

Inland Fisheries Service Report

Recreational Fisheries Report



Fisheries Performance Assessment Technical Report Woods Lake – October 2018

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I. Introduction

Woods Lake was originally a natural lake that was enlarged in 1911 with the construction of a levee across the upper Lake River. This remained until the establishment of the Arthurs Lake dam in 1962 that resulted in cessation of natural flows into Woods Lake. Consequently, to meet downstream irrigation requirements, a seven metre high rock fill dam was constructed, substantially increasing the size of Woods Lake to around 1 250 Ha.

The lake is an important brown trout fishery with around 4 000 – 5 000 anglers fishing this water per season. It is presently the second most popular freshwater fishery in the State.

Brown trout naturally recruit from the upper Lake River in the section of stream between Woods Lake and the dam at Arthurs Lake. The lake has never been stocked with brown trout. Evidence from this survey and bycatch collected during the annual monitoring for galaxids, suggests consistent annual recruitment maintains a healthy and robust fishery.

The fishery has until 2006, been accessed primarily by a high clearance 4WD track. During 2006-07, this track was upgraded to an all vehicle standard. Fishing effort has since increased substantially and is on average three times the long term average pre 2006.

The Woods Lake fishery is regulated with a minimum fish size limit of 300 mm and a daily bag limit of 5 fish, consisting of only 2 fish over 500 mm. The fishing season opens on the first Saturday in August and closes the Sunday nearest the 30 April in the next year, with the lake open to all methods of fishing.

2. FPA Survey Methodology

2.1. In-Lake Population Survey

During 3-5 October 2018, 80 box traps were set each night for two nights (total of 160 box trap sets) with all habitats around the shoreline surveyed (see appendix A). All fish were identified as female, male or indeterminate/immature and weighed to the nearest 10 grams and measured to the nearest mm (fork length). Captured fish were not marked but were released away from the trap site after being processed. At the time of the survey the lake level was 0.4 metres (737.37msl) from full supply (see appendix B). Weather details during the survey are presented in appendix C.

2.2. Annual Postal Survey

Since 1986, the Service has conducted a postal survey seeking information about anglers' catches. The survey comprises a form sent to ten percent of all categories of anglers, asking set questions about their angling (catch of trout) for the past season. This information is entered into a database and information on catch per day, harvest and angling effort is extrapolated. This provides a long term overview of individual fishery performance in addition to characterising effort. In this report, only records post 2000 are analysed.

2.3. Analysis methods

Condition factor for all fish was calculated using the basic formula of $K=10^5 \times \text{weight}/\text{length}^3$. This provides a basic 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. *NB* Categories are indicative and may not necessarily reflect the perception of anglers in general. Growth equation was generated by fitting a standard linear equation to the \ln for weight against \ln length data.

3. Results

3.1. In-Lake Population Survey 2018

During 3 - 5 October 2018, an in-lake survey was conducted at Woods Lake to examine:

- Catch Per Unit Effort (CPUE) for brown trout,
- population structure and,
- the condition of fish.

CPUE

In total, 368 brown trout were captured from 160 box trap sets. This equates to a CPUE of 2.30 fish per trap. Woods Lake has never been surveyed for trout previously, consequently there are no results to compare this data with.

Weight and Length Information

The total catch consisted of 39% females, 34% males with the remaining 27% being immature or indeterminate fish. Table I shows the summary statistics for these fish separated by sex. On average, male fish were significantly heavier than female fish by around 204 grams.

The average weight for all fish, including immature/indeterminate fish was 724 grams. The average weight for fish over 300 mm was 804 grams, with 88% of the catch being greater than 300 mm length. The average weight of fish over 500 mm was 1.34 kg, with 19% of the catch being greater than 500 mm (see figures 1 & 2).

