# Carp Management Program
# **Annual Report**
# 2018-19


Inland Fisheries Service

Inland Fisheries Service

Tasmanian Government

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**This annual report details the Carp Management Program activities for the financial year 2018 – 19.**

*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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# Executive Summary

The hunt for the needle in a haystack continues as the Carp Management Program (CMP) focusses on catching the last carp from Lake Sorell. In spring, water levels and rising temperatures built nicely to provide good conditions to induce carp movement and fishing opportunities. This year all "Judas" radio transmitter implanted carp were removed from the lake prior to the carp season to limit spawning potential. Fishing was targeted based on the extensive data set and knowledge.

December was the most productive fishing period for the season, with the surrounding months very slow. There was a window of very hot weather in late January where four carp were captured. Monthly sampling for recruitment throughout, and post-spawning period failed to find any young of the year carp. No spawning was seen which is vital to complete the eradication. There was no requirement to draw water from Lake Sorell for downstream use, with enough reserves in Lake Crescent to satisfy this requirement. This allowed good stimulus for carp movement on rainfall events, and the lake level is now positioned well for the 2019/20 carp fishing season.

A thorough review of data and further scrutiny of effort and techniques was done at the annual carp workshop in May. Despite maintaining a high level of fishing effort there were only 39 carp caught for the year and the average weight was 797 grams. The CMP has removed a total of 41,491 carp from Lake Sorell since 1995, and it is believed that less than 20 fish now remain.

There are now so few carp remaining in the lake that winter fishing effort is not being undertaken. The battle will continue this coming spring.

# 1.

# Carp Captures and Fish-down Effort

## 1.1 Carp Captures at a Glance

*Table 1. Carp Captures from lakes Sorell and Crescent for the 2018/19 season.*

| Lake | Total 2018/19 | Adult / Juvenile | Total 1995 to present |
|---|---|---|---|
| Sorell | 39 | 39 / 0 | 41,491 |
| Crescent | 0 | 0 | 7,797 |

## 1.2 Lake Sorell

*Overview*

In July-September, maintenance was undertaken at Lake Sorell to prepare for the carp spawning season (October to February). This involved inspecting the 14 kilometres of barrier net blocking the wetlands. Several kilometres of gill net was also repaired, which included both gill nets used in active fishing operations, as well as blocking gill nets to prevent carp from accessing the marshes. A small amount of fishing was done during this cold period. In September the two remaining transmitter fish moved onto the shore during a period of sunny, still weather, and were consequently caught and removed from the lake. This was done because of the low associated catch rates of wild carp with the transmitter fish last season, and to limit recruitment potential. Using only advanced stage sterile JGC male carp would solve this issue, however the techniques required to confidently confirm the status of the gonad before release has been difficult. No other wild carp were caught with the transmitter fish which further supports that the remaining population in the lake is very low. For the first time since 1997, transmitter fish were not used this season to assist with the fish-down strategies, and instead there was more of an emphasis on gill netting known areas of structure, assisted with the use of electrofishing and fyke nets.

In mid-September, the big fyke nets were sewn into the barrier nets. These were placed in strategic locations to catch mature carp pushing into the shallows seeking spawning habitat. These fyke nets are also an indicator of when the carp will begin to push inshore, allowing gill nets to be set to target these movements.

*Table 2. Total carp captured from all methods used in Lake Sorell over the 2018/19 season.*

| Gear Type | Jul-Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr-Jun | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| Non- targeted gillnets | 0 | 2 | 6 | 17 | 4 | 1 | 0 | 0 | 30 |
| Inshore set gillnets* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Barrier fyke nets | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 4 |
| Backpack electro-fisher | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Boat electro-fisher | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gillnets behind marsh | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 4 |
| **Grand Total** | **0** | **4** | **6** | **23** | **5** | **1** | **0** | **0** | **39** |

**Blocking gillnets which prevent access to particular bays.*

As predicted, the total number of carp caught this season was much less than the 2017/18 season (Table 2, Figure 4), despite a big increase in the amount of netting effort (Table 3). Carp catch rates peaked in December (Table 2), which coincided with a sharp increase in temperature (Figure 10). Warming waters in addition to a rising lake level trigger carp to increase their movement, in a bid to look for spawning opportunities in shallow marshes. This in turn makes them vulnerable to a range of our fishing techniques. Despite maintaining a high level of fishing effort throughout the peak carp season (October to February), carp numbers were very low apart from in December (Table 2).

Non-targeted gill nets caught the majority of carp (76%), which was similar to the 2017/18 season (Table 2, Figure 1). Barrier fyke nets only accounted for a very small proportion of the catch, which was also reflected in last season's results (Table 2, Figure 1). For the first time in the history of the program, no carp were caught by boat or backpack electrofishing, despite extensive effort around the lake (Table 2, Figure 1). A big contributor to this result is likely to be due to the absence of transmitter fish to guide effort, however it also reflects the diminishing remaining carp population. Although non-targeted gill netting is currently the most effective technique, it is still important to continue to persist with the other gear types, in order to select for all sizes/ ages of carp (some of which are not susceptible to gillnet capture).

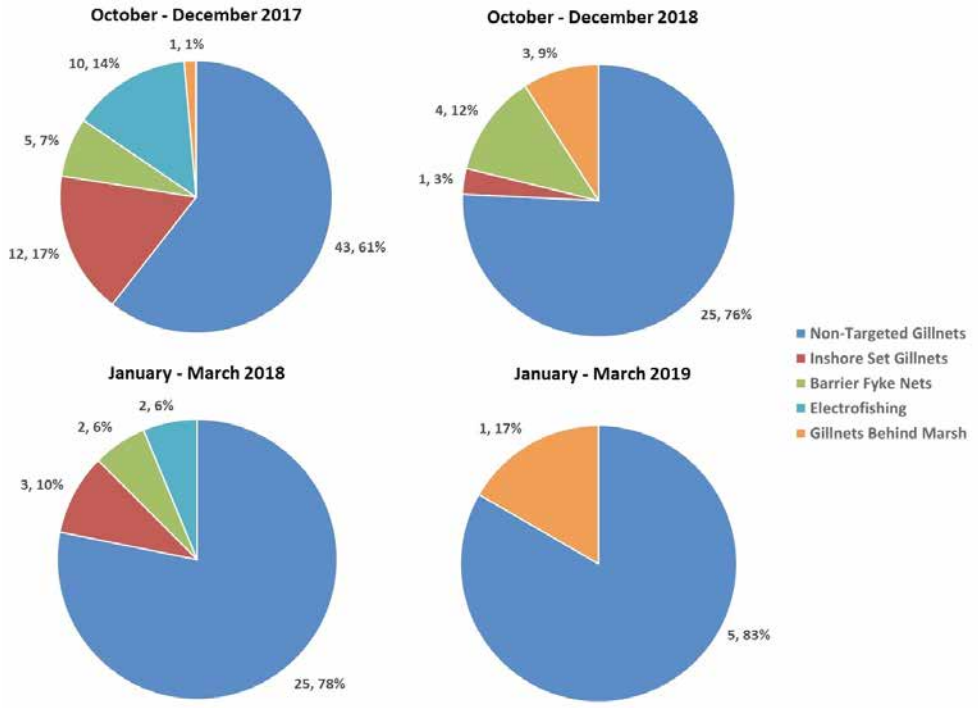


*Figure 1. Percentage of total carp captured from each gear type during the carp fishing season (October to March) in Lake Sorell comparing the 2017/18 and 2018/19 seasons.*

Trammel gillnets were the main type of gill net used for non-targeted effort due to their ability to catch carp of a range of sizes effectively. The majority of nets this season were focused around the shallow regions of the lake in response to rising water temperatures and lake levels. 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. The high proportion of carp caught by non-targeted gillnets (Table 2, Figure 1), reflects the high level of gill netting effort this season (Table 3).

*Picture 1. One of four carp which pushed in to barrier fyke nets in an attempt to look for spawning habitat.*

Since 2016, the proportion of carp caught by non-targeted gill nets has continued to increase (CMP Annual reports 2016-17 and 2017-18), however the number of carp caught by this method continues to decrease (Table 3). This is despite the increasing effort in non-targeted netting effort over the 2018/19 season, compared to the last two seasons (Table 3). This is strong evidence which supports that the number of remaining carp is critically low, and increased netting effort is required to continue to remove them effectively.

