Economic Impact Assessment: Te Manahuna Mackenzie Basin Hydro Canals

Joel Hjelte[a], Brent Lovelock[b], Stu Hayes[b], Viktoria Kahuia[a]

[a] Department of Economics, University of Otago

[b] Centre for Recreation Research, Department of Tourism, University of Otago

May 2024

Abstract

Central South Island Fish and Game Council, in partnership with the University of Otago, conducted an economic impact assessment of the hydro canals fishery in the Mackenzie Basin for the 2022-2023 sports fishing season. Utilising Fish & Game licence holder data and online survey methods, expenditure data from 1,626 anglers were collected during October 2023, covering 22,537.9 days of activity in the Mackenzie Basin and totaling $4.6 million. The expenditure data were scaled to all anglers using figures from the 2021-2022 National Anglers Survey. Indirect economic impacts were estimated using government-produced national input-output (IO) tables and totals adjusted for angler motivation. The total economic impact of the Hydro Canals fishery was assessed at **$13.6 million** comprised of a direct economic impact of $8.0 million and an indirect economic impact of $5.6 million. The final figures were subjected to extensive robustness checks, including outlier analysis and alternative source verification, to ensure the reliability of the assessment.

Contents

List of Tables

List of Figures

1 Introduction

Economic Impact Assessments (EIAs) have long been a crucial tool for understanding the influence of fisheries on local and regional economies. These assessments provide a comprehensive evaluation of the economic contributions of fisheries, encompassing both direct impacts and indirect impacts, the latter comprising the ripple effects on related sectors and the broader community. By systematically quantifying these economic effects, EIAs offer valuable insights that can guide informed decision-making and strategy development.[1] EIAs serve as an objective basis for discussions, enabling stakeholders to consider the full economic implications of fisheries-related policies and interventions. This report, produced by the University of Otago with funding and support from the Central South Island Fish and Game Council, aims to determine the economic impact of the most popular freshwater fishery in New Zealand, the Te Manahuna Mackenzie Basin hydro canals.[2] The hydro canals, located in the central South Island, New Zealand, play an important role in tourism both locally and nationally. Through a detailed analysis, we sought to define and quantify this role to aid in future policy considerations and strategic planning.

The hydro canal fishery, situated in the picturesque Te Manahuna Mackenzie Basin, originates from the development of a hydroelectric power project constructed in the 1970s and 1980s. This initiative led to the creation of three artificial canals that form the backbone of the hydro canal fishery: Tekapo, Pūkaki, and Ōhau. These canals not only serve as prime angling locations but also play a pivotal role in Aotearoa New Zealand's renewable energy sector. They are owned and operated by Meridian Energy and Genesis Energy, two of the country's leading energy companies. This strategic infrastructure development has not only contributed to the nation's energy sustainability but has also created a productive location for salmon farms (Central South Island Fish & Game, 2023). Figure 1 shows a map of the area and the canal system (Central South Island Fish & Game, 2023).

The introduction of salmon farms within the canals has further enhanced the fishing attractiveness by both increasing the size of targeted species and providing readily harvestable salmon.[3] Emphasising this point are the results from a 2023 survey examining the values of anglers in the hydro canals; in it, Adams (2024) found that 66% of anglers would cease or reduce their angling of the canals if the salmon farms were not present.

This unique combination of factors has led to the hydro canals becoming the most frequented freshwater fishery within New Zealand (Stoffels and Unwin, 2023). Fish & Game New Zealand (FGNZ) manages a freshwater licence programme in which all anglers must purchase a freshwater sports fishing licence, with options ranging from individual day licences to yearly family licences.

The combination of scenic appeal, ample angling locations, and the positive side effects of salmon farming has established this fishery as one of significant importance for the local Te Manahuna Mackenzie Basin economy. This economic impact assessment aims to quantify the influence of the hydro canal fisheries on the local economy. Specifically, it measures the direct and indirect economic impacts of expenditures by individuals and groups visiting the hydro canal fisheries.

To achieve this goal, we designed an online survey which was distributed to all licence holders, wherein expenditure and trip habits were recorded. The results were analysed alongside data from the existing national angling survey and employing input-output multiplier tables. Throughout the analysis, adjustments were made to the level of individual respondents' expenditure based on the respondents' motivations. These adjustments are important given that Te Manahuna Mackenzie Basin supports a range of visitor activities, which presents a risk of overstating the economic influence of this single tourism component (i.e., that fishing is just one of multiple motivations for visiting the area, and the associated spending there). To counteract this potential risk, our study introduces an innovative approach utilising both reported retrospective motivation across the surveyed time period and a hypothetical future loss scenario to confirm and refine the adjustments for angler motivation.

The remainder of this report is organised as follows: first, a brief review of the literature on EIA methodologies and other relevant EIAs conducted in New Zealand is presented. Next, the study design is described

[1] Existing literature also commonly use the initialism EcIA to delineate from environmental impact assessments. In this report, we will use the shorter abbreviation EIA.

[2] Hereby simply referred to as the hydro canals.

[3] The exact mechanism of enhanced growth is unclear, however, the salmon farm feeding process is believed to contribute to the larger size (Central South Island Fish & Game, 2023).

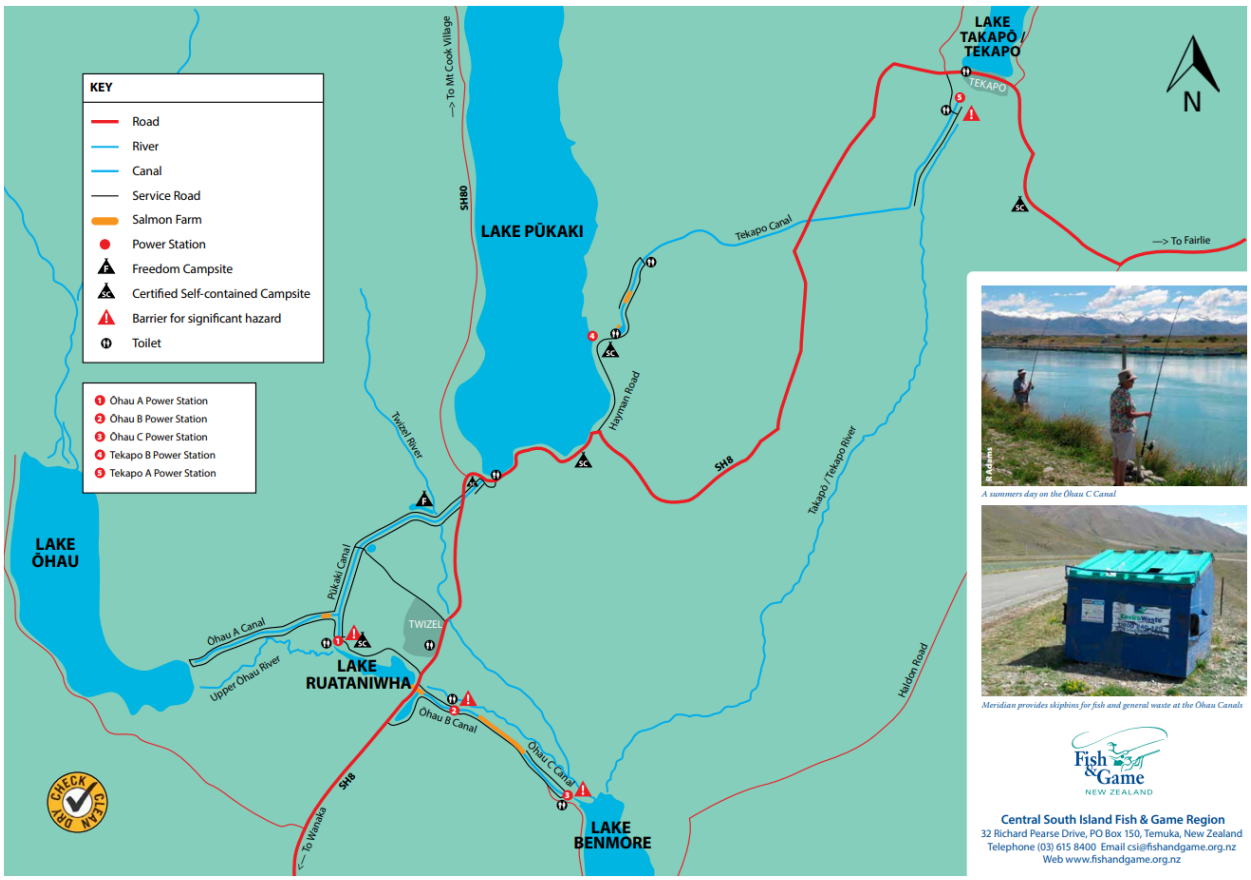


Figure 1: Te Manahuna Mackenzie Basin Hydro Canals

and the key results are presented. Subsequently, and using robustness verification techniques, the direct and indirect economic impacts of the hydro canals fishery are calculated, with adjustments made for respondents' motivations. Finally, the report concludes with a review and discussion of the results and their implications.

2 Background

There are two primary components of an economic impact assessment: first, an estimation of the stimulus or expenditure that serves as the direct economic impact, and second, the economic model used to calculate the indirect impacts (Pleeter, 1980). The tools and methods for both components have evolved over time, and here we consider them separately.

Methods to collect and aggregate direct expenditure data vary across applications and time. At the largest scale, detailed expenditure records are collected from all active economic agents in the target area. This includes detailed financial, employment, and import/export records for all businesses, as well as approximations of all individuals in the area via survey or interview. This level of detail is commonly only possible with direct government involvement and is reserved for the most extensive EIA projects (Pleeter, 1980).

We observe a simplified version of such an approach in an analysis of the economic impact of tourism in Rotorua, New Zealand, which relied upon interviews with businesses and the collection of employment and expense estimates which was then combined with a sample of visitor spending (Butcher et al., 2000). These values were then aggregated using national tourism figures. The methods employed by Butcher et al. remain comprehensive, however the use of surveys especially for industrial figures adds in additional reliance on individual responses that needs to be accounted for. Moreover, such approaches are still time-consuming

and costly, rendering them feasible only in cases involving large geographic and economic areas.[4]

When considering fisheries, the scope of economic analyses is generally more limited. There have been significant efforts overseas, such as Hutt et al. (2013), who evaluated the Regional Economic Impacts of Recreational Fisheries in Mississippi Reservoirs. This study utilised access point surveys to interview and collect data from angler groups at popular fishing locations. Each individual in the interviewed group would provide expenditure data for their current trip, then extrapolate to total days per location to aggregate the data. Additionally, a follow-up postal survey was conducted in which a specified individual from each group was surveyed. These surveys augmented in-person interviews, as they allowed for the full expenditure data to be returned for the entire year. This method of dual surveys, first established by Riechers et al. (1991), has gained significant popularity and has been shown to provide accurate estimates of angler expenditure. Dillman (2007) expanded this approach to include email surveys, which offer several distinct advantages: they are cheaper, easier to respond to, and facilitate follow-up. We contend and agree with Dillman (2007) that advancements in online survey technology, coupled with the rise of the digital age, have now created an environment where online surveys are viewed as the preferred method.

