

# Inland Fisheries Service

## *RECREATIONAL FISHERIES REPORT*



### **Fisheries Performance Assessment**

### **Technical Report**

### **Curries River Reservoir – August 2019**

# Inland Fisheries Service *Fisheries Performance Assessment*

## *Technical Report Curries River Reservoir 2019*

### Contents

1. <u>Introduction</u>	3
2. <u>FPA Survey Methodology</u>	4
2.1. In-Lake Population Surveys	4
2.2. Annual Postal Survey	4
2.3. Stocking Database	4
2.4. Analysis Methods	4
3. <u>Results</u>	5
3.1. In-Lake Population Survey – Brown Trout	5
3.2. In-Lake Population Survey – Rainbow Trout	7
3.3. Angler Postal Survey	8
3.4. Stocking	10
4. <u>Discussion</u>	11
5. <u>Recommendations</u>	12
6. <u>Appendix</u>	13

Title:	Fisheries Performance Assessment Technical Report, Curries River Reservoir (August 2019) Inland Fisheries Service.
Prepared by:	R. Freeman, Senior Fisheries Manager
Version:	Final
Approved by:	Chris Wisniewski, Section Manager Inland Fisheries Service

### **I. Introduction**

Curries River Reservoir is a moderately sized impoundment with a full supply capacity of 12 000 ML, covering 182 Ha. The reservoir was constructed in 1979 and first commissioned in 1981 as the water supply for the George Town area. The headwaters of the catchment start at Tippogoree Hills (350 m AHD) with annual rainfall of around 850 mm. While rainfall in this area is reasonably high with low variability, the inflow catchment is very limited and habitable area for trout and spawning grounds is restricted.

The reservoir was first opened to fishing during 1990 and has at times produced above average sized brown trout, although the long term catch rate is low. The reservoir is stocked occasionally with rainbow trout, pending availability from commercial sources.

Under the *Tasmanian Inland Recreation Fishery Management Plan 2018-28*, Curries River Reservoir is managed as an 'assisted fishery' with a fishing season managed for brown trout. Angling is only permitted between one hour before sunrise until three hours after sunset. All fishing methods are permitted with the use of bait and artificial lures being most popular. A daily bag limit of 5 fish exists with minimum size limit of 300 mm and no more than two fish over 500 mm permitted.

The reservoir is primarily a brown trout fishery however, there are a moderate number of rainbow trout stocked most years. This water also has populations of short finned eels, the common galaxias (*G. maculatus*), spotted galaxias and the introduced yabby, *Cherax destructor*.

## **2. FPA Survey Methodology**

### **2.1. In-Lake Population Surveys**

On 8 May 2019, 1 175 adult brown trout that had their adipose fin clipped were released into Curries River Reservoir. All fish were sourced from the spawning trap at Liawenee, yingina / Great Lake. These fish formed the basis of a capture-mark-recapture (CMR) population estimate for the Curries River Reservoir fishery. All fish were released into the main body (eastern section) of the lake. On average these brown trout weighed 721 g and average length of 420 mm.

During 26–28 August 2019, 80 box traps were set each night over two nights (total of 160 box trap sets). On the first night 18 box traps were set in the western section of the lake (west of the road causeway). The remaining 62 box traps were set between the main section of the lake and the eastern arm. The vast majority were set around the perimeter, as the main body was generally too deep. On the second night of trapping all 18 traps from the western section were transferred to the main lake. In addition, two 180 metre trammel gill nets were set on one day for a period of three hours soak time each. All brown trout were judged as male, female or indeterminate, and any fin clipped fish recorded. After processing fish were released away from the trap site without being marked. Past surveys using tagged fish have shown recapture rates for this type of CMR survey are extremely low and do not affect the final estimate significantly.

### **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 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 1989 are analysed.

### **2.3. Stocking Database**

The IFS keep 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 some 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 only records post 1999 are analysed.

### **2.4. 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 time within the reproductive cycle and will therefore change during this cycle e.g. high during peak spawning condition.

