# Economic value of Tasmanian inland fisheries

FINAL REPORT

**July 2023 | Prepared by:**


Satoshi Yamazaki (Tasmanian School of Business and Economics, University of Tasmania).
Satoshi.Yamazaki@utas.edu.au
Eriko Hoshino (Commonwealth Scientific and Industrial Research Organisation).
Eriko.Hoshino@csiro.au

# Contents

# Acknowledgment of Country

The University of Tasmania pays its respects to elders past and present and to the many Aboriginal people that did not make elder status and to the Tasmanian Aboriginal community that continues to care for Country.
We acknowledge the profound effect of climate change on this Country and seek to work alongside Tasmanian Aboriginal communities, with their deep wisdom and knowledge, to address climate change and its impacts.
The Palawa people belong to one of the world's oldest living cultures, continually resident on this Country for over 65,000 years. They have survived and adapted to significant climate changes over this time, such as sea-level rise and extreme rainfall variability, and as such embody thousands of generations of intimate place-based knowledge.
We acknowledge with deep respect that this knowledge represents a range of cultural practices, wisdom, traditions, and ways of knowing the world that provide accurate and useful climate change information, observations, and solutions.
The University of Tasmania likewise recognises a history of truth that acknowledges the impacts of invasion and colonisation upon Aboriginal people, resulting in forcible removal from their lands.
Our island is deeply unique, with cities and towns surrounded by spectacular landscapes of bushland, waterways, mountain ranges, and beaches.
The University of Tasmania stands for a future that profoundly respects and acknowledges Aboriginal perspectives, culture, language, and history, and a continued effort to fight for Aboriginal justice and rights, paving the way for a strong future.

# Acknowledgments

This project received funding from the Anglers Alliance Tasmania. Eriko Hoshino provided an in-kind contribution to the project. The authors wish to acknowledge Mr Terry Byard, Mr Tony Wright, and Mr Denis Edwards of the Anglers Alliance Tasmania, as well as Mr Chris Wisniewski and Mr John Diggle of the Inland Fisheries Service, for providing valuable insights and feedback throughout the project. The authors are also grateful to Dr Gabriela Scheufele for her helpful comments and suggestions on the travel cost method and to Dr Namgay Dorji for his support in survey administration and preparing the final report. The authors would like to extend sincere appreciation to the individuals who took the time to complete the survey. Their contribution and support are invaluable and greatly appreciated.

# Disclaimer

The authors do not warrant that the information in this document is free from errors or omissions. The authors do not accept any form of liability, be it contractual, tortious, or otherwise, for the contents of this document or for any consequences arising from its use or any reliance placed upon it. The information, opinions and advice contained in this document may not relate, or be relevant, to a reader's particular circumstance. Opinions expressed by the authors are the individual opinions expressed by those persons and are not necessarily those of the University of Tasmania (UTas).

# Executive Summary

## Background

- Recreational fishing in Tasmanian inland waters provides a range of economic, social and health benefits to both local and non-local anglers, including those from interstate and overseas. However, there has been limited information available on the economic characteristics of the inland fisheries and their contribution to the regional economy.
- Previous estimates were based on expenditure information.
    - $1,787 per fisher per year, including marine recreational fisheries during 2017-18 (Lyle et al., 2019)
    - $40 per fisher per day (Inland Fisheries Commission Newsletter, 1991,1992)
- Estimating the economic value of recreational fishing requires not only information about expenditure but also the use of non-market valuation methods because expenditure-based metrics ignore the non-market recreational benefits enjoyed by anglers.
- This report presents an analysis of the value of Tasmanian inland fisheries based on expenditure data as well as the non-market value (i.e., consumer surplus) associated with recreational fishing in inland waters.

## Survey and methodology

- A survey was conducted to collect information about the fishing experience and activities of Tasmanian inland fishing licence holders during the 2021-22 angling season. The survey also collected information about the most recent fishing day and demographics (see Appendix C).
- A total of 5,720 licence holders for the 2021-22 season were randomly selected and invited to complete the survey either online or by mail from September to October 2022.
- A total of 412 responses were received, of which 304 were fully completed.
- The level of direct expenditure on recreational fishing in Tasmanian inland waters was calculated using self-reported personal expenses incurred during the most recent day of fishing.
- To estimate the non-market value of recreational fishing in Tasmanian inland waters, we used the travel cost method along with data collected from the survey. The travel cost method is an established technique that is commonly employed to determine the demand for recreational uses of the environment, including recreational fishing.

## General sample characteristics

- The surveyed anglers in Tasmanian inland waters have an average age range of 60-69 years and an average of 40 years of fishing experience. These sample characteristics are comparable to those found in the IFS Angler Postal Survey.

- About 40% of the surveyed anglers had higher education, 40% were employed fulltime, and 40% were retired. The income distribution among the anglers is diverse, with 30% earning more than $100,000 per year while 23% earning less than $40,000 per year. The income of the latter group is comparable to the median personal income reported in Tasmania for 2021 ($701 per week).

- A total of 95 lakes and lagoons as well as 60 rivers and creeks were identified as important fishing sites for the 2021-22 season.

- Fly fishing and lure fishing were the two most commonly used fishing methods on the most recent day of fishing, accounting for 54% and 46% of the surveyed anglers, respectively. The median catch for the day was two fish, and brown trout was the most commonly caught species.

- More than 80% of the anglers reported being satisfied with their overall fishing experience during the 2021-22 season. Similarly, over 70% of the anglers were satisfied with the number of fish they caught during their last fishing trip.

- While 38% of the anglers reported that catching fish for eating was one of the main motivations for going fishing, the vast majority (95%) also reported other non-consumptive motivations. These include the enjoyment of catching fish, relaxation, being outdoors, and spending time with family and friends.

- The comments provided by the anglers show that the top three reasons for satisfaction on the last fishing day were related to catch number (mentioned 59 times), weather (52 times), and enjoyment (20 times). Similarly, the top three reasons for satisfaction for the last fishing season were related to water level (31 times), catch number (30 times), and weather (30 times).

- The open-ended comments provided by the anglers were generally positive ("great," "good", "best", or "well-managed" appeared 31 times combined), although stocking level (18 times), licence fees (15 times), and lack of insects (6 times) were among the most discussed concerns.

## Expenditure and consumer surplus

- The mean expenditure for the most recent day of fishing was $143. This figure includes various expenses associated with the day's fishing, including the travel cost (fuel, rental fees); boat-related expenses (fuel, rental fees); fishing gear for the day (bait, lures, and flies); food, drinks, and ice; and other items, such as guide, tour and park fees.

- Based on the number of non-junior licences issued to Tasmanian and interstate anglers during the 2021-22 season as well as the average number of fishing days per season, it is estimated that the total expenditure on inland fishing in Tasmania is approximately $82.7 million.

- The estimated mean consumer surplus – a measure of non-market recreational benefits enjoyed by anglers for the most recent day of fishing – was $135. This figure represents the difference between the travel cost to the fishing site for the most recent day of fishing and the maximum amount that an individual is willing to pay for the fishing experience on the day.

- Based on the number of non-junior licences and the average number of fishing days, the total consumer surplus is estimated at $78.1 million.

## Conclusions

This report presents the first economic analysis of Tasmanian inland fisheries, offering estimates of daily expenditure and non-market benefits enjoyed by anglers. The findings indicate that the average expenditure of an angler for a day of fishing in the 2021-22 season was $143, which is more than three times higher than the previous estimate of $40 per day. Based on this figure, along with the number of licences and average number of fishing days in that year, the total expenditure on Tasmanian inland recreational fishing is estimated at approximately $82.7 million. A further $78.1 million of non-market benefits were generated for anglers from the experience of recreational fishing.

The estimated total expenditure of $82.7 million is considered conservative and may represent a lower bound as it does not take into account other major expenditures that contribute to the local economy and are associated with the Tasmanian inland fisheries. These expenditures include fishing equipment, accommodation and capital expenditure for boats and shacks, some of which are used not only for fishing but also for other purposes. Further analysis is required to quantify the exact share of their value that is directly attributable to recreational fishing in inland waters.

These results provide evidence that the inland recreational fishery sector in Tasmania generates considerable economic benefits for the local economy, and continued support for the sustainable management of this important sector is warranted.

# List of Tables



# List of Figures

# 1. Introduction

Recreational fishing offers participants a wide range of social, economic and health benefits, and its significant contributions to local economies have been widely recognised globally (Cisneros-Montemayor et al., 2010; Cowx et al., 2010; Hyder et al., 2020). In Australia, the significance of recreational fishing led to the development of a national policy in 1994, which aimed at addressing the growing awareness of recreational fishing's importance. Additionally, the National Recreational Fishing Survey (NRFS) was established in 2000, providing a framework for conducting state-wide surveys using a common methodology. Its primary objectives include determining participation rates in recreational fishing, profiling the demographic characteristics of recreational fishers, collecting data on expenditure in the recreational sector, and assessing the attitudes and awareness of recreational fishers regarding issues relevant to the fishery (Henry & Lyle, 2003).

Prior to the establishment of the NRFS, there was limited information available regarding recreational fishing in Tasmania as well as other states and territories across Australia. The first state-wide recreational fishing survey, aimed at providing a comprehensive overview of recreational fishing, was conducted in 2007-08, with the most recent survey conducted in 2017-18 (Lyle et al., 2019). In Tasmania, more focused studies have been conducted, including surveys of the tuna charter boat fishery (Evans, 1995; Smith, 1994), licensed marine recreational fishing (Lyle, 2000; Lyle & Smith, 1998; Tracey et al., 2013), and regular surveys of high-value marine recreational fisheries including rock lobster, abalone, and scallop fisheries since 2000 (Lyle et al 2019).

