

# Inland Fisheries Service



## Redfin Perch Incursion Report King Island – September 2022

### Contents

<b>1. ACKNOWLEDGEMENTS</b>	<b>1</b>
<b>2. TIMELINE OF EVENTS</b>	<b>1</b>
<b>3. INTRODUCTION</b>	<b>1</b>
<b>4. METHODS</b>	<b>3</b>
4.1. PENNYS LAGOON REDFIN PERCH SURVEY	4
4.2. CURRIE GOLF COURSE DAM REDFIN PERCH SURVEY	5
4.3. REDFIN PERCH DISTRIBUTION SURVEY	7
4.4. MAINLAND YABBY SURVEY	7
<b>5. RESULTS</b>	<b>7</b>
5.1. PENNYS LAGOON REDFIN PERCH SURVEY	7
<i>Catch effort</i>	7
<i>Biological Information</i>	9
5.2. CURRIE GOLF COURSE DAM REDFIN PERCH SURVEY	13
<i>Catch effort</i>	13
<i>Biological Information</i>	14
5.3. REDFIN PERCH DISTRIBUTION SURVEY	15
5.4. MAINLAND YABBY SURVEY	16
<i>Pennys Lagoon</i>	16
<i>Currie Golf Course Dam</i>	18
<b>6. DISCUSSION</b>	<b>18</b>
<i>Pennys Lagoon</i>	18
<i>Redfin distribution on King Island</i>	19
<i>Mainland yabbies on King Island</i>	20
<i>Summary</i>	20
<b>7. RECOMMENDATIONS</b>	<b>21</b>
<b>8. REFERENCES</b>	<b>21</b>
<b>9. APPENDIX</b>	<b>23</b>

<b>Title:</b>	Redfin Perch Incursion Report, King Island – September 2022, Inland Fisheries Service
<b>Prepared by:</b>	Jonah Yick, Carp Management Program Leader
<b>Version:</b>	FINAL
<b>Approved by:</b>	John Diggle, Director - Inland Fisheries

### 1. ACKNOWLEDGEMENTS

Thanks to the retired and current King Island Parks and Wildlife Service rangers, in particular Shelley Graham and Dwayne “Jigs” Denby for their hospitality on the island, as well as their assistance with travel logistics. We are also appreciative of the help given to us by Terry and Paul Perry for providing a wealth of historical and current local fishing information on the island. Special thanks also to local fisher Dale Ellis for personally taking us to a potential redfin site. Thanks to anyone else who dedicated their time and effort chatting to us about redfin perch distribution on King Island.

### 2. TIMELINE OF EVENTS

**Table 1:** Timeline of redfin perch and mainland yabby reports received by the Inland Fisheries Service

Date	Description
14 December 2021	Email received from King Island Parks and Wildlife Service (PWS) ranger in charge Ted Bugg, reporting the presence of redfin perch in Pennys Lagoon. No photos included.
January 2022	Phone call made to commercial eel fishers on King Island for more information. It was mentioned that local kids had seen and speared redfin perch. No photos included.
17 May 2022	Email received from King Island PWS new ranger in charge Shelley Graham, stating she believes redfin perch have been translocated to Pennys Lagoon without authority. She attached a photo of the remains of a fish, however it was too degraded to identify.
24 May 2022	Another email received by Shelley Graham with attached photo of a fish, which was confirmed to be a redfin perch.
20 June 2022	Plan to travel to King Island in September to investigate redfin perch in Pennys Lagoon. September was chosen to coincide with the spawning season when the fish will be aggregated and easier to detect.
6 July 2022	Email received from Ryan Francis reporting the presence of a mainland yabby in Pennys Lagoon. A photo was attached of a crayfish which was confirmed to be a mainland yabby.
14 September 2022	Begin survey on King Island.

### 3. INTRODUCTION

Reports were received by the Inland Fisheries Service (IFS) in December 2021 and May 2022 regarding a population of redfin perch in Pennys Lagoon on King Island (Table 1). This was of concern to the IFS given redfin perch have not been recorded as established on the island. There were historical reports that they were introduced to the island in 1964 (IFC 1964), with no reports of establishment.

Pennys Lagoon is located on the northeast section of King Island, within close proximity (500 m) to the coastline (Appendix 1). It is part of the Lavinia State Reserve, which is also an internationally listed Ramsar wetland (Newall and Lloyd 2012). The lagoon is a “perched” or “suspended” freshwater lake, formed in a depression above the regional water table (Newall and Lloyd 2012). It is approximately 650m x 250m and is approximately 5m at the deepest point. The lagoon is fringed with aquatic grasses around the edges, while much of the main basin of the lake is covered with weed beds. Pennys Lagoon has exceptional water clarity, estimated to be in the range of two to five Nephelometric Turbidity Units (NTUs). The endangered green and gold frog (*Litoria raniformis*) is known to inhabit this area (Newall and Lloyd 2012). There are no other fish species known to inhabit this lagoon.



**Picture 1:** The first reported photo of a redfin perch caught from Pennys Lagoon, King Island

Redfin perch (*Perca fluviatilis*) are regarded as a pest fish in Tasmania and were introduced from England by Morton Allport in 1862 (Mollison 2020). Given their ability to breed prolifically, they were able to overpopulate waters. They have spread throughout mainland Tasmania and are also established in New South Wales, ACT, South Australia, Victoria, and south-western Western Australia.

The IFS has extensively highlighted the invasive nature of redfin perch in interpretation material, signage, and on the IFS website. Anglers are encouraged to humanely dispatch and appropriately dispose of any redfin perch caught. Legislation is also in place under the *Inland Fisheries Act 1995* which prohibits the translocation or transfer of any species of fish without the authority of the Director, where significant penalties can apply.

Until recently, redfin perch had not been reported on King Island, with no records present on the Natural Values Atlas, or on the Inland Fisheries - Pest Fish App. Redfin perch generally spawn at night during late winter and spring (mid August to late October), when water temperatures reach 12°C (DPI 2022; VFA 2022). They prefer areas away from fast currents and usually amongst aquatic vegetation and debris (VFA 2022). Hatching occurs seven to eight days later, where they form dense schools for some time (VFA 2022).

Brown and rainbow trout were stocked on King Island from the 1930s to the mid 1990s in select waterways (IFC 1963, 1964, 1973, 1996). Some of these waterways are Lake Flanagan, Lake Wickham, Pennys Lagoon, and Cask Lake. The last recorded trout stocking to a private farm dam was in November 2003 (IFS 2004). Anecdotal evidence suggested that redfin perch had been introduced to Pennys Lagoon in 2020. It was still not clear whether this was the only water body where redfin perch were established. Given their high fecundity and aggressive nature the decision was made to survey the island, to assess the redfin perch population in Pennys Lagoon, as well as their potential distribution around the island.

On 6 July 2022, the IFS confirmed, from a photograph, that the Mainland yabby (*Cherax destructor*) was present in Pennys Lagoon. As there were no previous reports of yabbies on King Island (NVA, Inland Fisheries - Pest Fish App.), the IFS needed to determine whether they were also established in Pennys Lagoon.

