

Inland Fisheries Service

Fisheries Performance Assessment Technical Report

Big Waterhouse Lake October 2024



Inland Fisheries Service

Big Waterhouse Lake FPA October 2024

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Introduction

Big Waterhouse Lake is a coastal lake located in the Waterhouse Conservation Area in northeast Tasmania, situated about 50 km east of Bridport. The lake covers an area of approximately 110 hectares when full. It is a permanent, deepwater lake, fed by Sheepwash Creek. The lake's outflow is via a creek that breaches the adjacent dunes, draining into Bass Strait. However, this connection can be temporary and is influenced by rainfall and lake levels. The area is known for its wetland communities, extensive dune systems and heathland and is popular for camping and fishing.

As a trout fishery, Big Waterhouse Lake is considered a minor fishery, but it is one of the more well-known waters in the area, along with Blackmans Lagoon. The lake was stocked as early as 1932 but the frequency of stocking was inconsistent and the presence of other fish species such as long finned eels, sea mullet and sandies led to low fry survival rates. The lake is now stocked regularly with adult brown trout and a mix of yearling and young adult rainbow trout. Anecdotally, and from limited creel records, catches have improved to around one to two fish per day, with fish weighing 1.25 – 2.5 kg. All methods of fishing are permitted i.e. bait, lures, and flies. Due to the heavy weed growth and a shoreline of dense tea tree, using a boat is almost essential to fish it successfully.

Fish surveys of Big Waterhouse Lake are uncommon with the last reported survey completed during June 1985 (Appendix A).

FPA Survey Methodology

In-Lake Population Surveys

During 14 – 16 October 2024, 30 box traps were set each night over two nights (total of 60 box trap sets) (Appendix B). Soak times were between 20–24 hours. All trout captured were recorded as male or female and were weighed and measured (fork length). Fish were released away from the trap site after processing (without being marked).

Prior to the survey, 300 adult brown trout sourced from Tumbledown Creek, Arthurs Lake, were tagged with a distinctive pink tag and released into Big Waterhouse Lake during June 2024. These fish formed the base of a capture-mark-recapture population estimate. Due to the low total catch returns, Chapmans CMR population estimate was used.

At the time of the survey, the Lake water level was high but there was minimal outflow via Lake Creek.

Annual Angler Survey

Since 1986, the Inland Fisheries Service (IFS) has conducted a postal/email survey seeking information about anglers' catches. The survey comprises a form sent to around 4,000 anglers annually 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 characterising fishing effort. In this report, records post 2000 are analysed.

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, stock type and genotype, in addition to length/weight data and comments e.g. denoting tagged fish. This information provides an historical record of supplementary recruitment into individual waters. In this report, records post 2019 are reported.

Angler Creel Data

Each season the IFS staff collect fishing effort and catch data from anglers interviewed at a range of waters. This information is used to examine the catch of trout at individual waters. Once analysed, the summary information is reported as the number of fish caught per day, irrespective if an angler had fished for three or more hours or was continuing to fish. All fish, irrespective of being kept or released were used, including zero catches. In this report, only records from anglers that fished for three or more hours were examined. Additionally, for the purpose of calculating the number of fish captured per day, a day's fishing is deemed to be equal to six hours.

Results

In-Lake Population Survey – Brown Trout

During 14 – 16 October 2024, the IFS conducted an in-lake survey at Big Waterhouse Lake to:

- Determine a catch per unit of effort (CPUE) for brown and rainbow trout
- Examine the length, weight and condition of brown and rainbow trout,
- Assess the population structure of brown trout and,
- estimate the brown trout population size.

CPUE

A total of 47 brown trout were captured from 60 box trap sets, consisting of 30 traps set over two nights, with soak times between 20–24 hours. This resulted in a catch per unit effort (CPUE) of 0.8 brown trout per trap.

Weight and Length Information (brown trout)

Forty-seven brown trout were weighed, measured and sex determined. Seven of these were tagged adult brown trout released into the lake during June 2024.