Similar to its marine counterpart, recreational fishing in Tasmanian inland waters (such as lakes, lagoons, rivers, and creeks) has been recognised for providing a myriad of economic, social and health benefits to both local and non-local anglers, including those from interstate and overseas. The Tasmanian inland recreational fishery attracts over 20,000 licenced local anglers per year, also attracting over 4,000 interstate anglers in the 2021-22 season (IFS, 2021, 2022). Furthermore, prior to the COVID-19 pandemic, nearly 500 licences were held by international anglers (IFS, 2020). However, there is limited information available on the economic characteristics of inland fishing in Tasmania, as the previous studies have predominantly focused on the recreational marine fishing sector and there has been no formal study assessing the economic value of Tasmania inland fisheries.

There are two previous studies that provide valuable insights into the value of Tasmanian inland fisheries. One study involved a survey conducted by the Inland Fisheries Commission, with the results reported in their newsletter (Inland Fisheries Commission, 1991, 1992). This study collected data from both Tasmanian anglers and interstate/overseas anglers. It concluded that Tasmanian anglers, on average, spent around $40 per fishing day, while the collective expenditure by interstate and overseas anglers during the 1989-1990 season was around $4.5 million. These estimates include expenditures related to travel costs, fishing gear and equipment, as well as accommodation for fishing trips. A more recent study by Lyle et al. (2019) estimated the annual expenditure per active fisher to be $1,787. However, it is important to note that this estimate is derived from a comprehensive survey conducted with Tasmanian recreational fishers across all Tasmanian waters, including freshwater, estuarine, and marine areas.

Research on recreational fisheries is generally underdeveloped compared to commercial fisheries (Abbott et al., 2022). This is in part due to the absence of a comprehensive monitoring and reporting system, resulting in a lack of available data for conducting sound economic assessments of recreational fisheries. Moreover, estimating the economic value of recreational fishing is a complex task (Abbott et al., 2022; Scheufele & Pascoe, 2022). This complexity arises from the fact that recreational fishing experiences, as well as the fish caught, do not involve traditional market transactions. Therefore, estimating the economic value of recreational fishing requires not only information about expenditure but also the use of non-market valuation methods. The travel cost method (TCM) is one of such approaches that uses information about the travel expenses incurred by anglers and their observed behaviour to elicit their preferences for recreational fishing activities. It is the most prominent approach used to estimate the value of recreational fishing in Australia and internationally (Scheufele et al. 2021).

There is a growing body of research employing non-market valuation methods to estimate the economic value of recreational fishing in Australia. For example, Pascoe et al (2014) estimated the economic value of the recreational fishery in Moreton Bay to range from $20 million to $35 million annually, with an average non-market recreational fishing benefits ranging between $60 and $100 per fisher per trip. This value of the recreational fishing is significant, as it may greatly exceed the value of the commercial fishery. Similar estimates have been found in other studies, including $167 per fisher per trip in the Capricorn Coast of the Great Barrier Reef (Rolfe & Prayaga, 2007) and $33-$132 per fisher per trip for recreational fishing of southern bluefin tuna in Portland of Victoria (Ezzy et al., 2012). In Tasmania, Yamazaki et al (2013) estimated the non-market recreational benefits of the inshore saltwater fishery and the rock lobster fishery to be around $60-$80 and $80-$110 per fisher per day, respectively.

This report presents an analysis of the value of Tasmania's inland fisheries. A survey was conducted to collect data on inland fishing activities in Tasmania, including expenditure by both local and interstate anglers who participated in inland fishing during the 2021-22 season. The collected data was used to estimate the economic value of Tasmanian inland fisheries through two approaches. The first approach is based on the personal expenditures reported by the surveyed anglers on their last fishing day, while the second approach employs the travel cost method to estimate the non-market value (i.e., consumer surplus) associated with recreational fishing in inland waters.

# 2. Survey

A survey was conducted among inland fishing licence holders for the 2021-22 angling season in Tasmania, using a structured questionnaire. See Appendix C for the questionnaire used in the survey. The survey design and recruitment strategy were developed in consultation with the Anglers Alliance Tasmania and the Inland Fisheries Service.

## 2.1 Questionnaire

The survey questionnaire comprised four main sections.

A. **General Fishing Experience in Tasmanian Inland Waters:** This section collected information about the respondents' general fishing experience in Tasmanian inland waters. The section included questions about the number of years they have been fishing in these waters, their intention of going fishing in the next season, and whether they personally own a boat and/or shack specifically for fishing in inland waters.

B. **Fishing Activity for the 2021-22 Season:** This section focused on the respondents' fishing experience in Tasmanian inland waters specifically during the 2021-22 angling season. The section covered questions about the number of fishing days they participated in during the season, their most important fishing sites, main motivations for engaging in fishing in the inland fisheries, and their overall level of satisfaction with the season.

C. **Most Recent Fishing Day:** This section asked questions about the respondents' most recent day of fishing in Tasmanian inland waters. The respondents were asked about their fishing activity on that particular day, encompassing the fishing locations visited, the fishing methods used, the number of fish caught, whether fishing was part of a multi-day trip, and their overall satisfaction with the fishing experience on that day. Additionally, this section collected information related to personal expenditures incurred during the day's fishing activity, including travel costs, boat-related expenses, and other consumable items, such as food and fishing gear.

D. **Demographics:** The final section collected data on the demographics of the respondents, including their age, place of residence, level of education, employment status and income level.

The respondents were also provided with an opportunity to make general comments about the Tasmanian inland fisheries and the survey itself at the end of the questionnaire. These comments were analysed using a text analysis method to gain insights into anglers' attitude towards the inland fisheries and their management. The survey was intended to be completed within 20-25 minutes. The survey maintained respondent anonymity by not collecting any personal information, such as names and licence numbers.

## 2.2 Survey implementation

The target participants for this study consisted of anglers who held a licence for the 2021-22 season. Eligibility for selection was limited to licence holders aged 18 years or older, thereby excluding anglers with junior licences. The study focused on residents of Tasmania as well as other states and territories within Australia. Overseas anglers were excluded from the study due to the potential significant differences in their behaviours and economic characteristics when compared to domestic anglers. This exclusion was necessary to mitigate the potential risk of insufficient information being collected for the overseas anglers group. The study was reviewed and approved by the University of Tasmania Human Research Ethics Committee (H0027612).

The survey was conducted between September and October 2022. Prior to its administration, the questionnaire was pre-tested with the participation of anglers who were invited through personal networks. The aim of this pre-testing was to ensure that the questionnaire was designed effectively to capture the intended information and generate reliable data for analysis. Potential respondents were selected at random from the licence database, resulting in a total of 5,720 licence holders for the 2021-22 season being invited to complete the survey either online or by mail. Among these, a total of 412 responses were received, of which only 304 were deemed eligible for inclusion in the analysis as these many were fully completed.

# 3. Sample characteristics

This section provides an overview of the characteristics of the surveyed anglers. We begin by discussing their demographic characteristics, including age, years of fishing experience in Tasmania inland waters, and their residential regions. We also examine their level of education, employment status, and income level. Furthermore, this section explores the general characteristics of the surveyed anglers during the 2021-22 season as well as the most recent day's fishing activities. To assess the representativeness of the sample in the present survey, we compare the characteristics of the surveyed anglers with those obtained from the IFS Angler Postal Survey (IFS, 2019) and the Census (ABS, 2023) , where data is available.

## 3.1 Demographics

Figure 1 illustrates the distribution of age and years of fishing experience in Tasmanian inland waters. The age distribution is right-skewed, indicating a relatively high participation of senior anglers compared to younger cohorts. On average, the surveyed anglers fall in the age range of 60-69 years, and more than 75 percent of the respondents are above 50 years old. The age distribution of our survey respondents aligns with the age distribution observed in the IFS postal survey, which also reported the mean age of 59 years old.

On the contrary, the distribution of years of experience among anglers in Tasmanian inland water is relatively even, showing a diverse fishing experience ranging from less than one year to 75 years. The mean years of fishing experience among the surveyed anglers is 33 years. Notably, about 15% of the respondents had less than 10 years of experience, whereas about 10% had a fishing history in inland waters for more than 60 years. These sample characteristics are comparable to those found in the IFS Angler Postal Survey (IFS, 2019).

