Inland Fisheries Service Carp Management Program

Quarterly Report

January to March 2019

Australian Government

Inland Fisheries Service

Inland Fisheries Service

Tasmanian Government

For further information contact:

Inland Fisheries Service

PO Box 575
New Norfolk

TAS 7140

Telephone: (03) 6165 3808

Facsimile: (03) 6173 0246

Email: infish@ifs.tas.gov.au

Find further information about Inland Fisheries Service (IFS) at www.ifs.tas.gov.au

This quarterly report details the Carp Management Program activities from January to March 2019.

The objective of the program is: *To eradicate carp from Tasmanian waters and, in the meantime, to minimise the impact of carp on Tasmania from economic, recreational and ecological points of view.*

Copyright

Disclaimer

Carp captures at a glance

Lake Sorell

January – March 2019 (Total)	Adult/Juvenile	Total 1995 to present
6	6 / 0	41,491

Lake Crescent

January – March 2019 (Total)	Adult/Juvenile	Total 1995 to present
0	0 / 0	7797

Overview

Lake Sorell

Fishing effort this quarter resulted in the removal of 6 carp from Lake Sorell. This is in comparison to 32 carp removed for the same period in 2018. All fish caught in gill nets were from nets set around the edge of the lake. In addition to gillnets, other fishing methods were used over the last three months (Table 1, Figure 1). These included big fyke nets stitched into barrier nets, the boat electro-shocker, and backpack electro-shockers. All these methods select for adult and any potential juvenile carp. No juvenile carp were caught while fishing across a wide area of the lake. However in December three adult carp were caught in Silver Plains marsh in the four inch monofilament gill net behind the barrier net. After catching these carp behind the barriers, intensive netting effort was done in the Silver Plains marsh, with an additional ten nets set. In January another carp was caught in these gill nets (Table 1). Of the four carp which were caught behind the barrier nets, two were males which were affected with the jelly gonad condition (JGC), while the other two were females which had their full gonads intact.

No other carp were caught behind the barrier nets and these nets were removed in late February, as the marshes became dewatered. The juvenile carp surveys conducted in January, February, and March did not find any juvenile carp, which suggests that these four fish were caught before they had a chance to spawn.

Table 1. Catch data from all methods used in Lake Sorell over the January-March 2019 quarter.

Gear Type	January	February	March	Total
Non-Targeted Gillnets	4	1	0	**5**
Inshore Set Gillnets*	0	0	0	**0**
Barrier Fyke Nets	0	0	0	**0**
Backpack Electro-shocker	0	0	0	**0**
Boat Electro-shocker	0	0	0	**0**
Gillnets Behind Barrier Nets	1	0	0	**1**
Total	**5**	**1**	**0**	**6**

*Blocking gillnets which prevent access to particular bays.

This quarter the majority (83%) of carp were caught in non-targeted gillnets set close to the edge of the lake (Table 1, Figure 1), which was similar to the proportion caught in January-March 2018, where non-targeted gill nets accounted for 78% of the total catch (Figure 1). The small number of carp caught this quarter (six fish) should be taken into account with the comparisons.