The catch consisted of 15 females and 32 males. The mean weight was 1,245 g and length of 506 mm (Table 1). The mean condition factor was 0.95 k, with many fish in fair to poor condition. On average, in terms of weight, female fish weighed slightly more than male fish and were in slightly better condition.

Table 1: Length, weight and condition factor for resident brown trout separated by sex, 2024.

Grouping	Measurement	Mean	Minimum	Maximum
All brown trout (n= 47)	Length (mm)	506	310	608
	Weight (g)	1,245	320	1,890
	Cond Factor (k)	0.95	0.53	1.20
Male (n= 32)	Length (mm)	507	321	591
	Weight (g)	1,215	360	1,800
	Cond Factor (k)	0.93	0.53	1.20
Female (n= 15)	Length (mm)	504	310	608
	Weight (g)	1,309	320	1,890
	Cond Factor (k)	0.99	0.67	1.18

The length/weight plot (Figure 1) shows the range of lengths and weights for all brown trout captured and the trend line associated with resident fish and recently tagged and released fish from Arthurs Lake (Tumbledown Creek). Tagged fish while smaller, displayed a stronger growth trend than resident (i.e. past stocked adult fish). Several resident fish displayed poor weight for their recorded length. Most of these poor condition fish were around 505 to 567 mm and weighed 750 – 1,200 g, with the remainder displaying moderately good growth. The potential reasons for this are outlined in the discussion section.

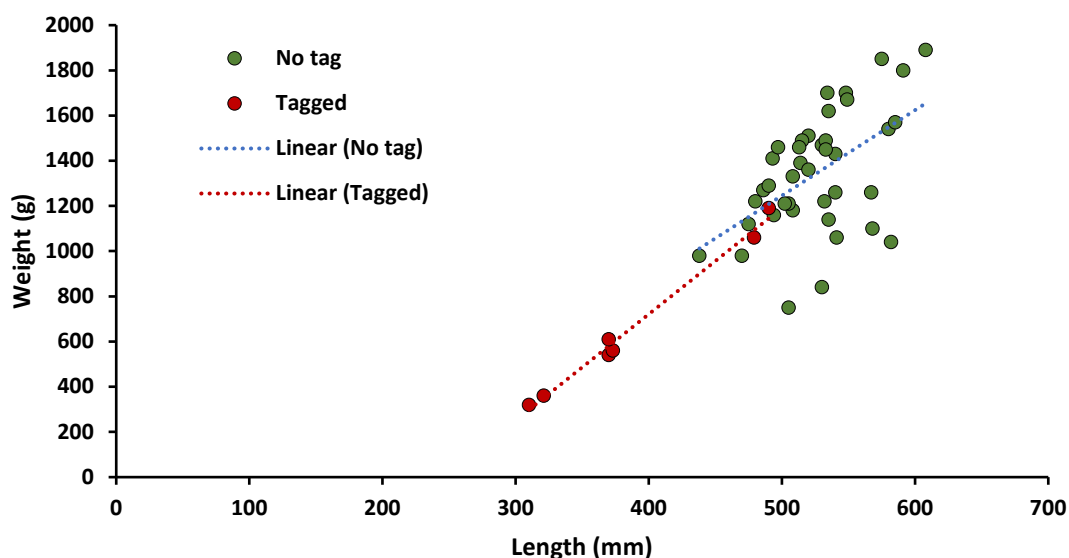


Figure 1: Length/weight plot for brown trout showing tagged and untagged fish with associated trendline.

