Inland Fisheries Service Carp Management Program

Quarterly Report

October to December 2017

Australian Government

Inland Fisheries Service

Inland Fisheries Service

Tasmanian Government

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This quarterly report details the Carp Management Program activities from October to December 2017.

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

October – December 2017 (Total)	Adult/Juvenile	Total 1995 to present
71	71 / 0	41,418

Lake Crescent

October – December 2017 (Total)	Adult/Juvenile	Total 1995 to present
0	0 / 0	7797

Overview

Lake Sorell

Fishing effort this quarter resulted in the removal of 71 carp from Lake Sorell. This is in comparison to 289 carp removed from the same quarter in 2016. Gillnetting effort occurred over a wide area of the lake, with regions of structure and habitat continuing to be a priority. The majority of nets were focused around the shallow regions of the lake in response to rising water temperatures and lake levels during this quarter. Most nets were set at right angles to the shoreline to target fish moving around the margins of the lake. Some nets were also set in deeper water over the rocky reefs where carp have historically been known to favor. By late December, although the average warm water temperatures remained high, the lack of rain combined with evaporation resulted in the lake level beginning to fall. Consequently, the majority of the marsh areas around the lake became dewatered, which also removed the environmental stimulus for fish to push into the wetlands. Catch rates then slowed to only 1 carp per two days.

In addition to gillnets, a wide range of fishing methods were used during this quarter (Table 1, Figure 1). These included fyke nets stitched into barrier netting, the boat electro-shocker (45 hours), and

backpack electro-shockers (30 hours). Drains, marshes in front of and behind barrier nets, as well as a range of rocky, muddy, and sandy shorelines were all electro fished. These techniques select for both adult, and any potential juvenile carp (which are not susceptible to gillnet capture). No juvenile carp were detected from these fishing methods, however a healthy population of golden galaxias, shortfin eels, tadpoles, and aquatic invertebrates were present.

Table 1. Catch data from all methods used in Lake Sorell over the October-December 2017 quarter.

Gear Type	October	November	December	Total
Non-Targeted Gillnets	6	26	11	**43**
Inshore Set Gillnets*	3	5	4	**12**
Barrier Fyke Nets	0	0	5	**5**
Backpack Electro-shocker	1	2	0	**3**
Boat Electro-shocker	0	2	5	**7**
Gillnets Behind barrier nets	0	0	1	**1**
Total	**10**	**35**	**26**	**71**

*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.

Of note this quarter was the high catch rate of current and expired radio transmitter carp, with 12 active transmitter carp used throughout this quarter. Eight of the 71 captured carp caught were expired transmitter carp. These fish were all sterile males implanted within the last year. In addition to expired transmitter fish, the ratio of current transmitter carp to wild carp captured in non-targeted gill nets for this quarter was 17:45. There were also 13 events where transmitter fish were actively targeted with gill nets and backpack electro-shockers when detected around the shallow margins of the lake. Of the 13 targeting events, only 4 carp were caught (2 ex-transmitter fish and 2 wild fish). The high proportion of transmitter carp recaptures, low associated catch rates, and lack of aggregations are all good indicators of a critically small remaining population size.

In line with previous seasons, gill nets were strategically set behind the barrier nets as a secondary precautionary measure to prevent carp from entering spawning habitats. However, due to a lower lake level, less net was required to achieve this. Three kilometres of these nets were set, compared to 10km in 2016. Gillnets were also set across and within key drainage areas in the marshes behind the barrier nets, as additional safety. Trammel gillnets which have been proven to be highly efficient in capturing

carp of varying sizes were used to block off these areas. Since the start of this financial year, only one carp was able to breach the barrier net, but was caught in the gill net set behind (Table1).

Picture 1. 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.

During this quarter only 7% of carp were captured in fyke nets, despite ideal environmental conditions where a major rainfall event occurred in early December, which coincided with periods of warm weather (Figure 1). Carp are known to respond to these environmental cues, which usually trigger the fish to push into shallow marsh environments in a bid to look for spawning opportunities/aggregations. Following this weather event only five fish were caught in fyke nets, the largest carp being a sterile 1.4kg male jelly gonad carp (JGC). This is a stark comparison to the 2016/17 season for the same period, where the fyke nets accounted for 39.1% of fish caught for the same quarter (Figure 1). During a similar weather event in December 2016, 24 carp were captured across three fyke nets at Silver Plains Marsh in

a single day. The low catch rates observed this season are likely to be due to a combination of a low remaining population size as well as inhibited maturity levels amongst the remnant fish.