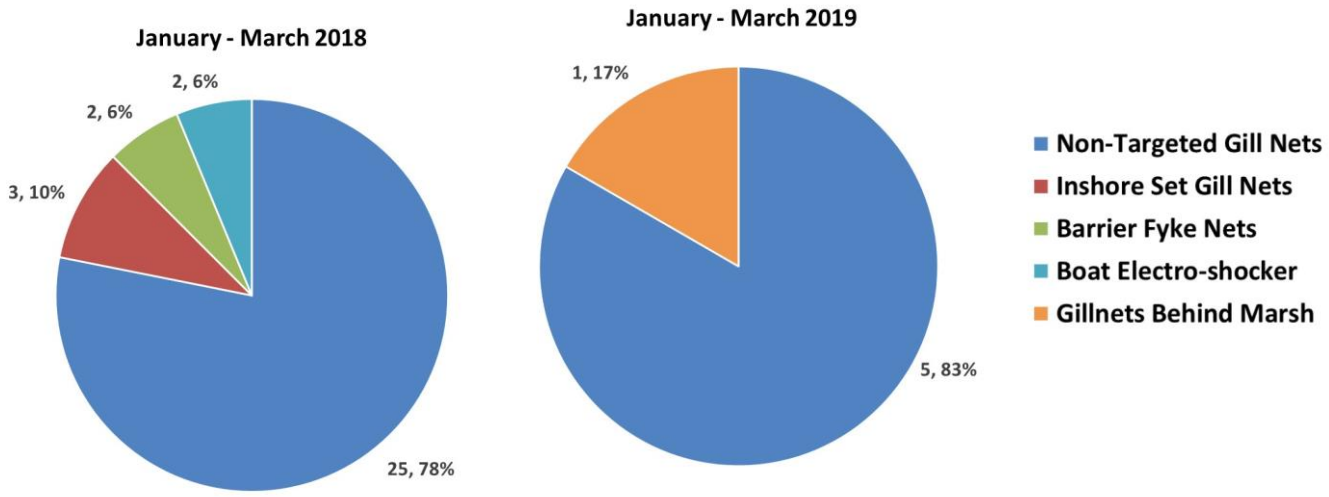


Figure 1. Actual numbers and percentages of total carp captures from all gear types used in Lake Sorell during the January-March quarter in both 2018 and 2019.

Picture 1. An example of the remaining nine year old carp now left in Lake Sorell.

This year inshore set gill nets, electrofishing, and barrier fyke nets did not account for any carp over the January to March quarter (Table 1, Figure 1). Trammel gillnets continued to be the main type of gill net used for non-targeted effort due to their high catch efficiency. Carp captures decreased in January, and by February only 1 fish was caught in non-targeted gill nets around the shoreline (Table 1). The low numbers of carp caught this quarter are likely to be because of environmental factors, as well as a low remaining number of carp left in the lake. A falling water temperature and lake level results in the carp moving away from the shore and back to deeper water, where their overall movement slows down. In response to these factors, some gill nets were moved away from the shoreline and set around reef structures, in particular the blow fly reef area. As a result of the low catch rates, by March all gill nets were removed from the lake, including the gill nets behind the barriers and the barrier fyke nets. The drop in overall carp caught this quarter continues the trend of declining catch rates as the 2009 cohort is fished out.

Table 2. Non-targeted carp captures, gillnet fishing effort, and catch per unit effort (carp per 100m net hour) in Lake Sorell during the January-March quarter for 2018 and 2019.

	Non-Targeted Carp Captures*		100m Net Hours		Catch Per Unit Effort	
Month	**2018**	**2019**	**2018**	**2019**	**2018**	**2019**
January	12	4	26715	49490	0.0004492	0.0000808
February	13	1	30171	30870	0.0004309	0.0000324
March	0	0	10129	0	0.0000000	0.0000000
Total	**25**	**5**	**67015**	**80360**	**0.0008801**	**0.0001132**

*Note: Non-targeted carp captures refers to carp caught in fishing gill nets without the aid of transmitter fish, and not part of aggregations.

Catch from non-targeted gillnets is standardized to carp per 100 m net hour, in order to allow us to compare between different nets, months, and years. With this information, the gear has been adjusted to allow us to catch more efficiently. This quarter, trammel gillnets were used a lot as they have been proven to catch better than the other types of net. Catch per unit effort (CPUE) of non-targeted gillnets was considerably less across all three months when compared with the same quarter in 2018 (Table 2, Figure 2).