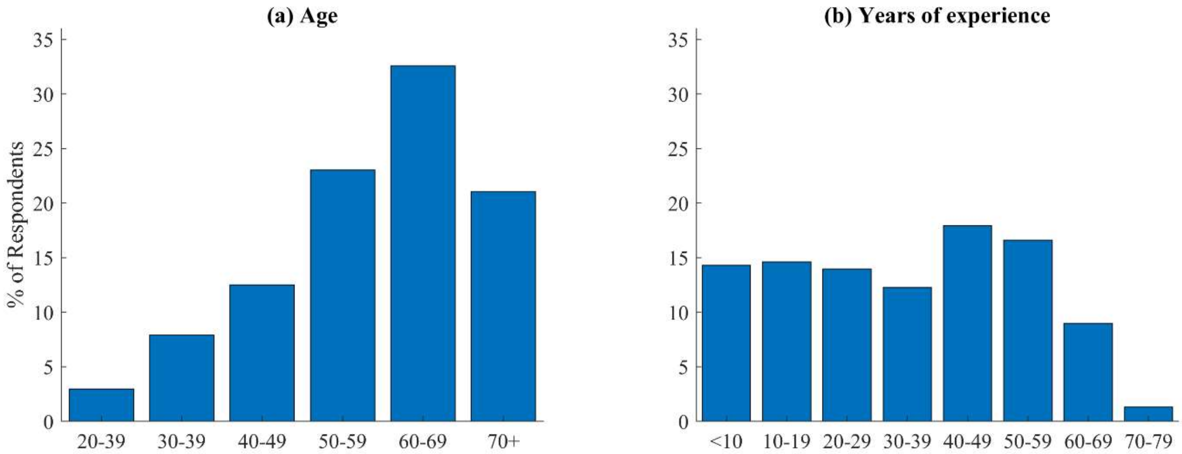


**Figure 1**. Age and years of experience.

Table 1 reports the respondents' residential locations by postcodes. Around 80% of survey anglers reside in Tasmania, and the geographical distribution of these respondents broadly aligns with that of the general population. In addition, the survey included data from 63 interstate anglers who visited Tasmania for inland fishing. These anglers came from Victoria (23), New South Wales (16), Queensland (13), South Australia (3), and Western Australia (3). We did not receive any responses from anglers living in the Northern Territory or ACT.

**Table 1.** Residential regions in Tasmania and other states.

| | # | % |
|---|---|---|
| Two-digit postcode areas in Tasmania | | |
| 70 | 72 | 23.9 |
| 71 | 25 | 8.3 |
| 72 | 62 | 20.6 |
| 73 | 75 | 24.9 |
| 74 | 4 | 1.3 |
| Other states | 63 | 20.9 |

Figure 2 reports the highest level of education completed by the survey respondents and their current employment status and personal income levels. The most prevalent education category among the anglers is a university degree, with about 45% of the respondents reporting this qualification as the highest level of education. The second most common category is secondary education, which represents the highest level of education completed by about 25% of the respondents.

In terms of the employment status, two distinguished groups emerge; full time employed and retired, collectively accounting for over 80% of the respondents. Other employment statuses reported by the respondents include self-employment, accountings for approximately 8.5% of the respondents. The income distribution among the anglers exhibits a diverse range, with 30% earning more than $100,000 per year, while 23% earning less than $40,000 per year.

These statistics suggest that the surveyed anglers, on average, are older, more likely to have completed a university degree and have a higher income compared to the average residents of Tasmania, as indicated by the 2021 Census data.

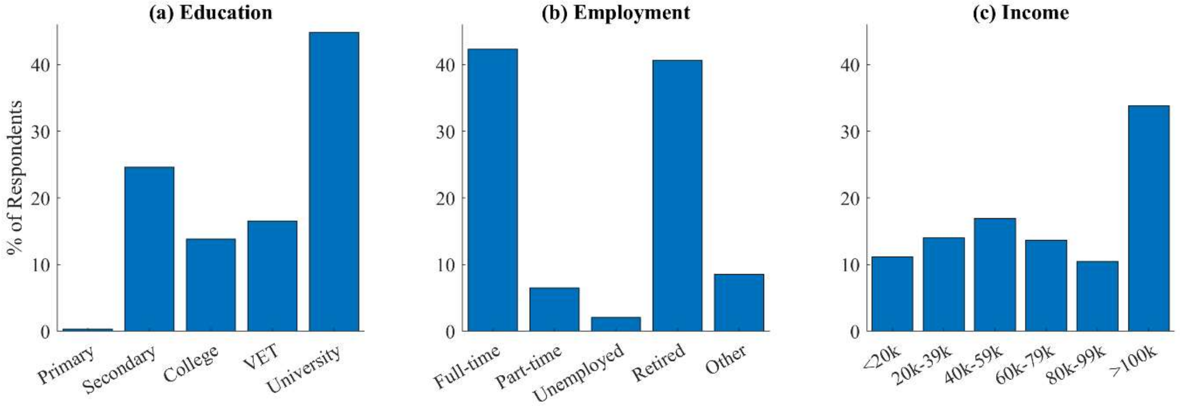


**Figure 2**. Education, employment, and income.

## 3.2 Fishing activities in the 2021-2022 season

Figure 3 summarises the number of fishing days that each respondent went fishing in Tasmanian inland waters during the 2021-22 season. More than 70% of the respondents spent fewer than 30 days throughout the season, with 36% of them spending less than 10 days. Nevertheless, there were also a notable number of anglers who devoted a considerable amount of time to inland fishing during the season, with 14% reporting that they spent more than 50 days (approximately more than once per week).

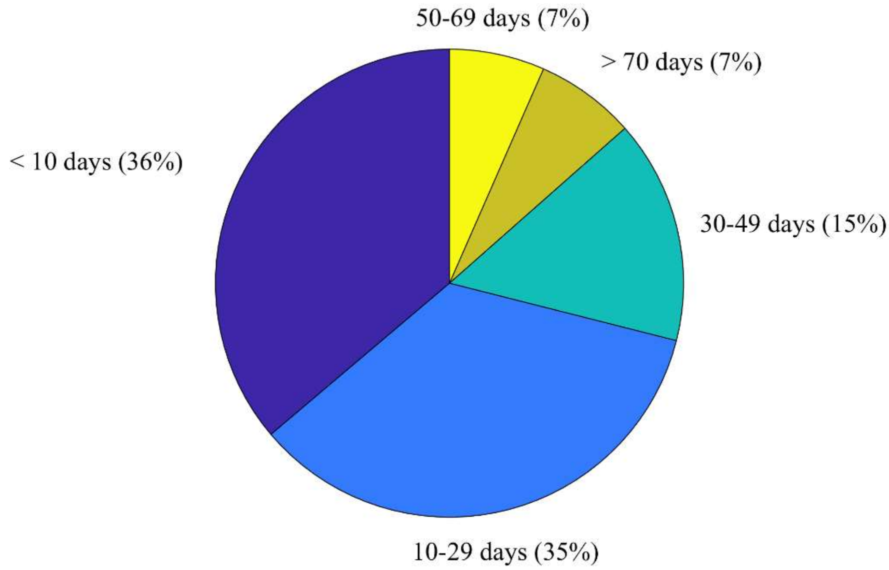


**Figure 3**. Number of fishing days in Tasmanian inland waters during the 2021-22 season.

The survey included a question where respondents were asked to nominate their five most important fishing destinations during the 2021-22 season, and this question was asked for lakes/lagoons and rivers/creeks. Initially, the original dataset contained 313 unique names of lakes and lagoons, as well as 233 unique names of rivers and creeks were reported.

However, these names were reported inconsistently with variations in names and spelling. To address this issue, we cross-checked the nominated fishing destinations using Google Maps and the IFS website, which provides a comprehensive list of major fishing destinations in Tasmanian inland waters (https://www.ifs.tas.gov.au/fisheries/waters-a-z/). After this data cleaning process, a total of 95 lakes and lagoons and 60 rivers and creeks were identified as important fishing sites for the 2021-22 season.

Figure 4 provides the top 10 fishing locations as reported by the survey respondents. Among these, the three most important lakes and lagoons were yingina/Great Lake, Little Pine Lagoon and Penstock Lagoon, with over 24% of the respondents identifying them as the primary lakes and lagoons for inland fishing. In terms of river and creeks, the three most important locations were the Mersey River, Meander River and Derwent River. However, the nominated list of rivers and creeks is highly variable among the respondents, with no single river or creek being nominated by more than 20% of anglers as an important fishing location. It is worth noting that the rankings of inland waters by angler visitation, as recorded in the IFS Angler Postal Survey, align closely with the self-nominated rankings of important fishing sites, resulting in an almost identical list (IFS, 2019).

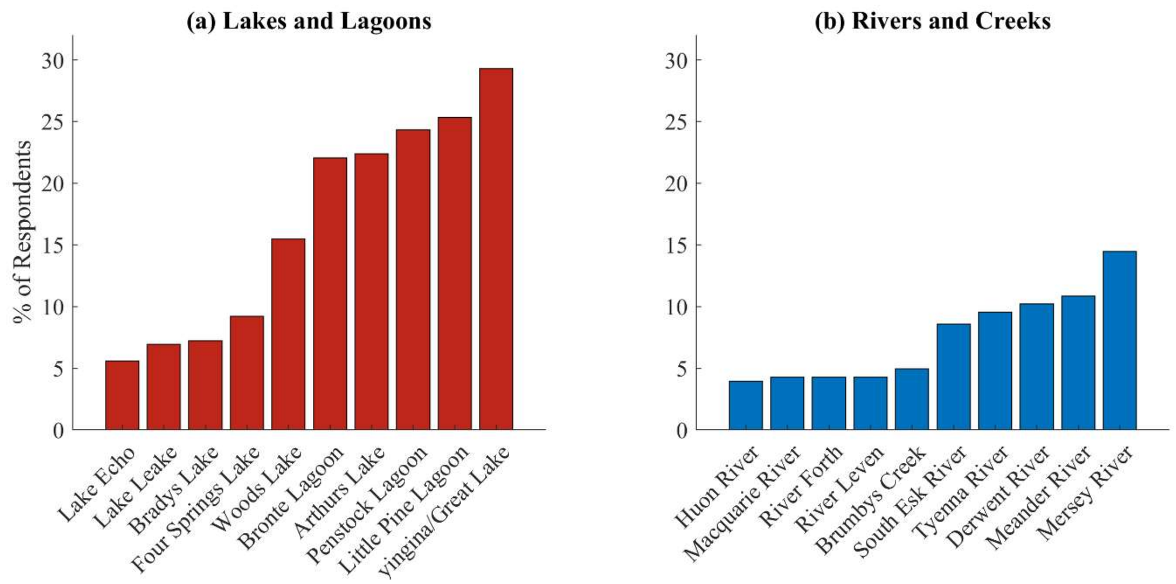


**Figure 4**. Top 10 fishing locations reported by the survey respondents.

Previous studies around the world have highlighted the diverse motivations behind participating in recreational fishing, emphasising the importance of understanding these factors to assess the value of recreational fishing as well as to predict angler response to regulatory changes (Cooke et al., 2018; Mackay et al., 2020). In line with this, the survey collected information about the main motivations of the surveyed anglers for inland fishing in Tasmania for the 2021-22 season. The results are presented in Figure 5 (a).