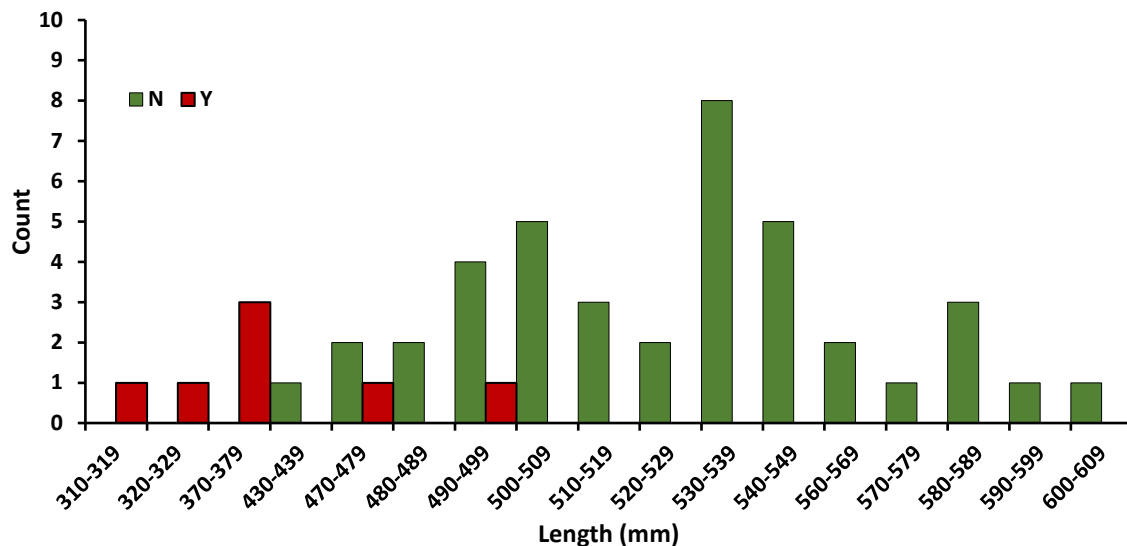


Figure 2: Length frequency for brown trout showing tagged (Y) and untagged fish (N) n=47.

Figure 2 shows the length frequency plot for all brown trout captured, including the seven tagged fish released during June 2024. These tagged fish are identified in the 310 to 500 mm length classes with a modal peak of 370-379 mm. Length cohorts for resident fish are centered around 500-509 mm and 530-539 mm with a maximum length of 608 mm. It is assumed these cohorts related to the past stocking of adult brown trout between 2020 to 2024, plus the 2024 tagged fish.

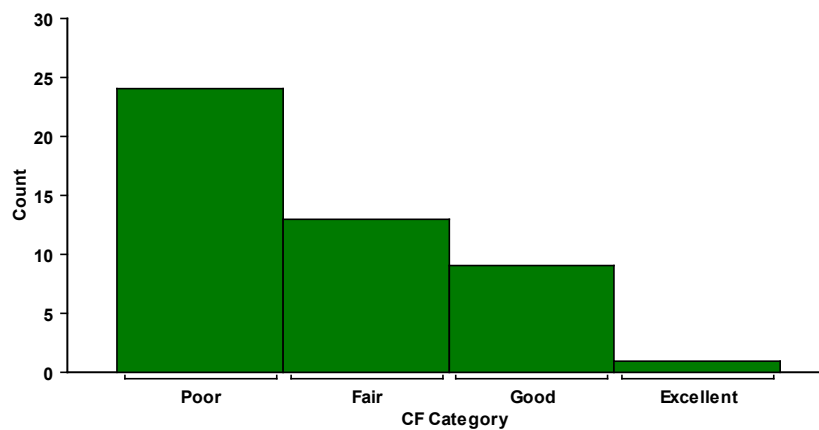


Figure 3: Condition factor category for brown trout.