Categories are indicative and may not necessarily reflect the perception of anglers in general. A growth equation was generated using standardised log-linear data (ln) for weight against length.

### 3. Results

#### 3.1. In-Lake Population Survey – Brown Trout

During 26–28 August 2019, the Service conducted an in-lake survey at Curries River Reservoir to examine:

- CPUE for brown trout and rainbow trout,
- estimate the population size for brown trout,
- to assess the population structure of resident brown trout, and
- the condition of all resident trout.

#### CPUE

In total, 102 brown trout were captured from 160 box trap sets. This equates to a CPUE of 0.64 fish per trap, with approximately 75 per cent of trap sets catching one or more fish. Despite a previous survey being undertaken during 1998, no directly comparable catch effort data is available, as the previous survey used gill nets to collect fish. Of the 102 brown trout captured, just 17 were resident fish (i.e. not fin clipped). The CPUE for resident fish only was extremely low, at 0.11 brown trout per trap.

#### Weight and Length Information

The catch of resident fish consisted of 9 females, 8 males with no immature fish. All resident brown trout were weighed and measured for fork length. table 1 shows the summary statistics for these fish separated by sex. The mean weight for all fish was 1 004 grams at a mean length of 445 mm, with the largest fish being a female of 1.85 kg. The mean condition factor was 1.10 (good – fair). On average, female fish were slightly heavier than male fish. All resident fish were over 300 mm, (the legal minimum size limit) with the smallest fish measuring 370 mm. All the transferred fish were also over 300 mm.

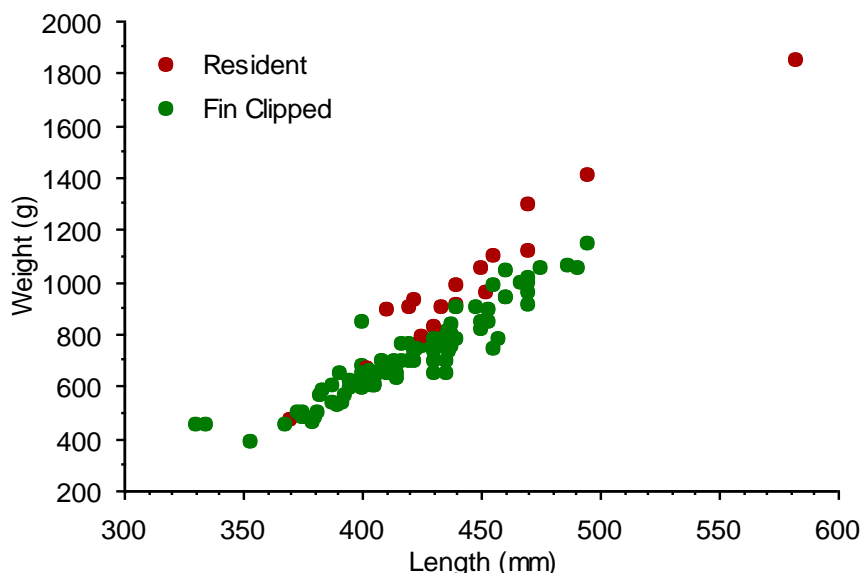
Grouping	Measurement	Mean	Minimum	Maximum
All Resident brown trout (n=17)	Length (mm)	445	370	582
	Weight (g)	1 004	470	1 850
	Cond Factor (k)	1.10	0.93	1.29
Male (n=8)	Length (mm)	439	370	495
	Weight (g)	945	470	1 410
	Cond Factor (k)	1.08	0.93	1.24
Female (n=9)	Length (mm)	450	402	582
	Weight (g)	1 057	670	1 850
	Cond Factor (k)	1.14	0.94	1.29

table 1: Length, weight and condition factor for brown trout separated by sex.

