

Inland Fisheries Service

Recreational Fisheries Report



Fisheries Performance Assessment

Technical Report

Shannon Lagoon – May 2019

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Introduction

Shannon Lagoon is an impounded wetland on the Shannon River south of yingina/Great Lake. Presently, the lagoon provides habitat for threatened native aquatic plant and animal species, including two species of threatened freshwater fish. The lagoon is managed by Hydro Tasmania for power generation by pumping water into yingina/Great Lake making it available for use at the Poatina Power Station. Additionally, water from the lagoon is released downstream to supply riparian users and irrigators via the Shannon River.

The trout fishery at Shannon Lagoon relative to other highland lake fisheries is minor, with low angler visitation. Hydro Tasmania and the Inland Fisheries Service have been working jointly to provide a more amenable and productive trout fishery at Shannon Lagoon. This is being achieved by limiting the period of peak turbidity and attempting to maintain total turbidity between 10 to 30 NTU (Nephelometric Turbidity Units). This goal is presently achieved by actively maintaining a high water level within the lagoon and using current irrigation flows to flush the lagoon. This situation will be enhanced with the installation of an automated pump at the Miena Dam that will assist in achieving this goal.

This survey is one of three similar surveys conducted during 2014, 2017 and 2019 to assess the status of the trout fishery. Other surveys for native fish i.e. galaxiids are conducted annually, under the threatened freshwater fish monitoring program. These are reported in the IFS annual report.

Fishery Performance Methods

In-lake survey

During July 2017, 503 adult brown trout sourced from the River Derwent fish trap, Lake King William were transferred to Shannon Lagoon. All fish were tagged with a single white individually numbered t-bar tag, with each fish weighed and measured. The average weight of these transferred fish was 339 grams. These fish formed the basis of an initial capture-mark-recapture (CMR) population estimate survey during July 2017 (refer to Shannon Lagoon FPA Report Oct 2017). These fish also allowed for the assessment of growth and survival that was the basis of the May 2019 survey.

During 14-15 May 2019, the Service undertook a trapping survey within Shannon Lagoon. The purpose of the survey was to gain information on:

- catch per unit effort,
- the length structure of the brown trout population,
- the growth (weight and length) and survival of tagged brown trout that were released during July 2017.

A total of 40 box traps (see figure 1) were set over one night, with most deployed around the perimeter of the lagoon and 8 deployed in slightly deeper water near the dam wall.

All fish were weighed and measured for fork length and checked for the presence of a t-bar tag.



Figure 1: Typical box trap set showing three co-joined traps (e.g. Little Pine Lagoon).

Stocking History

The IFS keeps electronic records of public water stockings dating back to 1980. These records set out information on location, date of stocking, species, age, origin, stock (wild or domestic strain) and genotype, in addition to some length/weight data and comments of stocked fish, e.g. denoting tagged fish. This information provides an historical record of supplementary recruitment into individual waters.

Annual Postal Survey

Since 1986, the Service has conducted a postal survey seeking information about anglers' catches. The survey comprises of 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 fishing effort.

Fishery Performance Results

In-Lake Survey Brown Trout

Brown trout length weight data

From 40 box trap sets, 43 brown trout were captured. No rainbow trout were captured. All fish were weighed and measured with the summary results for female and male fish shown in table 1.

Grouping	Measurement	Mean	Minimum	Maximum
Female (n=24)	Length (mm)	441	320	550
	Weight (g)	1 049	434	1 684
	Cond Factor (k)	1.19	0.96	1.42
Male (n=19)	Length (mm)	465	375	580
	Weight (g)	1 164	618	2 120
	Cond Factor (k)	1.13	0.81	1.36
All (n=43)	Length (mm)	452	320	580
	Weight (g)	1 100	434	2 120
	Cond Factor (k)	1.16	0.81	1.42

Table 1: Summary statistics for female and male brown trout, Shannon Lagoon May 2019.

Female fish represented 56 percent of the catch with no immature fish captured. Of interest, many fish did not display any overt signs of any gonad development despite the survey being conducted close to the commencement of the brown trout spawning period. There was no significant difference in the weight and length of male and female fish and consequently condition factor was similar. The mean weight for all fish was 1.1 kg with fish over 500 mm weighing 1.5 kg. The condition factor of 1.16 indicates the most of fish were in good condition, with only nine percent having a condition factor of less than 1.0.

