Carp Management Program
Annual Report
2016-17

Inland Fisheries Service

Australian Government

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Tasmanian Government

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For further information contact:

Inland Fisheries Service
PO Box 575
New Norfolk
Tas 7140
Telephone: (03) 6165 3808
Facsimile: (03) 6261 8051
Email: infish@ifs.tas.gov.au

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

This annual report details the Carp Management Program activities for the financial year 2016 – 17.

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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Contents

List of Figures

List of Tables

List of Pictures

Executive Summary

Wow. What a hectic spring and summer chasing carp. Lake Sorell filled quickly, after good winter rain stimulating the carp to move. The lake hit full supply at the end of September and continued to rise in early October peaking around 160mm above full supply level. This tested the levee banks and outflow screens containing carp to the lake. Everything held and the water was drawn down taking some stimulus out of potential carp spawning while the water temperature was cooler.

The high water levels also tested the barriers keeping carp out of the wetland spawning areas. Numerous fish were caught in traps as they moved in from offshore. At a number of sites carp breached the barriers. This became a priority and they were targeted using gill nets and electrofishing gear to prevent any spawning. Further rain in late November provided additional stimulus and another wave of movement that enabled more carp to be caught.

Monthly sampling for spawning started in November, culminating with a large survey in March which failed to detect any sign of spawning or recruitment. The team did an amazing job to survive the onslaught of favourable environmental conditions and maturing carp, but this was a just reward for the long hours and hard work.

The remaining carp appear to be struggling in both size and maturity. The observations of jelly gonad condition (JGC) carp have increased from 33% to now over 50% of the male population being adversely affected and infertile.

The State Government has continued its support for carp eradication with annual funding, while the Australian Government funding finished on 30 June 2017. Further negotiations are underway with the Australian Government for financial support to finish the project.

Surveys indicate that carp remain contained to Lake Sorell.

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 2016/17 season

Lake	Total 2016/17	Adult / Juvenile	Total 1995 to present
Sorell	439	439 / 0	41,345
Crescent	0	0	7797

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 netting blocking the wetlands. Several kilometres of gillnet was also repaired, which included both gillnets used in active fishing operations, as well as blocking gillnets to prevent carp from accessing the marshes.

A small amount of fishing was done during this cold period. Transmitter fish remained spread around the lake, with most of the fish sitting in the same locations for weeks at a time. Their individual movements increased in line with rising lake levels, however no aggregations were found. Gill nets were set in a range of locations, targeting both tracker fish as well as rocky reef structures in deep water (2m +). Seven carp were caught during this period, of which two consisted of an ex-tracker and a tagged population estimate carp.

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 back inshore, allowing gill nets to be set to target these movements. Significant rain events throughout the winter months elevated both lakes Sorell and Crescent to high levels increasing the amount of marsh.

Picture 1. A large jelly gonad male carp caught in December in a trammel net over shallow, rocky substrate

This year late September marked the start of the carp fishing season. Rapidly rising water levels flooding the marshes, along with the rising temperatures over the spring months resulted in the carp population displaying a strong drive to push in shore. This resulted in fishing effort being shifted from deeper water, into the shallow margins around the lake. In addition to gillnets, a wide range of other fishing methods were also used (Figure 1, Table 2). These included small fyke nets, big fyke nets stitched into barrier nets, double fyke nets, box traps, the boat electrofisher, and backpack electrofisher. These techniques combined 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, with sampling conducted across a wide area of the lake.

Table 2. Total carp captured from all methods used in Lake Sorell over the 2016/17 season

Gear Type	Jul-Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr-Jun	Grand Total
Non- targeted gillnets	2	12	42	30	44	22	5	0	157
Inshore set gillnets*	3	4	24	18	30	0	10	8	97
Barrier fyke nets	0	29	26	58	4	1	0	0	118
In-lake fyke nets†	0	0	1	2	0	0	0	0	3
Backpack electrofisher	0	0	1	4	3	0	4	0	12
Boat electrofisher	0	0	2	1	0	1	0	0	4
Gillnets behind marsh	0	1	3	33	11	0	0	0	48
Grand Total	**5**	**46**	**99**	**146**	**92**	**24**	**19**	**8**	**439**

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

†In-lake fyke nets include small fyke nets, double fyke nets, and box traps.

A total of 10km of gillnet was strategically set behind the barrier nets to prevent carp from entering spawning habitats, as well as partitioning the marshes into fishable sections. This was more than double the amount of gill net set behind the marshes in previous seasons, allowing the location of any breaches to be pin pointed, and electrofishing to be undertaken to target carp. Gillnets were also set across and within key drainage areas in the marshes. Trammel gillnets played a key role in catching fish due to their ability to capture various size classes of carp. In total, 52 carp were removed from high-risk zones behind the barrier nets using a combination of gillnet (48 carp) and electrofishing (4) effort (Table 2). However no evidence of spawning was observed, with all captured female carp possessing gonads that were neither hydrated nor 'spent'. This suggests that these fish were removed before they had the opportunity to settle in the marsh habitats and spawn.

Intensive fishing effort in inshore regions along with high water temperatures resulted in high catch rates, peaking on the 26th of December where 41 carp were caught in a single day. This capture included 24 carp which were caught across three fyke nets stitched into barrier net at Silver Plains marsh.

Picture 2. The 2.93kg female carp that was caught in a trammel net whilst targeting a transmitter fish. This was the biggest carp caught over the past six years.

The barrier fyke nets were most effective from October to December 2016, where they accounted for 39.1% of the total carp caught for that quarter (Figure 1). The capture of these carp in barrier fyke nets was the first major push into inshore regions from this cohort, and has not been observed to this extent for many years in Lake Sorell. For the same period during the 2015/16 season, the barrier fyke nets only caught 1% of the total catch (Figure 1). The biggest fish caught from the fyke nets was a 1.9kg female carp, which contained 399 grams of eggs (with a GSI of 21%). During the 2015/16 season from October to December, 82.5% of carp were captured in gillnets in deep water, compared to only 28.4% this year (Figure 1). The second half of the 2016/17 season resulted in the carp moving out into deep water, and as a result there was an increase in carp caught from non-targeted gill nets (53%) (Figure 1). This was a much lower proportion when compared with January to March 2016 where 87% of fish caught during that quarter were from non-targeted gill nets. This year inshore set gillnets continued to produce high catch rates throughout January, however by the end of the month catch rates in these areas stopped. The reduction in overall carp caught from January to March continues the trend of declining catch rates as the 2009 cohort is fished out (Table 2, Figure 2, and Figure 3).

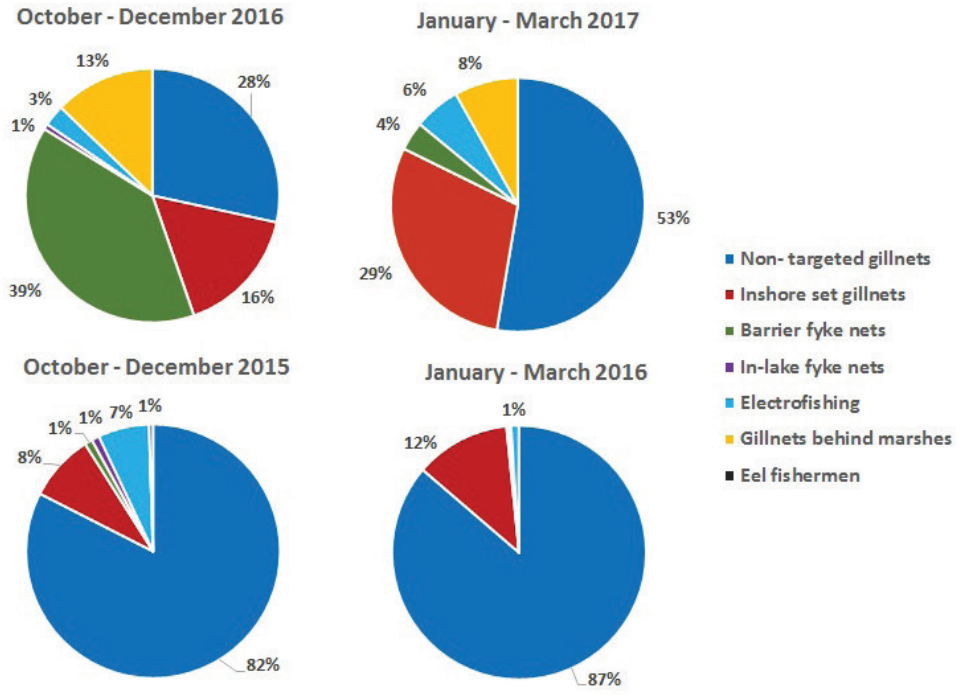

Figure 1. Percentage of total carp captured from each gear type during the carp fishing season (October to March) in Lake Sorell comparing the 2016/17 and 2015/16 seasons

Catch from non-targeted gillnets is standardised to carp per 100 m net hour, to make meaningful comparisons between different nets, months, and years. With this information, adjustments in gear use are made to ensure a high level of fishing efficiency. Non-targeted gillnetting effort this season occurred over a wide area of the lake, with structure and habitat continuing to be a priority.

Table 3. Non-targeted gill net fishing effort and carp captures in Lake Sorell for the 2015/16 and 2016/17 seasons.