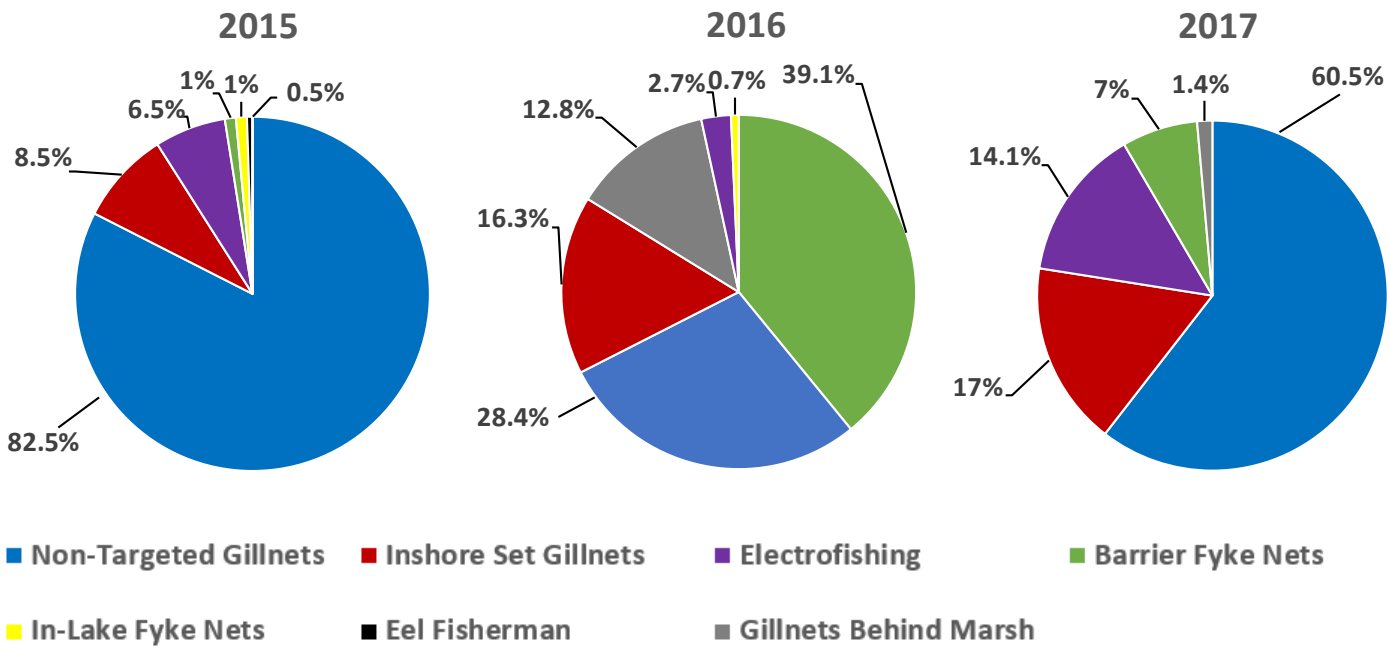


Figure 1. Percentage of total carp captures from all gear types used in Lake Sorell during the October-December quarter for 2015, 2016, and 2017.

Non-targeted netting effort was maintained at a similar level applied during the same period in 2016/17 (Table 2), however the catch rates were 50% less. This continues the trend of dramatically declining catch rates as the 2009 cohort is further depleted (Table 2, Figure 2). Catch from non-targeted gillnets is standardized to carp per 100 m net hour, in order to make meaningful comparisons between different nets and months and years. With this information, adjustments in gear use are made to ensure, and maintain, a high level of fishing efficiency. For this reason, 4 inch trammel and monofilament gillnets were prioritised for use in the lake this quarter.

Table 2. Non-targeted carp captures and gillnet fishing effort in Lake Sorell during the October-December quarter for 2015, 2016, and 2017.

