

Inland Fisheries Service Carp Management Program

Quarterly Report



January to March 2018



Australian Government

Inland Fisheries Service



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This quarterly report details the Carp Management Program activities from January to March 2018.

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.*

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Carp captures at a glance

Lake Sorell

January – March 2018 (Total)	Adult/Juvenile	Total 1995 to present
32	32 / 0	41,450

Lake Crescent

January – March 2018 (Total)	Adult/Juvenile	Total 1995 to present
0	0 / 0	7797

Overview

Lake Sorell

Fishing effort this quarter resulted in the removal of 32 carp from Lake Sorell. This is in comparison to 135 carp removed for the same period in 2017. Most fish were caught in gill nets set around the edge of the lake, with only a small number of fish caught offshore. In addition to gillnets, a wide range of 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 combined select for adult and any potential juvenile carp. No juvenile carp were caught while fishing across a wide area of the lake. Another positive note is the fact that no carp were caught in the gill nets set behind the barrier nets this quarter (Table 1). A total of 3 km of gillnets had been set in the marshes behind the barrier nets over the past 5 months to catch any carp which attempted to reach spawning habitat. Last year in the January-March quarter, 11 carp were caught in these nets. No adult carp were caught in these areas and no spawning was observed.

Table 1. Catch data from all methods used in Lake Sorell over the January-March 2018 quarter.

Gear Type	January	February	March	Total
Non-Targeted Gillnets	12	13	0	25
Inshore Set Gillnets*	2	1	0	3
Barrier Fyke Nets	2	0	0	2
Backpack Electro-shocker	0	0	0	0
Boat Electro-shocker	0	2	0	2
Gillnets Behind Barrier Nets	0	0	0	0
Total	16	16	0	32

*These gillnets include blocking gillnets which prevent access to particular bays, fixed gill nets set adjacent to the shoreline, and gillnets set around transmitter fish in the shallows.

This quarter the majority (78.13%) of carp were caught in non-targeted gillnets set close to the margins of the lake (Table 1, Figure 1), which was a higher proportion than in January-March 2017, where non-targeted gill nets accounted for 52.60% of the total catch (Figure 1). Inshore set gill nets, electrofishing, and barrier fyke nets all resulted in a similarly small proportion of carp captures (Table 1, Figure 1). Trammel gillnets were the main type of gill net used for non-targeted effort due to their high catch efficiency. The biggest carp for the season was caught in late January, in a non-targeted trammel gill net set off the shore at Dogs Head Bay. The big female carp weighed 2229gm, and had a gonad weight of 401gm (GSI: 18%). This was the only large carp caught all season, with no fish exceeding 1500gm, and the average size caught was less than 1000gm.

Carp captures remained steady in January and February with fish continuing to be caught in non-targeted gill nets around the shoreline, however by March catch rates dropped off completely (Table 1). This is likely to be due to a combination of environmental factors, which includes a falling water temperature and lake level, as well as cold unsettled weather. These conditions result in the carp moving away from the shore and back to deeper water, where their overall movement slows down.



Picture 1. The biggest carp of the 2017/18 season; a 2.2kg female carp caught in a non-targeted trammel gill net set off the shore at Dogs Head.

In response to these factors, the majority of gill nets were moved away from the shoreline and around reef structures. The gill nets behind the barrier nets were also removed in March, and some of these nets were also redeployed offshore. Despite the increased effort offshore, no carp were caught for the month of March, which is the first time this has occurred in the last nine years. The drop in overall carp caught this quarter continues the trend of declining catch rates as the 2009 cohort is fished out (Table 1).