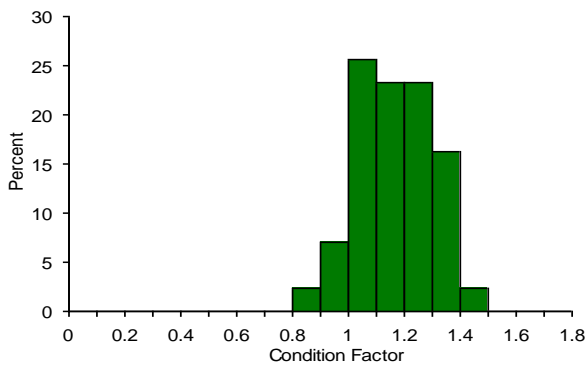


Table 2: Frequency for condition factor of brown trout expressed in percentage, Shannon Lagoon May 2019.

The plot of length against weight suggests the growth of fish is good across all lengths, with tagged fish showing the same growth characteristics as resident fish (see figure 3). A high proportion of fish (28%) grew to over 500 mm in length with 18 percent in the 1.5 kg – 2.5 kg weight range.

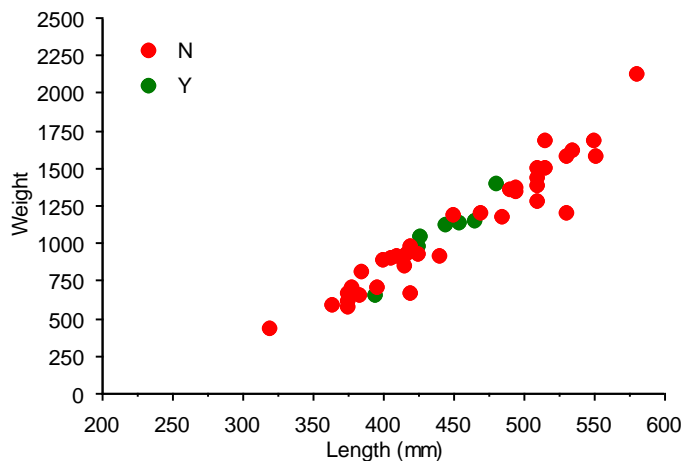


Figure 3: Length/weight comparison for tagged (Y) and untagged (N) 'resident' brown trout, May 2019.

Tagged brown trout recaptures

Of the 43 brown trout captured, seven were tagged (16%). These tagged fish weighed an average of 287 g when initially released in July 2017. All but two of these seven fish when recaptured, weighed over 1 kg (see table 2). On average, tagged fish gained 779 g in weight (271% increase) and increased in length by 156 mm (55% increase) (see figure 4) during the 19 months they were in Shannon Lagoon.

Tag No	Release weight (g)	Capture weight (g)	Gain in weigh (g)	Release length (mm)	Capture length (mm)	Gain in length (mm)
	Year 2017	Year 2019		Year 2017	Year 2019	
2567	250	650	400	280	395	115
2540	260	1120	860	264	445	181
2291	220	1387	1167	263	480	217
2084	270	980	710	264	425	161
2138	290	1047	757	286	427	141
2556	290	1128	838	297	454	157
2350	430	1150	720	345	465	120
Average	287	1066	779	286	442	156

Table 2: Tagged fish collected from Lake King William trap and released into Shannon Lagoon in 2017 and examined again in May 2019.

There was no significant difference in the average weight, length or condition factor of tagged fish compared to non-tagged 'resident' fish (see figure 2).

During the 2017 CMR population survey, tagged fish represented 24% of the total recaptures. This compares to 16% for the 2019 survey, representing a 33% decline in presence within the total catch. This implies a survival of rate of around 66% for the 503 brown trout released in July 2017.