The objectives of the survey were:

- Determine the current stock structure and overall population size of redfin perch in Pennys Lagoon.
- Determine whether sustained effort should be undertaken to focus on eradication or management of redfin perch numbers in Pennys Lagoon. Or no action taken at all.
- Determine whether redfin perch are established in any other waterbodies on the island, and whether they can be removed from these locations.
- Determine if it is worthwhile dedicating sustained effort into controlling redfin perch on King Island.
- Sample for Mainland yabby in Pennys Lagoon. Determine whether they are established.

#### 4. METHODS

All redfin perch caught were counted, measured to fork length (mm), weighed (g), sex determined, and their sexual maturity staged, and Gonadosomatic Index (GSI) calculated.

For females, the gonad condition is defined in the following stages: 1 - immature, gonad tissue developing; 2 - gonad non-vascularised, eggs visible (maturing); 3 - mature, vascularized but not running; 4 - running ripe; 5 - spent.

For males, the gonad condition is defined in the following stages: 1 - immature, gonad tissue developing; 2 - gonad non-vascularised, milt visible (maturing), 3 - mature, vascularised but not running, 4 - running ripe.

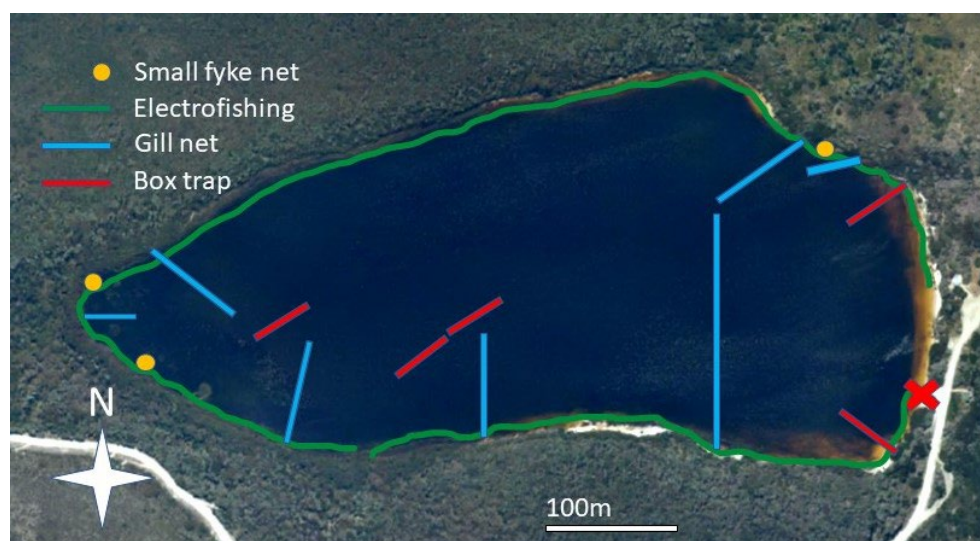
A fish is classed as indeterminate if it is unable to be identified as either a male or female (usually due to early development).

The stomachs of redfin perch were dissected, and prey items were removed, identified, and counted. In some cases, prey items were also measured.

Any spotted galaxias (*Galaxias truttaceus*) or jollytail galaxias (*Galaxias maculatus*) encountered were counted, collected (maximum of x20 individuals each), and preserved in vials of ethanol. Any other native/pest fish species caught on King Island were also counted, and potentially collected/noted.

### 4.1. PENNYS LAGOON REDFIN PERCH SURVEY

From 14-16 September 2022, four box traps, nine small fyke nets, five trammel gill nets (4 inch inner mesh and 24 inch outer mesh), a 2.5 and 3 inch monofilament gill net were set over two nights in Pennys Lagoon (249071E, 5606343N). A 4.5m open aluminum dinghy was launched from the eastern side and used to set gear around the lagoon (Figure 1). Box traps were set at right angles to the shoreline in the shallows amongst the macrophyte, as well as out in the deeper water over the weed beds. Small fyke nets were set along the edges of the shoreline amongst the macrophyte. Trammel gill nets were set from the shoreline out into deeper water across the lagoon, in various locations. The 2.5 and 3 inch monofilament gill nets were set in the shallows amongst the macrophyte and wetland area. Day sets of trammel gill nets and box traps were also undertaken. All gear types were set around sections of the shoreline (northern, eastern, southern, and western), and some were moved to different locations to increase catch efficiency (Figure 1). Backpack electrofishing was also undertaken around the shoreline of the lagoon (Figure 1).



**Figure 1:** Map of Pennys Lagoon showing small fyke net, backpack electrofishing, gill net, and box trap effort. Note: X- location where boat was launched.



**Picture 2:** Backpack electrofishing in the shallows of Pennys Lagoon.

#### 4.2. CURRIE GOLF COURSE DAM REDFIN PERCH SURVEY

From 17-18 September 2022, two box traps were set over night in a dam (230365E, 5574570N) located on the Currie golf course (Appendix 2). This dam consists of two interconnected basins, of which one is approximately 35m x 15m, and the other is 33m x 36m in area. One box trap was set in each basin (Figure 2). They were set in the deeper sections of the basins by tying a rope to one end of the box trap, while one officer walked around to the opposite bank and pulled the box trap into the water by the rope. The water in the dam was reasonably clear with an approximate turbidity reading of 10-12 NTUs. Large amounts of aquatic weed and macrophyte could be seen around the edges of the dam as well as in the deeper sections.

A second smaller dam (230151E, 5574688N) on the golf course was also surveyed using a backpack electrofisher. This dam was called “Jezza’s Lagoon” with the name on a sign next to it.



**Figure 2:** Map of the Currie Golf Course dam survey, showing box trap effort.



**Picture 3:** The Currie Golf Course dam with an established population of redfin perch



### 4.3. REDFIN PERCH DISTRIBUTION SURVEY

From 17 to 18 September 2022, the island was surveyed to determine whether redfin perch had established in other waterbodies. Most of these surveys were undertaken using a backpack electrofisher, however box traps were also used in one location.

### 4.4. MAINLAND YABBY SURVEY

While redfin sampling in Pennys Lagoon, sampling for the Mainland yabby was also undertaken. On 15 September 2022, two hoop nets and one bait trap (baited with chicken bones/necks) were set during the day in the lagoon.

Mainland yabbies are also vulnerable to capture by backpack electrofishing, small fyke nets, and box traps, therefore careful attention was taken when using these gears in all locations. While dissecting the stomachs of redfin perch, care was taken to look for Mainland yabbies.