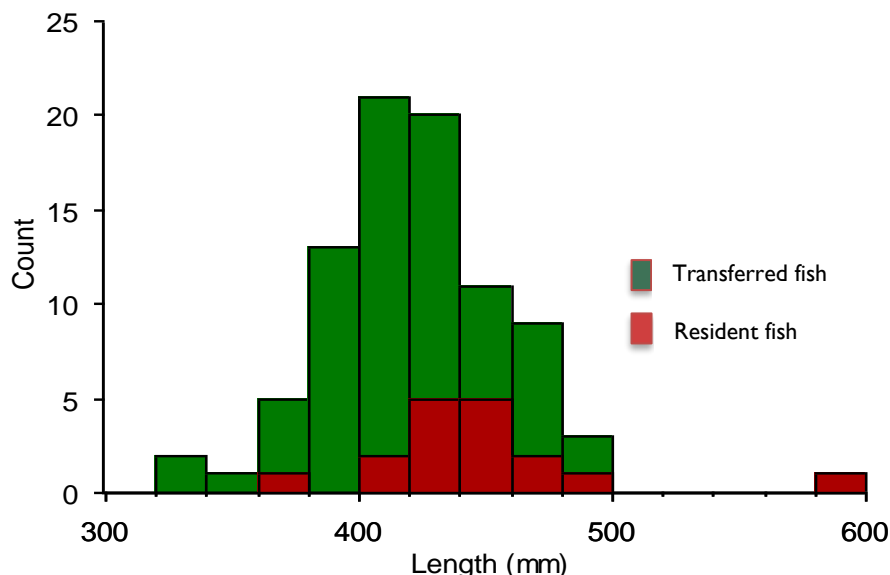
# Inland Fisheries Service Fisheries Performance Assessment

## Technical Report Curries River Reservoir August 2019

The growth of resident fish was very good with all fish showing a higher weight for a given length compared to recently transferred fish. Only one brown trout was over 500 mm and this was a resident fish weighing 1.85 kg (see figure 1).



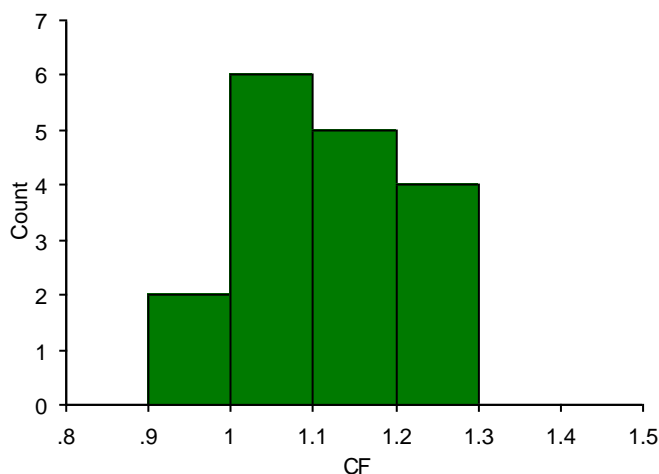
**figure 1:** Length/weight regression for transferred (fin clipped) and resident brown trout captured 2019



**figure 2:** Length frequency for brown trout 2019.

There was no evidence of any natural recruitment over the past three years, with no resident fish less than 370 mm (see figure 2). There was a notable absence of fish over 500 mm with just one fish of 582 mm. By comparison to the transferred fish, the resident fish were on average mostly larger.

# Inland Fisheries Service *Fisheries Performance Assessment* Technical Report Curries River Reservoir August 2019



**figure 3:** Condition factor (k-factor) for brown trout 2019.

The overall condition of brown trout was fair to good, with an average k-factor of 1.10. There were no fish considered to be in the excellent range >1.4 (see figure 3).

### 3.2. *In-Lake Population Survey – Rainbow Trout*

Just 4 rainbow trout were captured, with two being captured in box traps and two in trammel nets. The CPUE for rainbow trout was therefore extremely low at 0.063 fish per trap or 3.8 percent of the total catch of all (106) trout captured (box traps and trammel nets). All rainbow trout were between 314 – 355 mm length with an average weight of 445 g and average length 331 mm, all were in good condition with an average k-factor of 1.24.

