the month of February, but the run

materializes in March, April, and May. Steelhead (both summer and winter) spawn in May and June, but generally the spring steelhead season ends not for lack of fresh fish but rather because conditions become unfishable due to freshet or rains, or steelhead have moved into smaller tributaries or further upriver to spawn.

Figure 3 presents guided angling activity for each month over our reference years, highlighting the spring steelhead fishery. The month of April, particularly in 2015 and 2016, saw significant growth in terms of guided angling pressure.

Figure 3: Guided angling activity in the Lower Skeena Region directed at spring steelhead, by month, 2013–2016



Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Table 18 presents the same information displayed in Figure 3 for select waterbodies, along with year over year percentage changes for all guided angling directed at spring steelhead.

Table 18: Guided angler days and year over year growth for the spring steelhead season in the Lower Skeena region, 2013–2016

| | 2013 | 2014 | 2015 | 2016 |
|--------------------------|------------|------------|--------------|--------------|
| <i>Kitsumkalum River</i> | 83 | 141 | 186 | 273 |
| <i>Skeena River</i> | 337 | 170 | 512 | 564 |
| <i>Kitimat River</i> | 110 | 178 | 240 | 312 |
| <i>Other</i> | 127 | 109 | 180 | 190 |
| Total | 657 | 598 | 1,118 | 1,339 |
| <i>Growth</i> | | -9% | 87% | 20% |

Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

IMPACTS OVERVIEW

The roughly 1,000 guided angling days per year directed at spring steelhead in the Lower Skeena region generate significant economic impacts in the region and in BC as a whole. Table 19 presents those impacts in terms of spending, domestic output, GDP, employment, and taxation within the Lower Skeena region.

Table 19: Economic impacts in the Lower Skeena region associated with guided angling directed at spring steelhead

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-----------|-----------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$914,504 | \$832,380 | \$1,556,189 | \$1,863,579 | \$1,291,663 |
| <i>Domestic Output</i> | \$926,691 | \$843,472 | \$1,576,926 | \$1,888,414 | \$1,308,876 |
| <i>GDP at Basic Prices</i> | \$464,488 | \$422,776 | \$790,408 | \$946,536 | \$656,052 |
| <i>Employment (jobs)</i> | 17 | 15 | 28 | 34 | 23 |
| <i>Total Taxes</i> | \$175,297 | \$159,555 | \$298,298 | \$357,220 | \$247,592 |
| <i>Total Federal Taxes</i> | \$85,728 | \$78,029 | \$145,881 | \$174,696 | \$121,083 |
| <i>Total Provincial Taxes</i> | \$89,569 | \$81,525 | \$152,417 | \$182,524 | \$126,509 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at spring steelhead in the Lower Skeena region amount to around \$1.3 million in terms of direct angler expenditures and domestic output, and just over half a million dollars in terms GDP. On average, 23 jobs are attributable to guided angling directed at spring steelhead, and \$250,000 in tax revenue is generated by the industry in this short fishing season.

The economic impacts of guided angling directed at spring steelhead in the Lower Skeena region extend beyond the local region. Table 20 extends the geographic scope of included economic impacts to include the rest of BC.

Table 20: Economic impacts in all of BC (including the Lower Skeena region) associated with guided angling directed at spring steelhead

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$914,504 | \$832,380 | \$1,556,189 | \$1,863,579 | \$1,291,663 |
| <i>Domestic Output</i> | \$1,439,116 | \$1,309,880 | \$2,448,907 | \$2,932,634 | \$2,032,634 |
| <i>GDP at Basic Prices</i> | \$753,124 | \$685,492 | \$1,281,572 | \$1,534,718 | \$1,063,727 |
| <i>Employment (jobs)</i> | 19 | 18 | 33 | 40 | 27 |
| <i>Total Taxes</i> | \$235,751 | \$214,580 | \$401,171 | \$480,414 | \$332,979 |
| <i>Total Federal Taxes</i> | \$113,707 | \$103,496 | \$193,493 | \$231,713 | \$160,602 |
| <i>Total Provincial Taxes</i> | \$122,044 | \$111,084 | \$207,678 | \$248,701 | \$172,377 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at spring steelhead in the Lower Skeena region amount to around \$1.3 million in terms of direct angler expenditures, \$2 million in terms of domestic output, and just over \$1 million in terms GDP. On average, 27 jobs are attributable to guided angling directed at spring steelhead, and \$333,000 in tax revenue is generated by the industry in this short fishing season. In 2016, the most recent year in our reference period, these figures were significantly higher. If the spring steelhead season continued to grow in 2017 and 2018 it may have overtaken the chinook fishery in terms of economic impacts in a typical year and given the recent closures (partial closure in 2017 and total closure in 2018), the spring steelhead fishery is clearly a vital component of the local and regional economy.

VALUE PER LANDED AND KILLED FISH

In this section we examine the economic value per landed fish and killed fish. The wild steelhead fishery province-wide is catch-and-release. In our reference area, only the Kitimat river supports hatchery steelhead and from the data we have, no steelhead were kept over our reference period in the spring steelhead fishery. Table 21 provides an overview of angler success per day and the total number of steelhead caught in each of our reference years.

Table 21: Guided angler success and the number of steelhead caught in each of our reference years

| | <i>Released/Day</i> | <i>Kept/Day</i> | <i>Released</i> | <i>Kept</i> | <i>Caught</i> |
|-------------|---------------------|-----------------|-----------------|-------------|---------------|
| <i>2013</i> | 0.50 | 0.00 | 326 | 0 | 326 |
| <i>2014</i> | 0.52 | 0.00 | 313 | 0 | 313 |
| <i>2015</i> | 0.50 | 0.00 | 555 | 0 | 555 |
| <i>2016</i> | 0.49 | 0.00 | 659 | 0 | 659 |

Source: Big River Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

).

Table 22 provides an overview of the economic impact per steelhead caught in the spring steelhead season. In 2016, anglers spent over \$2,800 per steelhead caught (direct expenditure).

Table 22: Economic impact per fish caught in the spring steelhead season (guided angling)

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|------------|------------|------------|------------|
| <i>Direct Expenditure</i> | \$2,803.74 | \$2,657.06 | \$2,804.84 | \$2,826.08 |
| <i>Domestic Output</i> | \$4,412.13 | \$4,181.30 | \$4,413.86 | \$4,447.28 |
| <i>GDP at Basic Prices</i> | \$2,308.97 | \$2,188.18 | \$2,309.88 | \$2,327.37 |
| <i>Total Taxes</i> | \$722.78 | \$684.97 | \$723.06 | \$728.54 |
| <i>Total Federal Taxes</i> | \$348.61 | \$330.37 | \$348.75 | \$351.39 |
| <i>Total Provincial Taxes</i> | \$374.17 | \$354.59 | \$374.32 | \$377.15 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Since, according to our data, no spring steelhead were kept in our reference period, mortality due to guided angling only occurred due to incidental catch and release mortality. While there is good research on incidental steelhead mortality attributable to catch and release angling, the factors that influence mortality estimates create a range of possible rates that might apply to the spring steelhead fishery in the Lower Skeena region. For that reason, Table 23 to Table 26 present estimates of the economic impact per killed steelhead in the spring steelhead fishery in the Lower Skeena region for mortality rates of 5%, 10%, 15%, and 20%.

Table 23: Estimated value per killed steelhead in the spring steelhead fishery (guided angling), 5% incidental mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$56,075 | \$53,141 | \$56,097 | \$56,522 |
| <i>Domestic Output</i> | \$88,243 | \$83,626 | \$88,277 | \$88,946 |
| <i>GDP at Basic Prices</i> | \$46,179 | \$43,764 | \$46,198 | \$46,547 |
| <i>Total Taxes</i> | \$14,456 | \$13,699 | \$14,461 | \$14,571 |
| <i>Total Federal Taxes</i> | \$6,972 | \$6,607 | \$6,975 | \$7,028 |
| <i>Total Provincial Taxes</i> | \$7,483 | \$7,092 | \$7,486 | \$7,543 |

Table 24: Estimated value per killed steelhead in the spring steelhead fishery (guided angling), 10% incidental mortality

| | 2013 | 2014 | 2015 | 2016 |
|----------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$28,037 | \$26,571 | \$28,048 | \$28,261 |
| <i>Domestic Output</i> | \$44,121 | \$41,813 | \$44,139 | \$44,473 |
| <i>GDP at Basic Prices</i> | \$23,090 | \$21,882 | \$23,099 | \$23,274 |
| <i>Total Taxes</i> | \$7,228 | \$6,850 | \$7,231 | \$7,285 |

| | | | | |
|-------------------------------|---------|---------|---------|---------|
| <i>Total Federal Taxes</i> | \$3,486 | \$3,304 | \$3,487 | \$3,514 |
| <i>Total Provincial Taxes</i> | \$3,742 | \$3,546 | \$3,743 | \$3,771 |

Table 25: Estimated value per killed steelhead in the spring steelhead fishery (guided angling), 15% incidental mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$18,692 | \$17,714 | \$18,699 | \$18,841 |
| <i>Domestic Output</i> | \$29,414 | \$27,875 | \$29,426 | \$29,649 |
| <i>GDP at Basic Prices</i> | \$15,393 | \$14,588 | \$15,399 | \$15,516 |
| <i>Total Taxes</i> | \$4,819 | \$4,566 | \$4,820 | \$4,857 |
| <i>Total Federal Taxes</i> | \$2,324 | \$2,202 | \$2,325 | \$2,343 |
| <i>Total Provincial Taxes</i> | \$2,494 | \$2,364 | \$2,495 | \$2,514 |

Table 26: Estimated value per killed steelhead in the spring steelhead fishery (guided angling), 20% incidental mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$14,019 | \$13,285 | \$14,024 | \$14,130 |
| <i>Domestic Output</i> | \$22,061 | \$20,907 | \$22,069 | \$22,236 |
| <i>GDP at Basic Prices</i> | \$11,545 | \$10,941 | \$11,549 | \$11,637 |
| <i>Total Taxes</i> | \$3,614 | \$3,425 | \$3,615 | \$3,643 |
| <i>Total Federal Taxes</i> | \$1,743 | \$1,652 | \$1,744 | \$1,757 |
| <i>Total Provincial Taxes</i> | \$1,871 | \$1,773 | \$1,872 | \$1,886 |

Source (Table 23 to Table 26): Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

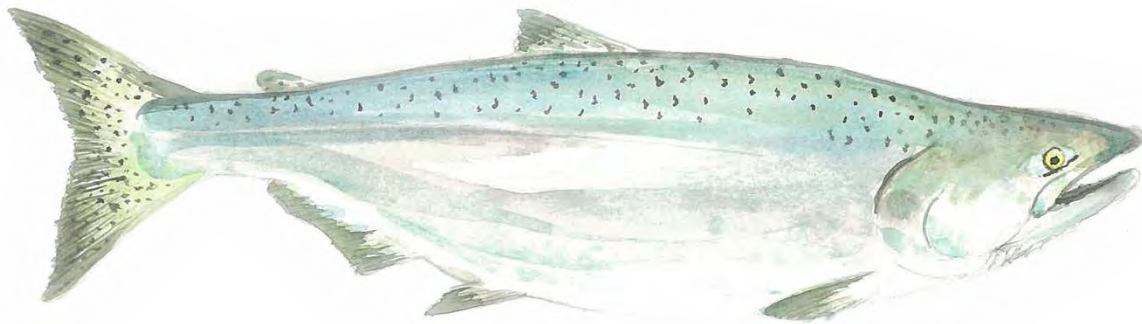


Image Credit: Rod Brown – Cohowood Studio

CHINOOK SEASON

Chinook return to the Skeena primarily during the months of June and July. During that window, most guided angling is directed at chinook. The “chinook season” is of increasing importance to guiding operations in the Lower Skeena. In 2013, there were 1,360 angler days directed at chinook in June and July. For the same period in 2016, there were 1,790 guided angler days directed at chinook, an increase of 32% over those four years. The economic impact of the guided chinook fishery in the Lower Skeena region has ripple effects across BC. In 2016, the chinook fishery in the Lower Skeena region attracted \$2.5 million in direct guided angler expenditures.