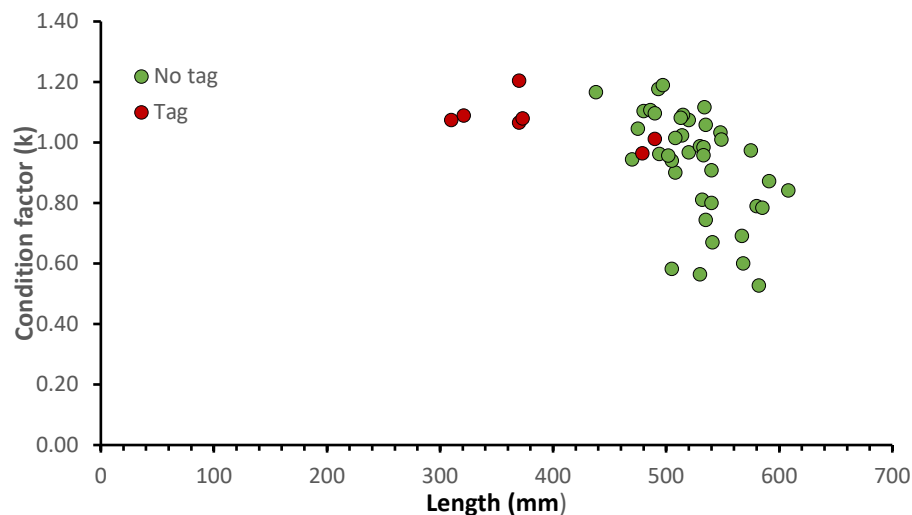


Figure 4: Condition factor (k-factor) for brown trout by length.

The average condition for brown trout from the 2024 survey was 0.95 k with a minimum of 0.53 indicating very poor condition and 1.20 representing fish in excellent condition (Figure 3). There were several fish in the 505-567 mm length range that were in very poor condition (Figure 4). These fish are likely related to a one of stocking event using large fish from Lake Crescent during May 2023 that averaged 3.0 kg (Appendix C).

Population Estimate

To estimate the brown trout population size, a total of 300 adult brown trout sourced from Tumbledown Creek, Arthurs Lake, were tagged with a distinctive pink tag and released into Big Waterhouse Lake during June 2024.

The Chapman estimator for the total population size $N=(R+1)(M+1)(C+1)-1$ was used to estimate the brown trout population. Where: M = The number of individuals initially marked and released; C = The total number of individuals captured over the survey period; R = The number of tagged individuals captured over the survey period.

During the October 2024 survey, 47 brown trout were captured. Of these fish, seven (15 per cent) were tagged. This provided an estimate of the brown trout population at 2,014 (+/- 1,361) fish (Table 2). The estimate of bias was low (i.e. < 4), indicating a significant bias in the population estimate and consequently, a wide range in the upper and lower confidence limits 743 - 2,869 for the population estimate.

Table 2: Chapmans, Capture-Mark-Recapture (CMR) population estimate for Curries River Reservoir October 2024.

Parameter	Result
Total fin clipped fish released (M)	300
Total captures (C)	47
Total marked recaptures (R)	7
Population estimate: $MC/R = N$	1,806
Standard error	542
Lower and Upper 95% CI limits	743 – 2,869
Estimate bias level: $MC/4N =$	2.0 (>4 acceptable bias)

Rainbow Trout

Over the two days of trapping, just one rainbow trout was captured. This fish was 360 mm length and 500 g, possibly from a stocking of 250 adult triploid rainbow trout during June 2024.

Annual Angler Survey

The results of the Angler Catch Survey (AAS) for Big Waterhouse Lake are generated from a small number of respondents per season. Consequently, the results are highly variable and therefore need to be interpreted with caution.

The fishing effort (i.e. number of days per season fished by all anglers at this water), is highly variable with low numbers of anglers fishing the lake each season (Figure 5).

