**Agenda For The Meeting of Otago Fish & Game Council**
**On 30th September 2021**
**At Otago Fish and Game Council Office**
**Cnr Hanover and Harrow Streets, Dunedin**

# 14.0 Items To Be Received Or Noted

## Contents

# 14.1 Whole Season Game Bird Harvest and Activity for the 2021 Season September 2021

**Introduction**

The game bird harvest survey estimates total harvest, effort and the average hunter's season bag for each game bird species in New Zealand. The survey covers all of New Zealand however each Fish & Game Region is responsible for surveying their own hunters. The survey has been running since 1993 and provides an excellent long-term dataset on game bird hunting in New Zealand.

The Otago portion of the survey consists of calling approximately 120 randomly selected adult and junior Otago hunting licence holders following Opening Weekend, then every two weeks throughout the rest of the game bird season.

Harvest estimates exclude the harvest of child licence holders, day licence holders and unlicenced hunters including landowners who hunt their own land under the owner/occupier exemption.

Total licence holder harvest in the region is a combination of three varying factors: the number of game birds harvested per hour hunted as surveyed, the number of hours that licence holders spend hunting and the total number of licences sold.

Due to hybridizing and the difficulty of distinguishing between mallard ducks and grey ducks, the term "greylard" is used in this report to refer to mallard ducks, grey ducks and any hybrid of the two. The term waterfowl in this report refers to greylards, paradise shelduck, black swans, shoveler and pukeko.

Where possible, 95% confidence intervals have been calculated. The bars that extend above and below each estimated value in Figures 1, 5 and 6 are representations of the confidence intervals. Confidence intervals give a plausible range of values and provide an indication of how certain we are of our estimate. If we repeated this survey multiple times the confidence interval would span the true population estimate in 95% of the surveys. Factors that affect confidence intervals are: the number of interviews, the total numbers of hunters in the region and the amount of variability of daily bag sizes between the hunters that were interviewed. We have also provided "p" values where possible. The given "p" values are an indication of how certain we can be that an effect is happening. The lower the "p" values are, the more confident we are that there is a significant effect happening. A "p" value of less than .05 is a common standard to confidently state that an effect is happening.

**Summary**

The 2021 game bird season was similar to long term averages in every key metric except the amount of time that hunters spent in the maimai. Licence sales this year showed a strong increase after a period of falling numbers. Overall, there 73,850 game birds harvested in the Otago Region this season. Just over three quarters of harvested game birds were greylards.

**Number of Hours Per Hunter**

Hunters in Otago have spent a reasonably consistent amount of time hunting over the last ten years (Figure 1). The total number of hours spent hunting on Opening Weekend this year was just below the ten-year average. Total hours through the season were almost eight percent below the ten-year average, meaning that hunters spent less total time hunting following Opening Weekend.


*Figure 1: Total number of hours spent hunting in Otago on Opening Weekend and the whole season for 2012 – 2021 and the average number of Opening Weekend and whole season hours for the period (dashed lines).*

Figure 2 shows the percentage of hours spent during Opening Weekend out of the whole season total since 1993. This year 69.5% of time spent hunting was on Opening Weekend, this is 2.1 percentage points behind the highest on record, experienced in 2018. The percentage of hunting occurring on Opening Weekend has shown a statistically significant increasing trend since the start of the game bird harvest survey ($p<.001$), which strongly suggests a shift in hunter behaviour. While Opening Weekend hours have stayed relatively constant since 2010 (Figure 1), hunters are choosing to spend less time hunting after Opening Weekend is finished.