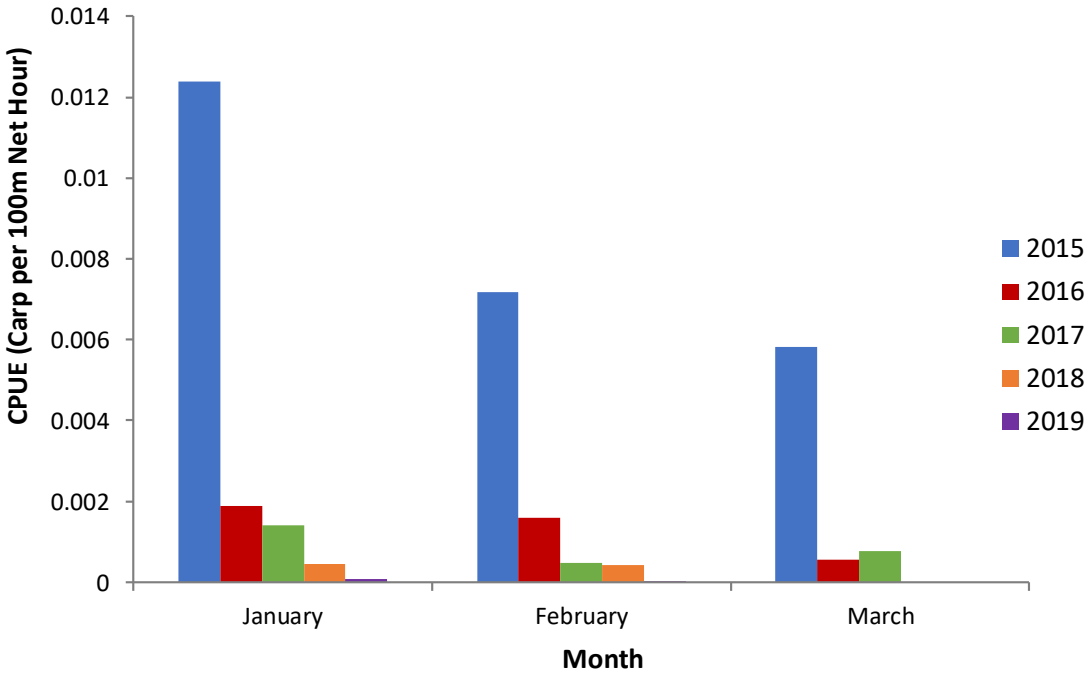


Figure 2. Catch per unit effort of non-targeted gillnet sets in Lake Sorell during the January-March quarter in 2015, 2016, 2017, 2018, and 2019.

Picture 2. A carp captured in a trammel gill net set behind the barrier net at Silver Plains marsh. Luckily this carp was caught before it was able to penetrate the marshes in an attempt to spawn.

The ratio of male carp with JGC has been close to 50% over the last two years (Figure 3). The ratio this quarter was 1 affected male to 1 healthy male (with a sample size of 2 fish), while the ratio for the previous quarter from October-December 2018 was 1 affected male to 1 healthy male (with a sample size of 14 fish) (Figure 3). With 50% of male carp now affected by the JGC, and the remaining proportion of males in poor condition averaging 600gm in weight, it is likely that these fish will play an important part in the final stages of the eradication due to their reduced reproductive output.

In summary, this past summer indicates that carp are now close to being eradicated from Lake Sorell. It is now believed that less than twenty carp remain. The data also shows that there is likely to be less male carp in the lake than females, and when you take into account the high proportion of JGC affecting the remaining males, and the overall poor condition and small size of the females, success is possible.

The focus moving into winter will be to begin the annual maintenance of gear, interrogate data, and plan strategies for the upcoming season.