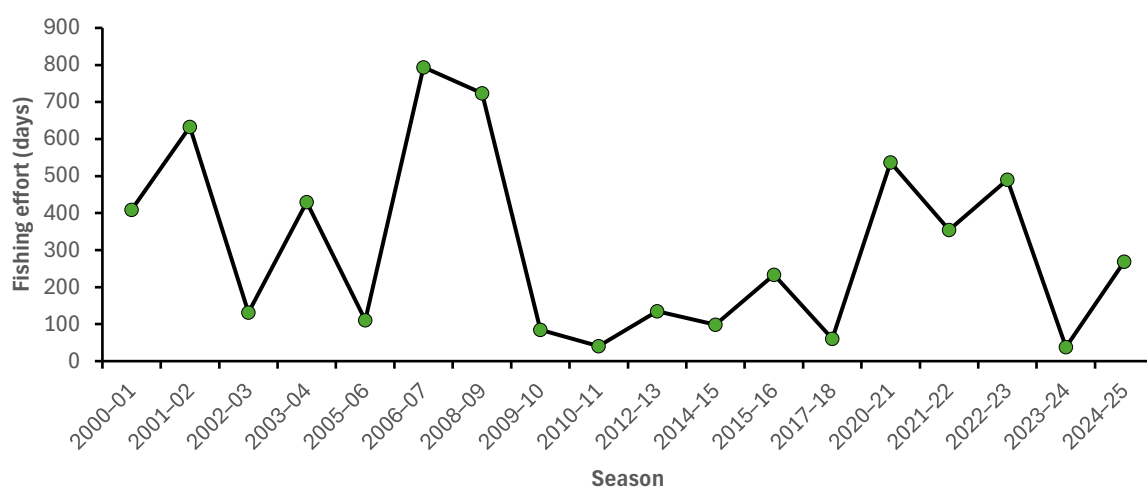


Figure 5: Estimated total angling effort days in Lake Crescent 2004 - 2024

Catch rates for brown and rainbow trout were generally variable (Figure 6), with the low survey response rate biasing results. However, since 2020-21, this water has been reasonably popular with anglers, with catch rates for brown trout between 0.7 - 1.1 fish per day. The daily catch rate for rainbow trout has since 2021-22, declined to low levels. This result is related to the reduced number of rainbow trout stocked since 2020. Conversely, since 2020, adult brown trout have been consistently stocked, producing a more productive fishery for anglers.

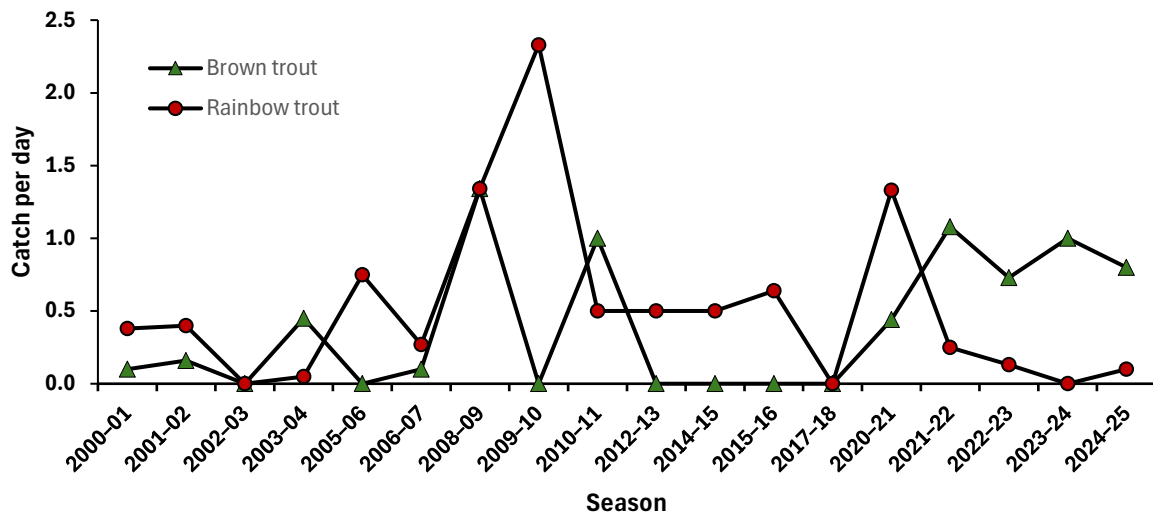


Figure 6: Daily catch rate for brown and rainbow trout 2004 - 2024.

Angler Creel Data

The IFS systematically collects fishing effort and catch data directly from anglers while they are undertaking compliance patrols. This provides real time information on catch rates for individual fisheries.