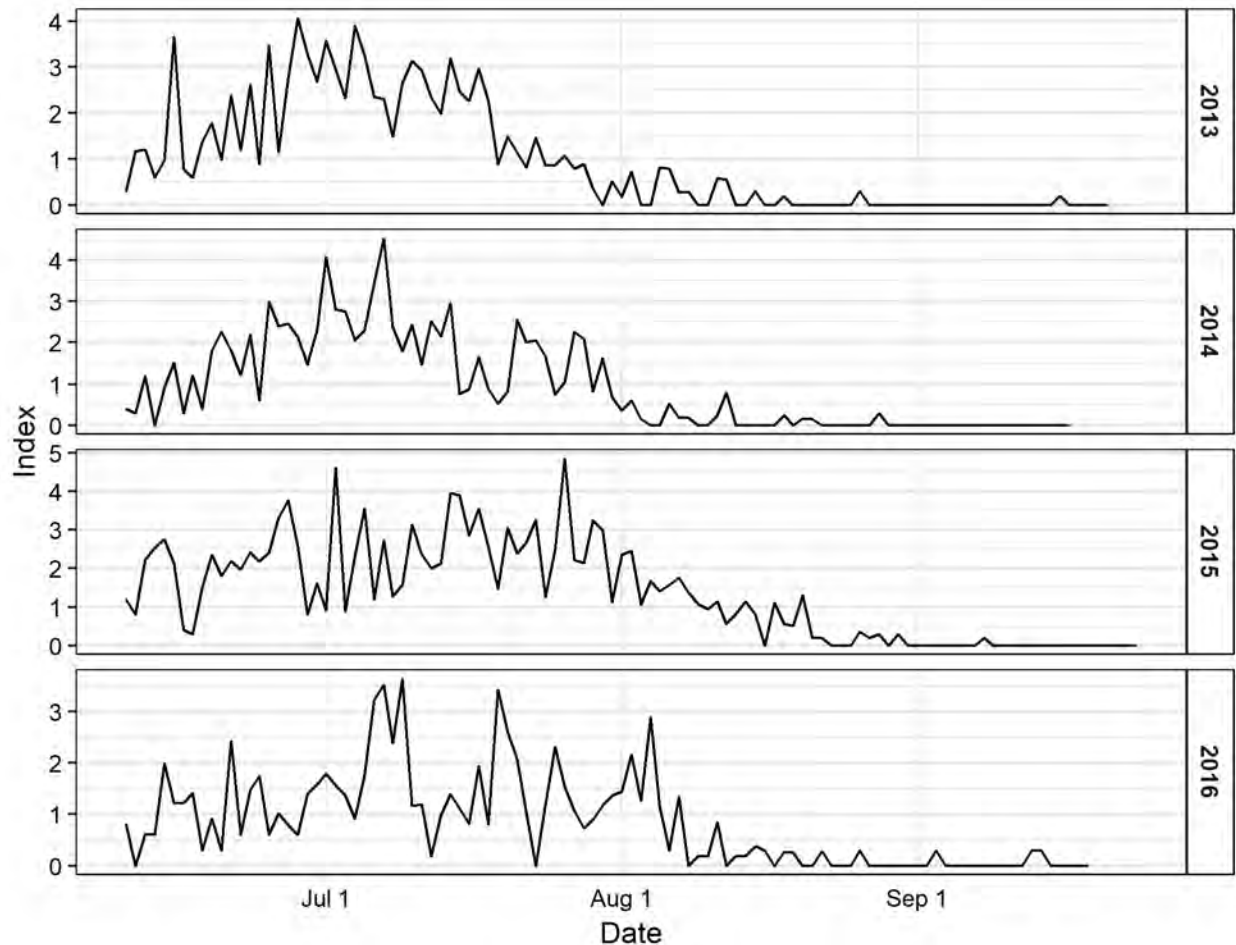
Most chinook caught by guided anglers in the Lower Skeena region are released (94%). Because most chinook are released, the economic impact per killed fish is remarkably high. This is important in an environment of reduced chinook abundance. In 2016, anglers spent an average of \$2,273 per fish landed (kept or released). Depending on the mortality rate assumed for fish that are caught and released, between \$9,430 (based on a 20% mortality rate) and \$23,016 (based on a 5% mortality rate) was generated in direct guided angler expenditures per killed chinook in the Lower Skeena chinook fishery.

In May of 2018, DFO announced a set of new regulations closing the fishery to recreational angling in the Skeena watershed and closing the chinook fishery in the Nass watershed. Relative to a regulation change that would have kept the fisheries open but mandated zero retention like in other watersheds emptying into Areas 1–6, the regulation change is expected to cost over \$1.3 million in direct guided angler expenditures. Additionally, also in terms of direct guided angler expenditures, the implicit value ranges from \$11,000 (20% mortality, 120 chinook protected) to \$47,000 (5% mortality, 28 chinook protected) per protected chinook that would have been killed by guided anglers in a catch-and-release fishery, depending on the assumed catch and release mortality rate.

TIMING

Chinook salmon arrive in the Skeena and her tributaries in two distinct runs: April and May see a smaller, early-timing component that is not targeted in any significant way by the sport fishery, but the bulk of Skeena chinook start arriving in June through to early August. Figure 4 presents data from the Tye Test Fishery for our reference years. The Tye Test Fishery is located near the mouth of the Skeena and the timing presented in Figure 4 predates the arrival of chinook near Terrace by a couple of weeks (Gottesfeld, Doire, & English, 2010). Figure 4 shows that the bulk of the chinook run enters the Skeena in June and July, then tapers rapidly in August.

Figure 4: Tye test fishery data for 2013–2016; index represents daily relative chinook abundance near the mouth of the Skeena



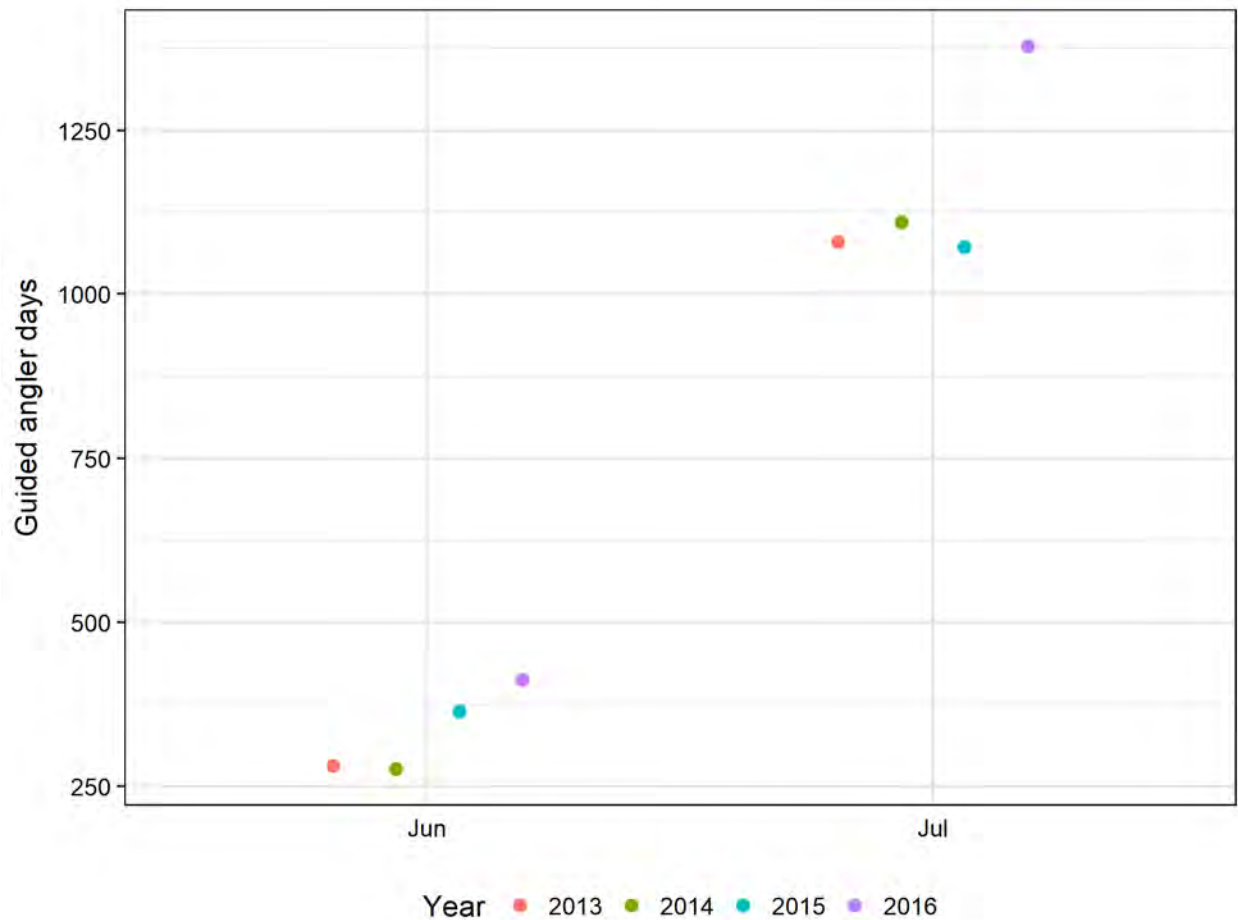
Source: Tye test fishery, daily index. http://www-ops2.pac.dfo-mpo.gc.ca/fos2_Internet/Testfish/rptDTFDTyeeParm.cfm?fsub_id=585

In our four reference years, recreational angling targeting chinook in most of the Lower Skeena has been open until August 7th. For the purposes of this report, we define the chinook fishery to include all guided angling in the Lower Skeena region between June 1st and July 31st. The first week in August sees effort directed at chinook, but the overlap with other target species is significant. The days spent targeting chinook in August are offset by days in July targeting other salmon.

EFFORT

Figure 5 presents angling effort directed at chinook in terms of guided angler days for our reference years.

Figure 5: Guided angling in the Lower Skeena Region directed at chinook, by month, 2013–2016



Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Guided angling effort directed at chinook has generally increased through our reference years. The chinook season has not experienced quite the same level of growth seen in the spring or fall steelhead fisheries, or the August mixed fishery. However, at 32% growth over 4 years, the chinook fishery is clearly of increasing importance. Decreasing abundance of Skeena chinook may contribute to the relative lower growth of the guided angling fishery targeting Skeena chinook. Table 27 summarizes guided angling effort directed at chinook based in the Lower Skeena by major watershed and reference year.

Table 27: Guided angler days and year over year growth for the chinook season in the Lower Skeena region, 2013–2016

| | 2013 | 2014 | 2015 | 2016 |
|--------------------------|--------------|--------------|--------------|--------------|
| <i>Kitsumkalum River</i> | 55 | 72 | 76 | 123 |
| <i>Skeena River</i> | 688 | 762 | 456 | 679 |
| <i>Kitimat River</i> | 442 | 330 | 638 | 722 |
| <i>Zymoetz River</i> | 56 | 85 | 142 | 77 |
| <i>Other</i> | 119 | 137 | 124 | 190 |
| Total | 1,360 | 1,386 | 1,436 | 1,790 |
| Growth | | 2% | 4% | 25% |

Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

IMPACTS OVERVIEW

The roughly 1,500 guided angling days per year directed at chinook in the lower river generate significant economic impacts in the region and in BC as a whole. Table 28 presents those impacts in terms of spending, domestic output, GDP, employment, and taxation within the Lower Skeena region.

Table 28: Economic impacts in the Lower Skeena region associated with guided angling directed at chinook (June and July)

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$1,893,038 | \$1,929,228 | \$1,998,825 | \$2,492,064 | \$2,078,289 |
| <i>Domestic Output</i> | \$1,918,265 | \$1,954,937 | \$2,025,462 | \$2,525,273 | \$2,105,984 |
| <i>GDP at Basic Prices</i> | \$961,498 | \$979,880 | \$1,015,229 | \$1,265,751 | \$1,055,589 |
| <i>Employment (jobs)</i> | 34 | 35 | 36 | 45 | 38 |
| <i>Total Taxes</i> | \$362,867 | \$369,804 | \$383,144 | \$477,691 | \$398,376 |
| <i>Total Federal Taxes</i> | \$177,458 | \$180,850 | \$187,374 | \$233,612 | \$194,823 |
| <i>Total Provincial Taxes</i> | \$185,409 | \$188,954 | \$195,770 | \$244,079 | \$203,553 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at chinook in the Lower Skeena region amount to over \$2 million in terms of domestic output, and just over \$1 million in terms of GDP. On average, 38 jobs are attributable to guided angling directed at chinook, and just under \$400,000 dollars in tax revenue are generated by the industry in this one fishery.

The economic impacts of guided angling directed at chinook in the Lower Skeena region extend beyond the local region. Table 29 extends the geographic scope of included economic impacts to include the rest of BC.

Table 29: Economic impacts in all of BC (including the Lower Skeena region) associated with guided angling directed at chinook in the Lower Skeena region (June and July)

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$1,893,038 | \$1,929,228 | \$1,998,825 | \$2,492,064 | \$2,078,289 |
| <i>Domestic Output</i> | \$2,978,992 | \$3,035,943 | \$3,145,465 | \$3,921,653 | \$3,270,513 |
| <i>GDP at Basic Prices</i> | \$1,558,978 | \$1,588,782 | \$1,646,098 | \$2,052,296 | \$1,711,539 |
| <i>Employment (jobs)</i> | 40 | 41 | 43 | 53 | 44 |
| <i>Total Taxes</i> | \$488,008 | \$497,337 | \$515,279 | \$642,431 | \$535,764 |
| <i>Total Federal Taxes</i> | \$235,376 | \$239,875 | \$248,529 | \$309,857 | \$258,409 |
| <i>Total Provincial Taxes</i> | \$252,632 | \$257,462 | \$266,750 | \$332,574 | \$277,354 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at chinook in the Lower Skeena region amount to over \$3.2 million in terms of domestic output, and just over \$1.7 million in terms of GDP. On average, 44 jobs are attributable to guided angling directed at chinook, and over half a million dollars in tax revenue are generated by the two-month fishery on a few rivers.

