Inland Fisheries Service

RECREATIONAL FISHERIES REPORT

Fisheries Performance Assessment
Technical Report
Tooms Lake – April 2022

Inland Fisheries Service

CONTENTS

Technical Report Tooms Lake 2022

Title:	Fisheries Performance Assessment, Technical Report, Tooms Lake – April 2022
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1. Introduction

Tooms Lake is an artificial impoundment situated 36 km northeast of Oatlands. The lake is used as a water supply for Campbell Town as well as providing irrigation water for downstream users. The waters of the lake inundate a natural marshland covering an area of 6.6 square km. Tooms Lake is subject to annual drawdowns that affects water turbidity. The lake catchment is subject to highly variable inflows that influence water quality and trout population dynamics. This presents challenges in managing the fishery from season to season.

Surveys of the trout population have previously been undertaken during 2003, 2015 and 2021.

2. FPA Survey Methodology

2.1. In-Lake Population Survey

During 20-21 April, the Service conducted an in-lake survey at Tooms Lake to examine the trout population with the primary aim of determining whether there was natural recruitment occurring for brown trout.

Using the Smith-Root boat mounted electrofishing unit the lake was electrofished around the shoreline. All sighted fish were netted and stored in the boat's live well for later processing. All fish were released after processing their length and weights.

A total of 12 coarse mesh fyke nets were set in various locations near the inflows of Jimmys and Alfreds creeks. The nets were set overnight, and the resulting catch weighed, measured and released.

2.2. Annual Postal Survey

Since 1986, the Inland Fisheries Service (IFS) has conducted a postal survey seeking information about anglers' catches. The survey comprises a form sent to around 5,000 anglers of all licence categories asking set questions about their angling (catch of trout) for the past season. Information on catch per day, harvest and angling effort is collated and analysed. This provides a long-term overview of individual fishery performance in addition to fishing effort. In this report, only records post year 2000 are analysed.

2.3. Stocking Database

The IFS keeps electronic records of fish stocking within public waters dating back to 1980. These records set out information on location, date of stocking, species, age, origin and stock type, in addition to some length/weight data and comments e.g., denoting tagged fish. In this report, only records post year 2000 are examined.

2.4. Analysis Methods

Condition Factor was calculated using the basic formula of $K=10^5 \times weight/length^3$. This provides a generalised result that can be used to compare other fish and fisheries. Condition Factor categories assigned to each level of condition i.e. poor, fair, good or excellent, are reflective of an individual fish or population at a particular time within the reproductive cycle and will therefore change during this cycle e.g., high during peak spawning condition. The short comings of Condition Factor are acknowledged but are used for relative comparisons only. Categories are indicative and may not necessarily reflect the perception of anglers in general.

3. Results

3.1. In-Lake Population Survey – Brown Trout

During 20-21 April, the Service conducted an in-lake survey at Tooms Lake to determine if natural recruitment was occurring. The length, weight and condition of all fish was assessed.

CPUE

The CPUE for electrofishing at a total shock time of 17,640 seconds was equivalent to 3.1 fish per hour. One overnight (20 hours) set of 12 coarse mesh fyke nets yielded four brown trout giving a CPUE of 0.33 fish per net

Weight and Length Information

Of the 19 brown trout captured, all were weighed, measured. This total consisted of six females, seven males and six of undetermined sex. Table 1 shows the summary statistics for these fish. The mean weight for all brown trout captured was 938 g with an average length of 416 mm. The average Condition Factor (K) was 1.09. On average, males weighed 395 g more than females, with female fish in marginally better condition compared to males. However, given the low numbers of fish captured this does not have any statistical meaning.

The six fish of undetermined sex were all less than 350 mm. This puts them in a distinctly different size/age class from the rest of the brown trout caught during the survey. The Condition Factor (K) of these fish was on average in the 'good' category and better than the longer/older fish.

Table 1: Length, weight and Condition Factor for all fish, male, female and indetermined sexes.

Grouping	Measurement	Mean	Minimum	Maximum
All fish (n = 19)	Length (mm)	416	229	568
	Weight (g)	938	110	2,350
	Condition Factor (K)	1.09	0.80	1.14
Male (n= 7)	Length (mm)	504	470	568
	Weight (g)	1,400	860	2,350
	Condition Factor (K)	1.06	0.81	1.28
Indeterminate (n=6)	Length (mm)	262	229	340
	Weight (g)	232	110	550
	Condition Factor (K)	1.13	0.90	1.40
Female (n= 6)	Length (mm)	468	458	481
	Weight (g)	1,105	770	1,310
	Condition Factor (K)	1.08	0.80	1.35

The length vs weight plot (Figure 1) and the length frequency plot (Figure 3) show the distinct separation of the six smaller fish from those where sex was determined.