Five primary reasons as the main motivations for going fishing were (1) catching fish for consumption (2) the enjoyment or challenge of catching fish, (3) relaxation and unwinding, (4) the opportunity to be outdoors and (5) spending time with family and friends. Overall, 38% of the anglers reported catching fish for eating as one of the main motivations for going fishing. However, the vast majority (95%) also reported other non-consumptive motivations. The highest proportion of respondents (83%) identified the enjoyment or challenge of catching fish as one of the most important motivations. Additionally, a significant percentage of the respondents reported relaxation, being outdoors and spending time with family and friends (65, 65, and 47% respectively) as crucial reasons for their participation in the inland fisheries.

The level of overall satisfaction with the fishing experience in inland waters is generally high, as highlighted in Figure 5 (b). Survey respondents were specifically asked to rate their overall satisfaction with the fishing experience in the 2021-22 season compared to the previous angling year. The results show that 80% of the respondents reported their satisfaction level as either satisfactory, good or very good. In contrast, only 3% expressed significant dissatisfaction, categorising their experience as terrible.

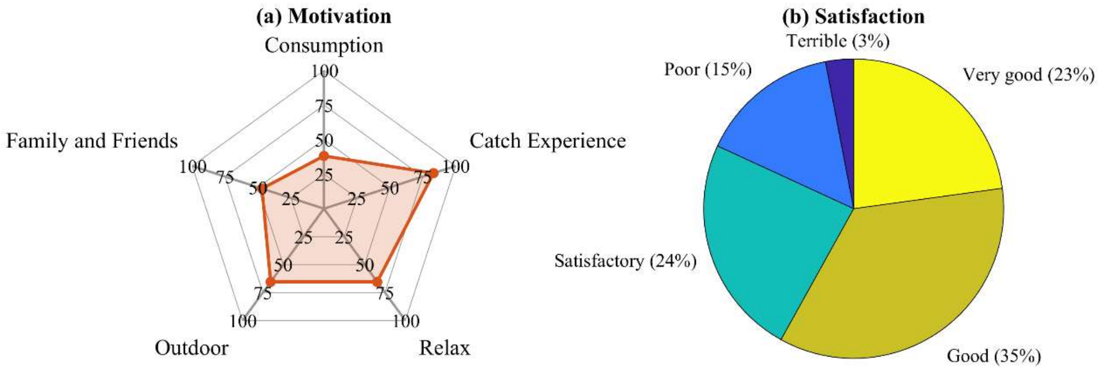


**Figure 5**. Motivation and overall satisfaction for the season.

An analysis of the open-ended comments provided by the respondents was carried out to extract information regarding (i) the main reasons for satisfaction or dissatisfaction with the 2021-22 season and (ii) general comments or concerns raised by the respondents. To this end, we applied a text mining approach using “tm” package in R (Feinerer, 2023) along with a free online word cloud visualization tool (WordClouds.com). Text mining is a technique that transforms unstructured text into structured data for simplified analysis.

We first extracted the most frequently used words from the original text of the open-ended comments. However, this approach resulted in frequently appearing words that do not provide useful information about the anglers’ opinions. For example, regarding the reasons for satisfaction or dissatisfaction with the season, words like “fish” (238 times), “lake” (72 times), and “river” (37 times) are among the most frequently used words.

As an alternative, we created a summary of keywords to extract more meaningful words or phrases that are directly relevant to the reasons for satisfaction with the 2021-22 season or general comments about the fisheries. The resulting words and phrases that were drawn from the open-ended comments are summarised in Figure 6. Additionally, the top 20 words and phrases used to describe satisfaction or dissatisfaction with the season, as well as general comments about the Tasmanian inland fisheries, are summarised in Appendix A.

An open-ended question asking about the main reasons for overall satisfaction or dissatisfaction during the 2021-22 season suggests that "water level" (mentioned 31 times), "catch number" (30 times), and "weather" (30 times) are the top three factors influencing satisfaction or dissatisfaction with the season. Regarding the open-ended general comments provided by the anglers, the majority expressed positive sentiments, with words like "great," "good", "best", or "well-managed" appearing a combined total of 31 times. However, concerns were also raised, with "stocking level" (18 times), "licence fees" (15 times), and "lack of insects" (6 times) being among the most frequently discussed issues.

(a) Season satisfaction (b) General comment


**Figure 6**. Word cloud for the reasons for satisfaction or dissatisfaction with the 2021-22 season (a) and general comments about the Tasmanian inland fishing (b).

## 3.3 Most recent day's fishing activities

Figure 7 provides a summary of the fishing methods used by the surveyed anglers in their most recent day's fishing activities in the inland fisheries. Fly fishing and lure fishing were the two most common methods, with 54% and 46% of the anglers using them, respectively. A relatively small percentage (13%) of the anglers reported engaging in bait fishing, either solely or in conjunction with other fishing methods. The IFS Angler Postal Survey also collected information about the fishing methods used by anglers. A notable disparity exists between the distribution of fishing methods reported in the current survey and that of the IFS survey. In particular, the proportions of respondents using fly fishing and lure fishing exclusively in the current survey are significantly higher compared to the figures reported in the IFS survey. It is important to note, however, that the two datasets are not directly comparable. The present survey focuses on fishing methods used during the most recent fishing day, whereas the IFS survey considers the percentage of time spent using each fishing method over the entire season.

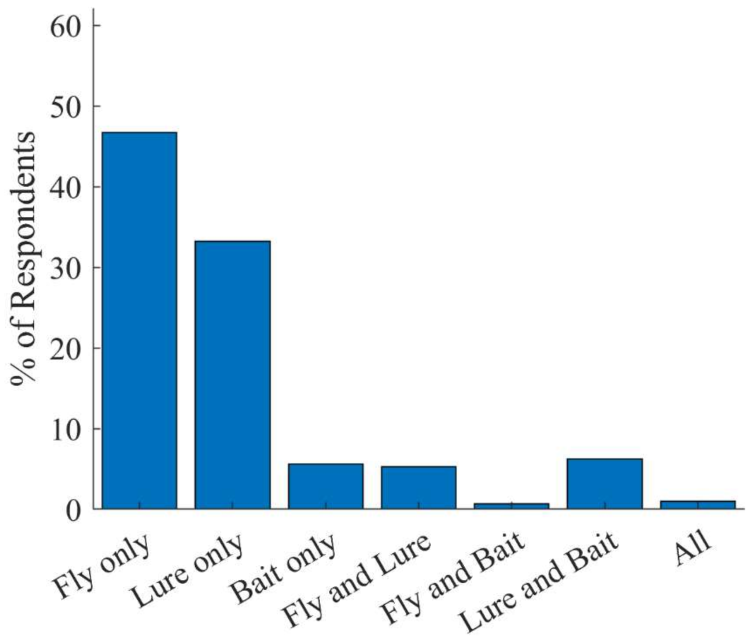


**Figure 7**. Fishing methods used on the last fishing day.

Table 2 reports the number of fish caught by the respondents on their most recent fishing day. The catch per angler per day tends to be relatively small, aligning with the findings of the IFS Angler Postal Survey. The median catch for the day was two fish, with brown trout being the most commonly caught species. There is a considerable variation in catch among the respondents for certain species, including brown trout, rainbow trout and other species. This variability is evident in the fact that 26% of the anglers reported not catching any fish on their last fishing day, while one angler reported catching more than 20 brown trouts.

**Table 2**. Number of fish caught on the last fishing day.

| | Mean | Median | Standard Dev. |
|---|---|---|---|
| Brown | 2.25 | 2 | 3.13 |
| Rainbow | 0.51 | 0 | 1.44 |
| Brook | 0.003 | 0 | 0.06 |
| Atlantic | 0.02 | 0 | 0.17 |
| Other | 0.38 | 0 | 1.59 |

The survey also asked information regarding the characteristics of fishing trips. Among the surveyed anglers, 53% reported taking single-day fishing trip, while the remaining anglers indicated that their fishing trips spanned multiple days, with a median duration of 3 days. For the majority of anglers (> 90%), fishing was the most important or equally important activity during their trips. About 80% of anglers went fishing alone or with one or two other anglers, and the size of the fishing parties rarely exceeded six people. The most common mode of travel was personal car, with 82% of anglers using their own vehicles, while 7.6% reported the use of rental cars.