*Table 3. Non-targeted carp captures and gill net fishing effort in Lake Sorell for the 2016/17, 2017/18, and 2018/19 seasons.*

| Month | Non-Targeted Carp Captures * | | | 100m Net Hours | | |
|---|---|---|---|---|---|---|
| **Month** | **2016/17** | **2017/18** | **2018/19** | **2016/17** | **2017/18** | **2018/19** |
| July-Sept | 2 | 1 | 0 | 57.5 | 4467 | 213 |
| October | 12 | 6 | 2 | 24010 | 21132 | 31403 |
| November | 42 | 26 | 6 | 27097 | 30314 | 41186 |
| December | 30 | 11 | 17 | 28412 | 26450 | 52509 |
| January | 44 | 12 | 4 | 31137 | 26715 | 49490 |
| February | 22 | 13 | 1 | 47341 | 30172 | 30870 |
| March | 5 | 0 | 0 | 6547 | 10130 | 0 |
| Apr-Jun | 0 | 1 | 0 | 0 | 528 | 0 |
| **Grand Total** | **157** | **70** | **30** | **164 602** | **149 908** | **205 671** |

Non-targeted gill netting catch rates remained very low all season, with December being the only month where the catch per unit effort (CPUE) was higher than last season (Figure 2). This follows the historic trend of declining total carp captures as the population is continually depleted (Figure 4). The weather at Lake Sorell this summer was warm and stable (Figure 10), and in addition to a high lake level (Figure 12), these conditions provided favourable conditions for catching carp. Therefore this factor can be ruled out as a contributor to the low CPUE.

The biggest carp for the season was caught in late December, in a non-targeted trammel gill net set thirty metres from the Dago Point boat ramp (Picture 2). The female carp weighed 1857gm, and had a gonad weight of 364gm (GSI: 20%). There were no other fish caught exceeding 1500gm, and the average weight of carp this season was 797gm.

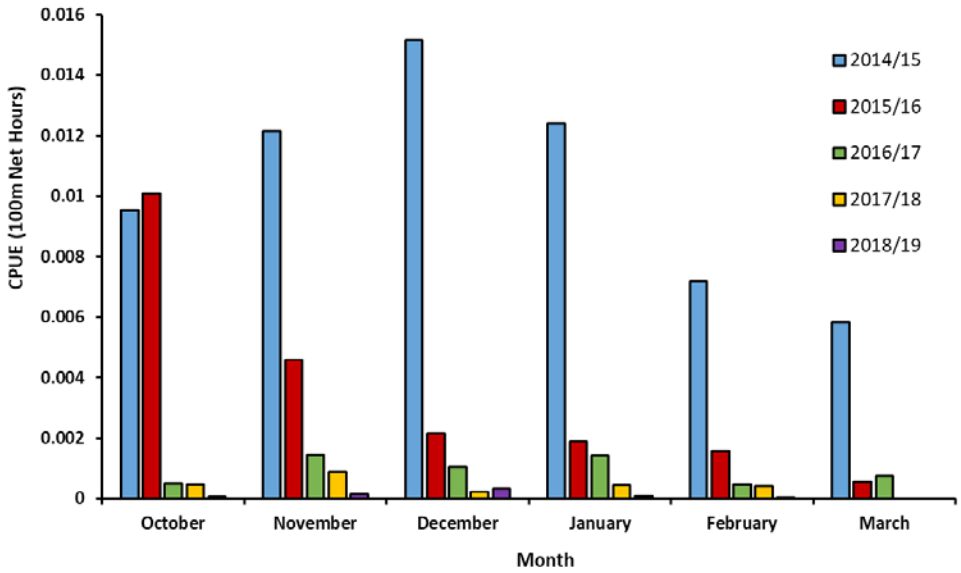


*Figure 2. Catch per unit effort (CPUE) of non-targeted gill netting during the carp fishing season (October to March) in Lake Sorell comparing the 2014/15, 2015/16, 2016/17, 2017/18, and 2018/19 seasons.*

In line with previous seasons, 5.5km of gill net was strategically set behind the barrier nets as a secondary line of defence to prevent carp from entering spawning habitat. Gill nets were also set across and within key drainage areas in the marshes behind the barrier nets. Trammel gill nets, which are good at capturing carp of varying sizes, were used to block off these areas. Three carp were caught in Silver Plains marsh in the four inch monofilament gill net behind the barrier net (Table 2). The three carp were mature but had not spawned. After catching these carp behind the barriers, intensive netting effort was undertaken behind the barrier net at Silver Plains, with an additional ten nets installed. Electrofishing was also undertaken throughout this area, including in the drains. No carp were detected from electrofishing. The additional nets were left to soak, to ensure that any other carp that may have breached the barrier net were captured. In January another carp was caught in these gill nets (Table 2). 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.

*Picture 2. The biggest carp of the 2018/19 season; a 1.9kg female carp caught in a trammel gill net set thirty metres off the Dago Point boat ramp.*

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.

The ratio of male carp with the jelly gonad condition (JGC) has been close to 50% over the last two years (Figure 3). With approximately 50% of male carp now affected by the JGC, and the remaining proportion of males in poor condition averaging 715gm 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.

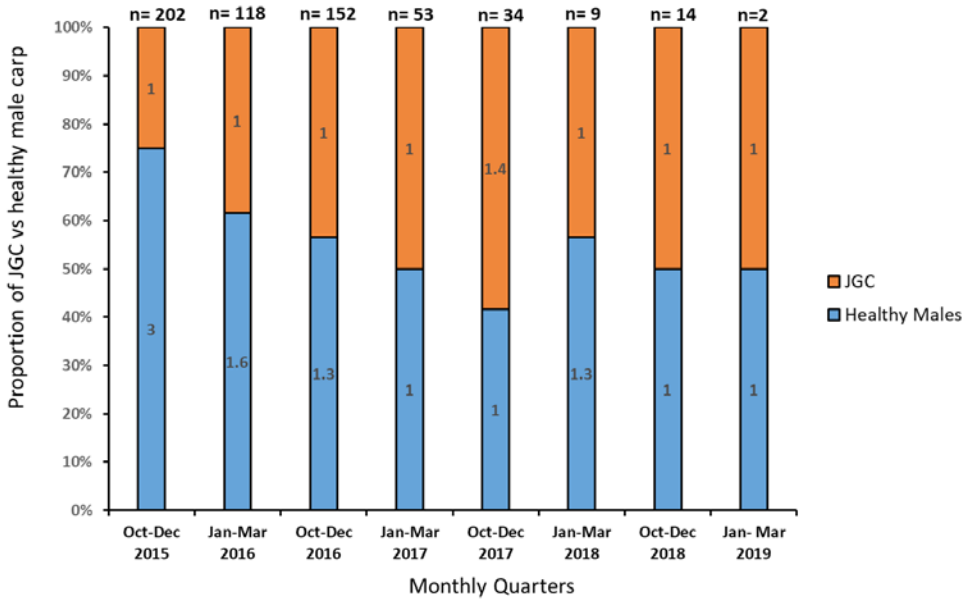


*Figure 3. The change in ratio of jelly gonad condition (JGC) males to healthy males from 2015-19, compared by October to December and January to March quarters.*