A comparison to the 2003, 2015 and 2021 FPA survey results is shown in Figure 2. The numbers caught during this survey are comparatively low compared to the previous surveys. However, there is some indication in an improvement in weight for length and therefore condition in comparison to the 2021 survey.

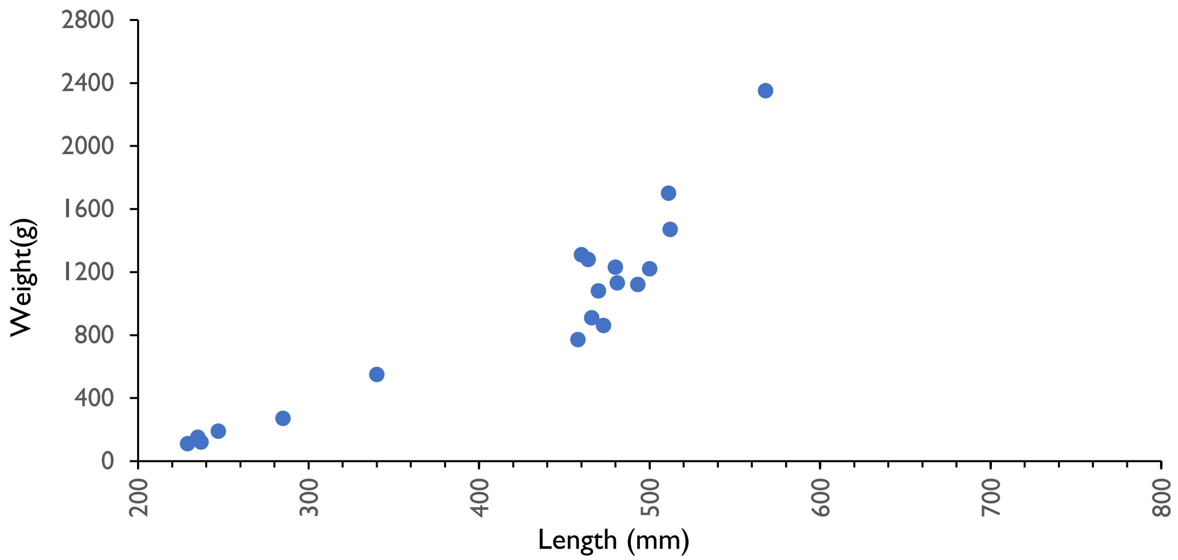

Figure 1: Length/weight scatterplot for brown trout 2022.

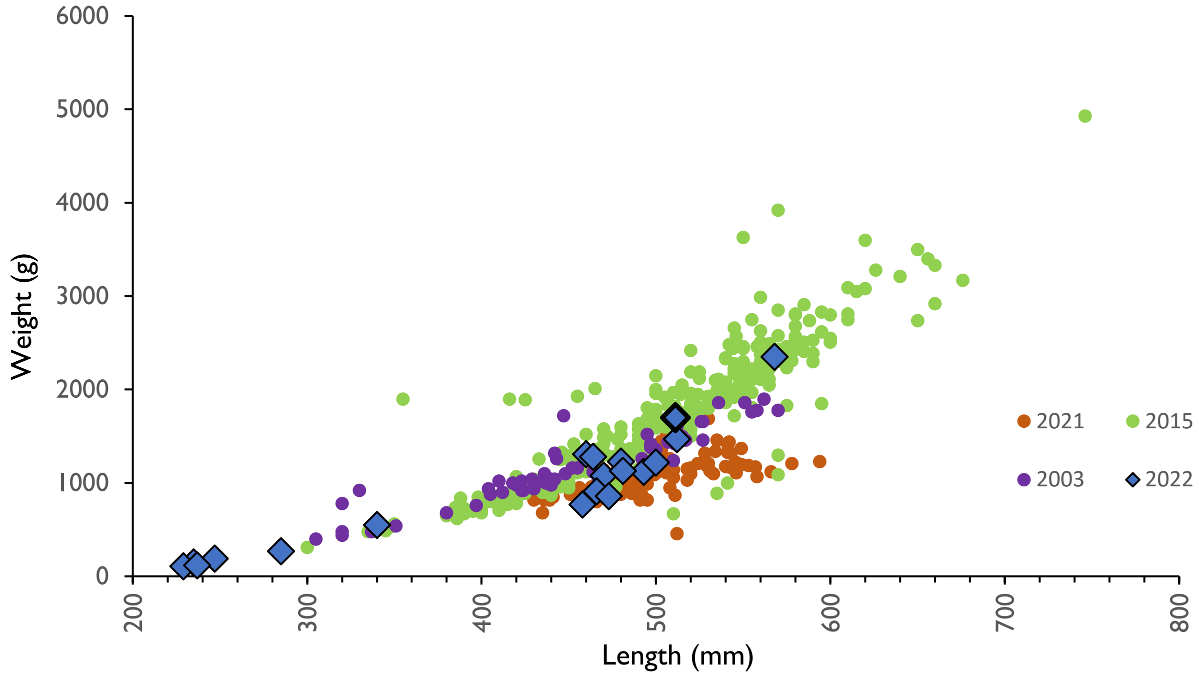

Figure 2: Length/weight scatterplot for brown trout showing 2003, 2015, 2021 and 2022 FPA survey data.