DETAILED IMPACTS

With the combination of effort, economic impacts, and catch data from guide reports, we are able to estimate not only expected catch per angler day, but also the impacts attributable per caught fish. Table 30 presents catch estimates of chinook in the months of June and July for all guided angling in the Lower Skeena region.

Table 30: Chinook landed and kept or released while guided, per day and in total for each reference year, Lower Skeena region

| | <i>Released / Day</i> | <i>Kept / Day</i> | <i>Released</i> | <i>Kept</i> | <i>Caught</i> |
|------|-----------------------|-------------------|-----------------|-------------|---------------|
| 2013 | 0.53 | 0.04 | 726 | 60 | 786 |
| 2014 | 0.52 | 0.04 | 723 | 59 | 782 |
| 2015 | 0.52 | 0.02 | 746 | 35 | 781 |
| 2016 | 0.58 | 0.03 | 1,040 | 56 | 1,096 |

Source: Big River Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

ECONOMIC IMPACT PER FISH CAUGHT (ALL OF BC)

If we are willing to assume that guided anglers only come to the Skeena to catch fish, adding up fish that are caught and released and fish that are kept allows us to estimate the economic impact and angler expenditure per landed fish. Table 31 provides an overview of those expenditures and impacts for our reference period.

Table 31: Economic impacts in all of BC (including the Lower Skeena region) per landed chinook in the Lower Skeena region

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$2,407 | \$2,468 | \$2,560 | \$2,273 |
| <i>Domestic Output</i> | \$3,788 | \$3,883 | \$4,029 | \$3,577 |
| <i>GDP at Basic Prices</i> | \$1,982 | \$2,032 | \$2,108 | \$1,872 |
| <i>Total Taxes</i> | \$621 | \$636 | \$660 | \$586 |
| <i>Total Federal Taxes</i> | \$299 | \$307 | \$318 | \$283 |
| <i>Total Provincial Taxes</i> | \$321 | \$329 | \$342 | \$303 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Anglers’ direct expenditures per landed fish (kept or released) amounts to between \$2,300 and \$2,600. In terms of domestic output, the impact is between \$3,600 and \$4,000 per fish. Each landed fish can be thought of in terms of generating between \$600 and \$700 in total tax revenue.

ECONOMIC IMPACT PER KILLED FISH (ALL OF BC)

In a period of reduced chinook abundance, taking into account an industry’s impact on the resource is critical. Table 32 to

Table 35 provide estimates of the economic impacts per killed chinook based on four mortality rate assumptions: 5 percent, 10 percent, 15 percent, and 20 percent for caught and released chinook.

Table 32: Economic impacts across BC per killed chinook caught by a guided angler in the Lower Skeena region, 5% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$20,931 | \$21,090 | \$30,260 | \$23,592 |
| <i>Domestic Output</i> | \$32,939 | \$33,188 | \$47,618 | \$37,126 |
| <i>GDP at Basic Prices</i> | \$17,238 | \$17,368 | \$24,920 | \$19,429 |
| <i>Total Taxes</i> | \$5,396 | \$5,437 | \$7,801 | \$6,082 |
| <i>Total Federal Taxes</i> | \$2,603 | \$2,622 | \$3,762 | \$2,933 |
| <i>Total Provincial Taxes</i> | \$2,793 | \$2,815 | \$4,038 | \$3,148 |

Table 33: Economic impacts across BC per killed chinook caught by a guided angler in the Lower Skeena region, 10% mortality

| | 2013 | 2014 | 2015 | 2016 |
|--|------|------|------|------|
|--|------|------|------|------|

| | | | | |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$14,967 | \$15,130 | \$19,332 | \$15,817 |
| <i>Domestic Output</i> | \$23,553 | \$23,809 | \$30,423 | \$24,891 |
| <i>GDP at Basic Prices</i> | \$12,326 | \$12,460 | \$15,921 | \$13,026 |
| <i>Total Taxes</i> | \$3,858 | \$3,900 | \$4,984 | \$4,078 |
| <i>Total Federal Taxes</i> | \$1,861 | \$1,881 | \$2,404 | \$1,967 |
| <i>Total Provincial Taxes</i> | \$1,997 | \$2,019 | \$2,580 | \$2,111 |

Table 34: Economic impacts across BC per killed chinook caught by a guided angler in the Lower Skeena region, 15% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$11,648 | \$11,796 | \$14,203 | \$11,897 |
| <i>Domestic Output</i> | \$18,330 | \$18,563 | \$22,351 | \$18,722 |
| <i>GDP at Basic Prices</i> | \$9,593 | \$9,714 | \$11,697 | \$9,798 |
| <i>Total Taxes</i> | \$3,003 | \$3,041 | \$3,662 | \$3,067 |
| <i>Total Federal Taxes</i> | \$1,448 | \$1,467 | \$1,766 | \$1,479 |
| <i>Total Provincial Taxes</i> | \$1,554 | \$1,574 | \$1,896 | \$1,588 |

Table 35: Economic impacts across BC per killed chinook caught by a guided angler in the Lower Skeena region, 20% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$9,534 | \$9,666 | \$11,225 | \$9,534 |
| <i>Domestic Output</i> | \$15,003 | \$15,211 | \$17,665 | \$15,003 |
| <i>GDP at Basic Prices</i> | \$7,851 | \$7,960 | \$9,244 | \$7,851 |
| <i>Total Taxes</i> | \$2,458 | \$2,492 | \$2,894 | \$2,458 |
| <i>Total Federal Taxes</i> | \$1,185 | \$1,202 | \$1,396 | \$1,185 |
| <i>Total Provincial Taxes</i> | \$1,272 | \$1,290 | \$1,498 | \$1,272 |

Source (Table 32 to

Table 35): Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

COST OF A CLOSURE

Regulation affecting the 2018 chinook season in the Lower Skeena region has changed significantly. Specifically, through the following three amendments:

1. Effective immediately, recreational salmon fishing in the entire Skeena River Watershed is closed until further notice.
2. Effective immediately, recreational chinook fishing in the entire Nass River Watershed is closed until further notice.
3. Effective immediately, there is no retention of Chinook salmon in all rivers draining into Pacific Fishery Management Areas 1 to 6 until further notice.

The following assumptions need to be made in order to estimate the economic impact of this regulation change:

1. We assume zero guided angling days in the Skeena Watershed for June and July (peak chinook migration and directed angling period).
2. We assume zero guided angling days in the Nass Watershed for June and July (since species other than chinook are not targeted in June or July).
3. We assume guiding activity on the Kitimat River and other rivers draining into Area 6 will remain unaffected by the closure to retention. Because retention is now much less common for guided anglers in the Skeena region than in the past and the loss of guided angling days to retention anglers will not be significant. Those days that are lost are likely compensated for by guides fishing more days than they would otherwise on the Kitimat and other rivers draining into Area 6 in response to closures in the Skeena and Nass systems.

Overall, we estimate a reduction of 949 guided angler days⁵ compared to the most recent reference year (2016), -an estimated 842 guided angler days targeting chinook in catch and release fisheries on rivers draining into Area 6.

Table 36 presents our estimate of the economic impact of the regulation change, in terms of the anticipated change in number of guided angling days.

Table 36: Estimated lost economic impact attributable to reduction in guided angling in the Lower Skeena region given the new 2018 regulations

| | <i>Lower Skeena</i> | <i>All of BC</i> |
|-------------------------------|---------------------|------------------|
| <i>Direct Expenditures</i> | \$1,320,458 | \$1,320,458 |
| <i>Domestic Output</i> | \$1,338,055 | \$2,077,949 |
| <i>GDP at Basic Prices</i> | \$670,678 | \$1,087,441 |
| <i>Employment (jobs)</i> | 24 | 28 |
| <i>Total Taxes</i> | \$253,112 | \$340,402 |
| <i>Total Federal Taxes</i> | \$123,783 | \$164,183 |
| <i>Total Provincial Taxes</i> | \$129,329 | \$176,219 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

The economic impact of the regulation change on provincial domestic output is estimated to be in excess of \$2 million. The loss of the recreational (non-guided) fishery will significantly increase the impacts felt locally. In the Lower Skeena region, 24 jobs are expected to be lost for the duration of the closure attributable to the regulation change. Given these impacts, it is important to understand what was gained, relative to other regulatory scenarios.

⁵ The difference between all guided angler days in June and July 2016 (1,790) and those rivers supporting chinook runs draining into Area 6, which remains open to catch and release. A total of 842 guided angler days are anticipated in 2018 on rivers emptying into Area 6.

Table 37 presents the estimated number of killed chinook attributable to guided angling for the following three scenarios:

1. The regulation regime in place in 2016 would be in place for 2018⁶.
2. A zero-retention for chinook regulation is put in place for 2018, but the fishery remains open⁷.
3. The recently announced regulations (detailed above) are in place for 2018⁸.

Results are presented under four mortality scenarios: 5%, 10%, 15%, and 20%.

Table 37: Expected chinook mortality attributable to guided angling under different regulatory scenarios

| <i>Mortality assumption</i> | <i>Scenario 1</i> | <i>Scenario 2</i> | <i>Scenario 3</i> |
|-----------------------------|-------------------|-------------------|-------------------|
| 5% | 108 | 52 | 24 |
| 10% | 160 | 104 | 45 |
| 15% | 212 | 156 | 66 |
| 20% | 264 | 208 | 88 |

Source: Big River Analytics calculations

Given the anticipated chinook mortality estimates that can be attributed to guided angling under different regulatory scenarios and mortality assumptions, we are able to estimate the implicit cost of each fish protected from guided anglers under the new 2018 regulations relative to our Scenario 1 and Scenario 2 baselines. Table 38 to Table 40 present those costs in terms of direct spending, domestic output, and GDP, for all of BC. Cost per fish is estimated by first estimating the number of fish killed under each scenario. The differences in the respective measures of economic impacts for the different scenarios are divided by the difference in the number of fish killed to generate a “cost” per fish protected under the new regulations.

Table 38: Expected cost per fish protected under different regulatory scenarios (direct spending)

| <i>Mortality assumption</i> | <i>Scenario 1 vs. scenario 3</i> | | <i>Scenario 2 vs. scenario 3</i> | |
|-----------------------------|----------------------------------|----------------------|----------------------------------|----------------------|
| | <i>Chinook protected</i> | <i>Cost per fish</i> | <i>Chinook protected</i> | <i>Cost per fish</i> |
| 5% | 84 | \$15,646 | 28 | \$46,961 |
| 10% | 115 | \$11,472 | 59 | \$22,449 |
| 15% | 146 | \$9,057 | 90 | \$14,750 |
| 20% | 177 | \$7,481 | 120 | \$10,983 |

⁶ We assume the same level of guided angling that took place in 2016 would take place in 2018 and the same number of fish that were killed in 2016 would be killed in 2018. Estimates reflect activity prior to 2017 fisheries closure

⁷ We assume the same level of guided angling that took place in 2016 would take place in 2018; however, no fish would be killed beyond catch and release mortality.

⁸ We assume rivers draining into Area 6 would see continued guided angling effort at 2016 levels; however, no fish would be killed beyond catch and release mortality.