Returning to New Zealand, perhaps the most comparable freshwater fishery to have been studied, in scope and size, is Lake Taupō (Shaw, 1985). At the time of that study, survey data was collected via both in-person interviews and postal surveys. As per the previous examples, these methods were combined to aggregate the data. More recently, Taupō has again seen another economic impact assessment of its freshwater fishery, this time in 2012 as part of a larger Taupō Sports Fishery review (APR Consultants, 2012). This latest EIA only involved online surveys where anglers reported their estimated total expenditure. Expenditure values, however, were not split into categories, nor was motivation taken into account in any detail; rather the researchers took a binary approach of either including or excluding responses depending on whether a participant reported that their primary reason for visiting Taupō was something other than angling. The method of aggregation used in that study was similar to what is used in this report in that the authors also used the national angler survey to scale up to the total anglers using the fishery. While this method of aggregation depends on the specific data and definitions within the NAS and is therefore unique to New Zealand fisheries, the application of online surveys is a recognised universal tool. To summarise, the methods used to collect direct expenditure data have evolved to primarily focus on online surveys, especially in small-scale studies. In larger applications, such as region-wide impact studies, more comprehensive methods are required to fully capture the impact. These more comprehensive methods, that may include interviews with businesses or use detailed economic data, allow specific calculation and/or modification of industrial input-output (IO) tables. IO tables are structured matrices that depict the economic transactions between sectors within an economy, serving as a primary method for calculating the indirect and induced effects of direct expenditures within the local economy. These tables transform direct expenditure data into a broader economic context, essential for analysing the ripple effects of economic activity across sectors. They quantify both direct and indirect impacts of economic changes or policy interventions, with multipliers such as expenditure multipliers indicating the total economic impact from spending within a specific industry on the broader economy. For example, a multiplier of 1.5 for the manufacturing sector implies that every dollar spent generates an additional $0.50 of economic output across various industries Akbari et al. (2023).

The methodology for constructing IO tables can vary significantly depending on the scale and budget of the project. For large-scale Economic Impact Assessments (EIAs), tables are often generated using extensive data collections, including sales, census data, and imports and exports, providing high accuracy in capturing indirect effects. Such comprehensive approaches are illustrated by studies such as the economic impact of wide-mouth bass in Texas (Chen et al., 2003). However, for smaller-scale EIAs, it is common to modify existing national IO tables to create district-specific tables, a method well-documented for regions within New Zealand by Butcher (1985) and Butcher (1992). Both methods demand considerable effort and financial resources, underscoring the complexity of producing accurate IO tables. A simpler but still effective method to calculate indirect economic effects is to use existing multipliers for a similar region. The previously mentioned Taupō study(APR Consultants, 2012) used this method wherein multipliers from comparable regions such as Kaikoura, Akaroa, and Westland retrieved from Becken and Butcher (2004) were averaged and used. Importantly, this method does not take into account the disposition of expenditure data; rather, multipliers are only applied at the aggregate expenditure amount, resulting in a simplification.

[4]Butcher et al. (2000) found that tourism in Rotorua accounts for $463 million per year, in 2003.

Ultimately, both the method selected to determine the direct expenditure and the method used to calculate the indirect impacts come with trade-offs. When considering large economic areas, such as a US state or a tourist hotspot such as Rotorua, there are options to calculate indirect impacts at a more granular level; however, this comes at a steep cost in terms of resources and money. Therefore, when considering smaller areas such as Taupō, or indeed the hydro canals that are the focus of this report, existing sources of multipliers and surveys should be leveraged.

Finally, another important piece of data on which this report relies is the National Anglers Survey (NAS). This survey, commissioned by FGNZ, is intended to estimate annual waterbody usage by anglers for all significant freshwater sports fisheries within the 12 FGNZ regions. The survey has been carried out over five sports fishing seasons since 1994. The latest survey, and the one on which this report relies, was carried out for the 2021-2022 fishing season (Stoffels and Unwin, 2023). The critical information contained within the 2021-2022 NAS is the number of angling days per waterbody in the EIA area. The National Institute of Water & Atmospheric Research Ltd (NIWA) provides a detailed description and justification for, the concept of angler days within the document. The amount of angler days is required to effectively scale up the survey data collected to all anglers using the canals. To collect this data NIWA leverages stratified phone interviews with existing FGNZ licence holders to establish angling effort per waterbody.[5]

3 Methods

3.1 Survey

To accurately calculate the direct economic impact of the hydro canals, an online survey was chosen primarily for the potential to reach a broad sample and for the accessibility it offers in terms of data collection. The survey focused on three main areas: trip details, trip motivation, and trip expenditure.

First, anglers were asked to provide details about their fishing trips, including the number of trips made within the last fishing season, the average duration of these trips, the number of days spent fishing per trip, and the number of different canal locations visited per angling day. This information is crucial for constructing the concept of angling effort in line with the NIWA classification, and for estimating yearly expenditures from individual trip expenses.

Second, the survey aimed to capture specific expenditure data. Participants were asked to differentiate between one-off expenses and average trip expenditures. This distinction was important to ensure that large single-item purchases, such as vehicle maintenance or entertainment, were adequately accounted for. Expenditures were further categorised into accommodation costs and other expenses.

Lastly, the survey sought to understand the motivations of participants for visiting the area. By collecting data on anglers' motivations, the economic impact analysis could account for alternative motives in the assessment. Additional information was also gathered to improve the accuracy of the estimated figures, including whether participants usually share or pay for others on their fishing trips and how influential the fishery was in their decision to undertake their trips.

To address potential biases, particularly recency bias, respondents were asked to consider their 'average' trip during the targeted sports fishing season, in this case, October 2022 to September 2023.[6] This approach not only simplifies the data collection process but also enhances the reliability of calculating totals in each of the primary categories, based on the trip count provided by the participants.

The survey was administered using Qualtrics, a platform that is popular because of its advanced survey distribution options and dynamic survey design capabilities. Significant effort was made to streamline the survey collection process, addressing historical known correlations where lengthy surveys tended to yield fewer responses (Kato and Miura, 2021). This strategic choice not only facilitated efficient data collection but also enhanced the overall accuracy and retention of the survey results. To further ensure effective data collection, the survey was distributed to multiple avid anglers within FGNZ, who provided valuable feedback on the wording and content. Additionally, to encourage participation, FGNZ informed all licence

[5] A detailed description of the entire process, and history of the survey can be found with Stoffels and Unwin (2023).

[6] Recency bias refers to the cognitive tendency in survey respondents to disproportionately emphasise more recent events over earlier ones when asked to consider a long period, such as a year in this study. Participants may unintentionally weigh their more recent trips more heavily than ones earlier in the year.

holders about the survey prior to its distribution and reminded recipients to respond through their ongoing communications throughout the survey period.[7]

3.2 Economic Analysis

Following the distribution and collection of the survey, the economic analysis unfolded through a series of methodical steps to ensure the reliability and accuracy of the findings. The initial phase of the analysis involved a thorough evaluation of the individual survey responses, ensuring that each contained feasible and complete data. This critical review was fundamental to ascertain that all data moving forward in the analysis was accurate and representative, minimising the risk of biases or errors that could skew the economic interpretation.

In the second step, the focus shifted to the surveyed direct expenditures. This examination was conducted both geographically and by expenditure category, providing a detailed insight into the demographic distribution of anglers and pinpointing which local industrial sectors benefit from angling activities. By categorising all expenditures from the survey into 16 distinct groups as listed in Table 3, the analysis not only captured the direct financial contributions of anglers but also highlighted the economic sectors that are most influenced by these expenditures.

The third step involved scaling the surveyed direct expenditures to estimate the total economic impact attributed to all anglers in the area. This scaling is crucial for extending the analysis beyond the survey sample to the entire angler population within the surveyed area. By comparing the angler effort reported in the survey with the total angler effort estimated for the target areas from NIWA, the analysis calculates the total direct economic impact. This measure reflects the overall amount spent by anglers in the EIA area during the 2022 - 2023 fishing season, providing a comprehensive view of the economic significance of angling to the local economy.

Following scaling, the indirect economic impact was calculated using national IO tables (Statistics New Zealand, 2020). These tables, produced approximately every five years by Stats NZ, consider 109 different industrial sectors within New Zealand and how they are interrelated.[8] The survey categorises 18 different expenditure categories into 8 industrial sectors. These sectors are fuel retailing, supermarket and grocery stores, food and beverage services, recreational activities, clothing and footwear retailing, sport and recreation services, repair and maintenance, as well as furniture, electrical, and hardware retailing, and accommodation. This classification ensures that each reported expenditure is multiplied by the applicable category to calculate the indirect economic effects. Indirect economic impacts are no longer examined by category as they encompass the knock-on effects in up to 108 other industrial sectors; from this point onward, the aggregate economic impact is considered.

The final step in this analysis was an adjustment for motivation, a measure essential both due to the method of survey collection and the distinctive nature of the economic impact assessment area.

The scenic Te Manahuna Mackenzie Basin is a popular tourist destination, attracting visitors for various reasons apart from fishing. To accurately isolate the economic impact attributable to angling of the specific fisheries of interest, the survey included motivation questions. These allowed for the proper identification and adjustment of reported expenditures based on whether recipient licence holders are primarily in the area for angling. This rigorous filtering process is vital because of the area's natural beauty and its appeal for activities like sight-seeing, cycling, hunting, and other leisure pursuits. The culmination of these adjustments provides an adjusted estimate of the total economic impact—both direct and indirect—that anglers and their travel companions have on the EIA area and the broader Te Manahuna Mackenzie Basin.

To reinforce the validity of these findings, the analysis concluded with comprehensive robustness checks. These checks scrutinised the integrity of individual survey responses, the consistency of angling effort reported, and the accuracy of the expenditure categorisation and aggregation process, ensuring that the final economic impact figures are both robust and defensible.

[7] FGNZ informed licence holders in late August, on September 22nd, and again on September 28th through seasonal magazines, email newsletters, and a Facebook post, respectively. This communication highlighted that the survey would be released in October. Additionally, FGNZ sent out a reminder email as part of the weekly fishing report on September 5th.

[8] A detailed description of the calculation method and descriptions can be found at: https://www.stats.govt.nz/methods/annual-national-accounts-sources-and-methods.

4 Results

This section is structured into three parts. Initially, the section presents the raw data collected from the survey distributed to licence holders from the 2022-2023 fishing season. Following this, the survey results are analysed to ascertain their economic impact, adjusted for the motivation behind the respondents' visits to the fishing areas. Lastly, the section concludes with an overview of the robustness checks applied to validate the reliability and accuracy of the findings.

4.1 Survey

The results from the survey are shown below. The full survey text is available in Appendix C.

4.1.1 Collection

To facilitate the distribution of the survey, Fish & Game New Zealand provided a list that included the email addresses of licence holders from the 2022-2023 fishing season. After removing duplicates and invalid emails, 73,132 recipients remained. To ensure an effective distribution strategy, an initial batch of 1,500 emails was sent on September 27th, 2023. The remainder, comprising 71,632 licence holders, received the survey on October 1st, 2023. This scheduling was strategically chosen to coincide with the end of the fishing season in September, a period likely to see increased licence renewals, thereby potentially enhancing both the accuracy and volume of the responses. Of the total recipients, 1,715 anglers completed the survey. Notably, the survey's relevance was explicitly stated in both the initial email and the survey's introduction, clarifying its applicability only to those who had fished in the hydro canals area during the preceding fishing season. Survey responses were limited to trips in which anglers had fished in one or more of the following areas: Tekapo Canal, Pūkaki Canal, Ōhau A Canal, Ōhau B Canal, Ōhau C Canal, Lake Ruataniwha, or Upper Ōhau River (only during the September 2023 controlled period ballot). Furthermore, recipients were instructed to include only expenditures made in the town of Twizel, the town of Lake Tekapo, or the town of Omarama and surrounding areas.