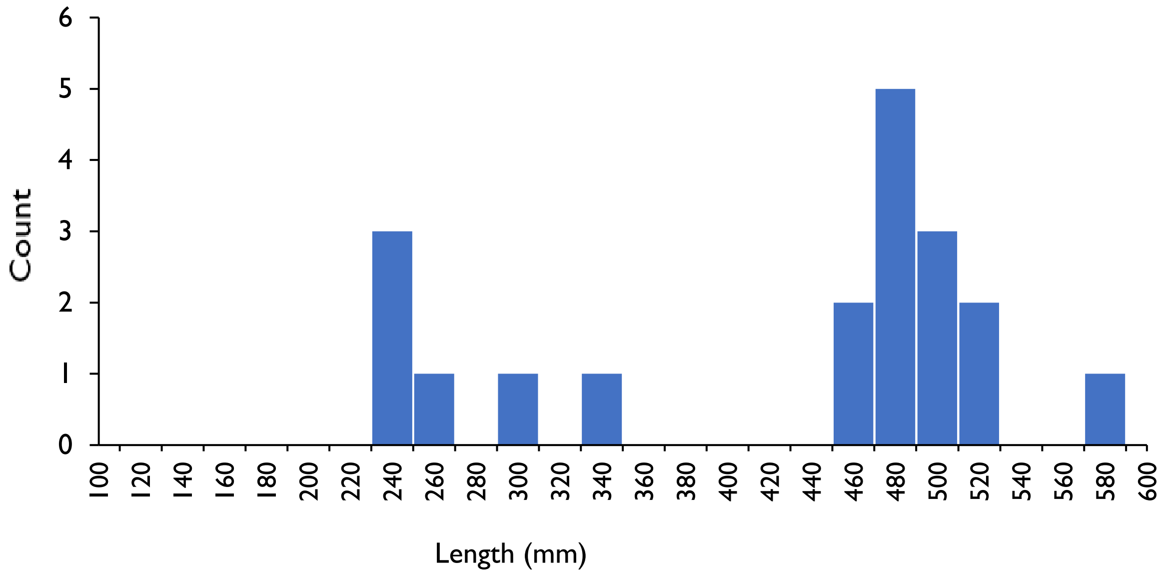

Figure 3: Length frequency plot for brown trout 2022.

Although the number of fish captured was low, there is at least one cohort of fish below 350 mm in length present in the result of this survey. The remaining fish represent several cohorts above 450 mm. Again, because of the low numbers of fish caught there is not a clear indication how many size (age) classes of fish there are.

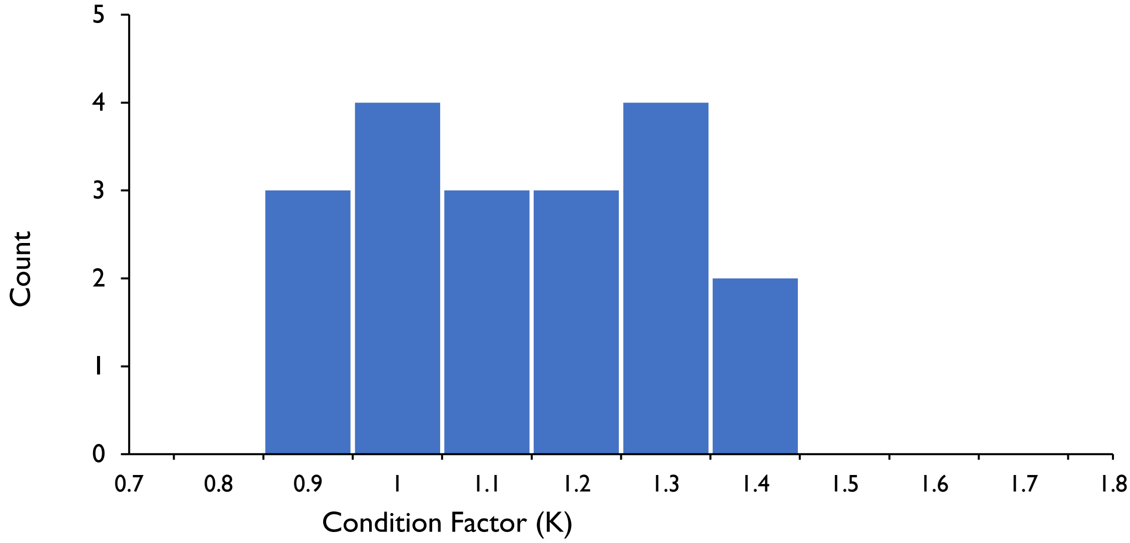

Figure 4: Condition Factor (K Factor) for resident brown trout 2022.
Condition Factor categories: <1.1 = poor, 1.1 – 1.3 = fair, 1.3-1.5 = good, >1.5 = excellent