Table 39: Expected cost per fish protected under different regulatory scenarios (domestic output; all of BC)

| <i>Mortality assumption</i> | <i>Scenario 1 vs. scenario 3</i> | | <i>Scenario 2 vs. scenario 3</i> | |
|-----------------------------|----------------------------------|----------------------|----------------------------------|----------------------|
| | <i>Chinook protected</i> | <i>Cost per fish</i> | <i>Chinook protected</i> | <i>Cost per fish</i> |
| 5% | 84 | \$24,621 | 28 | \$73,900 |
| 10% | 115 | \$18,054 | 59 | \$35,327 |
| 15% | 146 | \$14,252 | 90 | \$23,211 |
| 20% | 177 | \$11,773 | 120 | \$17,284 |

Table 40: Expected cost per fish protected under different regulatory scenarios (GDP; all of BC)

| <i>Mortality assumption</i> | <i>Scenario 1 vs. scenario 3</i> | | <i>Scenario 2 vs. scenario 3</i> | |
|-----------------------------|----------------------------------|----------------------|----------------------------------|----------------------|
| | <i>Chinook protected</i> | <i>Cost per fish</i> | <i>Chinook protected</i> | <i>Cost per fish</i> |
| 5% | 84 | \$12,885 | 28 | \$38,674 |
| 10% | 115 | \$9,448 | 59 | \$18,487 |
| 15% | 146 | \$7,458 | 90 | \$12,147 |
| 20% | 177 | \$6,161 | 120 | \$9,045 |

Source (Table 38 to Table 40): Big River and Pacific Analytics calculations based on SAGA member financial statements and Big River Analytics estimates

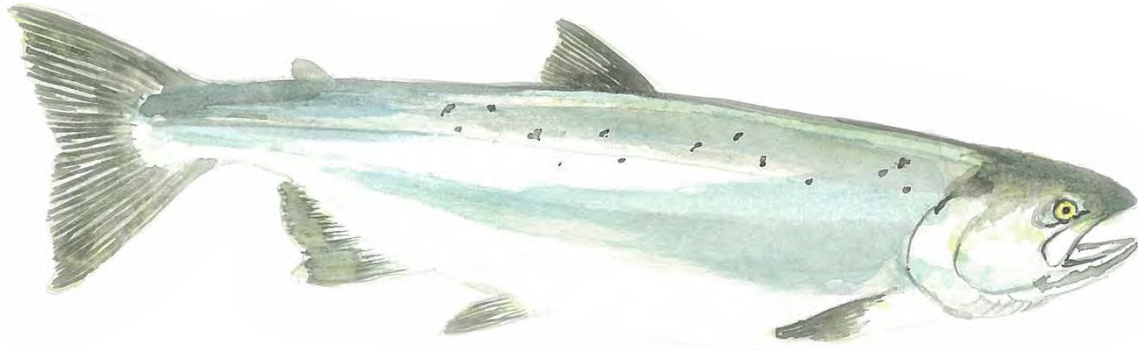


Image Credit: Rod Brown – Cohowood Studio

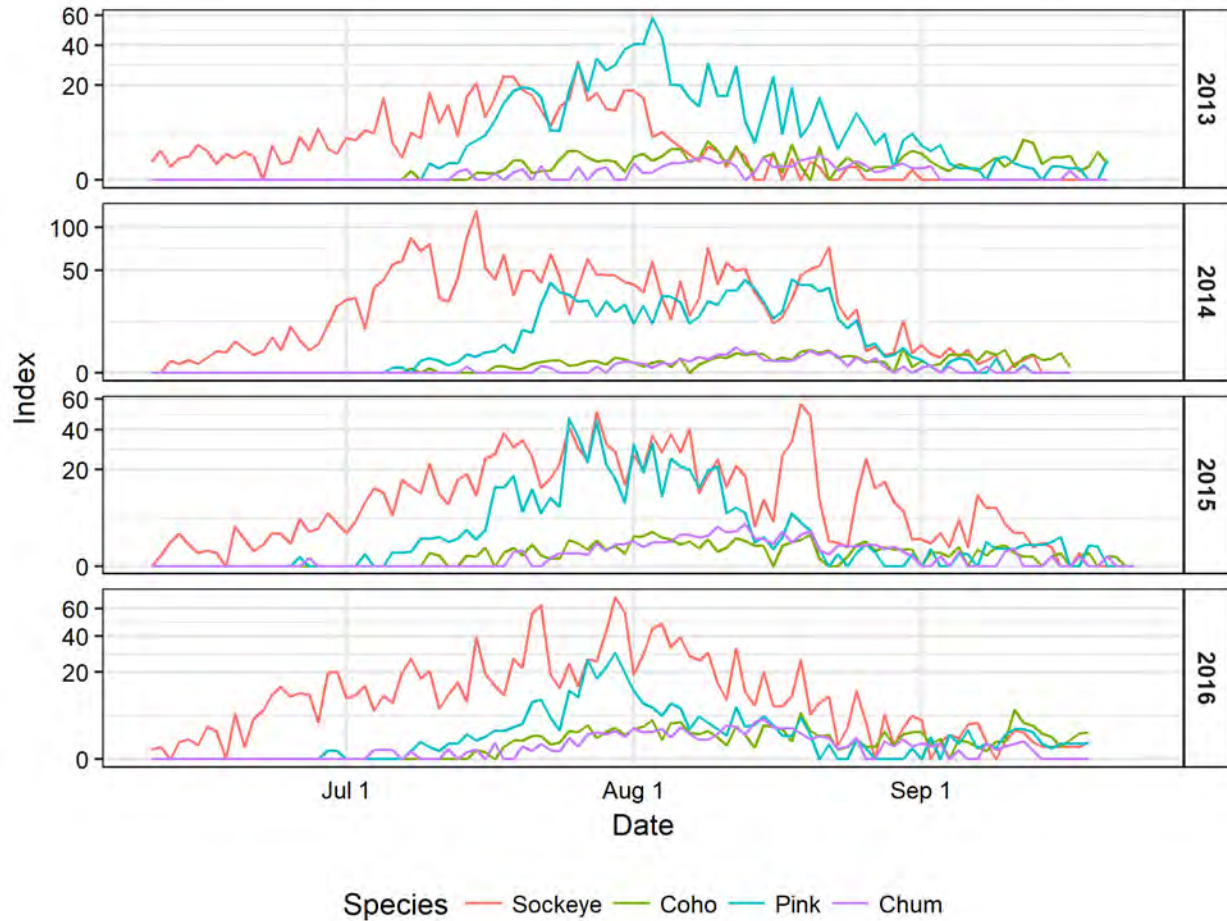
SALMON SEASON

Salmon season really starts a little earlier than how it is defined in this report—but because through June and July the primary target species is chinook, and the chinook fishery is of specific interest, we have produced the estimates for the chinook fishery separately. Salmon season, as defined here, includes the pink, chum, and sockeye salmon that are abundant in August and the fall salmon fishery directed at coho starting later in August through to the end of October.

TIMING

Figure 6 provides an overview of run timing for coho, chum, pink, and sockeye salmon. During the reference years, by far the most abundant species are pink and sockeye, although coho typically become more abundant starting in the second week of September as the pink and sockeye runs trail off.

Figure 6: Tye test fishery data for 2013–2016; index represents daily relative abundance near the mouth of the Skeena

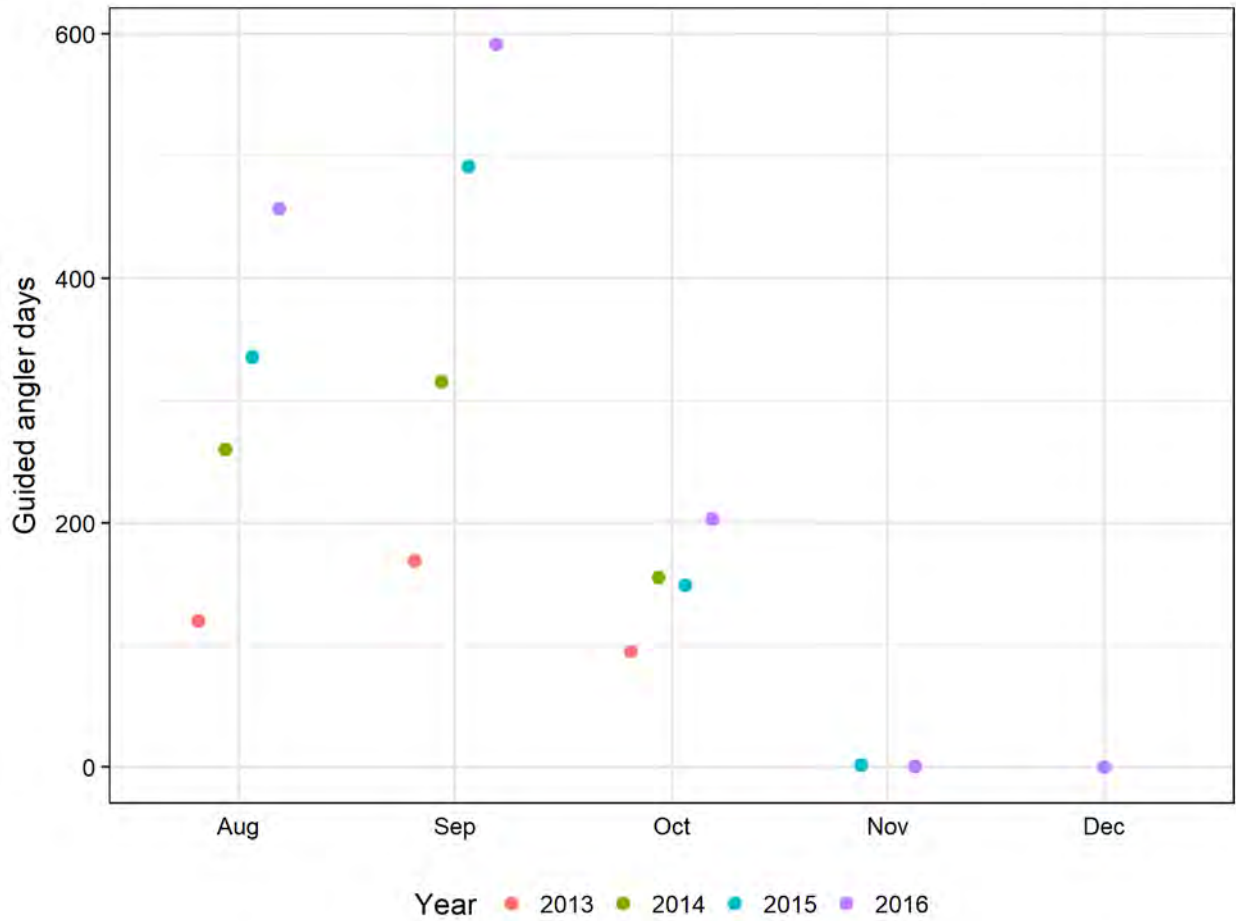


Source: Tye test fishery, daily index. http://www-ops2.pac.dfo-mpo.gc.ca/fos2_Internet/Testfish/rptDTFDTyeParm.cfm?fsub_id=585

EFFORT

Figure 7 presents angling effort in terms of guided angler days for our reference years in the salmon season for those waterbodies in the summer salmon fishery (see Table 2).

Figure 7: Guided angling activity directed at summer salmon based in the Lower Skeena region, by month, 2013–2016



Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Guided angling effort directed at salmon has increased significantly through our reference years. Specifically, the number of guided angling days has increased 226% over the four reference years, from 384 guided angler days in 2013 to 1,252 guided angler days in 2016.

Table 41: Guided angling effort (angler days) directed at summer salmon (August–December) based in the Lower Skeena, by major waterbody and reference year

| | 2013 | 2014 | 2015 | 2016 |
|----------------------|------------|------------|------------|--------------|
| <i>Ecstall River</i> | 23 | 115 | 67 | 126 |
| <i>Kasiks River</i> | 25 | 50 | 132 | 175 |
| <i>Kemano River</i> | 35 | 66 | 87 | 116 |
| <i>Kitimat River</i> | 142 | 150 | 371 | 388 |
| <i>Nass River</i> | 81 | 180 | 159 | 204 |
| <i>Other</i> | 78 | 170 | 163 | 243 |
| Total | 384 | 731 | 979 | 1,252 |
| <i>Growth</i> | | 90% | 34% | 28% |

Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

IMPACTS OVERVIEW

The roughly 1,000 guided angling days per year directed at salmon in the Lower Skeena region generate significant economic impacts in the region and in BC as a whole. Table 42 provides regional estimates of the economic impacts of guided angling directed at salmon in the Lower Skeena region.

Table 42: Economic impacts in the Lower Skeena region associated with guided angling directed at salmon (August–December)

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-----------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$534,505 | \$1,017,508 | \$1,362,709 | \$1,743,264 | \$1,164,497 |
| <i>Domestic Output</i> | \$541,628 | \$1,031,067 | \$1,380,869 | \$1,766,495 | \$1,180,015 |
| <i>GDP at Basic Prices</i> | \$271,482 | \$516,805 | \$692,137 | \$885,426 | \$591,463 |
| <i>Employment (jobs)</i> | 10 | 18 | 25 | 32 | 21 |
| <i>Total Taxes</i> | \$102,456 | \$195,041 | \$261,211 | \$334,157 | \$223,216 |
| <i>Total Federal Taxes</i> | \$50,106 | \$95,383 | \$127,743 | \$163,418 | \$109,163 |
| <i>Total Provincial Taxes</i> | \$52,351 | \$99,657 | \$133,467 | \$170,740 | \$114,054 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at salmon in the Lower Skeena region amount to almost \$1.2 million in terms of domestic output and \$600,000 in terms of GDP. On average, 21 jobs are attributable to guided angling directed at salmon, and over \$220,000 dollars in tax revenue are generated by the industry in this one fishery.

The economic impacts of guided angling directed at salmon in the Lower Skeena region extend beyond the local region. Table 43 extends the geographic scope of included economic impacts to include the rest of BC.

