

# Inland Fisheries Service Report

## *Recreational Fisheries Report*



### Fisheries Performance Assessment Technical Report South Riana Dam - July 2018

## Document Information

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# I Introduction

South Riana Dam (410628E 5434658N GDA94), is managed by Tasmania Irrigation and was commissioned during 2015 following the construction of a dam on an unnamed tributary of the Blythe River at South Riana. Water is supplied by local inflows to fill the 4,000 ML dam, with additional water pumped from the Blythe River to supply irrigation water for the Dial Blythe Irrigation Scheme.

The dam floods a series of small to medium sized farm dams that were known to hold brown trout and the inflowing streams contained a small population of brown trout and the freshwater lobster *Astacopsis gouldi*.

## 2 Fishery Performance Methods

### 2.1 In-lake Surveys

In readiness for a capture-mark-recapture population estimate, 400 adult brown trout sourced from the Liawenee Canal spawning trap were adipose fin clipped and transferred to South Riana Dam (14 June 2018). These fish weighed an average of 850 grams and measured 417 mm (fork length).

During 23-25 July 2018, the Service undertook an intensive trapping survey within South Riana Dam. The purpose of the survey was to gain information on:

- catch per unit effort,
- the length structure of the brown trout population,
- the condition of fish,
- examine natural recruitment and stocking success, and
- establish an estimate of the brown trout population size.

A total of 27 box traps (see figure 1) were set each night over two nights (total 54 box traps sets), with all traps deployed around the perimeter of the lake.

From the 54 box trap sets, 115 brown trout were captured. All fish were weighed and measured for length. Brown trout were examined for the presence of an adipose fin clip. Traps were checked and cleared after the first night and then cleared and retrieved after the second night.

All nets were set from a boat. The lake level was down from full supply level by approximately 1 metre with a low flow from both inflowing creeks slowly filling the lake.



**Figure 1:** Typical box trap set showing three co-joined traps (Penstock Lagoon).

## **2.2 Stocking History**

The Service keeps electronic records of public water stockings dating back to 1980. As South Riana Dam has only been operating as a fishery since 2015, no in-depth analysis was undertaken; stocking records are shown in appendix a).

## **2.3 Annual Postal Survey**

Due to the low number of respondents for this water between 2015-2017, no analysis was undertaken.

## 3 Fishery Performance Results

### 3.1 In-Lake Survey

#### Length weight data

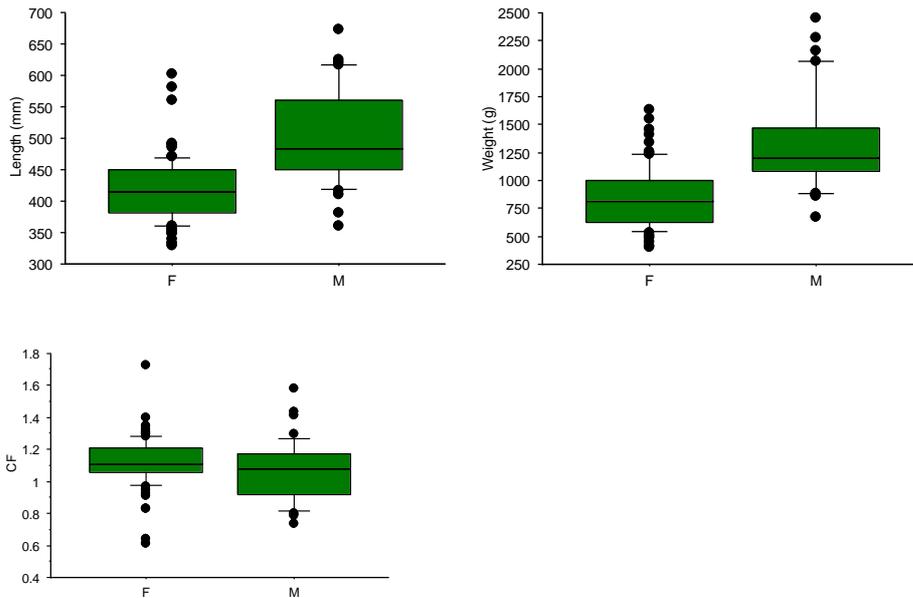
From 54 box trap sets, 115 brown trout were captured with all fish weighed and measured.