#### **Population Estimate**

During the August 2019 survey, a total of 102 brown trout were captured. Of these fish, 88 (86 per cent) were adipose fin clipped (see table 2). This provided an estimate of the brown trout population at 1 410 (+/- 118) fish. Given that 1 075 fish were transferred into this water during early May 2019, the existing number of brown trout prior to this time was negligible. Throughout the recapture survey, all areas trapped held some fish, indicating the sample was generally un-biased across the survey area.

Parameter	Result
Total all tagged & fin clipped fish released (M)	1 075
Total captures (C)	102
Total marked recaptures (R)	88
Population estimate: $MC/R = N$	1 410
Standard error	60
Lower and Upper 95% CI limits	1 292 – 1 528
Estimate bias level: $MC/4N =$	21.5 (>4 acceptable bias)

**table 2:** Petersen CMR population estimate for Curries River Reservoir.

# Inland Fisheries Service Fisheries Performance Assessment Technical Report Curries River Reservoir August 2019

## 3.3. Angler Postal Survey

Average (mean) fishing effort in the period 2000-2019 was 3 792 angler days per season, with a low of just 461 days during 2016-17 and a high of 8 851 days during 1995-96 (see figure 4). Peaks during 1995-96 and 2007-08 relate mainly to the stocking of yearling and adult rainbow trout (see appendix 6B), while some smaller size Atlantic salmon during 1994 aided this increase. The period 2012-18 has seen consistently low levels of fishing effort.

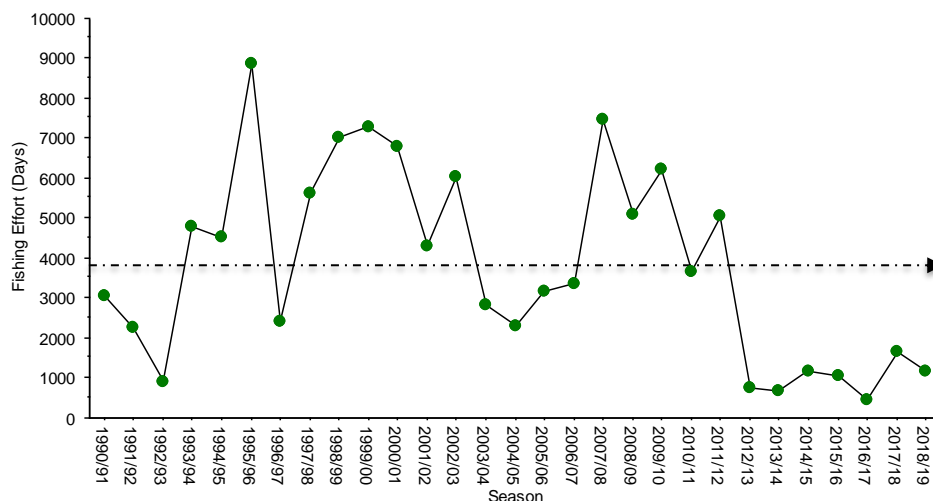


figure 4: Total fishing effort 2000 – 2019 (dotted line indicates long-term average).