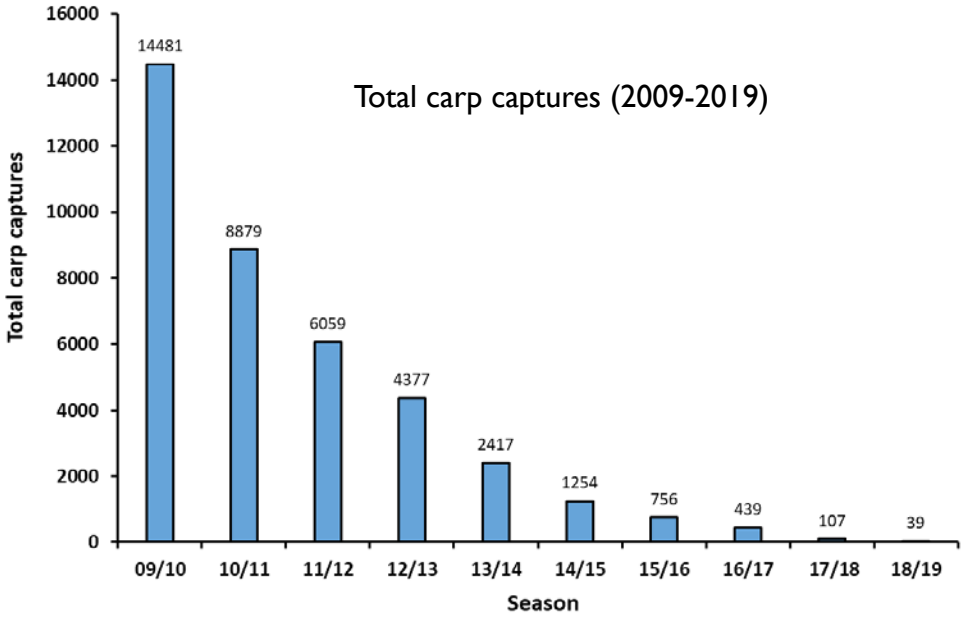


*Figure 4. Total carp captures from Lake Sorell using all methods (2009-2019).*

In summary, the slow fishing and reduced catch rates encountered this season strongly suggests that carp are now close to being eradicated from Lake Sorell. Despite increasing the amount of netting effort above the last few seasons, only 39 carp were caught. It is now estimated that less than twenty carp remain. This coming season the team is motivated to maintain the high level of fishing pressure, despite the likelihood of even lower catch rates. A range of fishing techniques will continue to be used to ensure all sizes of carp are removed from the lake. In addition, there will also be an equally important emphasis on stopping spawning. Hopefully by the end of the coming spring most of remaining carp will have been caught.

Turbidity levels in Lake Sorell have been steadily decreasing since 2009, however over the last few years there have been various short term jumps and drops in the total turbidity. This can be attributed to changes in lake level, combined with wind conditions during the time the water samples were taken. Wind fetch on the lakes can cause a spike of natural silt re-suspension in the water column. Despite the increase in total turbidity at times, the associated colloidal component of the turbidity is relatively stable, and is still declining slowly. Increasing lake levels over the coming spring can result in a decrease in the overall total turbidity.

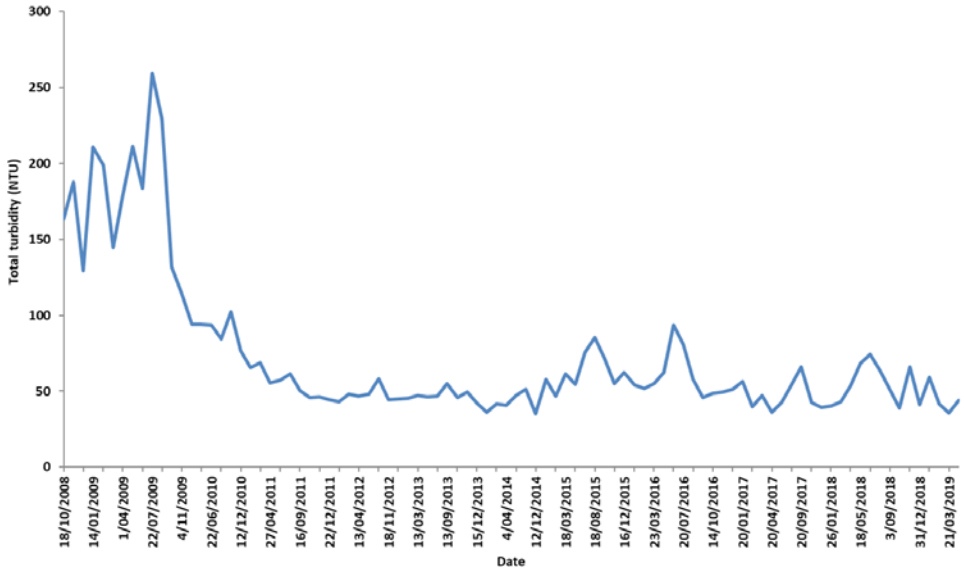


*Figure 5. Turbidity levels in Lake Sorell from 2008 to 2019.*

## 1.3 Lake Crescent

No carp were captured in Lake Crescent this year despite continued annual sampling and monitoring, with the last carp caught in 2007. Since the extremely low water levels in 2008, the average total turbidity of Lake Crescent has improved considerably. This is the direct result of high water levels flushing the lake after large rainfall events. The slight increases in total turbidity from December 2017 to the present is explained in the previous section.

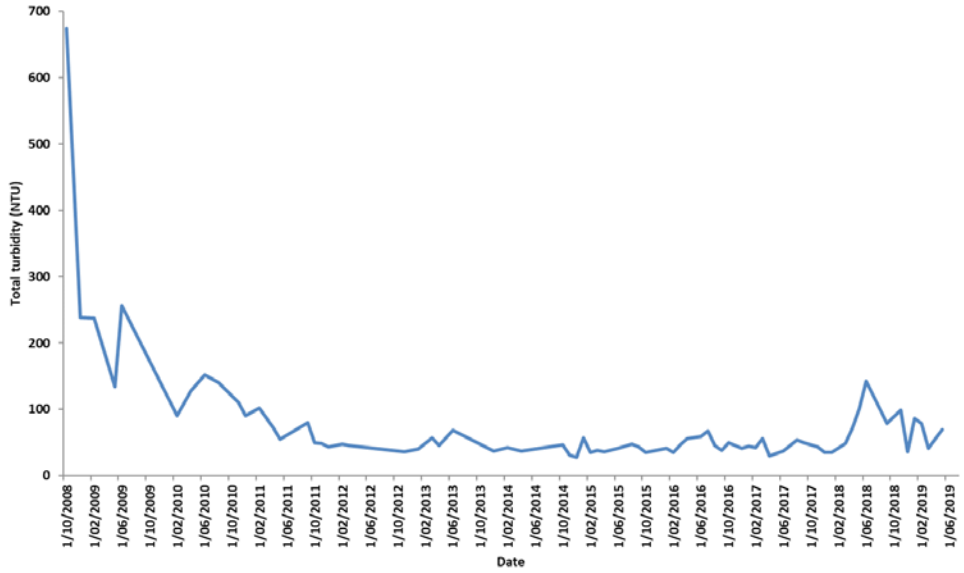


*Figure 6. Turbidity levels in Lake Crescent from 2008 to 2019.*

# 2.

## Juvenile Carp Surveys

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 have done 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-fishers 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 3. Electrofishing the shallows of Lake Crescent showed no signs of carp.*

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 carp spawning.

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-fishers. 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 4. Setting fyke nets around the edge of the lake to target juvenile carp.*

# 3.

## The River Clyde Survey

In addition to the lakes Sorell and Crescent juvenile carp surveys, a downstream carp survey of the River Clyde was also done. The survey looks at sites with ideal carp habitat around Bothwell and Hamilton. The survey has been done for the last 24 years. Backpack electrofishing was done at three sites on the River Clyde 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 5. A haul of juvenile redfin perch and tench caught while electrofishing the River Clyde.*

# 4.

# Golden Galaxias Survey

The annual golden galaxias (*Galaxias auratus*) survey was done from the 27th to the 29th of 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 4. 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 (Table 4). At Lake Sorell 5,882 golden galaxias were captured, with the Grassy Point site capturing three quarters of the total catch (Table 4). This site also produced over half the total catch at Lake Sorell during the 2018 survey and remains a highly productive area for galaxiids.