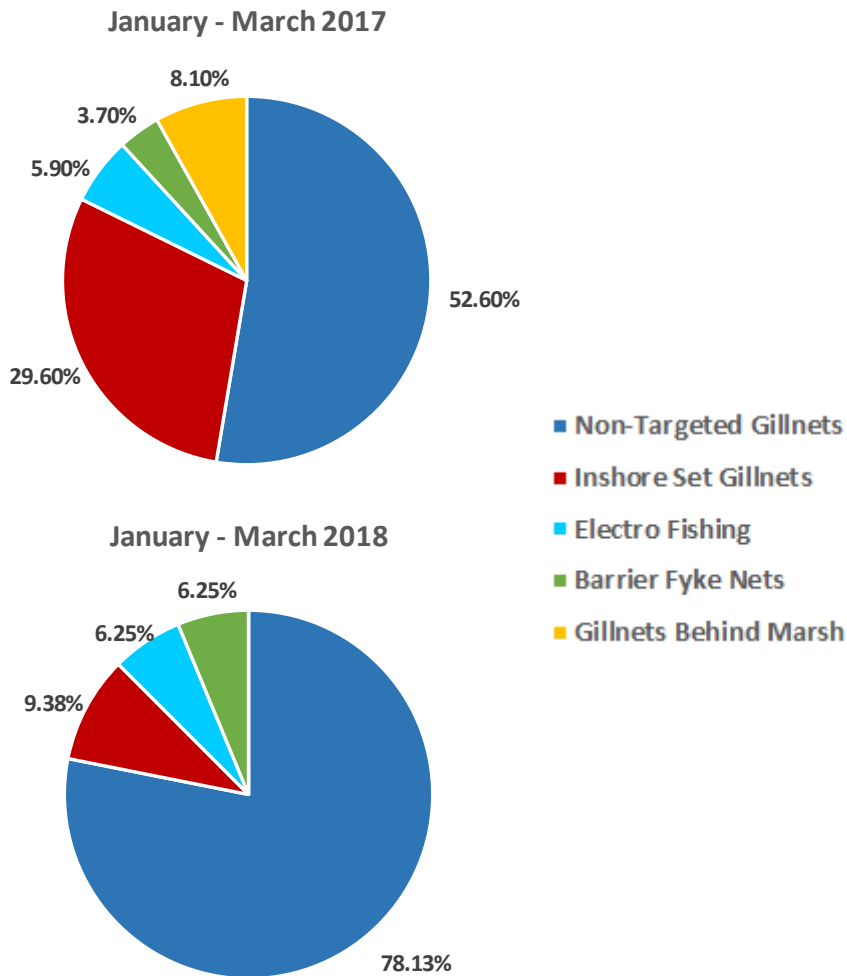


Figure 1. Percentage of total carp captures from all gear types used in Lake Sorell during the January-March quarter in both 2017 and 2018.

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 fish. This quarter, trammel gillnets continued to be used in greater quantities due to their higher efficiency. Catch per unit effort (CPUE) of non-targeted gillnets was considerably less across all three months when compared with the same quarter in 2017 (Table 2, Figure 2).

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 2017 and 2018.

Month	Non-Targeted Carp Captures*		100m Net Hours		Catch per Unit Effort	
	2017	2018	2017	2018	2017	2018
January	44	12	31137	26715.04	0.0014131	0.0004492
February	22	13	47341	30171.60	0.0004647	0.0004309
March	5	0	6547	10129.87	0.0007637	0.0000000
Total	71	25	85025	67016.51	0.0026415	0.00088

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

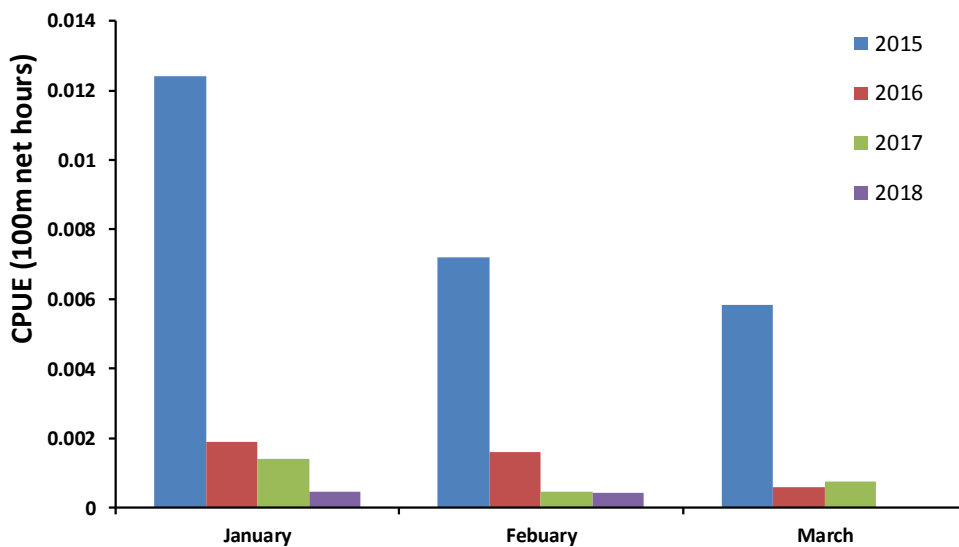


Figure 2. Catch per unit effort of non-targeted gillnet sets in Lake Sorell during the January-March quarter in 2015, 2016, 2017, and 2018.