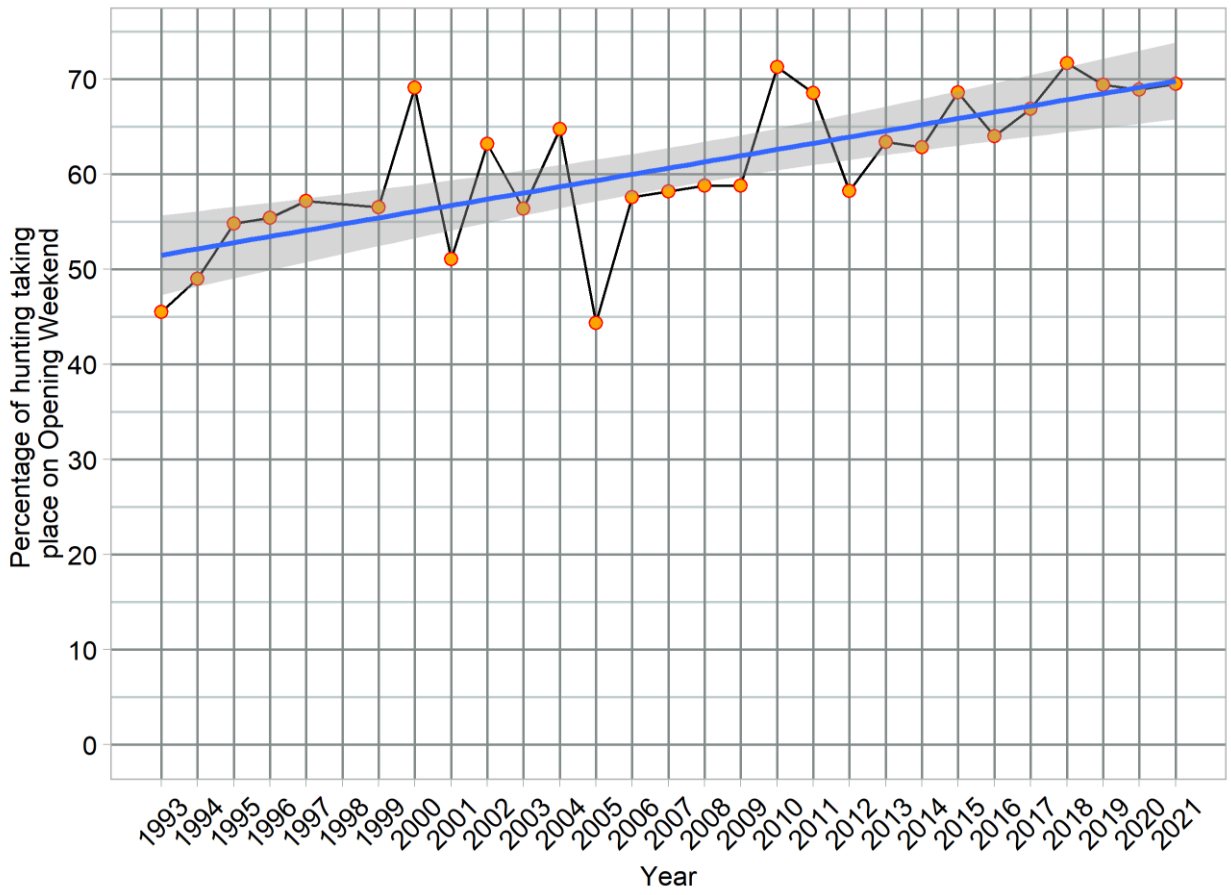



*Figure 2: Percentage of whole season waterfowl hunting hours spent on Opening Weekend since 1993. Long term trend is shown in blue with the 95% confidence interval for the trendline in grey. Please note 1998 has been removed from the analysis due to incomplete data.*

**Licence Sales**

One of the major factors affecting the daily total hunting hours outlined in Figure 1 above is the total number of licence holders in the region. Figure 3 shows Otago licence sales since 1993. Long term there has been a general upward trend in licence sales, however this has turned over the last ten years. This season showed a marked increase in the number of licences sold, the second highest for this period behind that of 2013.

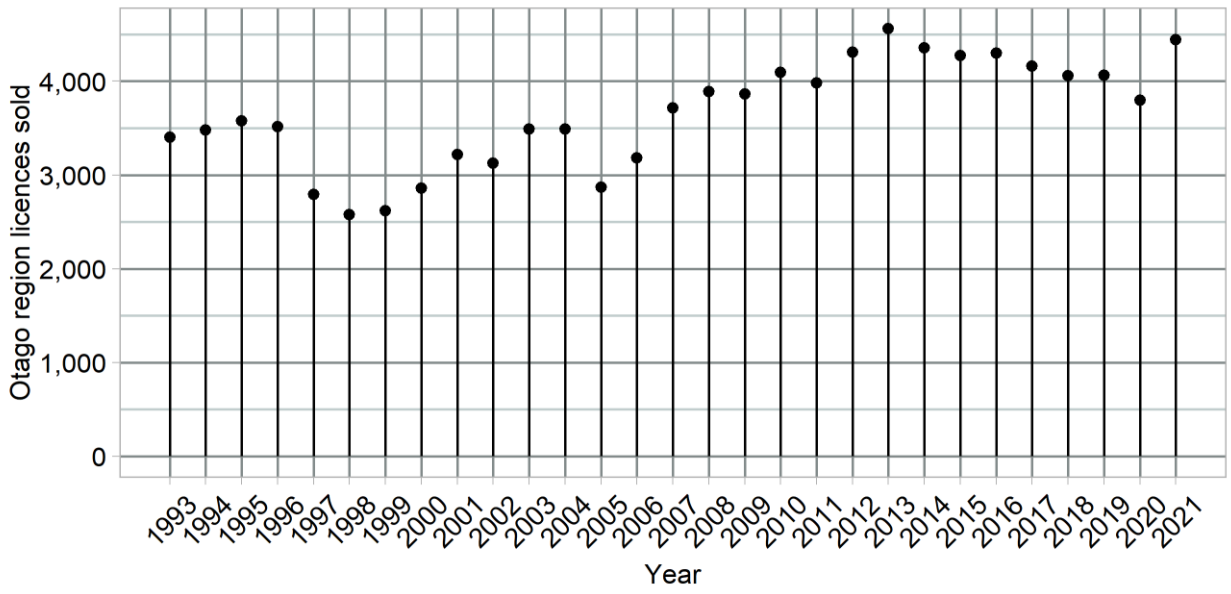



*Figure 3: Otago adult and junior whole season game bird licence sales.*

**Total Harvest**

Almost 73,900 game birds were harvested this season in the Otago Region (Figure 4). Greylards were the most common game bird making up 76 percent of total season waterfowl harvest, with paradise shelduck making up a further 18 percent.