Table 43: Economic impacts in all of BC (including the Lower Skeena region) associated with guided angling directed at salmon in the Lower Skeena region (August–December)

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-----------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$534,505 | \$1,017,508 | \$1,362,709 | \$1,743,264 | \$1,164,497 |
| <i>Domestic Output</i> | \$841,127 | \$1,601,208 | \$2,144,436 | \$2,743,300 | \$1,832,518 |
| <i>GDP at Basic Prices</i> | \$440,182 | \$837,951 | \$1,122,235 | \$1,435,635 | \$959,001 |
| <i>Employment (jobs)</i> | 11 | 22 | 29 | 37 | 25 |
| <i>Total Taxes</i> | \$137,790 | \$262,304 | \$351,294 | \$449,398 | \$300,196 |
| <i>Total Federal Taxes</i> | \$66,459 | \$126,514 | \$169,436 | \$216,753 | \$144,791 |
| <i>Total Provincial Taxes</i> | \$71,331 | \$135,790 | \$181,858 | \$232,644 | \$155,406 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at salmon in the Lower Skeena region amount to over \$1.8 million in terms of domestic output, and just under \$1 million in terms GDP. On average, 25 jobs are attributable to guided angling directed at salmon, and over \$300,000 in tax revenue is generated by this one fishery alone.

DETAILED IMPACTS

Combining effort, economic impact, and catch data, we estimate the expected catch per angler day and economic impacts attributable per caught fish in the summer salmon fishery. Table 44 presents catch estimates for the summer salmon season in each reference year.

Table 44: Salmon landed and kept or released in the summer salmon season while guided, per day and in total for each reference year, Lower Skeena region

| | <i>Released / Day</i> | <i>Kept / Day</i> | <i>Released</i> | <i>Kept</i> | <i>Caught</i> |
|------|-----------------------|-------------------|-----------------|-------------|---------------|
| 2013 | 2.79 | 0.02 | 1,070 | 8 | 1,077 |
| 2014 | 2.53 | 0.02 | 1,847 | 13 | 1,860 |
| 2015 | 2.91 | 0.02 | 2,850 | 18 | 2,868 |
| 2016 | 2.95 | 0.02 | 3,693 | 24 | 3,716 |

Source: Big River Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

ECONOMIC IMPACT PER FISH CAUGHT (ALL OF BC)

If we are willing to assume that guided anglers only come to the Skeena to catch fish, adding up fish that are caught and released and fish that are kept allows us to estimate the economic impact and angler expenditure per landed fish. Table 45 provides an overview of those expenditures and impacts for our reference period.

Table 45: Economic impacts in all of BC (including the Lower Skeena region) per landed summer salmon in the Lower Skeena region

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$496.08 | \$547.02 | \$475.13 | \$469.11 |
| <i>Domestic Output</i> | \$780.66 | \$860.82 | \$747.69 | \$738.21 |
| <i>GDP at Basic Prices</i> | \$408.54 | \$450.49 | \$391.28 | \$386.33 |
| <i>Total Taxes</i> | \$127.88 | \$141.02 | \$122.48 | \$120.93 |
| <i>Total Federal Taxes</i> | \$61.68 | \$68.02 | \$59.08 | \$58.33 |
| <i>Total Provincial Taxes</i> | \$66.20 | \$73.00 | \$63.41 | \$62.60 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Anglers’ direct expenditures per landed fish (kept or released) amounts to between \$470 and \$550. In terms of domestic output, the impact is between \$740 and \$860 per fish. Each fish landed in the summer salmon fishery can be thought of in terms of generating between \$120 and \$140 in total tax revenue.

ECONOMIC IMPACT PER KILLED FISH (ALL OF BC)

In a period of reduced salmon abundance, accounting for an industry’s impact on the resource is critical. Table 46 to Table 49 provide estimates of the economic impacts per killed summer salmon based on four mortality rate assumptions: 5 percent, 10 percent, 15 percent, and 20 percent for caught and released summer salmon.

Table 46: Economic impacts across BC per killed summer salmon caught by a guided angler in the Lower Skeena region, 5% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$8,730 | \$9,649 | \$8,502 | \$8,373 |
| <i>Domestic Output</i> | \$13,739 | \$15,184 | \$13,380 | \$13,177 |
| <i>GDP at Basic Prices</i> | \$7,190 | \$7,946 | \$7,002 | \$6,896 |
| <i>Total Taxes</i> | \$2,251 | \$2,487 | \$2,192 | \$2,159 |
| <i>Total Federal Taxes</i> | \$1,086 | \$1,200 | \$1,057 | \$1,041 |
| <i>Total Provincial Taxes</i> | \$1,165 | \$1,288 | \$1,135 | \$1,117 |

Table 47: Economic impacts across BC per killed summer salmon caught by a guided angler in the Lower Skeena region, 10% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$4,660 | \$5,144 | \$4,500 | \$4,438 |
| <i>Domestic Output</i> | \$7,333 | \$8,095 | \$7,082 | \$6,984 |
| <i>GDP at Basic Prices</i> | \$3,837 | \$4,236 | \$3,706 | \$3,655 |
| <i>Total Taxes</i> | \$1,201 | \$1,326 | \$1,160 | \$1,144 |
| <i>Total Federal Taxes</i> | \$579 | \$640 | \$560 | \$552 |
| <i>Total Provincial Taxes</i> | \$622 | \$686 | \$601 | \$592 |

Table 48: Economic impacts across BC per killed summer salmon caught by a guided angler in the Lower Skeena region, 15% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$3,178 | \$3,507 | \$3,060 | \$3,019 |
| <i>Domestic Output</i> | \$5,001 | \$5,519 | \$4,816 | \$4,751 |
| <i>GDP at Basic Prices</i> | \$2,617 | \$2,888 | \$2,520 | \$2,486 |
| <i>Total Taxes</i> | \$819 | \$904 | \$789 | \$778 |
| <i>Total Federal Taxes</i> | \$395 | \$436 | \$380 | \$375 |
| <i>Total Provincial Taxes</i> | \$424 | \$468 | \$408 | \$403 |

Table 49: Economic impacts across BC per killed summer salmon caught by a guided angler in the Lower Skeena region, 20% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$2,411 | \$2,660 | \$2,318 | \$2,288 |
| <i>Domestic Output</i> | \$3,794 | \$4,186 | \$3,648 | \$3,600 |
| <i>GDP at Basic Prices</i> | \$1,986 | \$2,191 | \$1,909 | \$1,884 |
| <i>Total Taxes</i> | \$622 | \$686 | \$598 | \$590 |
| <i>Total Federal Taxes</i> | \$300 | \$331 | \$288 | \$284 |
| <i>Total Provincial Taxes</i> | \$322 | \$355 | \$309 | \$305 |

Source (Table 46 to Table 49): Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)



Image Credit: Rod Brown – Cohowood Studio

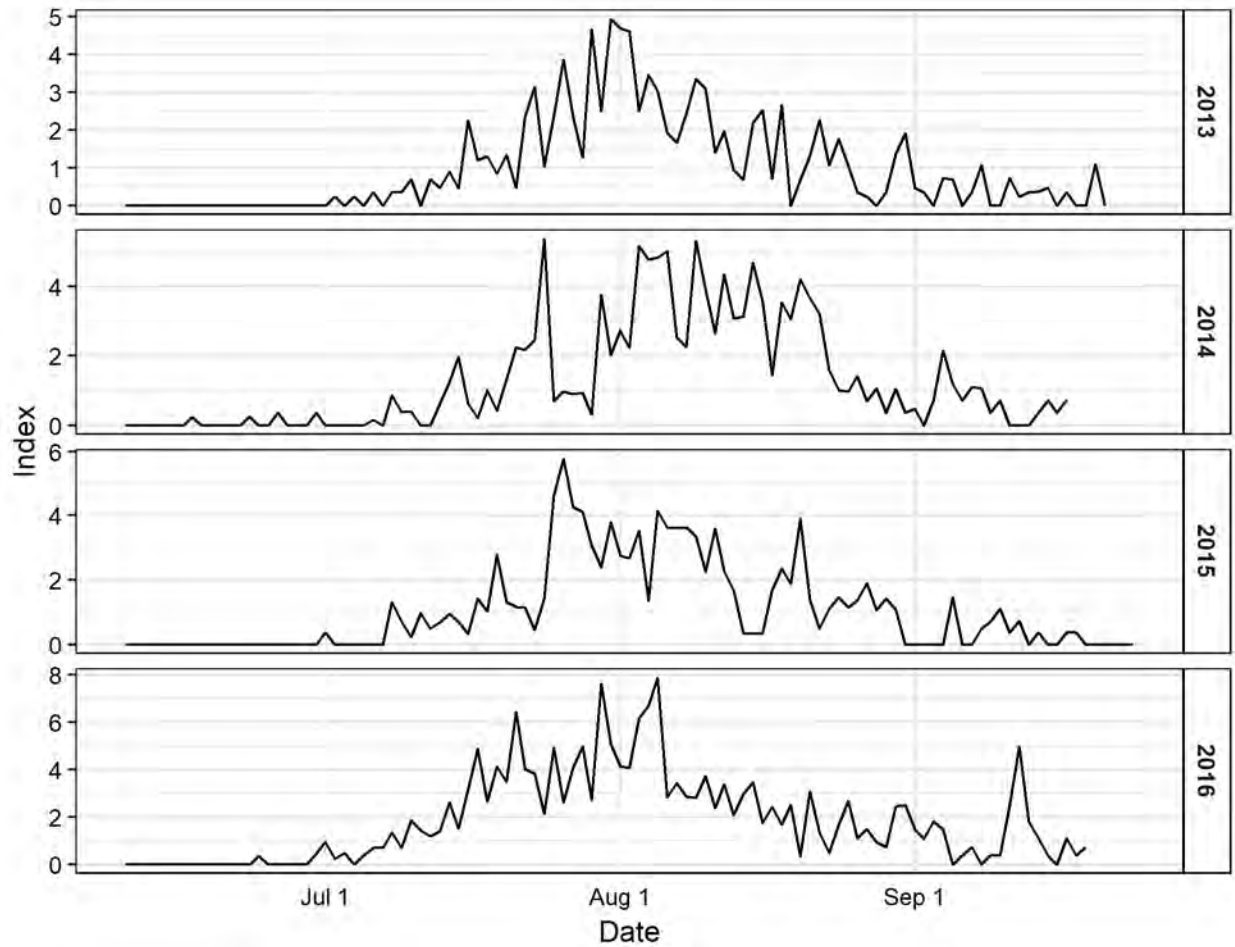
SUMMER STEELHEAD

The Skeena sport fishery is probably most famous for its abundant, world record-breaking summer steelhead. The major upriver tributaries like the Babine, Kispiox, Bulkley, Morice, and Sustut rivers all play host to world-class lodges with decades-long traditions of guided steelhead angling. The Lower Skeena region, apart from Zymoetz River, was for a long time more or less ignored by anglers pursuing summer steelhead. The Lower Skeena region summer steelhead fishery has evolved and matured and other Lower Skeena tributaries like Kitsumkalum River, the Nass River and its tributaries, and the main stem Skeena itself are developing reputations as worthy rivals of the established upriver systems.

TIMING

Summer steelhead arrive in the Skeena and her tributaries beginning in July, with peak abundance occurring in the last week of July or first week of August. Summer steelhead abundance remains high throughout August and remains significant through the end of September. Figure 8 presents summer steelhead data from the Tyee Test Fishery for our reference years. The Tyee Test Fishery is located near the mouth of the Skeena and the timing presented in Figure 8 predates the arrival of Chinook near Terrace by a couple of weeks.