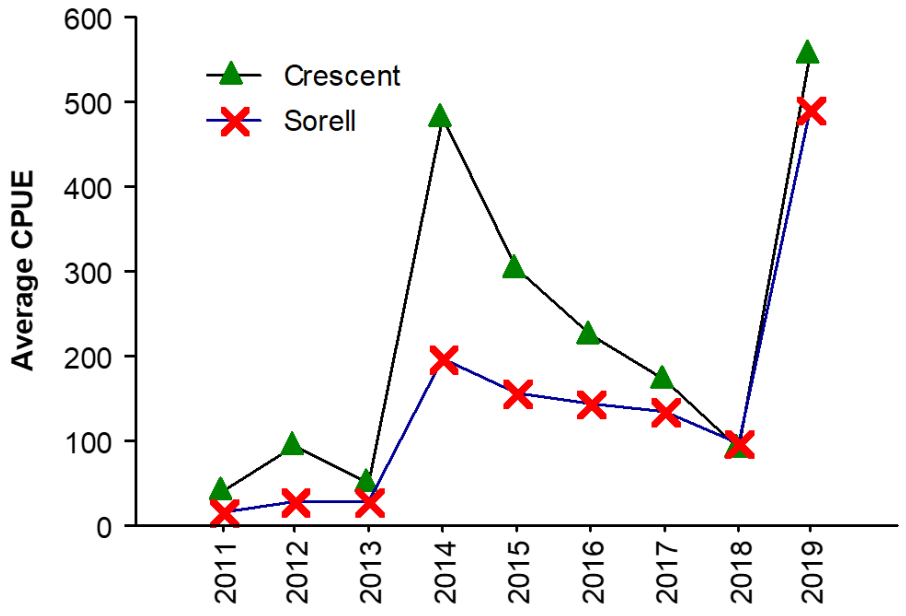


*Figure 7. Average (mean) CPUE of golden galaxias for lakes Crescent and Sorell, 2011-2019.*

The long term declining trend in CPUE for Lake Crescent has stopped, with a major increase in the number of galaxiids captured during the 2019 survey (Figure 7). This increase is almost entirely due to the large number of juvenile fish 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 (Figure 7). This result reflects the response of high recruitment during inundation of rocky and marshland areas that provided good spawning conditions and favourable juvenile habitat.

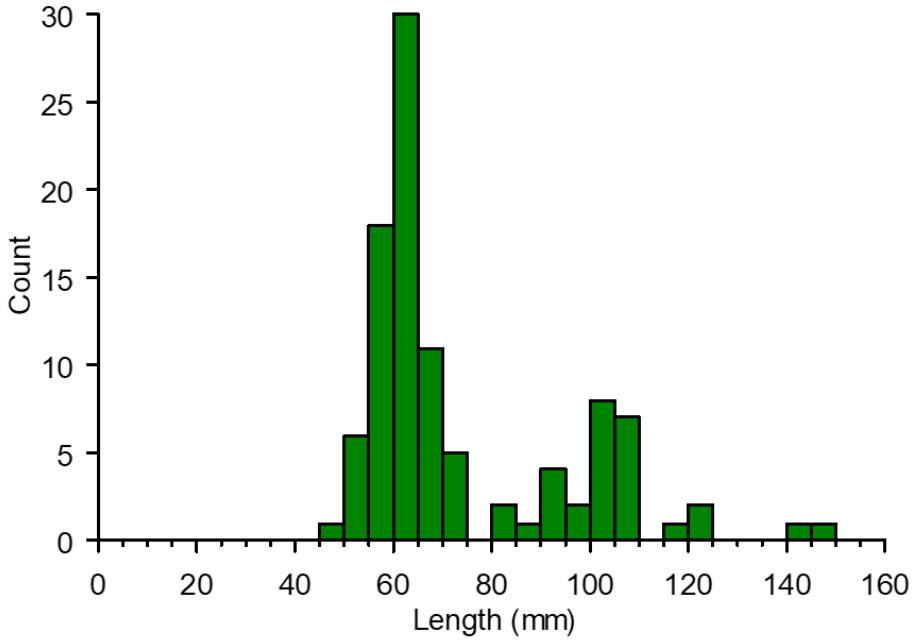


*Figure 8. Length frequency of golden galaxias sampled from Lake Crescent 2019 (n=100).*

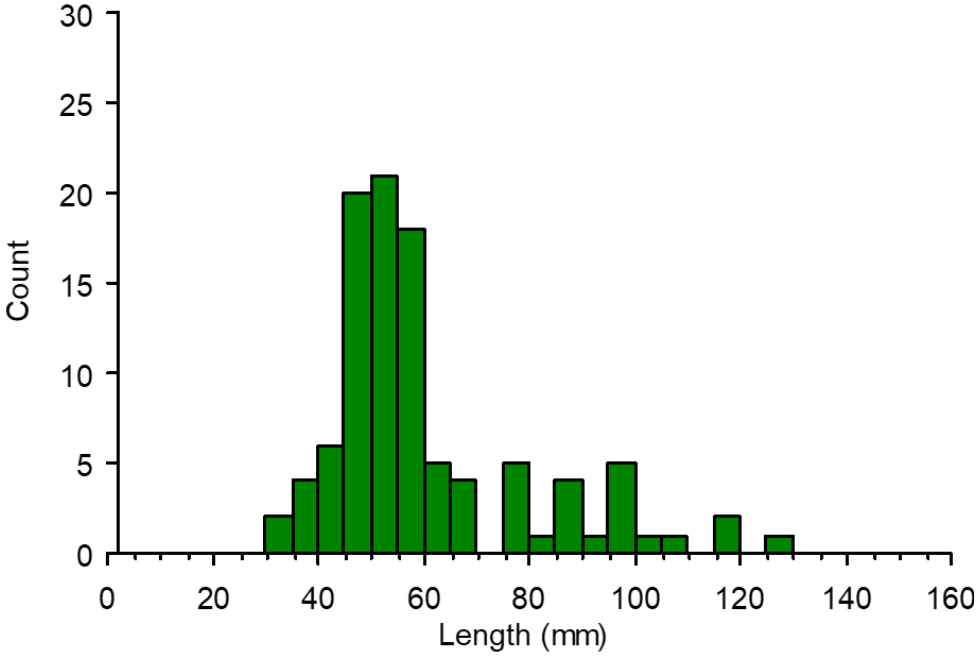


*Figure 9. Length frequency of golden galaxias sampled from Lake Sorell 2019 (n=100).*

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 45 – 75 mm length range for Lake Crescent (Figure 8), and 30 – 70 mm for Lake Sorell (Figure 9). 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 6. A wide range of size classes of golden galaxias were caught during the Lake Sorell and Crescent surveys.*

# 5.
## Work Experience

Maddie Crowden is a recent graduate from the Australian Maritime College (AMC) 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 gill/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. Only a few months after working with the CMP, she was successful in obtaining a position with the Queensland Boating and Fisheries Patrol as a Fisheries Officer. Well done Maddie!

*Table 5. Work Experience (2018/19).*

| Name | Background | Timeline |
|---|---|---|
| Laurence Farr | Australian Maritime College | 3rd – 5th September |
| Laurence Kenwaorthy-Neale | University of Tasmania | 3rd – 5th September |
| Julian Butschek | Victoria University | 10th – 12th September |
| Laughlan Freeman | St Virgil's College | 17th – 21st September |
| Jack Brown | Institute for Marine and Antarctic Studies | 25th – 27th September |
| Jacob Kelly | Triabunna District School | 4th – 5th Oct |
| Jake Brumley | Australian Maritime College | 5th – 11th Oct |
| Brendan Klok | Australian Maritime College | 28th – 29th Oct |
| Benjamin Elliott | Deakin University | 2nd – 14th January |
| Chris Boon | Queensland Boating and Fisheries Patrol | 9th – 10th January |
| Maddie Crowden | Australian Maritime College | 9th – 10th January |
| Dave Mossop | Melbourne University | 12th – 14th January |
| Travis Harris | Australian Maritime College | 22nd – 24th January |
| Alex Gilmour | Elizabeth College | 23rd – 25th January |
| Nic Shelverton | St. Aloysius Catholic College | 8th – 12th April |
| Shahriar Hossain | IUB Universiy, Bangladesh | 23rd December |

# 6.
# Carp Workshops

The Carp Management Program held its yearly Workshop on the 9th of May. We looked over the past year's work and started planning for the coming year. The Workshop provided an update for the Minister responsible for the Inland Fisheries Service, the Honourable Guy Barnett. The Minister linked in via video conference where he offered his support, and the team appreciated his words of encouragement. The day involved presentations and discussions of different aspects of the data collected during the 2018-19 season. This gave an understanding of how the carp removal is progressing, the findings for the season and what can be done to complete the eradication of carp from Tasmania.