	Non-Targeted Carp Captures*			100m Net Hours		
Month	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
October	128	12	6	12701	24010	21132
November	136	39	26	29586	27097	30314
December	100	30	11	46176	28412	26450
Total	**364**	**81**	**43**	**88463**	**79519**	**77896**

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

100m net hours of non-targeted gillnets peaked in November (Figure 2), which was in response to ideal weather conditions, and increased movement in carp. Catch rates also peaked during this time, and in line with the 2016/17 season, this also coincided with an increase in movement of transmitter fish. Routine tracking revealed that transmitter fish moved great distances throughout the lake, often traveling many kilometers overnight.

The ratio of carp with JGC has continued to increase since the 2016/17 season. The ratio this quarter was 1.5 affected carp to 1 healthy male, while previously the ratio during January-March 2017 was 1:1. This increase in male carp affected by JGC will play an important part in the final stages of the eradication. It further supports the hypothesis that the remaining carp are the remnants of the population with the slowest development.

Picture 2. A current transmitter fish entangled in a trammel net after being pin-pointed in the warm shallows.

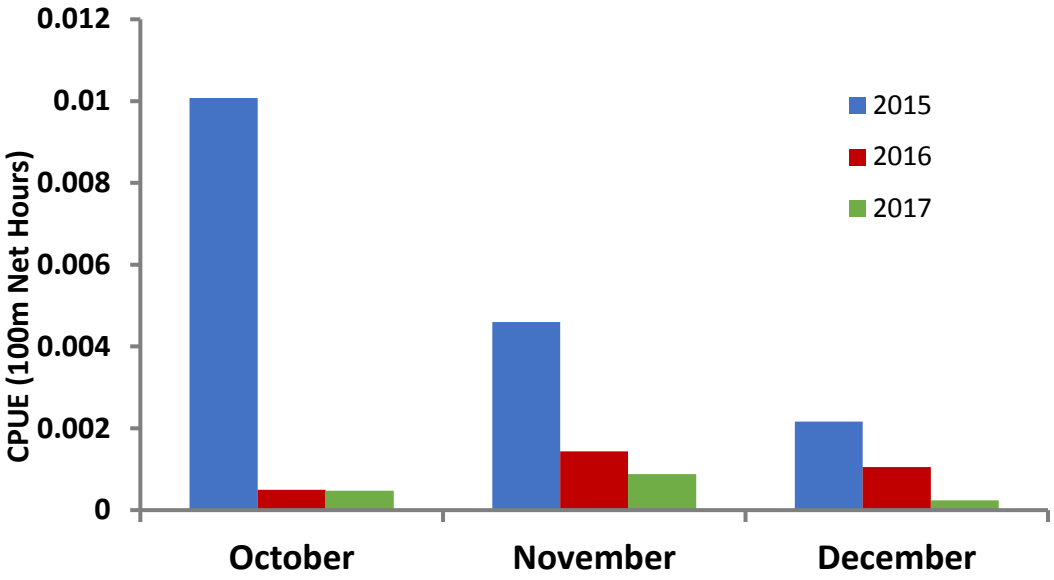


Figure 2. Catch per unit effort (CPUE) of non-targeted gillnet sets in Lake Sorell during the October-December quarter in 2015, 2016, and 2017.

In summary, this quarter required varying responses to changing environmental conditions in order to effectively target the critically small population of carp. An adequate lake level and the presence of rain events and warm weather resulted in carp becoming active throughout this quarter. When the transmitter fish indicated inshore movements towards particular areas of the lake, fishing effort was able to be directed and prioritized to these areas. Intensive effort within these zones resulted in the removal of a large proportion of the estimated remaining population. As of the end of December, the spawning risk had dramatically decreased due to the loss of spawning habitat in the marshes and the reduction of important environmental cues such as rain events and rising water levels. Moving into January, it is expected that the majority of the carp population will push back out to the deeper sections of the lake due to the lack of environmental cues. In response to this change, the CMP will shift the fishing strategy from non-targeted gill net sets to monitoring and tracking the movements of transmitter fish. A large proportion of gill nets will be removed from the lake, and instead an additional number of transmitter fish will be released to aid in the detection of any potential inshore movements/aggregations.