Transmitter fish were targeted throughout the 2017/18 season however no aggregations were detected. This quarter there were six events where transmitter fish were actively targeted with gill nets and backpack electro-shockers, when detected around the shallow margins of the lake. One such event occurred on the 9th of January when four transmitter fish were located in close proximity in Diamond Bay. A congregation of numerous transmitter fish in an area has previously been a good indication of a

large aggregation, and usually resulted in high carp catch rates. The last big aggregation occurred on the 28th of November 2012, where five transmitter fish were detected in Kermodes Bay over the muddy shallows. Targeting these fish resulted in the capture of 717 carp in a day. With this in mind, it could be expected to catch a reasonable number of fish in this event. However, after sampling the area with gill nets, backpack electro-shockers, and boat electro-shockers, not a single wild carp was detected, with only the transmitter fish being caught. Of the five other targeting events this quarter, only two carp were caught as a result (one ex-transmitter fish and one wild fish). The low associated catch rates with targeting tracker fish and the lack of aggregations are all good indicators of a critically small remaining population size.



Picture 2. The result of targeted effort using radio telemetry equipment, a gill net, and backpack electrofishing; on the left is an ex-transmitter fish which was caught in a trammel net, as a result of pin pointing a current transmitter fish on the right..

The ratio of carp with jelly gonad condition (JGC) has continued to increase since the 2015/16 season. The ratio this quarter was 4 affected males to 1 healthy male, while the ratio for the previous quarter from October-December 2017 was 1.5 affected males to 1 healthy male. Due to the low sample size of wild male fish this quarter (5 carp), this ratio may not be an accurate representation. The increase in male carp affected by JGC will play an important part in the final stages of the eradication due to their reduced reproductive output. This further supports the hypothesis that the remaining carp are the remnants of the population with the slowest development.

In summary, this quarter gave the CMP an indication of the upcoming season, in respect to fishing down critically low numbers of carp. The reducing CPUE associated with the daily netting requires focused effort. However, these signs are very positive, and the team is motivated to maintain the fishing pressure. By continuing to use a range of fishing techniques the aim will be to finish off any remaining carp during Spring 2018. The focus moving into winter will be monitoring the transmitter fish, as well as beginning annual maintenance of gear and preparing/planning for the upcoming season.

Lake Crescent

Lake Crescent's water quality is continuing to show signs of improvement (Figure 6). Since the extremely low water levels in 2008, the average total turbidity of Lake Crescent has decreased considerably. 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. Electrofishing the shallows of Lake Crescent showed no signs of carp.

Juvenile Carp Surveys

Lake Crescent

The annual Lake Crescent juvenile carp survey took place on the 15th of March 2018. 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 signs of new recruitment if spawning had occurred recently. Although no carp have been seen in Lake Crescent since 2007, surveys are still carried out every year to ensure a carp free lake.

Backpack electrofishing was undertaken in areas where historically carp were known to favour. These habitats included rocky shores, sandy shores, and areas with lots of underwater vegetation. 14 areas around the lake were surveyed using backpack electro-shockers for a minimum of 10 minutes at each location. A total of 210 electrofishing minutes was undertaken, with short-fin eels and golden galaxias making up the majority of the catch. A couple of well-conditioned rainbow trout were also caught in the shallows. There was no sign of any carp present in Lake Crescent.



Picture 4. One of the well-conditioned short fin eels caught during the Lake Crescent juvenile carp survey.

Lake Sorell

The Lake Sorell juvenile carp survey was conducted from Monday the 5th to Friday the 9th of March 2018. The aim of this survey was to determine if spawning had occurred over the past few months, and whether any new cohorts of carp could be detected.