Month	Non-Targeted Carp Captures *		100m Net Hours	
Season	**2015/16**	**2016/17**	**2015/16**	**2016/17**
July-Sept	28	2	5698	57.5
October	128	12	12701	24010
November	136	42	29586	27097
December	100	30	46176	28412
January	109	44	57707	31137
February	93	22	58531	47341
March	6	5	10521	6547
Apr-Jun	6	0	9794	0
Grand Total	**606**	**157**	**272 975**	**164 602**

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

There was a reduction in non-targeted gill net sets compared to last season, where the amount of effort this season was decreased by 40% (Table 3). However in the months where a similar amount of effort was undertaken compared to the 2015/16 season (November and February), the catch rates were significantly less (Table 3). Gillnetting peaked in February (Table 3), in response to fish moving back into deep water. In January and February as carp moved away from the shore and back to deeper water, we removed the gillnets from the marshes behind the barrier nets. These nets were deployed into deep water to increase non-targeted netting effort.

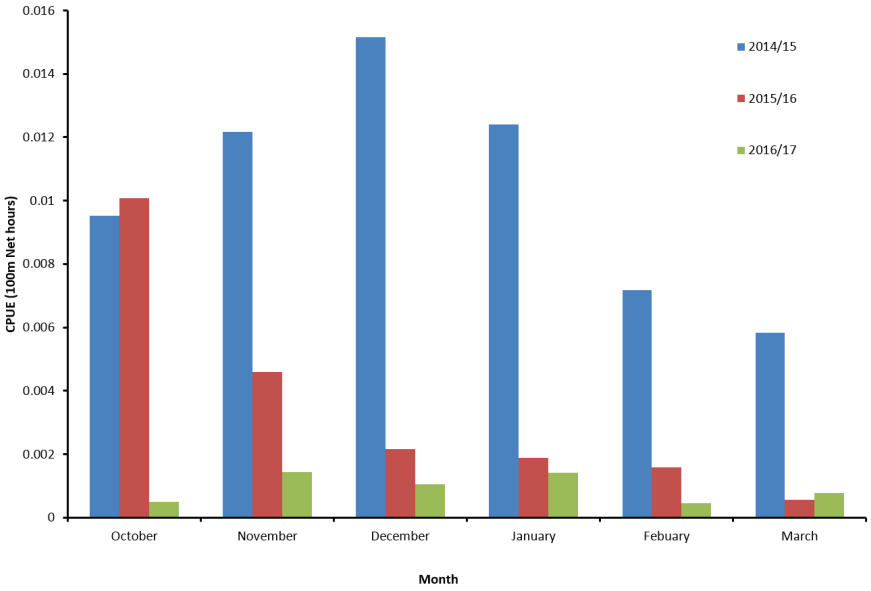

Figure 2. Catch per unit effort (CPUE) of non-targeted gill netting during the carp fishing season (October to March) in Lake Sorell comparing the 2014/15, 2015/16, and 2016/17 seasons.

Non-targeted gill netting catch rates remained relatively low all year, and the catch per unit effort (CPUE) was much less for all months when compared to last season, apart from March (unlikely to be of any significance) (Figure 2). This follows the historic trend of declining total carp captures as the population is continually depleted (Figure 3). This reduction in CPUE continues across all gear types, suggesting that the size range of the population is being exploited evenly. The weather at Lake Sorell this summer was warm and stable, which provided favourable conditions for catching carp. This factor can be ruled out as a contributor to the low CPUE.

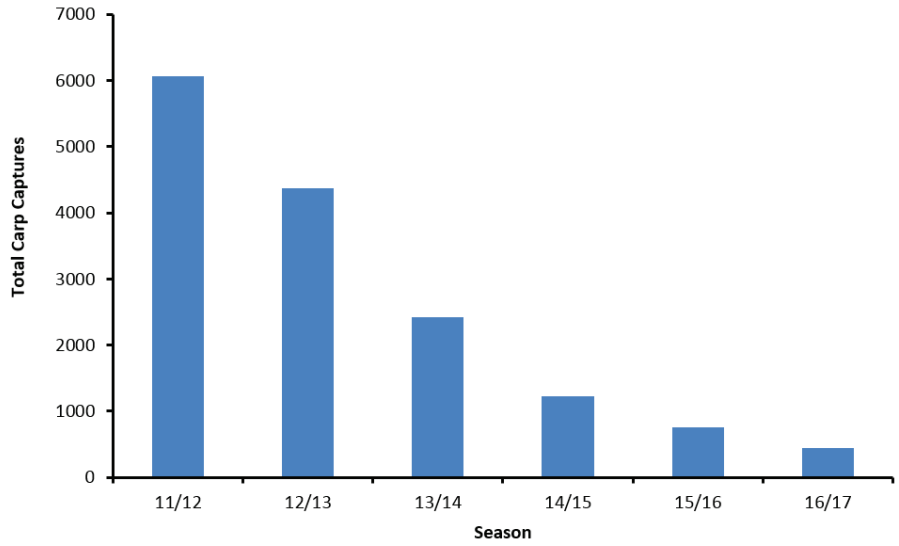

Figure 3. Total carp captures from Lake Sorell using all methods (2011-2017)

Targeting transmitter fish throughout the 2016/17 season proved to be an effective technique, with some significant catches being made (see Transmitter section for more details). The main advantage of targeting aggregations as opposed to non-targeted effort is that the CPUE of aggregations are high, and large numbers of key fish can be removed quickly. Only one small feeding aggregation was found this season, which occurred in mid-March after a period of warm settled weather. A single transmitter fish was pinpointed and targeted in a rocky backwater on Dago Point, and trammel gillnets were used to block off access to the area. Backpack electrofishers were then used to herd the transmitter fish into a gillnet. This fish was carefully removed from the gillnet and released back into the lake. Further electrofishing was undertaken and three carp were caught in the electric current. One of these carp was a 2.86kg JGC male, which is the largest example of its kind seen to date on the program. The whole area was shocked multiple times and gillnets were checked periodically as carp were pushed into them. The nets were left in the water and a total of 14 carp were captured over three days. This late season aggregation shows us the importance of our radio transmitter fish in finding carp in Lake Sorell, given the small remaining population size.

Routine tracking and fishing activities between April and June resulted in the capture of 8 carp, all of which were the result of targeting transmitter fish. One notable event involved two transmitter fish which were detected in late June on the Kemps rocky shore, a close distance from one another. Nets were set around these fish and six carp were caught including one of the transmitter fish.

Picture 3. The rocky backwater which was the site of the first and only carp aggregation detected for the 2016/17 season. The entry points were blocked off, and trammel gill nets were zig zagged through the whole area in conjunction with backpack electrofishing.

The ratio of carp with JGC has continued to increase since the beginning of the 2015/16 season. The ratio for the January-March 2017 quarter was 1:1, which relates to 1 affected carp for 1 healthy male. This increase in male carp affected by JGC will play an important part in the final stages of the eradication.

In summary, this season required a dramatically different fishing strategy compared to the 2015/16 season. A rising lake level and inundated marshes resulted in a strong drive from the carp population to push into the high-risk marsh areas. Rather than saturating the whole lake with nets, the majority of netting effort was focused in the inshore areas to capture carp attempting to push into the marshes. For the first time in many seasons, big fyke nets stitched into barrier nets caught effectively at the start of the season. Spawning prevention was a high priority, focusing on removing any fish that breached the barrier nets and entered the marshes. Transmitter fish also played a big part in the capture of numerous significant fish, as well as the one and only aggregation for the season.

Turbidity levels in Lake Sorell have been steadily decreasing since 2008, and for the last 2 years the average total turbidity has been at 58.2 NTU (Figure 4). The big rain event in early June 2016 caused a sudden increase in lake levels, which resulted in the sediment in the water column being pushed into the far reaches of the wetlands, drawing these particles away from the main body of water.

Increasing inflows and outflows are beneficial in reducing turbidity, where large volumes of turbid water are flushed out of the system.

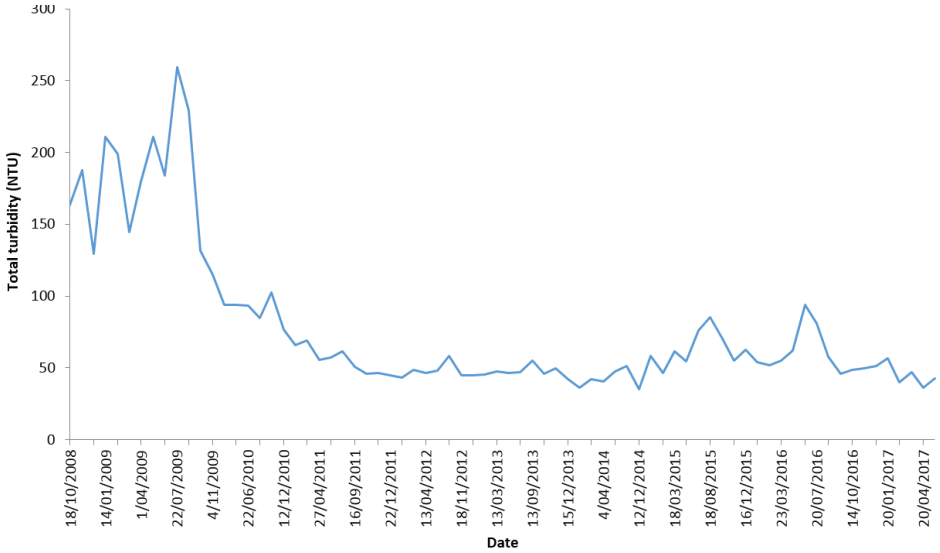

Figure 4. Turbidity levels in Lake Sorell from 2008 to 2017

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. Lake Crescent's water quality is also continuing to show signs of improvement (Figure 5). 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. Currently, the water quality of Lake Crescent is the best it's been for the past 10 years.