Grouping	Measurement	Mean	Std Error	Minimum	Maximum
All brown trout (n=368)	Length (mm)	403	5.19	125	603
	Weight (g)	724	22.25	20	2 050
	Cond Factor (k)	0.98	0.01	0.68	1.62
Male (n=124)	Length (mm)	466	6.09	316	603
	Weight (g)	1006	32.96	350	2 050
	Cond Factor (k)	0.96	0.01	0.72	1.62
Female (n=142)	Length (mm)	430	5.82	283	600
	Weight (g)	802	29.20	250	2 000
	Cond Factor (k)	0.97	0.01	0.68	1.43
Immature/ indeterminate (n=102)	Length (mm)	288	6.52	125	389
	Weight (g)	273	13.15	20	640
	Cond Factor (k)	1.03	0.01	0.77	1.48

Table I: Length, weight and condition factor for brown trout separated by sex or immature fish.

The growth of fish appears to be good with all fish showing a consistent increase in length overtime (see figure 1). The linear growth equation parameter of 2.8 is similar to other fisheries eg. Little Pine Lagoon. Moreover, 19 percent of fish had grown to over 500 mm, with these fish not displaying any signs of being underweight. There was however, a significant proportion of fish that recoded a lower condition factor i.e. below 1.0 k-factor (see figure 3).

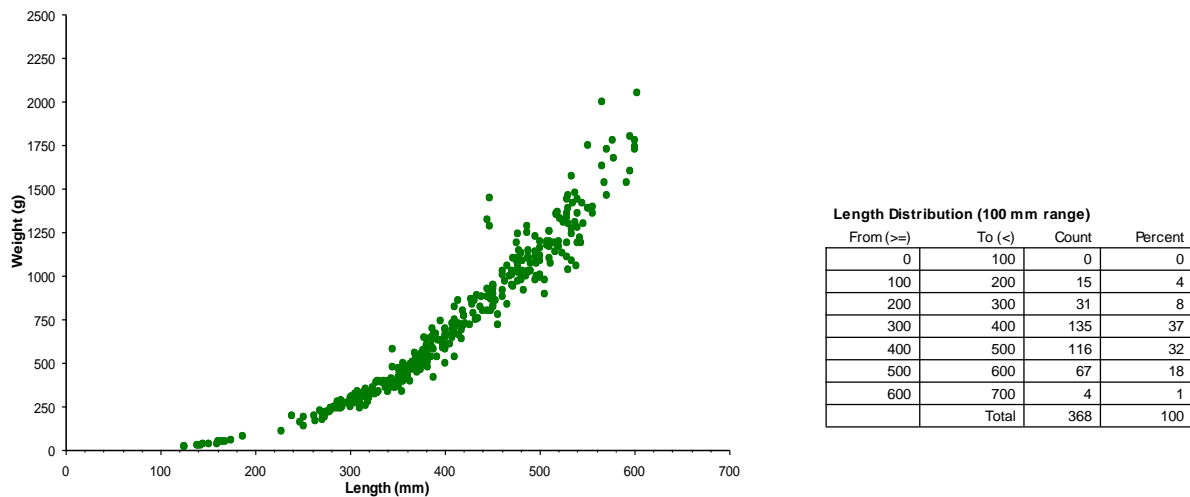


Figure 1: Length/weight regression for brown trout captured 2018 (Linear growth equation $Y = -10.363 + 2.803 * X$; $R^2 = 0.982$)