66 fyke nets were set around the lake in close proximity to macrophytes and near shore areas where young of the year carp have been caught previously. In addition to this, backpack electro-shockers were used at 24 sites around the lake. Electrofishing was undertaken for a minimum of 15 minutes at each location. In total, 6149 fyke net hours were put in over the duration of the survey, as well as a total of 385 electrofishing minutes. This resulted in numerous eels and golden galaxiids caught, but no sign of any young of the year carp.

This season additional monthly juvenile surveys from October to February were also done. These were undertaken over one or two days and involved backpack electroshocking, as well as fine mesh dip

netting of any available wetland areas, from the barrier net back to the shoreline. No juvenile carp were detected on any of the surveys which suggests that spawning was stopped again.



Picture 5. Checking fyke nets set around the edge of the lake to target any 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 examines selected sites that feature ideal carp habitat immediately downstream of Lake Crescent to the township of Hamilton, and ensures that carp have not become established in the Clyde River system. The survey has been done each year since carp were first found in lakes Crescent and Sorell. 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. 55 redbfin perch, 9 tench, 3 brown trout, and 11 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 good brown trout shocked upstream of the Nant Bridge in one of the shallow pools.

Golden galaxias survey

The annual golden galaxias (*Galaxias auratus*) survey was conducted during March 2018. This is the 13th 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 2018.

Lake	Location	No. Fyke Nets	Number Captured
Crescent	Site 1 Agnew Creek Shore	4	504
	Site 2 Boathouse Shore	4	222
	Site 3 Lower Clyde Marsh	4	365
	Total	12	1,091
Sorell	Site 1 East side of Island	4	327
	Site 2 Inside Grassy Point	4	706
	Site 3 Dogshead Point	4	143
	Total	12	1,176

The total catch of golden galaxias in Lake Crescent was 1,091, with all sites producing good numbers of fish. At Lake Sorell, 1,176 golden galaxias were captured with the Grassy Point site capturing over half the total catch (Table 3).

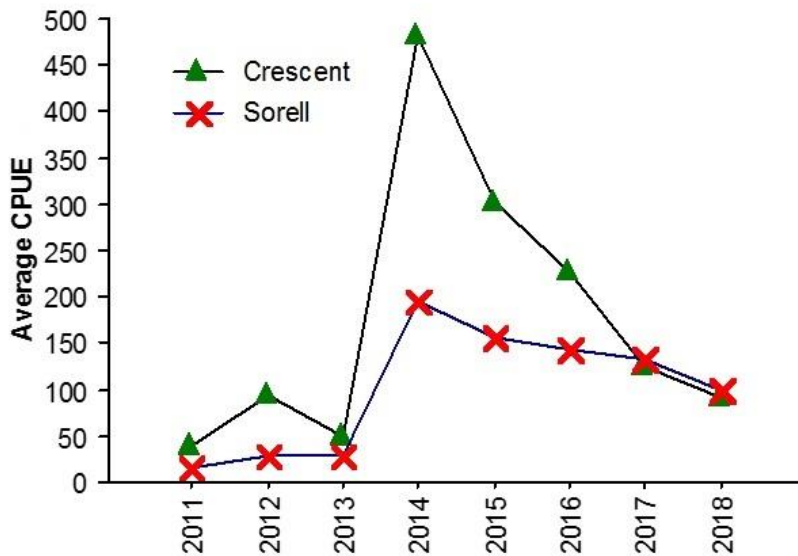


Figure 3. Average (mean) CPUE of golden galaxias for lakes Crescent and Sorell, 2011-2018.

The long term trend in CPUE for Lake Crescent shows a continuing decline in catch following an extreme high CPUE during 2014 (Figure 3). This trend most likely reflects the response of high recruitment during inundation of rocky and marshland areas that provided favorable spawning conditions and preferred juvenile habitat. The decline in CPUE at Lake Sorell was not as apparent and is within the bounds of normal variability (Figure 3). However, the CPUE for both lakes Crescent and Sorell remained above that for the period 2011-13.