## 5. RESULTS

### 5.1. PENNYS LAGOON REDFIN PERCH SURVEY

#### **Catch effort**

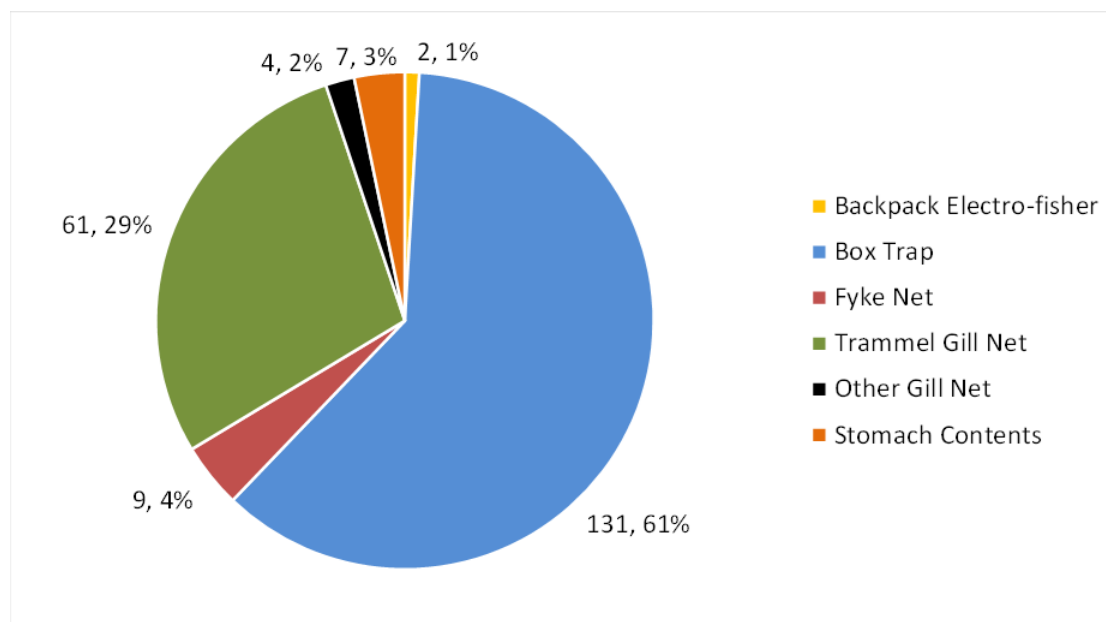
In total, 214 redfin perch were captured over two nights using a backpack electrofisher, box traps, multi-monofilament 2.5 inch gill nets, monofilament 3 inch gill nets, trammel gill nets, and small fyke nets. Seven redfin perch were removed from the stomachs of other larger individuals and had little damage from digestion.

Box traps accounted for the most redfin perch caught of all gear types with 131 fish, followed by trammel gill nets (61 fish), and fyke nets (9 fish) (Table 2, Figures 3 and 4). The backpack electrofisher and smaller meshed gill nets caught fewer fish, however the amount of electrofishing effort was much less compared to the other techniques (Table 2, Figure 3). The box traps appeared to select for the smaller individuals in the range of 90 to 180mm fork length, while the trammel gill net selected for the larger size classes in the 210 to 410mm range (Figure 4). Fyke nets caught fish in the 110 to 300mm range, while the smaller meshed gill nets caught fish in the 170 to 290mm range (Figure 4).

**Table 2:** The amount of effort for each gear type used compared with the number of redfin perch caught

Technique	Effort	Unit of Effort	No. of redfin perch
Backpack Electrofisher	1	electrofishing hours	2
Box Trap	192	Trap net hours	131
Gill Net*	665	100m net hours	64
Fyke Net	381	fyke net hours	9

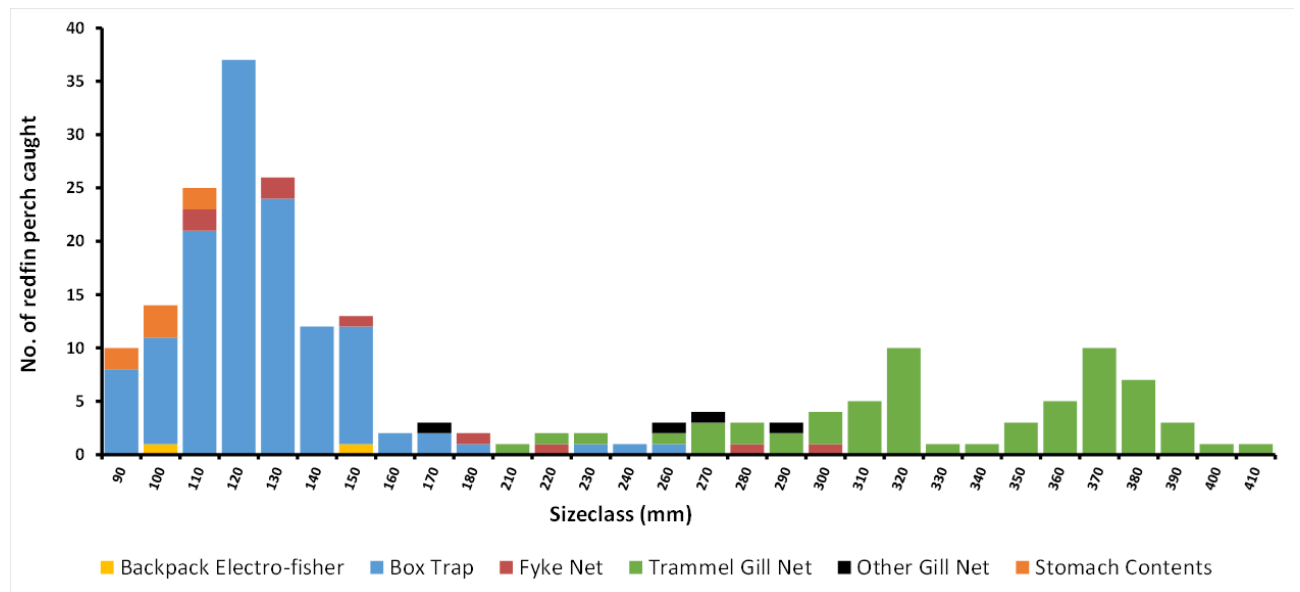
\*Gill net refers to all three types of gill nets combined.



**Figure 3:** The number and percentages of redfin perch caught by each gear type

\*Other Gill Net refers to 2.5inch multi-monofilament and 3inch monofilament gill nets combined.