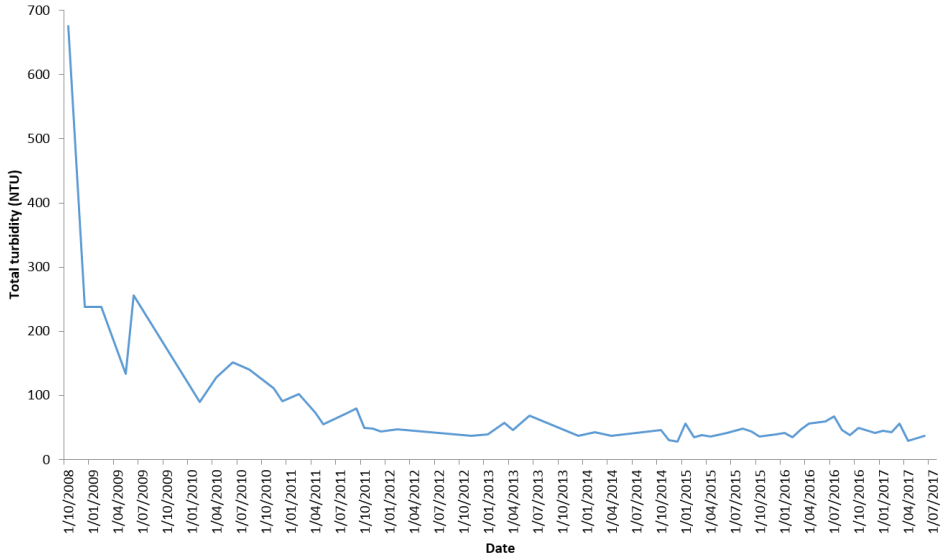

Figure 5. Turbidity levels in Lake Crescent from 2008 to 2017

2.

Juvenile Carp Surveys

The annual Lake Crescent juvenile carp survey took place on the 15th of March 2017. The aim of this survey was to make sure 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. 11 areas around the lake were surveyed using backpack electrofishers for a minimum of 10 minutes at each location. A total of 135 electrofishing hours were undertaken, with brown trout, short-fin eels, and golden galaxias making up the catch. There was no sign of any carp in Lake Crescent.

Picture 4. Backpack electrofishing amongst the strap weed for any presence of juvenile or adult carp in Lake Crescent.

Picture 5. Backpack electrofishing patches of baumea behind the barrier net at Dogs Head marsh to search for any presence of juvenile carp.

The Lake Sorell juvenile carp survey was conducted from Monday the 6th to Friday the 10th of March 2017. 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.

64 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 electrofishers were used at 24 sites around the lake. Electrofishing was undertaken for a minimum of 15 minutes at each location. In total, 6144 fyke net hours were put in over the duration of the survey, as well as a total of 394 electrofishing hours. This resulted in numerous juvenile brown trout, eels, and golden galaxiids caught, but no sign of any new young of the year carp.

This year additional monthly juvenile surveys from December to February were also conducted in response to numerous carp being caught behind the barrier nets at Kermodes, Silver Plains, and Robertsons Marsh. The increased frequency of these surveys this season was to ensure early detection of potential spawning events to increase capture efficiency of juvenile fish. The surveys were undertaken over three to four days and involved intensive backpack and boat electrofishing, as well as fine mesh dip netting of the whole wetland area, from the barrier net back to the shoreline. A total of 687, 922, and 398 electrofishing hours were undertaken in December, January, and February, respectively. No juvenile carp were detected.

Picture 6. Checking fyke nets set around the periphery of the lake to target any juvenile carp moving around the shallows.

3.

The River Clyde Survey

A downstream carp survey of the Clyde River was also undertaken. The survey examines selected sites that feature ideal carp habitat immediately downstream of Lake Crescent to the township of Hamilton, and to check that carp have not become established in the Clyde River system. The survey has been undertaken annually since carp were first found in lakes Crescent and Sorell in 1995. Backpack electrofishing was undertaken 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 undertaken at each site, with a range of bycatch species captured. 17 redfin perch, 17 tench, 13 brown trout, and 18 eels were shocked in total. No carp were found, which indicates that the containment strategy employed since 1995 continues to be successful.

Picture 7. A couple of redfin perch electrofished from the Clyde River downstream survey.

4.

Transmitters

For most of the year, the transmitter fish were dispersed around Lake Sorell, and occasionally moved close to shore individually on suitable weather events. These conditions consisted of periods of warm, sunny, settled weather, as well as rain events which were able to raise the lake level. Nets were mainly set on transmitter fish when they were found close to the shore, however if groups of transmitter fish were found in deep water a short distance apart, nets were also set around these fish. The ability to accurately set nets around transmitter fish was much higher when the fish are in shallow water, as opposed to deeper water (1m +). Only one shallow aggregation was found this year, and was the result of detecting a transmitter fish in shallow rocky water in mid-March.

Picture 8. An ex-transmitter fish captured this season which had shed its transmitter. The healed incision wound can be seen near the anal fin with no whip antennae protruding.

This year, there was a significantly reduced mortality rate of transmitter fish because they were not as readily exposed to the large number of gill nets which were set behind barrier nets. This was in response to high water levels in the marshes, thus making spawning prevention a priority. Another contributing factor to the lower mortality rate this season is the change from 14gm to 7gm transmitters. This smaller transmitter size suits the overall small size of the current cohort, where the average size of fish being caught now is approximately 750 grams. Although these were limited by battery life, the smaller sized fish were able to retain them more effectively.

Of the 17 transmitter fish released over the course of the season, five fish (28%) were detected on mort mode, and five fish (28%) were killed after being recaptured (Figure 6b). Of these recaptured fish, three were due to expire and were intentionally euthanised, while the other two died due to injuries sustained by capture (Figure 6b). This was a considerably lower figure than last season, where the eight fish (33%) which were killed all died due to injuries sustained by capture (Figure 6a). Eight (44%) of the 17 transmitter fish released are now currently still alive, which is a much higher proportion than last season, where only two (8%) transmitter fish survived the fishing season (Figure 6a).

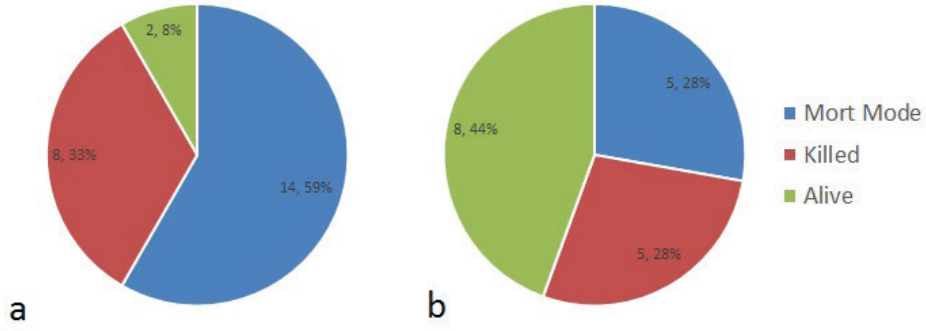

Figure 6. The fate of all transmitter fish used over a. the 2015/16 season, and b. the 2016/17 season

Note: Mort mode refers to a transmitter fish which has been inactive for 12hrs or more, therefore assumed dead or the transmitter was shed from the fish. Killed refers to a fish which was able to be recovered but was either dead on arrival, or it was deliberately killed.

Overall, the recapture rates of fish between the two seasons appeared to be quite similar (Figure 7a, b), with high proportions of fish only caught once and a small percentage of fish avoided capture altogether. However this season one transmitter fish was recaptured six times, while last season the most recaptures observed was three. Another major difference is that over 2015/16 most of the transmitter fish died after the last recapture, where they were either dead on arrival or euthanised due to injuries from capture. It was also noted over the 2015/16 season that all of the fish recaptured apart from one individual died in 2015, with only one of the fish making it through to 2016. This was considerably different to the 2016/17 season, where the majority of the tracker fish survived after the last capture. Therefore they were at liberty for the duration of the season, and were exposed to the fishing gear, but avoided further recapture.

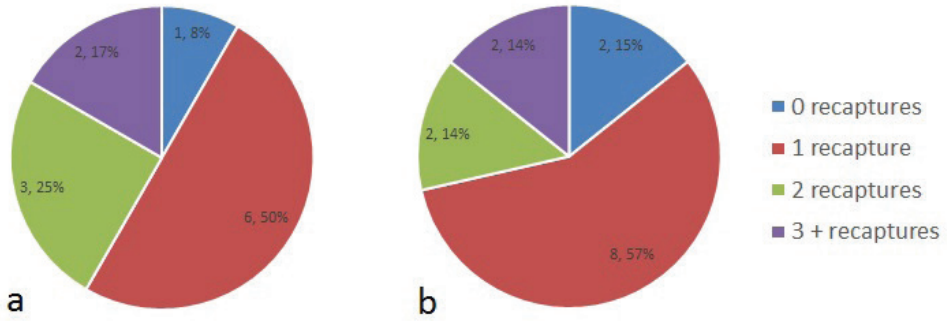

Figure 7. The number of recaptures of transmitter fish over a. the 2015/16 season, and b. the 2016/17 season

Note: Fish detected on mortality mode but not recaptured/recovered are not included in these charts.