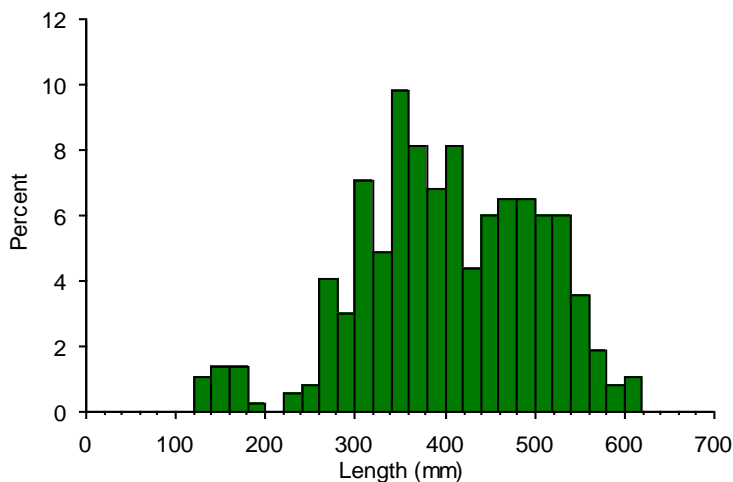


Figure 2: Length frequency for brown trout 2018.

There was strong evidence that recruitment of brown trout has been solid across several years with multiple length classes present (see figure 2). Of particular interest is the very large grouping of fish in the 260-420 mm length range and the signature of 1⁺ year old fish in the 120-200 mm range. In addition to this information, a survey of the galaxiid population during 28-29 November 2018, showed the presence of a strong cohort of young of the year brown trout fry (30-50 mm length), indicating a further strong recruitment year in 2018.

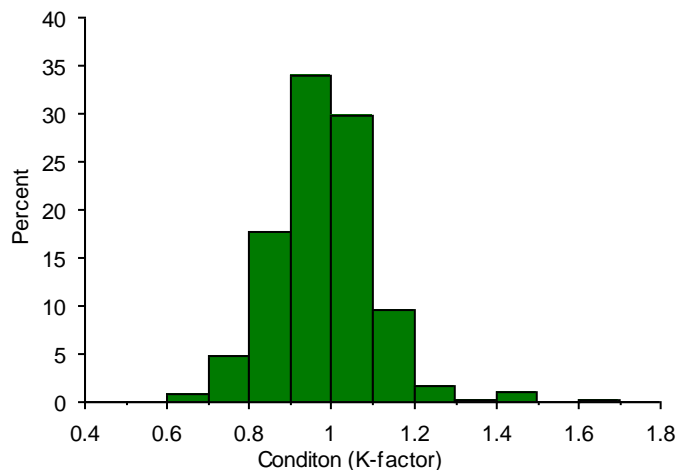


Figure 3: Condition factor for brown trout 2018.

In general, the overall condition of brown trout was below expectation, with an average k-factor of 0.98 for all fish captured (see figure 3). There was no suggestion that larger fish were in any poorer condition than smaller fish. This appears to be a function of fish being slow to put on weight early in the season rather than any wider systemic environmental issue.

3.2. Angler Postal Survey

Average (mean) fishing effort in the period 2000-18 was 8 777 angler days per season, with a low of 1 033 days in 2000-01 and a high of 18 994 days during 2017-18 (see figure 4). Overall, the increase in angling effort post 2005-06 is related to the upgrading of the access track to an all vehicle standard. The increase in fishing effort during 2008-10 is likely a consequence of drought conditions during 2006-08 affecting other major fisheries. During this time, a large influx of anglers elected to fish Woods Lake and Little Pine Lagoon. The drought broke in 2009 and anglers have continued to fish at Woods Lake that has provided favourable fishing conditions. A significant increase in angling effort was recorded for the 2017-18 season at a high of 18 994 days and resulted in a record high estimated harvest of 52 088 brown trout (see figure 6). This high harvest was essentially driven by increased fishing effort assisted by a continued improvement in water quality.

The average daily catch rate was 2.6 brown trout with the daily catch rate never falling below 1.7 fish (see figure 7). The highest daily catch rate of 4.1 fish was recorded for the 2005-06 season and is related to the initial upgrading of the access road and the take up of latent fishing effort.

The average number of days fished by anglers within each season has fluctuated over time around the long term average of 3.8 days and had little effect on angling effort (see figure 5).