Lake Crescent

Lake Crescent's water quality is continuing to show signs of improvement (Figure 3). 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 a number of transmitter fish in December 2007 proved to be significant, with no other carp caught since this event. Despite extensive fishing effort and monitoring over the past ten 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 extensive marshlands to fully recover.

Picture 3. The final carp removed from Lake Crescent back in December 2007. A photo similar to this in Lake Sorell may not be too far away!

Work experience

The Inland Fisheries Service (IFS) receives regular requests from schools, universities, and interested graduates looking for work experience in freshwater fisheries. The CMP is especially sought after due to the overall diversity of work in the field. In some cases, students come from across the globe to get involved in the eradication of carp from Lake Sorell. Stanley Muloma, a university graduate from Kenya, was one such example. Stanley completed a Bachelor of Science majoring in Zoology and Chemistry at the University of Nairobi, Kenya. He was working as the Principal Fisheries Officer at the Ministry of Agriculture, Livestock, and Fisheries department, from 1997 till 2016, when he decided to come to Tasmania. He arrived in Tasmania in June 2016 to study a Masters degree in fisheries management at the Australian Maritime College, and to learn about the fisheries practises implemented in Tasmania and Australia. Although not a recreational fisherman himself, he was specifically interested in the way recreational fishing in Tasmania was managed. To fulfil the required 20 days of work experience, he chose the Inland Fisheries Service as it had similarities to his fisheries department in Kenya. He was based at the Lake Crescent Field Station for the duration of the period, working with the CMP. The activities he was involved in ranged from general boating activities, checking and setting of gillnets/fyke nets, using telemetry receivers to pin point the locations of radio transmitter carp, using the boat and backpack electro-shockers to survey the margins of the lake, to dissecting carp and staging the maturity of the gonads. Overall, he found that the time spent with the CMP allowed him to develop the social skills required to work in a small team for extended periods of time, as well as with people of a different cultural background to his own. He was also able to develop important skills in relation to boat operation and aquatic field work. On completion of his studies, Stanley hopes to either gain employment in a fisheries related department in Australia, or he will apply his new found knowledge and skills back to his old workplace in Kenya.

Table 3. Work experience (October – December 2017)

Name	Background	Timeline
Jarrad Hunt	University of Tasmania	2nd – 4th Oct
Brodie Marley	St Virgil's College	5th – 6th Oct
Alex Robins	Oatlands District High School	16th – 20th Oct
Pedro Castro	Institute for Marine and Antarctic Studies student	28th Oct
Lincoln Wong	Australian Maritime College	2nd – 3rd Nov
Stanley Muloma	Australian Maritime College	6th Nov – 1st Dec
Helen O'Neill	Bangor University, Wales	11th – 12th Nov
Farzana Noorzahan	Dhaka Univeristy, Bangladesh	23rd Dec
Shahriar Hossain	IUB Universiy, Bangladesh	23rd Dec

Employment and funding

Four casual workers were employed to assist with the onset of the carp spawning season and the repair of gillnets.

Table 4. Casual positions (October – December 2017)

Name	Background	Timeline
Raihan Mahmud	Institute for Marine and Antarctic Studies PHD student	7th October – 31st December
Kim Clark	Interlaken Shack Owner	3rd November – 15th December
Josef Wisniewski	University of Melbourne student	11th – 12th December
Jarrad Hunt	University of Tasmania	11th – 14th December

Water Management

Table 5. Water Release data (October – December 2017)

Month	Lake Sorell release (ML)	Lake Crescent release (ML)
October	-	231.51
November	-	978.90
December	-	579.76
TOTAL	**-**	**1790.17**