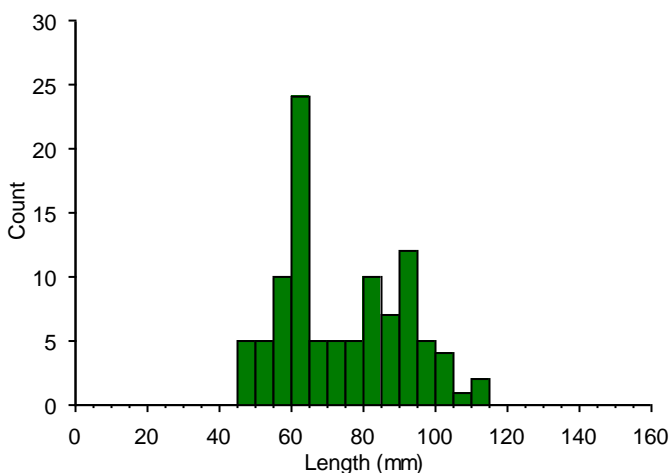


Figure 4. Length frequency of golden galaxias sampled from Lake Crescent 2018 (n=100).

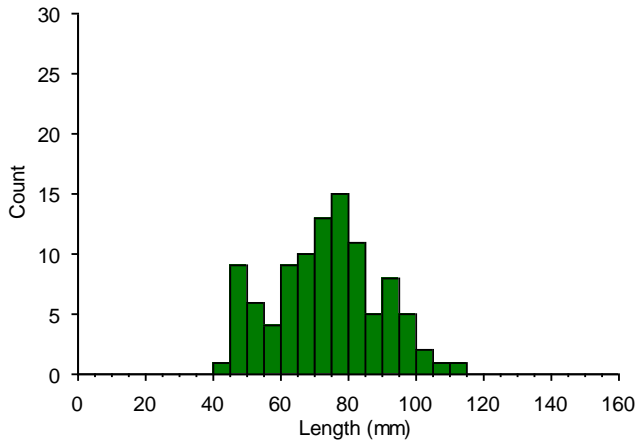


Figure 5. Length frequency of golden galaxias sampled from Lake Sorell 2018 (n=100).

Captures of young of the year (YOY) golden galaxias were significant in both lakes, with a strong cohort of juvenile fish in the 45 – 65 mm length range for Lake Crescent (Figure 4), and 40 – 60 mm for Lake Sorell (Figure 5). In contrast to the 2017 survey results, there appears to be good survival of longer (older) fish into the 3+ year class, particularly for Lake Sorell. Based on these results, the golden galaxias populations within lakes Crescent and Sorell presently remain healthy, with strong recruitment evident in the period 2014 – 2018. However, the continued decline in CPUE for Lake Crescent during 2015-18 needs scrutiny to ensure this population remains robust.



Picture 7. A large golden galaxias caught during the 2018 survey, displaying its striking markings.

Employment and funding

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

Table 4. Work experience (January – March 2018)

Name	Background	Timeline
Alex Gilmour	Elizabeth College	23 rd – 25 th January

Table 5. Casual positions (January – March 2018)

Name	Background	Timeline
Raihan Mahmud	Institute for Marine and Antarctic Studies PHD student	20 th January – 24 th February
Kim Clark	Interlaken Shack Owner	19 th January – 9 th March
Josef Wisniewski	University of Melbourne graduate	8 th February

Water Management

Table 6. Water Release data (January – March 2018)

Month	Lake Sorell release (ML)*	Lake Crescent release (ML)
January	-	1542.84
February	-	1213.34
March	-	825.59
TOTAL	-	3581.77

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



Picture 8. A 1.3kg mirror carp caught in a trammel net set around a transmitter fish. This could be one of the few remaining mirror carp left in Lake Sorell.