Of the 1,715 completed responses, 91 responses were excluded for various reasons such as incoherence, implausible trip and fishing durations, and unfeasible expenditures and group sizes. This resulted in a final sample size of 1,626 and a data retention rate of 94.8%. Of the valid responses, the median completion time of the survey was just over 10 minutes (606 seconds). The survey asked respondents to consider their average angling trip and report expenditures, duration, and trip count for the 2022-2023 fishing season. Table 1 contains a summary of the trip and expenditure data of respondents by region.

4.1.2 Trip Descriptions

The data presented in Table 1 pertain to individual responses. However, as each respondent was asked to report the average number of additional party members they pay for, the figures in the table may represent multiple individuals. Figure 2 displays a histogram of the distribution of additional party members that respondents reported paying for. It shows that, on average, 44.73% of respondents visit the area with at least one other person (adult or junior). Alternate survey result summaries categorised by person, licence holder, and adult licence holder, can be found in Appendix A. These tables aid in understanding the impact of reporting group expenditure and angling behaviour.

Table 1 also reveals that the overall average trip count is 4.60 trips per year. As expected, South Islanders tend to make more trips per year than international visitors or those from the North Island. Figure 3 illustrates the distribution of the average number of trips per year for all respondents. Notably, this histogram is limited to 15 trips per year, although several responses indicated trip counts higher than 50 per year. These were deemed feasible upon investigation, as the originating postal codes were near the hydro canals.

Furthermore, Table 1 provides information on the average reported trip length and angling days per trip. On average, respondents spend 3.55 days in the economic expenditure area on fishing trips, with 2.88 of those days spent fishing. Figures 4 and 5 show the distributions of these metrics, with both histograms truncated to 15 days due to display limitations. Considering the ratio of trip length to angling days, the average across all respondents is 1.33, indicating that each day spent fishing results in 1.33 days in the area. For example,

Table 1: Survey Results Summary: Per Response

Location	Responses (count)	Trips (avg)	Trip Length (avg)	Angling Days (avg)	$/Trip (avg)	$/Year (avg)
International	**69**	**2.65**	**5.36**	**4.03**	**1,544.71**	**4,305.82**
Argentina	1	1.00	1.00	1.00	130.00	130.00
Australia	44	2.82	5.57	4.39	1,837.09	5,431.59
Canada	2	3.00	15.00	3.50	950.00	4,777.00
Finland	1	2.00	3.00	3.00	260.00	520.00
Germany	3	1.33	8.00	8.00	380.00	648.33
Netherlands	1	1.00	4.00	1.00	235.00	745.00
Singapore	1	1.00	2.00	2.00	310.00	310.00
UK	5	1.40	2.40	2.20	508.80	640.80
USA	11	3.36	4.45	3.27	1,748.55	3,791.27
North Island	**193**	**1.74**	**5.83**	**4.60**	**1,193.44**	**2,251.97**
Auckland	36	1.33	3.64	2.67	1,358.33	1,904.81
Bay of Plenty	44	1.77	8.70	6.82	1,193.52	2,155.98
Gisborne	5	1.00	8.00	5.80	2,982.20	2,982.20
Hawke's Bay	18	2.22	5.50	5.00	1,001.00	1,905.83
Manawatu-Wang.	12	1.50	5.33	5.00	1,012.33	1,950.25
Northland	14	1.43	4.50	3.29	1,008.57	1,876.93
Taranaki	4	1.50	4.50	4.25	1,827.25	3,302.25
Waikato	37	1.57	4.59	3.76	955.19	1,819.97
Wellington	23	2.70	6.83	4.78	1,176.98	3,989.16
South Island	**1289**	**5.12**	**3.13**	**2.57**	**646.06**	**2,833.02**
Canterbury	705	5.76	2.96	2.38	622.64	2,962.30
Marlborough	24	2.17	4.50	3.58	672.92	1,346.88
Nelson	26	1.62	4.58	3.67	931.15	1,727.12
Otago	383	5.24	2.75	2.26	562.92	2,857.62
Southland	118	3.13	4.31	3.84	901.03	2,675.75
Tasman	18	1.72	5.39	4.28	1,076.28	2,160.50
West Coast	15	2.47	4.47	3.73	810.67	2,468.33
Unspecified NZ[1]	**75**	**4.72**	**3.23**	**2.79**	**779.07**	**2,942.86**
Grand Total	**1626**	**4.60**	**3.55**	**2.88**	**755.30**	**2,831.62**

[1] Unspecified New Zealand refers to respondents who indicated they reside in New Zealand but either did not provide a postal code or entered an invalid one.

an angler intending to fish the hydro canals for three days would stay in the economic assessment area for a total of four days.

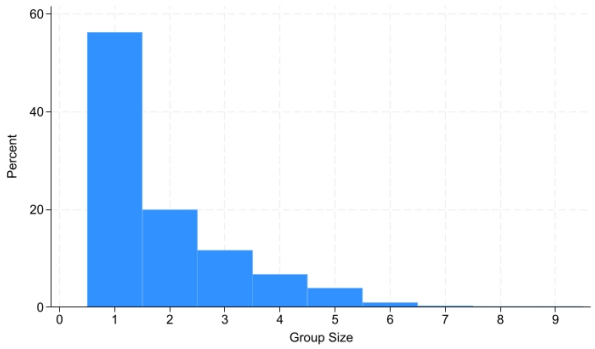


Figure 2: Group Size

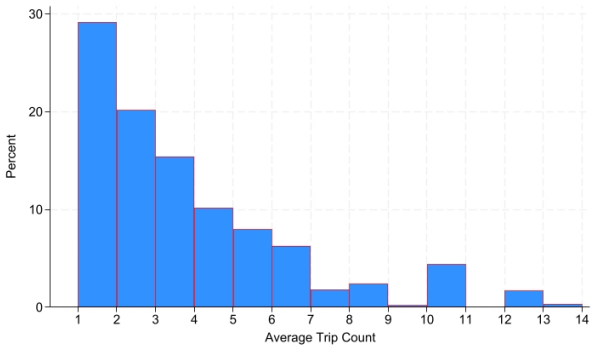


Figure 3: Average Trip Count Per Year

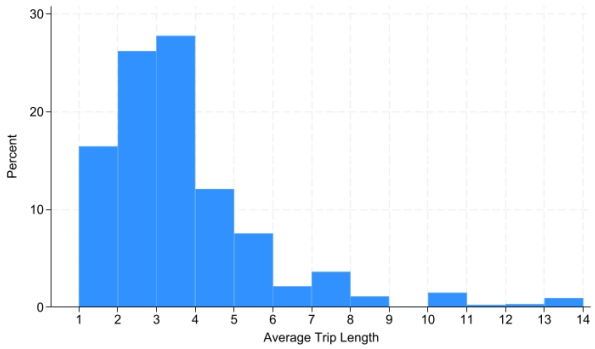


Figure 4: Average Trip Length

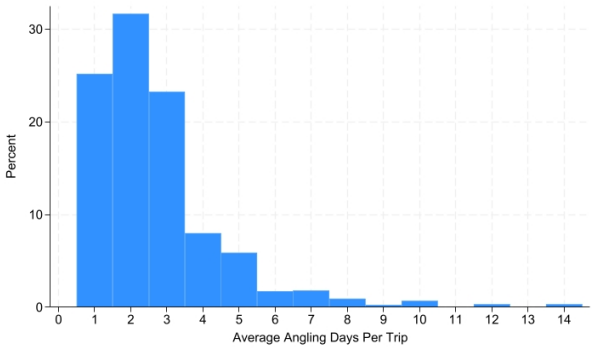


Figure 5: Average Angling Days Per Trip

4.1.3 Motivation

Understanding the economic impact of angling on Te Manahuna Mackenzie Basin, a popular tourism destination, requires distinguishing between expenditures related to angling, specifically, and tourism in general. This differentiation is crucial because an individual visiting primarily for fishing would attribute most, if not all, of their spending to the fishery, while someone fishing during a vacation would only allocate a portion. This paper adopts a novel approach to address this issue by employing two survey-based methods:

1. **Method One:** Participants specify their motivation for visiting the Mackenzie Basin concerning fishing in the Hydro Canals. They can choose from five responses: "Sole/Only Reason," "Primary Reason," "Important Reason," "A Reason," "Not Important." Those who select "Not Important" are further asked if any fishing trips were a significant motivation; if not, the survey concludes. Responses are then converted into a percentage of expenditures allocated to the hydro canals fishery, ranging from 100% to 0%. Figure 6 illustrates the distribution of responses, with approximately 50% of respondents stating that the hydro canal fishery is the sole reason for their visit.

2. **Method Two:** At the survey's end, an additional verification question is posed: "If the Mackenzie Basin hydro canal angling fisheries were no longer available, how would it influence how often you travel to the Mackenzie Basin?" Participants indicate a percentage reduction in their visits. Figure 7 shows the distribution of stated reductions, revealing a slight decrease in the importance of the fishery, with around 30% of respondents indicating they would reduce their trips if the fishery were unavailable. This method yields a wider distribution of answers compared to the first.

An additional survey question explored whether the loss of the hydro canal fishery in Te Manahuna Mackenzie Basin would influence both domestic and international respondents' overall angling frequency

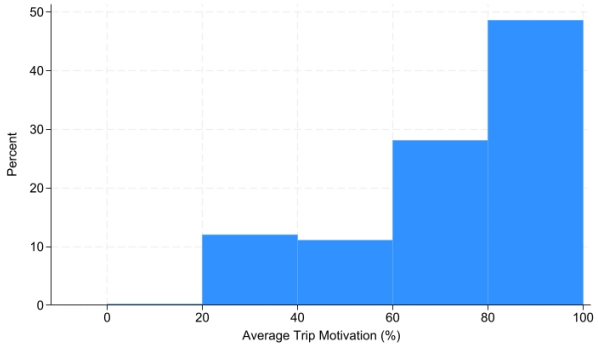


Figure 6: Fishery Influence on Motivation for Trip

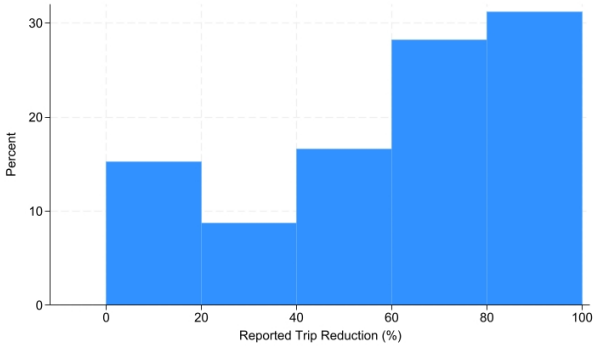


Figure 7: Reduction in Trips to the EIA Area

New Zealand wide through the following question: "If the Mackenzie Basin hydro canal angling fisheries were no longer available, how would it influence how often you fish in New Zealand?" Figure 8 shows that approximately 50% of respondents believe that the hypothetical loss of this fishery would not impact their angling frequency, while the other half indicate varying degrees of impact, with about 5% stating they would no longer fish in New Zealand. This percentage increases to 13% among international respondents.

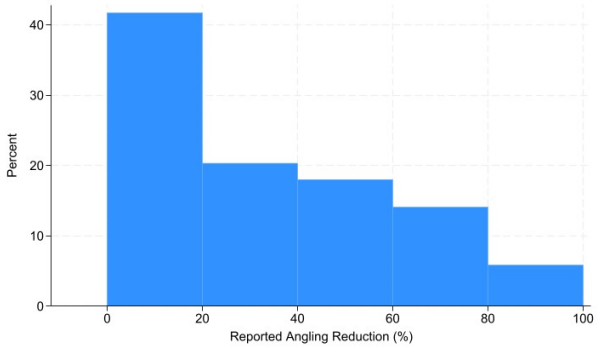


Figure 8: Reduction in Angling Within New Zealand

These motivation figures are utilised later in the economic impact analysis to adjust the economic impact based on motivation.