Some recaptures resulted from net sets focused on specific habitats or 'hot spots' rather than targeting individual transmitter fish. Some transmitter fish were also caught in passive fishing gears such as the fyke nets, where this relies on the fish attempting to push into a particular area or habitat. The transmitter fish 743 had the highest number of recaptures for 2016/17 , with six recaptures from the 14th September 2016 to the 24th of February 2017 (Table 4). Of the six recaptures, five of them were from active targeting, and out of the five events, three of the recapture events resulted in the capture of other carp (Table 5). Transmitter fish 072 had the second highest number of recaptures for the season with three recaptures, with two of these events being highly significant (Tables 4, 5). On the 27th December 2016, a trammel net which was set around transmitter fish 072 resulted in the capture of two other fish, one of which was a 2.93kg female carp (Table 5). This was the largest carp caught in the previous 6 years, and contained 460 grams of eggs (with a GSI of 16%). On 16th March 2017 this same fish was detected in a shallow rocky backwater on Dago point (Table 4). Gill nets and backpack electrofishing resulted in 14 carp, and was the only aggregation found for the year. This included a 2.86kg JGC male, which was the biggest seen to date. More details of these events can be found in the carp captures section.

The three other transmitter fish which were captured by active targeting also had other carp with them (Tables 4, 5). This highlights the importance of vigilant tracking, and the precise targeting of transmitter fish, when the opportunity arises. The catch rates are usually better when targeting transmitter fish, and the CPUE is also greatly improved compared to non-

targeted gill net sets. The majority of the transmitter fish detected inshore this season were found on shallow rocky shores and appeared to be feeding. Therefore there was no evidence of potential spawning involving any of these transmitter fish, and none were able to breach the barrier net.

Table 4. Tracker fish recaptures for the 2016/17 season with recapture dates

	Number of recaptures					
TrackerID	1st	2nd	3rd	4th	5th	6th
151.883	17/11/16					
151.923	9/6/16					
151.722	10/1/17					
151.743	14/9/16	20/11/16	30/12/16	5/01/17	6/02/17	24/2/17
151.253	20/11/16					
151.903	14/11/16					
151.214	30/12/16					
151.014	4/1/17	10/01/17				
151.152	17/1/17					
151.051	1/12/16	10/01/17				
151.072	27/12/16	4/01/17	16/03/17			
151.903	27/12/16					

Table 5. Tracker fish recaptures for the 2016/17 season with associated fish captures

	Number of recaptures					
TrackerID	1st	2nd	3rd	4th	5th	6th
151.883	0 carp					
151.923	0 carp					
151.722	3 carp					
151.743	1 carp	0 carp	3 carp	5 carp	5 carp	0 carp
151.253	0 carp					
151.903	0 carp					
151.214	1 carp					
151.014	6 carp	0 carp				
151.152	4 carp					
151.051	5 carp	3 carp				
151.072	2 carp	3 carp	14 carp			
151.903	1 carp					

Note: Shaded cells represent fish caught by active targeting of the tracker fish, non-shaded cells represent fish caught in non-targeted fishing gear

Based on the observations of movement, JGC carp will be exclusively used as transmitter fish over the 2017/18 season. This is to take into account the dwindling number of carp remaining, and to reduce the chance of an accidental recruitment by healthy male transmitter fish. Research conducted by IMAS PHD student Raihan Mahmud has shown that carp with advanced stages of JGC have little viable gonad tissue present, and are completely sterile. The fact that 25% of fish caught behind barrier nets (in marsh), and 26% of all fish caught in big fyke nets were JGC carp, suggests that despite being reproductively disadvantaged, they still respond to environmental cues and lead us to spawning aggregations. JGC carp were also caught with transmitter fish in shallow water, and were also involved in feeding aggregations.

With ideal weather conditions (rising lake levels combined with warm settled weather in spring) in the coming year, we should see the remaining fish push back inshore to respond to spawning cues. With an even higher proportion of both male and female carp maturing, the transmitter fish can then be used to effectively detect any inshore aggregations, and catch a large proportion of the remaining fish.

5.

Golden Galaxias Survey

The annual golden galaxias (*Galaxias auratus*) survey was conducted from the 28th to the 29th March 2017. This is the 12th 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.

The total catch of golden galaxias in Lake Crescent was 1,485, which was lower than recent surveys, as four fyke nets were badly impacted by wind, therefore reducing the total catch. All fyke nets set at Lake Sorell caught effectively, with 1,590 golden galaxias captured (Table 6).

Table 6. Captures of golden galaxias in fyke nets, set at three locations within each of Lakes Crescent and Sorell

Lake	Location	No. Fyke Nets	Number Captured
Crescent	Site 1 Agnew Creek Shore*	4	900
	Site 2 Boathouse Shore*	4	151
	Site 3 Lower Clyde Marsh	4	434
	Total	**12**	**1,485**
Sorell	Site 1 East side of Island	4	85
	Site 2 Inside Grassy Point	4	1042
	Site 3 Dogshead Point	4	463
	Total	**12**	**1,590**

** Denotes site impacted by wind.*

Total captures of golden galaxias in Lake Crescent were reduced due to strong winds affecting four nets across two sites (Table 6). However, the adjusted CPUE figure using only the data from the eight unaffected nets, suggest the galaxiid population numbers remain robust. There is evidence of a continued decline in CPUE following a peak during 2014 (Figure 8). This on-going decline is likely to be a settling of population numbers and a response of slightly lower lake levels than experienced during 2013/14, which provided optimal spawning conditions and resulting high recruitment. At Lake Sorell, the

decline in CPUE is minimal, suggesting the population has reached a relatively robust and stable state. The pooled long term median CPUE data (2011-2017) for both lakes suggest the present catch effort is well within the normal variability for the population (Figure 11).

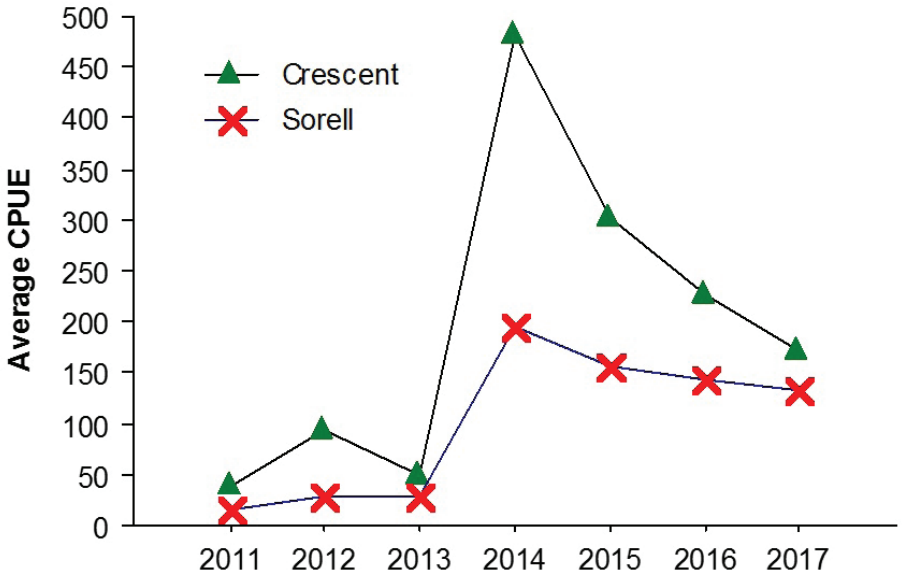

Figure 8. Average (mean) CPUE of golden galaxias for lakes Crescent and Sorell, 2011-2017.

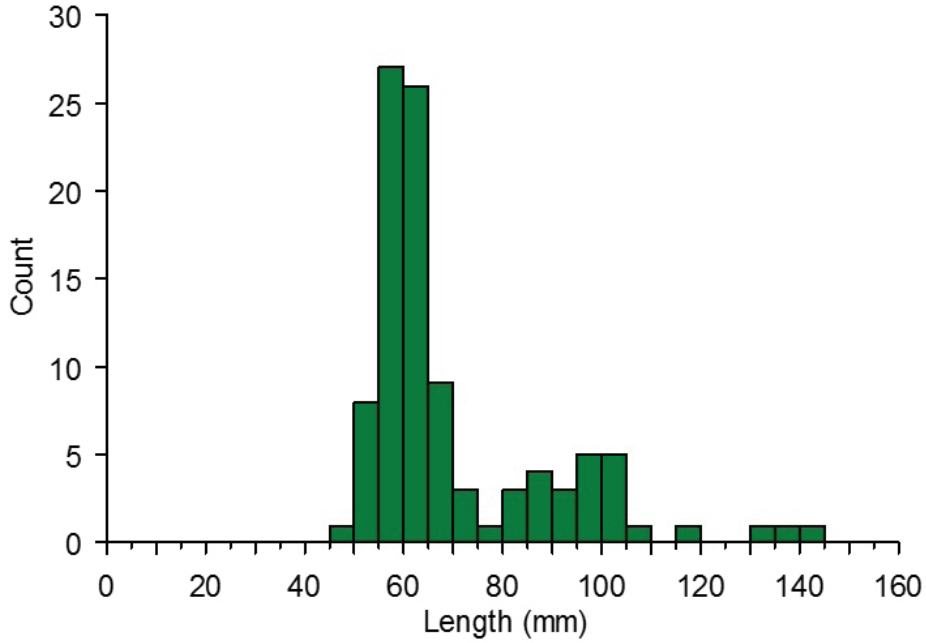

Figure 9. Length frequency of golden galaxias sampled from Lake Crescent 2017 (n=100).