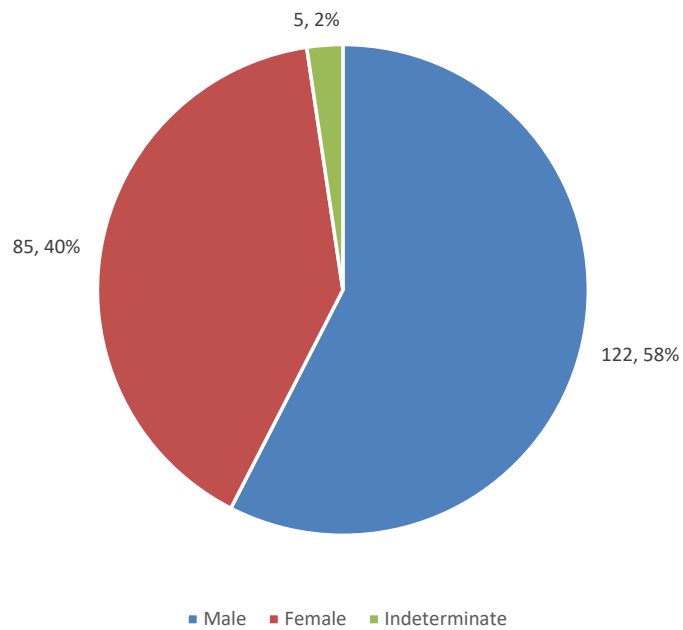
Backpack electrofishing was undertaken for 25 minutes on 14 September for approximately 450m along the southern shore of the lagoon (Figure 1). The areas shocked were approximately knee deep, and areas with macrophyte were targeted. No redfin perch were caught. Backpack electrofishing was undertaken again on 15 September for 40 minutes, for approximately 925m along the southern, western, northern, and eastern shorelines (Figure 1). The areas shocked were approximately knee deep, and areas with macrophyte were targeted. Two redfin perch were caught; one measuring 100mm, 12g in weight which was a running ripe male (stage 4), and another measuring 152mm, 49g in weight which was a mature female but not running (stage 3).



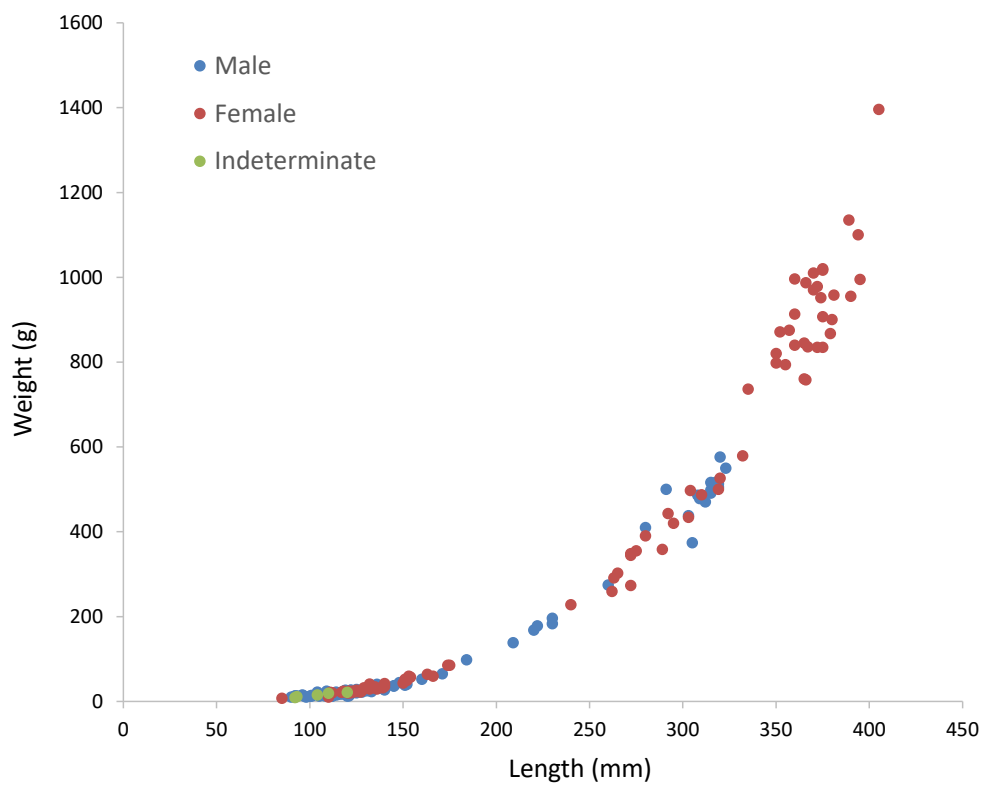
**Figure 4:** Length frequency of all redfin perch caught, separated by gear types

### Biological Information

All 214 redfin perch were weighed and measured, consisting of 122 males, 85 females, five indeterminate fish, one which was not able to be sexed due to advanced digestion, and another which was not sexed as it was kept for an intact reference specimen (Figure 5). The lengths of the redfin caught ranged in size from 85mm to 405mm fork length (Figure 6). The average length and weight was 188mm and 232g respectively. The maximum length recorded for an individual fish was a mature female of 405mm, weighing 1,396g, while the minimum length recorded was an immature female of 85mm and 7g in weight (Figure 6).



**Figure 5:** The number and percentage of male, female, and indeterminate redfin perch caught



**Figure 6:** Length/weight scatterplot of all redfin perch caught, showing male, female, and indeterminate fish

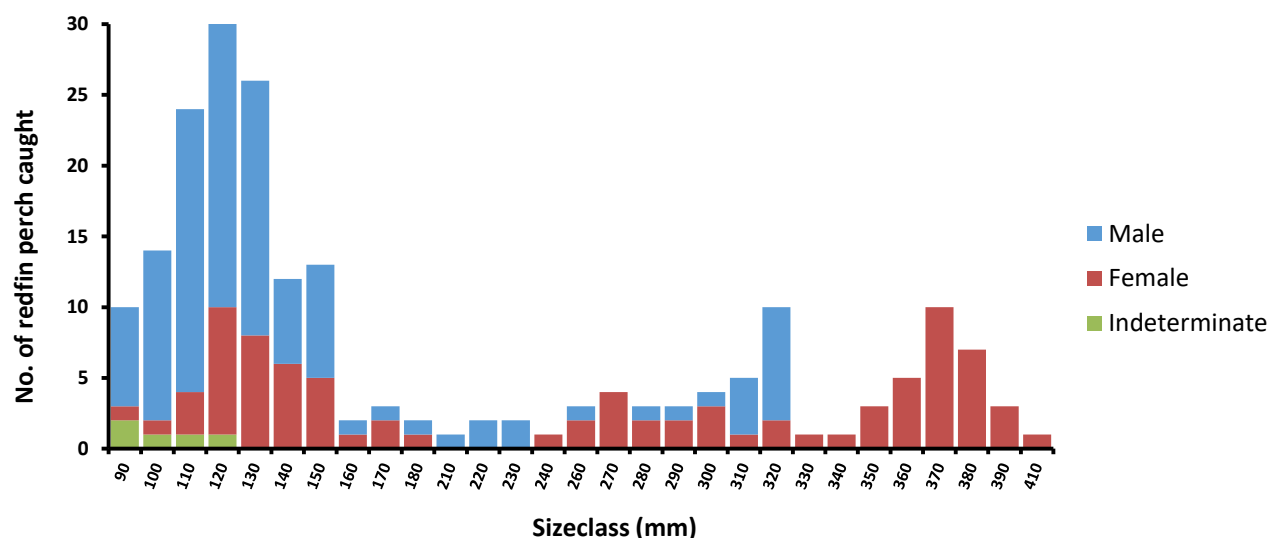
The female redfin perch caught ranged in size from 85 to 405mm, while the male fish ranged from 90 to 323mm (Figure 7). There was a wide range of maturity stages in the females, with 1% classed as immature (stage 1), 6% classed as maturing (stage 2), 52% classed as mature but not running (stage 3), 14% classed as mature and running ripe (stage 4), and 26% classed as spent/stage 5 (Table 3, Figure 8). Despite most males being relatively small at under 160mm in length (Figure 7), the majority were running ripe/stage 4 (98%), and only 2% were mature but not running ripe/stage 3 (Table 3). There appeared to be two distinct cohorts of fish present, with the majority in the 90 to 150mm size class, and another in the 330 to 410mm size class which consisted of female fish (Figure 7). There is likely to be additional cohorts in the 150mm to 330mm range, but due to low numbers of fish it is not possible to define them.