4.1.4 Angling Effort

As the expenditure data collected only represents a subsample of all licence holders who fish in the Hydro Canals, the results must be scaled to all licence holders. To do this, the National Angler Surveys (NAS) are utilised. The NAS, commissioned by Fish & Game New Zealand, facilitate more effective management of freshwater fishing resources by providing timely and accurate information about waterbody usage by anglers (Stoffels and Unwin, 2023).

The 2021-2022 NAS uses 'Angling Days' to measure waterbody usage within New Zealand. To calculate this, semi-random[9] phone surveys are used, in which respondents answer how many days they fished at each individual waterbody. This survey is repeated multiple times per year and scaled to all licence holders.[10]

Table 4.1.4 contains the total angling days 121,985 for the EIA area. In order to convert the survey angling data to a comparable metric, the following equation is used:

[9] Respondents are targeted based on stratum (licence holder classification) and location.
[10] A detailed description can be found in Stoffels and Unwin (2023).

Table 2: Angler Days in Fisheries of Interest for Economic Impact Assessment

Fisheries (Only Areas of Interest for EIA)	**Angler Days**
Upper Waitaki Canals Waitaki hydroelectric canals specific canal unknown	7,165
Ōhau B Canal Hydroelectric canal between Ruataniwha and Ōhau B power station	29,257
Ōhau C Canal Hydroelectric canal between Ōhau B and Ōhau C power stations	32,655
Pūkaki/Ōhau A Canal	26,211
Tekapo Canal	22,526
Lake Ruataniwha (Wairepo)	3,835
Balloted - Ōhau River above Lake Ruataniwha[1]	336
Total:	**121,985**

[1] This figure was provided by Fish & Game New Zealand as the balloted area is only fished for a short time during the year.

$$AnglingDays_{EIA} = \sum_{i=1}^{N} Trips_i \times ADays_i \times ALoc_i \times (PF\_junior_i + PF\_adult_i) \tag{1}$$

In equation (1), $Trips_i$ represents the number of trips reported by participant i during the 2022 - 2023 fishing season. $ADays_i$ indicates the number of days participant i fished on each trip, while Loc_i denotes the number of prescribed fishing locations visited per angling day. The terms PF_junior_i and PF_adult_i refer to the expenses claimed for junior and adult licence holders, respectively, on the average trip made by participant i.

$$ScalingFactor = \frac{AnglingDays_{NAS}}{AnglingDays_{EIA}} \tag{2}$$

Aggregating the results across all anglers within the survey yields 53,350.2 angling days. Finally, to calculate a scaling factor, the ratio of the 2021-2022 NAS total angling days to the EIA angling days is calculated as 2.29, resulting in all survey-accounted expenditures being multiplied by a factor of 2.29 to scale to all licence holders.

4.2 Economic Impact

This section provides a comprehensive reporting of the economic impact derived from the survey data and Input-Output (IO) tables. First, the survey expenditures were detailed and scaled. Next, IO multipliers were applied to estimate the indirect effects. Subsequently, the total economic impact is estimated. Finally, adjustments are made to the total economic impact based on trip motivation.

4.2.1 Direct

In order to accurately capture expenditures and minimise the impact of recency bias, two approaches were used. First, multiple different expenditure categories were listed, which served both to allow precision with IO multipliers and to encourage thoughtful responses. For example, by specifying a category such as "Fishing Guide," a participant is more likely to recall specific expenditures of that category. Second, participants were asked to report both one-off trip expenditures and average trip expenditures. One-off expenditures were believed to be particularly useful for capturing infrequent, large expenditures such as significant entertainment expenses or vehicle maintenance. It should be noted that one-off expenditures play a very small role, with over 95% of all reported values coming from average trip expenditures. Equation (3) details the summation by category (c) for calculating the direct expenditure, where $AvgExp_{ic}$ is a particular individual's average expenditure per trip, $Trips_i$ is the individual's reported trip count during the 2022 - 2023 fishing season, $OneOffExp_{ic}$ is any reported one-off expenditures for the given category, and $ScalingFactor$ is used to scale the expenditures from survey responses to all anglers.

$$D.Expenditure_c = \sum_{i=1}^{N}((AvgExp_{ic} \times Trips_i) + OneOffExp_{ic}) \times ScalingFactor \tag{3}$$

Table 3 summarises the direct scaled expenditure by major geographic area and expenditure category. Total scaled expenditure values are dominated by anglers from the South Island, which accounts for over $8 million of the total. Table 4 comprises the percentage that each geographic area contributes to each expenditure group.

Table 3: Scaled Expenditure by Geographic Origin of Respondent

	International	North Island	South Island	Unspecific NZ	Grand Total
Accommodation Total	**182,395**	**284,038**	**2,347,089**	**109,660**	**2,923,182**
Camping	27,301	44,139	432,756	32,240	536,435
Gifts	21,264	2,858	35,726	0	59,849
Home Rental (ex. Airbnb)	67,544	140,345	1,043,095	37,201	1,288,185
Other	0	3,430	50,257	0	53,687
Traditional (Hotels)	66,286	93,266	785,255	40,219	985,026
Food & Beverage Total	**154,746**	**260,869**	**2,300,309**	**163,359**	**2,879,283**
Grocery & Drink	86,316	176,868	1,423,764	98,011	1,784,959
Restaurant & Bar	68,430	84,001	876,545	65,348	1,094,324
Other Expenses Total	**342,181**	**448,874**	**3,702,357**	**231,643**	**4,725,055**
Camping Supplies	8,209	14,643	136,712	7,385	166,949
Clothing & Jewellery	6,039	21,116	89,656	2,858	119,668
Fishing Equipment	46,610	94,805	642,238	43,375	827,028
Fishing Guide	78,891	35,731	278,138	8,917	401,678
Fuel	71,688	145,101	1,794,865	108,814	2,120,468
Other	2,890	6,418	49,729	412	59,449
Tools and Hardware	702	1,909	18,043	252	20,905
Tourism & Entertainment	27,507	33,724	152,074	25,245	238,549
Vehicle & Transport	99,646	95,428	540,903	34,385	770,362
Column Total	**679,322**	**993,781**	**8,349,754**	**504,662**	**10,527,519**

Table 4: % Expenditure by Geographic Origin of Respondent

	International	North Island	South Island	Unspecific NZ	Grand Total
Accomodation Total	**26.8%**	**28.6%**	**28.1%**	**21.7%**	**27.8%**
Camping	4.0%	4.4%	5.2%	6.4%	5.1%
Gifts	3.1%	0.3%	0.4%	0.0%	0.6%
Home Rental (ex. Airbnb)	9.9%	14.1%	12.5%	7.4%	12.2%
Other	0.0%	0.3%	0.6%	0.0%	0.5%
Traditional (Hotels)	9.8%	9.4%	9.4%	8.0%	9.4%
Food & Beverage Total	**22.8%**	**26.3%**	**27.5%**	**32.4%**	**27.4%**
Grocery & Drink	12.7%	17.8%	17.1%	19.4%	17.0%
Restaurant & Bar	10.1%	8.5%	10.5%	12.9%	10.4%
Other Expenses Total	**50.4%**	**45.2%**	**44.3%**	**45.9%**	**44.9%**
Camping Supplies	1.2%	1.5%	1.6%	1.5%	1.6%
Clothing & Jewellery	0.9%	2.1%	1.1%	0.6%	1.1%
Fishing Equipment	6.9%	9.5%	7.7%	8.6%	7.9%
Fishing Guide	11.6%	3.6%	3.3%	1.8%	3.8%
Fuel	10.6%	14.6%	21.5%	21.6%	20.1%
Other	0.4%	0.6%	0.6%	0.1%	0.6%
Tools and Hardware	0.1%	0.2%	0.2%	0.0%	0.2%
Tourism & Entertainment	4.0%	3.4%	1.8%	5.0%	2.3%
Vehicle & Transport	14.7%	9.6%	6.5%	6.8%	7.3%
Column Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The total direct expenditure attributed to anglers during the 2022-2023 fishing season is found in Table

3 and the total is calculated to be $10,527,519.34. Figure 9 further demonstrates the distribution of total scaled expenditure by category, while Figure 10 illustrates the breakdown of accommodation expenditures. Respondents, on average, spend 27.8% of their total expenditures on accommodation, 27.4% on food and beverages and the remainder on other expenses. The largest other expense and single category of expenditure is fuel, accounting for 20.1% of the total scaled expenditure amount. Notably, it can be seen that respondents from the South Island of New Zealand and Unspecified New Zealand spend a substantially larger portion of their expenses on fuel than do International or North Island visitors.

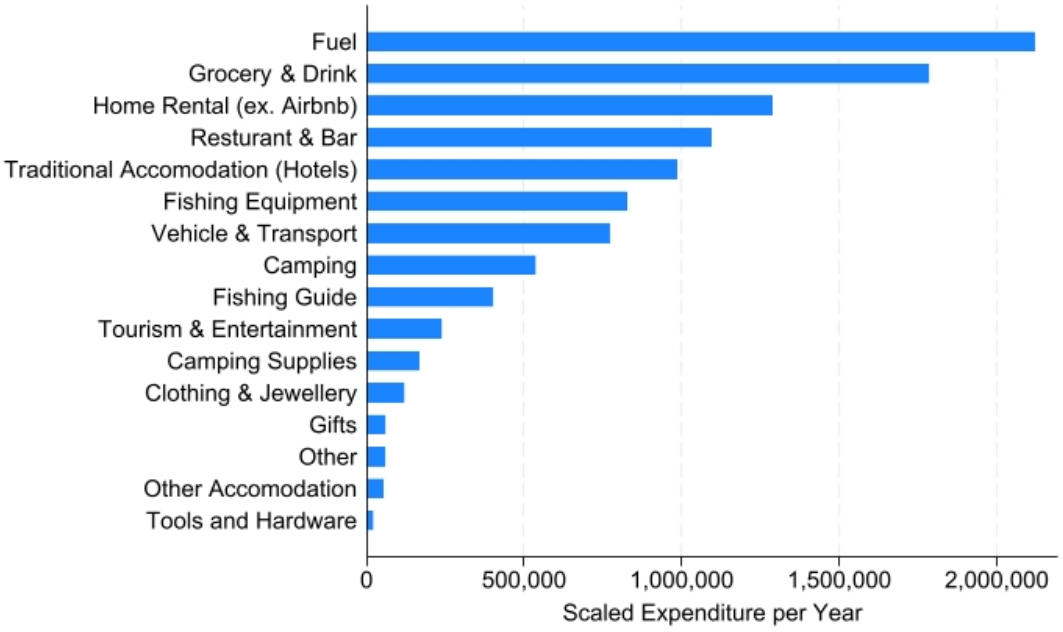


Figure 9: Yearly Total Expenditure

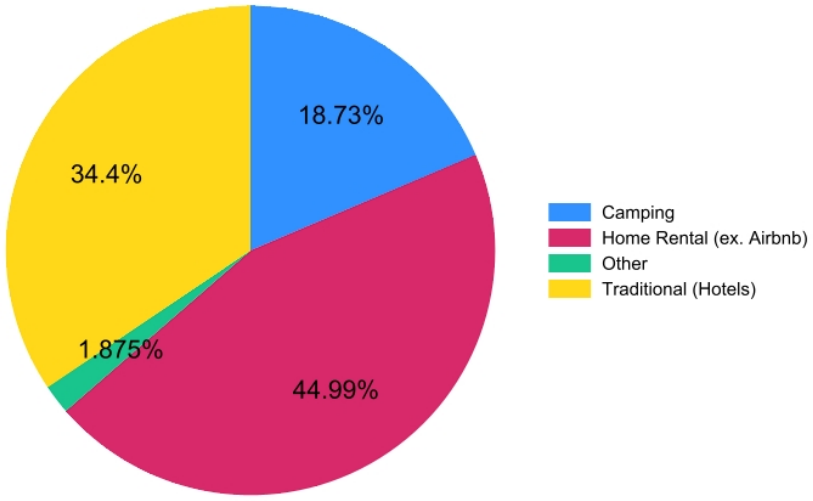


Figure 10: Accommodation Expenditure Breakdown

4.2.2 Indirect & Total

The economic impact of expenditures comprises two components: the direct impact (as detailed in the previous section) and the indirect impact. The indirect impact encompasses the subsequent economic activity generated as the initial expenditures circulate through the local economy, including increased demand for supplies and services that support angling as an economic activity.[11]

Table 5 contains the direct, indirect and total economic impact by expenditure category. The direct impact is calculated as $10,527,519.34, the indirect impact as $7,423,813.72 and the total economic impact as $17,951,333.06.