# 4. Economic value of Tasmanian inland fisheries

This section presents the estimated economic value of Tasmanian inland fisheries. The value was estimated using two different approaches. In the first approach, we used data on the personal expenditure incurred for the surveyed anglers on their most recent day's fishing. In the second approach, we used the travel cost method to estimate the consumer surplus, which captures the non-market benefits experienced by the anglers. Using daily expenditure data and the estimate of consumer surplus in conjunction with the number of licenses issued in the 2021-22 season and the average number of fishing days per person for the season, we calculated the total value of the inland fisheries, in terms of both the total expenditure and total consumer surplus derived from the recreational activities.

When estimating the economic value of the fisheries for the 2021-22 angling season, we focused on data related to respondents' most recent fishing day. This is a common approach in the literature. Collecting expenditure and other information for each trip throughout the entire season is not recommended as it would significantly lengthen the survey. Moreover, respondents may not be able to recall the necessary information for every trip, which could increase the chances of recall bias (Parsons, 2017).

## 4.1 Expenditure

For the expenditure-based valuation approach, we focused on five main expenditure groups: (1) travel costs (including fuel, rental fees, and other related expenses); (2) boat expenses (including fuel, rental fees and other related expenses); (3) fishing gear (including baits, lures and flies); (4) food, drinks, and ice; and (5) other expenditures (including guide fees, tour expenses, and national park fees).

When evaluating the value of recreational fishery based on expenditure data, it is crucial to include only those items that are directly attributed to the fishing experience enjoyed by anglers during their last day of fishing. However, estimating the value of recreational fishing solely based on expenditure data poses a significant challenge, as it is not always evident which portion of the expenditure incurred by the anglers is directly related to recreational fishing. This complexity is well known in the literature (Parsons, 2017) and becomes particularly apparent when fishing activities are part of a multi-day trip involving various non-fishing activities. For this reason, we excluded expenditure on accommodation since the survey data did not provide sufficient information to estimate the expenditure on accommodation specifically associated with the most recent day of recreational fishing. Additionally, capital expenditure was not included in our analysis, focusing solely on the daily expenses listed above. The implications of these omitted expenses in the expenditure-based valuation of recreational fishing will be discussed in the Conclusion section.

Figure 8 presents a summary of daily expenditure for each expenditure group and the total expenditure, which are reported for the full sample as well as a sub-sample of Tasmanian anglers and interstate anglers. The mean expenditure for the most recent day of fishing was $143. The total expenditure for a day's fishing by interstate anglers was significantly higher compared to that of Tasmanian anglers. Specifically, the mean daily expenditure for Tasmanian anglers was $122, while for interstate anglers, it was $227. This trend holds true for most expenditure groups, except for boat-related expenses, where Tasmanian anglers, on average, spent more than interstate anglers. Among the five major expenditure groups, travel costs and expenses on food showed relatively high values compared to the other groups.

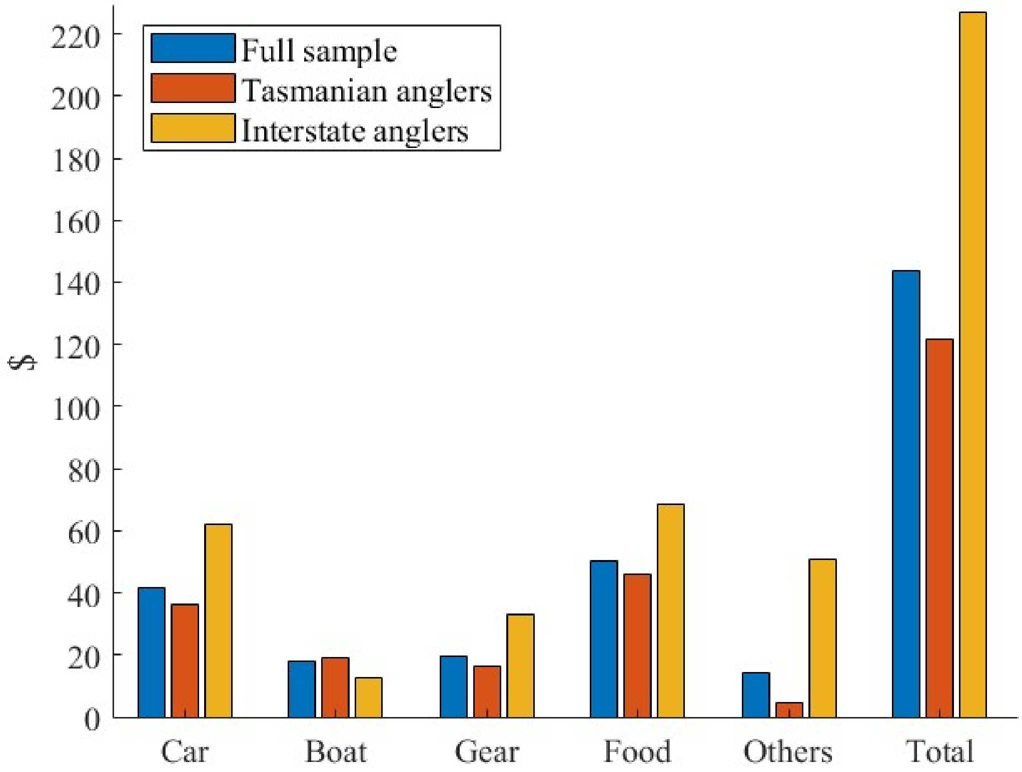


**Figure 8**. Mean daily expenditure for the Tasmanian and interstate anglers.

## 4.2 Consumer surplus

Recreational fishing generates significant non-market value in Tasmania and elsewhere as its experience and the associated recreational values are not directly traded in markets (Ezzy et al., 2012; Rolfe & Prayaga, 2007; Yamazaki et al., 2013). For the Tasmanian inland fisheries, this is clearly reflected in the primary motivations reported by the surveyed anglers for engaging in fishing activities in inland waters (see Figure 5 (a)). To capture and quantify this value, we used the travel cost method to estimate the consumer surplus enjoyed by the surveyed anglers on the most recent fishing day.

The technical details of the travel cost model used in this study are described in Appendix B. In short, the travel cost method exploits the fact that anglers' willingness to pay (WTP) for participating in inland fishing is typically higher than the actual cost they incur and that there is a negative relationship between the number of fishing days during the season (i.e., quantity demanded) and the associated travel cost (i.e., price).

A statistical analysis was undertaken to identify the factors associated with the individuals' non-market values. For the purpose of model estimation, we used data provided by the surveyed anglers to construct the key variables, including the location of fishing and travel cost incurred on their last fishing day, as well as the number of fishing days spent at that location during the 2021-22 season. These variables were used to estimate the relationship between the number of fishing days and the corresponding travel costs. Since travel costs alone do not fully explain anglers' decision on the number of fishing days made during the season, we also incorporated additional control variables in the model. These control variables, such as income, catch and motivation, were used to account for other factors that potentially influence fishing behaviour (see Appendix B for the details). However, not all respondents provided the necessary information required for the estimation of the travel cost model. Among the 304 respondents, data from 243 individuals were considered eligible and included in this analysis.

Table 3 reports the estimated consumer surplus for the full sample, as well as a sub-sample of Tasmanian anglers and those who fished in lakes or lagoons. The mean consumer surplus per fisher per day is estimated to be $135. This value represents the difference between the travel cost to the fishing site for the most recent day of fishing and the maximum amount that individuals are willing to pay for the fishing experience. The mean consumer surplus for Tasmanian anglers is approximately $25 lower than the estimate for the full sample, suggesting that interstate anglers, on average, have a higher consumer surplus compared to Tasmanian anglers.[1] Furthermore, our results suggest that anglers who fished in lakes or lagoons have a higher consumer surplus compared to those who fished in rivers or creeks. It is also important to note that the null hypothesis of zero consumer surplus is rejected at the 5% level of significance for all cases, suggesting that the surveyed anglers hold a significant non-market value to the fishing experience in Tasmanian inland waters.

**Table 3**. Mean consumer surplus for the last fishing day.

| | Full sample | Tas anglers | Lake |
|---|---|---|---|
| Mean ($/day) | 135.31 | 110.55 | 158.27 |
| Number of observations | 243 | 190 | 174 |

The positive and significant non-market value of the fishing experience in Tasmanian inland waters, as measured by the consumer surplus, is further evident in anglers' responses to hypothetical questions, which are designed to assess whether respondents would still have chosen to go fishing if they had faced additional costs, such as an increase in fuel expenses or an increased licence fee. More specifically, the question asked was:

> *"Bearing in mind that you have many calls on your income, if it has cost you an extra $X for your fuel on the last day's fishing, would you still have gone fishing on that day?,"*

where $X represented a randomly selected bid, ranging from $10, $20, $30 or $40. A similar question was asked regarding an increase in the licence fee, but with a smaller range of amounts, namely $4, $8, $12 or $16 (see Q15 in Appendix C).

Figure 9 shows that, regardless of the bid amount, more than 70% of respondents consistently indicated that an increase in these costs would not impact their participation in the Tasmanian inland fisheries. This finding aligns with their earlier response in the survey

[1] Unfortunately, the sample size of interstate anglers is insufficient to accurately estimate the consumer surplus specific to this group.

indicating that 96% of them have plans to go fishing in the next season.