**Table 3:** Percentages of maturity stages for male and female redfin perch

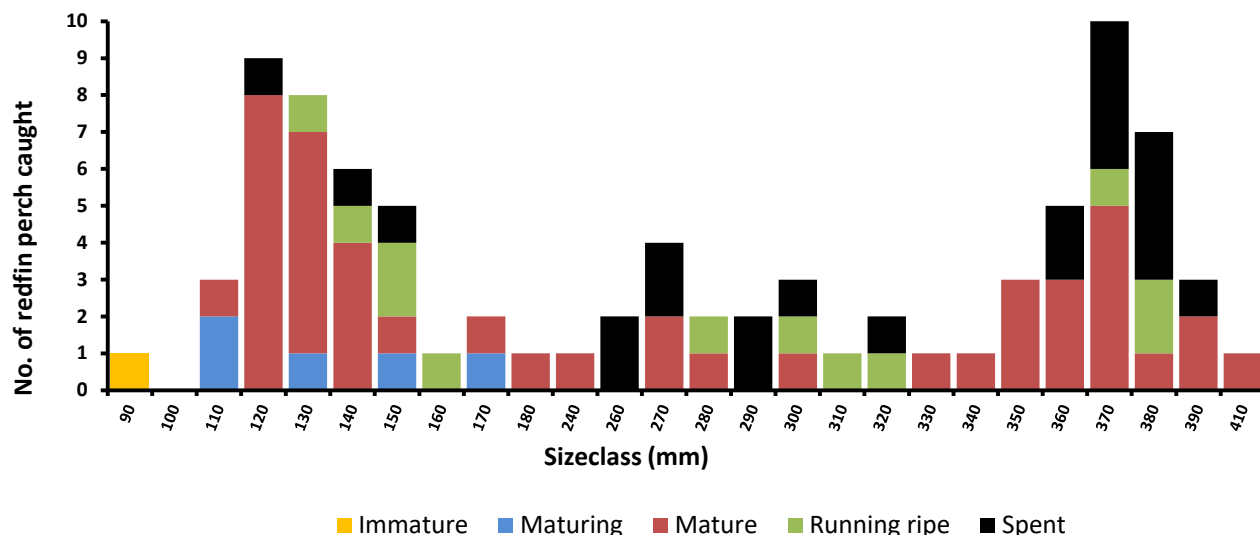
Gonad condition stages	Male (no. of fish)	Male (%)	Female (no. of fish)	Female (%)
1	0	0%	1	1%
2	0	0%	5	6%
3	2	2%	44	52%
4	120	98%	12	14%
5	-	-	22	26%
<b>Total</b>	<b>122</b>	<b>100%</b>	<b>84</b>	<b>100%</b>

**Note: Male stages:** 1 - immature, gonad tissue developing; 2 - gonad non-vascularised, milt visible (maturing), 3 - mature, vascularized but not running, 4 - running ripe.

**Females stages:** 1 - immature, gonad tissue developing; 2 - gonad non-vascularised, eggs visible (maturing); 3 - mature, vascularized but not running; 4 - running ripe; 5 - spent.



**Figure 7:** Length frequency of all redfin perch caught, separated by sex



**Figure 8:** Length frequency of female redfin perch, separated by maturity stages

Of the 207 redfin perch caught, the stomachs of 194 were removed and excised. Of the 194 stomachs' examined, 30 (15%) contained prey items. These prey items consisted of 10 redfin perch (dissected from five stomachs), 30 Mainland yabbies (dissected from 27 stomachs), and one frog species (dissected from one stomach). In the stomach's where fragments (claws) of Mainland yabbies were found, these were counted as one individual (one or two claws). The redfin perch that were consumed ranged in size from 90 to 110mm, with six being able to be sexed. Of the six individuals, five were actively running ripe males (stage 5), while one was a female. The Mainland yabbies were not measured, however it was apparent that there were numerous cohorts which were consumed. The carapace of some of the yabbies were 40 to 60mm. The frog measured approximately 24mm, however it was heavily digested.



**Picture 4:** A large female redfin perch with small mature running males excised from it's stomach

### 5.2. CURRIE GOLF COURSE DAM REDFIN PERCH SURVEY

#### **Catch effort**

In total, 14 redfin perch were captured over one night using two box traps. Unlike Pennys Lagoon, the redfin perch caught in box traps were a larger size class, ranging from 250 to 420mm (Figure 9).

Backpack electrofishing was not undertaken in this dam, however another smaller dam called “Jezza’s Lagoon” located on the golf course was electrofished for seven minutes. No redfin perch were caught, only two frog spp.



**Picture 5:** The large redfin perch caught from the Currie golf course dam

### Biological Information

All 14 redfin perch were weighed and measured. Seven were males, six were females, and one was not sexed as it was kept for an intact reference specimen (Table 4). The redfin perch caught ranged from 250mm to 420mm fork length. The average length and weight was 348mm and 970g respectively. The maximum length recorded for an individual fish was a mature female of 420mm, weighing 1627g, while the minimum length recorded was a mature male of 250mm and 296g in weight (Figure 9).

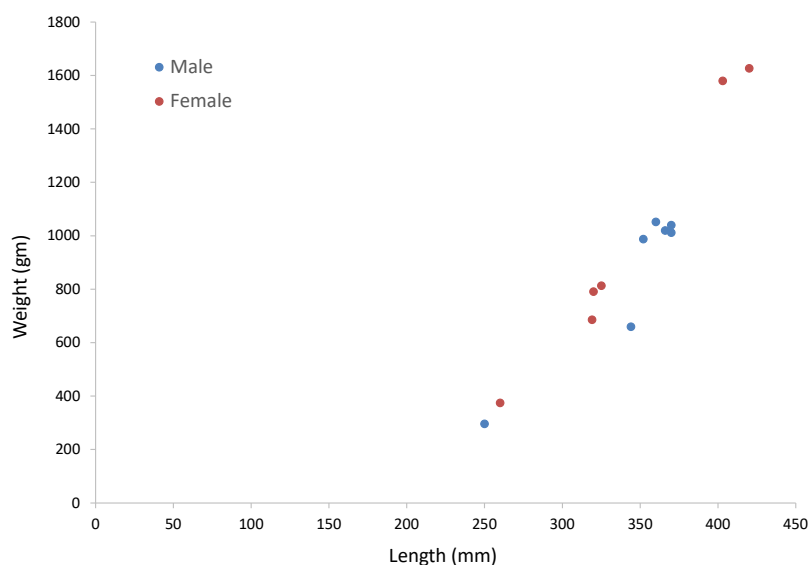


Figure 9: Length/weight scatterplot of all redfin perch caught, showing male and female fish