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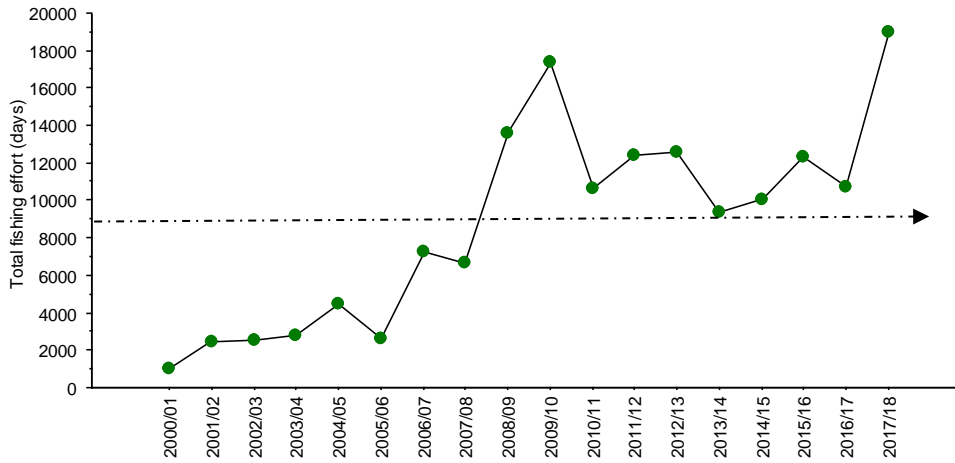


Figure 4: Total fishing effort 2000 – 18 (dotted line indicates long-term average).

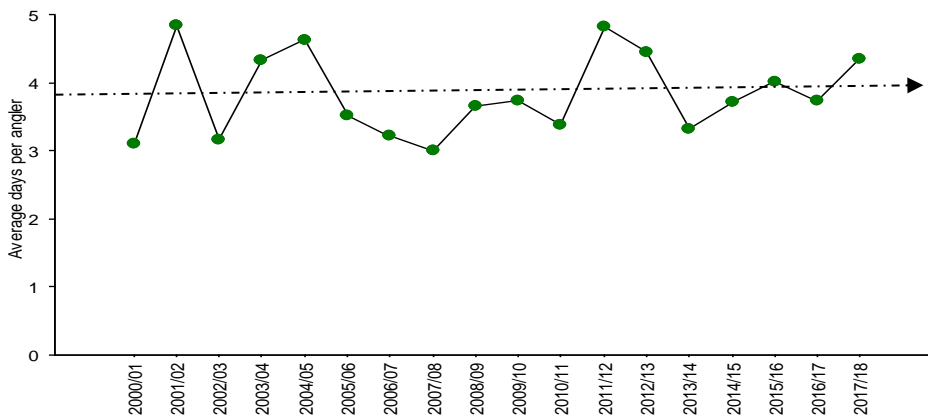


Figure 5: Number of days fished per angler for each season 2000 – 18 (dotted line indicates long-term average).

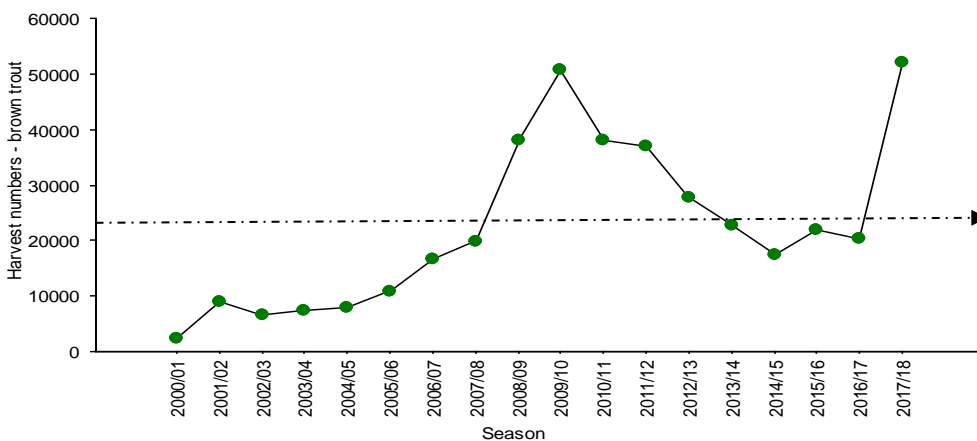


Figure 6: Estimated harvest of brown trout 2000 – 18 (dotted line indicates long-term average).