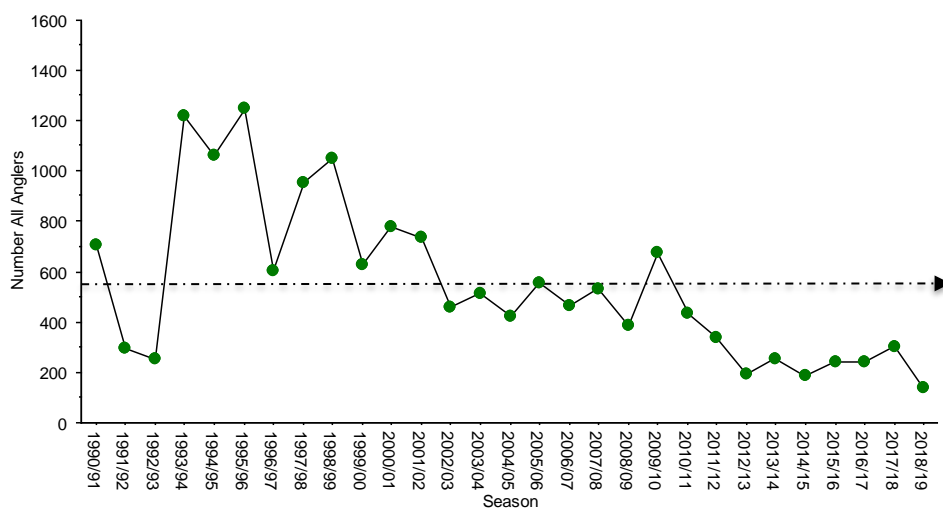


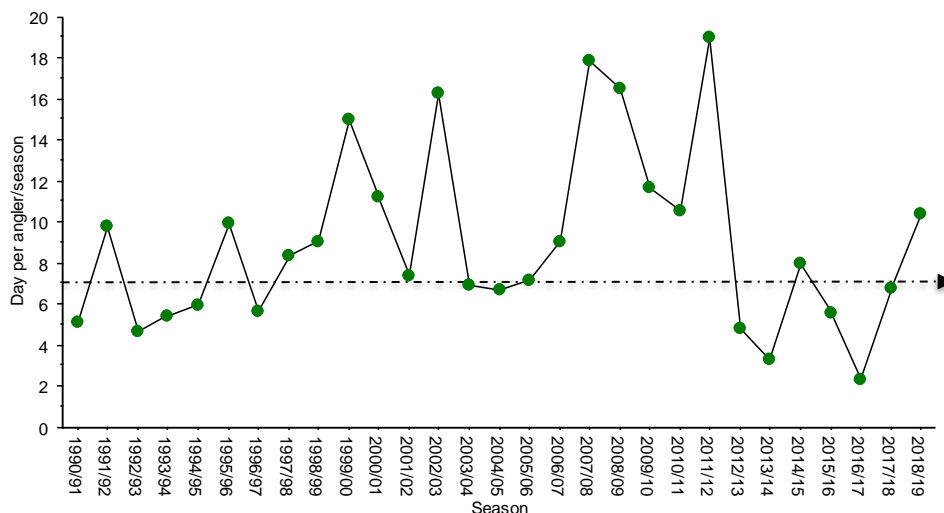
figure 5: Number of all anglers fishing per season 2000 – 2019 (dotted line indicates long-term average).

Through time, the total number of anglers fishing this water has continued to decrease to just 139 anglers during the 2018-19 season (see figure 5). While the number of anglers has declined, the average number of days per person, per season has generally increased until 2011-12. This suggest that local anglers still fish at this water, even when angling effort is low, the number of days reported by individual anglers remains elevated with a long-term average of 9 days per season (see figure 6).