As only two fin clipped fish were captured, all the data has been combined to produce an average length and weight (i.e. unclipped and clipped fish) (see table 1). One individual freshwater crayfish (*Astacopsis gouldi* CPL 110 mm) was also captured.

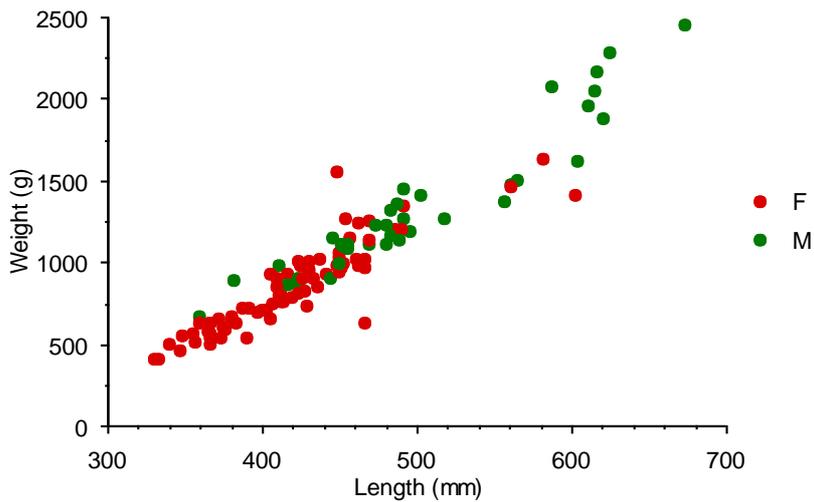
Grouping	Measurement	Mean	Std Error	Minimum	Maximum
All brown trout (n=115)	Length (mm)	446	6.64	330	673
	Weight (g)	1006	37.63	400	2450
	Cond Factor (k)	1.10	0.02	0.61	1.72
Female (n=77)	Length (mm)	420	5.88	330	603
	Weight (g)	847	30.89	400	1630
	Cond Factor (k)	1.12	0.02	0.61	1.72
Male (n=38)	Length (mm)	499	12.39	360	673
	Weight (g)	1328	70.99	670	2450
	Cond Factor (k)	1.07	0.03	0.74	1.58

**Table 1:** Descriptive statistics for brown trout for combined sample, female and male fish.

The catch of 115 brown trout consisted of 77 females and 38 males, with no immature fish recorded. There was a significant difference in both the mean weight and length between male and females fish (see figure 2). Males weighed an average of 1,328 g with an average length of 499 mm. This compared to females at 847 grams and 420 mm. This difference was largely driven by the high percentage (34%) of male fish greater than 500 mm (see figure 3). In comparison, only 4 percent of females were greater than 500 mm. The mean condition factor for both males and female fish was not significantly different, although fish over 500 mm generally showed signs of poor condition (see figure 5).