Table 5: Total Economic Impact (E.Impact)

	IO Multiplier	Direct E.Impact ($)	Indirect E.Impact ($)	Total E.Impact ($)
Accommodation		**2,923,181.69**	**2,213,327.18**	**5,136,508.88**
Camping	0.76	536,434.75	406,081.06	942,515.81
Gifts	0.57	59,849.02	45,784.50	105,633.52
Home Rental (ex. Airbnb)	0.76	1,288,185.13	975,156.13	2,263,341.25
Other	0.76	53,686.92	40,641.00	94,327.91
Traditional (Hotels)	0.76	985,025.88	745,664.50	1,730,690.38
Food & Beverage Total		**2,879,282.76**	**1,963,326.13**	**4,842,608.88**
Grocery & Drink	0.57	1,784,958.63	1,015,641.38	2,800,600.00
Restaurant & Bar	0.87	1,094,324.13	947,684.75	2,042,008.88
Other Expenses Total		**4,725,055.97**	**3,247,160.41**	**7,972,215.31**
Camping Supplies	0.77	166,948.47	127,715.56	294,664.03
Clothing & Jewellery	0.77	119,668.32	91,546.26	211,214.58
Fishing Equipment	0.77	827,027.81	632,676.31	1,459,704.13
Fishing Guide	0.88	401,677.84	353,074.78	754,752.63
Fuel	0.61	2,120,467.50	1,282,883.00	3,403,350.50
Other	0.57	59,448.89	33,826.42	93,275.30
Tools and Hardware	0.57	20,905.43	11,937.00	32,842.43
Tourism and Entertainment	0.88	238,548.89	209,684.45	448,233.34
Vehicle & Transport	0.65	770,361.75	503,816.63	1,274,178.38
Grand Total		**10,527,519.34**	**7,423,813.72**	**17,951,333.06**

4.2.3 Adjusted

Given that the local area is a popular tourism destination independent of the canal fisheries, particular attention was given to ensure that the expenditures reported could be attributed explicitly to the hydro canal fisheries. To do this, respondents answered two questions within the survey. The first asked how important fishing the hydro canals fishery was to their visit to the area (M1), and the second asked how much less they would visit the area if the fishery were not there (M2).

Table 6 contains the adjusted values, determined by multiplying the total economic impact of each individual by the adjustment methods described and their average. Utilising the average of M1 and M2 yields a total economic impact of $13,597,938 is determined.

[11] Indirect expenditure is calculated using multiplier tables published by the government (Stats NZ) as listed in Table 5.

Table 6: Adjusted Economic Values

	Unadjusted ($)	Adjusted M1 ($)	Adjusted M2 ($)	Adjusted Average ($)
Direct E.Impact	10,527,520	8,657,634	7,259,275	7,958,455
(se)	(425,802)	(384,167)	(363,515)	(364,595)
Indirect E.Impact	7,423,813	6,127,651	5,151,316	5,639,483
(se)	(310,421)	(282,740)	(268,158)	(269,170)
Total E. Impact	17,951,333	14,785,285	12,410,591	13,597,938
(se)	(724,109)	(655,979)	(621,380)	(623,403)

4.3 Robustness Checks

To verify the validity of the results, it is essential to conduct various robustness checks. First, the inclusion of the balloted fishing area might lead to discrepancies between the calculated figures and those from the NAS surveys, as the NIWA survey does not cover these areas. To ensure that this inclusion has not significantly affected the results, an analysis was conducted that removed the additional angling days and reduced the reported angling spots per day from six to five. This adjustment modified the adjusted total economic impact within the standard error bounds indicating both an agreement between both methods and a low sensitivity to the balloted area inclusion.

Secondly, it is essential to address potentially erroneous data points within the survey. To achieve this, we use the interquartile range method to identify outliers in two critical variables that influence the final adjusted figure: per person daily expenditure, total reported angling days, and their combined effect. These variables can significantly affect the final results, either by impacting the scaling factor directly or influencing the surveyed expenditures. When outliers are removed from each specific case, we observe that outliers in expenditure data cause a slight overestimate in the final adjusted economic impact, while outliers in angling days lead to a slight underestimate. Combining both analyses also results in a slight underestimate. This suggests that our estimate is likely to be conservative regarding the overall economic impact.

Details of robustness checks are found in Appendix B.

5 Discussion

The primary aim of this report was to establish the economic significance of the Te Manahuna Mackenzie Basin hydro canals fishery in the area comprising the towns of Twizel, Lake Tekapo, and Omarama. To this end, the report demonstrates significant direct and indirect economic impacts of $13,597,938 from October 2022 to September 2023. This section will focus on the final value, discussing the data used to arrive at this figure, and placing it in context with the economic statistics from the wider region.

First, when considering the raw survey expenditure data, several clear patterns emerge. South Islanders tend to take more, shorter trips, while North Islanders and international visitors tend to take fewer, longer trips. This is consistent with the idea that many South Islanders take frequent day or weekend trips, as the hydro canals are a relatively short journey. The largest groups represented in the data are those from Canterbury and Otago, who account for over a thousand survey responses and whose average trip lengths are the shortest of all New Zealand locations at 2.96 and 2.75 days, respectively. In contrast, international and North Island visitors exhibit a strong pattern of taking longer trips, spending 5.36 and 5.83 days respectively in the area.

Second, the data shows that the further a respondent travels, the greater their per-trip and per-person expenditures. Per trip, participants from the South Island spend the least, those from the North Island spend considerably more, and lastly, international visitors spend the most. This can partially be explained by the increased trip duration, with North Islanders tending to spend the most time per trip in the EIA area. However, international visitors, on average, spend slightly less time per trip (5.36 versus 5.83 days) but still spend substantially more than both North and South Islanders. This indicates that both the trip length and the origin of the angler influence their expenditure amounts.

The 2015 (Unwin, 2016) and 2021 (Stoffels and Unwin, 2023) NAS reports both show that Australia is the predominant origin of international anglers, followed by North America, and then Europe. Our data aligns with these findings, with Australians making up 64% of all international visitors, North Americans 19%, and Europeans 7%. Notably, our study identifies a higher percentage of international anglers compared to the NAS reports, which recorded overall percentages of 3% in 2015 and 0.5% in 2021, versus 6% in our study.[12] This highlights the global allure of the hydro canals and the unique opportunities they present. International visitors, as observed, tend to stay longer and spend more per trip than the average domestic angler. The sustained draw of these international visitors not only has the potential to positively impact the EIA area economically but also benefit New Zealand as a whole by boosting international tourism.

Further insight can be gleaned by examining the categories of expenditure by respondents. On average, approximately 28% of total expenditure is allocated to accommodation, with the remainder split between food and beverages and other expenses. Among accommodation options, home rentals are the most popular, accounting for 45%, highlighting the importance of platforms such as Airbnb and Bachcare. This is followed by traditional accommodations such as hotels and lodges at 34%, and camping at 19%. This trend underscores an observed broader shift from historic accommodation models to home rentals and illustrates how angling activities benefit not only business owners but also residential owners who can rent out their secondary or primary homes for additional income. Notably, this study did not consider the impact that the hydro canal's attraction to anglers has on housing prices. Given the popularity of this fishery and the rise of home rental platforms such as those mentioned above, this may be a useful area for further research.

Survey respondents' eating and drinking habits are highlighted in the food and beverage category, comprising slightly less than accommodation at 27.4% of total expenditures. Within this category, respondents reported spending 6.6% more on purchasing groceries and drinks than on eating out. At 27.4% of all expenditures, both grocery establishments and bars and restaurants have significant upturns, reflecting a diverse consumption pattern among anglers. This highlights the economic benefits not only to accommodations but also to local food suppliers and dining establishments.

Considering all expenses, fuel emerges as the single largest expense item across all categories at 20%. This is likely due to its necessity for all types of anglers—whether they are South Islanders who camp, North Islanders who lodge, or internationals who stay in luxury resorts.[13] While expenditures on food, drink, accommodation and entertainment vary and are spit across multiple items, fuel is a common requirement due to the geographical location and extent of the canal fishery, which necessitates the use of motor vehicles for both travel to and within the fishery. Notably, the highest percentage of fuel expenses is attributed to South Island residents, which correlates with a greater number of travel days per angling day, as highlighted by their trip durations.

Following fuel within other expenses, 'Fishing Equipment' and 'Vehicle & Transport' expenditures make up 7.9% and 7.3% of total expenditures, respectively. These figures suggest a robust market for angling supplies and vehicle maintenance, underscoring the dependence on motor vehicles within the area. Both categories signal potential growth opportunities for local businesses. These spending patterns not only bolster direct retail but also support ancillary services such as equipment rental and fishing guides, enhancing the overall economic impact of the fishery.

Crucially, when factoring in respondent motivation, we see a strong reliance on the hydro canal fishery for motivating visitation to the area. According to Method 1 which asks how much the hydro canals influence trips to the area, approximately 50% claimed that the hydro canals were the sole reason for their visit, and 30% responded that it was the primary reason. When asked an equivalent question in Method 2, 'If the hydro canals were to become inaccessible for fishing, how would it influence your frequency of visits?' 30% stated they would visit the area 100% less, i.e., not visit at all, and approximately 30% stated they would reduce visits by 80%. These responses indicate the significant attraction anglers have to the hydro canals.

The differences in expenditure figures obtained from the two methods underscore the importance of employing multiple approaches in economic impact surveys. Method 1, which directly assessed the motivation for visits, provides a clear picture of the current significance of the hydro canals. Method 2, which evaluated

[12]The 2021 NAS report was generated during the COVID-19 lockdowns. Consequently, it is preferable to use the 2015 figure for international visitors. It is also worth noting that while the altered demographics of visitors could influence the results, the overall impact is likely to be minimal due to the relatively small number of international visitors. Furthermore, similar to other robustness checks, this is likely to result in an underestimate.

[13]It is possible that those who use all-inclusive fishing guides could have fuel included. However, due to the limited number of visitors who use fishing guides, this is not expected to have a significant impact.

the impact of losing access to the canals, offers insights into potential future changes in visitor behaviour and economic impact. While both questions effectively ask the same question - the nuances of human responses to question framing can yield different but related answers. Averaging methods allow for a comprehensive understanding of the importance of the hydro canal fishery on anglers visiting the area. It highlights the current reliance while also predicting possible changes in visitor patterns under different scenarios. This dual approach ensures that the results are robust and represent both current and future views.