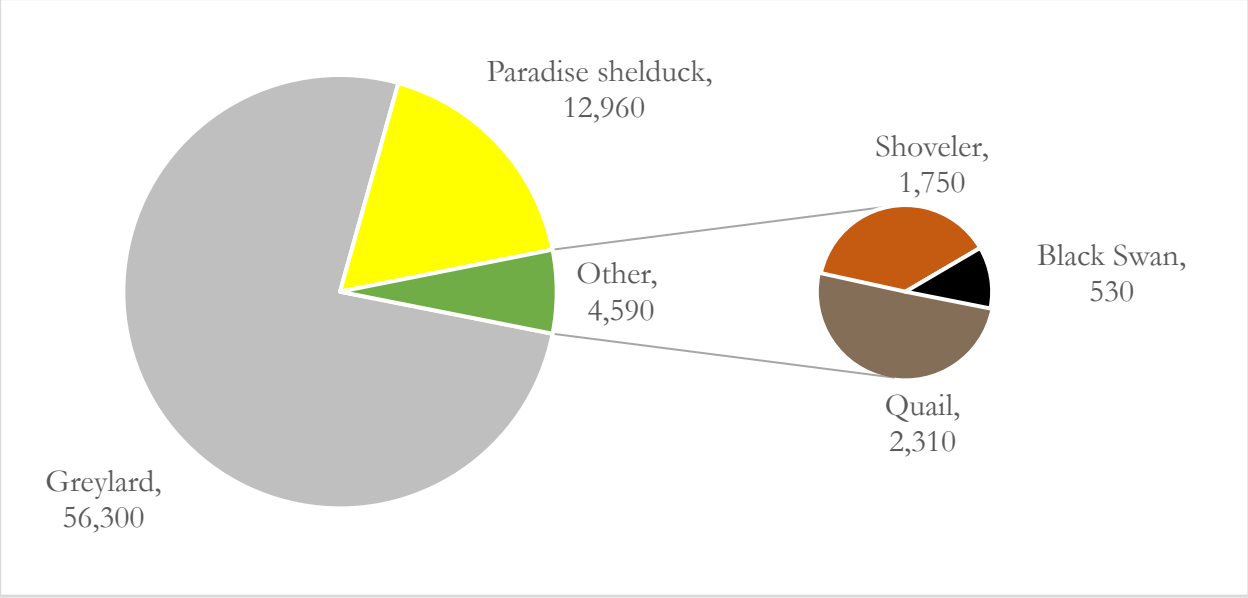



*Figure 4: Whole season waterfowl harvest broken down by species in the Otago Region for 2021.*

**Paradise Shelduck**

This year we estimated that 12,960 paradise shelduck were harvested in the Otago Region this hunting season, slightly above long term (1993-2021) average (Figure 5).

Paradise shelduck harvest in the Otago Region has shown a statistically significant increasing trend (p=0.002) since 1993 suggesting that paradise shelduck availability has increased or that hunters are more inclined to harvest them.