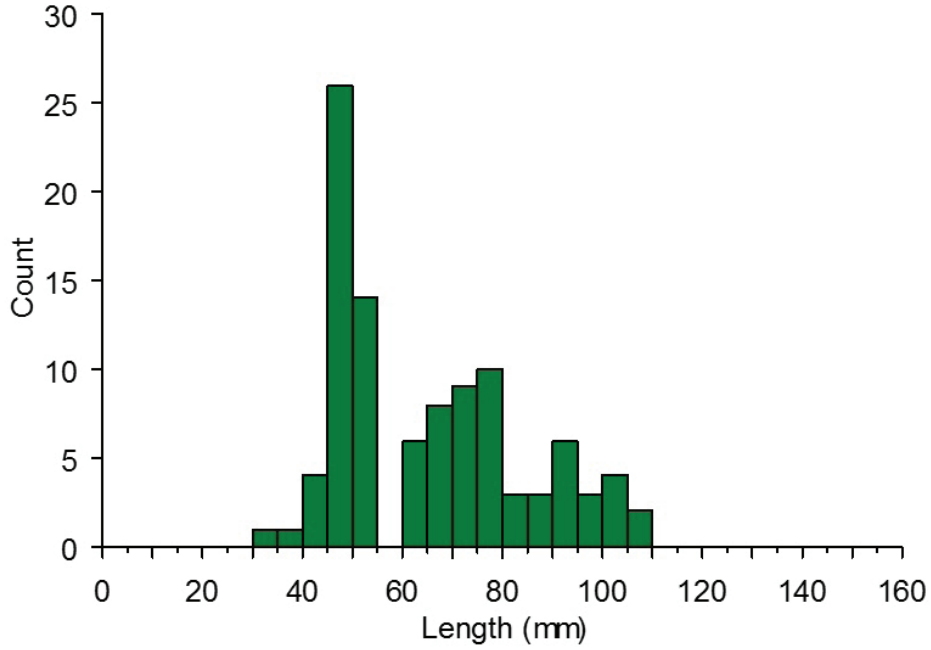

Figure 10. Length frequency of golden galaxias sampled from Lake Sorell 2017 (n=100).

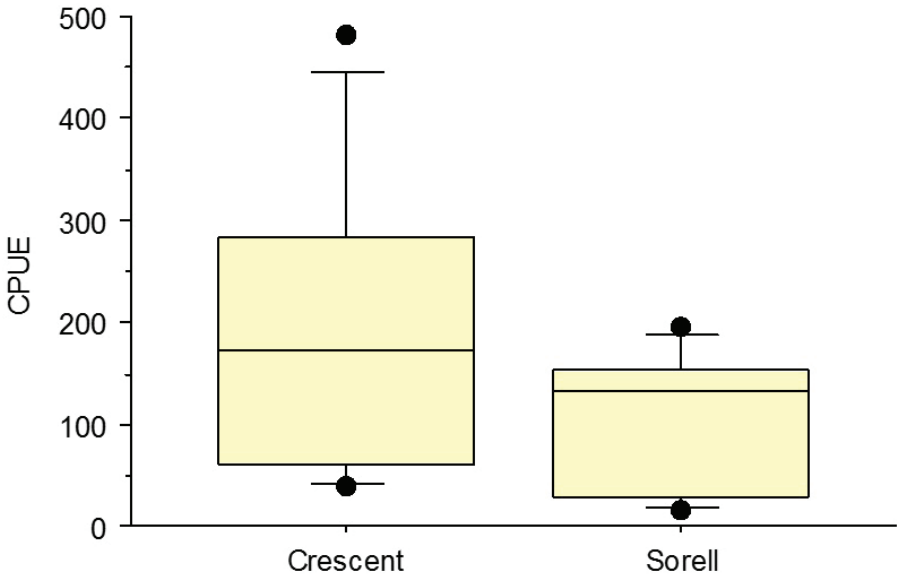

Figure 11. Median and interquartile range for CPUE, lakes Crescent and Sorell pooled data 2011-2017.

Captures of YOY golden galaxias were significant in both lakes with a strong cohort of juvenile fish in the 50 – 70 mm length range for Lake Crescent (Figure 9), and 40 – 55 mm for Lake Sorell (Figure 10).

Unlike previous survey results from 2015 and 2016, there is evidence of substantial numbers of fish within both lakes not surviving into their second and third years (Figures 9, 10). This is especially evident in Lake Crescent.

Based on these results, the golden galaxias populations within lakes Crescent and Sorell presently appears to be robust, with strong recruitment evident in the period 2014 – 2017. However, by comparison to previous survey results, the survival of two and three year old galaxiids appears to be significantly lower. The continued decline in CPUE within the period 2014 to 2017 for Lake Crescent needs monitoring to ensure this population remains robust.

Picture 9. The striking markings of the golden galaxias are hard to appreciate in the turbid waters of Lakes Crescent and Sorell

6.
Training

In late July, Jonah Yick, Brock Cuthbertson, and Chris Bowen from the Carp Management Program (CMP) attended the Smith-Root Introduction to electrofishing training course, organised by the Soldiers Point Marine Centre at Port Stephens, NSW. Electrofishing with backpack and boat units are fundamental techniques used on the CMP to not only catch carp in shallow water, but to also herd carp into gill nets set adjacent to shorelines. Electrofishing techniques are also used in other sections of IFS, which include the collection of native and pest fish, and general fish surveys. 14 people attended from a range of departments around the country, including staff from Sydney Water, Arthur Rylah Institute in Victoria, and a range of environmental consultants from Victoria, Sydney, and Brisbane. Patrick Cooney, the Director of Electrofishing Science for Smith-Root flew from Vancouver, WA to run the training course, which consisted of a day in the classroom and a day out in the field. The theory component detailed the science behind electrofishing, safe equipment usage, as well as the ability to use the equipment as effectively as possible, causing minimal harm to the fish. The field trip was based at a small lagoon in Port Stephens, and allowed the group to apply the techniques and information learnt in the classroom. A range of fish species were caught including eels, gambusia, gudgeons, gobies, and Australian bass. Although the staff from the IFS were already proficient with electrofishing use, this training course provided additional information in regards to troubleshooting in the field, improved electrofishing techniques, understanding the fundamentals behind electrofishing, as well as increased accuracy in reporting electrofishing effort.

Picture 10. The electrofishing class at Blue Lagoon, Port Stephens undertaking the practical component of the course.

7.
Conferences

The 2016 ASFB and OCS conference was held from the 4th – 8th of September at Wrest Point, Hobart. Delegates from universities, environment, and fisheries bodies around Australia attended the conference. There were 200 oral presentations in total, focusing on a range of fisheries related topics. Chris Bowen, Jonah Yick, Chris Boon, and Raihan Mahmud from the Carp Management Program presented work in the "Invasive species: impacts, detection and control" session. The team talked about the eradication of carp from Lake Crescent, the current status of carp in Lake Sorell, and the research being conducted into the jelly gonad condition (JGC) which is affecting a proportion of the male carp in Lake Sorell. All presentations were well received by other delegates, and highlighted the need to carefully manage both recreational and invasive pest fish in Tasmania.

Picture 11. Chris Bowen, Jonah Yick, Dr. Jawahar Patil, Chris Boon, and Raihan Mahmud at the ASFB conference.

8.
Work Experience

The IFS receives regular requests from schools, universities, and interested graduates from around the world looking for work experience in the fisheries field. However it isn't just students and prospective employees who are looking to get involved in our day to day work. Andrew Pickworth from the Arthur Rylah Institute (ARI) for Environmental Research in Victoria spent a few days with the Carp Management Program (CMP) in September, after meeting some of the CMP staff at a training course a few months earlier. Being in the fisheries field himself, he was interested in seeing how the CMP operated in Lake Sorell, and was able to fit the trip in while visiting friends in Tasmania. Andrew graduated with a Bachelor of Applied Science in agriculture, has worked for Victoria Fisheries and ARI for collectively 20 years, and is now a senior technical officer/workshop manager with ARI. His role usually involves him assisting scientists with field work in the freshwater and estuarine ecosystems, in particular electrofishing studies and building and monitoring fishways.

While working with the CMP, Andrew was involved in gill netting in Lake Sorell, and was also able to give technical advice on the backpack electrofishers and the boat electrofisher, being a senior electrofishing operator himself.