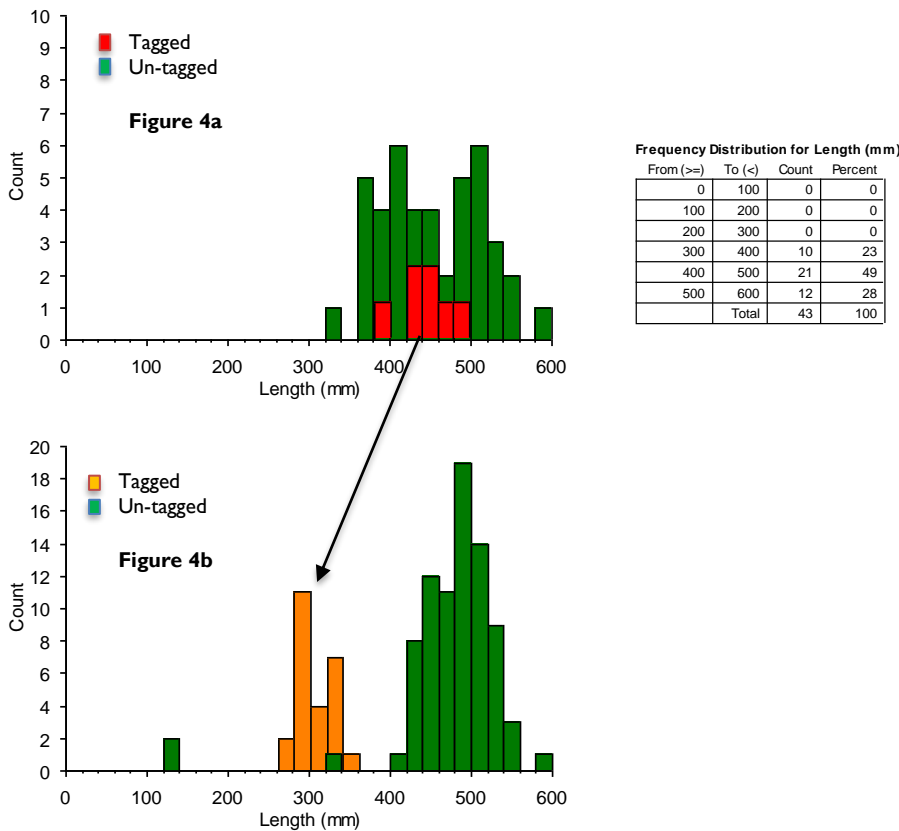


Figure 4 a&b: Length frequency plots for (a) tagged brown trout captured 2019 (including tabulated summary data) and, (b) brown trout captured during the 2017 survey showing the tagged cohort when initially released into Shannon Lagoon (July 2017).

Figure 4a shows the length frequency for the 43 brown trout captured during the 2019 survey. There were no fish captured measuring less than 320 mm, suggesting very low natural recruitment. There appears to be two distinct peaks in the length distribution at 420 mm and 520 mm, however their distinction as age cohorts is unclear. Of particular note there was no sign of the (untagged) group of fish in the 380 mm – 460 mm length range that were captured in 2019, within the previous 2017 results (see figure 4b). This significant group of fish should have shown up during the 2017 survey within 200 mm – 360 mm range.

Tagged fish were about 280 mm - 300 mm when released in 2017 (see figure 4b) grew to around 420 mm -440 mm by May 2019 (see figure 4a).

CPUE Information

Generally, the capture of brown trout in box traps was low with 43 brown trout capture from 40 box traps set over one night. This equates to a mean CPUE of 1.08, which is comparable to 1.33 fish per trap from the 2017 survey.

Stocking History

There have been very few stocking events undertaken at Shannon Lagoon. The most recent events consisted of 503 adult brown trout (tagged) transferred from the Lake King William trap in July 2017 and 400 adult brown trout from Liawenee Canal in May 2003 (adipose fin clipped). The only other recent stocking was a release of 11 000 advanced rainbow trout fry in January 2002.

Angler Postal Survey (APS)

Due to the low number of respondents for this water (average 3 replies per season), no detailed analysis has been undertaken. The APS data for brown trout is summarised in the appendix, with the averages for the period 2000 – 2019 displayed. On average, 84 anglers fish this water per season at a catch rate of 0.47 brown trout, with an estimated annual harvest of 91 brown trout, with no fish captures reported by any respondents during the five year period 2013-17.

Discussion

The results of the previous 2017 survey indicated Shannon Lagoon had a relatively small population of around 2 200 brown trout, at a CPUE of 1.13 fish per trap set. During this survey (2019), the CPUE was similar, at 1.08 fish per trap, indicating the population remains around the 2017 level.