The total scaled economic impact calculated at ∼$18 million is reduced to ∼$14 million. This reduction of 22% occurs when respondents' expenditures are adjusted to consider the specific motivations and scenarios presented in Methods 1 and 2. This adjusted figure includes both direct and indirect economic benefits, where direct benefits refer to the immediate financial impacts such as spending by visitors directly related to the hydro canals, and indirect benefits encompass the secondary economic activities generated by this spending, such as increased business for local suppliers and service providers. By accounting for the varying degrees of dependency on the hydro canals, this adjustment provides a more realistic and conservative estimate of the economic impact. Such adjustments are crucial in economic impact assessments to avoid overestimations.

Placing the calculated economic impact of the canal fishery into the wider economic context of the Te Manahuna Mackenzie Basin can be done by leveraging the Quarterly Economic Monitor (QEM) report commissioned by the Mackenzie District (Infometrics, 2023).[14] Within it the total GDP within the entire Mackenzie District is calculated at ∼$403 million meaning that the direct and indirect economic impact of the hydro canals in the area accounts for 3.5% of all economic activity in the area. Additionally, the QEM report calculates total tourism expenditure to be ∼$118 million. Comparing the adjusted direct expenditure figures from this report, 6.7% of all tourism expenditures can be attributed to the hydro canals. These percentages, while already substantial, are unequivocally underestimates of the percentages in the target EIA area, as the townships of Twizel, Lake Tekapo, and Omarama represent only a fraction of the entire Mackenzie District, the percentages within them of total GDP and direct expenditure attributed to the hydro canals will be substantially higher.

Building on the insights gained from this study, several avenues for future research emerge that could further enhance our understanding of the economic and social dynamics associated with the Te Manahuna Mackenzie Basin hydro canal fishery. Firstly, a longitudinal study could be conducted to monitor the changes in economic impact over time, particularly focusing on the long-term sustainability of tourism and fishing activities. Such research could identify trends and potential stress points that may require intervention. Secondly, a comparative analysis with other similar recreational areas could provide valuable benchmarks and best practices for optimising economic benefits. Additionally, exploring the socio-economic impacts of changing housing market dynamics due to increased tourism, such as the rise in short-term rentals, would offer crucial insights into the broader effects on local communities. Thirdly, understanding the appeal and marketability of the hydro canal fishery to international visitors could allow for the design of an international marketing campaign, which, due to the disproportionately high expenditures of overseas visitors, could provide a large local economic stimulus. Finally, investigating angler satisfaction and the qualitative aspects of their experiences could help tailor services and amenities to better meet the needs of different visitor segments, potentially driving higher spending and repeat visits. These areas of study would not only deepen the current understanding but also guide policy and investment decisions critical for the fishery's future development.

6 Conclusion

The economic impact assessment of the Te Manahuna Mackenzie Basin hydro canal fishery underscores their substantial contribution to the local economy, with a total economic impact of $13,597,938 for the 2022-2023 fishing season. This figure, derived from direct and indirect expenditure analyses, represents 3.5% of the total GDP of the region and 6.7% of tourism expenditure specifically. As the townships of interest, Twizel, Lake Tekapo, and Omarama represent a limited subset of the larger region these values provide a lower bound of the economic impact in the targeted area.

[14]The report spans June 2022 to June 2023, while this report covers October 2022 to October 2023. Despite this offset, the difference in timeframes is unlikely to significantly affect the economic comparisons due to the consistent stability of key economic indicators and tourism trends in the region.

In summary, the Te Manahuna Mackenzie Basin hydro canal fishery plays a critical role in the local economy, not only through direct expenditures by visitors but also through substantial secondary economic benefits.

References

Adams, R. (2024, March). Canal angler values survey. Survey Report. A survey of the values, preferences, opinions, and activities of Mackenzie Basin hydro canal anglers during the 2022/23 sports fishing season.

Aggarwal, C. C. (2013). *Outlier Analysis*. Springer.

Akbari, N., P. Failler, H. Pan, B. Drakeford, and A. Forse (2023). The impact of fisheries on the economy: A systematic review on the application of general equilibrium and input–output methods. *Sustainability 15*(7).

APR Consultants (2012, 12). Taupō fisheries economic analysis. Technical report, Department of Conservation. Confidential.

Becken, S. and G. Butcher (2004, 01). Economic yield associated with different types of tourists - a pilot analysis.

Butcher, G. (1985). Regional income, output and employment multipliers: Their uses and estimates of them. Ministry of Agriculture and Fisheries.

Butcher, G. (1992). Regional inter-industry transactions tables: (base 1981-82). MAF Policy Technical Paper 92/11.

Butcher, G., J. R. Fairweather, and D. G. Simmons (2000, February). The economic impact of tourism on rotorua. *Butcher Partners Limited*.

Central South Island Fish & Game (2023, March). Hydro canals fishery brochure. Accessed: 2024-02-15.

Chen, R. J., K. M. Hunt, and R. B. Ditton (2003). Estimating the Economic Impacts of a Trophy Largemouth Bass Fishery: Issues and Applications. *23*(3), 835–844.

Dillman, D. A. (2007). *Mail and Internet Surveys: The Tailored Design Method* (2 ed.). Hoboken, New Jersey: Wiley.

Hutt, C. P., K. M. Hunt, S. F. Steffen, S. C. Grado, and L. E. Miranda (2013). Economic Values and Regional Economic Impacts of Recreational Fisheries in Mississippi Reservoirs. *33*(1), 44–55.

Infometrics (2023, June). Quarterly economic monitor: Mackenzie district june 2023. Report, Mackenzie District. Retrieved from: `https://www.mackenzie.govt.nz/__data/assets/pdf_file/0008/777833/qem-mackenzie-district-2023-6.pdf`, Downloaded: Thu 10 Aug 2023.

Kato, T. and T. Miura (2021). The impact of questionnaire length on the accuracy rate of online surveys. *9*, 1–16.

Pleeter, S. (1980). Methodologies of economic impact analysis: An overview. pp. 7–31.

Riechers, R. K., G. C. Matlock, and R. B. Ditton (1991). A dual-survey approach for estimating the economic aspects of fishing. In D. Guthrie, J. M. Hoenig, M. Holliday, C. M. Jones, M. J. Mills, S. A. Moberly, K. H. Pollock, and D. R. Talhelm (Eds.), *Creel and angler surveys in fisheries management*, Bethesda, Maryland, pp. 344–355. American Fisheries Society, Symposium 12.

Shaw, D. (1985). *Taupō: A Treasury of Trout*. Department of Conservation.

Statistics New Zealand (2020). National accounts: Input-output tables: Year ended march 2020. Accessed: date.

Stoffels, R. and M. Unwin (2023, July). Angler usage of new zealand lake and river fisheries: Results from the 2021/22 national angler survey. Technical report, Fish and Game New Zealand. Freshwater Scientist, Freshwater Modelling, NIWA.

Unwin, M. (2016, July). Angler usage of new zealand lake and river fisheries: Results from the 2021/22 national angler survey. Technical report, Fish and Game New Zealand. Freshwater Scientist, Freshwater Modelling, NIWA.

A Appendix: Survey Results Summary

A.1 Per Person

Table 7: Survey Results Summary: Per Person

Location	Responses (count)	Trips (avg)	Trip Length (avg)	Angling Days (avg)	$/Trip (avg)	$/Year (avg)
International	**69**	**2.65**	**5.36**	**4.03**	**1,389.98**	**3,509.35**
Argentina	1	1.00	1.00	1.00	130.00	130.00
Australia	44	2.82	5.57	4.39	1703.20	4433.06
Canada	2	3.00	15.00	3.50	383.33	1659.00
Finland	1	2.00	3.00	3.00	86.67	173.33
Germany	3	1.33	8.00	8.00	281.11	549.44
Netherlands	1	1.00	4.00	1.00	235.00	745.00
Singapore	1	1.00	2.00	2.00	310.00	310.00
UK	5	1.40	2.40	2.20	432.40	564.40
USA	11	3.36	4.45	3.27	1494.00	3449.45
North Island	**193**	**1.74**	**5.83**	**4.60**	**787.88**	**1475.24**
Auckland	36	1.33	3.64	2.67	987.23	1320.93
Bay of Plenty	44	1.77	8.70	6.82	855.08	1446.94
Gisborne	5	1.00	8.00	5.80	1157.10	1157.10
Hawke's Bay	18	2.22	5.50	5.00	617.00	1187.49
Manawatu-Wanganui	12	1.50	5.33	5.00	594.35	1171.64
Northland	14	1.43	4.50	3.29	593.23	1106.21
Taranaki	4	1.50	4.50	4.25	733.90	1181.81
Waikato	37	1.57	4.59	3.76	683.86	1318.82
Wellington	23	2.70	6.83	4.78	796.94	2750.96
South Island	**1289**	**5.12**	**3.13**	**2.57**	**412.19**	**1745.48**
Canterbury	705	5.76	2.96	2.38	404.59	1832.72
Marlborough	24	2.17	4.50	3.58	536.90	1001.63
Nelson	26	1.62	4.58	3.67	637.44	1003.69
Otago	383	5.24	2.75	2.26	344.79	1772.07
Southland	118	3.13	4.31	3.84	538.40	1521.62
Tasman	18	1.72	5.39	4.28	793.69	1736.24
West Coast	15	2.47	4.47	3.73	449.33	1214.67
Unspecified NZ	**75**	**4.72**	**3.23**	**2.79**	**476.86**	**1895.08**
Grand Total	**1626**	**4.60**	**3.55**	**2.88**	**501.25**	**1795.16**

A.2 Per Licence Holder

Table 8: Survey Results Summary: Per Licence Holder

Location	Responses (count)	Trips (avg)	Trip Length (avg)	Angling Days (avg)	$/Trip (avg)	$/Year (avg)
International	**69**	**2.65**	**5.36**	**4.03**	**1,416.73**	**3,609.72**
Argentina	1	1.00	1.00	1.00	130.00	130.00
Australia	44	2.82	5.57	4.39	1727.96	4539.65
Canada	2	3.00	15.00	3.50	525.00	2438.50
Finland	1	2.00	3.00	3.00	130.00	260.00
Germany	3	1.33	8.00	8.00	380.00	648.33
Netherlands	1	1.00	4.00	1.00	235.00	745.00
Singapore	1	1.00	2.00	2.00	310.00	310.00
UK	5	1.40	2.40	2.20	432.40	564.40
USA	11	3.36	4.45	3.27	1506.12	3476.12
North Island	**193**	**1.74**	**5.83**	**4.60**	**852.03**	**1596.48**
Auckland	36	1.33	3.64	2.67	1011.44	1360.86
Bay of Plenty	44	1.77	8.70	6.82	890.53	1562.70
Gisborne	5	1.00	8.00	5.80	1157.10	1157.10
Hawke's Bay	18	2.22	5.50	5.00	617.00	1187.49
Manawatu-Wanganui	12	1.50	5.33	5.00	725.18	1389.35
Northland	14	1.43	4.50	3.29	859.29	1664.54
Taranaki	4	1.50	4.50	4.25	803.21	1263.63
Waikato	37	1.57	4.59	3.76	708.53	1347.78
Wellington	23	2.70	6.83	4.78	947.62	2970.12
South Island	**1289**	**5.12**	**3.13**	**2.57**	**441.97**	**1845.90**
Canterbury	705	5.76	2.96	2.38	434.18	1943.78
Marlborough	24	2.17	4.50	3.58	631.42	1187.01
Nelson	26	1.62	4.58	3.67	707.76	1171.92
Otago	383	5.24	2.75	2.26	372.49	1863.22
Southland	118	3.13	4.31	3.84	557.45	1577.81
Tasman	18	1.72	5.39	4.28	807.57	1750.13
West Coast	15	2.47	4.47	3.73	471.33	1250.00
Unspecified NZ	**75**	**4.72**	**3.23**	**2.79**	**516.23**	**1999.97**
Grand Total	**1626**	**4.60**	**3.55**	**2.88**	**535.43**	**1898.25**