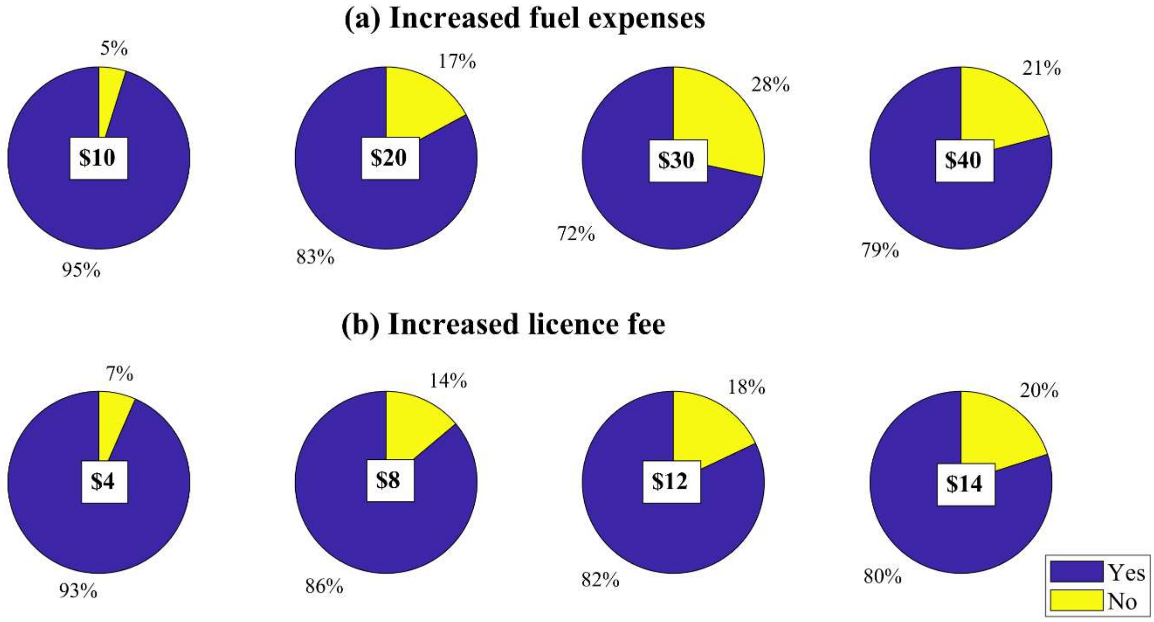


**Figure 9**. Response to a hypothetical increase in fuel expenses and licence fees.
A 'Yes' response indicates that the respondent would still choose to go fishing even if the fuel expenses or licence fees were increased by the amount presented in the middle of the pie chart.

## 4.3 Aggregation

Using the mean daily expenditure and estimated consumer surplus for Tasmanian and interstate anglers on their last fishing day, we calculated the total expenditure and total consumer surplus for the Tasmanian inland fisheries during the 2021-22 season. According to the IFS Annual Report 2021-2022 (IFS, 2022), a total of 24,118 non-junior licences were issued to Tasmanian and interstate anglers in that season, with 21,332 licences (88%) held by Tasmanian anglers. The survey data collected in this study indicates that, on average, these anglers spent 24 days fishing per season, with Tasmanian anglers spending 27 days.

Figure 10 illustrates the total expenditure and total consumer surplus calculated based on the figures above. It is estimated that during the 2021-22 season, the total expenditure and total consumer surplus for inland fishing in Tasmania were approximately $82.7 million and $78.1 million, respectively. Considering that the majority of anglers (over 85%) reside in Tasmania, these values primarily represent the impact on local residents.

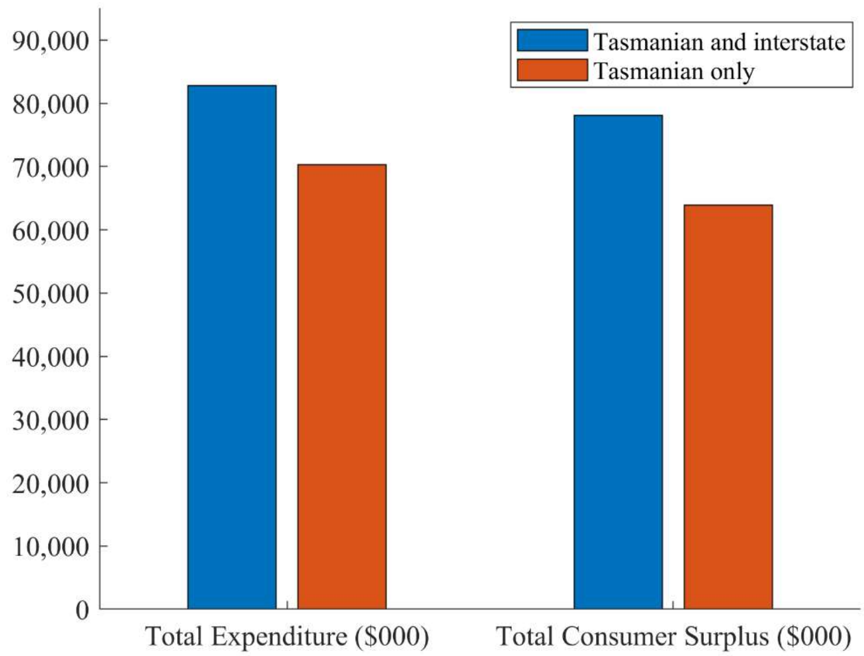


**Figure 10**. The estimated total expenditure and total consumer surplus for recreational fishing in Tasmanian inland waters during the 2021-22 season.

# 5. Conclusion

This report presents the first comprehensive economic analysis of Tasmanian inland fisheries, encompassing a profile of anglers, their attitudes towards fishing experiences in inland waters, and an assessment of daily expenditure and non-market benefits enjoyed by anglers. The result highlights that the Tasmanian inland fisheries provide significant recreational opportunities for both casual anglers, who fish only occasionally in inland waters, and avid anglers, who engage in inland fishing on a weekly basis.

A distinguishing characteristic of Tasmania's inland fisheries is the wide array of locations where fishing takes place. This is evident in the data collected in this study, which identified 155 unique locations from 304 respondents. Moreover, no single lake, lagoon, river or creek emerged as the predominant destination for the majority of anglers. While this signifies abundant opportunities for local and visiting anglers to enjoy inland fishing throughout the state, it also presents challenges for fisheries management, particularly in terms of monitoring fishing activities and providing adequate facilities across all locations.

Tasmanian inland waters offer recreational fishing opportunities to anglers from diverse socio-demographic backgrounds. This diversity is reflected in the varied motivation behind participating in recreational fishing. Unsurprisingly, the primary reason for participation among most anglers is catching experience. However, each angler is also driven by additional factors, such as relaxation, unwinding, the opportunity to be outdoors, and spending time with family and friends. Similar non-consumptive motivations have been observed in marine recreational fisheries in Tasmania (Frijlink & Lyle, 2010).

The vast majority of surveyed anglers indicated their satisfaction with the fishing experience in Tasmanian inland waters during the 2021-22 season. The open-ended comments further showed their satisfaction with fisheries management. The level of satisfaction was found to be linked to factors such as the number of fish caught, water levels, and weather conditions. However, some concerns were also raised, including issues related to the stocking of inland waters, licence fees, and the absence of insects.

The findings indicate that the average expenditure per angler for a day of fishing in the 2021-22 season was $143, which is more than three times higher than the previous estimate of $40 per day. Based on this figure, along with the number of licences and average number of fishing days in that year, the total expenditure on Tasmanian inland recreational fishing is estimated at approximately $82.7 million. A further $78.1 million of non-market benefits were generated for anglers from the experience of recreational fishing.

We conclude this report by highlighting several important caveats that should be considered when interpretating these estimates, while also identifying areas for future research to further develop our understanding of the economic value of Tasmanian inland fisheries. First, the expenditure-based value of the fisheries reported in this study may be considered a conservative value, representing a lower bound. Certain significant elements, such accommodation and capital expenditure, were excluded from the analysis. For example, nearly 50% of the surveyed respondents indicated that their last fishing day was part of multi-day trips where fishing was the primary or equally important activity. This implies that accommodation expenses are directly associated with inland fishing, making a substantial contribution to the tourism sector and local economies.

Moreover, direct expenditures on boats, fishing gear (e.g., rods and reels), camping equipment, and other capital items, as well as expenses related to shacks used for fishing in inland waters, were excluded from the analysis. Despite their significance, incorporating these expenses into the annual value of the fisheries is not necessarily straightforward. These expenditures do not occur every year, and not all expenses on these items can be directly attributed to creating the experience of recreational fishing as they may serve multiple purposes (Parsons, 2017). Furthermore, the frequency and allocation of these expenses are likely to vary among anglers, and such individual variations add further complexity when quantifying the contribution of these expenditure items to the economic value of the fisheries.

Finally, considering that the survey was conducted within a relatively short timeframe, it is important to discuss the possible implications on the representativeness of the sample used in this study. The characteristics of anglers in this study align closely with those found in the IFS Angler Postal Surveys, which have been conducted annually over the past 30-plus angling seasons. However, the sample in the present study comprises a relatively small number of respondents who engaged in bait fishing on their last fishing day. If the proportion of anglers who normally engage in bait fishing is more prevalent than represented in the sample, and if their behaviours and economic characteristics significantly differ from those observed in the sample, it may be necessary to adjust the estimated value of the fisheries accordingly.

Moreover, the survey was conducted on a voluntary basis, implying a potential higher likelihood of participation from more committed and avid anglers to complete the survey.

This may introduce sampling bias. While self-selection or non-response bias is a well-recognised challenge when surveying individuals with varying levels of motivation to respond, we did not find evidence of this bias in the dataset. The data collected in this study encompasses a diverse mix of avid and infrequent anglers with varying levels of fishing history in Tasmanian inland waters. Additionally, the dataset includes respondents with a wide range of motivations to participate in inland fishing, suggesting that the sample information used in this study is not skewed towards a specific group of anglers.