Table 7. Work Experience (2016/17)

Name	Background	Timeline
Will Ertler	Don College	4th – 8th July
Angus Robinson	University of Adelaide	12th – 20th September
Storm Eastley	Rosny College	19th – 21st September
Samuel Coppleman	Oatlands District High School	19th – 23rd September
Helen O'Neill	Bangor University, Wales	26th – 28th September
Andrew Pickworth	Arthur Rylah Institute for Environmental Research	19th – 20th September
Jared Flakemore	St James Catholic College	31st Oct – 4th Nov
Alex Schaap	Former Director of the Environment Protection Authority	2nd Nov – 7th Dec
Aaron McAndrew	Australian Maritime College student	7th – 9th Nov
Travis Harris	Australian Maritime College student	14th – 18th Nov
Gareth Edwards	Charles Sturt University	23rd – 27th January
Mark Cuthbertson	Commercial scale fisherman- Tasman Peninsula	25th – 26th February
Brodie Marley	St Virgil's College	27th – 28th April

9.
Student Projects

Raihan Mahmud is a PhD student at the Institute for Marine and Antarctic Studies (IMAS), investigating the jelly gonad condition (JGC) in carp. The project is supervised by Dr. Jawahar Patil and A/P John Purser.

The project is focused on determining the cause of JGC in carp which is routinely encountered in the Tasmanian population. The condition appears unique to carp (not encountered in any other fish species in the habitat). As the name suggests the gonads of the affected fish look like 'beads of jelly'. The condition appears to be triggered by onset of maturity with a tendency to increase in frequency with maturity/age of the fish. Lake-wide radio-tracking studies indicate that the JGC affected animals are well integrated into the population, with no obvious behavioural traits or habitat choices that are different to other wild cohorts. Investigations so far suggest that the condition is not associated with viral or bacterial infection, nor with pollution, but likely has a physiological/genetic aetiology. Predictably, gametogenesis of JGC carp is perturbed with severe condition resulting in sterility of affected animals. However, the general health of the animals appears normal. The project is progressing steadily, with physiological and genetic analyses underway. The study forms part of a broader objective to develop a sex-specific marker and genetic pest control option for carp.

Raihan and Jawahar also work closely with the Carp Management Program, and have developed a non-invasive assay to identify the affected carp. Catheterisation and sperm motility assays were collectively used to identify and verify the affected and healthy male carp. So far 26 JGC and 26 healthy males have been retained in captivity. The technique is assisting in deploying the JGC carp as radio-trackers, which have been useful in targeted removal of carp aggregations. The 'sterile JGC-Judas carp' reduce the risk of recruitment, whilst assisting in the capture of wild 'smart carp' that otherwise tend to evade capture by other methods.

Picture 12. Raihan Mahmud working with carp DNA samples using a real time PCR machine

10.

Carp Workshop 2017

The Carp Management Program held its yearly workshop on the 10th of May. We looked over the past year's work and started planning for the coming year. Dr. Sean Tracey, a Senior Research Fellow from the Institute for Marine and Antarctic Studies, provided an independent review of the workshop and helped develop the plan for the coming year. Minister for Primary Industries and Water, Jeremy Rockliff, came to the workshop and was given an update. The Minister continues to offer his support for the work being done, and his words of encouragement were appreciated by the team. The day involved presentations from staff on all aspects of work done in the last year. This gave everyone an understanding of how the Program is progressing, the findings for the season, what we did well, what can be improved and the plan for the coming season.

Key findings from the workshop were:

- No carp were detected in Lake Crescent or downstream in the Clyde River.
- Carp remain contained to Lake Sorell.
- No spawning or small carp were found in Lake Sorell.
- We fished hard in 2016-17, as we have in previous years, and caught around half as many carp as last year. This suggests the population has fallen greatly.
- Studies of the "jelly gonad" disease which causes sterility is now affecting 50% of the male carp.
- Over 41 330 carp have been removed from Lake Sorell since 1995.
- Less than 1% of the original population remains.

The plan for the coming year:

- JGC carp will be used as transmitter fish over the 2017-18 season to assist in spawning prevention.
- Be prepared for spawning conditions in spring 2017 (i.e. rising water levels combined with warm settled weather in spring).
- If the conditions are right carp will push inshore to marsh areas. This makes them easier to catch in nets and traps and we could catch most of the carp left in the lake.

Picture 13. Carp team with stakeholders

11.

Water Yields and Deficits

Total rainfall of 686.4 mm was recorded at the Lake Crescent field station from 1st July 2016 to 30th June 2017

Table 8. Rainfall and release data (2016/17)

Month	Rainfall (mm)	Sorell Release (ML)	Crescent Release (ML)
July	83.8	-	125.62
August	40.8	-	979.99
September	147.6	-	5388.02
October	71.6	-	14683.41
November	95.4	-	5684.21
December	40.8	-	727.90
January	35.2	-	1199.14
February	11.2	-	1525.35
March	39.6	-	1450.56
April	46	-	897.65
May	63.6	-	127.80
June	10.8	-	75.45
Total	**686.4**	**-**	**32865.1**

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

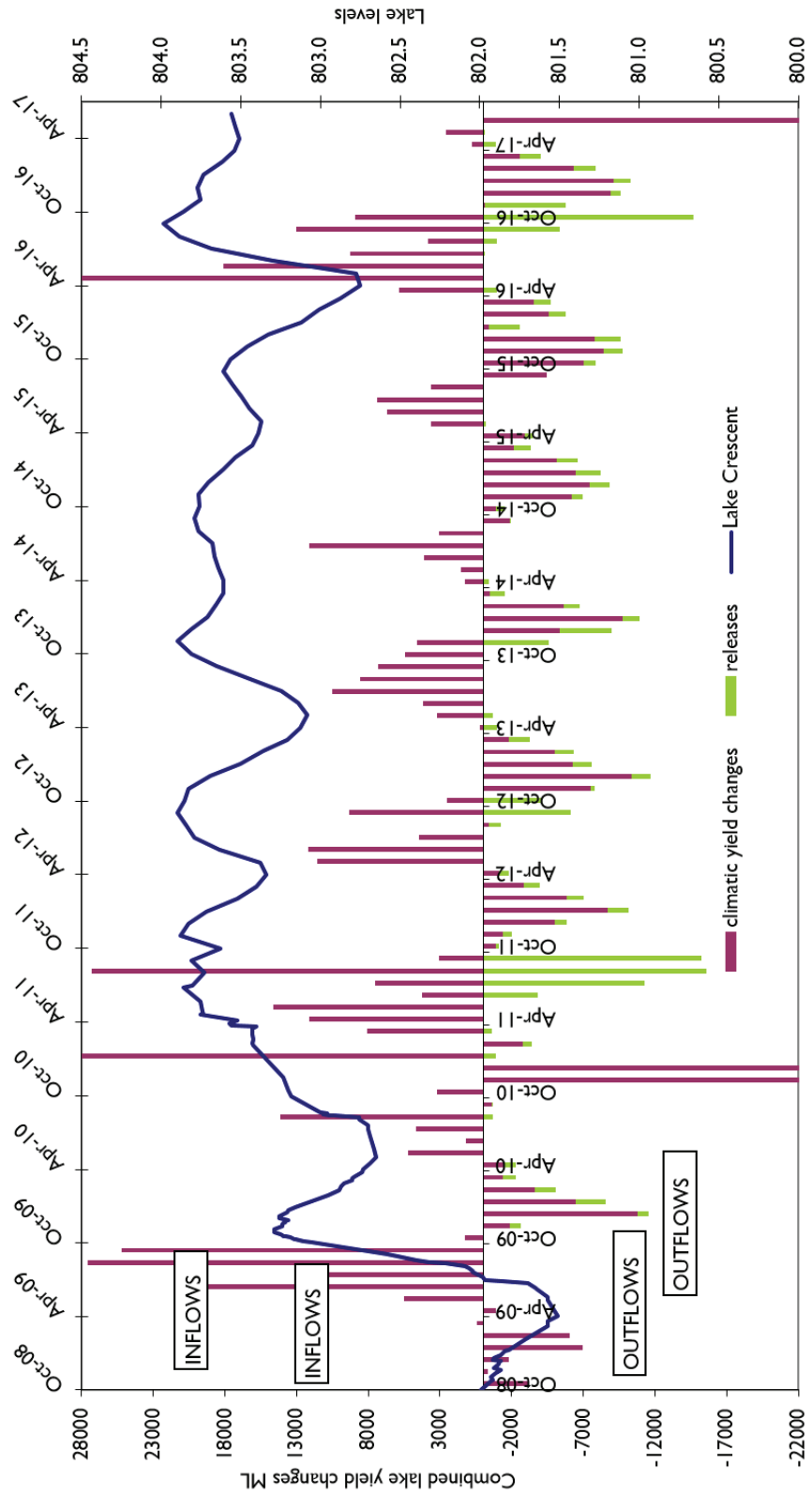

Figure 12. Lake Crescent lake levels, water yields and deficits (2008 – June 2017)