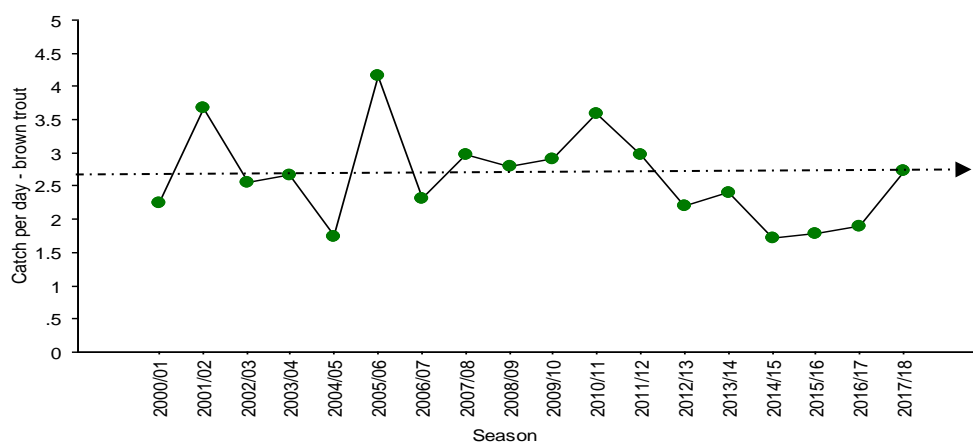


Figure 7: Daily catch rate for brown trout 2000 – 18 (dotted line indicates long-term average).

4. Discussion

The Woods Lake trout fishery appears to be robust and performing well. Based on CPUE, the lake supports a moderately high abundance of brown trout across a range of length classes. At present, there is a high proportion of fish (51%) in the 260-420 mm length range that are dominant in the fishery. Consequently, the average weight for all fish surveyed was 724 grams. Nonetheless, there still remains a significant proportion (19%) of fish over 500 mm length (average 1.34 kg). The average weight for fish over the legal size limit of 300 mm was 804 grams, with 88% of the catch being greater than 300 mm length. Additionally, indications are that recruitment from the 2017 and 2018 spawning is substantial and likely to continue the dominance of smaller fish in the lake.

The condition of brown trout was on average lower than expected and was apparent across all fish lengths. This appears to be a function of fish being slow to put on weight early in the season rather than any wider systemic environmental or ecological issue, as no fish showed any signs of being abnormally underweight. It is likely there is significant competition occurring within the trout population that is limiting early season weight gain but at present, this is not a major concern as the annual harvest is correspondingly high and limiting the population size.

In relation to catch and the harvest figures, there is a significant increase across most results, which correlates with the upgrading of the access road during 2006-07. For the period 2000-06, fishing effort was around 2 600 days, while for 2007-18 this increased to around 11 500 days (342%). Consequently, the annual harvest of brown trout tripled to around 30 000 brown trout. Despite these increases, the daily catch rate has typically fluctuated around the long term average of 2.6 fish during 2000-18. These figures suggest that prior to 2006-07, there was significant latent effort in the fishery. This effort is now being fully exploited and careful management of the trout fishery is required to maintain acceptable angler expectation levels.