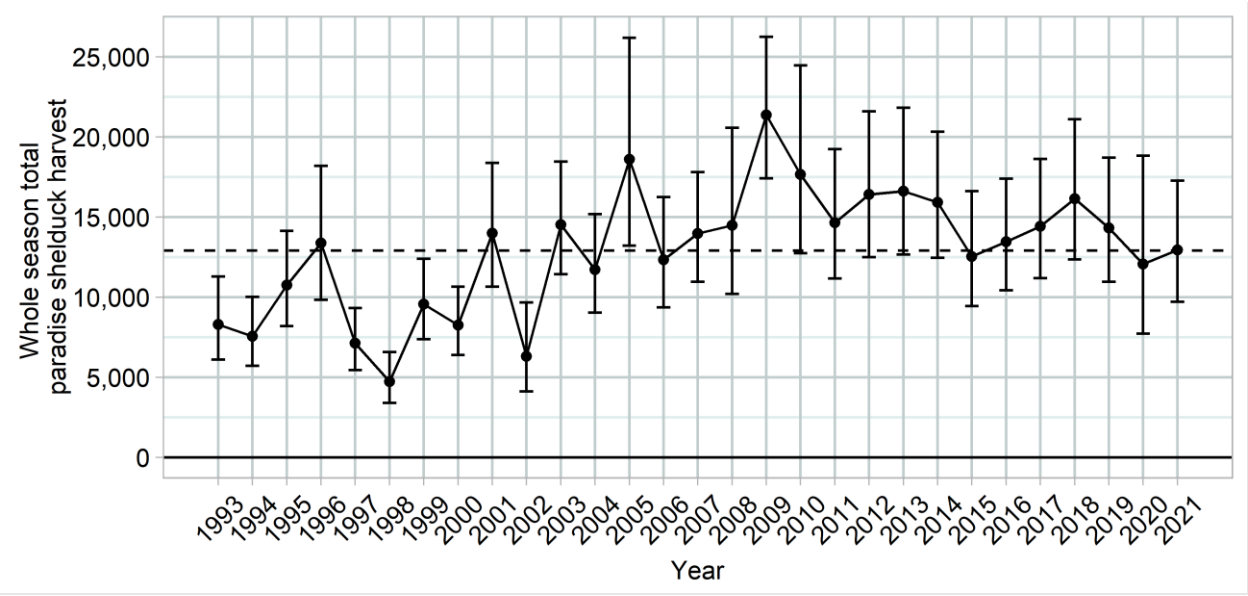



*Figure 5: Whole season total paradise shelduck harvest for 2012-2021 with 95% confidence intervals and the ten-year average (dotted line).*

**Greylards**

Figure 6 shows total greylard harvest since 1993. There was a reasonably large variation in the number of greylards harvested, with a statistically insignificant (p=0.595) upward trend spanning the period. The greylard harvest for 2021 was 56,300 birds, slightly below the long-term average at 58,000 birds.

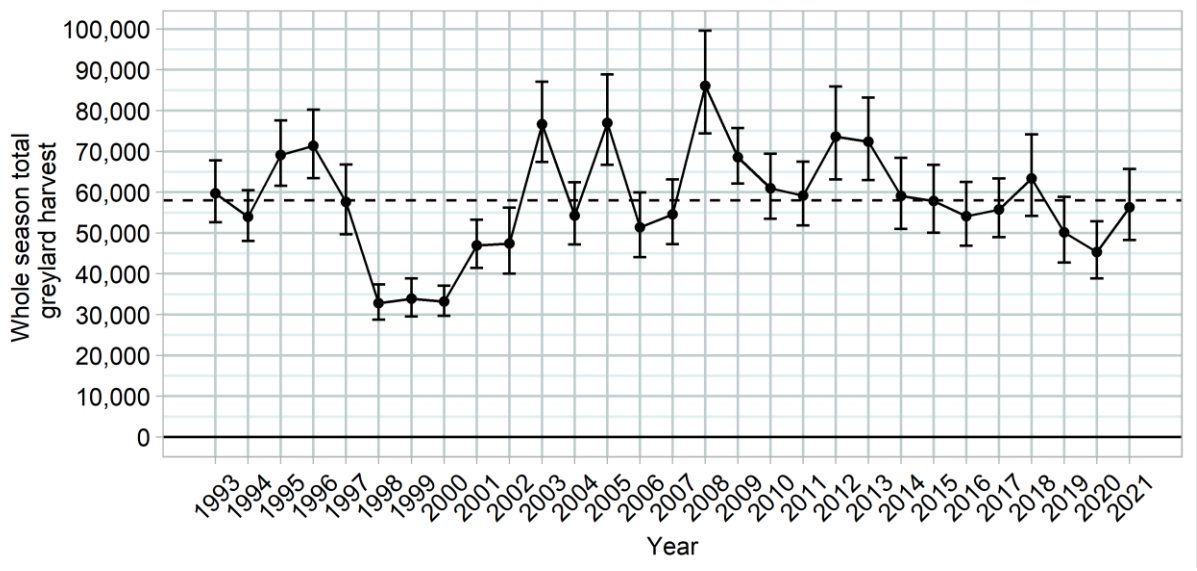



*Figure 6: Main season total greylard harvest for 1993-2021 with 95% confidence intervals and the long-term average (dotted line).*

Figure 7 shows the average rate that hunters in Otago harvest greylards and is likely one of the best indicators of hunter satisfaction. There has been a statistically insignificant downward trend (p=0.60) over the last ten years. The average harvest rate of greylards this season was 0.93 birds per hour, slightly above the ten-year mean at 0.90. Greylard harvest rates appear to be relatively stable over this period.