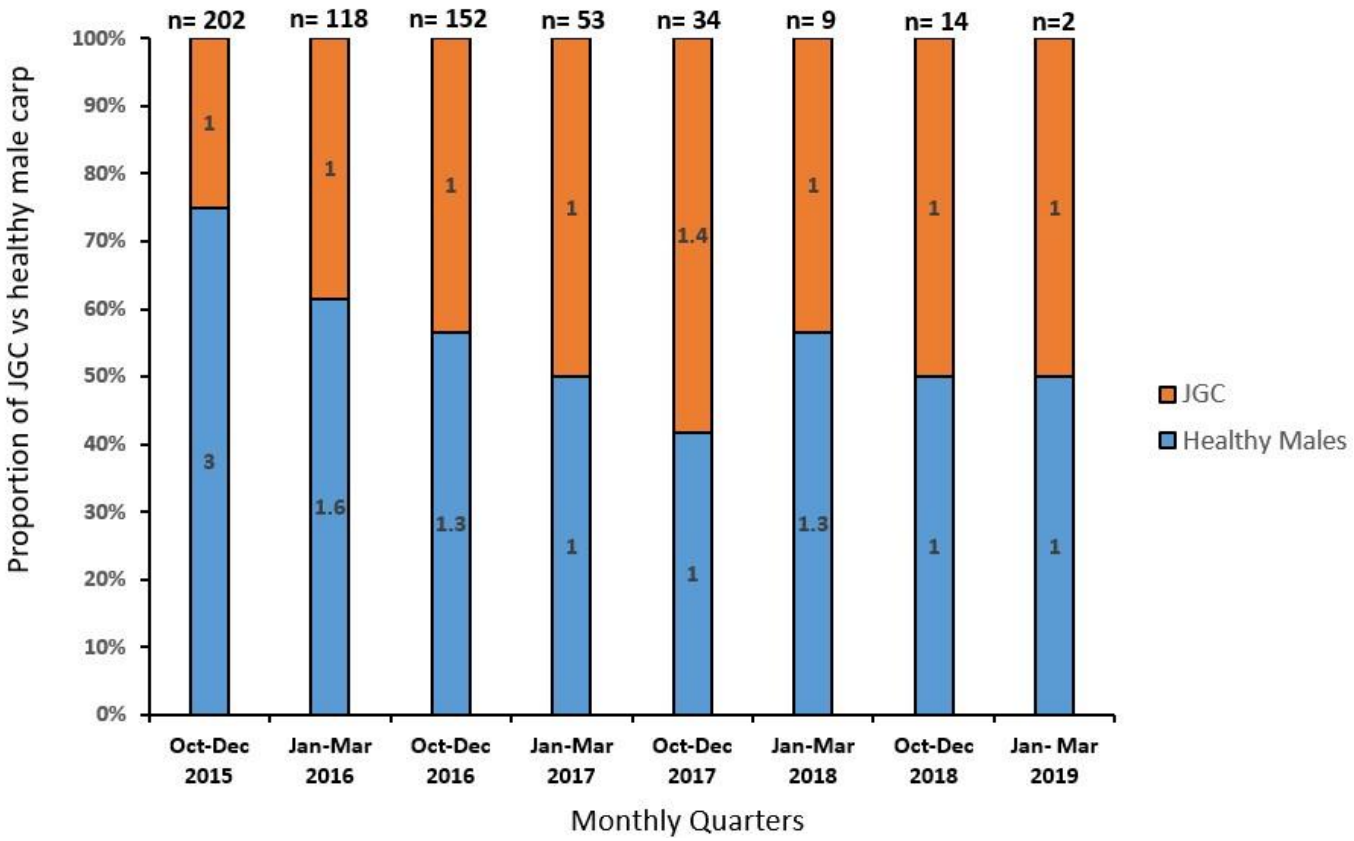


Figure 3. The ratio of jelly gonad condition to healthy males during the October-December and January-March quarters (2015-2019).

Lake Crescent

Since the extremely low water levels in 2008, the average total turbidity of Lake Crescent has decreased considerably (Figure 7). This is the direct result of high water levels flushing the lake after large rainfall events. The capture of a lone female carp in an aggregation with transmitter fish in December 2007 proved to be very important, with no other carp caught since this event. Despite annual surveys and monitoring over the past eleven years there has been no evidence of recruitment or the presence of any carp. Timely rains over the winter period have returned the lake to full supply level, allowing the marshlands to fully recover.

Picture 3. The winter period allows the lake level to rise in Lake Crescent, filling the marshes with water.

Juvenile Carp Surveys

Lake Crescent

The annual Lake Crescent juvenile carp survey took place on the 6th of March 2019. The aim of this survey was to make sure that carp had not made their way back into Lake Crescent, and to look for any sign of spawning. We have not seen a carp in Lake Crescent since 2007, but we do surveys every year to check.

We focused on areas that carp like. These include rocky or sandy shores and spaces with lots of weed. We fished fourteen areas around the lake using backpack electro-shockers for a minimum of 10 minutes at each location. A total of 280 electrofishing minutes was done, with short-fin eels and golden galaxias making up the majority of the catch. There was no sign of any carp in Lake Crescent.

Picture 4. Electrofishing the shallows of Lake Crescent showed no signs of carp.

Lake Sorell

The Lake Sorell juvenile carp survey was conducted from Monday the 18th to Friday the 22nd of March 2019. The aim of this survey was to check for any carp spawning over the past few months.

Sixty-six fyke nets were set around the lake near weed beds and parts of the shore where we have caught small carp before. Twenty sites were fished using backpack electro-shockers. Electrofishing was done for a minimum of 15 minutes at each location. In total, 7779 fyke net hours were put in over the survey, as well as a total of 278 electrofishing minutes. This resulted in eels and golden galaxiids caught, but no sign of any small carp.

This season monthly juvenile surveys from December to February were also done. These were done over a number of days and involved backpack electrofishing, as well as fine mesh dip netting weedy areas, from the barrier net back to the shoreline. No juvenile carp were found on any of the surveys which suggests that spawning was stopped again.

Picture 5. Installing fyke nets around the edge of the lake to target juvenile carp.

The Clyde River Survey

As well as the lakes Sorell and Crescent juvenile carp surveys, a downstream carp survey of the Clyde River was also done. The survey looks at sites with ideal carp habitat around Bothwell and Hamilton, and to make sure there are no carp in the Clyde River system. The survey has been done for the last 24 years. Backpack electrofishing was done at three sites on the Clyde River which includes the Nant Bridge (300m stretch), the Bothwell sewage works (100m stretch), and the Hamilton Weir (100m stretch). A minimum of 30 minutes of backpack electrofishing was done at each site, with a range of species caught. 27 redfin perch, 36 tench, 35 brown trout, and 60 eels were shocked in total. Most importantly, no carp were found, which shows that the containment strategy used since 1995 has been successful.

Picture 6. A haul of juvenile redfin perch and tench caught while electrofishing the Clyde River.