Because Big Waterhouse Lake is considered a minor fishery, angler participation is low. Consequently, creel data collection and compliance patrols are mostly incidental. Only a small dataset of 9–14 records has been collected each season since 2022–23 (see Appendix D).

When analysis of this data is restricted to anglers who fished for three or more hours per day, the daily catch rate for brown trout is between 0.2 and 1.2 fish per day. The catch rate for rainbow trout is significantly lower. It is also worth noting that catch and release rates at this lake are typically low.

Stocking

Brown Trout

Over the past five years 2020-24, 1,488 adult brown trout were stocked into Big Waterhouse Lake, with most weighing 360 – 800 g. The exception to this was a release of 32 adult brown trout averaging 3 kg. These fish were sourced from a fish salvage at Lake Crescent during May 2023 (Appendix C).

Rainbow Trout

Over the past six years, a total of 1,900 adult and 1,200 yearling rainbow trout were stocked into Big Waterhouse Lake. The numbers stocked vary according to the size of the fish, with between 200 to 600 fish stocked in most years (Appendix C).

Additional Data or Information

During the survey, a range of other fish species were captured, this included long and short finned eels, Pygmy perch, sandies, common galaxias and sea mullet.

Discussion

In comparison to the CPUE result of 3.6 fish per trap recorded during the 2019 Blackmans Lagoon FPA survey, the CPUE for Big Waterhouse Lake was significantly lower at 0.8, indicating a reduced abundance of brown trout. However, based on creel surveys and limited annual catch data, the overall catch rate for brown trout appears to be holding steady in recent years. This improvement is linked to the consistent stocking of adult brown trout sourced from several highland spawning traps. Once stocked, depending on conditions, these fish generally grow relatively slowly but maintain good condition, provided they are not introduced as large individuals, such as the 32 fish transferred from Lake Crescent in 2023. A number of brown trout during the survey were in poor condition, with several in very poor condition. These very poor condition fish are likely to be the brown trout salvaged from Lake Crescent (average 3.0 kg) and transferred to Big Waterhouse Lake. Given the growth of resident fish is generally slow, these large fish have been unable to maintain condition.

An interesting observation from comparing resident brown trout with those tagged and released in June 2024 is that the resident fish exhibited slower growth than their counterparts sourced from Arthurs Lake. This disparity may be linked to recent changes in salinity levels in Big Waterhouse Lake, as well as potential competition with other fish species. Notably, a 1985 fishery assessment also identified these factors (see Appendix A). During the current survey, a diverse range of both freshwater and marine species were recorded, including long and short-finned eels, pygmy perch, sandies, common galaxiids, and sea mullet.

Fishing effort at Big Waterhouse Lake remains low, which has resulted in a correspondingly low harvest of brown trout. Nevertheless, the annual stocking of 200–300 adult brown trout continues to support a viable recreational fishery.

While rainbow trout represent a minor component of the Big Waterhouse fishery, their supplementary stocking contributes to species diversity and enhances the angling experience, even though they are not critical to the fishery's overall success.

Recommendations

- Fishery management criteria are established for Big Waterhouse Lake.
- No changes to current regulations are required.
- To be stocked biennially with around 250-300 adult brown trout sourced from highland spawning traps, with no fish over 1.5 kg used.
- To be stocked annually with 250 adult rainbow trout or yearling equivalent.
- All future stockings are to consider the potential for high or low salinity episodes within the lake and the long-term implications for trout growth and survival.
- Future angling effort and harvest are monitored through angler feedback, creel checks, and the annual angler survey.
- Growth of tagged brown trout released during June 2024 are monitored during creel checks.

Appendix

Appendix A: Survey report summary for Blackmans Lagoon and the Waterhouse Lakes 1984.

SURVEY OF BLACKMANS LAGOON AND THE WATERHOUSE LAKES

by Wayne Fulton and Stuart Chilcott,
Scientific Officer and Research Assistant, Inland Fisheries Commission.