Key findings were:

- No carp were found in Lake Crescent or downstream in the River Clyde.
- Carp are contained to Lake Sorell.
- No spawning or small carp were found in Lake Sorell.
- The fishing effort was more than last year but we caught less than half of the number of carp. This shows that the carp population is being fished out.
- Studies of the JGC which causes sterility is now affecting 50% of male carp caught.
- 41 491 carp have been removed from Lake Sorell since 1995.
- We now estimate that less than 20 carp remain in Lake Sorell.

*Picture 7. The 2019 Carp Management Program workshop.*

In mid-July, a workshop was held in Canberra as part of a larger project under the National Carp Control Plan (NCCP), to discuss how various levels of carp reduction from mainland waterways may impact the surrounding ecosystem. Small and large bodied fish researchers, plant scientists, water bird scientists, amphibian researchers, and bug scientists from around the country were in attendance, including the Tasmanian CMP Leader Jonah Yick. There were also discussions based on water quality, system modelling, risk analysis, and economics.

The outcome of the workshop will hopefully assist the NCCP in planning for an integrated approach to controlling carp in Australia's waterways, understanding and managing the risks involved associated with the removal of carp, quantifying the benefit/cost analysis of the project, as well as informing stakeholder engagement.

For more information about the National Carp Control Plan, see the link below:

**www.carp.gov.au/**

*Picture 8. The 2018 National Carp Control Plan workshop held in Canberra, ACT.*

# 7.
## Carp Conferences

Team leader Jonah Yick, presented at the 2018 Australian Society for Fish Biology conference which was held from the 7th – 11th of October in Melbourne. Delegates from universities, environment, and fisheries bodies around Australia also attended. There were approximately 200 presentations during the conference and Jonah presented in the "Carp control" special session, chaired by staff from the NCCP. Jonah talked about the current status of carp in Lake Sorell, and how close the CMP are to eradicating carp from Tasmania. His presentation was well received by other delegates, and highlighted the need to carefully manage invasive pest fish in Tasmania.


*Picture 9. Presenting the carp situation in Lake Sorell at the 2018 Australian Society for Fish Biology conference held in Melbourne, Victoria.*

# 8.

## Student Projects

Raihan Mahmud has been investigating the Jelly Gonad Condition (JGC) of Lake Sorell carp for the last four years. This project was supervised by A/P John Purser and Dr. Jawahar Patil from the Institute for Marine and Antarctic Studies (IMAS). The primary objectives of the project were to characterise the condition, detect any potential biological and abiotic cues that influences the condition and assess the practical application of the condition. The results of the research indicated that, occurrence of this condition is unique but shares some feature with human carcinoma. Over 7000 genes and more than 130 pathways were distinguished to be involved with the JGC condition, however, 40 genes were found to be the prime suspects developing the condition. Follow up research is underway to potentially discern the function of those prime genes. Overall, this research could be helpful to understand the many aspects of biology including sterility, cell death and reproduction. This PhD project is complete and a thesis detailing the research findings, background literatures, practical applications and future directions of the JGC project has been submitted to the University of Tasmania.


*Picture 10. Raihan Mahmud with a JGC male carp caught in a trammel net.*

# 9.

## Video Releases

In November last year, British television presenter and biologist Jeremy Wade travelled to Tasmania to film for his latest TV show, Dark Waters. This particular episode focused on the Tasmanian Giant Freshwater Crayfish (*Astacopsis gouldi*), but also covered the carp management activities in lakes Sorell and Crescent.

This episode (s01e07) titled "Jurassic river beast" is now available on the Discovery Channel and Animal Planet, and features some spectacular landscapes and the unique animals found around Tasmania.


*Picture 11. British television presenter and biologist Jeremy Wade talks carp with Jonah Yick, during the filming for his new show "Dark Waters".*

In early May, the Inland Fisheries Service published a short video which described the history of the Carp Management Program, from the discovery of the first carp in 1995, through till the current low numbers. The video describes the progress of the fish down, the various techniques used to catch carp effectively, as well as the blocking of the extensive wetlands and marshes to prevent spawning. This video can be viewed at the link below:

**www.ifs.tas.gov.au/about/video-library**

# 10.

## Water Yields and Deficits

Total rainfall of 569.2 mm was recorded at the Lake Crescent field station from 1st July 2018 to 30th June 2019.

*Table 6. Rainfall and release data (2018/19).*

| Month | Rainfall (mm) | Sorell Release (ML) | Crescent Release (ML) |
|---|---|---|---|
| July | 108 | - | 9.62 |
| August | 77.8 | - | 49.38 |
| September | 33 | - | 19.37 |
| October | 26 | - | 636.97 |
| November | 83.2 | - | 633.56 |
| December | 49.2 | - | 811.61 |
| January | 24.8 | - | 2142.89 |
| February | 31.2 | - | 2428.84 |
| March | 28.6 | - | 1325.49 |
| April | 45.2 | - | 800.68 |
| May | 25.6 | - | 400.74 |
| June | 36.6 | - | 63.24 |
| **Total** | **569.2** | **-** | **9322.39** |

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

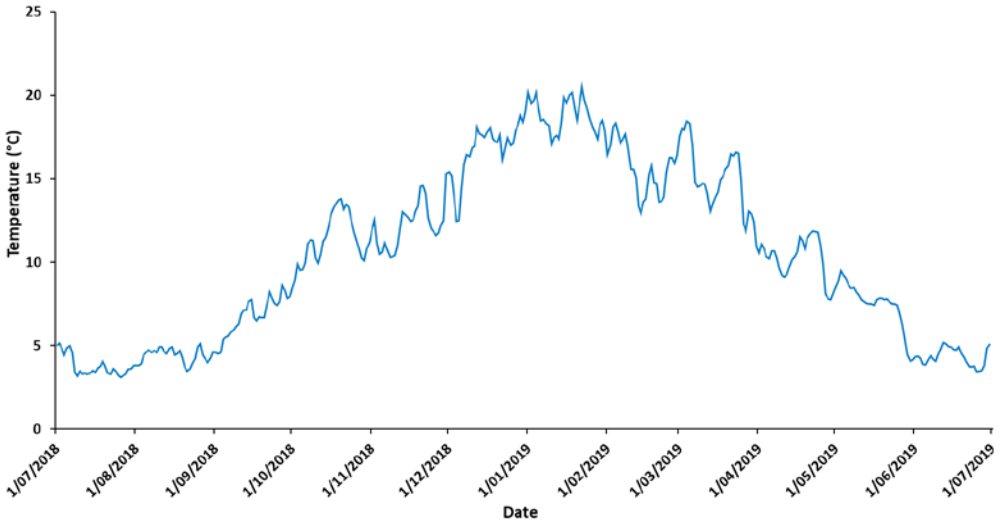


*Figure 10. Lake Sorell water temperature from Diamond Shore deep site (July 2018 – June 2019).*