Golden galaxias survey

The annual golden galaxias *(Galaxias auratus)* survey was done during 27-29 March 2019. This is the 14th consecutive year this action from the Lakes Sorell and Crescent Water Management Plan 2005 has been completed.

At lakes Sorell and Crescent, twelve fine-mesh fyke nets were set overnight at three locations within each lake. Sets consisted of four fyke nets at each location, with the number of golden galaxias captured per fyke net recorded. In addition, the fork lengths of 100 golden galaxias were recorded for each lake.

Table 3. Captures of golden galaxias in fyke nets, set at three locations in lakes Crescent and Sorell 2019.

Lake	Location	No. Fyke Nets	Number Captured
Crescent	Site 1 Agnew Creek Shore	4	2,309
	Site 2 Boathouse Shore	4	882
	Site 3 Lower Clyde Marsh	4	3,488
	Total	***12***	***6,679***
Sorell	Site 1 East side of Island	4	48
	Site 2 Inside Grassy Point	4	4442
	Site 3 Dogshead Point	4	1392
	Total	***12***	***5,882***

The total catch of golden galaxias in Lake Crescent was 6,679, with all sites producing good numbers of fish. At Lake Sorell 5,882 golden galaxias were captured, with the Grassy Point site capturing three

quarters of the total catch (see Table 3). This site also produced over half the total catch at Lake Sorell during the 2018 survey and remains a highly productive area for galaxiids.

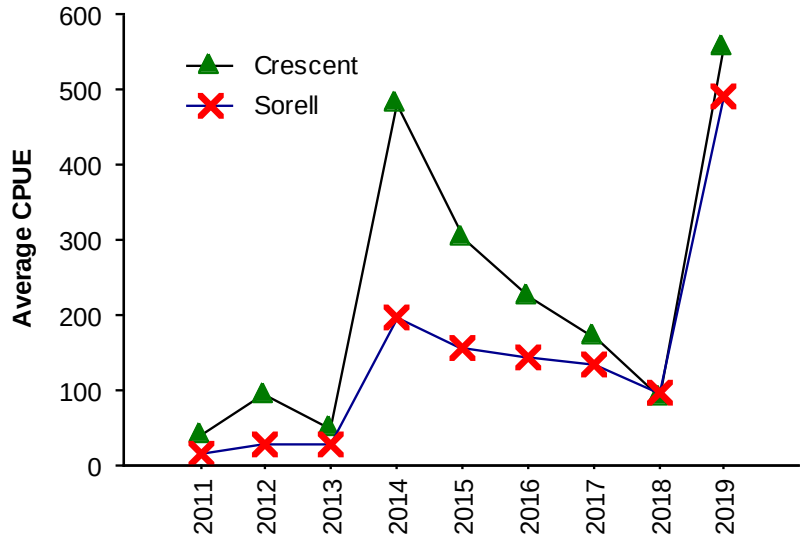


Figure 4. Average (mean) CPUE of golden galaxias for lakes Crescent and Sorell, 2011-2019.

The long term declining trend in CPUE for Lake Crescent has now been stopped, with a major increase in the number of galaxiids captured during the 2019 survey (see Figure 4). This increase is almost entirely due to the presence of a large number of juvenile fish resulting from the 2018 spawning. A similar magnitude of change was also recorded at Lake Sorell with the CPUE increasing by 400% between the 2018 and 2019 surveys. This result reflects the response of high recruitment during inundation of rocky and marshland areas that provided favorable spawning conditions and preferred juvenile habitat.

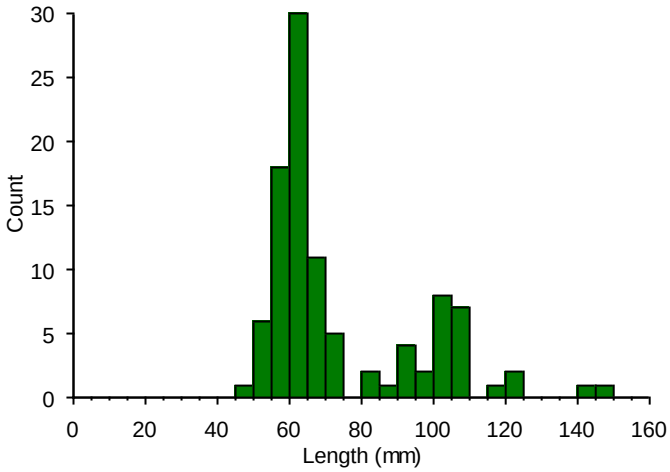


Figure 5. Length frequency of golden galaxias sampled from Lake Crescent 2019 (n=100).