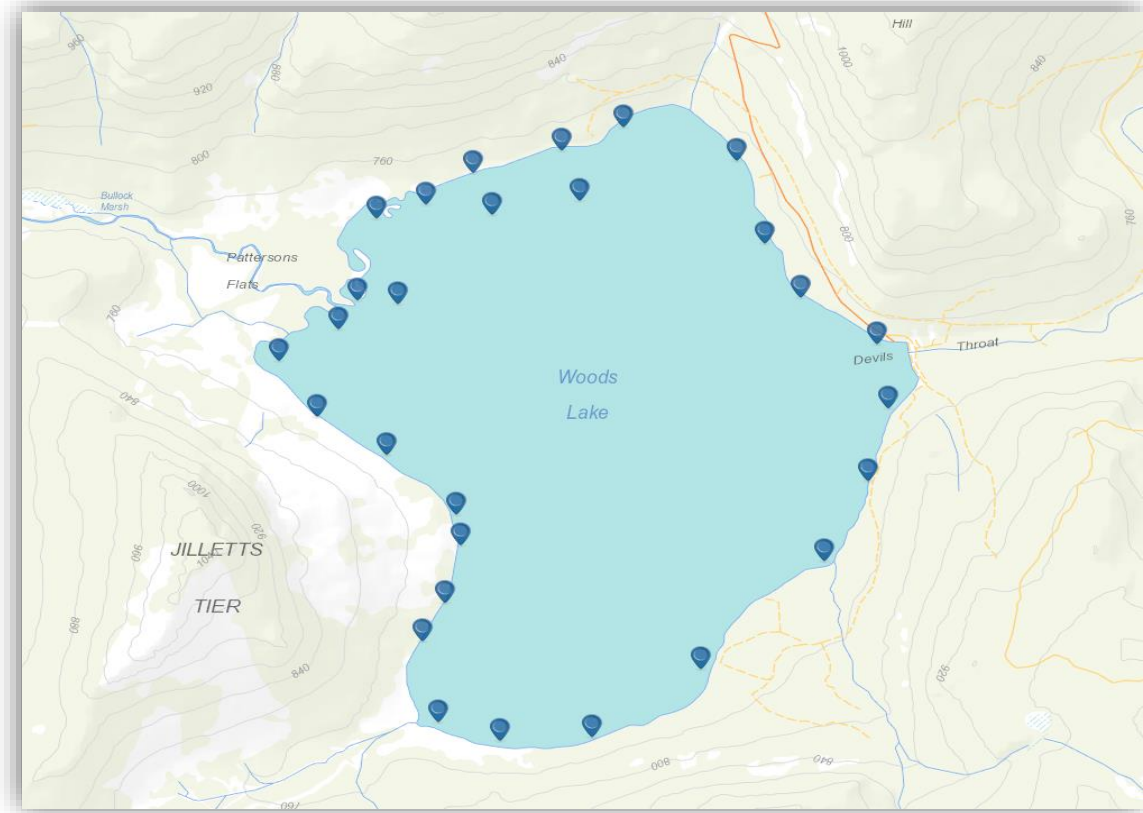
Current bag and size limits are expected to assist in sustaining the fishery but ideally, in the long term, a reduction in overall angling effort is desirable. This is especially relevant to periods when recruitment of brown trout is lower than presently occurring.

In summary, the Woods Lake fishery has a moderately high abundance of brown trout across a wide range of sizes. The condition of brown trout was on average lower than expected across all fish lengths, nonetheless the growth of fish over time was good and similar to comparable fisheries. The annual harvest relative to fish abundance is substantial and reliant on consistent annual recruitment to maintain the fishery at acceptable levels. Current bag and size limit regulations are in part assisting in maintaining the sustainability of the fishery, however a reduction in total fishing effort over time is desirable.