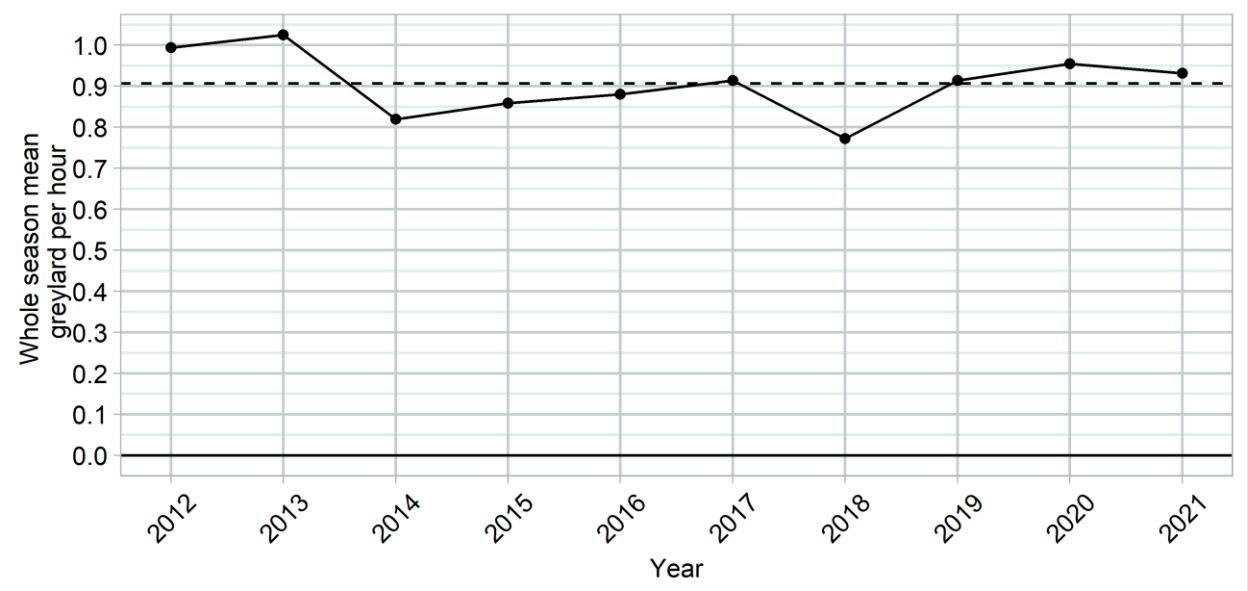



*Figure 7: Average number of greylard harvested per hour for 2012-2021 and the average for this period (dotted line).*

Figure 8 shows the whole season greylard harvest rate over a longer time period. Since 1993 there has been a weak linear trend of decreasing greylard harvest rates (p=0.36). The 1993-2021 data were fitted with a linear regression (blue line) and a cyclical (sinusoidal) model (red dashed line). The cyclical and linear models were tested and refined using the Akaike Information Criterion (AIC). The AIC showed that the cyclical model did a significantly better job at explaining the data than the linear model. The cyclical model suggests there is potentially an 8-year cycle in the availability of greylards to the hunter. AIC provides a good way to compare two models but gives limited information on their overall suitability. The best way to test these models is to see which predicts future results more accurately.

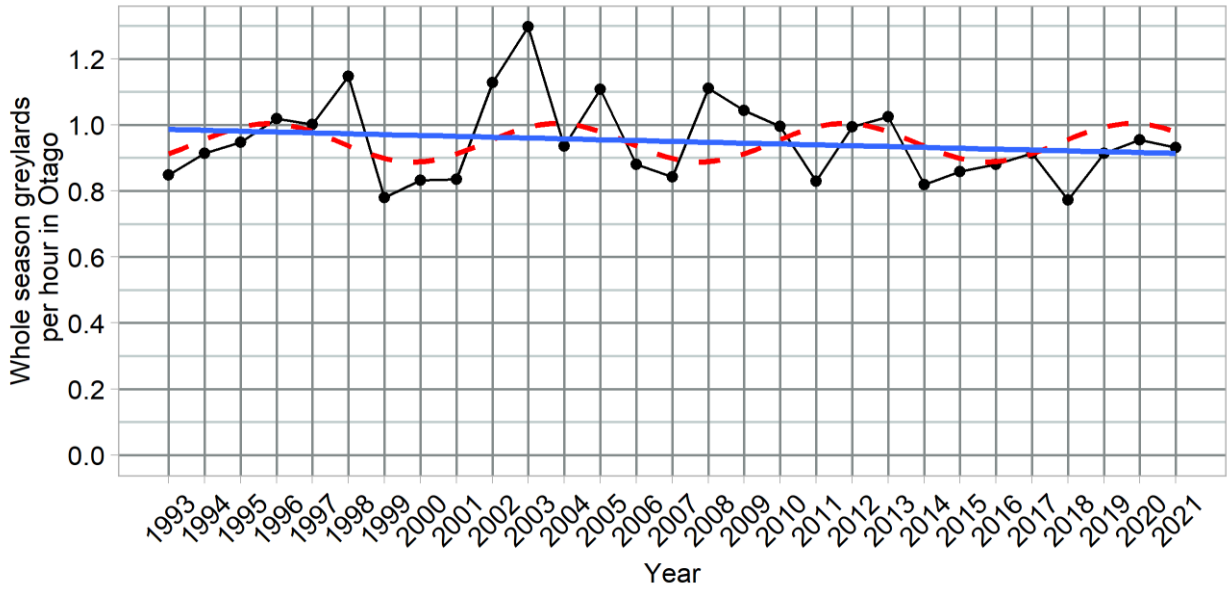



*Figure 8: Long-term number of whole season greylards harvested per hour in the Otago region. The blue line shows the linear model, and the dotted red line shows the cyclical model.*