The average condition of brown trout was 1.09 K (see Figure 4). This is an improvement on the results of the 2021 survey where the average condition was 0.87 K, but still in the 'poor' category. The results show a similar range of Condition Factor values as seen in the 2003 and 2015 surveys (see Figure 5) with 'poor', 'fair' and 'good' conditioned fish amongst the catch. However, the low numbers of fish caught means that no conclusion on the condition of the total population should be made from these results.

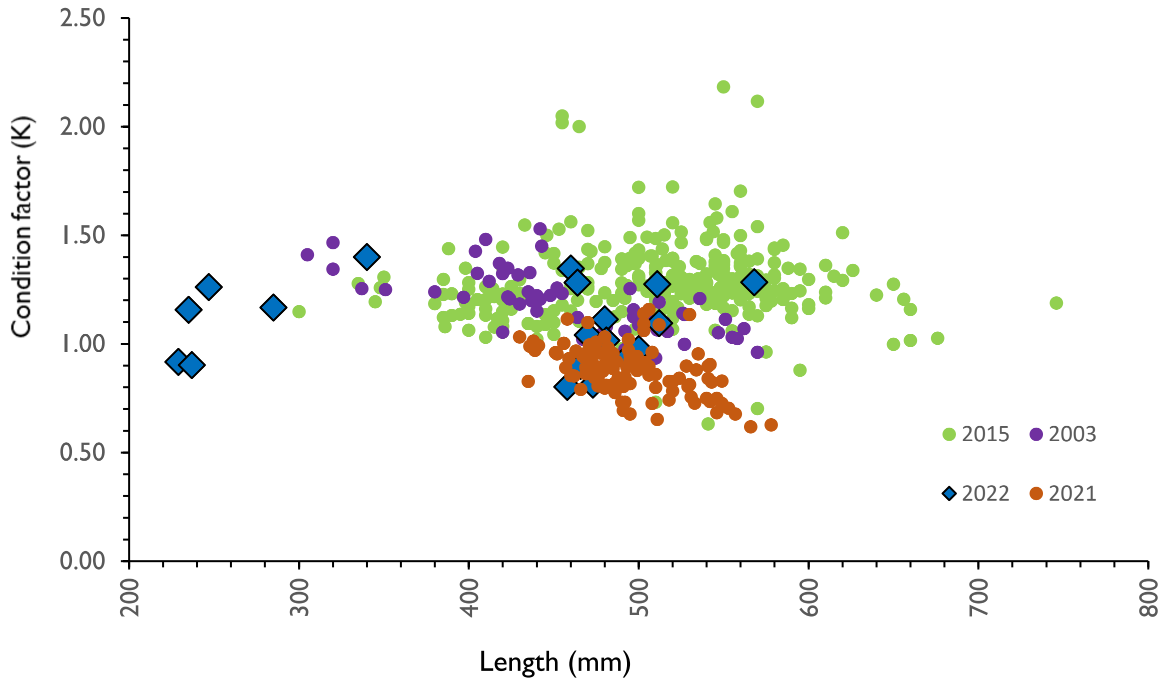

Figure 5: Comparison of Condition Factor by length of brown trout, for 2003, 2015, 2021 and 2022 surveys.

3.2. In-Lake Population Survey – Rainbow Trout

Weight and Length Information

With only four rainbow trout caught during the survey no conclusions regarding growth can be made from the results.

As two of the fish were below 400 mm and two above 500 mm these fish represent distinct cohorts from separate stocking events. The stocking of rainbow trout at an average weight of 380 g in July 2021 would account for the smaller of these two cohorts. The two larger fish would have originated from stocking of rainbow trout in 2020 or 2019, that latter of which were 500 g.

Table 2: Length, weight and Condition Factor for rainbow trout captures 2022.