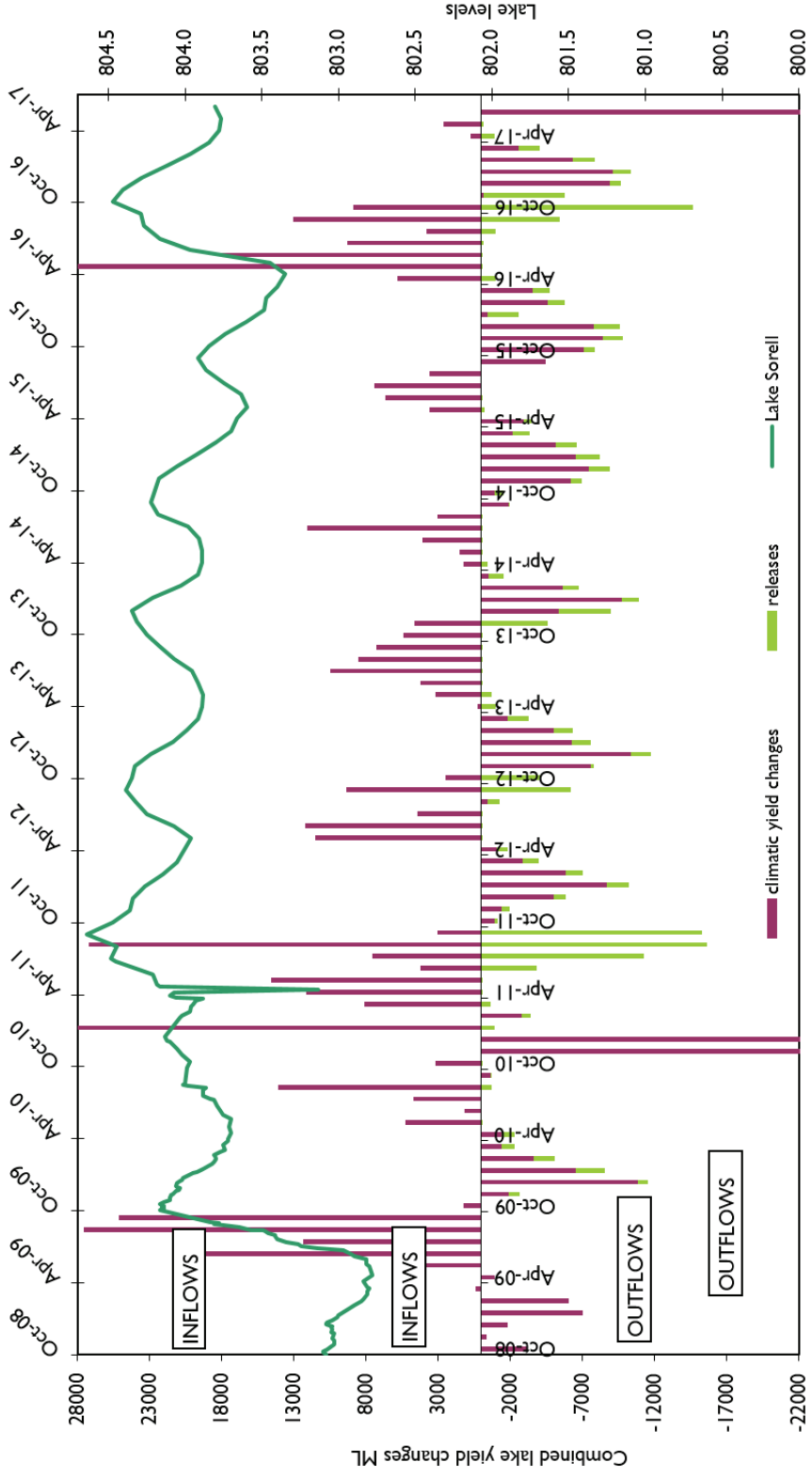

Figure 13. Lake Sorell lake levels, water yields and deficits (2008 – June 2017)

12.
Staffing

12.1 Staff Positions

In early November Chris Boon was successful in his application for a 6 month Technical Officer position. Eight casual workers were employed to assist with the carp spawning season and the repair of gillnets. The majority of staff were university graduates or students. The additional funding from the Federal Government finished this financial year.

Table 9. Staff positions (2016/17)

Field Officers	Robert Cordwell (0.9fte) Terry Byard (0.5fte)
Technical Officers	Brock Cuthbertson (1fte) Chris Bowen (1fte) Chris Boon (1 fte)
Program Leader	Jonah Yick (1 fte)
Consulting Scientist	Dr. Jawahar Patil
Section Manager	Chris Wisniewski (1fte)

Table 10. Casual positions (2016/17)

Name	Background	Timeline
Storm Eastley	Rosny College	22nd August – 29th March
Chris Boon	Australian Maritime College	19th September – 28th October
Raihan Mahmud	Institute for Marine and Antarctic Studies PHD student	7th October – 20th March
Ben Grossmith	Australian Maritime College	7th – 11th October
Helen O'Neill	Bangor University, Wales	24th October – 24th February
Kim Clark	Interlaken Shack Owner	25th November – 22nd February
Will Ertler	Don College	5th December – 17th January
Garath Edwards	Charles Sturt University	1st February – 15th March

12.2 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 11. Weekend work, public holidays and extra hours

Staff Member	Saturday	Sunday	Public Holidays	Extra Hours
Jonah Yick	6	6	1	234.65
Brock Cuthbertson	7	8	1	217.52
Chris Boon	3	3	3	103.26
Terry Byard	3	2	0	-
Chris Bowen	4	6	3	206.85
Robert Cordwell	4	4	1	113.42

13.
Activities

13.1 Carp Sightings

1 July 2016 – Lachlan River - Goldfish

13 September 2016 – Grindelwald Golf Course Dam – Goldfish

7 October 2016 – Bagdad Farm Dam - Goldfish

11 November 2016 – Margate Farm Dam - Goldfish

13 November 2016 – Brumby's Creek – Tench

6 December 2016 – Mole Creek – Goldfish

22 March 2017 – Perth Irrigation Drain - Goldfish

13.2 Public Presentations

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

Table 12. Public presentations

Date	Organisation
3rd – 7th July 2016	Society for Molecular Biology and Evolution (Presenter- Elise Furlan)
5th – 7th September 2016	Australian Society for Fish Biology Conference
10th April 2017	Tasmanian Fly Tyers' Club
1st – 4th May 2017	17th Australasian Vertebrate Pest Conference (Presenter- Elise Furlan)
20th – 21st May 2017	Liawenee Trout Weekend

13.3 Timeline of Major Events

Table 13. Timeline of major events 2016/17

Date	Event
July	
4th	Sorell screens raised 150mm above Lake Crescent level
17th – 20th	Smith-Root electrofishing course at Port Stephens, NSW
August	
18th	Field trip to Lake Sorell with ATS representative Craig Morrison
September	
19th	Three new transmitter carp released into Lake Sorell
21st	One new transmitter carp released into Lake Sorell
28th	Big fyke nets installed into barrier nets and opened up
October	
1st	Seven carp caught in big fyke nets at Silver Plains. First sign of carp reacting to environmental cues for the last few seasons
2nd	Blocking gill nets installed in front of barrier nets
3rd	Wing nets set in Lake Sorell
3rd – 23rd	Permanent gill nets installed behind barrier nets around Lake Sorell
7th	Four new transmitter carp released into Lake Sorell
9th	Excavator used to build up the height of particular sections of the Kermodes cut levy bank
15th	ABC News crew visit Lake Sorell
19th	Two new transmitter carp released into Lake Sorell
29th	Small fyke nets set in Lake Sorell
29th	Box traps set in Lake Sorell
November	
16th	Lake Crescent field station site inspection
18th	One new transmitter carp released into Lake Sorell
21st	Largest carp caught out of a fyke net for the season: 435mm, 1900gm, female, 21% GSI
22nd	One new transmitter carp released into Lake Sorell
December	
19th – 22nd	Monthly Lake Sorell juvenile survey
24th	Box traps removed from Lake Sorell
26th	Most carp caught in a day for the season: 41 fish
27th	Largest carp caught for the season and the last 6 years: 511mm, 2925gm, female
January	
23rd – 25th	Monthly Lake Sorell juvenile carp survey
February	
20th – 22nd	Monthly Lake Sorell juvenile carp survey
24th	Wing nets removed from Lake Sorell
26th	Permanent gill nets behind barrier nets removed from Lake Sorell

March	
1st	Blocking gill nets removed from Lake Sorell
6th – 10th	Annual Lake Sorell juvenile carp survey
10th	Small fyke nets removed from Lake Sorell
15th	Annual Lake Crescent juvenile carp survey
16th	First aggregation of the season: 14 carp captured over three days
17th	Largest jelly gonad condition carp caught for the season and to date: 487mm, 2859gm, male
20th	Four new transmitter carp released into Lake Sorell
23rd	Clyde River downstream survey
28th	Two new transmitter carp released into Lake Sorell
28th – 29th	Lake Crescent and Sorell annual golden galaxias fyke net survey
April	
11th	Big fyke nets removed from barrier nets
May	
10th	Carp workshop
19th	Lake Sorell screens shut down

13.4 Media Articles

JJune/July 2016 – Tasmanian Fishing and Boating News – "Carp".

July 2016 – Victoria and Tasmania Fishing and Boating Monthly – "Carp workshop 2016 findings".

20th July 2016 – DPIPWE Pod Latest News – "Carping in the cold".

30th July 2016 – The Mercury – "Public Notices".

30th July 2016 – The Examiner – "Public Notices".

30th July 2016- The Advocate – "Public Notices".

10th Aug 2016 – Inland Fisheries Service website, Latest News – "Work experience with Inland Fisheries".