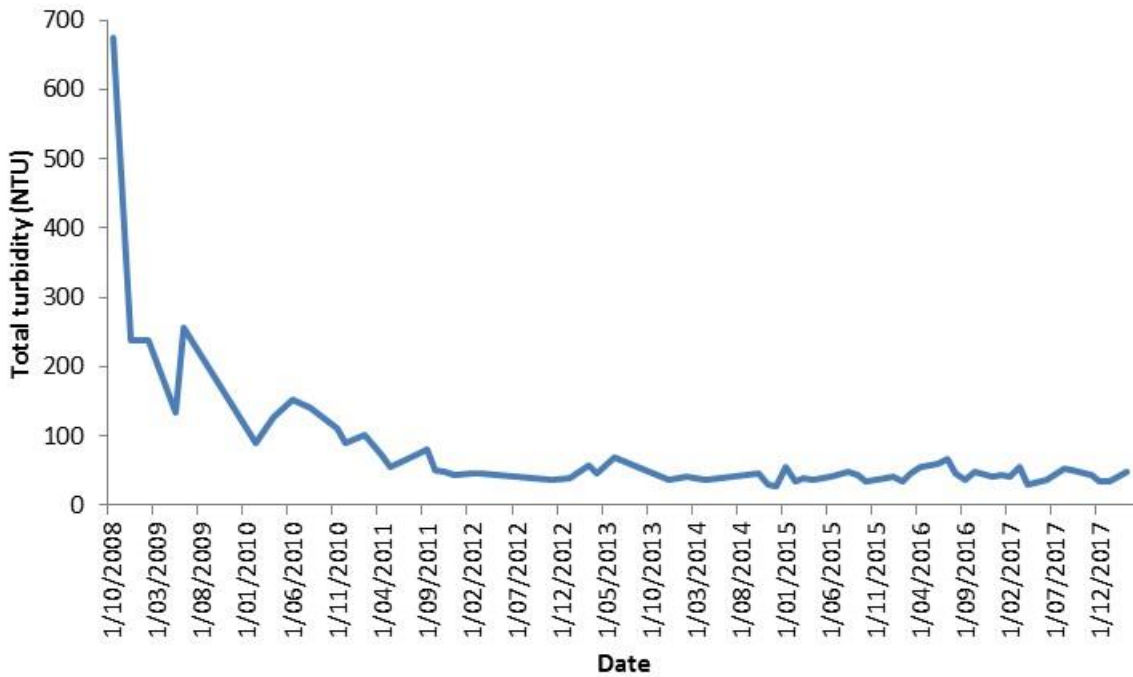


Figure 6. Turbidity levels in Lake Crescent from October 2008 to March 2018.