Grouping	Measurement	Mean	Minimum	Maximum
Rainbow trout (n= 4)	Length (mm)	438	342	522
	Weight (g)	793	400	1,220
	Cond Factor (K)	0.91	0.76	1.02

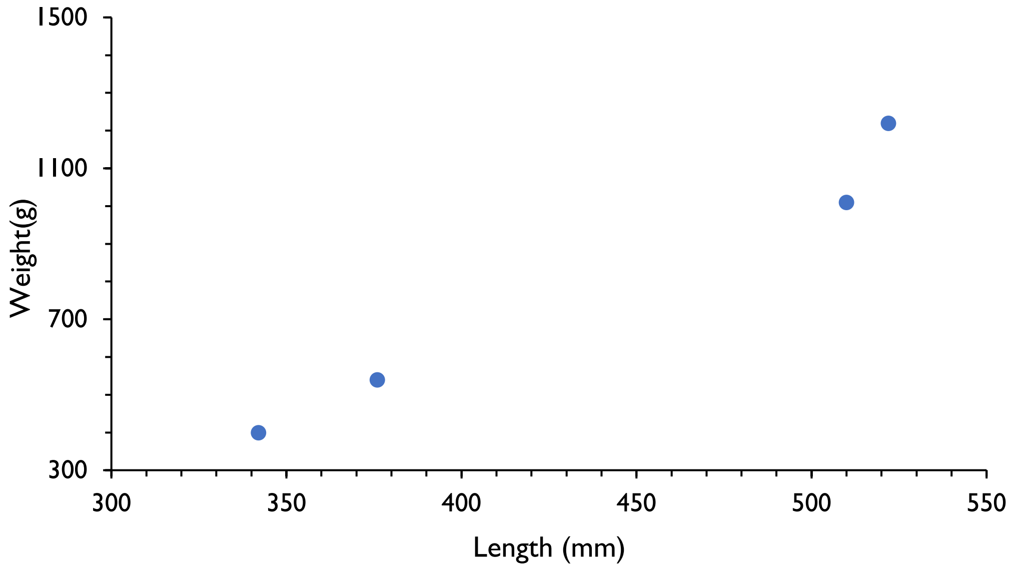

Figure 6: Length/weight scatterplot for rainbow trout caught during the 2022 survey.

4. Angler Postal Survey

The results of the Angler Postal Survey (APS) for Tooms Lake between the 2000-01 to 2021-22 angling seasons, were generated from an average of 21 respondents per season. Between 2000 and 2005 reply rates were high, ranging between 74 to 102 respondents. Reply rates were low during 2007-08 and 2008-09 (10 & 5 respondents respectively) and 16 respondents for 2020. For the two most recent seasons 2020-21 and 2021-22, for which the last two FPA surveys occurred, the respondent numbers were mid-range at 45 and 24 respectively.

Total fishing effort (see Figure 9) was very high during the period 2001 to 2006, with a high of 11,686 days fished during the 2001-02 season. This figure fell to a low of 350 days during the 2008-09 season, a period of low lake level. Apart from 2018 to 2020, fishing effort has remained around the long-term average of 6,461 days per season. The total number of anglers fishing this water (see Figure 10) is as expected, reflective of fishing effort, with high numbers during 2001 to 2005 and lows during the 2008-09 and 2019-20 seasons.

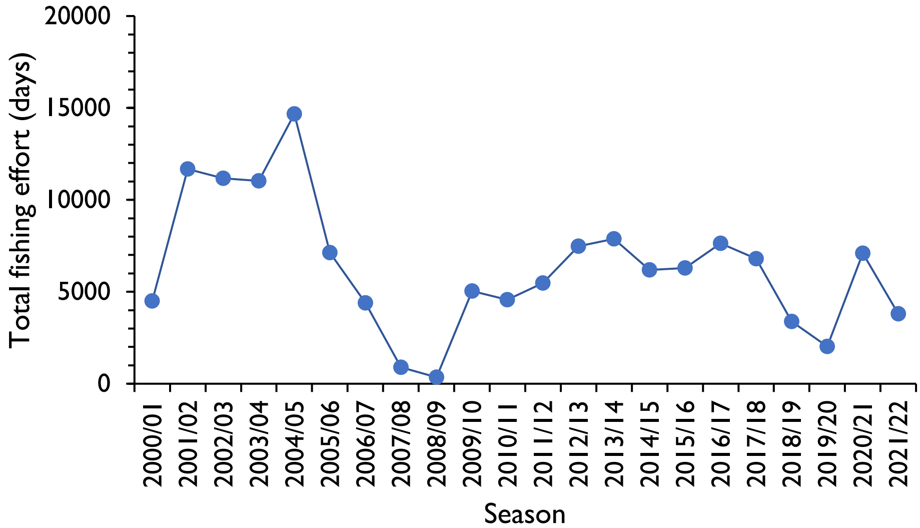

Figure 9: Total fishing effort 2000 - 2022.