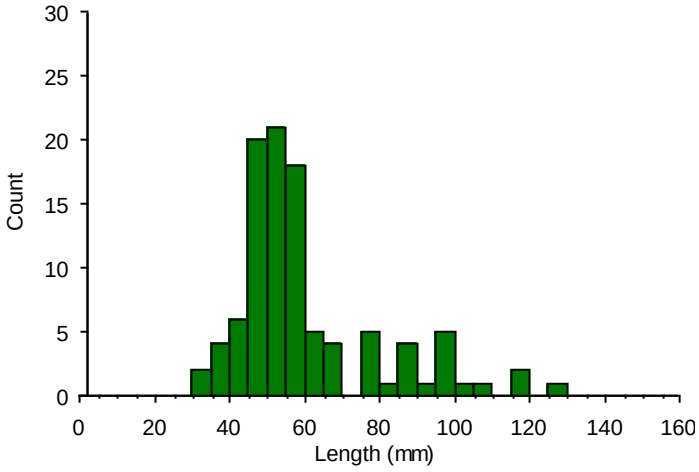


Figure 6. Length frequency of golden galaxias sampled from Lake Sorell 2019 (n=100).

There were very high numbers of young of the year golden galaxias captured in both lakes, with a strong cohort of juvenile fish in the 35 – 75 mm length range for Lake Crescent (Figure 5), and 30 – 70 mm for Lake Sorell (Figure 6). In comparison to the 2018 survey, there appears to be lower survival of longer (older) fish into the 3+ year class at both lakes.

Based on these results, the golden galaxias populations within lakes Crescent and Sorell remain healthy and resilient. The provision of favourable lake level management during the critical spawning and juvenile development stages is necessary if this resilience is to persist.

Picture 7. A wide range of size classes of golden galaxias were caught during the Lake Sorell and Crescent surveys.

Work experience

Maddie Crowden is a recent graduate from the Australian Maritime College who completed a Bachelor of Marine Science and Fisheries Management. She grew up around two marine scientists, and ever since then she's had a strong interest in fisheries management and the aquatic environment. In addition to her studies, she also became a very keen fresh and saltwater fisher. After completing her degree, she begun actively looking for employment opportunities in the fisheries field. Through word of mouth with her fellow AMC peers, she got in touch with the CMP and organised a volunteer shift to spend a few days in the field at Lake Sorell. The activities she was involved in ranged from general boating activities, to checking and setting of gillnets/fyke nets, using the backpack electro-fishers to survey the margins of the lake, and dissecting carp and staging the maturity of the gonads. She was also able to develop important skills in relation to boat operation and aquatic field work. Due to Maddie's great work ethic and initiative, she was offered casual employment over the carp season from January through till March. During her casual employment she was also involved in two juvenile carp surveys on Lake Sorell, which gave her some insight into the range of monitoring the CMP undertakes in order to work towards a complete eradication. The experience also assisted her in developing her practical and theoretical skills she learnt during her university studies, and enable her to apply them in a working environment. She hopes that she can continue to fine tune these skills towards future careers in the aquatic, environmental, or fisheries departments around Australia.

Picture 8. Maddie Crowden electrofishing the marshes in search of juvenile carp

Employment and funding

Four casual workers were employed to assist with carp management activities.

Table 4. Work experience (January – March 2019)

Name	Background	Timeline
Benjamin Elliott	Deakin University	2nd – 14th January
Chris Boon	Fisheries Queensland	9th – 10th January
Maddie Crowden	Australian Maritime College	9th – 10th January
Travis Harris	Australian Maritime College	22nd – 24th January
Dave Mossop	Melbourne University	12th – 14th January

Table 5. Casual positions (January – March 2019)

Name	Background	Timeline
Craig Burgess	Salmon Aquaculture Attendant	2nd – 3rd January
Kim Clark	Interlaken Shack Owner	1st January – 29th March
Jake Brumley	Australian Maritime College	27th – 28th January
Maddie Crowden	Australian Maritime College	18th January – 22nd March

Water Management

Table 6. Water Release data (January – March 2019)

Month	Lake Sorell release (ML)*	Lake Crescent release (ML)
January	-	2142.89
February	-	2428.84
March	-	1325.49
TOTAL	**-**	**5897.22**

* Note: There is no continuous flow monitoring on the Lake Sorell release, only spot checks are done.

Picture 9. Robertsons Marsh completely de-watered in mid-March. The low lake level of Lake Sorell makes conducting the juvenile carp survey much more focused, and gives the CMP a higher chance of detecting any evidence of spawning.