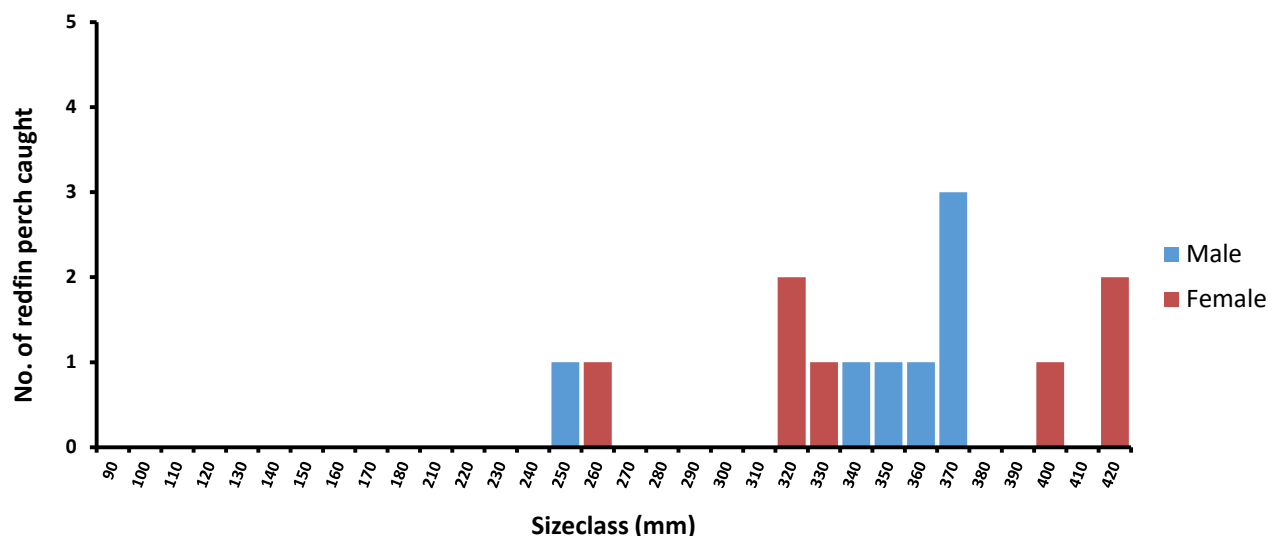


Figure 10: Length frequency of all redfin perch caught, separated by sex



The female redfin perch ranged in size from 260 to 420mm, while the male fish were similar, ranging from 250 to 370mm (Figure 10). Of the six females, five were mature but not running (stage 3), while one was running ripe/stage 4 (Table 4). Of the seven males, six were running ripe (stage 4), while one was mature but not running/stage 3 (Table 4). Given the small sample size of redfin perch caught, it is not possible to determine how many cohorts were present in the dam. Both sexes of fish appeared to be a larger size class than the population in Pennys Lagoon, with no individuals less than 240mm in length.

**Table 4:** Percentages of maturity stages for male and female redfin perch

Gonad condition stages	Male (no. of fish)	Male (%)	Female (no. of fish)	Female (%)
1	0	0	0	0
2	0	0	0	0
3	1	14	5	83
4	6	86	1	17
5	-	-	0	0
<b>Total</b>	<b>7</b>	<b>100%</b>	<b>6</b>	<b>100%</b>

**Note: Male stages:** 1 - immature, gonad tissue developing; 2 - gonad non-vascularised, milt visible (maturing), 3 - mature, vascularized but not running, 4 - running ripe.

**Females stages:** 1 - immature, gonad tissue developing; 2 - gonad non-vascularised, eggs visible (maturing); 3 - mature, vascularized but not running; 4 - running ripe; 5 - spent.

Of the 14 redfin perch caught, the stomachs of 13 were removed and dissected. Of the 13 stomachs examined, 2 (15%) contained prey items. These prey items consisted of four Mainland yabbies (dissected from two stomachs). In the stomachs where fragments (claws) of Mainland yabbies were found, these were counted as one individual (one or two claws). The carapace of these yabbies were not measured.

### 5.3. REDFIN PERCH DISTRIBUTION SURVEY

In addition to Pennys Lagoon and the Currie Golf Course Dam, other locations around King Island were also surveyed (Table 5). These locations were chosen based on “hear-say” and anecdotal evidence from residents on the island (Appendix 3). Redfin perch were not detected anywhere else, though shortfin eels (*Anguilla australis*), common jolly tails (*Galaxias maculatus*), and spotted galaxias (*Galaxias truttaceus*) were captured. Over the two days there was high rainfall around the island resulting in the dams being full, and many of the creeks and rivers flowing fast with the water being turbid. As a result, the conditions were not optimal for surveying. Further sampling work is required for a more conclusive result. Three other creeks (Rankins, Fraser, and

Bronzewing) in Naracoopa were also highlighted as potential redfin perch sites, however due to strong flows and deep, discoloured water, they were unable to be electrofished. Three other locations were surveyed focusing on the presence of native fish species (redfin perch were not detected here) (Appendix 4).

**Table 5:** Other potential redfin perch sites surveyed on King Island

Date	Location	GPS waypoints	Gear	Shock/soak time (minutes)	Catch
17 September 2022	Martha Lavinia Road Gravel Pit 1	246174E, 5606832N	Backpack electrofisher	7	-
17 September 2022	Martha Lavinia Road Gravel Pit 2	246291E, 5606819N	Backpack electrofisher	11	-
17 September 2022	Cask Lake	238781E, 5611791N	Backpack electrofisher	16	6 short fin eels
18 September 2022	Tin Mine Dam	245129E, 5587856N	2 Box Traps	570	3 common jolly tails, 3 spotted galaxias

#### 5.4. MAINLAND YABBY SURVEY

##### **Pennys Lagoon**

On 15 September 2022 two hoop nets, and one bait trap (all baited with chicken bones/necks) were set in approximately 2m depth, over weed beds to target Mainland yabbies. After 1.5 to 2.5 hours, the hoop nets and bait trap were checked and removed with nothing caught. Four box traps and nine fyke nets were set for two nights to target redfin perch. Numerous Mainland yabbies were captured incidentally in the box traps and fyke nets, therefore the hoop nets and bait traps were not reset.

In total, 49 Mainland yabbies were found in Pennys Lagoon, which includes 30 dissected from the stomachs of redfin perch, three caught in box traps, and 16 caught in small fyke nets. Although the carapaces were not measured, there appeared to be a range of size classes present.