A.3 Per Adult Licence Holder

Table 9: Survey Results Summary: Per Adult Licence Holder

Location	Responses (count)	Trips (avg)	Trip Length (avg)	Angling Days (avg)	$/Trip (avg)	$/Year (avg)
International	**69**	**2.65**	**5.36**	**4.03**	**1,423.33**	**3,636.10**
Argentina	1	1.00	1.00	1.00	130.00	130.00
Australia	44	2.82	5.57	4.39	1738.30	4581.01
Canada	2	3.00	15.00	3.50	525.00	2438.50
Finland	1	2.00	3.00	3.00	130.00	260.00
Germany	3	1.33	8.00	8.00	380.00	648.33
Netherlands	1	1.00	4.00	1.00	235.00	745.00
Singapore	1	1.00	2.00	2.00	310.00	310.00
UK	5	1.40	2.40	2.20	432.40	564.40
USA	11	3.36	4.45	3.27	1506.12	3476.12
North Island	**193**	**1.74**	**5.83**	**4.60**	**902.11**	**1675.95**
Auckland	36	1.33	3.64	2.67	1088.57	1442.99
Bay of Plenty	44	1.77	8.70	6.82	898.81	1598.25
Gisborne	5	1.00	8.00	5.80	1742.10	1742.10
Hawke's Bay	18	2.22	5.50	5.00	682.28	1318.05
Manawatu-Wanganui	12	1.50	5.33	5.00	745.67	1439.69
Northland	14	1.43	4.50	3.29	859.29	1664.54
Taranaki	4	1.50	4.50	4.25	980.29	1638.63
Waikato	37	1.57	4.59	3.76	722.05	1363.72
Wellington	23	2.70	6.83	4.78	989.80	3093.93
South Island	**1289**	**5.12**	**3.13**	**2.57**	**477.52**	**1973.79**
Canterbury	705	5.76	2.96	2.38	465.99	2069.62
Marlborough	24	2.17	4.50	3.58	633.44	1203.13
Nelson	26	1.62	4.58	3.67	758.08	1266.47
Otago	383	5.24	2.75	2.26	399.46	1973.36
Southland	118	3.13	4.31	3.84	632.47	1781.88
Tasman	18	1.72	5.39	4.28	838.78	1781.33
West Coast	15	2.47	4.47	3.73	624.39	1680.56
Unspecified NZ	**75**	**4.72**	**3.23**	**2.79**	**550.88**	**2106.02**
Grand Total	**1626**	**4.60**	**3.55**	**2.88**	**571.44**	**2015.08**

B Appendix: Robustness Checks:

B.1 Balloted Area

Area (Only Areas of Interest for EIA)	Angler Days
Upper Waitaki Canals Waitaki hydroelectric canals specific canal unknown	7,165
Ōhau B Canal Hydroelectric canal between Ruataniwha and Ōhau B power station	29,257
Ōhau C Canal Hydroelectric canal between Ōhau B and Ōhau C power stations	32,655
Pūkaki/Ōhau A Canal	26,211
Tekapo Canal	22,526
Lake Ruataniwha (Wairepo)	3,835
Total:	**121,649**

[1] Note the removal of the ballored area as opposed to 4.1.4.

Table 10: Angler Days in Fisheries of Interest

The removal of the balloted fishery aligns the survey-collected fishery data fully with that from the 2021 NAS report and offers assurance that inclusion did not significantly alter the results.

Table 11: Balloted Days Removed

	SC_EIA	Method 1	Method 2	Average
1	18,327,111.38	15,126,661.88	12,697,138.71	13,911,900.29

Notably we see a statistically insignificant change to the estimated adjusted total economic impact.

B.2 Outliers

The outlier analysis was performed using the interquartile range (IQR) method, chosen for its robustness against extreme values.[15] Given the distribution of the analyzed metrics, only high values were identified as outliers and subsequently removed. This approach is justified because the distribution is skewed towards lower values, meaning that extreme high values disproportionately affect the analysis. In practical terms, this skewness indicates that lower values are more typical within the dataset, and the presence of high outliers can distort the results.

B.2.1 Angling Effort

By examining total angling effort, we investigated how individuals who reported exceptionally high combinations of angling days, trip counts, and angling locations per day impacted the results. As angling effort is critical in calculating the scaling factor, removing high angling responses provides a sensitivity analysis. This method can be seen as a way to remove potential overestimations of angling frequency and diversity. In total, this method removed 118 survey responses, or 6.8%.

Table 12: Outliers Removed (Angling Days)

	Unadjusted	Method 1	Method 2	Average
1	23,243,760.07	18,750,611.11	15,829,134.65	17,289,872.89

By removing high angling effort responses, we increased the total adjusted economic impact by ∼$3.7 million.

B.2.2 Removed Expenditure Per Day Per Person

Another highly influential variable is the expenditure reported per person per day. Notably, this differs from total expenditure per person and total expenditure per respondent per day. This method can be seen as a way to remove potential overestimates of expenditures. By including expenses reported for any other individuals, this outlier analysis also accounts for large groups or families. Ultimately, this method resulted in the removal of 97 survey responses or 5.7%.

Table 13: Outliers Removed ($/Per Person Per Day)

	Unadjusted	Method 1	Method 2	Average
1	16,062,061.00	13,279,870.02	11,108,775.53	12,194,322.80

By removing outlier expenditure per person per day values, we decreased the total adjusted economic impact by ∼$1.4 million.

[15] See Aggarwal (2013) for a comprehensive description of the approach and benefits of IQR.

B.2.3 Per Person Per Day & Angling Days

Lastly, combining the two above methods yields perhaps the most convincing robustness check. Here, outliers that reported abnormally high expenditures per person per day or a high number of calculated angling efforts are both removed. By implementing both methods, 213 responses were removed, which constitutes 12.4% of the total.

Table 14: Outliers Removed Combined

	Unadjusted	Method 1	Method 2	Average
1	20,262,090.61	16,428,353.20	13,807,504.62	15,117,928.91

By removing outlier expenditure per person per day values as well as angling effort, we increased the total adjusted economic impact by ∼$1.5 million.

B.3 Summary

The robustness checks on balloted angling effort and outlier analysis for angling effort, as well as per person per day expenditure, yield a range of estimates. Notably, removing the balloted area and the corresponding 6th angling location shows no significant change in the estimated economic impact. While the latter three methods do yield modified figures, they indicate, both through their average and individual estimates, that our calculated figure of approximately $13.6 million is a conservative estimate of the overall impact. Ultimately, with EIAs, assumptions always need to be made regarding the validity of the data and its inclusion. These estimates provide a solid foundation for further examination and discussion on the reliability of our assessment.

C Appendix: Full Survey Text

This section contains the full text from the online survey. The exact display dimensions and questions displayed are dynamically configured based on a participant's screen resolution and prior answers, and as such, the experience may differ slightly from the screen captures below.

Survey Introduction

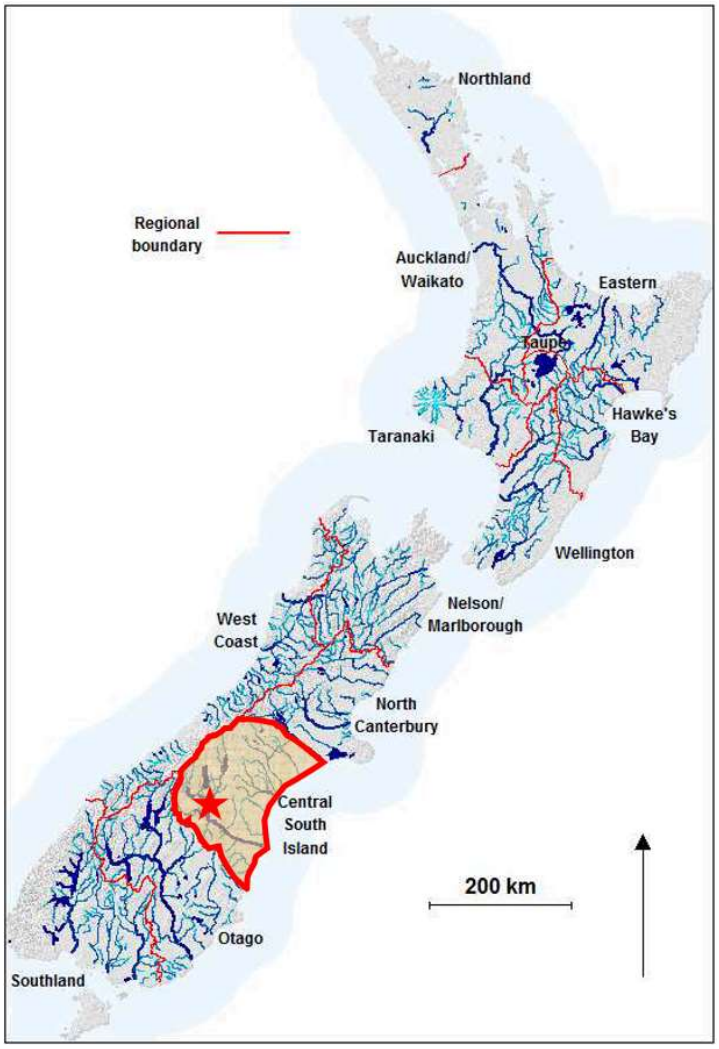
This survey is brought to you by Fish and Game New Zealand and the University of Otago. We are interested in evaluating the overall economic impact of the Mackenzie Basin hydro canals fishery to the local community. The data collected will assist Fish & Game in their planning and management of this fishery.

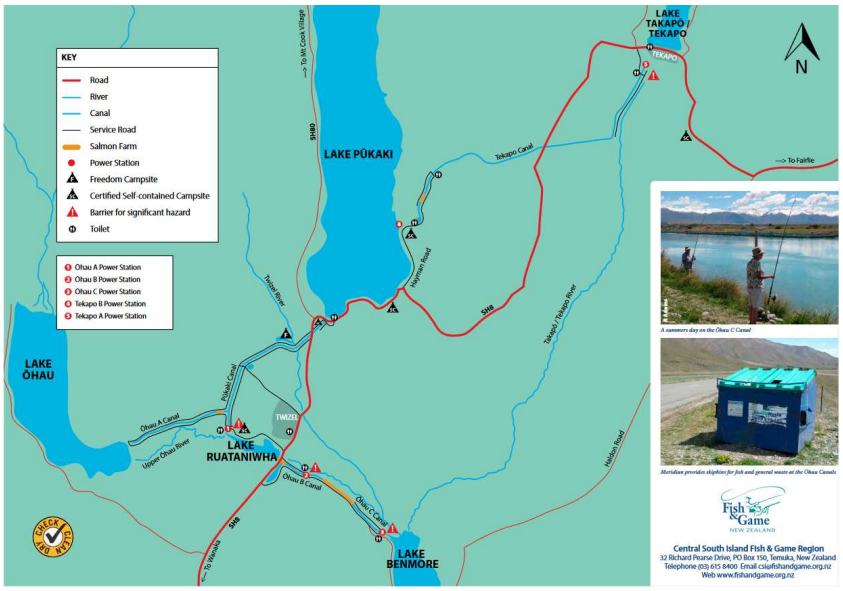
You will be asked a series of questions to understand your angling and expenditure habits in the area.