The mean weight, length and condition factor for brown trout was good and similar to that recorded during the 2017 survey (see appendix a). The growth of fish across all lengths was good with 28 percent of fish growing in excess of 500 mm length, indicating high survival. This result was also similar to the 2017 survey.

There was no evidence of any recruitment of young fish into the fishery over the past two years, indicating poor spawning conditions during 2017 and 2018. The 2017 survey also found evidence of poor recruitment for 2014 and 2015. However, there is a group of untagged fish in the 380 mm – 460 mm length range within the 2019 results that were not apparent as smaller fish during 2017. The reasons for this are unclear but they do not appear to be linked to sampling bias, as surveys at other fisheries using the same methodology consistently catch smaller fish. There may be the opportunity for downstream dispersal of larger brown trout from Great Lake during irrigation releases, or to a lesser degree from Bruisers Lagoon, both of which may be contributing larger fish to Shannon Lagoon.

If highly variable recruitment and incidental downstream inputs is the normal situation, then periodic stocking will be required if the lagoon is to be promoted as a productive and viable fishery into the future. Incidentally there were no reported captures by anglers from the APS results during 2012-17. This provides further evidence of poor recruitment resulting in low numbers of fish within the lagoon.

The tagged brown trout released in July 2017 displayed significant gains in weight and length over the 19 months they were in the lagoon. On average, the seven tagged fish recaptured increased in weight by 779 grams and grew by 156 mm. Their growth once released into the lagoon mirrored that of the

resident population. This highlights the potential of the Lake King William fish within this, and similar productive waters.

Because of low angling effort and variable recruitment, the trout population remains largely unharvested and hence contains a significant number of larger fish.

Given the results of the survey there is scope to increase the harvest of brown trout, especially fish over 500 mm. This action will need to be underpinned with an occasional supplementary stocking of fish, as the survey results from 2017 and 2019 suggests highly variable recruitment. The transfer of smaller Lake King William fish during the 2017 survey filled a void in in the fishery at that time and further supplementation will be required to address the failure of the 2017 and 2018 spawning.

Recommendations

- I. A transfer of 500 adult brown trout from Lake King William is undertaken every 2-3 years to ensure consistent 'recruitment' and provide some length structure within the population.
- II. Regulations for the Shannon Lagoon fishery remain unchanged i.e. minimum length limit 300 mm with a bag limit of five fish, consisting of no more than two fish over 500 mm.
- III. Monitoring of the fishery via angler catch effort surveys and if feasible by shore side creel survey.

Appendix

Appendix a): Summary statistics for tagged and untagged brown trout, 2017 survey

Grouping	Measurement	Mean	Minimum	Maximum
All brown trout (n=106)	Length (mm)	434	125	580
	Weight (g)	1 029	30	2 020
	Cond Factor (k)	1.13	0.75	1.61
Un-tagged (n=81)	Length (mm)	473	125	580
	Weight (g)	1 244	30	2 020
	Cond Factor (k)	1.13	0.75	1.61
Tagged (n=25)	Length (mm)	305	274	355
	Weight (g)	332	200	580
	Cond Factor (k)	1.15	0.84	1.34

Appendix b): Annual Postal Survey 2000 – 2019, brown trout

Season	Respondents this water	Catch per day brown	Brown Harvest	Total fishing effort (days)	No. all anglers
1999-00	1	0.0	0	51	32
2000-01	2	0.7	117	175	50
2001-02	7	0.8	279	356	224
2002-03	7	1.2	305	262	189
2003-04	3	0.4	43	107	80
2004-05	5	0.0	0	146	150
2005-06	2	0.5	165	303	69
2006-07	1	0.0	0	53	33
2007-08	4	1.4	306	223	141
2008-09	2	0.0	0	41	51
2009-10	1	1.0	28	28	35
2010-11	3	0.0	0	163	76
2011-12	2	2.5	296	118	74
2012-13	1	0.0	0	22	27
2013-14	0	0.0	0	0	0
2014-15	3	0.0	0	197	94
2015-16	1	0.0	0	21	26
2016-17	2	0.0	0	166	60
2017-18	3	0.21	61	283	76
2018-19	5	0.30	134	446	139
Average	3	0.47	91	164	84