Figure 8: Tye test fishery data for 2013–2016; index represents daily relative steelhead abundance near the mouth of the Skeena

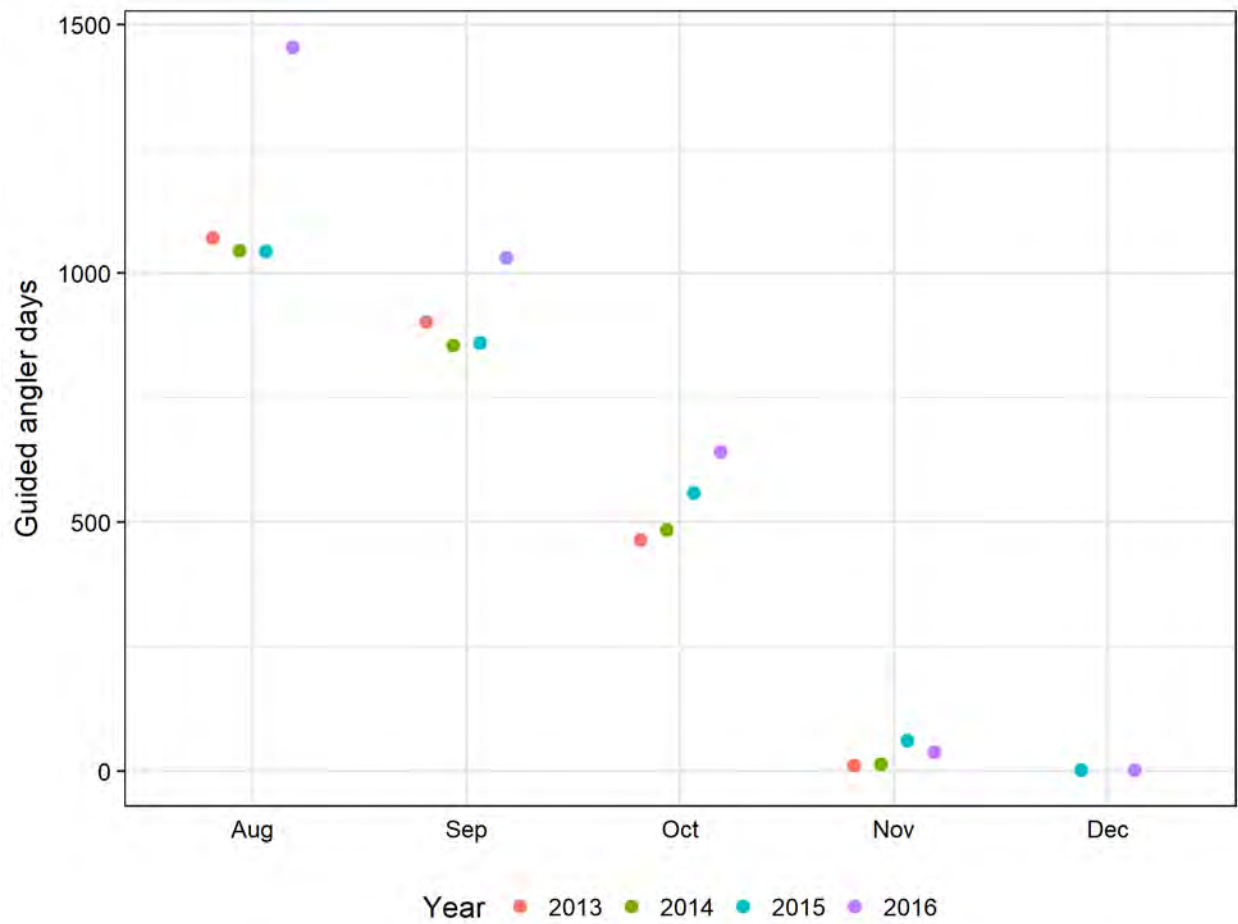


Source: Tye test fishery, daily index. http://www-ops2.pac.dfo-mpo.gc.ca/fos2_Internet/Testfish/rptDTFDTyeeParm.cfm?fsub_id=585

EFFORT

Figure 9 presents angling effort in terms of guided angler days in the summer steelhead fishery for our reference years.

Figure 9: Guided angling activity directed toward summer steelhead based in the Lower Skeena region, by month, 2013–2016



Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Guided angling effort directed at summer steelhead has increased significantly over our reference period, with the number of guided angler days increasing by 29% from 2013 to 2016. Table 50 summarizes guided angling effort directed at summer steelhead based in the Lower Skeena by major watershed and reference year.

Table 50: Guided angling effort (angler days) directed at summer steelhead based in the Lower Skeena by watershed and reference year

| | 2013 | 2014 | 2015 | 2016 |
|--------------------------|--------------|--------------|--------------|--------------|
| <i>Kitsumkalum River</i> | 162 | 185 | 335 | 433 |
| <i>Skeena River</i> | 1,778 | 1,666 | 1,593 | 2,232 |
| <i>Zymoetz River</i> | 179 | 252 | 282 | 215 |
| <i>Other</i> | 330 | 297 | 318 | 288 |
| Total | 2,449 | 2,400 | 2,528 | 3,168 |
| <i>Growth</i> | | -2% | 5% | 25% |

Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

IMPACTS OVERVIEW

The roughly 2,600 guided angling days per year directed at summer steelhead in the Lower Skeena generate significant economic impacts in the region and in BC as a whole. Table 51 presents those impacts in terms of spending, domestic output, GDP, employment, and taxation within the Lower Skeena region.

Table 51: Economic impacts in the Lower Skeena region associated with guided angling directed at summer steelhead

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$3,408,860 | \$3,340,655 | \$3,518,823 | \$4,409,237 | \$3,669,394 |
| <i>Domestic Output</i> | \$3,454,287 | \$3,385,173 | \$3,565,716 | \$4,467,996 | \$3,718,293 |
| <i>GDP at Basic Prices</i> | \$1,731,403 | \$1,696,761 | \$1,787,255 | \$2,239,508 | \$1,863,732 |
| <i>Employment (jobs)</i> | 62 | 60 | 64 | 80 | 66 |
| <i>Total Taxes</i> | \$653,427 | \$640,353 | \$674,505 | \$845,184 | \$703,367 |
| <i>Total Federal Taxes</i> | \$319,554 | \$313,161 | \$329,862 | \$413,332 | \$343,977 |
| <i>Total Provincial Taxes</i> | \$333,872 | \$327,192 | \$344,643 | \$431,852 | \$359,390 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at summer steelhead in the Lower Skeena region amount to over \$3.7 million in terms of domestic output, and almost \$2 million in terms of GDP. On average, 66 jobs are attributable to guided angling directed at summer steelhead, and just over \$700,000 in tax revenue is generated by the industry in this one fishery.

The economic impacts of guided angling directed at summer steelhead in the Lower Skeena region extend beyond the local region. Table 52 extends the geographic scope of included economic impacts to include the rest of BC.

Table 52: Economic impacts in all of BC (including the Lower Skeena region) associated with guided angling directed at summer steelhead in the Lower Skeena region

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$3,408,860 | \$3,340,655 | \$3,518,823 | \$4,409,237 | \$3,669,394 |
| <i>Domestic Output</i> | \$5,364,376 | \$5,257,045 | \$5,537,421 | \$6,938,627 | \$5,774,367 |
| <i>GDP at Basic Prices</i> | \$2,807,307 | \$2,751,138 | \$2,897,866 | \$3,631,151 | \$3,021,866 |
| <i>Employment (jobs)</i> | 73 | 71 | 75 | 94 | 78 |
| <i>Total Taxes</i> | \$878,773 | \$861,190 | \$907,120 | \$1,136,661 | \$945,936 |
| <i>Total Federal Taxes</i> | \$423,849 | \$415,369 | \$437,522 | \$548,234 | \$456,243 |
| <i>Total Provincial Taxes</i> | \$454,923 | \$445,821 | \$469,598 | \$588,427 | \$489,693 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

On average, the economic impacts of guided angling directed at summer steelhead in the Lower Skeena region amount to just under \$5.8 million in terms of domestic output and just over \$3 million in terms of GDP. On average, 78 jobs are attributable to guided angling directed at summer steelhead, and nearly \$1 million dollars in tax revenue is generated by the fishery.

DETAILED IMPACTS

Combining effort, economic impact, and catch data, we estimate the expected catch per angler day and economic impacts attributable per caught fish in the summer steelhead fishery. The wild steelhead fishery province-wide is catch-and-release. In our reference area, only the Kitimat river supports hatchery steelhead and from the data we have, virtually no summer steelhead were kept over our reference period. Table 53 provides an overview of angler success per angler day and the total number of summer steelhead caught in each of our reference years.

Table 53: Steelhead landed and kept or released in the summer steelhead season while guided, per angler day and in total for each reference year, Lower Skeena region

| | <i>Released/Day</i> | <i>Kept/Day</i> | <i>Released</i> | <i>Kept</i> | <i>Caught</i> |
|-------------|---------------------|-----------------|-----------------|-------------|---------------|
| <i>2013</i> | 0.53 | 0.00 | 1,289 | 0 | 1,289 |
| <i>2014</i> | 0.56 | 0.00 | 1,352 | 0 | 1,352 |
| <i>2015</i> | 0.59 | 0.00 | 1,491 | 0 | 1,491 |
| <i>2016</i> | 0.55 | 0.00 | 1,754 | 0 | 1,754 |

Source: Big River Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Table 54 presents the estimated Economic impacts in all of BC (including the Lower Skeena region) per summer steelhead in the Lower Skeena. In 2016, anglers spent approximately \$2,500 per summer steelhead caught; this figure ranged from \$2,400 in 2015 to \$2,600 in 2013. In 2016, each steelhead

caught in the summer steelhead fishery accounted for approximately \$2,100 in GDP for BC, and about \$650 in tax revenue, on average.

Table 54: Economic impacts for all of BC per summer steelhead caught in the Lower Skeena, 2013–2016

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|------------|------------|------------|------------|
| <i>Direct Expenditures</i> | \$2,644.34 | \$2,471.16 | \$2,359.12 | \$2,513.22 |
| <i>Domestic Output</i> | \$4,161.28 | \$3,888.75 | \$3,712.44 | \$3,954.94 |
| <i>GDP at Basic Prices</i> | \$2,177.70 | \$2,035.08 | \$1,942.81 | \$2,069.72 |
| <i>Total Taxes</i> | \$681.69 | \$637.04 | \$608.16 | \$647.88 |
| <i>Total Federal Taxes</i> | \$328.79 | \$307.26 | \$293.33 | \$312.49 |
| <i>Total Provincial Taxes</i> | \$352.90 | \$329.78 | \$314.83 | \$335.40 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Because essentially all summer steelhead caught in our sample were released, mortality from the summer steelhead fishery depends entirely on the mortality rate of released steelhead. In Table 55 to Table 58, we present estimated Economic impacts in all of BC (including the Lower Skeena region) per summer steelhead killed in the Lower Skeena under four catch-and-release mortality rate assumptions: 5%, 10%, 15%, and 20%. The estimated GDP per summer steelhead killed in 2016 ranges from \$10,000 under an assumption of 20% mortality to \$41,000 under an assumption of 5% mortality.

Table 55: Economic impacts across BC per killed summer steelhead caught by a guided angler in the Lower Skeena region, 5% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$52,456 | \$49,209 | \$46,948 | \$49,905 |
| <i>Domestic Output</i> | \$82,547 | \$77,439 | \$73,880 | \$78,533 |
| <i>GDP at Basic Prices</i> | \$43,199 | \$40,525 | \$38,663 | \$41,098 |
| <i>Total Taxes</i> | \$13,523 | \$12,686 | \$12,103 | \$12,865 |
| <i>Total Federal Taxes</i> | \$6,522 | \$6,119 | \$5,837 | \$6,205 |
| <i>Total Provincial Taxes</i> | \$7,000 | \$6,567 | \$6,265 | \$6,660 |

Table 56: Economic impacts across BC per killed summer steelhead caught by a guided angler in the Lower Skeena region, 10% mortality

| | 2013 | 2014 | 2015 | 2016 |
|----------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$26,341 | \$24,661 | \$23,535 | \$25,047 |
| <i>Domestic Output</i> | \$41,451 | \$38,808 | \$37,037 | \$39,415 |
| <i>GDP at Basic Prices</i> | \$21,693 | \$20,309 | \$19,382 | \$20,627 |
| <i>Total Taxes</i> | \$6,790 | \$6,357 | \$6,067 | \$6,457 |
| <i>Total Federal Taxes</i> | \$3,275 | \$3,066 | \$2,926 | \$3,114 |

| | | | | |
|-------------------------------|---------|---------|---------|---------|
| <i>Total Provincial Taxes</i> | \$3,515 | \$3,291 | \$3,141 | \$3,343 |
|-------------------------------|---------|---------|---------|---------|

Table 57: Economic impacts across BC per killed summer steelhead caught by a guided angler in the Lower Skeena region, 15% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$17,586 | \$16,453 | \$15,704 | \$16,719 |
| <i>Domestic Output</i> | \$27,674 | \$25,891 | \$24,713 | \$26,310 |
| <i>GDP at Basic Prices</i> | \$14,482 | \$13,550 | \$12,933 | \$13,769 |
| <i>Total Taxes</i> | \$4,533 | \$4,241 | \$4,048 | \$4,310 |
| <i>Total Federal Taxes</i> | \$2,187 | \$2,046 | \$1,953 | \$2,079 |
| <i>Total Provincial Taxes</i> | \$2,347 | \$2,196 | \$2,096 | \$2,231 |

Table 58: Economic impacts across BC per killed summer steelhead caught by a guided angler in the Lower Skeena region, 20% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$13,199 | \$12,344 | \$11,783 | \$12,547 |
| <i>Domestic Output</i> | \$20,770 | \$19,426 | \$18,543 | \$19,745 |
| <i>GDP at Basic Prices</i> | \$10,870 | \$10,166 | \$9,704 | \$10,333 |
| <i>Total Taxes</i> | \$3,403 | \$3,182 | \$3,038 | \$3,235 |
| <i>Total Federal Taxes</i> | \$1,641 | \$1,535 | \$1,465 | \$1,560 |
| <i>Total Provincial Taxes</i> | \$1,761 | \$1,647 | \$1,573 | \$1,674 |