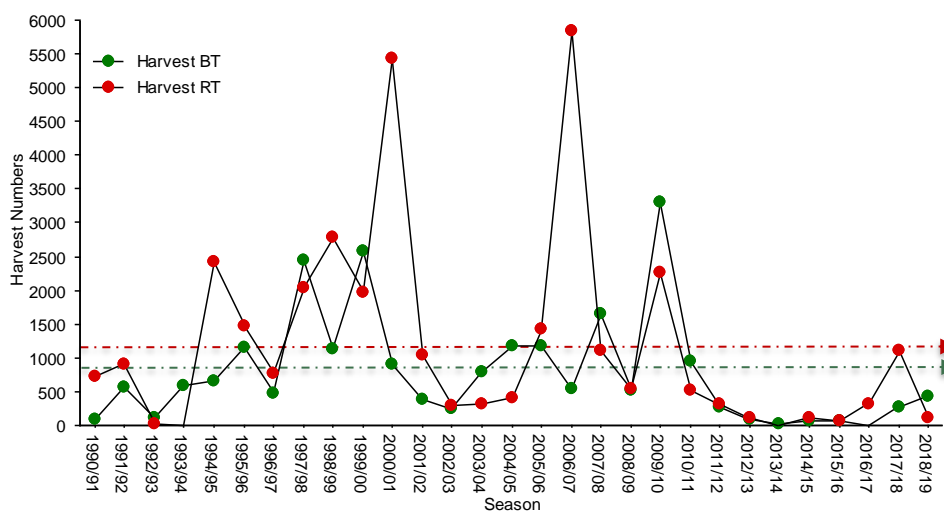


# Inland Fisheries Service Fisheries Performance Assessment

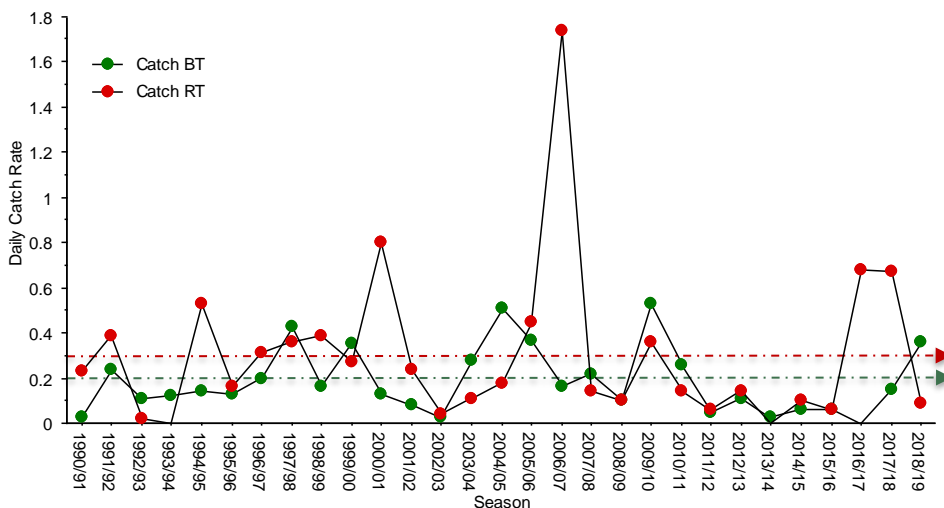
## Technical Report Curries River Reservoir August 2019



**figure 6:** Number of days fished per angler for each season 2000 – 2019 (dotted line indicates long-term average).



**figure 7:** Estimated harvest of brown & rainbow trout 2000 – 2019 (dotted lines indicates long-term average).



**figure 8:** Daily catch rate for brown & rainbow trout 2000 – 2019 (dotted line indicates long-term average).

# Inland Fisheries Service *Fisheries Performance Assessment*

## *Technical Report Curries River Reservoir August 2019*

The daily catch rate for brown trout has generally been low with a long-term average catch rate of just 0.2 fish per day (see figure 8). Even the peaks in the catch rate for brown trout are relatively low by comparison to other meaningful lake fisheries within the State and has only once exceeded 0.5 brown trout per day (i.e. one fish every two days fishing). The catch rate for 2018-19 was above the long-term average and may relate to the stocking of adult brown trout. Despite large peaks in the catch rate and harvest of rainbow trout during 2000-01 and 2006-07, the long term catch rate of 0.3 fish per day and resulting harvest have been low (see figures 7 & 8).

### **3.4. Stocking**

#### ***Brown trout***

Brown trout stocking of Curries River Reservoir has through time been inconsistent (see appendix 6A). Stocking has alternated between fry, fingerlings and adult fish, with some periods of no or low stocking rates. There is some evidence to suggest that fry, fingerlings and adults have produced an increase in catch rate at various times. But due to inconsistent stocking, no positive long term affects are apparent.

#### ***Rainbow trout***

The stocking of rainbow trout has generally been restricted by the availability of domestic rainbow trout from commercial sources. At times this has seen the stocking of larger numbers of advanced fish including yearling fish. When such stockings have occurred, such as in 2005-06 (see appendix 6B) there is generally an increase in catch rate. However, this link is not always apparent and some stockings may have failed.