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

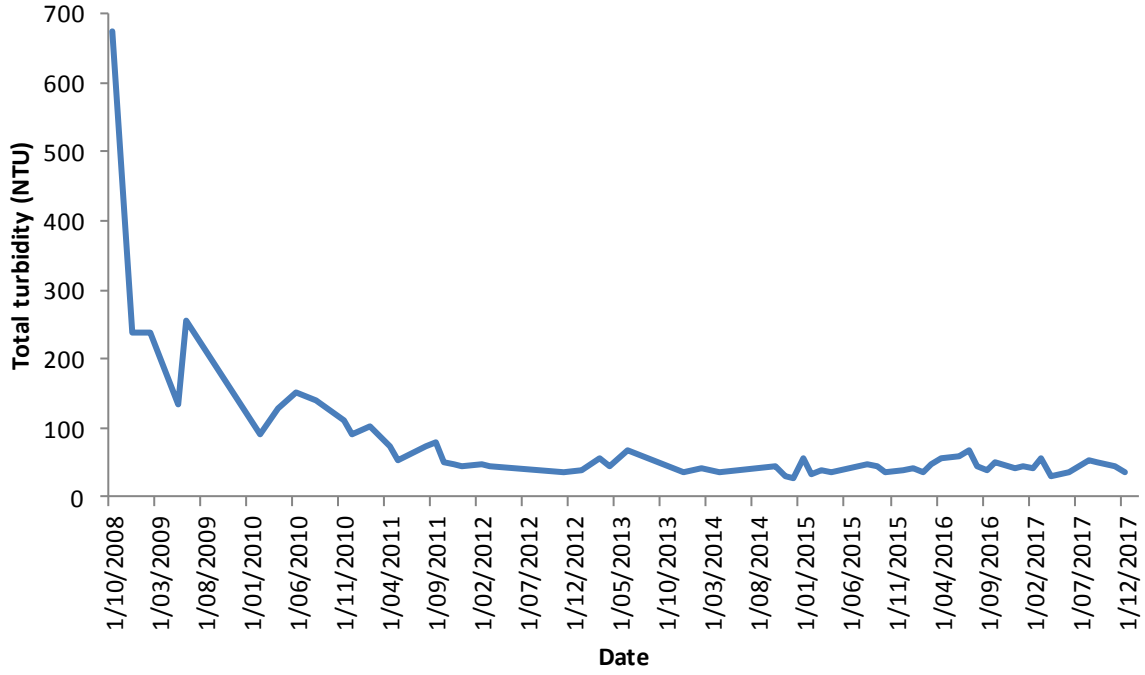


Figure 3. Turbidity levels in Lake