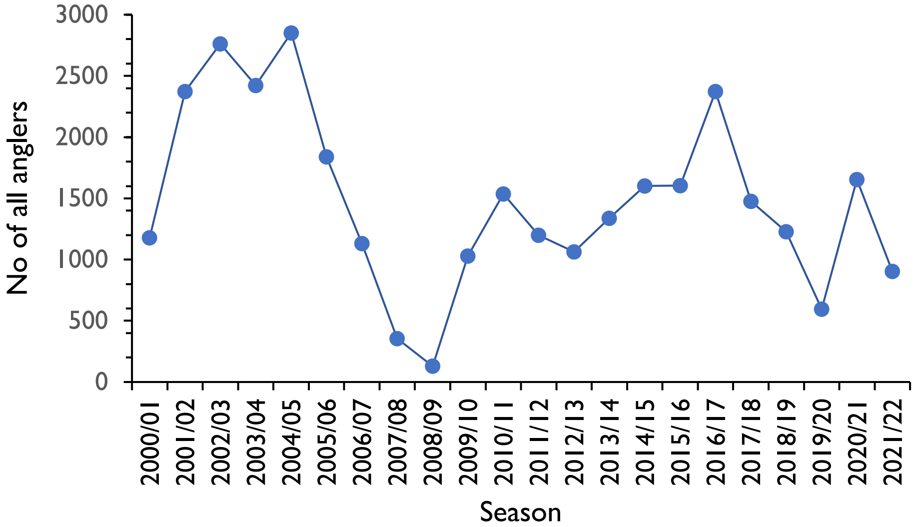

Figure 10: Number of all anglers that fished Tooms Lake each season 2000 - 2022.

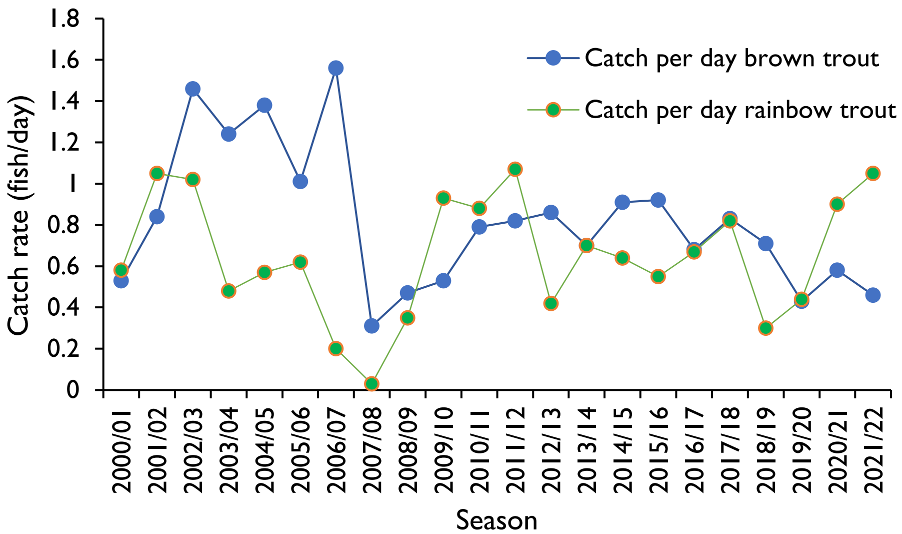

Figure 11: Daily catch rate for brown & rainbow trout 2000 - 2022.

The long-term average catch rate since the 2000-01 season was 0.82 brown trout and 0.65 rainbow trout per day (see Figure 11). Catch rates for brown trout were high during 2002 to 2007 and falling to a low of 0.03 during 2007-08. Catch rates were around average for 2010 to 2019 but decreased to below average from 2018-19 through to the 2021-22 season where is it 0.46 fish per day. Rainbow trout catch rates were over 1.0 fish per day during 2001 to 2003 but fell to low levels at the same time as brown trout during the 2007-08 season. Since this time the catch rate has increased but fluctuated and at present is 1.05 fish per day.

The estimated average annual harvest since the 2000-01 is 5,982 brown trout and 4,531 rainbow trout (see Figure 12). For brown trout this has been as high as 20,271 for the 2004-05 season, with very low numbers during 2007 – 2009. The season of this survey, 2021-22, there were an estimated 1,772 brown trout caught. The maximum harvest for rainbow trout was during 2001-02 with an estimated 12,295 fish caught. During 2007-08 this fell to a low of just 28 rainbow trout. In 2021-22, there were an estimated 4,011 rainbow trout caught.