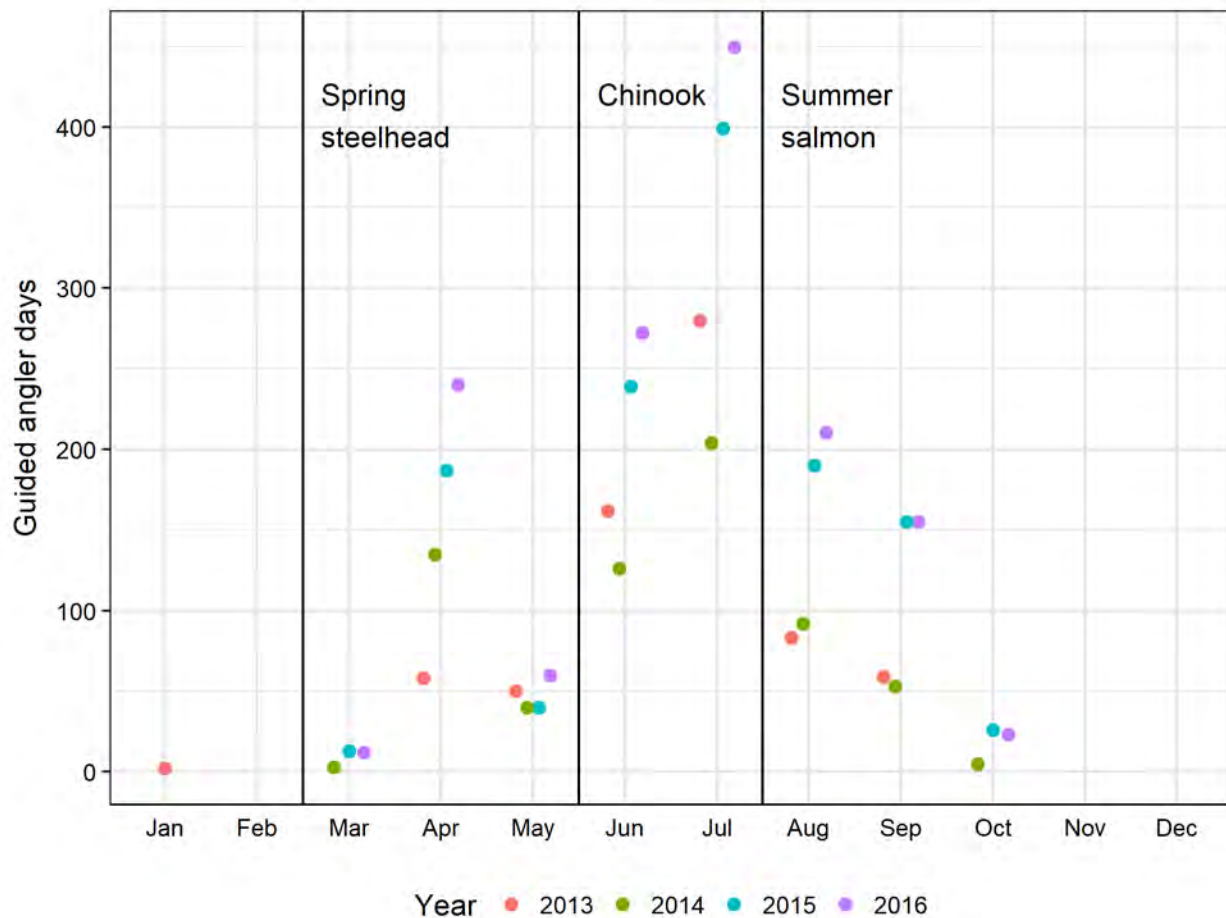
Source (Table 55 to Table 58): Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

KITIMAT RIVER

The Kitimat River is not part of the Skeena drainage. It lays to the south of the Skeena and it drains a 1,990 square kilometer basin directly into the Douglas Channel near the town site of Kitimat. The Kitimat is of special interest to this study because, while it is a relatively small river, the Kitimat remains unclassified and it supports runs of spring steelhead, chinook, pink, chum, and coho. As a result of its abundant salmon and unclassified status there are significant numbers of guided anglers on the Kitimat from March right through to October. In 2016, the guided angler days on the Kitimat river alone represented almost a fifth (19%) of all guided angler days in the Lower Skeena region. For such a small system, the economic importance of guided angling on the Kitimat is hard to overstate for the wider region and BC as a whole.

There are several guiding businesses based out of Kitimat but a significant number of guided angler days on the Kitimat are originating in Terrace and traveling south to fish the Kitimat. To the extent that guided anglers are originating in Terrace and not with businesses in Kitimat, the economic impacts of guiding on the Kitimat River in Kitimat itself would be reduced. We have not estimated the relative proportions of guided angler days originating with businesses in Terrace as compared to businesses in Kitimat, however we present estimated economic impacts for the Lower Skeena region and the province of BC.

Figure 10: Guided angling activity on Kitimat River, by month, 2013–2016; vertical lines mark seasons as defined in Table 2



Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Guided angling effort on the Kitimat has more than doubled over our reference period (2013 – 2016) going from only 692 days in 2013 to 1,422 days in 2016. This growth is due primarily to increasing interest in the spring steelhead and chinook fisheries. Fishing directed at salmon after August 1st has seen a modest increase in 2016 but it has effectively remained stable over our reference years.

Table 59: Guided angling effort (angler days) on Kitimat River, by fishing season and reference year

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------|------------|------------|--------------|--------------|
| <i>Spring steelhead</i> | 108 | 178 | 240 | 312 |
| <i>Chinook</i> | 442 | 330 | 638 | 722 |
| <i>Summer salmon</i> | 142 | 150 | 371 | 388 |
| <i>Other</i> | 2 | 0 | 0 | 0 |
| Total | 692 | 658 | 1,249 | 1,422 |
| <i>Growth</i> | | -5% | 90% | 14% |

Source: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Guided angling on the Kitimat River has significant economic impacts in the local area. Table 60 presents the economic impacts associated with guided angling on the Kitimat River on average and for our reference years. Because our economic impacts are a multiple of the number of guided angler days, the economic impacts of guided angling on the Kitimat River have more than doubled over our reference period. In terms of direct angler expenditures, almost \$2 million was spent on guided angling on the Kitimat in 2016, in terms of GDP, over \$1 million was generated supporting or creating 36 jobs. Just under \$400,000 in total taxation revenue was generated by guided angling on the Kitimat River from the economic activity in the Lower Skeena region.

Table 60: Economic impacts in the Lower Skeena region associated with guided angling on Kitimat River

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-----------|-----------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$963,222 | \$915,896 | \$1,738,533 | \$1,979,338 | \$1,399,247 |
| <i>Domestic Output</i> | \$976,058 | \$928,102 | \$1,761,701 | \$2,005,715 | \$1,417,894 |
| <i>GDP at Basic Prices</i> | \$489,233 | \$465,195 | \$883,023 | \$1,005,331 | \$710,695 |
| <i>Employment (jobs)</i> | 17 | 17 | 31 | 36 | 25 |
| <i>Total Taxes</i> | \$184,635 | \$175,563 | \$333,250 | \$379,409 | \$268,214 |
| <i>Total Federal Taxes</i> | \$90,295 | \$85,858 | \$162,974 | \$185,548 | \$131,169 |
| <i>Total Provincial Taxes</i> | \$94,340 | \$89,705 | \$170,276 | \$193,861 | \$137,046 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Table 61 extends the geographic scope of the economic impacts and includes the economic impacts of guided angling on the Kitimat River to all of BC.

Table 61: Economic impacts in all of BC (including the Lower Skeena region) associated with guided angling on Kitimat River

| | 2013 | 2014 | 2015 | 2016 | Average |
|-------------------------------|-------------|-------------|-------------|-------------|-------------|
| <i>Direct Expenditures</i> | \$963,222 | \$915,896 | \$1,738,533 | \$1,979,338 | \$1,399,247 |
| <i>Domestic Output</i> | \$1,515,781 | \$1,441,306 | \$2,735,854 | \$3,114,799 | \$2,201,935 |
| <i>GDP at Basic Prices</i> | \$793,245 | \$754,270 | \$1,431,738 | \$1,630,049 | \$1,152,326 |
| <i>Employment (jobs)</i> | 20 | 19 | 37 | 42 | 30 |
| <i>Total Taxes</i> | \$248,310 | \$236,110 | \$448,178 | \$510,255 | \$360,713 |
| <i>Total Federal Taxes</i> | \$119,765 | \$113,880 | \$216,165 | \$246,106 | \$173,979 |
| <i>Total Provincial Taxes</i> | \$128,545 | \$122,229 | \$232,013 | \$264,149 | \$186,734 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Angler success, in terms of fish landed and kept or released while guided, is significantly higher on the Kitimat than for the seasons we’ve outlined in this document. This higher angler success is driven primarily by the salmon season in August when large numbers of chum and pink salmon are present in the river.

Table 62: Fish (all species) landed and kept or released while guided, per angler day and in total for each reference year, Kitimat River

| | <i>Released/Day</i> | <i>Kept/Day</i> | <i>Released</i> | <i>Kept</i> | <i>Caught</i> |
|------|---------------------|-----------------|-----------------|-------------|---------------|
| 2013 | 2.98 | 0.02 | 2,064 | 14 | 2,078 |
| 2014 | 2.70 | 0.02 | 1,779 | 12 | 1,791 |
| 2015 | 2.88 | 0.02 | 3,591 | 24 | 3,615 |
| 2016 | 2.82 | 0.02 | 4,005 | 27 | 4,032 |

Source: Big River Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Because essentially all fish caught in our sample were released, mortality from the Kitimat fishery depends almost entirely on the mortality rate of released fish. In Tables 63 - 67, we present estimated Economic impacts in all of BC (including the Lower Skeena region) per fish killed on the Kitimat River under four catch-and-release mortality rate assumptions: 5%, 10%, 15%, and 20%. The estimated GDP per fish killed in 2016 ranges from \$1,800 under an assumption of 20% mortality to \$7,200 under an assumption of 5% mortality.

Table 63: Economic impacts for all of BC per fish caught (kept or released) on Kitimat River, 2013–2016

| | 2013 | 2014 | 2015 | 2016 |
|----------------------------|-------|-------|-------|-------|
| <i>Direct Expenditures</i> | \$464 | \$511 | \$481 | \$491 |
| <i>Domestic Output</i> | \$729 | \$805 | \$757 | \$773 |

| | | | | |
|-------------------------------|-------|-------|-------|-------|
| <i>GDP at Basic Prices</i> | \$382 | \$421 | \$396 | \$404 |
| <i>Total Taxes</i> | \$119 | \$132 | \$124 | \$127 |
| <i>Total Federal Taxes</i> | \$58 | \$64 | \$60 | \$61 |
| <i>Total Provincial Taxes</i> | \$62 | \$68 | \$64 | \$66 |

Source: Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

Table 64: Economic impacts across BC per killed fish caught by a guided angler on Kitimat River, 5% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|----------|----------|----------|----------|
| <i>Direct Expenditures</i> | \$8,195 | \$9,083 | \$8,545 | \$8,723 |
| <i>Domestic Output</i> | \$12,896 | \$14,293 | \$13,447 | \$13,727 |
| <i>GDP at Basic Prices</i> | \$6,749 | \$7,480 | \$7,037 | \$7,184 |
| <i>Total Taxes</i> | \$2,113 | \$2,341 | \$2,203 | \$2,249 |
| <i>Total Federal Taxes</i> | \$1,019 | \$1,129 | \$1,062 | \$1,085 |
| <i>Total Provincial Taxes</i> | \$1,094 | \$1,212 | \$1,140 | \$1,164 |

Table 65: Economic impacts across BC per killed fish caught by a guided angler on Kitimat River, 10% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$4,364 | \$4,825 | \$4,539 | \$4,634 |
| <i>Domestic Output</i> | \$6,867 | \$7,593 | \$7,143 | \$7,292 |
| <i>GDP at Basic Prices</i> | \$3,594 | \$3,974 | \$3,738 | \$3,816 |
| <i>Total Taxes</i> | \$1,125 | \$1,244 | \$1,170 | \$1,195 |
| <i>Total Federal Taxes</i> | \$543 | \$600 | \$564 | \$576 |
| <i>Total Provincial Taxes</i> | \$582 | \$644 | \$606 | \$618 |

Table 66: Economic impacts across BC per killed fish caught by a guided angler on Kitimat River, 15% mortality

| | 2013 | 2014 | 2015 | 2016 |
|-------------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$2,974 | \$3,285 | \$3,090 | \$3,155 |
| <i>Domestic Output</i> | \$4,680 | \$5,170 | \$4,863 | \$4,965 |
| <i>GDP at Basic Prices</i> | \$2,449 | \$2,706 | \$2,545 | \$2,598 |
| <i>Total Taxes</i> | \$767 | \$847 | \$797 | \$813 |
| <i>Total Federal Taxes</i> | \$370 | \$408 | \$384 | \$392 |
| <i>Total Provincial Taxes</i> | \$397 | \$438 | \$412 | \$421 |

Table 67: Economic impacts across BC per killed fish caught by a guided angler on Kitimat River, 20% mortality

| | 2013 | 2014 | 2015 | 2016 |
|----------------------------|---------|---------|---------|---------|
| <i>Direct Expenditures</i> | \$2,411 | \$2,660 | \$2,318 | \$2,288 |
| <i>Domestic Output</i> | \$3,794 | \$4,186 | \$3,648 | \$3,600 |
| <i>GDP at Basic Prices</i> | \$1,986 | \$2,191 | \$1,909 | \$1,884 |

| | | | | |
|-------------------------------|-------|-------|-------|-------|
| <i>Total Taxes</i> | \$622 | \$686 | \$598 | \$590 |
| <i>Total Federal Taxes</i> | \$300 | \$331 | \$288 | \$284 |
| <i>Total Provincial Taxes</i> | \$322 | \$355 | \$309 | \$305 |

Source (Table 64 to Table 67): Big River and Pacific Analytics calculations based on SAGA member financial statements, Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Smithers, BC (2013–2015) and Big River Analytics estimates (2016)

METHODS

This section describes how we produced our estimates of economic impacts attributable to guided angling in the Lower Skeena region.