# Inland Fisheries Service *Fisheries Performance Assessment*

## *Technical Report Curries River Reservoir August 2019*

### 4. Discussion

It is clear from CPUE data, the population estimate, and the very low catch rates recorded by anglers, that Curries River Reservoir has an extremely low population of brown trout. It is also evident the number of rainbow trout is low. Curries River Reservoir is a relatively large water and if meaningful catch rates for trout are to be achieved, this fishery will need to be more intensively managed. Results show there is no evidence of any natural recruitment of either trout species, consequently stocking will need to be the primary tool for increasing and maintaining the number of fish within the lake.

Regarding stocking rates, there is little indication as to what is an acceptable level, as previous stockings have been ad hoc or opportunistic, based on the number of fish available at any given time. There is some evidence to suggest that fry, fingerling and/or adult fish can influence catch rates but inconsistency in stocking over a long period makes it difficult to make an informed judgment. At present, the best short to medium solution would be to use adult brown trout and yearling rainbow trout. The fishery has excellent potential to grow fish to a substantial size with good condition, as demonstrated by the few resident fish captured during the survey. This aspect of the fishery should be incorporated into management actions to produce a quality wild brown trout fishery, consequently, adult brown trout stockings could be underpinned with consistent supplementary releases of large numbers of fry.

It is evident that anglers are willing to fish at this water, as previous high levels of angling effort have occurred. This is particularly relevant for local anglers that fish this water regularly and have been shown to spend extended periods fishing, even when lower catch rates occurred. The importance of this fishery as a local recreational resource is therefore an important issue in how this fishery can be managed. Management of the fishery should not be limited only to the stocking of brown and rainbow trout. The use of bag and size limits should be strongly considered to ensure acceptable catch rates are achieved.

Furthermore, the fishery does not have any defined fishery goals or objectives, which has most likely led to the ongoing poor performance of this water. A review of the data from the 1998 survey (see appendix 6C) shows this water can grow reasonable numbers of brown trout to over 2kg, which is comparable to the growth rates from this survey. Consequently, this element should be considered when setting goals for this fishery.

### **5. Recommendations**

- Long term objectives and goals are established for the Curries River Reservoir fishery that encompass the ability of this water to grow larger fish.
- A long-term stocking plan is established to meet the objectives and goals for this water. This plan should incorporate the use of adult brown trout in the short to medium term (recommended 2 000 per annum) and the stocking of significant numbers of brown trout fry (recommended an initial 60 000 per annum). Where feasible, an annual allocation of between 500 – 1,000 yearling rainbow trout (or fingerling equivalent) should be included in the annual stocking plan. These actions should be reviewed in 2026.
- A review of bag limits and size limits is undertaken to support the objectives and goals for this fishery.
- Monitoring of future angling effort and harvest is achieved by angler feedback and assessment via the annual postal survey (or similar mechanism).
- Monitoring of the trout population is undertaken during 2025-26 season to assess the success of management actions.

# Inland Fisheries Service *Fisheries Performance Assessment* *Technical Report Curries River Reservoir August 2019*

## 6. Appendix

<b>Year</b>	<b>Age</b>	<b>Number</b>	<b>Stock</b>	<b>Weight (g)</b>
2000	Fry	10 000	Wild	
2001	Fry	20 000	Wild	
2004	Adult	1 770	Wild	
2005	Fingerling	13 500	Wild	8.4
2005	Adult	1 000	Wild	1 000.00
2005	Fry	100 000	Wild	0.13
2006	Adult	600	Wild	100.00
2007	Fingerling	31 847	Wild	20.00
2008	Adult	750	Wild	1 100.00
2008	Fingerling	9 000	Wild	20.00
2009	Fingerling	20 000	Wild	5.00
2009	Adult	600	Wild	1 100.00
2009	Fingerling	14 000	Wild	5.50
2010	Fingerling	21 000	Wild	26.50
2011	Fry	5 000	Wild	5.00
2013	Fry	10 000	Wild	1.10
2014	Adult	400	Wild	600.00
2018	Adult	600	Wild	465.00
2019	Adult	1 175	Wild	850.00