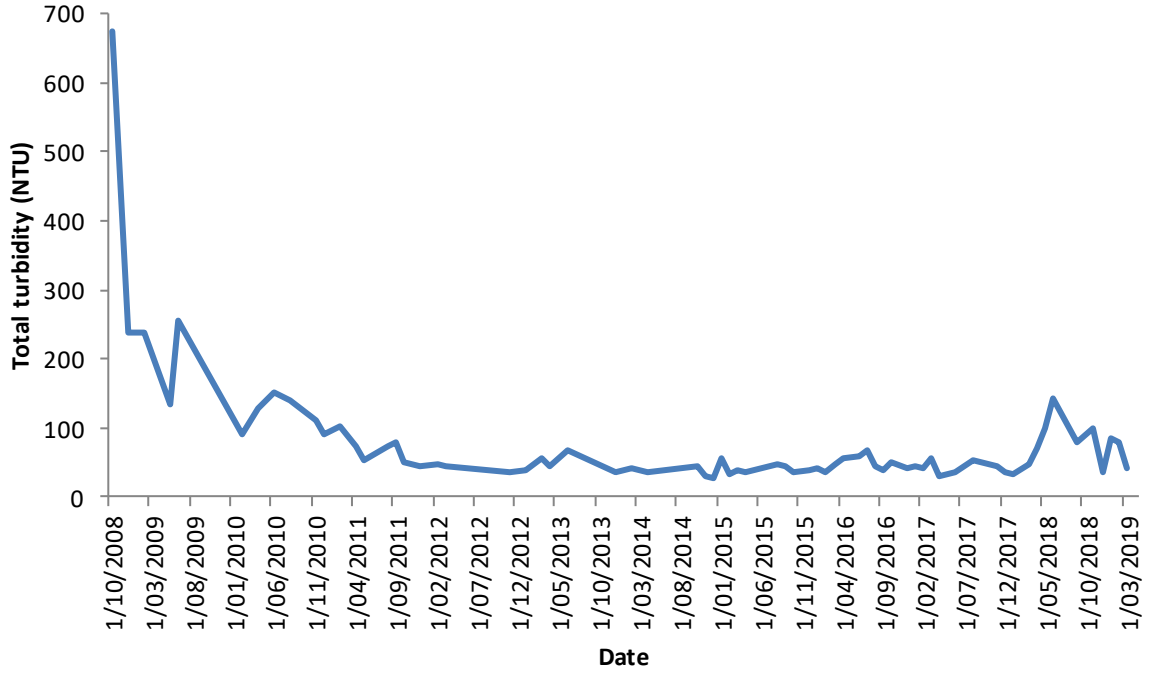


Figure 7. Turbidity levels in Lake Crescent from October 2008 to March 2019.