**Recommendation**

**This report be received.**

Jayde Couper
Fish & Game Officer
September 2021

## 14.2 Compliance Summary Report Purpose

This report provides a summary of compliance activity during the 2020-2021 fishing and hunting seasons with focus to the period from 1 October 2020 – 31 September 2021.
It also reports on achievement of internal regional compliance guidelines of:

- Checking 10% of fish or game adult full season licence holders annually
- Maintaining 95% compliance with laws and regulation

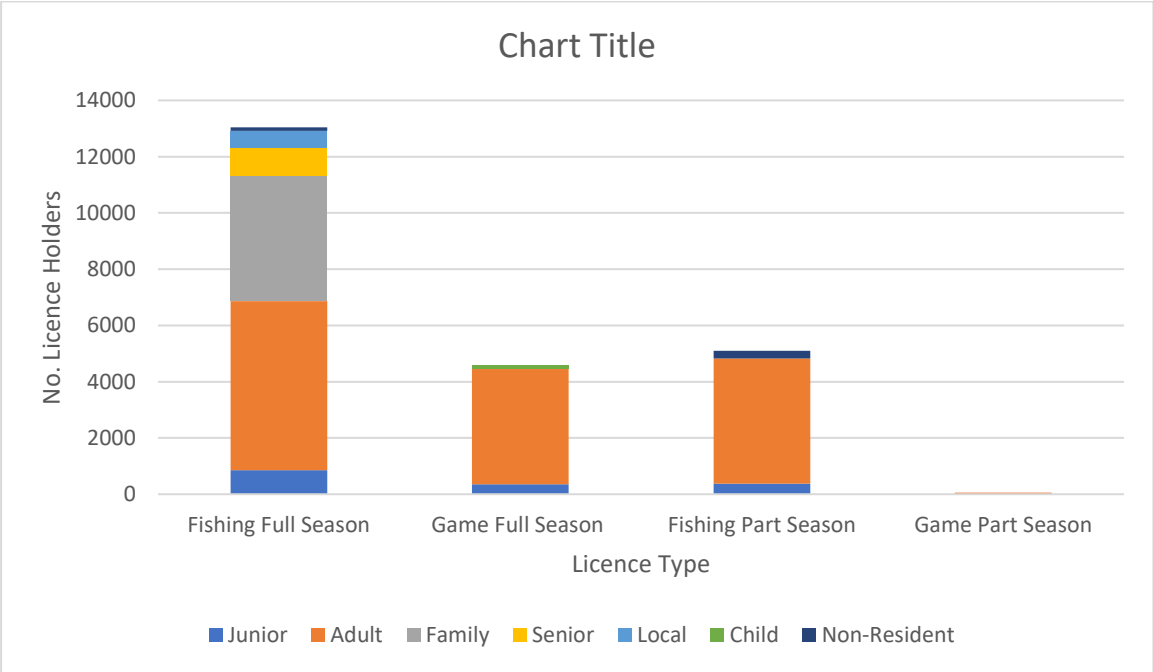
***Licence Diversion Levels***

Direction on matters of prosecution, including diversion levels, are guided by the "Offence Guidelines" adopted by the Council. These standardized diversion payment levels were approved in November 2020 and are in line with the Southland and Central South Island regional levels.

**Impact of COVID-19**

The COVID-19 virus has continued to have a significant impact on all of New Zealand. Otago Fish and Game Council has faced a decrease in licence sales, with non-resident fishing licence sales being most impacted. COVID-19 (Delta) has also provided challenges to rangers who are doing well to conduct licence checks while adhering to government restrictions, including social distancing limitations.

**Overview of Licence Holders (2021):**



**Fishing Season Compliance**

| | |
|---|---|
| Documented interviews with anglers | 1059 |
| Total whole season adult and family licence holders | 10, 483 |
| % Checked (target: >10% adult licence holders) | 10.1% |
| Number of offenders<br>(excluding failure to produce or "FTP's") | 27 |
| % Compliant (target: >95%) | 97.5% |

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This season, **non-resident** full season fishing licence volumes decreased by 89% from the 2019-2020 season. In comparison, **resident** full season adult and family licence sales were up by 1781. Overall, Licence Equivalents (LEQ) were up by 0.06%

The Council achieved its target of 10% licence holder contacts this season. Many rangers active in South and Coastal Otago continue to report traveling long distances to find very few or no anglers. This is consistent with a general downturn in angler use of lowland waterways that is also reflected in National Angler Survey results as well. Lower angler activity and the prohibition on angling during the level 4 lockdown also had impact on the overall number of interviews undertaken.