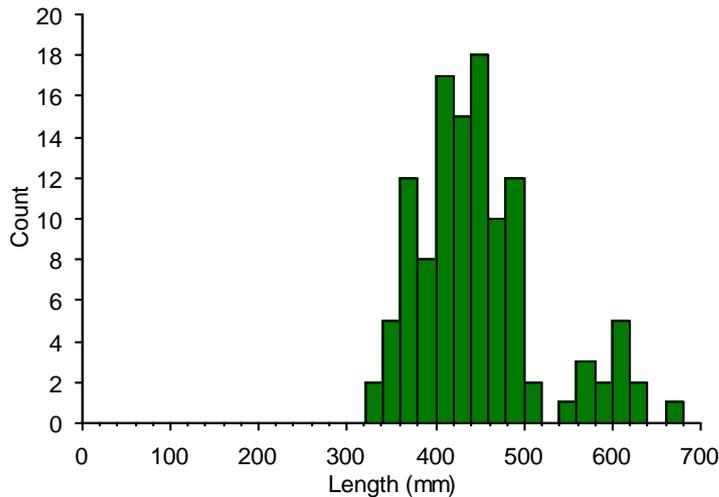


**Figure 2:** Box plots for brown trout - length, weight & condition factor separated by sex (F=female & M=male).



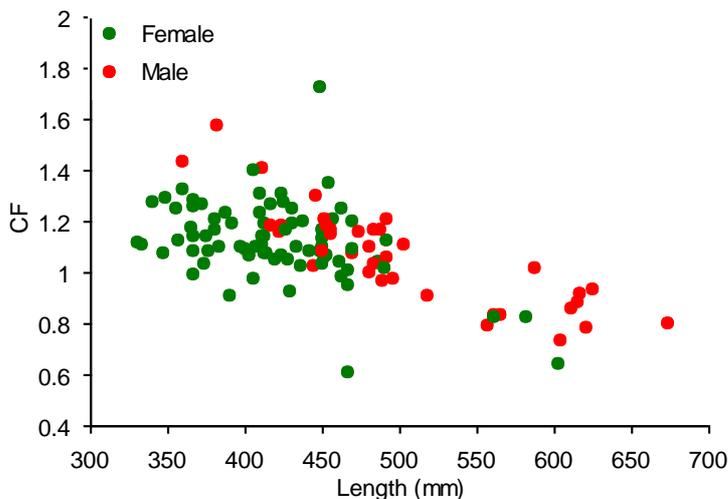
**Figure 3:** Length/weight comparison for brown trout separated by sex (F=female & M=male).

A comparison of length against weight (see figure 3) indicates the growth of fish is unremarkable, indicating the fishery has already plateaued with typical growth rates apparent. A group of fish greater than 500 mm is evident, with most in poor condition (see figure 5). These fish are the remnants of the original population from the inundated farms dams. These fish have peaked in condition and are now reaching old age with several fish over 600 mm in length. Fish under 500 mm displayed consistent growth but the rate of growth was marginally slower than similar lake fisheries.



**Figure 4:** Length frequency plot for all brown trout captured.

A plot of length frequencies clearly shows a group of brown trout measuring 540 – 680 mm. These fish are from the original farm dams that were inundated during 2014. These fish have now reached old age and are beginning to lose condition (see figure 5) with most being male fish. There are a number of fish 340 – 420 mm range that likely represent fry stocked during 2015 that collectively form a single cohort of 3 year old fish (see appendix a). Fish between 420 – 500 mm may be from an existing population of river fish present prior to flooding, and/or a stocking done in November 2016 consisting of 200 g fish (refer discussion), although this is unclear. There is no evidence of either the 2017 fingerling stocking or fish from natural recruitment from 2016 that should have shown up as fish of approximately 220<sup>+</sup> mm. Smaller fish (less than 180 mm) are typically not captured in box traps, consequently they are absent in the length frequency data.



**Figure 5:** Condition factor for all brown trout captured separated by sex.

### 3.2 CPUE Information

Generally, the capture of brown trout in box traps was low with 115 brown trout capture from 54 box traps set over two nights (27 box trap sets each night). This equates to a mean CPUE of 2.13 brown trout per trap. This indicates a moderate to low number of fish within the lake.

### 3.3 Population Estimate

On 14 June 2018, 400 adult brown trout that had been adipose fin clipped were transferred from Great Lake to South Riana Dam to allow a population estimate to be conducted. A six-week settling in period during the closed fishing season was allowed, before a recapture survey was undertaken. A total of 115 brown trout were captured in box traps over two nights. Of these fish, just two were fin clipped (1.7%). Table 2 shows the parameters of the Petersen estimate, with 23,000 brown trout estimated to be within the dam. The associated estimate of bias was very low i.e. 0.5 and implies a very poor degree of confidence of the estimate that is reflected in the 95% confidence limits. The estimate is of little use but is reported here for future reference.

Parameter	Result
Total tagged fish released (M)	400
Total recaptures (C)	115
Total marked recaptures (R)	2
Population estimate: $MC/R = N$	23,000
Standard error	16,081
Lower and Upper 95% CI limits	- 8,250 – +54,520
Estimate bias level: $MC/4N =$	0.5 (>4 acceptable bias)

**Table 2:** Petersen population estimate for brown trout South Riana Dam.

## 4 Stocking History

There have been just six stocking events undertaken at South Riana Dam since it was inundated during 2014. All stocking events are listed in appendix a.