**Appendix A:** Stocking records for Curries River Reservoir – brown trout (2000 – 2019)

# Inland Fisheries Service *Fisheries Performance Assessment*

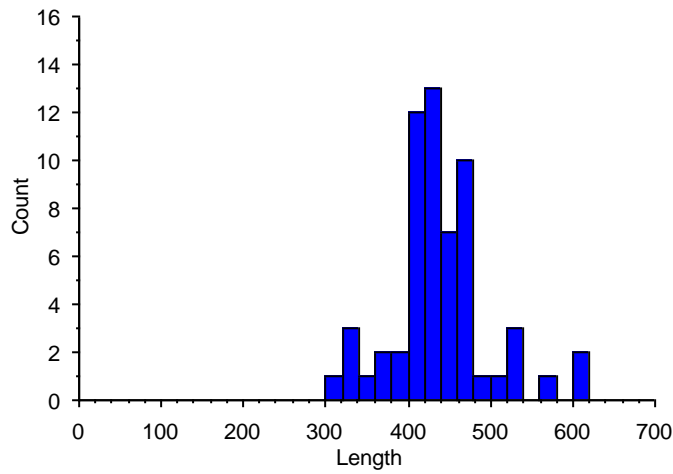
## *Technical Report Curries River Reservoir August 2019*

<b>Year</b>	<b>Age</b>	<b>Number</b>	<b>Stock</b>	<b>Weight (g)</b>
2000	Yearling	2 000	Domestic	200
2001	Adult	150	Domestic	1 500
2002	Fingerling	5 000	Domestic	10
2003	Advanced Fry	10 000	Domestic	
2004	Adult	350	Domestic	900
2004	Yearling	850	Domestic	
2004	Advanced Fry	20 000	Domestic	4
2005	Yearling	9 000	Domestic	200
2006	Fingerling	15 000	Domestic	15
2006	Yearling	3 500	Domestic	250
2007	Adult	300	Domestic	300
2008	Fingerling	10 000	Wild	20
2009	Fingerling	12 500	Domestic	20
2009	Fingerling	3 800	Domestic	100
2011	Fingerling	10 000	Wild	12
2012	Yearling	2 000	Domestic	200
2013	Fry	12 000	Wild	1.2
2013	Fingerling	3 000	Domestic	130
2014	Fingerling	13 400	Domestic	60
2015	Fingerling	10 000	Domestic	10
2017	Yearling	3 300	Domestic	220
2018	Adult	200	Domestic	385
2019	Adult	400	Domestic	500

**Appendix B:** Stocking records for Curries River Reservoir – rainbow trout (2000 – 2019)

# Inland Fisheries Service Fisheries Performance Assessment

## Technical Report Curries River Reservoir August 2019

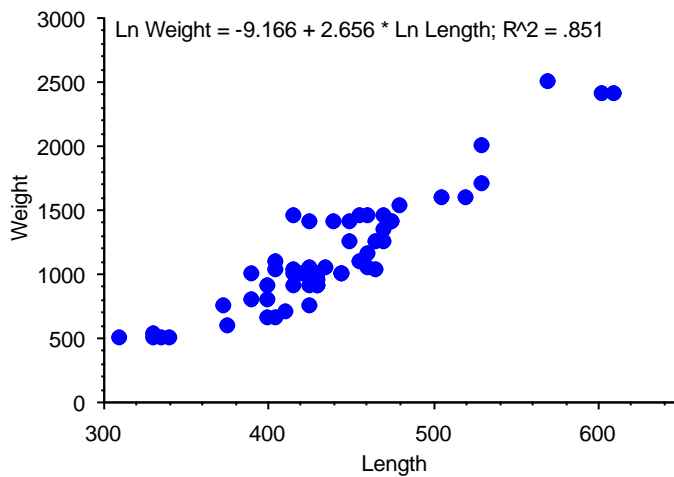


### Descriptive Statistics

	Mean	Count	Minimum	Maximum
Length	437	59	310	610
Weight	1133	59	500	2500

### Descriptive Statistics

	Mean	Minimum	Maximum
CF	1.313	0.980	2.030



**Appendix C:** Summary statistics for the 1998 netting survey of Curries River Reservoir (59 brown trout).