**Picture 6:** The average sized Mainland yabby caught in Pennys Lagoon



**Picture 7:** A large Mainland yabby excised from the stomach of a redfin perch

### **Currie Golf Course Dam**

On 17 September 2022 two box traps were set over night in the Currie Golf Course Dam targeting redfin perch. In total, 14 Mainland yabbies were found, which includes four found in the stomachs of captured redfin perch, and 10 caught in box traps. Although not all the yabbies' carapaces were measured, there appeared to be a range of size classes present.

Mainland yabbies were not detected at any of the other locations surveyed around King Island.

## **6. DISCUSSION**

### **Pennys Lagoon**

The survey at Pennys Lagoon resulted in a wide size range of redfin perch caught, and a sufficient total number of fish to understand the population structure in the lagoon. It was clear that using a combination of gear types resulted in the capture of all size classes of fish. The box traps and trammel gill nets accounted for the majority of the catch. The survey was timed in September to coincide with the spawning season which is generally in early spring. During this time the fish are likely to be more mobile and potentially aggregating, making them vulnerable to capture. Given 98% of males were running ripe and the majority of females were either mature, running ripe, or spent, the timing of this survey was appropriate.

The lake appeared to be highly productive with extensive weed beds throughout the lake, as well as a small marsh/wetland along the western side of the lagoon. Therefore there was plenty of adequate substrate for spawning. Although there did not appear to be any sign of other native fish in the lagoon, the fact that the Mainland yabby was established, as well as plentiful numbers of smaller redfin perch suggests that food is not a limiting factor to the redfin perch population. Stomach content inspection also showed that the redfin perch population was preying on Mainland yabbies and the smaller sized redfin perch, and to a lesser degree frogs.

There appeared to be at least two distinct cohorts present in the lake (potentially four in total), which is consistent with the theory that the fish were introduced into the lagoon in the last two to five years (based on anecdotal evidence). Despite there being a broad size range of fish caught from 85mm to 405mm, the majority of fish were found to be mature. Only five (2%) individuals were found to be indeterminate, while six (3%) females were classed as immature/maturing). In addition, the males were found to dominate the smaller size classes (90 to 150mm), however all of them were mature. This difference in the size at maturity between the two sexes could be due to the larger sized fish being the original translocated individuals, while the smaller fish may have come from spawning events after the introduction. Male redfin perch generally mature a year ahead of females, and it has been found that in other populations on mainland Australia males will mature at two years, and females at three years (MDBA 2009). However in faster growing populations, males may mature after one year (MDBA 2009). Some studies have shown that in areas which are either food limited or overcrowded, redfin perch are able to "stunt", and mature at a very small size (approx. 120mm) (MDBA 2009). This theory is not consistent with what was

observed in Pennys Lagoon, given the relatively low biomass of fish for the size of the water body, as well as the high level of productivity. Another possible theory is that an increased level of predation risk can result in an increased growth rate (Heibo and Magnhagen 2005). Thus having a population of redfin perch dominated by larger 250mm+ individuals may result in the newer cohorts maturing faster (Heibo and Magnhagen 2005). This would explain the smaller mature cohort of redfin perch in the range of 90 to 150mm.

The complete lack of juveniles caught may be due to the cannibalistic nature of the redfin perch, which may significantly suppress the numbers of juveniles able to reach maturity. Studies have shown that redfin perch generally switch to a piscivorous diet as they increase in size, and in some cases can make the change as young as five months of age, and 93mm TL (Wedderburn and Barnes 2016).

### ***Redfin distribution on King Island***

The second aim while on King Island was to determine whether redfin perch were established in any other waterbodies other than Pennys Lagoon. We were given strong anecdotal information that a dam on the Currie golf course was likely to hold a second population. After setting two box traps in this dam overnight, their presence was confirmed, along with the establishment of the Mainland yabby. The 14 redfin perch caught were of a larger size class, ranging from 250 to 420mm. The lack of immature fish or fish under 250mm could be due to high predation levels from the larger adult redfin perch, in a relatively small water body. Therefore only a small proportion of new cohorts are reaching maturity, and may be in small numbers and behave more cryptically. It has been suggested that this population of redfin perch was introduced back in the 1990s, therefore the lack of juveniles is not likely to be due to the population being a recent introduction. Although the dam is relatively small in size, it had extensive weed beds and macrophyte growth, therefore there was plenty of adequate substrate for spawning. Multiple spawning events are likely to have occurred, but are heavily regulated by cannibalistic predation.

Given the large average size of the redfin perch caught here, the theory that this was the source population which was translocated to Pennys Lagoon recently could explain the differences in the sizes of maturity observed within the lagoon population.

Four other potential sites were investigated around the island, with no other redfin perch captured. However given the high rainfall, strong flows, and high levels, these conditions were not conducive to obtaining a confident result. Further surveying would be required to have a high degree of certainty that redfin perch were not established in these other water bodies. In particular the Tin Mine Dam, where a resident who personally took us to this location mentioned he had been catching redfin perch at this location since the 1990s. This same resident was also on site at the Currie golf course dam, and mentioned he had caught redfin perch from this location since the 1990s as well. Speaking to other residents on the island, it is also highly probable that redfin perch are established in farm dams on private properties which we are unaware of. This is consistent with a report in IFC (1964), which mentioned the unauthorised introduction of redfin

perch into private dams on King Island. At that time trout were stocked into select waters on King Island, and the concern was that the redfin perch may make their way into these particular waters. Pennys Lagoon was one of these waters which was previously stocked with brown trout. It is unclear what the IFC response was to this incursion, however it was stated in the report that the “*commission takes a serious view of the situation and the necessary arrangements to deal with the matter are in hand*”.

### **Mainland yabbies on King Island**

The Mainland yabbies appeared to be well established in both Pennys Lagoon and the Currie golf course dam. Although the majority were not measured, it was clear that there were numerous cohorts present in both locations. Box traps and small fyke nets set overnight appeared to be the most effective method of capture. To increase catch efficiency, the addition of bait to these gear types would be ideal. Based on anecdotal information, it is also highly likely that the Mainland yabbies are established in farm dams on private property.

### **Summary**

Redfin perch were found to be established at two locations on King Island; Pennys Lagoon and a dam on the Currie golf course. Given the small size of the dam on the golf course, eradication would be relatively straight forward, by way of draining the dam, then treating with rotenone. However Pennys Lagoon would be much more difficult, given its relatively large size, and its status as a RAMSAR site. Given Pennys Lagoon is also a water table fed body, draining or poisoning the lagoon would not be a viable option. Therefore the only potential method for eradication would be by way of physical removal. This is likely to be a long term and resource heavy operation, which could potentially take years, with no guarantee of success.