Thank you for taking the time to open this survey. If eligible, you will have the opportunity to enter your email address for a chance to win one of six NZ$100 gift cards.

The hydro canals of the Mackenzie Basin are a uniquely productive and world-famous sports fishery. The canals were constructed in the 1970's and 1980's to link power stations and combine the waters from lakes Tekapo, Pūkaki and Ōhau to utilize the full potential of that water to generate power before it reaches Lake Benmore.

A full description can be found here.





This survey is intended for anglers who fished in one or more of the following hydro canal fisheries or connecting fisheries in the 2022-2023 season:

- Tekapo Canal

- Pūkaki Canal
- Ōhau A Canal
- Ōhau B Canal
- Ōhau C Canal
- Lake Ruataniwha
- Upper Ōhau River (**Only** October 2022 or/and September 2023 controlled period ballot)

Did you fish in one or more of the fisheries listed above in the 2022-2023 season? (1st October 2022 - 30th September 2023)

No

Yes

Consent Form

INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?
Fish & Game New Zealand is committed to managing, maintaining and enhancing the sports fish resource in the recreational interests of all anglers. The overall aim of this research is to assess the economic impact associated with fishing on the Mackenzie Basin hydro canals. The findings will be used by Fish & Game New Zealand to help manage the hydro canal fishery.

What Types of Participants are being sought?
Participants have been selected from the Fish & Game database holding the contact information of all anglers who held a license in any region of New Zealand during the 2022/2023 season.

What will Participants be asked to do?
Should you agree to take part in this project, you will be asked to complete a web-based survey that will take approximately 10 minutes to complete. Participants may choose to enter the prize draw for one of six $100 gift vouchers. To do so requires that you enter your contact details. However, these will be deleted once the prize draw has been undertaken and winners notified.

What Data or Information will be collected and what use will be made of it?
The survey seeks to collect data on your expenditure associated with fishing on the canals. You will be asked a range on questions about the following:

- Your angling visits to the canals; how often, when and to which canals.
- Your expenditure in the Mackenzie Basin region, in the categories of: transport; accommodation; food, fishing related gear; activities; other.
- Your home location (postcode)

Email addresses will be collected for the purposes of the prize draw and this will be stored at all times on a password-protected computer. At the completion of the research project, all email addresses will be permanently deleted from any files containing them. **All survey participants remain anonymous**. The results of the survey will be analysed and used as part of a report presented to Fish & Game New Zealand and in future academic publications.

CONSENT FORM

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.
I know that:-

1. My participation in the project is entirely voluntary;

2. As I remain anonymous in this survey I may only withdraw from participation in the project up to the point before I complete the survey - at which time my response would be incorporated into the data set for analysis.

3. Personal identifying information [e.g. email addresses] will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

By clicking the next arrow, I agree to take part in this project.

StartDemo

Do you live in New Zealand (i.e., are you a NZ citizen or permanent resident)?

- No
- Yes

What is your 4 digit primary home postal code (find your postcode)?

What country is your primary residence in?

Trip Intro

It is important to understand what type of motivation anglers have to travel to the Mackenzie Basin.

Think about an **average** trip to the Mackenzie Basin during the 2022-2023 fishing season. How important was fishing the canals to you being there?

Sole/Only Reason:
Example: I travelled to the area to fish the canals for two or more days. **Or** I took a day trip to fish the canals.

Primary Reason:
Example: I travelled to the area to fish the canals most days, but also for a holiday in the area.

Important Reason:
Example: I travelled to the area to both visit family/friends and fish the canals.

A Reason:
Example: I travelled through the Mackenzie Basin and fished a short duration because it was convenient

Not Important:
Example: I travelled to or through the area and did not fish.

Did you take one or more trips to the Mackenzie Basin during the 2022-2023 fishing season in which you fished in the hydro canals?

Yes (moving forward, please only consider these trips)

No

For the remainder of the survey, please limit all feedback to trips to the Mackenzie Basin during the 2022-2023 fishing season (1st October 2022 - 30th September 2023) in which you fished in the hydro canals.

Trip Details

During the 2022-2023 fishing season, how **many times** did you travel from your primary residence to the Mackenzie Basin and fished in the hydro canals?

(If you are unsure just estimate as best you can)

The survey will now focus on your **'average trip'** to the Mackenzie Basin for fishing the hydro canals. Please consider this as the most common type of trip you took. If you are unsure about any of the details, please just estimate.

Please consider an **average trip** you took in the 2022 - 2023 season:

	Days per trip
What was the average length of your stay(s) in the hydro canals area? (enter 1 for day trips)	
On average how many days per trip did you fish the hydro canals?	

On the days you did fish, how many **hours per day** did you spend fishing in the hydro canals?

Less than 1 ○ 1 -- 3 ○ 3 -- 5 ○ 5 -- 7 ○ 7 -- 9 ○ 9 -- 11 ○ More than 12+ ○

On an **average <u>day</u>** of fishing on the hydro canal fisheries, how many of the different hydro canal fisheries would you fish? (map)

- Tekapo Canal
- Pūkaki Canal - Ōhau A Canal (Please treat both canals as a single fishery)
- Ōhau B Canal
- Ōhau C Canal
- Lake Ruataniwha
- Upper Ōhau River (**<u>Only</u>** October 2022 or/and September 2023 controlled period ballot)

○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 (All)

Expense details

Expenditures:

To be able to determine the economic impact of canal fishing on the local area it is necessary to understand anglers' expenditure habits in the area. There are 3 sections to input your expenditures:

1. Average trip expenditure
2. One-off expenditures
3. Accommodation expenditures

For this survey, please limit reported expenditures to purchases made in one or more of the following Mackenzie Basin areas during the 2022-2023 season:

Assessment Areas:

- Town of Twizel and surrounding area
- Town of Lake Tekapo and surrounding area
- Town of Omarama and surrounding area

It is also important to understand if anglers commonly share costs. Again, please limit your consideration to trips in which you fished in the hydro canals.

On an average trip, do you share costs with anyone else (e.g., family or friends)? (example: splitting accommodation, fuel etc.)

Yes

No

You listed that you share costs with someone else while on fishing trips to the Mackenzie Basin.

When entering expenditure and accommodation expenses please only input **your portion of the total shared amount.**

It is important to understand if anglers commonly pay for others. Please limit your consideration to trips in which you fished in the hydro canals.

On an **average trip,** do you pay expenses for anyone other than yourself? (example: paying for family members' accommodation)

Yes

No

You have entered that you pay for someone else while on fishing trips to the Mackenzie Basin.

Please enter the number of people paid for on an average trip:

	# of People (excluding yourself)
Adult (Licence Holder)	0
Adult (Non-Licence Holder)	0

	# of People (excluding yourself)
Junior/Child (Licence Holder)	0
Adolescent/Child (Non-Licence Holder)	0

You have entered that you share costs **And** pay for someone else.

When entering expenditure and accommodation expenses data please input only **your portion** of the entire expenditure amount including expenses for those you pay for.

When entering expenditure and accommodation expenses data please input **the entire expenditure** amount including expenses for those you pay for.

Expenses

Please list your average **expenditures** made in Twizel, Lake Tekapo and/or Omarama per trip. As before, please limit consideration to trips in which you fished in the hydro canals.

Notes:

- Please **do NOT enter accommodation** or one-off expenditures here. Subsequent sections provide space for these entries.
- Enter "0" for no expenditure.
- ${e://Field/Nothing}${e://Field/Split}${e://Field/Payfor}${e://Field/SplitPayfor}

	Average Fishing Trip (NZ$/Trip)
Petrol / Diesel	
Groceries Food and Drink (incl. alcohol)	
Restaurant and Takeaways	
Fishing Equipment (incl. bait)	
Fishing Guide (local)	
Camping Gear / Supplies	
Transportation & Vehicle Expenses (incl. Boating)	
Clothing / Jewellery	

	Average Fishing Trip (NZ$/Trip)
Entertainment	
Other (please name)	

Did you make any one-off purchases in Twizel, Lake Tekapo and/or Omarama during the **entire 2022-2023** on trips in which you fished in the hydro canals?

Examples could be (but not limited to): tourist attractions (skydiving, horse riding, scenic tours), vehicle maintenance, durable goods (hardware, tools, art, homeware).

No

Yes

Please document the one-off purchases. Anything listed here should **not** be listed in the average trip expenditure section.

Notes:

- A following section covers **accommodations.**
- Please enter "0" for no expenditure.
- ${e://Field/Nothing}${e://Field/Split}${e://Field/Payfor}${e://Field/SplitPayfor}

	One Off Purchases (NZ$)
Fishing Equipment	
Fishing Guide Fees (local)	
Transportation & Vehicle Expenses (incl. Boating)	
Camping Gear	
Entertainment & Tourist Attractions	
Clothing / Jewellery	
Tools / Hardware	
Other (please name)	

Accommodation Expenditure

Think of the canal fishing trip(s) taken during the 2022 - 2023 season. If you stay in the area, what type of accommodation do you typically use? Again, please limit consideration to trips in which you fished in the hydro canals. Select all that apply.

- Traditional Paid Accommodation (Hotel / Lodge / Motel / Hostel).
- AirBnB / Bookabach / Holiday Houses / Bachcare / Other home rental.
- Camping / Motor Park / Camper Van.
- I own a second / vacation / holiday home in the area.
- My primary home is in the area.
- I do day trips from my permanent residence.
- I stay with friends or family.
- Other

Continuing with the 2022 - 2023 fishing season, on an **average** fishing trip in which you fished the hydro canals, how much do you spend on accommodation per trip?

Notes:

- ${e://Field/Nothing}${e://Field/Split}${e://Field/Payfor}${e://Field/SplitPayfor}

	Average Fishing Trip ($/Trip)
Traditional Paid Accommodation (Hotel / Lodge / Motel)	
AirBnB / Bookabach / Holiday Houses / Bachcare / Other home rental.	
Camping / Motor Park Fees	
Other (please name)	

You've listed that you own a secondary or vacation/holiday home in the local area.

How important was fishing the hydro fishing canals in your decision to purchase or keep the secondary home?

- Sole/Only Reason
- Main Reason
- Important Reason
- A Reason
- Not Important

You've listed that your primary home is nearby the Mackenzie Basin hydro canals.

How important was fishing the hydro fishing canals in your decision to live in the local area?

- Sole/Only Reason
- Main Reason
- Important Reason
- A Reason
- Not Important

While staying at a friend's or family members' house do you offer gifts as an informal way of payment?

- Yes and I purchase the gift(s) in the **assessment area** (please list average NZ$/Trip)

  0

- No
- Yes but I purchase the gift(s) outside the assessment area

Closing Demographics

If the Mackenzie Basin hydro canal angling fisheries were **no longer** available, how would it influence how often you travel to the Mackenzie Basin?

0% Less (No Impact)

If the Mackenzie Basin hydro canal angling fisheries were **no longer** available, how would it influence how often you fish in New Zealand?

0% Less (No Impact)

Thank you for taking the time complete this survey. Your input will help Fish and Game New Zealand, and the University of Otago better understand and accommodate anglers in the future.

If you would like to be entered for a chance to win one of the six NZ$100 gift cards please enter your email address:

Do you have any feedback you would like to share with the survey authors?