Introduction

The north-eastern part of the State is relatively remote from the major still-water trout angling areas of Tasmania's Central Plateau. Consequently, there is considerable interest in the trout fishing available locally. Blackmans Lagoon, Big Waterhouse Lake and Little Waterhouse Lake near the coast are known to support very large numbers of invertebrate animals and should provide a good environment for trout production.

However, Northern Tasmanian Fisheries Association annual reports over the past decade generally indicate that angling has been disappointing. The Scottsdale Branch of the NTFA has also expressed concern over these waters and has requested that their trout populations be investigated.

Blackmans Lagoon covers an area of 20-25 hectares, depending on water level. In recent years this has been quite low and emergent water weeds have been a significant problem. Recent efforts by the Scottsdale Branch to supplement the catchment of this lagoon should keep the water level higher in future and reduce the weed problem.

Little Waterhouse Lake is the smallest of the three waters and it also has a considerable amount of emergent weed which provides excellent cover and a source of food for trout.

Big Waterhouse Lake covers an area of approximately 130 hectares and is open to the sea via Lake Creek. Large areas of weed considerably reduce the fishable area but provide good conditions for fish growth. The salinity of this water at the time of sampling was 5 ppm which is regarded as brackish.

Stocking History

The stocking records for these three waters are given in Table 1. Earlier records show that the two Waterhouse lakes were first stocked in 1932 whilst Blackmans Lagoon was initially stocked in 1955.

Year	Blackmans Lagoon	Little Waterhouse Lake	Big Waterhouse Lake
1967	3000 R	1820 B	
1968	5000 R		
1969	50000 R	5500 B	
1970			
1971	5000 R		45983+
	8000 B*		
1972	220000		420000
1973	100000		405000
1974			
1975	50130++	1800**	110000
1976	50000		
1977	50000		
1978	39000		
1979	52000	50000 R	
1980	10000	10000 R	
1981	20000		
1982			
1983	20000	20000 R	
1984	70000	15000	

Table 1: Stocking history of Blackmans Lagoon, Little Waterhouse Lake and Big Waterhouse Lake since 1967. Figures indicate brown trout fry unless indicated, viz. R: Rainbow trout; B: Brook trout; *: fingerlings; **: yearlings; +: included 130 fish electrofished from rivers; ++: included 983 wild fish transferred.

Big Waterhouse Lake has received both brown and rainbow trout whilst both these

species as well as brook trout have been placed in the other two waters at various times.

Methods

A survey of the trout populations in these waters was carried out using gill nets on 30-31 January 1985. The objective was to make some assessment of the status of trout stocks in these waters.

Water	Species		Average Wt. (g)	Range of Wt. (g)
Blackmans Lagoon	Brown trout	34	1527	751-2554
Little Waterhouse Lake	Brown trout	2	1512	890-2134
Big Waterhouse Lake	Sea mullet	9	1711	1470-2010

Table 2: Catch details for netting survey in north-east Tasmania, 30-31 January 1985.

The scales of the trout were examined to determine their age and growth rates. The results of this analysis showed that trout growth was excellent and comparable to that shown by Lagoon of Islands fish. The details are given in Table 3 below.

Age Class	Mean Weight
1+	751 g
2+	1439 g
3+	1656 g
4+	1970 g

Table 3: Mean weight for age of brown trout from Blackmans Lagoon 30 January 1985.

Variations in weight around the mean of up to 500 g were observed within the 2+ and 3+ age group. Spawning checks were evident in a number of these fish.

The two fish from Little Waterhouse Lake showed a similar growth rate to those in Blackmans Lagoon.

The catch for Big Waterhouse Lake was a surprise, although the presence of sea mullet (*Mugil cephalus*) is probably known to locals. The fish caught were large examples of the species and were all in excellent condition.

The main tributary stream of this water, Sheepwash Creek, was briefly examined for trout spawning potential. It was not flowing at the time although it is known to carry a good volume of water in winter. The creek gradient was low, with little suitable spawning substrate in the area examined. The possibility of constructing a spawning channel by diversion of water appears unlikely but would require further examination before being completely rejected.