The other issue is it is likely that redfin perch are established in other areas of the island, therefore translocation back into the lagoon or other areas of the island is a real threat. It is also important to note that the IFS has little presence on the island to regulate the unauthorised translocation of fish. Anecdotal evidence suggests that local anglers on the island would like to see trout stocked back into numerous freshwater locations, and the original reports of redfin perch being introduced onto the island may have been the result of disgruntled anglers wanting more freshwater fishing opportunities. In summary, it is not worth attempting to eradicate redfin perch or the Mainland yabby from Pennys Lagoon or the whole of King Island, given the likelihood that they are already established in multiple locations around the island. Instead, there should be a focus on reducing the spread of this species and attempting to contain them to their current established locations.

### 7. RECOMMENDATIONS

- To decrease the risk of redfin perch and Mainland yabby translocations to other areas, recreational fishing in Pennys Lagoon and the Currie golf course dam should be closed.
- Eradication of redfin perch and Mainland yabby populations from the Currie golf course dam could be achieved, by draining and treating the water with rotenone. This would remove the risk of translocation from this waterbody, given the ease of access and capture of redfin perch/Mainland yabby from this location.
- An educational campaign should be undertaken to educate the public/fishers of the negative effects of translocating redfin perch and Mainland yabby to other locations.
- Parks and Wildlife staff should be authorised under the *Inland Fisheries Act 1995*, in order to enforce the unauthorized translocation of fish (specifically targeting redfin perch and Mainland yabby).
- If warranted, another redfin perch distribution survey could be undertaken to determine if there are other locations on the island where they are established.

### 8. REFERENCES

DPI. *Department of Primary Industries, Department of Primary Industries website*, NSW government, 2022. Available online: [www.dpi.nsw.gov.au/fishing/aquatic-biosecurity/pests-diseases/freshwater-pests/finfish-species/redfin-perch](http://www.dpi.nsw.gov.au/fishing/aquatic-biosecurity/pests-diseases/freshwater-pests/finfish-species/redfin-perch) (accessed 1 July 2022).

Heibo, E.; C. Magnhagen. Variation in age and size at maturity in perch (*Perca fluviatilis* L.), compared across lakes with different predation risk. *Ecol. Freshw. Fish.* **2005**, *14*, 344-351.

IFC. *Inland Fisheries Commission Newsletter, On the Rise*; Inland Fisheries Commission: Hobart, Australia, 25(1) 1996.

IFC. *Inland Fisheries Commission Annual Report 1963*; Inland Fisheries Commission: Hobart, Australia, 1963.

IFC. *Inland Fisheries Commission Annual Report 1964*; Inland Fisheries Commission: Hobart, Australia, 1964.

IFC. *Inland Fisheries Commission Annual Report 1973*; Inland Fisheries Commission: Hobart, Australia, 1973.

IFC. *Inland Fisheries Commission Annual Report 1996*; Inland Fisheries Commission: Hobart, Australia, 1996.

IFS. *Inland Fisheries Service Annual Report 2003-04*; Inland Fisheries Service: Hobart, Australia, 2004.

Land Tasmania, Department of Primary Industries, Parks, Water, and Environment (2016) *Inland Fisheries – Pest Fish* [Mobile app]. App Store. <http://www.apple.com/itunes/>

Mollison, R. Morton Allport and the Acclimatisation of Fish in Tasmania. *Pap. Proc. Tasman. Hist. Res. Assoc.* **2020**, *67* (3), 45-58.

MDBA. *Murray-Darling Basin Authority, Native Fish Strategy Fish Factsheet*, Australian Government, 2009. Available online: [Fish Factsheet: Redfin Perch \(feralscan.org.au\)](https://feralscan.org.au). (accessed 15 July 2023).

NVA. *Natural Values Atlas, Natural Values Atlas website*, Tasmanian Government, 2022. Available online: [www.naturalvaluesatlas.tas.gov.au](http://www.naturalvaluesatlas.tas.gov.au). (accessed 28 June 2022).

Newall, P.R.; Lloyd, L.N. *Lavinia Ramsar Site Ecological Character Description*. Lloyd Environmental report to NRM North. Lloyd Environmental, Victoria, Australia, 2012.

VFA. *Victorian Fisheries Authority, Victorian Fisheries Authority website*, Victorian Government, 2022. Available online: [vfa.vic.gov.au/education/fish-species/english-perch](http://vfa.vic.gov.au/education/fish-species/english-perch). (accessed 1 July 2022).

Wedderburn, S. D.; T. C. Barnes. Piscivory by alien redfin perch (*Perca fluviatilis*) begins earlier than anticipated in two contrasting habitats of Lake Alexandrina, South Australia. *Aust. J. Zool.* **2016**, *64*, 1-7.



### 9. APPENDIX



**Appendix 1:** The location of Pennys Lagoon, King Island



**Appendix 2:** The location of the dam on Currie golf course

**Appendix 3:** Background information relating to sites surveyed on King Island

Location	Background information
Currie Golf Course dam	This site was highlighted as the most likely location to hold a second redfin population. Many residents reported that redfin perch were first introduced here in the 1990s, and were later moved to Pennys Lagoon. During the survey one resident on site confirmed that he had caught redfin perch in the dam in the 1990s. This same resident also said he'd caught them in the Tin Mine Dam.
Martha Lavinia Road Gravel Pits	A resident mentioned redfin may have been introduced here, given it's proximity to Pennys Lagoon.
Cask Lake	A resident mentioned redfin had been introduced here years ago, however he also mentioned the dam may have dried up at some point.
Tin Mine Dam	A resident mentioned he had been catching redfin perch here since the 1990s. He personally took us to this location.
Naracoopa Creeks (Rankins, Fraser, and Bronzewing)	A local cray fisher reported seeing redfin perch in one of the creeks located behind the esplanade in Naracoopa, when he was a kid.

**Appendix 4:** Locations surveyed for the King Island native fish distribution survey

Date	Location	GPS waypoints	Gear	Shock/soak time (minutes)	Catch
18 September 2022	Camp Creek	231173E, 5575950N	Backpack electrofisher	4	2 common jolly tails, 2 short fin eels
18 September 2022	Mack's Creek	237571E, 5556596N	Backpack electrofisher	3	-
18 September 2022	Big Lake	240921E, 5556967N	Backpack electrofisher	20	2 common jolly tails*, 7 short fin eels

\*Caught in river

### **Appendix 5:** Schedule of travel to King Island

<b>Date</b>	<b>Description</b>
13 September 2022	Load boat and vehicle onto ship in Stanley in the morning.
14 September 2022	Fly to King Island, collect boat and vehicle. Travel to Lavinia Reserve and begin surveying at Pennys Lagoon.
15 September 2022	Continue survey at Pennys Lagoon.
16 September 2022	Complete survey at Pennys Lagoon.
17 September 2022	Surveyed numerous sites around King Island, including the Currie Golf Course, gravel pits, and lakes.
18 September 2022	Continued surveying sites around King Island, including removing gear from the Currie Golf Course, creeks, and another lake.
19 September 2022	Boat and vehicle loaded back onto ship in the morning and fly back to Wynyard in the afternoon.
20 September 2022	Boat and vehicle picked up in Stanley and commenced travel back to Hobart.