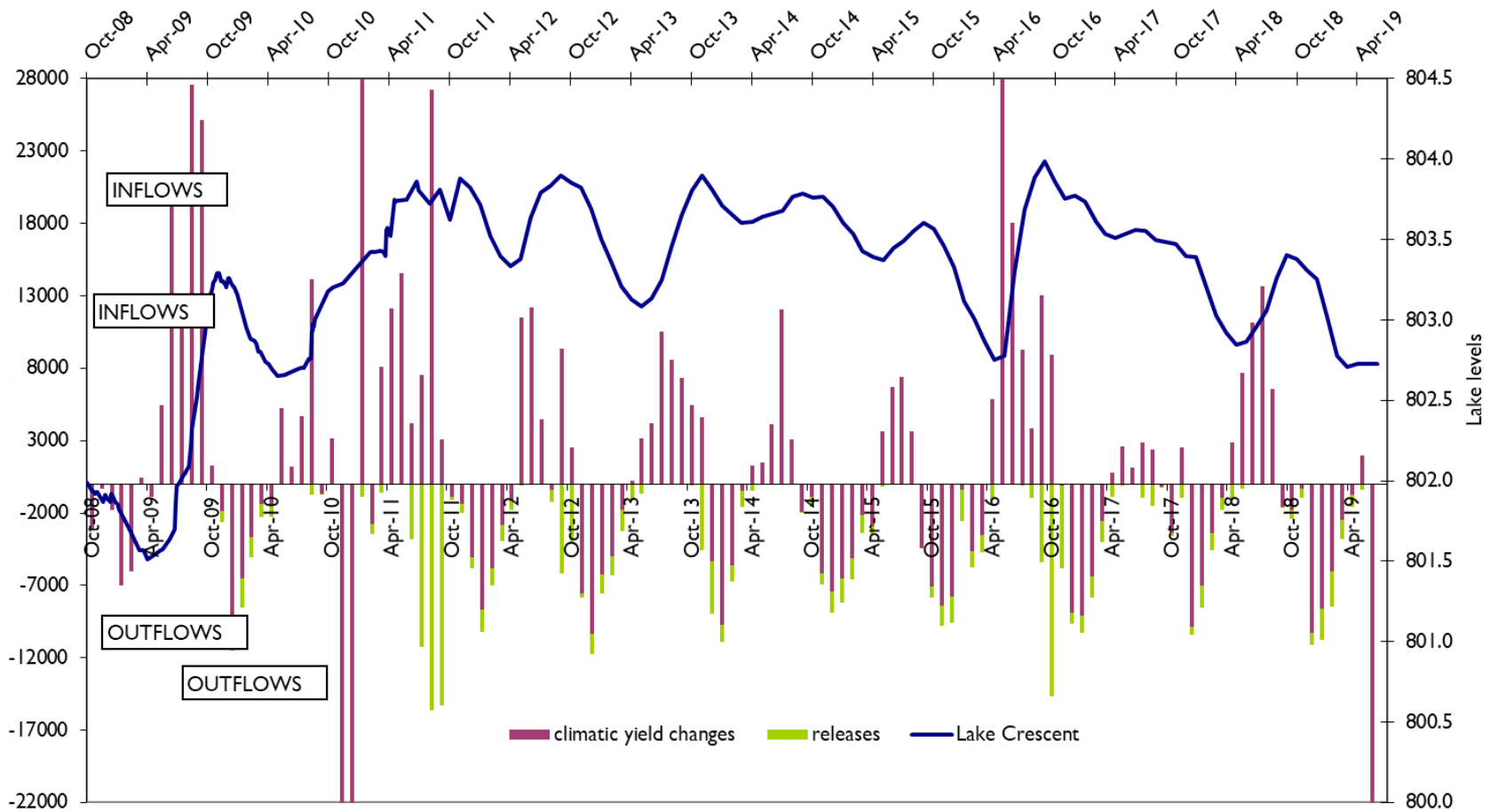


*Figure 11. Lake Crescent lake levels, water yields and deficits (2008 – June 2019).*

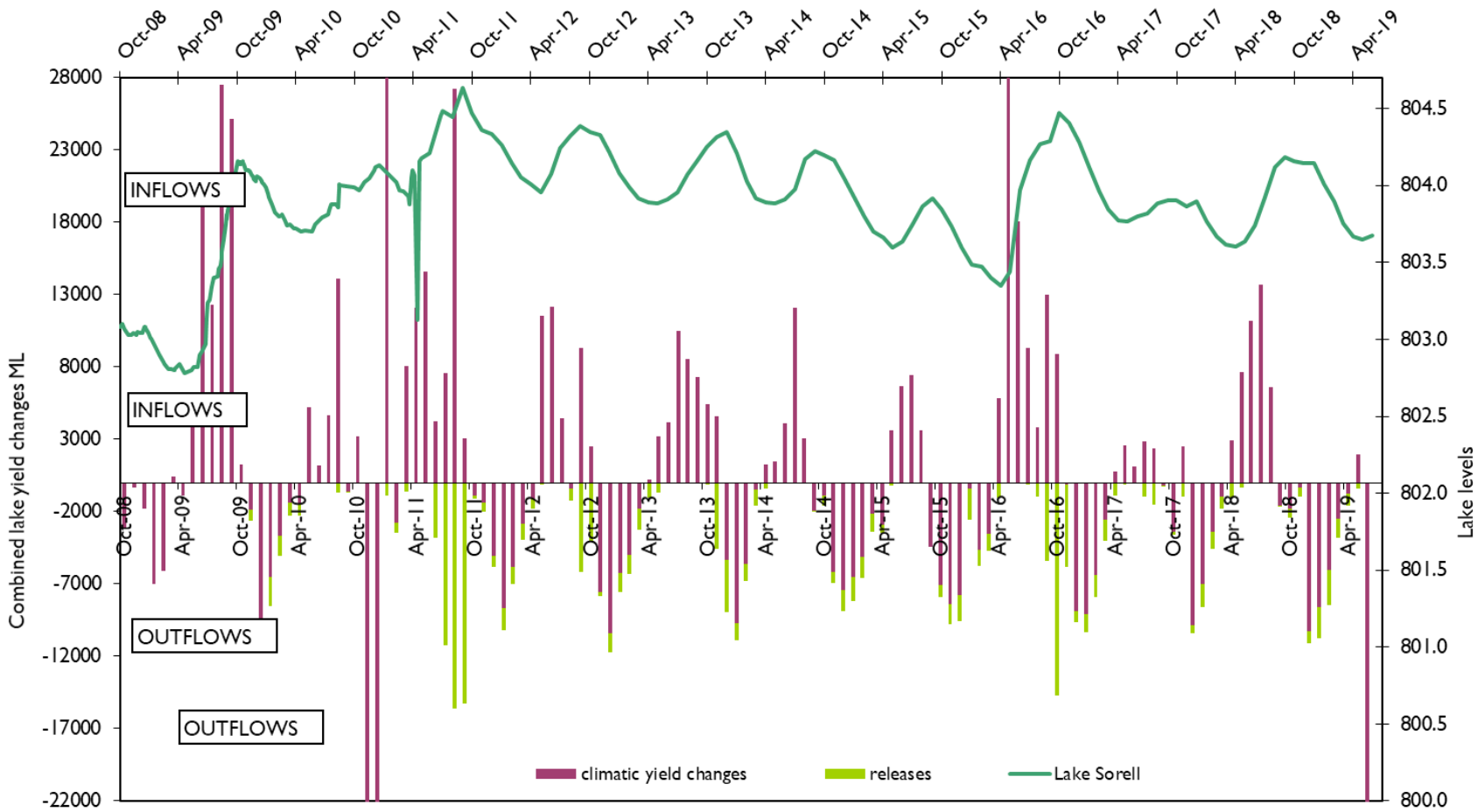


*Figure 12. Lake Sorell lake levels, water yields and deficits (2008 – June 2019).*

# 11.
# Staffing

## 11.1 Staff Positions

In May, Storm Eastley accepted a twelve month contract extension. Seven casual workers were employed to assist with carp management activities during the period.

*Table 7. Staff positions (2018/19).*

| | |
|---|---|
| **Field Officers** | Robert Cordwell (0.8fte) Terry Byard (0.5fte) |
| **Technical Officers** | Brock Cuthbertson (1fte) Storm Eastley (1 fte) |
| **Program Leader** | Jonah Yick (1 fte) |
| **Consulting Scientist** | Dr. Jawahar Patil |
| **Section Manager** | Chris Wisniewski (1fte) |

*Table 8. Casual positions (2018/19).*

| Name | Background | Timeline |
|---|---|---|
| Kim Clark | Interlaken Shack Owner | 11th September – 29th March |
| Julian Butschek | University of Tasmania | 1st – 19th October |
| Laurence Farr | Australian Maritime College | 17th October |
| Jake Brumley | Australian Maritime College student | 19th November – 28th January |
| Will Ertler | Australian National University student | 14th – 28th December |
| Maddie Crowden | Australian Maritime College | 18th January – 22nd March |
| Craig Burgess | Huon Aquaculture | 2nd – 4th January |

## 11.2 Staff Requirements as per Industrial Agreement

IFS staff are required to undertake weekend work and hours beyond general conditions of service as part of the industrial agreement. The following table outlines the work undertaken by CMP staff for the year.