Crescent from October 2008 to December 2017

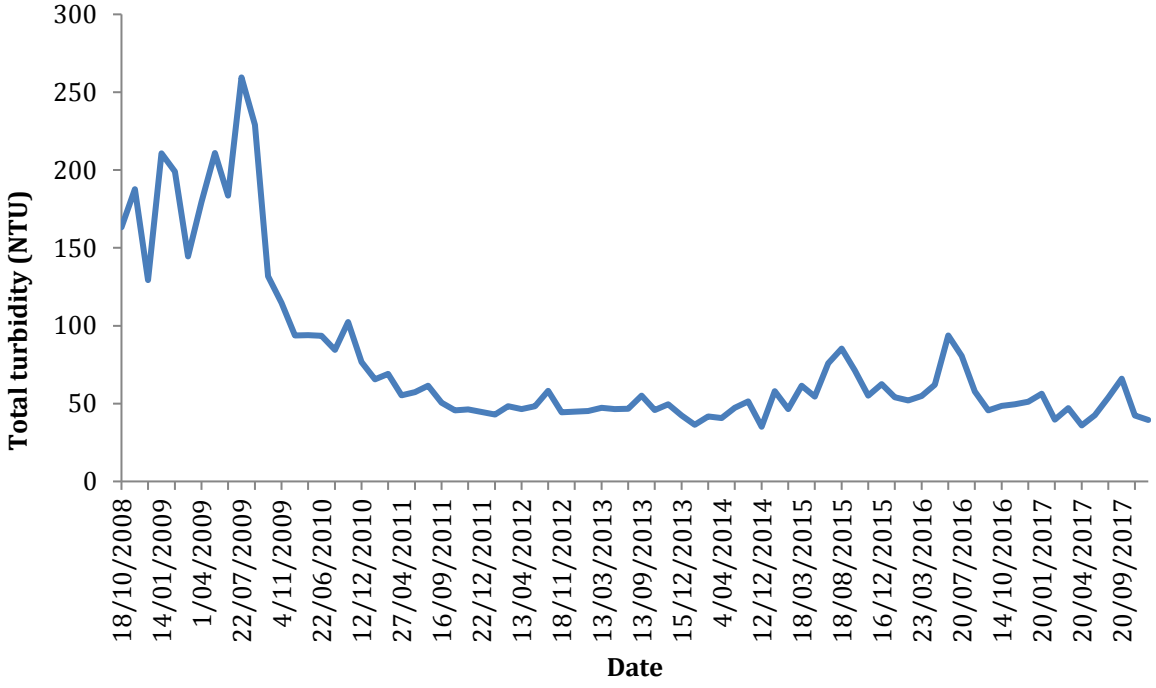
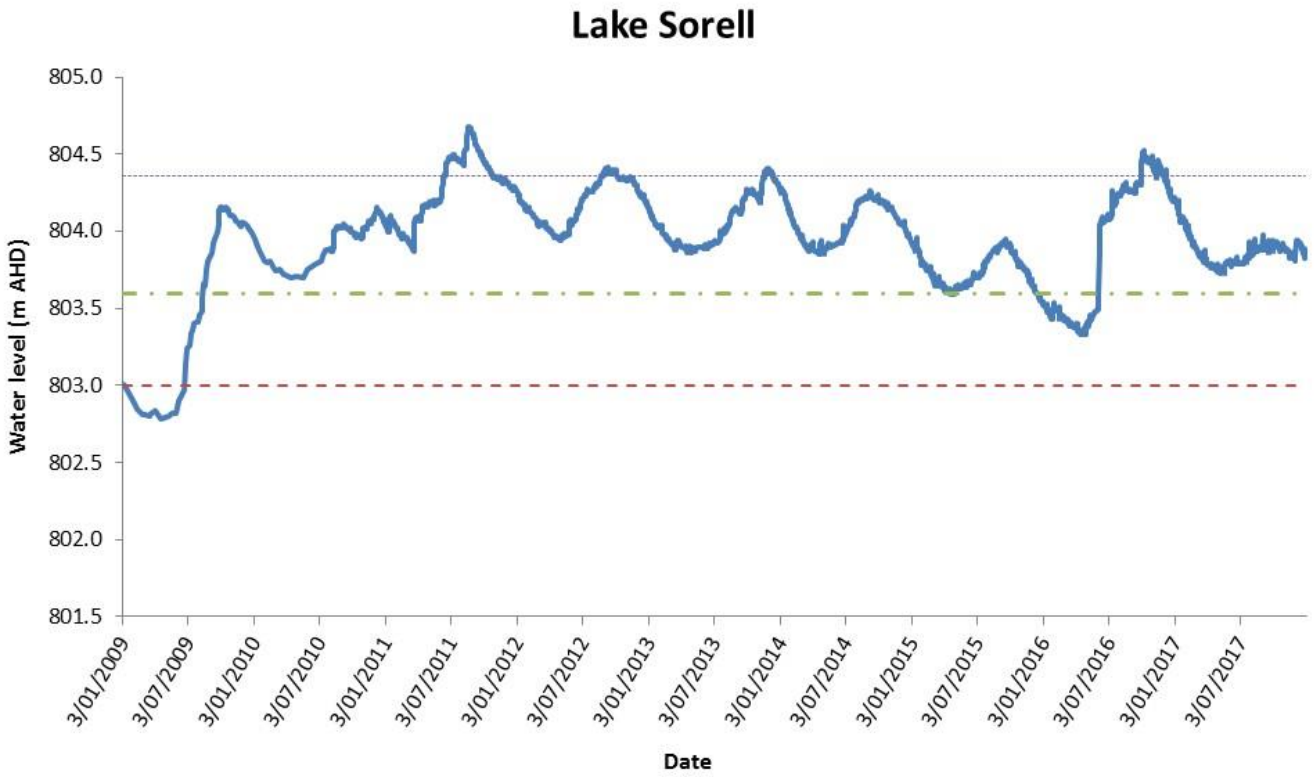