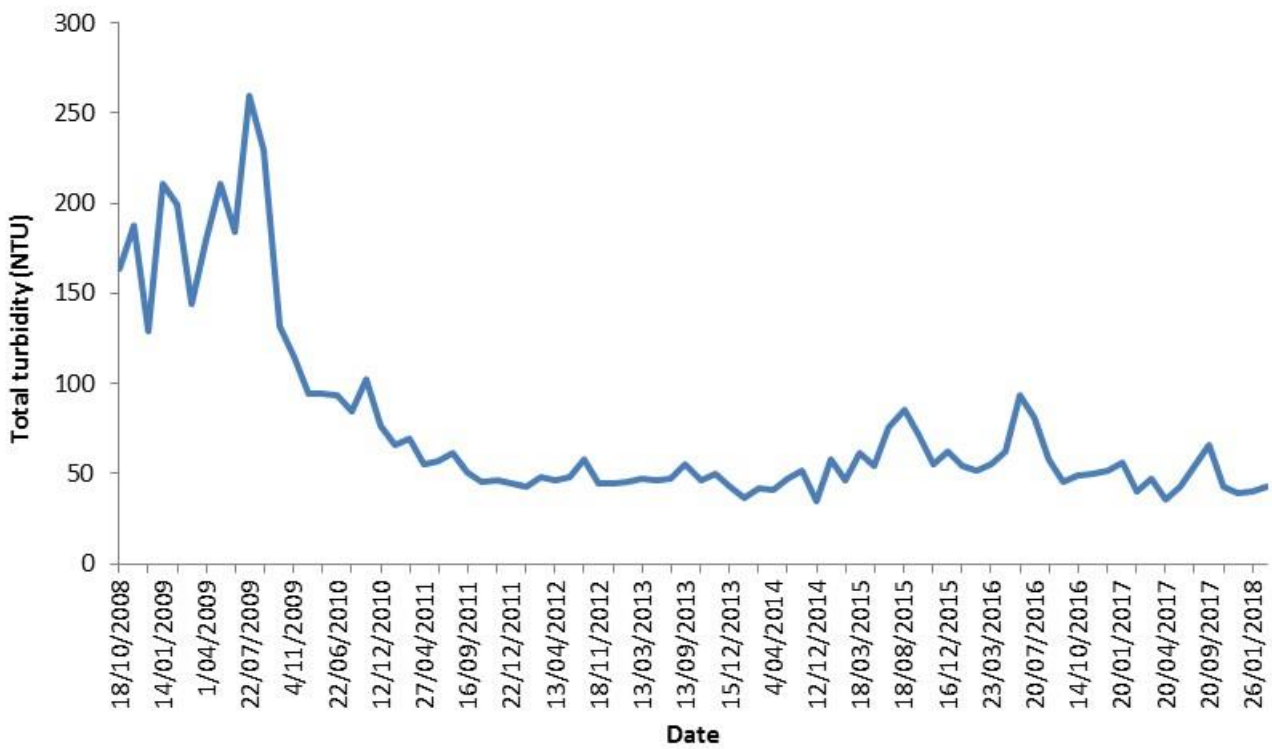
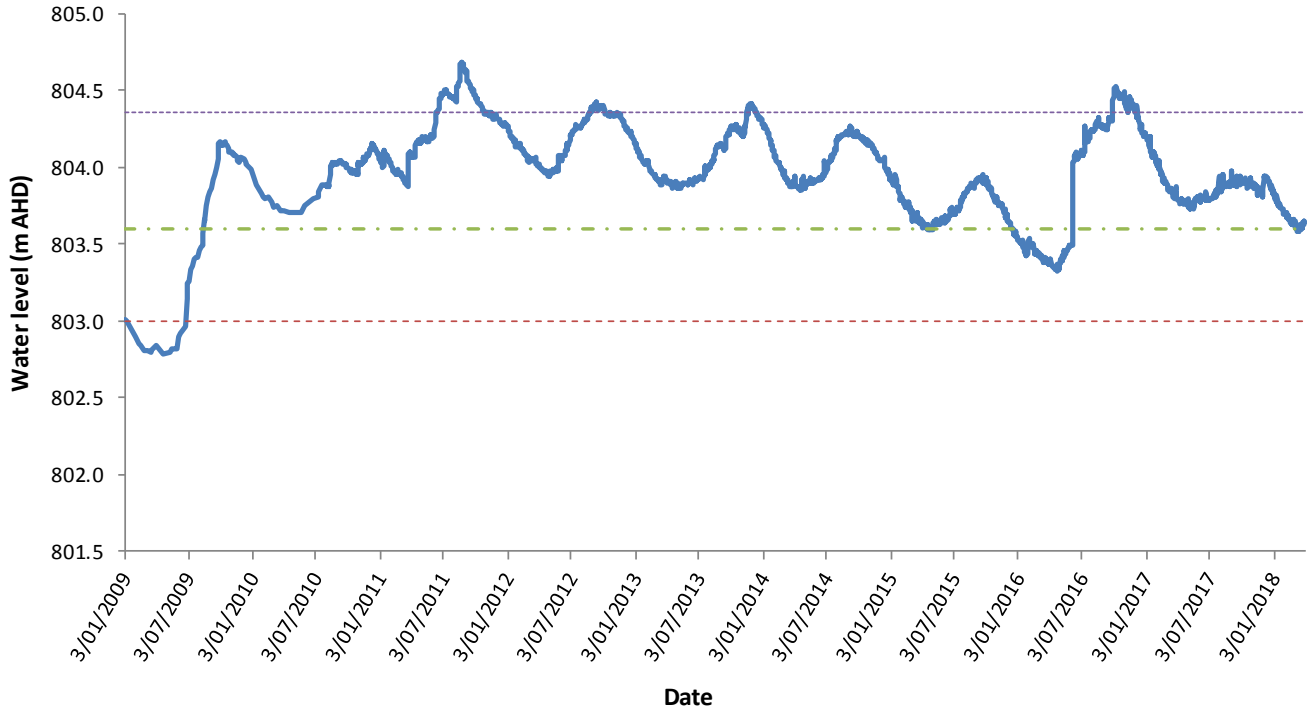


Figure 7. Turbidity levels in Lake Sorell from October 2008 to March 2018.

Lake Sorell



Lake Crescent