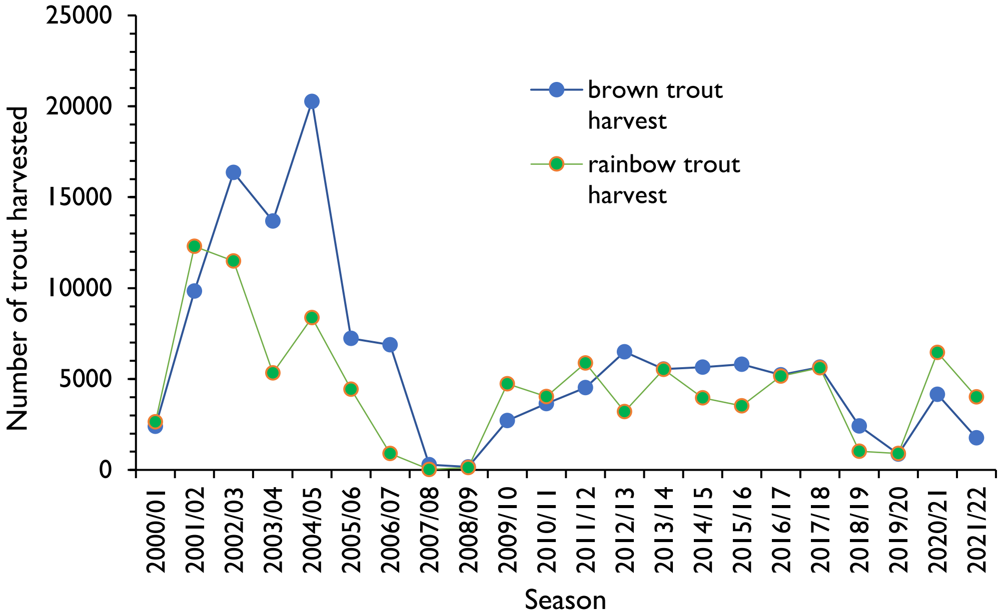

Figure 12: Estimated harvest of brown & rainbow trout 2000 – 2022.

5. Stocking

5.1. Brown trout

There has been no stocking of brown trout since 2019, meaning most fish would be at least six years old based on the assumption that brown trout are at least four years old when transferred from the highland spawning traps.

5.2. Rainbow trout

A stocking of 1,000 rainbow trout at 380 g average occurred after the 2021 survey and before this current (2022) survey. (see Appendix A).

6. Fishery Performance Criteria

Fishery performance criteria for Tooms Lake are set out in the *Tasmanian Inland Recreational Fishery Management Plan 2018 – 28* (TIRFMP) (see Appendix B).

The number of fish caught during this survey was too low to assess the trout population attributes against those set out in the TRIFMP.

7. Additional data or information

7.1. By-catch

No by-catch was recorded for this survey.

7.2. Turbidity Levels

Tooms is a large, relatively shallow lake with depths of between 1 – 3 metres. The lake is subject to significant drawdowns relating to high evaporation and irrigation takes, with high turbidly events occurring during extended periods of low or no inflow, specifically during drought. Typically, turbidity levels range between 20 – 40 NTU (nephelometric turbidity units) with very high events occurring with low lake levels and high winds. The significance of these increases in turbidity and the impacts on the trout population need to be examined, however there is evidence to show that increased levels of turbidly lead to decreasing trout productivity.

At the time of this survey turbidity at the dam wall was 13.4 NTU and at the boat ramp it was 14.0 NTU.

8. Discussion

The results indicate that there are brown trout caught in this survey that cannot be accounted for by previous stocking events. The last stocking of brown trout prior to this survey were adults transferred from Liawenee Canal, yingina / Great Lake, spawning trap in May 2019. The fish averaged 900 g and would have been at least four years old at the time and greater than 400 mm in length. Six brown trout caught during this survey were less than 350 mm in length and therefore not from the 2019 or previous stocking events.

The six smaller brown trout caught in the survey show natural recruitment to the population. The size of these fish indicates they've recruited within the last three years. No assessment of the reliability nor strength of the recruitment of brown trout can be made due to the low total number of fish caught during this survey.

The results of this survey do not provide a statistically robust assessment of the brown trout or rainbow trout populations of Tooms Lake. Overall, the numbers of both species caught were too low for any conclusions to be made about growth or make up of the trout populations.

This survey was undertaken during a period of relatively clear water. This makes it easier to sight fish whilst electrofishing so capture efficiency should have been good. The results show that as a method of quantitative surveying the trout population it is inferior to the box trap and netting methods employed during previous surveys. Fyke nets also showed poor catch rates. The advantage of electrofishing for small fish is that it doesn't require fish to move about for capture. Small fish would have a reduced range and therefore less likely to be caught in box traps that rely on fish movement to be caught.

Electrofishing the lake's shorelines and inflowing streams would be the most effective method of surveying for evidence of natural recruitment. This type of survey would be most suited to backpack mounted electrofishing units. Brown trout fry are likely to drop out of streams into the lake during December in years of continuous stream flows. Rocky shorelines adjacent to stream outflows are likely areas for juvenile brown trout to inhabit in their first year of growth. Targeting these areas during March and April would be the best way to assess recruitment from the previous year's spawning. Surveys would need to be repeated annually to assess relative abundance of recruitment to brown trout stocks.

9. Recommendations

- The inflowing creeks (Jimmys Creek and Alfred Creek) and nearby shoreline to be surveyed using backpack electrofishing equipment during March to April to assess if natural recruitment has occurred. This would only be beneficial if creek flows were maintained over summer months. Successive years of such surveys would be needed to assess relative abundance of natural recruitment.
- For in-lake surveys, box traps should be used in preference to the electrofishing boat and fyke nets. This will provide comparative data that better represents the trout population.