Discussion

Blackmans Lagoon is presently carrying a good population of excellent-conditioned fish. This lake has in recent years been extensively stocked with brown trout fry by the Inland Fisheries Commission and also with advanced fry from the Kamona rearing unit operated by the Scottsdale Branch. It is apparent that these efforts are showing dividends.

Catch returns to the angler from this water have not been high, probably due to the fact that there is still an abundant food supply in the lagoon. It should also be remembered that, owing to the size selectivity of the gill-nets used, larger fish than those recorded are also certainly present in this water.

In contrast to Blackmans Lagoon, Little Waterhouse Lake has not been extensively

stocked, having received only 16 800 brown trout since 1967. Some rainbow trout have been released in recent years but reports of catches of these are sparse.

Results

The catch details are given in Table 2 below.

Big Waterhouse Lake has received almost one million trout, including nearly 1 000 adult fish, since 1971. However, when the area covered by this lake is compared to that of Blackmans Lagoon it shows that the latter water has received more than five times as many fish per unit area.

Another factor that has not been considered in previous stocking policy for these waters is the effect of salinity on trout fry. At 5 ppm, Big Waterhouse Lake is approximately twice as saline as Blackmans Lagoon and it is quite likely that this could be limiting the survival rate of hatchery reared stocks.

Big Waterhouse Lake has access to and from the sea as shown by the presence of sea mullet. As well as allowing for migration of trout out to sea it is possible for other migratory fish species to enter the lake. Among these would be predatory species such as the long-finned eel (*Anguilla reinhardtii*) which would further reduce the survival potential of brown trout fry. The sporting potential of some of these other species is also worth considering.



Conclusions & Recommendations

1. The quality and quantity of brown trout in Blackmans Lagoon is being adequately maintained.
2. Little Waterhouse and Big Waterhouse Lakes are apparently understocked.
3. Natural spawning facilities are absent in the two smaller waters and therefore stocks need to be fully maintained artificially.

Appendix B: Box trap set locations, Big Waterhouse Lake, October 2021 (10 sets of 3 traps over two nights, 60 sets in total).



Appendix C: Stocking records for Big Waterhouse – Brown Trout (2020– 2025) (excludes local fish salvages that were minimal).

Species	Date	Number	Age	Weight (g)	Source
Brown trout	27-Jun-22	334	Adult	363	Tumbledown Creek
	22-Jun-21	240	Adult	852	Liawenee Canal
	27-May-21	220	Adult	850	Sandbanks Creek
	26-Jun-20	20	Adult	800	Sandbanks Creek
	26-Jun-20	222	Adult	800	Liawenee Canal
	22-May-23	32	Adult	3000	Lake Crescent (Fish salvage)
	30-May-23	120	Adult	810	Sandbanks Creek
	14-Jun-24	300	Adult (tagged)	466	Tumbledown Creek
Rainbow trout	22-Jul-21	600	Adult	380	Millybrook (HAG)
	26-May-20	1200	Yearling	300	Springfield (HAG)
	5-Jun-19	200	Adult	500	Millybrook (HAG)
	1-Jun-19	400	Adult	500	Millybrook (HAG)
	11-May-23	250	Adult	485	Millybrook (HAG)
	17-Jun-24	250	Adult	360	Millybrook (HAG)
	19-May-25	200	Adult	540	Millybrook (HAG)

Appendix D: Big Waterhouse Lake, angler creel data from the 2021/22, 2022/23 and 2023/24 seasons.

Season	2022-23	2023-24	2024-25
Total Records	12	9	14
Total Records >= 3 hours	11	4	8
Total fishing effort >= 3 hours (hours)	47	20	66
Total fishing effort as days (6 hrs)	8.2	5	11.3
Total number of brown trout captured	10	1	13
Catch per day brown trout	1.2	0.2	1.2
Total number of brown trout released	0	0	5
Total number of rainbow trout captured	0	0	17
Catch per day rainbow trout	0	0	1.5
Total number of rainbow trout released	0	0	6

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