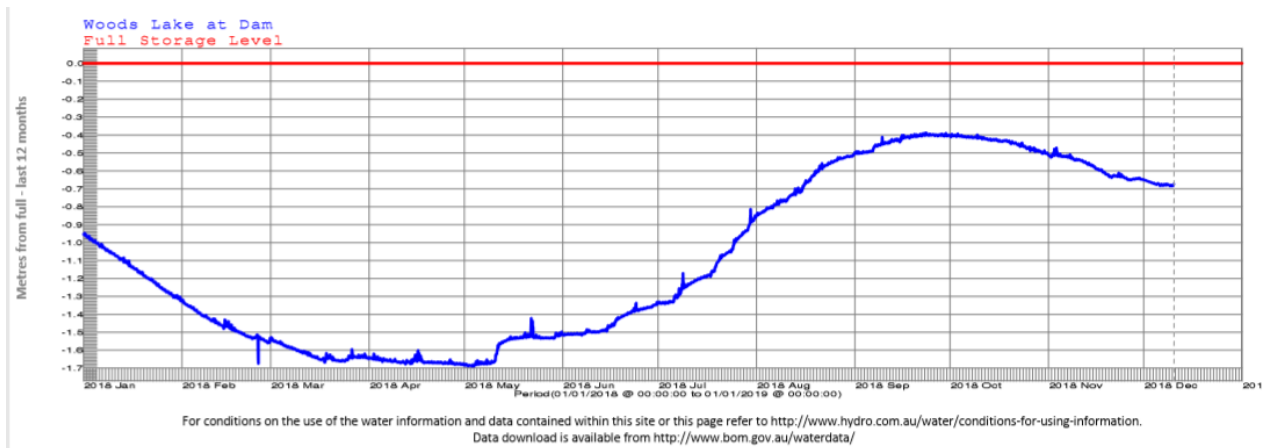
5. Recommendations

- The trout fishery at Woods Lake continues to be managed by way of adjustment to bag and size limits. At present, the minimum size limit of 300 mm with a daily bag limit of 5 fish consisting of only 2 fish over 500 mm length is sufficient. However, it will be necessary to monitor ongoing fishing effort and annual harvest.
- Monitoring of future angling effort and harvest will be achieved by angler feedback and assessment via the annual postal survey.
- To assist with on-going fishery management, it may be advantageous to establish an index of annual recruitment for Woods Lake.
- Monitoring of the brown trout population is in accordance with the schedule as outlined in the Tasmanian Inland Recreational Fishery Management Plan 2018-28 (two surveys over life of the plan).
- There are no performance targets set for Woods Lake but maintenance of long term daily catch rates are desirable.
- To reduce fishing effort, other waters should be promoted as alternate fisheries e.g. Little Pine Lagoon, Great Lake and Arthurs Lake
- The results of this survey suggest sampling effort and the timing of the survey are appropriate.

6. Appendix



Appendix A: Box trap string sets Woods Lake survey, October 2018 (80 box traps).



Appendix B: Lake level plot overtime Woods Lake (Hydro Tasmania www.hydro.com.au/water/lake-levels).

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Liawenee, Tasmania October 2018 Daily Weather Observations