## 5 Discussion

The results of the 2018 survey indicate South Riana Dam has a relatively small to moderate brown trout population. The capture – mark – recapture population survey was inaccurate, primarily due to the low number of fin clipped fish released and the low number of total captures. Given the low number of total captures, it is estimated that approximately 1,000 fish would have needed to be marked (fin clipped) to provide a meaningful estimate. Alternately, a total capture of at least 700 fish was needed with 400 marked fish (Robson and Regier 1964; Bernard and Hansen 1992). Nonetheless, the low CPUE of 2.13 fish per trap indicates a low to moderate population size.

The size of those fish captured was variable, with three groups of fish present. The largest of these were brown trout that were present in the farm dams inundated by the newly constructed dam during 2014. These fish initially grew to a very large size with most in the 540 – 673 mm size range. Due to the age of fish, and the falling productivity of the water, almost all had begun to loose condition. The second significant group of fish between 420 – 500 mm were possibly from the existing river fish that were present prior to flooding or alternately, from the stocking of 1,300; 200-gram fish stocked in November 2016, although this is unclear. A large group of fish in the 340 – 420 mm range represents the fry stocked during 2015 that collectively form a single cohort of 3 year old fish. The growth of these fish is slightly slower than the typical Tasmanian lake fishery. The presence of this cohort also indicates a high survival from the stocking of 35,000 fry. Owing to the survey method used, fry stocked during December 2017, were not evident. These fry would have been too small to be efficiently captured in box traps. There is also very little fry habitat within the lake making it difficult to target small fish. Moreover, the lack of fry habitat may be a factor for consideration when formulating future stocking programs for this water.

Given the results of this fishery assessment, it is apparent that South Riana Dam has already passed through the initial period of higher productivity normally associated with a newly formed water. The decline in the condition of fish over 500 mm is an indicator that larger/older fish are unable to sustain their weight. The growth of fish under 500 mm was within the lower bounds for a typical Tasmanian lake fishery. The reasons for this slightly slower growth are likely to be linked to the significant drawdowns in lake level for seasonal irrigation. This has limited the establishment and growth of both submerged and emergent macrophytes.

There was no conclusive evidence of natural recruitment contributing to the trout population, with an absence of fish less than 300 mm. Even fish from the May 2017 stocking were absent, although this stocking was small and consisted of 15-gram fish from the previous years hatchlings. If natural recruitment is occurring, it is at a very low level and below the number of recruits needed to sustain a meaningful fishery.

## 6 Recommendations

- South Riana Dam is stocked annually with a minimum of 70,000 brown trout fry or preferably fingerling equivalent. The use of adult brown trout transfers could be considered but at present, it appears fry/fingerlings will meet the requirements for this fishery.
- The regulations as outlined in the Tasmanian Inland Recreational Fishery Management Plan 2018-28 are implemented i.e. minimum size limit of 300 mm with a five fish bag limit consisting of only two fish greater than 500 mm (IFS 2018).

## 7 References

**IFS 2018**, Inland Fisheries Report, Tasmanian Inland Recreational Fishery Management Plan 2018-28. Inland Fisheries Service, Tasmania.

**Robson, D.S. & Regier H.A. 1964**, Sample Size in Petersen Mark-Recapture Experiments, *Transaction of the American Fisheries Society* Vol 93: Number 3.

**Bernard, D.R. & Hansen, P.H. 1992**, Mark-Recapture Experiments to Estimate the Abundance of Fish, Special publication No. 92-4, Department of Fish and Game, Alaska.

## 8 Appendix

Appendix a): Stocking list for South Riana Dam 2015 – 2018.

SPECIES	AGE	ORIGIN	DATE	NUMBER	WEIGHT (g)	Comments	Est length (mm) 2018
Brown trout	Fry	Salmon Ponds	12/11/2015	30000	1		340
Brown trout	Fry	Salmon Ponds	12/11/2015	5000	1.5		340
Brown trout	Fingerling #	Liawenee Canal	04/11/2016	1300	200		420
Brown trout	Fingerling	Salmon Ponds	07/05/2017	3000	15		220
Brown trout	Fry	Salmon Ponds	06/12/2017	35000	1.5		100
Brown trout	Adult	Liawenee Canal	14/06/2018	400	850	Adipose clip	430

# Likely to be yearlings from Liawenee, ex Salmon Ponds late 2016.