The following recommendations from the 2021 survey remain relevant:

- The fishery is monitored in accordance with the TIRFMP to examine progress toward the fishery management criteria and associated FPA survey schedule.
- The minimum size limit and daily bag limit remain unchanged.
- Future stocking/transfers are only undertaken when the turbidity levels and the seasonal climate outlook are favourable, and the risk of stocking trout is acceptable. Appendix C provides a risk assessment table to plan for trout stocking within turbid lakes.
- Monitoring of future angling effort and harvest is achieved by angler feedback, compliance creel checking and assessment via the digital angler diary and if applicable the APS.
- Lake levels and turbidity are monitored.

10. Appendix

Appendix A: Stocking data Tooms Lake for brown & rainbow trout 2005 to March 2022.

Species	Year	Age	Number	Origin	Stock	Type
Brown trout	2005	Fry	10,0000	IFS – S. Ponds	Wild	Diploid
Brown trout	2010	Fingerling	2,500	IFS - New Norfolk	Wild	Diploid
Brown trout	2010	Adult	620	Highland spawning run	Wild	Diploid
Brown trout	2010	Fingerling	20,000	IFS - New Norfolk	Wild	Diploid
Brown trout	2011	Adult	1,000	Highland spawning run	Wild	Diploid
Brown trout	2011	Fingerling	4,000	IFS - New Norfolk	Wild	Diploid
Brown trout	2012	Adult	600	Highland spawning run	Wild	Diploid
Brown trout	2013	Adult	1,080	Highland spawning run	Wild	Diploid
Brown trout	2013	Fry	30,000	IFS - New Norfolk	Wild	Triploid
Brown trout	2014	Adult	2,305	Highland spawning run	Wild	Diploid
Brown trout	2015	Adult (adipose clip)	3,850	Highland spawning run	Wild	Diploid
Brown trout	2016	Adult	420	Highland spawning run	Wild	Diploid
Brown trout	2017	Adult	1,200	Highland spawning run	Wild	Diploid
Brown trout	2018	Adult	1,000	Highland spawning run	Wild	Diploid
Brown trout	2019	Adult	1,100	Highland spawning run	Wild	Diploid
Rainbow trout	2005	Yearling	3,000	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2006	Fingerling	22,500	Commercial Hatchery	Domestic	Diploid
Rainbow trout	2009	Fingerling	5,500	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2009	Yearling	3,000	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2010	Fingerling	10,000	IFS - New Norfolk	Wild	Diploid
Rainbow trout	2010	Yearling	7,500	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2011	Fingerling	8,000	IFS - New Norfolk	Wild	Diploid
Rainbow trout	2012	Yearling	6,000	IFS - New Norfolk	Wild	Triploid
Rainbow trout	2012	Adult	300	Commercial Hatchery	Domestic	Diploid
Rainbow trout	2012	Fry	10,000	IFS New Norfolk	Wild	Diploid
Rainbow trout	2013	Fingerling	6,000	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2014	Fingerling	46,330	Commercial Hatchery	Domestic	Triploid

Rainbow trout	2015	Nil	Nil	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2016	Fingerling	15,000	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2017	Yearling/Adult	7,372	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2018	Adult	1,500	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2019	Adult	1,500	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2020	Adult	500	Commercial Hatchery	Domestic	Triploid
Rainbow trout	2021	Adult	1,000	Commercial Hatchery	Domestic	Triploid

Appendix B: Performance criteria for Tooms Lake, as listed in the Tasmania Inland Recreational Fishery Management Plan 2008 – 2018 (TIRFMP)

Water	Average weight (g)	Catch rate (fish per day)	Large fish (percentage)	Population size (BT) at full lake level
Brown trout	> 400mm 1.2kg $_{+/-0.1}$	1.0 +/-0.2	> 500mm 30%	15 000 – 22 000 *
Rainbow trout	> 400mm 1.2kg $_{+/-0.2}$	0.5 +/-0.1	> 500mm 15%	

Appendix C: Stocking risk assessment, relating to turbidity and seasonal climate outlook relating to rainfall.

		Seasonal climate outlook (rainfall)				
		Well above average	Above average	Average	Below average	Well below average
Turbidity range (NTU)	0 – 20	Low	Low	Low	Moderate	Moderate
	20 - 30	Low	Low	Moderate	Moderate	High
	30 - 50	Low	Moderate	Moderate	No stocking	No stocking
	> 50	Moderate	Moderate	High	No stocking	No stocking

- Low – normal stocking levels.
- Moderate – restricted stocking levels.
- High – highly restricted stocking levels or no stocking.
- No stocking – no stocking until risk levels fall to moderate or low risk levels.