Figure 4. Turbidity levels in Lake Sorell from October 2008 to December 2017


Lake Sorell
Water level (m AHD)
805.0
804.5
804.0
803.5
803.0
802.5
802.0
801.5
3/01/2009
3/07/2009
3/01/2010
3/07/2010
3/01/2011
3/07/2011
3/01/2012
3/07/2012
3/01/2013
3/07/2013
3/01/2014
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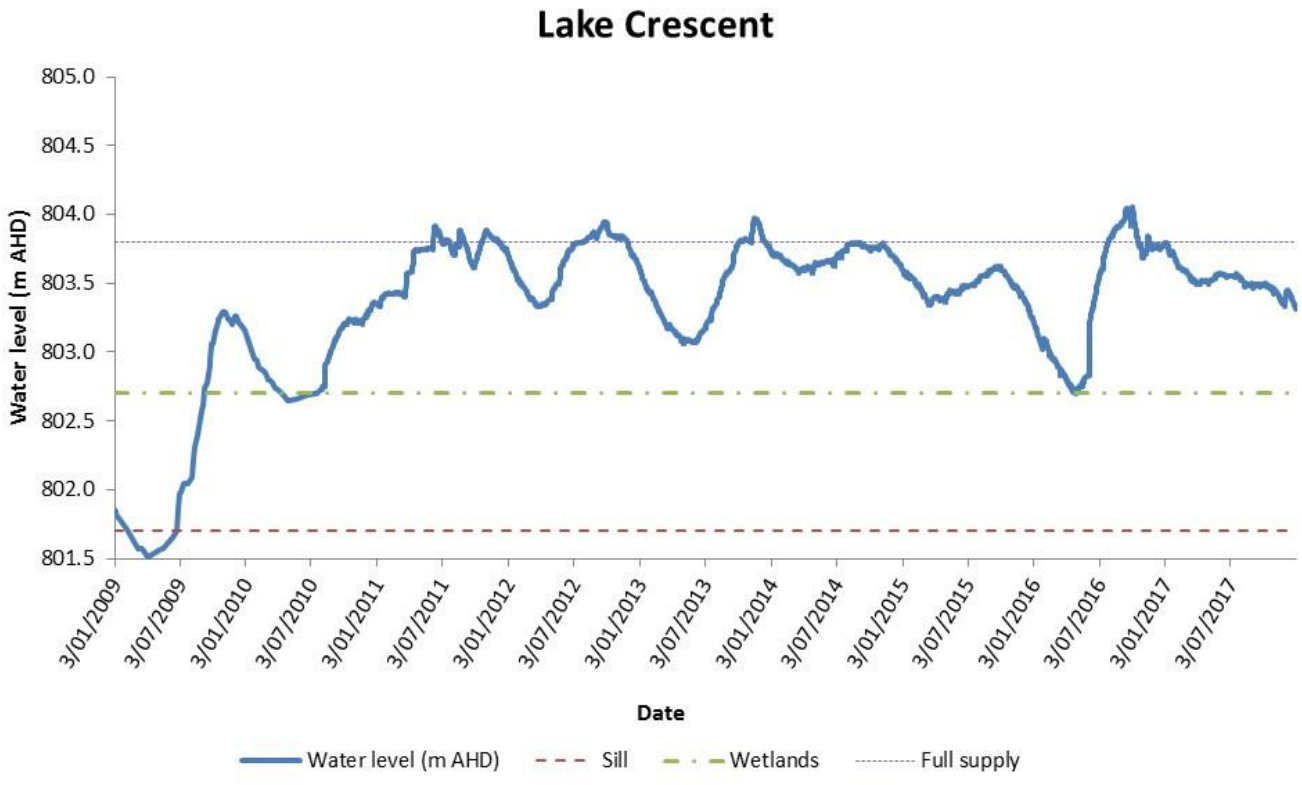
3/07/2017
Date


Lake Crescent
Water level (m AHD)
805.0
804.5
804.0
803.5
803.0
802.5
802.0
801.5
3/01/2009
3/07/2009
3/01/2010
3/07/2010
3/01/2011
3/07/2011
3/01/2012
3/07/2012
3/01/2013
3/07/2013
3/01/2014
3/07/2014
3/01/2015
3/07/2015
3/01/2016
3/07/2016
3/01/2017
3/07/2017
Date
Water level (m AHD)
Sill
Wetlands
Full supply