DATA

This section describes the various types and sources of data used in the computation of our estimates.

FINANCIAL DATA

FINANCIAL DATA FROM GUIDING BUSINESSES

In order to ensure our estimates were flexible and could be used for different years and waterbodies, we computed a “representative guided angler day”. This estimate consists of the revenues and expenditures of a representative guiding operation associated with the provision of a guided angler day and served as the primary input in the input/output (I/O) model developed by Pacific Analytics and used by Destination BC to calculate economic impacts in tourism industries for smaller regions in BC.

In total, nine guiding businesses from the Lower Skeena provided financial statements for all or a subset of our reference years (2013, 2014, 2015, and 2016), resulting in 32 financial reports that were included in our calculations. In order to estimate our representative angler day, we aggregated the 32 submissions across businesses and years whenever feasible while preserving as many revenue and expenditure categories as possible. The same nine guiding businesses also contributed annual guide reports. These reports detail their guiding activities in our reference years. The sum of guided angler days from these reports provided the number used as the denominator for our estimate of a representative guided angler day, expressed in terms of revenue and expenses, for our sample of guiding businesses across reference years. The resulting estimate is presented in Table 68.

Table 68: Guiding businesses revenue and expenditures expressed per guided angler day

| | <i>Per Day</i> |
|--|----------------|
| <i>Total Lodge Revenue</i> | \$1,032.14 |
| <i>Lodge Expenses</i> | |
| <i>Accommodations</i> | \$45.79 |
| <i>Advertising and promotion</i> | \$14.53 |
| <i>Air Charter</i> | \$36.98 |
| <i>Amortization</i> | \$40.07 |
| <i>Amortization of intangible assets</i> | \$6.01 |
| <i>BCAA</i> | \$0.03 |
| <i>Boat Insurance</i> | \$0.01 |
| <i>Client angling licences</i> | \$14.44 |
| <i>Client Lodge</i> | \$15.92 |
| <i>Credit card charges</i> | \$2.37 |
| <i>Delivery</i> | \$0.08 |
| <i>Driveway Repairs</i> | \$0.41 |
| <i>Fish Shuttles</i> | \$0.07 |
| <i>Food Supplies</i> | \$47.90 |
| <i>Fuel and oil</i> | \$29.59 |
| <i>Garbage</i> | \$0.04 |
| <i>Gardening</i> | \$0.27 |
| <i>Guide Supplies</i> | \$0.12 |
| <i>Guiding wages</i> | \$48.25 |
| <i>Insurance</i> | \$23.16 |
| <i>Interest and bank charges</i> | \$5.97 |
| <i>Interest on long term debt</i> | \$7.19 |
| <i>Licences, dues and rod day fees</i> | \$22.04 |
| <i>Rod day fees</i> | \$1.92 |
| <i>Lumber</i> | \$0.27 |
| <i>Meals and Entertainment</i> | \$0.64 |
| <i>Office</i> | \$30.24 |
| <i>Heat</i> | \$0.15 |
| <i>Internet</i> | \$0.14 |
| <i>Property Taxes</i> | \$0.14 |
| <i>Telephone</i> | \$0.10 |
| <i>Other</i> | \$6.83 |
| <i>Permits</i> | \$0.03 |
| <i>Professional fees</i> | \$24.73 |
| <i>Propane</i> | \$0.04 |
| <i>Property Taxes</i> | \$1.67 |
| <i>Rental</i> | \$40.11 |
| <i>Repairs and maintenance</i> | \$86.92 |
| <i>Salaries and wages</i> | \$188.11 |
| <i>Management</i> | \$41.19 |
| <i>Employee Benefits</i> | \$6.97 |
| <i>Other</i> | \$30.28 |
| <i>Sales commissions</i> | \$29.93 |
| <i>Shop Vac</i> | \$0.02 |
| <i>Subcontractors</i> | \$69.48 |
| <i>Supplies</i> | \$54.63 |
| <i>Telephone</i> | \$9.08 |
| <i>Travel</i> | \$8.74 |
| <i>Vehicle</i> | \$14.75 |
| <i>Total Lodge Expenses</i> | \$1,008.34 |
| <i>INCOME FROM OPERATIONS</i> | \$23.80 |
| <i>Gain (Loss) on disposal of assets</i> | (\$2.39) |
| <i>Foreign exchange gain (loss)</i> | \$8.26 |
| <i>Income Taxes</i> | \$11.81 |
| <i>NET INCOME (LOSS) FOR THE YEAR</i> | \$17.86 |

Because the input from to the I/O model was in terms of a representative angler day, the output from the I/O model was also in terms of a representative angler day. In order to estimate the economic impact in

each of our respective reference years, the vector of economic impacts (output from the I/O model) was multiplied by our estimated number of guided angler days in each reference year. This produced an estimate of the economic impacts attributable to guided angling in the Lower Skeena region and in BC as a whole in each year. No adjustments for inflation have been made, and estimates are in current-year dollars.

The secondary component included in the I/O model was client expenditures outside guiding businesses.

CLIENT EXPENDITURES OUTSIDE GUIDING BUSINESSES

Client expenditures outside guiding businesses include restaurant meals and accommodation provided outside the guiding operation, travel expenses incurred in BC, and souvenirs and other shopping done during an angling trip.

Client expenditures outside guiding businesses were estimated in consultation with the same guiding businesses that submitted financial statements and guide reports. These operators recommended estimating client expenditures outside their businesses on a “per-trip” basis, and so estimates submitted were divided by the mean trip duration (4 guided angler days). This produced an estimate of expenditure per guided angling day. This matches the type of metric used to estimate revenue and expenses. An estimated 95 percent of guided anglers arrive in Terrace by plane, so travel expenses were estimated separately from the contributions of guiding businesses.

The estimates arrived at by this method are higher than those calculated in other studies. Two factors contribute to this higher estimate. First, some businesses do not always include client accommodations and food in their businesses, and in these cases food and accommodations are captured here rather than in the operation’s revenue and expenses. Second, guides provide anecdotal evidence that guided anglers traveling from around the world to Terrace tend to have higher incomes and willingness to spend than other tourists. This observation is in line with guided anglers’ willingness to pay more than \$1,000 per day for their guide’s services.

Table 69 presents our estimate of expenditures outside guiding businesses per guided angling day over the reference period.

Since all estimated output from the I/O model are linear, estimates were added up for guiding businesses and additional client expenditures and then allocated among the reference years according to the number of guided angler days that took place in each year.

Table 69: Estimated expenditures outside guiding businesses per guided angling day, 2013–2016

| <i>Expense Category</i> | <i>Amount</i> |
|---------------------------------|-----------------|
| <i>Accommodations</i> | \$50.00 |
| <i>Tackle Shops</i> | \$37.60 |
| <i>Food and beverages</i> | \$48.60 |
| <i>Shopping</i> | \$33.50 |
| <i>Attractions</i> | \$9.00 |
| <i>Other outdoor recreation</i> | \$8.89 |
| <i>Entertainment</i> | \$10.87 |
| <i>Airfare/Travel</i> | 111.90 |
| <i>Total</i> | <i>\$310.35</i> |

As an example of how this “per guided angling day” approach adds up, consider the following example: a typical trip to the Lower Skeena region consists of 4 guided angler days. Within British Columbia, there are a minimum of two travel days that anglers would take on either end of their trip. The 4-day trip means we’ve included a total of \$1,241.40 to account for airfare or other forms of travel to make their way to Terrace, any accommodations and food they might need along the way, and any tackle, food, shopping, or other spending that might occur during their 6 day trip. Consider that return flights cost an average of \$400 between Vancouver and Terrace, hotel accommodations run between \$100 and \$200 per night, and guided anglers are known to purchase boots, waders, rods and other gear upon arrival and our estimate for additional spending fits the context.

CATCH DATA

Catch data, which refers to the number and species of fish caught, is included in the annual guide reports. From these data, we estimated the average number per angler day of each species of fish kept and released in the sample, by waterbody and month. For combinations of waterbody and month for which no catch data appear in the sample, the average catch per angler day across all waterbodies for the month were used. The catch rates per angler day were then multiplied by the number of guided days in the corresponding month and waterbody for each reference year to produce monthly catch estimates.

GUIDING ACTIVITY DATA

The above approach relies on two assumptions: a good estimate of the number of guided angler days, and the representativeness of the revenues, expenses, and additional client expenditures of the nine guided businesses for all guided angling in the Lower Skeena region.

GUIDED ANGLING DAYS

An estimate of guided angler days must take into account angling days in both classified and unclassified waters. The ministry responsible for regulating guiding activity is Forests, Lands, Natural Resource Operations and Rural Development (FLNRO). FLNRO estimates are complete for 2013, 2014, and 2015 for both classified and unclassified waters, but the guide reports from which they derive these estimates have not yet been tabulated for 2016.

Our estimates for the number of guided angler days in 2016 is different for classified and unclassified waters. Both estimates were computed annually, and then distributed across months according to the average monthly proportion of angler days for each waterbody in the FLNRO data. A few waterbodies

appear in the guide report sample but not in the FLNRO estimates; for these waterbodies, the average monthly distribution of angler days across all waterbodies in the FLNRO data was used to distribute days across months.

CLASSIFIED DAYS

Since the total number of possible rod days for all classified rivers in 2016 is set, as are the number of days allocated to the guides in our sample, and we know the number of days they guided, we can estimate the classified days by applying the utilization rate in our sample (days used in sample divided by possible days in sample) to classified rod days allocated to guides that were not included in our sample. Obviously, this relies on the second assumption above, that the guides in our sample are representative.

UNCLASSIFIED DAYS

Since there is no effective cap on unclassified days, the utilization rate approach cannot be used to estimate unclassified days.

Applying an average of the previous three years would likely understate the days in 2016 because there is an increasing trend in the number of guided angler days per year. Instead, we estimate a linear regression of days as a function of years for each unclassified waterbody for which we have FLNRO data in previous years.

A small subset of waterbodies that appear in our sample for 2016 do not appear in FLNRO data. Since a linear model estimate is not possible for those waterbodies, we include the unexpanded number of days present in our sample. Since these waterbodies are remote and specific, it is likely that the guiding businesses in our sample are the only ones, or are part of a small group, that are guiding on those waterbodies.

CONCLUSION

This study examines the economic impacts of guided angling in the Lower Skeena region for the years 2013 - 2016. We find that guided angling has increased significantly over our reference period (+56%) and relative to the most recent study (2008) that examined the same fisheries in terms of its economic impacts, we find that the economic impacts have also increased since they were last examined.

In aggregate, the four fisheries (spring steelhead, chinook, summer steelhead, salmon) that constitute the guided angling season in the Lower Skeena region are of increasing importance. The number of guided angler days is up 56% from 2013 to 2016, from 4,850 to 7,553. Direct angler expenditures totalled over \$10.5 million in 2016, producing \$16.5 million in total domestic output across BC and \$8.7 million in terms of GDP. Taken together, 2016 guided angling in the Lower Skeena region supported 190 local jobs and 224 jobs across BC, generating more than \$2.7 million in taxes province-wide.

The recent closures on the Skeena in 2017 and 2018 have a significant impact on the regional economy and guiding businesses based in the Lower Skeena region will be among the hardest hit. In an era of lower salmon abundance it is important to consider resource utilization compared with the value created by different resource stakeholders. Guided angling in the Lower Skeena region tends to create very large economic impacts per killed fish because the vast majority of guided angling is catch-and-release. The value created by this industry should be considered and compared with the value created by other users of the resource in the context of their respective resource utilization. Conservation is a shared responsibility and it is of utmost importance for the long-term sustainability of industries like guided angling. It is equally important that conservation measures that are taken to protect the resource are effective and take into account their economic cost in terms of what they are able to achieve.

WORKS CITED

- Counterpoint Consulting. (2008). *Economic Dimensions of Skeena Watershed Salmonid Fisheries*.
- Gottesfeld, A. S., Doire, J., & English, K. (2010). *Chinook Radiotelemetry Project*. Pacific Salmon Commission Chinook Technical Committee.
- Reid, D. J. (1974). *The Importance of Sport Fishing to the North Mainland Coast and Northern Central Areas of British Columbia An Economic Survey*. Fisheries and Marine Service. Environment Canada. Retrieved April 23, 2018, from <http://www.dfo-mpo.gc.ca/Library/22653.pdf>