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am			3 pm						
		Min °C	Max °C				Dir	Spd km/h	Time local	Temp °C	RH %	Cld g th	Dir	Spd km/h	MSLP hPa	Temp °C	RH %	Cld g th	Dir
1	Mo	-4.2	15.1	0			W	52	13:05	12.7	28	W	22	1024.3	13.9	28	WSW	33	1022.7
2	Tu	3.2	14.8	0			N	46	19:09	10.6	54	WSW	15	1025.8	10.4	51	NNW	17	1021.4
3	We	5.6	10.8	0.8			SSW	57	12:21	6.0	100	SSW	35	1011.2	9.1	63	SSW	28	1013.6
4	Th	-3.0	12.6	0.2			S	33	10:39	5.3	94	WSW	24	1022.1	8.8	68	SE	13	1021.8
5	Fr	-2.9	12.3	0			NNW	30	14:58	7.9	60	ESE	6	1026.9	10.6	56	NNE	24	1025.5
6	Sa	-1.4	13.2	0			WNW	28	13:36	7.8	69	NW	13	1026.0	11.2	54	NNW	15	1024.2
7	Su	0.9	12.7	0			NNE	35	10:28	7.2	76	NNE	13	1025.9	11.6	54	NNW	17	1024.5
8	Mo	-0.6	15.1	0			NW	26	11:43	8.2	71	ENE	9	1022.1	12.3	64	NW	11	1019.7
9	Tu	6.1	11.4	0.2			SW	54	12:31	9.0	100	WNW	17	1013.0	7.6	81	SSW	39	1013.6
10	We	-2.0	8.4	0.8			SSE	54	23:59	0.2	88	SSE	28	1025.2	7.0	53	ESE	15	1026.2
11	Th	-6.3	13.9	0			ESE	31	13:43	5.6	82	SSW	7	1026.9	12.4	33	SE	22	1026.6
12	Fr	1.2	12.2	0			NE	31	08:21	7.5	79	NNE	19	1029.4	11.7	64	NNE	17	1028.7
13	Sa	2.3	13.3	0			NNE	41	09:36	7.3	100	NNE	7	1028.1	12.4	61	NNE	19	1027.0
14	Su	3.5	12.1	0.4			NNE	48	20:51	7.7	100	NNE	17	1026.6	10.8	100	NNE	20	1024.4
15	Mo	7.7	16.0	0.6			N	41	09:37	10.7	100	NNE	20	1023.8	15.1	70	NNE	24	1022.5
16	Tu	8.9	19.0	0			NNE	30	08:31	11.8	100	NNE	13	1020.1	16.7	64	N	17	1018.0
17	We	8.7	13.3	0.4			NNE	26	08:33	12.4	100	NE	17	1015.4	11.6	100	NNW	2	1014.6
18	Th	6.2	12.2	5.8			N	35	12:10	9.8	100	NNE	13	1012.6	10.7	100	NNW	13	1010.9
19	Fr	6.3	14.1	5.0			NNE	46	22:20	9.5	100	WNW	15	1013.5	11.9	98	NW	20	1011.5
20	Sa	7.1	11.6	4.4			NNW	59	02:25	9.1	91	N	17	1007.8	11.0	64	SW	26	1010.5
21	Su	-2.7	16.6	0			E	30	12:12	8.7	87	NNW	7	1016.4	15.2	51	E	9	1014.5
22	Mo	-1.1	14.4	0			NNW	52	20:49	10.1	68	NNW	17	1012.1	12.2	65	NNW	20	1010.7
23	Tu	4.9	11.8	8.6			N	54	01:52	5.0	100	WNW	28	1009.0	10.2	64	W	30	1008.6
24	We	-3.6	11.1	0.2			WSW	33	07:54	1.4	84	WSW	26	1019.9	9.1	55	E	15	1021.0
25	Th	0.4	12.1	0			NNW	52	07:57	4.5	85	NNW	28	1017.2	11.4	51	W	22	1014.0
26	Fr	0.4	10.6	0			WSW	52	01:25	2.3	88	WSW	26	1013.7	9.4	52	WSW	20	1014.0
27	Sa	1.4	9.9	0			SW	67	14:12	5.3	93	WSW	24	1007.1	5.0	100	SW	44	1008.5
28	Su	-3.3	12.8	1.0			SW	43	21:37	1.2	81	SW	20	1017.6	10.5	50	ENE	13	1014.9
29	Mo	-0.3	15.0	0			SW	43	23:30	5.4	78	SW	17	1018.7	14.1	39	NNE	24	1017.2
30	Tu	0.5	18.0	0			WSW	56	14:25	9.0	58	W	19	1013.3	14.8	46	W	35	1010.7
31	We	-2.6	13.7	0			SSE	43	15:46	4.8	66	SW	15	1017.9	11.3	44	ENE	19	1018.3

Appendix C: Weather details for survey period, October 2018.