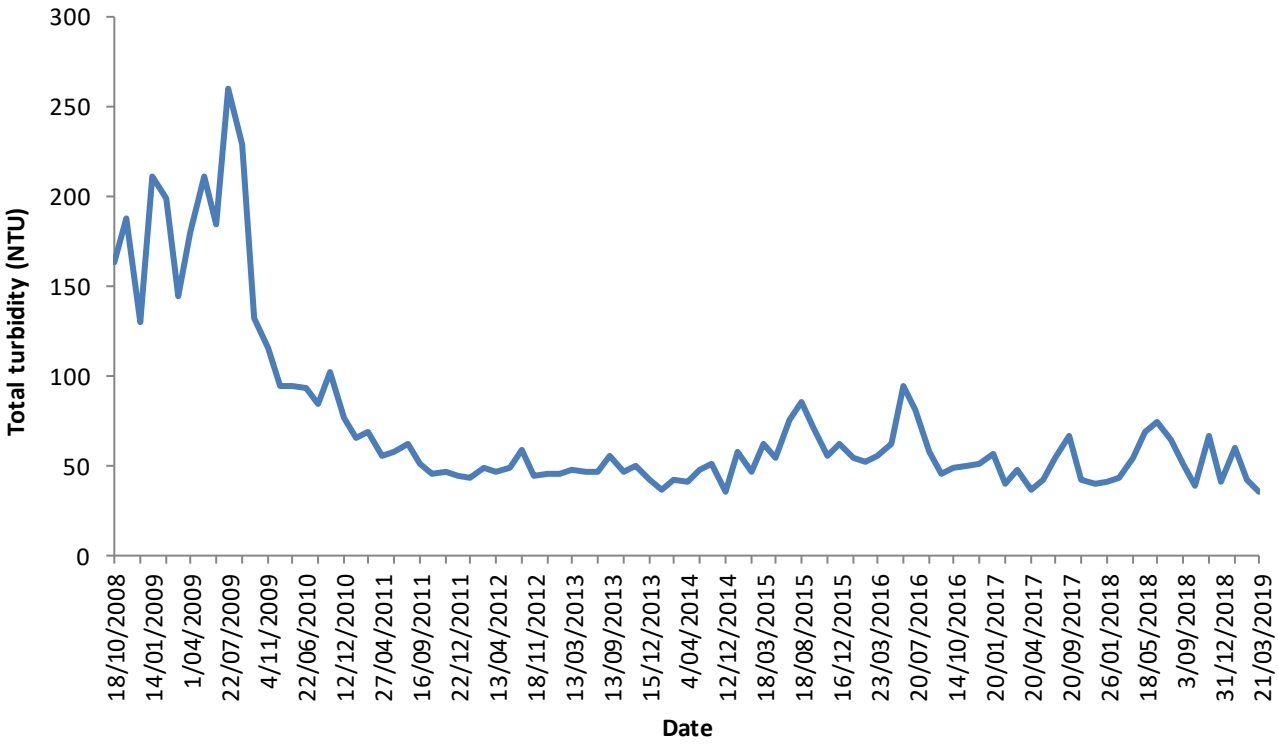
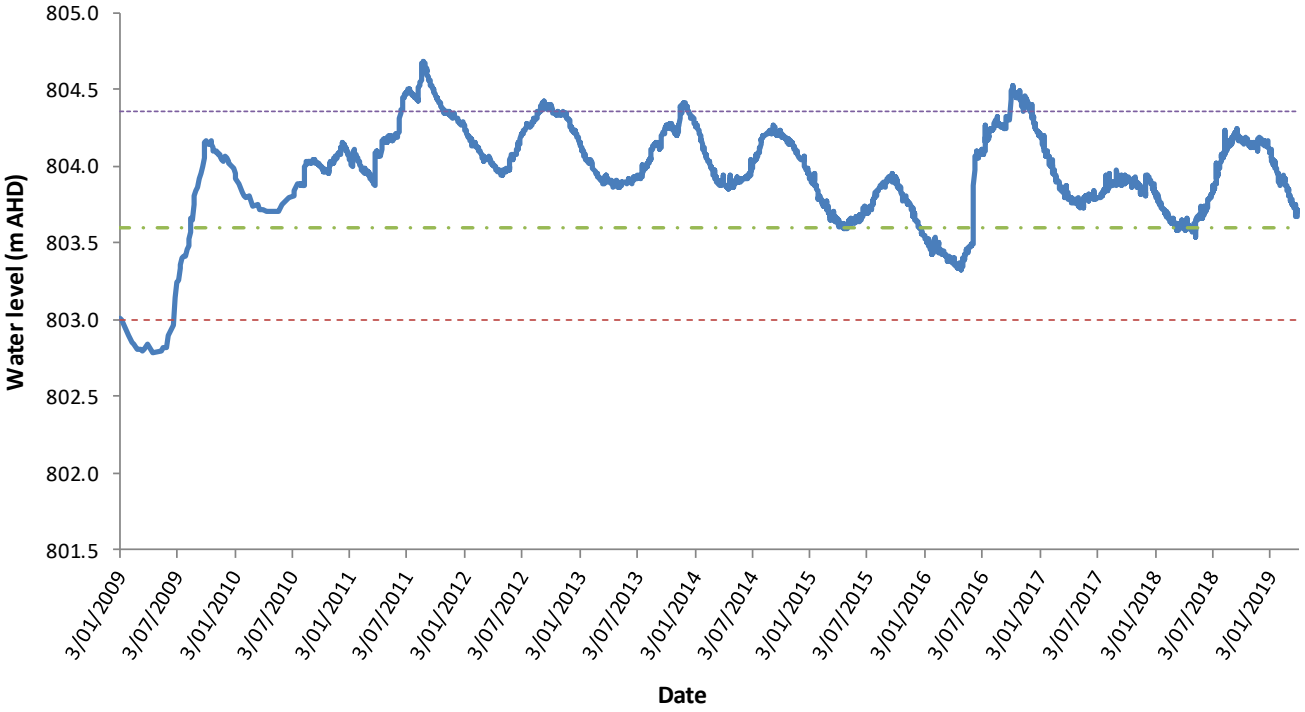


Figure 8. Turbidity levels in Lake Sorell from October 2008 to March 2019.

Lake Sorell



Lake Crescent