*Table 9. Weekend work, public holidays and extra hours.*

| Staff Member | Saturdays | Sundays | Public Holidays | Extra Hours |
|---|---|---|---|---|
| Jonah Yick | 8 | 9 | 1 | 166.4 |
| Brock Cuthbertson | 12 | 12 | 1 | 270.98 |
| Terry Byard | 3 | 4 | 0 | - |
| Robert Cordwell | 6 | 5 | 1 | 119.8 |
| Storm Eastley | 22 | 22 | 2 | 256.75 |

# 12.
# Activities

## 12.1 Carp Sightings

8 November 2018 – Brumbys Creek – Redfin Perch

3 January 2019 – Tamar River – Tench

11 January 2019 – Grindelwald Golf Course – Goldfish

15 February 2019 – Tiers Cottages, Deloraine – Tench

## 12.2 Public Presentations

During the course of the year staff from the IFS gave presentations to the following organisations on the CMP.

*Table 10. Public presentations.*

| Date | Organisation |
|---|---|
| 6th July 2018 | New Norfolk Licensed Anglers Association |
| 7th – 11th October 2018 | Australian Society for Fish Biology |
| 12th October 2018 | Talk Trout Tasmania |
| 15th October 2018 | Tasmanian Fly Tyers Club of Hobart |
| 8th May 2019 | Clarence Licensed Anglers Club meeting |
| 18th – 19th May 2019 | Liawenee Trout Weekend |
| 25th May 2019 | North West Fly Fishers Club of Tasmania |

## 12.3 Timeline of Major Events

*Table 11. Timeline of major events 2018/19.*

| Date | Organisation |
|---|---|
| **July** | |
| 18th | National Carp Control Plan (NCCP) workshop in Canberra |
| 31st | Begin to start checking barrier nets for holes and tears |
| 31st | Two bays opened up at the Lake Sorell screens |
| **August** | |
| 17th | The two bays open at the Lake Sorell screens had 12mm mesh installed |
| 22nd | One bay at the Lake Sorell screens closed |
| 30th | All barrier net checks and repairs completed |
| **September** | |
| 3rd | Lake Crescent shack inventory and clean up |
| 4th | Big fyke nets installed into barrier nets and opened up |
| 10th | Permanent gill nets installed behind barrier nets around Lake Sorell |
| 11th | Transmitter fish 2710 removed from the lake, one remaining |
| 12th | Another bay opened up at the Lake Sorell screens, total of two currently open. |
| 25th | Transmitter fish 5545 removed from the lake, all transmitter fish have now been removed. |
| 25th | Raised one of the bays at the Lake Sorell screens, all other bays shut off. |
| **October** | |
| 2nd | Lake Crescent screens opened, and water release commenced. |
| 4th | All carp at Salmon Ponds assessed |

| Date | Organisation |
|---|---|
| **October** | |
| 5th – 13th | Blocking gill nets installed in front of potential spawning areas |
| 7th | First carp of the season caught at Kemps rocky shore |
| 7th – 11th | Australian Society for Fish Biology conference Melbourne, Victoria |
| **November** | |
| 2nd | Filming with the River monsters /Dark Waters film crew |
| 14th | Filming for the IFS Carp Management Program feature video |
| **December** | |
| 7th | Lake Sorell field station site inspection |
| 12th – 14th | Monthly Lake Sorell juvenile carp survey |
| 29th | Largest carp caught for the season: 437mm, 1857gm, female |
| **January** | |
| 9th – 11th | Monthly Lake Sorell juvenile carp survey |
| 25th | Blocking gill nets removed from Lake Sorell |
| **February** | |
| 8th | Permanent gill nets behind barrier nets removed from Lake Sorell |
| 13th – 14th | Monthly Lake Sorell juvenile carp survey |
| 20th | Big fyke nets removed from barrier nets |
| **March** | |
| 6th | Annual Lake Crescent juvenile carp survey |
| 18th – 22nd | Annual Lake Sorell juvenile carp survey |
| 26th | River Clyde downstream survey |
| 27th – 29th | Lake Crescent and Sorell annual golden galaxias fyke net survey |
| **April** | |
| 12th | All carp at Salmon Ponds assessed for gonad development |
| **May** | |
| 9th | Carp workshop |
| 31st | Closed Lake Crescent screens |

## 12.4 Media Articles

**26th July 2018** – Inland Fisheries Service Website, Latest News – "Carp Management Program attends National Carp Control Plan workshop".

**28th July 2018** – The Advocate – "Public Notices: Lake Sorell Closure".

**28th July 2018** – The Examiner – "Public Notices: Lake Sorell Closure".

**28th July 2018** – The Mercury – "Public Notices: Lake Sorell Closure".

**August/September** – Tasmanian Fishing and Boating News – "Carp update", How many left?".

**21st September 2018** – Inland Fisheries Service Website, Latest News – "Carp Management Annual Report 2017-18".

**25th September 2018** – The Advocate – "Cutting the carp: Fewer than 50 remain".

**25th September 2018** –ABC Radio Hobart – Josh Rheinberger "Carp".

**September 2018** – Fishing and Boating Monthly – "Carp Management Program".

**5th October 2018** – Inland Fisheries Service Website, Latest News – "Carp Management Program Quarterly Report July Sept 2018".

**11th October 2018** – Fly Stream magazine – "The fall and rise of Lake Sorell".

**19th October 2018** – The Mercury – "Carp program reaps rewards".

**23rd October 2018** – Inland Fisheries Service Website, Latest News – "Inland Fisheries Service presents at national conference".

**24th October 2018** – Inland Fisheries Service Website, Latest News – "CMP presents to Tasmanian Fly Tyers Club meeting".

**8th November 2018** – The Examiner – "Carp Gone?".

**November 2018** – Fishing and Boating Monthly – "Carp Management".

**December 2018** – Fishing and Boating Monthly – "Inland Fisheries Service presents at national conference".

**December 2018** - Australian Society for Fish Biology Newsletter, Lateral lines – "State Reports: Tasmania, Inland Fisheries Service: Carp Management Program".

**December 2018** - Australian Society for Fish Biology Newsletter, Lateral lines – "Committee Reports: Tasmania, Carp Management Program".

**20th February 2019** – Inland Fisheries Service Website, Latest News – "The Carp Report – October-December".

**26th February 2019** – Inland Fisheries Service Website, Latest News – "Business Clean Up Australia Day".

**28th February 2019** – The Advocate – "Inland Fisheries Service program cuts carp at Lake Sorell".

**28th February 2019** – The Examiner – "Brown Dun".

**15th March 2019** – Inland Fisheries Service Website, Latest News – "Carp Management Program Update on Lake Sorell".

**20th March 2019** – The Advocate – "Opening of Lake Sorell Delayed".

**20th March 2019** – The Derwent Valley Gazette– "Carp clearing".

**20th March 2019** – ABC news website – "Tasmania poised to declare victory in war against carp".

**20th March 2019** – ABC radio Hobart– Leon Compton "Carp".

**29th March 2019** – The Mercury – "Progress On Carp".

**March 2019** – Highland Digest – "The Carp Report".

**5th April 2019** – Inland Fisheries Service Website, Latest News – "Lake Crescent remains carp free, and no spawning in Lake Sorell".

**8th April 2019** –The Advocate – "Highland lakes carp on way out".

**8th April 2019** –The Examiner – "Brown Dun".

**9th April 2019** – Inland Fisheries Service Website, Latest News – "River Clyde Carp Survey".

**10th April 2019** –DPIPWE Pod news and events – "Carp number dwindling".

**April 2019** – Highland Digest – "Carp management program update on Lake Sorell".

**April 2019** – Fishing and Boating Monthly – "Carp Management".

**3rd May 2019** –The Advocate – "The last gasps for carp coming".

**7th May 2019** – Inland Fisheries Service Website, Latest News – "Carp Management Program Quarterly Report for January to March 2019".

**10th May 2019** – Inland Fisheries Service Website, Latest News – "View the latest Tasmanian Carp Management Program video".