## References

Abbott, J. K., Lew, D. K., Whitehead, J. C., & Woodward, R. T. (2022). The future of fishing for fun: the economics and sustainable management of recreational fisheries. *Review of Environmental Economics and Policy, 16*(2), 262-281.

ABS. (2023). *Tasmania 2021 Census All persons QuickStats*. https://www.abs.gov.au/census/find-census-data/quickstats/2021/6.

Cameron, A., & Trivedi, P. (2005). *Microeconometrics: Methods and Applications*. Cambridge University Press.

Cisneros-Montemayor, A. M., Rashid Sumaila, · U, Cisneros-Montemayor, A. M., & Sumaila, U. R. (2010). A global estimate of benefits from ecosystem-based marine recreation: potential impacts and implications for management. *J Bioecon*, *12*, 245–268.

Cooke, S. J., Twardek, W. M., Lennox, R. J., Zolderdo, A. J., Bower, S. D., Gutowsky, L. F. G., Danylchuk, A. J., Arlinghaus, R., & Beard, D. (2018). The nexus of fun and nutrition: Recreational fishing is also about food. *Fish and Fisheries*, *19*, 201–224.

Cowx, I. G., Arlinghaus, R., & Cooke, S. J. (2010). Harmonizing recreational fisheries and conservation objectives for aquatic biodiversity in inland waters. *Journal of Fish Biology*, *76*(9), 2194–2215.

Evans, B. S. (1995). *Tasmanian Tuna charter Fishery – Update, Season 1994*. Department of Primary Industry and Fisheries. Hobart.

Ezzy, E., Scarborough, H., & Wallis, A. (2012). Recreational value of southern bluefin tuna fishing. *Economic Papers*, *31*, 150–159.

Feinerer, I. (2023). *Introduction to the tm Package: Text Mining in R*. https://cran.r-project.org/web/packages/tm/vignettes/tm.pdf.

Frijlink, S., & Lyle, J. M. (2010). *An Evaluation of Motivations, Attitudes and Awareness of Tasmanian Recreational Fishers*. Tasmanian Aquaculture and Fisheries Institute. Hobart.

Henry, G. W., & Lyle, J. M. (2003). *The National Recreational and Indigenous Fishing Survey*. Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

Hyder, K., Maravelias, C. D., Kraan, M., Radford, Z., & Prellezo, R. (2020). Marine recreational fisheries-current state and future opportunities. *ICES Journal of Marine Science*, *77*(6), 2171–2180.

IFS. (2019). *Inland Fisheries Service Recreational Fisheries Report: Angler Postal Survey 2017-18 Results*. Inland Fisheries Service. New Norfolk.

IFS. (2020). *Inland Fisheries Service Annual Report 2019-20*. Inland Fisheries Service. New Norfolk.

IFS. (2021). *Inland Fisheries Service Annual Report 2020-2021*. Inland Fisheries Service. New Norfolk.

IFS. (2022). *Inland Fisheries Service Annual Report 2021-2022*. Inland Fisheries Service. New Norfolk.

Inland Fisheries Commission. (1991, October). The value of angling to Tasmania. *Inland Fisheries Commission Newsletter Volume 20 Number 2*.

Inland Fisheries Commission. (1992, March). The value of angling to Tasmania (Part 2). *Inland Fisheries Commission Newsletter Volume 21 Number 1*.

Lyle, J. M. (2000). *Assessment of the licensed recreational fishery of Tasmania (Phase 2)*. Fisheries Research and Development Corporation, Project 1996/161.

Lyle, J. M., & Smith, J. T. (1998). *Pilot Survey of Licensed Recreational Sea Fishing in Tasmania*. Department of Primary Industry and Fisheries Tasmania. Hobart.

Lyle, J. M., Stark, K. E., Ewing, G. P., & Tracey, S. R. (2019). *2017-18 Survey of Recreational Fishing in Tasmania*. The Institute for Marine and Antarctic Studies. Hobart.

Mackay, M., Yamazaki, S., Lyle, J. M., & Ogier, E. M. (2020). Determining management preferences in a multimethod consumptive recreational fishery. *Ecology and Society*, *25*(2), 22.

Parsons, G. R. (2017). Travel Cost Models. In P. A. Champ, K. J. Boyle, & T. C. Brown (Eds.), *A Primer on Nonmarket Valuation* (Second Edition, pp. 187–233). Springer Nature.

Pascoe, S., Doshi, A., Dell, Q., Tonks, M., & Kenyon, R. (2014). Economic value of recreational fishing in Moreton Bay and the potential impact of the marine park rezoning. *Tourism Management*, *41*, 53–63.

Rolfe, J., & Prayaga, P. (2007). Estimating values for recreational fishing at freshwater dams in Queensland. *Australian Journal of Agricultural and Resource Economics*, *51*(2), 157–174.

Scheufele, G., & Pascoe, S. (2022). Estimation and use of recreational fishing values in management decisions. *Ambio, 51*(5), 1275–1286.

Smith, J. T. (1994). *Charter Fishing for Tuna in Tasmania*. Department of Primary Industry and Fisheries. Recreational Fishing Report No. 1. Hobart.

Tracey, S. R., Lyle, J. M., Ewing, G., Hartmann, K., & Mapleston, A. (2013). *Offshore Recreational Fishing in Tasmania 2011/12*. Institute for Marine and Antarctic Studies. Hobart.

Yamazaki, S., Rust, S., Jennings, S., Lyle, J., & Frijlink, S. (2013). Valuing recreational fishing in Tasmania and assessment of response bias in contingent valuation. *Australian Journal of Agricultural and Resource Economics*, *57*(2), 193–213.

## Appendix A. Top 20 words and phrases frequently used in open-ended comments.

| (a) Reasons for satisfaction or dissatisfaction with the 2021-22 season | | (b) General comments about Tasmanian inland fishing | |
|---|---|---|---|
| Word | freq | Word | freq |
| water_levels | 31 | restocking | 18 |
| catch_number | 30 | license_fees | 15 |
| weather | 30 | great | 11 |
| enjoyment | 25 | water_levels | 9 |
| lack_insects | 23 | good | 9 |
| size | 14 | access | 8 |
| fish | 13 | lack_insects | 6 |
| stock | 12 | harder_catch | 6 |
| catch_rate | 11 | well-managed | 6 |
| time_constraint | 9 | boatramps | 6 |
| access | 9 | overcrowded | 5 |
| conditions | 7 | water_quality | 5 |
| family_time | 7 | river_health | 5 |
| many_fish | 7 | best | 5 |
| crowdness | 6 | enjoy | 4 |
| covid | 6 | interstate | 4 |
| water_quality | 6 | Illegal_fishing | 4 |
| friends | 6 | Hydro_tasmania | 4 |
| fish_quality | 4 | enforcement | 4 |
| experience | 4 | fishing_pressure | 3 |

# Appendix B. Travel Cost Method

## B.1 Model specification

To estimate consumer surplus, we first assume that the number of days each angler spends in Tasmanian inland fisheries is influenced by various factors. We model this relationship using the following equation:

$$y_i = f(tc_i, income_i, \boldsymbol{z}_i) \quad (1).$$

The variable on the left-hand side of the equation, $y_i$, represents the total number of fishing days that angler *i* spent during the 2021-22 season. The right-hand side of the equation includes the factors that may be associated with this variable. These factors include travel cost ($tc_i$), income ($income_i$) and a vector of other individual characteristics ($\boldsymbol{z}_i$). For example, a decrease in travel cost or an increase in income would be expected to result in an increase in the number of fishing days. In the travel cost method, this negative relationship between the number of fishing days and travel cost is used to characterise the demand for recreational fishing. The estimated consumer surplus represents the different between the willingness of pay for a fishing day and the travel cost for that day, capturing the non-market benefit that anglers derive from participating in Tasmanian inland fisheries.

It is important to note that although anglers typically visit multiple fishing locations throughout the season, we only consider the number of fishing days associated with the primary location on the most recent day of fishing due to the availability of data. As discussed in Section 4, it is not practically feasible to collect information about every fishing day spent throughout the season. An important implication of this approach is that different fishing locations are considered as goods with a single price. Incorporating the heterogeneous features of each fishing location in Tasmanian inland fisheries poses a challenge, as reported in this report, there are at least over 150 primary fishing locations in inland waters. Considering this heterogeneity is an important area of future research.

The dependent variable of equation (1) is a non-negative integer (number of fishing days), meaning that ordinary least square (OLS) is inappropriate in estimating the model parameters. Therefore, we instead use the truncated negative binomial model, in which the expected number of fishing days angler *i* ($\lambda_i$) is specified as:

$$\lambda_i = \exp(\beta_{tc} tc_i + \beta_{inc} income_i + \boldsymbol{z}_i \boldsymbol{\beta}_z) \quad (2),$$

After estimating the parameters in equation (2), consumer surplus is estimated as $-1/\beta_{tc}$. See Cameron and Trivedi (2005), Parsons (2017), and Pascoe et al (2014) for the technical details.