16th Aug 2016 – Inland Fisheries Service website, Latest News – "IFS staff train in electrofishing".

19th Sep 2016 – Inland Fisheries Service website, Latest News – "Inland Fisheries Service presents at national conference".

22nd Sep 2016 – Inland Fisheries Service website, Latest News – "Carp Management Program Annual Report 2015-16".

October 2016 – Victoria and Tasmania Fishing and Boating Monthly – "IFS training in electrofishing for carp captures".

16th October 2016 – ABC News – "Tasmania on the brink of eradicating carp"-

http://www.abc.net.au/news/2016-10-16/fisheries-officers-push-for-carp-free-tasmania/7936798

November 2016 – Victoria and Tasmania Fishing and Boating Monthly – "Carp Management Program" and "Inland Fisheries Service presents at national conference".

2nd Nov 2016 – Inland Fisheries Service website, Latest News – "Carp quarterly report for July to September 2016".

9th November 2016 – The Derwent Valley Gazette – "Winning the war on carp".

16th Nov 2016 – Inland Fisheries Service website, Latest News – "Phew, it's tench, not carp".

30th November 2016 – The Derwent Valley Gazette – "Fishing".

12th Dec 2016 – Inland Fisheries Service website, Latest News – "Big female carp removed from Lake Sorell!".

12th Dec 2016 – Inland Fisheries Service website, Latest News – "Carp program on high alert".

21st Dec 2016 – Inland Fisheries Service website, Latest News – "Hectic carp hunt".

30th December 2016 – The Mercury – "Fishing".

January 2017 – Victoria and Tasmania Fishing and Boating Monthly – "Criminal carp".

17th Feb 2017 – Inland Fisheries Service website, Latest News – "Latest carp update".

22nd February 2017 – The Derwent Valley Gazette – "Fishing"

April 2017 – Victoria and Tasmania Fishing and Boating Monthly – "Cracking down on the carp".

7th Apr 2017 – Inland Fisheries Service website, Latest News – "Autumn brings the first carp aggregation of the 2016/17 season!".

12th April 2017 – The Derwent Valley Gazette – "Fishing".

14th April 2017 – The Mercury – "Fishing".

8th May 2017 – Inland Fisheries Service website, Latest News – "Latest Lake Sorell carp report".

12th May 2017 – Inland Fisheries Service website, Latest News – "Carp Workshop 2017".

17th May 2017 – The Derwent Valley Gazette – "Winning war on carp".

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
1210 - Asset Clearing	12,276.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12,276.29	0.00
5101 - Salaries	339,929.17	0.00	22,962.16	22,902.38	25,924.35	22,983.69	43,948.56	26,937.05	26,662.88	27,522.96	31,403.65	28,731.14	40,059.32	19,891.03	0.00
5102 - Lump Sum Leave	**27,052.04**	0.00	2,250.00	2,146.00	257.10	3,601.50	0.00	3,197.30	5,183.73	1,970.82	314.90	962.46	2,280.72	4,887.51	0.00
5106 - Superannuation	48,968.86	0.00	3,403.15	3,382.40	3,528.01	3,579.88	5,827.98	4,005.84	4,359.13	3,901.54	4,143.77	3,883.56	5,612.52	3,341.08	0.00
5107 - Otime-Penalties	1,259.85	0.00	0.00	0.00	0.00	0.00	0.00	833.54	0.00	426.31	0.00	0.00	0.00	0.00	0.00
5108 - Other EmpCosts	96.85	0.00	96.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5109 - Allowances	35,427.51	0.00	2,502.14	2,504.82	2,504.82	2,504.82	4,202.07	2,909.22	3,012.94	2,969.40	2,969.40	2,969.40	3,900.60	2,477.88	0.00
5202 - Audit Fees	1,250.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,250.00	0.00	0.00	0.00	0.00	0.00	0.00
5203 - Training	1,067.64	0.00	919.09	0.00	0.00	0.00	0.00	148.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5207 - Equip Hire/Lse	26,200.72	0.00	2,036.31	2,036.31	1,675.81	4,204.31	2,354.31	1,675.81	2,396.81	1,675.81	2,036.31	2,036.31	2,036.31	2,036.31	0.00
5208 - Equipment Maint	1,388.27	(596.00)	596.00	408.95	525.00	0.00	0.00	0.00	0.00	0.00	204.32	0.00	250.00	0.00	0.00
5209 - General Ins	7,608.46	0.00	0.00	0.00	0.00	6,280.73	0.00	0.00	0.00	780.77	546.96	0.00	0.00	0.00	0.00
5212 - Printing/Pubs	1,791.30	0.00	335.45	33.00	611.00	501.82	0.00	0.00	0.00	310.03	0.00	0.00	0.00	0.00	0.00
5214 - Vehicle Fuel	11,052.74	(713.59)	1,026.29	1,075.06	618.13	928.50	429.68	845.71	780.75	2,678.69	632.25	329.54	847.02	1,106.98	467.73
5217 - Vehicle Maint	2,740.10	0.00	537.07	0.00	0.00	63.64	0.00	109.00	257.45	333.37	359.95	1,047.80	0.00	31.82	0.00
5218 - Phones & Fax	230.89	(38.17)	38.17	41.21	38.02	38.87	75.24	0.00	37.55	0.00	0.00	0.00	0.00	0.00	0.00
5219 - Postage/Freight	571.69	0.00	0.00	0.00	92.05	244.71	0.00	0.00	234.93	0.00	0.00	0.00	0.00	0.00	0.00
5220 - Comp Hardware	1,223.07	0.00	0.00	0.00	0.00	1,223.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5222 - Comp Software	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,500.00
5223 - Network Costs	836.31	0.00	119.00	161.41	0.00	54.50	0.00	114.45	59.95	54.50	109.00	0.00	109.00	54.50	0.00
5224 - Office Req	3.99	0.00	0.00	0.00	0.00	0.00	0.00	3.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5227 - Gas & Oxygen	127.64	(68.18)	68.18	0.00	0.00	127.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5228 - Mob Phones Rads	3,954.92	(111.12)	383.66	266.57	121.52	641.92	206.14	127.09	406.53	386.35	354.72	141.77	637.72	392.05	0.00
5229 - Equip Purchases	9,743.17	0.00	0.00	1,483.34	0.00	0.00	0.00	0.00	2,379.71	0.00	0.00	0.00	5,880.12	0.00	0.00
5231 - MV Depn	16,415.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,878.94	0.00	0.00	13,537.02	0.00
5232 - Vessel Depn	11,910.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11,910.18	0.00
5234 - Op Supplies	14,728.59	0.00	4,881.95	406.20	0.00	2,246.25	3,795.00	597.84	1,121.55	699.77	791.02	7.64	142.29	39.08	0.00
5236 - Cont Services	93,764.26	0.00	625.07	2,087.73	740.85	923.37	2,320.59	4,004.12	17,627.87	39,911.14	11,830.74	3,167.85	9,640.80	700.27	183.86
5238 - OH & S	3,989.53	(135.00)	287.59	970.54	412.27	387.32	688.64	135.00	135.00	135.00	185.00	210.00	443.17	135.00	0.00
5240 - Meetings & Conf	3,530.11	0.00	2,128.20	11.82	0.00	0.00	0.00	62.36	0.00	0.00	0.00	0.00	1,307.73	20.00	0.00
5246 - Prop Maint	18.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.18	0.00
5253 - Vessel Maint	24,101.73	(134.63)	316.94	658.04	865.97	1,255.68	2,340.53	4,137.82	1,315.54	4,446.23	3,027.30	2,404.54	2,371.73	1,096.04	0.00
5254 - Interstate Trav	1,650.91	0.00	1,483.64	167.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5255 - Intrastate Trav	31,648.69	0.00	457.80	1,039.05	1,532.85	3,436.05	5,053.10	4,264.20	6,622.95	3,564.44	3,182.30	763.00	305.20	1,427.75	0.00
5258 - Prot Clothing	5,095.07	0.00	329.19	717.73	1,485.57	153.85	1,203.64	302.33	0.00	0.00	34.85	0.00	113.64	754.27	0.00
5267 - Vessel Outboard	6,372.80	0.00	0.00	0.00	0.00	0.00	0.00	150.80	0.00	4,668.99	0.00	0.00	1,393.01	160.00	0.00
5268 - Staff Fuel Allo	324.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	324.00	0.00
5269 - Office Printing	61.15	0.00	0.00	0.00	0.00	0.00	0.00	48.35	0.00	0.00	0.00	0.00	12.80	0.00	0.00
5271 - Advert & Pub	735.90	0.00	0.00	735.90	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)														
4204 - Other Int Grnts	(275,000.00)	0.00	0.00	0.00	(55,000.00)	0.00	(110,000.00)	0.00	0.00	0.00	(110,000.00)	0.00	0.00	0.00	0.00
IFS Contribution.	76,648.54														
Total expenditure	**751,648.54**	**(1,796.69)**	**47,783.90**	**43,235.73**	**40,933.32**	**55,382.12**	**72,445.48**	**54,610.37**	**73,845.27**	**96,436.12**	**65,005.38**	**46,655.01**	**77,343.70**	**76,617.24**	**3,151.59**

Notes

Tasmanian Government

CONTACT DETAILS

17 Back River Road

New Norfolk, 7140

Ph: 1300 INFISH

www.ifs.tas.gov.au

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