27 individuals were apprehended for Conservation Act 1987 offences, 21 less than last season. Over the last 5 years, compliance levels have ranged between 95% and 98% of those interviewed and this season's result fits within the range at 97.5%. In addition to the more serious offences, all those who failed to produce a licence to a ranger in the field ('FTP's) had offence notices issued and were given verbal or written warnings. This is routine procedure.

***Overview of Fishing Offences***

Fishing without holding a valid sports fishing licence remains the most common offence in the Otago region, with FWL comprising 81.5% of offences detected (excluding FTPs). Two offenders committed two simultaneous offences: one fished without a licence and with two rods, and the other fished without a licence and provided false details. In terms of regulation offences, two individuals lacked backcountry licence endorsements and six were caught fishing with two rods. Notably, the two individuals lacking backcountry endorsements were a fishing guide and their client.

***Outcomes for Fishing Offences***

Three individuals were untraceable, two because they changed address and refused to engage and one because they were a fast-moving tourist.

Eight written warnings were given for minor offences due to considerations including it being an individual's first fishing offence, age (<20) and impecuniosity. One written warning was

given to the client of the guide who did not advise them of the need for a backcountry licence. The fishing guide who did not have a backcountry licence completed diversion.
Eighteen offenders were charged and received offers of diversion, paying their fine into the Otago regions 'Research and Habitat Enhancement Fund'. One diversion case is currently ongoing.
One fishing offence was heard in the Queenstown district court. The offender was intercepted fishing without a licence and with multiple rods at Lake Wakatipu. The offender was unable to appear due to personal circumstances and was convicted. They were ordered to pay a fine of $800, along with $130 in court costs and $350 in solicitor costs.
Overall, the proportion of successful diversions has increased since last season, with 67% of all offenders (excluding 'FTP's) successfully being dealt with through diversion.

**Game Season Compliance**

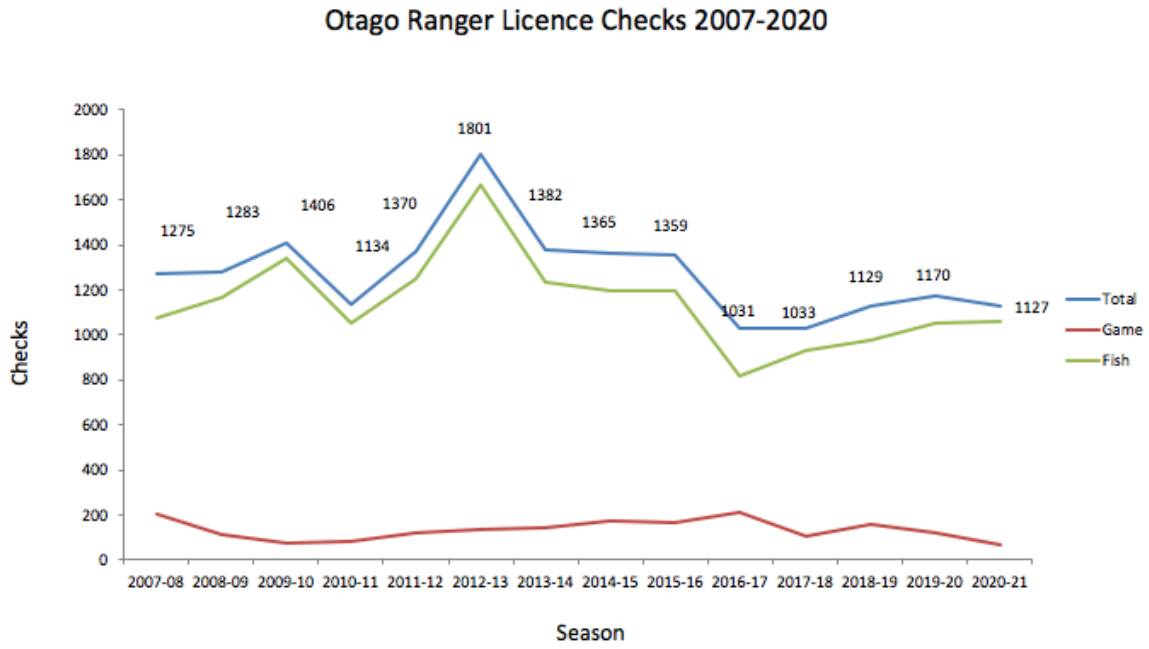
| | |
|---|---|
| Total documented game licence holder contacts | 68 |
| Total whole season adult licence holders | 4096 |
| % Checked (target: >10% adult licence holders) | 1.6% |
| Number of offenders (excluding 'FTP's) | 1 |
| % Compliant (target: > 95%) | 98.5% |

Game licence sales ('LEQ's) have risen from 3867 (2020) to 4179 (2021). This equates to a 8.1% increase from the 2020 season.