**16th May 2019** –The Examiner – "Brown Dun".

**June 2019** – FRDC FISH magazine – "Tasmania nears carp free status".

| Natural_Account | Total Prds | Period 0 | Period 1 | Period 2 | Period 3 | Period 4 | Period 5 | Period 6 | Period 7 | Period 8 | Period 9 | Period 10 | Period 11 | Period 12 | Period 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5101 - Salaries | 227,956.69 | 0.00 | 24,558.78 | 24,835.91 | 2,024.37 | 26,118.29 | 20,415.11 | 18,445.38 | 16,666.79 | 17,069.34 | 16,633.89 | 19,695.86 | 25,696.99 | 15,795.98 | 0.00 |
| 5102 - Lump Sum Leave | 12,375.56 | 0.00 | 8,625.60 | 5,848.32 | (13,589.09) | 525.60 | 0.00 | 0.00 | 2,325.74 | 897.28 | 2,615.79 | 215.87 | 448.64 | 4,461.81 | 0.00 |
| 5106 - Superannuation | 33,992.59 | 0.00 | 4,586.46 | 4,232.31 | (1,495.06) | 3,745.57 | 2,901.20 | 2,702.81 | 2,708.12 | 2,527.44 | 2,827.88 | 2,765.52 | 3,676.60 | 2,813.74 | 0.00 |
| 5107 - Otime-Penalties | 1,805.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 875.44 | 0.00 | 0.00 | 1,036.83 | (106.68) | 0.00 | 0.00 | 0.00 |
| 5109 - Allowances | 38,579.43 | 0.00 | 3,677.10 | 4,261.66 | 590.61 | 4,520.33 | 3,022.42 | 3,022.42 | 3,022.42 | 3,022.42 | 3,022.42 | 3,022.42 | 4,453.21 | 2,942.00 | 0.00 |
| 5113 - Staff Recruit | 303.73 | (275.00) | 275.00 | 0.00 | 303.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5203 - Training | 425.00 | 0.00 | 0.00 | 0.00 | 425.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5204 - Cons Fees | 5,509.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5,509.09 | 0.00 | 0.00 | 0.00 |
| 5205 - Prof Fees | 4,100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4,100.00 | 0.00 |
| 5207 - Equip Hire/Lse | 17,354.97 | 0.00 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 1,436.54 | 2,291.99 | 697.58 | 0.00 |
| 5208 - Equipment Maint | 7,647.29 | 0.00 | 0.00 | 755.27 | 1,151.72 | 0.00 | 653.42 | 0.00 | 0.00 | 0.00 | 0.00 | 2,585.78 | 579.29 | 1,235.45 | 686.36 |
| 5209 - General Ins | 9,370.51 | 0.00 | 0.00 | 0.00 | 6,994.48 | 2,303.13 | 0.00 | 0.00 | 0.00 | 0.00 | 530.90 | (458.00) | 0.00 | 0.00 | 0.00 |
| 5212 - Printing/Pubs | 1,146.36 | 0.00 | 0.00 | 0.00 | 310.00 | 836.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5213 - Library | 50.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5214 - Vehicle Fuel | 12,634.92 | (767.68) | 767.68 | 833.59 | 766.86 | 877.10 | 660.17 | 1,297.65 | 2,292.55 | 1,007.41 | 403.64 | 616.46 | 937.24 | 1,902.16 | 1,040.09 |
| 5215 - Vehicle Hire | 42.55 | 0.00 | 0.00 | 0.00 | 0.00 | 42.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5217 - Vehicle Maint | 5,142.66 | 0.00 | 241.55 | 16.40 | 1,528.15 | 424.95 | 438.18 | 385.64 | 0.00 | 1,038.12 | 0.00 | 16.50 | 342.00 | 613.67 | 97.50 |
| 5219 - Postage/Freight | 34.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 34.50 | 0.00 | 0.00 |
| 5220 - Comp Hardware | 5,618.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4,900.00 | 0.00 | 0.00 | 718.18 | 0.00 | 0.00 | 0.00 |
| 5222 - Comp Software | 2.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.73 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5223 - Network Costs | 811.03 | 0.00 | 0.00 | 54.50 | 0.00 | 54.50 | 109.00 | 0.00 | 168.82 | 0.00 | 54.50 | 194.52 | 0.00 | 175.19 | 0.00 |
| 5228 - Mob Phones Rads | 3,861.95 | 0.00 | 98.78 | 340.89 | 0.00 | 390.58 | 327.37 | 213.72 | 372.97 | 148.28 | 285.65 | 255.55 | 138.53 | 1,289.63 | 0.00 |
| 5229 - Equip Purchases | 5,143.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5,143.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5230 - Equipment Depn | 7,889.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7,889.67 | 0.00 |
| 5231 - MV Depn | 24,384.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2,936.99 | 21,447.21 | 0.00 |
| 5232 - Vessel Depn | 8,220.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8,220.88 | 0.00 |
| 5234 - Op Supplies | 7,401.03 | 0.00 | 0.00 | 378.67 | 0.00 | 925.37 | 670.61 | 0.00 | 636.94 | 23.46 | 67.26 | 1,101.61 | 0.00 | 3,597.11 | 0.00 |
| 5236 - Cont Services | 18,124.48 | 0.00 | 0.00 | 0.00 | 54.71 | 2,808.00 | 2,235.46 | 726.11 | 5,214.68 | 3,456.96 | 1,506.96 | 2,121.60 | 0.00 | 0.00 | 0.00 |
| 5238 - OH & S | 3,098.79 | 0.00 | 129.92 | 310.10 | 146.25 | 135.00 | 135.00 | 135.00 | 135.00 | 135.00 | 260.71 | 555.00 | 135.00 | 886.81 | 0.00 |
| 5240 - Meetings & Conf | 1,407.64 | 0.00 | 0.00 | 0.00 | 0.00 | 819.73 | 58.64 | 0.00 | 77.63 | 0.00 | 0.00 | 0.00 | 59.09 | 392.55 | 0.00 |
| 5244 - Council Rates | 73.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 23.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 50.00 | 0.00 |
| 5246 - Prop Maint | 374.08 | 0.00 | 0.00 | 352.72 | 0.00 | 21.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5253 - Vessel Maint | 17,124.60 | (121.39) | 552.73 | 194.00 | 348.15 | 4,341.58 | 4,326.60 | 1,759.55 | 1,772.06 | 726.11 | 1,129.44 | 1,244.73 | 299.41 | 551.63 | 0.00 |
| 5254 - Interstate Trav | 816.73 | 0.00 | 0.00 | 749.23 | 0.00 | 0.00 | 0.00 | 0.00 | 67.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5255 - Intrastate Trav | 24,413.68 | (414.00) | 414.00 | 1,530.60 | 2,241.90 | 3,674.25 | 4,299.75 | 2,780.25 | 3,711.60 | 3,264.60 | 1,727.10 | 863.55 | 211.90 | 108.18 | 0.00 |
| 5258 - Prot Clothing | 1,544.66 | 0.00 | 0.00 | 958.43 | 18.18 | 144.37 | 0.00 | 111.82 | 131.82 | 15.09 | 0.00 | 0.00 | 164.95 | 0.00 | 0.00 |
| 5267 - Vessel Outboard | 6,998.50 | 0.00 | 64.64 | 0.00 | 192.00 | 3,684.73 | 0.00 | 1,588.68 | 0.00 | 523.95 | 0.00 | 0.00 | 310.00 | 634.50 | 0.00 |
| 5269 - Office Printing | 181.85 | 0.00 | 0.00 | 0.00 | 0.00 | 121.47 | 46.78 | 11.00 | 0.00 | 0.00 | 0.00 | 2.60 | 0.00 | 0.00 | 0.00 |
| 5270 - WDV Disp Assets | 47,150.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22,645.86 | 24,504.83 | 0.00 |
| 5272 - Advert / Media | 758.24 | 0.00 | 0.00 | 758.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5280 - Signage | 90.00 | 0.00 | 0.00 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| State Contribution | (400,000.00) | | | | | | | | | | | | | | |
| IFS Contribution | 163,961.5 | | | | | | | | | | | | | | |
| **Total Expenditure** | **563,961.46** | **(1,578.07)** | **45,428.78** | **47,937.38** | **3,448.50** | **57,951.36** | **46,952.66** | **35,492.01** | **45,641.18** | **35,822.90** | **32,553.34** | **42,814.70** | **65,362.19** | **104,310.58** | **1,823.95** |

# 13. Budget

Tasmanian Government


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