## B.2 Estimation results

The table below reports the estimated parameters of the truncated negative binominal model.

| | Full Sample | Tas anglers | Lake |
|---|---|---|---|
| Travel cost | -0.007 | -0.009 | -0.006 |
| | (0.002) | (0.004) | (0.002) |
| Education | -0.554 | -0.537 | -0.507 |
| | (0.186) | (0.207) | (0.207) |
| Income | 0.140 | 0.145 | 0.108 |
| | (0.070) | (0.071) | (0.073) |
| Retired | 0.624 | 0.668 | 0.468 |
| | (0.225) | (0.239) | (0.236) |
| Fly | -0.646 | -0.508 | -0.662 |
| | (0.262) | (0.268) | (0.300) |
| Lure | -0.662 | -0.689 | -0.515 |
| | (0.286) | (0.298) | (0.318) |
| Catch rainbow | 0.110 | 0.078 | 0.102 |
| | (0.043) | (0.038) | (0.064) |
| Group size | 0.045 | 0.083 | -0.004 |
| | (0.038) | (0.047) | (0.035) |
| Important | 0.807 | 0.836 | 0.723 |
| | (0.198) | (0.210) | (0.208) |
| Motivation: consumption | -0.234 | -0.355 | -0.378 |
| | (0.182) | (0.192) | (0.195) |
| Constant | 1.549 | 1.639 | 2.006 |
| | (0.430) | (0.467) | (0.524) |
| Log likelihood | -740.59 | -605.28 | -532.09 |
| AIC | 1505.19 | 1234.56 | 1088.18 |
| N | 243 | 190 | 174 |

Note: The parameters of a truncated negative binomial model are estimated by maximum likelihood. The robust standard errors are reported in parentheses.

## Appendix C. Survey Questionnaire

# Tasmanian Inland Recreational Fishery Survey

## *Section A: Your fishing experience**Please provide information on*

- ***<u>your</u>*** *fishing experiences*
- *in* ***<u>Tasmanian inland waters</u>***

---

Q1. How many years have you been fishing in Tasmanian inland waters?

☐ years

Q2. (a) In the past 5 years, how many trips on average did you make each year for the purpose of primarily fishing?

☐ trips/year

(b) How many days did you normally spend on each trip?

☐ days/trip

(c) If your average trip length is more than 1 day, how many days did you typically go fishing on each trip?

☐ fishing days/trip

Q3. Do you plan to go fishing the next season?

☐ Yes ☐ No

Q4. Are you a member of any angling club or association?

☐ Yes ☐ No

Q5. Do you personally own a boat for fishing in Tasmanian inland waters?

☐ Yes ☐ No

Q6. Do you personally own a shack for fishing in Tasmanian inland waters?

☐ Yes ☐ No

## *Section B: Your fishing activity for the 2021-2022 season*

*Please provide information on*

- ***your*** *fishing experiences*
- *in* ***Tasmanian inland waters***
- *for* ***the 2021-2022 angling season****.*

---

Q1. What type of licence did you hold for the 2021-2022 season?
(*Please tick all applicable boxes*)

☐ Five seasons (purchase year: 20 __ __ ) ☐ One season
☐ 28 days ☐ 7 days ☐ 48 hours

Q2. In total, how many days did you go fishing in Tasmanian inland waters during the 2021-2022 season?

☐ days

Q3. What would you say was your main motivation for going fishing in the 2021-2022 season? (*Please tick all applicable boxes*)

☐ To catch fish for eating
☐ For the enjoyment or challenge of catching fish
☐ To relax or unwind
☐ To be outdoors
☐ To spend time with family/friends
☐ Other reason (*please specify*)

______________________________________________________________
______________________________________________________________
______________

Q4. (a) How many days did you go fishing in ***lakes and lagoons*** during the 2021-2022 season (regardless of the hours you spent)?

[ ] days

(b) What were the most important lakes/lagoons for you (max 5 locations) and how many days did you fish in these lakes/lagoons?

| **Ranking** | **Lake/lagoon location** | **Total number of days fished** |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

Q5. (a) How many days did you go fishing in ***rivers and creeks*** during the 2021-2022 season (regardless of the hours you spent)?

[ ] days

(b) What were the most important rivers/creeks for you (max 5 locations) and how many days did you fish in these lakes/lagoons?

| **Ranking** | **River/creek location** | **Total number of days fished** |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

Q6. Thinking about all of your activities associated with recreational fishing in Tasmanian inland waters during the 2021-2022 season, approximately how much did you ***personally*** spend for each of the following items?

| **Item** | **$** |
|---|---|
| Boat-related expenditure (e.g., maintenance, insurance, equipment, registration fee, boat licence fee) | |
| Vehicle-related expenditure (only those related to fishing in Tasmanian inland waters) | |
| Camping gear | |
| Shack-related expenditure (e.g., maintenance, insurance, council rates) | |
| Fishing gear (e.g., rod, reel, net, fly, lure) | |
| Club membership fees (if you are a member of any angling club) | |

Q7. (a) Compared to the previous angling year, what is your overall satisfaction with this year's fishing experience? (*Please tick one applicable box*)

☐ Very Good ☐ Good ☐ Satisfactory ☐ Poor ☐ Terrible

(b) Please tell us why you think so.

## *Section C: Your most recent recreational fishing day*

*We would now like you to think about*

- ***the most recent day*** *you spent recreational fishing*
- *in* ***Tasmanian inland waters***
- *for* ***the 2021-2022 angling season****.*

---

Q1. Which month and year was your most recent fishing day?

Month: __________________ Year: __________________

Q2. Where did you go fishing on that day?
(*Please list all the locations you went*)

_______________________________________

_______________________________________

_______________________________________

Q3. How many hours did you spend fishing that day?

☐ hours

Q4. Were you fishing in a competition on that day?

☐ Yes ☐ No

Q5. Were you fishing in a club event on that day?

☐ Yes ☐ No

Q6. Which fishing methods did you use on that day?
(*Please tick all applicable boxes*)

☐ Fly fishing ☐ Lure fishing ☐ Bait fishing

Q7. (a) How would you describe the overall satisfaction with your fishing experiece on that day?

(*Please tick one applicable box*)

☐ Very Good ☐ Good ☐ Satisfactory ☐ Poor ☐ Terrible

(b) Please tell us why you think so.

Q8. (a) Did you use a boat or kayak for fishing?

☐ Yes ☐ No

(b) (*If Yes*) What was the boat-related expenditure you ***personally*** had to spend for the last day's fishing?

| **Item** | **$** |
|---|---|
| Fuel for boat | |
| Boat/kayak rental fee | |
| Other (*please specify*) | |

Q9. (a) How many fish did you catch on that day?

| **Species** | **Number of fish you caught** |
|---|---|
| Brown trout | |
| Rainbow trout | |
| Brook trout | |
| Atlantic salmon | |
| Other species | |

(b) Thinking about the number of fish you caught on that day, how would you describe the quality of your fishing experience?
(*Please tick one applicable box*)

☐ Very Good ☐ Good ☐ Satisfactory ☐ Poor ☐ Terrible

Q10. (a) Was it a day trip or was it part of a multi-day trip where you stayed away from home overnight?

☐ Day trip ☐ Multi-day trip (_________ days)

(b) Thinking about all of the things you did during the trip, how important fishing was for you?

☐ Most important activity
☐ About same as other activities
☐ Less important than other activities

Q11. How many other persons went on the trip with you?

☐ persons

Q12. (a) What was the mode of travel within Tasmania?

☐ Own car ☐ Rental car ☐ Other

___________________________

(b) Approximately, what distance did you travel to get to your fishing location on that day?

_________________ km (one-way)

(c) What was the travel cost that you ***personally*** had to spend?

| **Item** | **$** |
|---|---|
| Fuel for car | |
| Car rental fee | |
| Other (*please specify*) | |

Q13. Thinking about your last fishing trip, what was the cost of all other items that you ***personally*** had to spend for the last day's fishing?

| **Item** | **$** |
|---|---|
| Bait, lure, fly | |
| Food, drink, and ice | |
| Accommodation | |
| Guide | |
| Tour package | |
| National parks fee | |
| Other (*please specify*) | |

Q14. Bearing in mind that you may have many calls on your income, if it had cost you an extra $10 for your fuel on the last day's fishing, would you still have gone fishing on that day?

☐ Yes ☐ No ☐ Unsure

Q15. The angling licence fees were frozen for 4 years from the 2017-18 season. These fees have been used to manage and support recreational fishing in Tasmanian inland waters.

If it had cost you an extra $4 for your licence fee, would you still have gone fishing in the last season?

☐ Yes ☐ No ☐ Unsure

## *Section D*
## *Lastly, please tell us about yourself*

---

Q1. How old are you?

☐ <20 ☐ 20-29 ☐ 30-39
☐ 40-49 ☐ 50-59 ☐ 60-69 ☐ 70+

Q2. What is your gender?

☐ Male ☐ Female ☐ Other ☐ Prefer not to say

Q3. Postcode of your residence? ☐☐☐☐

Q4. What is the highest level of education you have completed?

☐ Primary school
☐ Secondary school (Years 7-10)
☐ College/senior secondary school (Years 11-12)
☐ Vocational education and training (VET)
☐ Higher education

Q5. What is your employment status?

☐ Employed (full-time) ☐ Employed (part-time)
☐ Unemployed ☐ Retired
☐ Other
(*specify*)______________________________________________

Q6. What is your annual income (before tax)?

☐ Less than $20,000 ☐ $20,000 - $39,999 ☐ $40,000 - $59,999
☐ $60,000 - $79,999 ☐ $80,000 - $99,999 ☐ More than $100,000

Finally, do you have any other comments regarding the Tasmanian inland fishing or about this survey?

Thank you for your participation