The target of interviewing 10% of gamebird licence holders was once more, not achieved this season. This contact rate is an almost unattainable target, especially when much of our compliance work is focused on opening weekend and on individual farm ponds and private land, with a well-trained but limited number of rangers. After opening weekend, game ranging generally results in considerable effort for a limited number of hunter contacts. Thus, all 68 game licence checks were conducted in opening weekend this season. Rangers noted that, unlike anglers, the number of hunters present appeared unaffected by COVID-19 this season.

There was one game offence recorded by rangers this season, for possession of lead shot. The offender was given a warning.

**Overview Of Trends In Ranging Activity**




**Changes in honorary rangers**

Staff are pleased with the rangers' efforts this season, especially considering that COVID-19 precautions remained necessary even out of lockdown and there were generally less tourist anglers.

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The next ranger training event is scheduled for Tapanui on the 4th and 5th of December. Volunteer rangers have detected and professionally reported 7.5% of the total offences encountered in Otago. Their attendance at other events such as TAKF days and assisting with other field work is also greatly appreciated.

Over the last year, 2 rangers retired or resigned, and 2 new rangers were appointed . The Council currently have 13 volunteer rangers and 7 warranted staff (11 less than last year). Staff are processing 1 new ranger application at present.

**Recommendations**

**Council receive this report.**

**Alana Harris**

Otago Fish & Game Compliance Officer 2021

September 2021

## 14.3 Summary of Fishing Competitions for the 2020/21 season

**Introduction**

Fishing competitions are approved annually in line with the Sports Fish and Game Management Plan (SFGMP) for the Otago Region and subject to conditions defined in the Freshwater Fisheries Regulations 1983.

This report summarises competition activity for the 2020/21 work year (Project 1362 in the workplan) and provides details (appendix 1) of the larger commercial type competitions that are requested to pay a $40.00 administration fee and levies.

**Overview**

There were four main competitions which attracted levies in the Otago region during the 2020/21 season.

These publicly notified events focus on family participation, and junior anglers are always well catered for with prizes and giveaways.

Our approval conditions generally allow 1 fish of each species per contestant to be weighed and measured at each event. Fish numbers presented to the weigh in can vary significantly between seasons mostly due to the weather conditions. On Lakes Hawea and Wakatipu small salmon can be caught in abundance with many released.

**Freshwater Fisheries Regulations 1983 Section 57F Rental**

Where a Fish and Game Council approves a fishing competition under this Part and an entrance fee is charged by the holder, the holder shall be liable to pay to the Council a rental of $40, plus $5 for each participant aged 16 years or over and $2 for each participant aged under 16 years.

With all the major competitions we have only been requesting 50% of the levy acknowledging that these competitions are community based, provide angling opportunities with family involvement, and that profits support local communities. Levy income can vary depending on the grade of entries such as adults versus juniors.

Levy income can be used to assist with the purchase of fishing equipment and merchandise to support events run by schools and TAKF programmes. We provide the major competitions with a rod and reel set for a junior prize.

The table in Appendix 1. provides a full list of the major competitions and supporting information for the 2020/21 season noting that profits are derived from a range of sources including entry fees, donations, sponsorship, fundraising and BBQ's.

In house angling and hunting club competitions for club trophies feature regularly and some TAKF programmes incorporate a competition component. We are aware of most events and in some cases provide financial assistance through our grants budget. Staff attend competitions when they can especially the major events where the ongoing collection of fisheries information is important.

Staff attended events in Glenorchy and Hawea to undertake the measuring and weighing of fish.

**Collection of Fisheries Information**

Catch information is collected from major competitions and downloaded on a data base. We have a good range of fisheries information from Lakes Dunstan, Hawea and Wakatipu with over 30 years of data from the Glenorchy competition held annually at the head of Lake Wakatipu. Surprisingly, there is little interest from the community for a large competition on Lake Wanaka.

**Summary**

Fishing competitions provide a range of fishing opportunities and enjoyment for clubs, organisations, families, and individuals. Major competitions that attract levies are well organised and support requirements under Otago's SFGMP. Staff attendance at events is always well received by organisers and the fisheries information collected is proving very useful for monitoring population trends and fishery health.

Competitions early in a new season provide incentives for purchasing a new season licence.

**Recommendation**

The Report be received.

Ben Sowry
Fish and Game Officer
June 2021

Appendix 1. Major fishing completions which attracted an application fee and levies for the 2020/21 season

| Date | Event and duration (years) | Organiser | Lake | No of entries | Fish measured and weighed | Application fee $40, and levies | Distribution of Profits |
|---|---|---|---|---|---|---|---|
| 3rd October 2020 | Glenorchy Fishing Competition (39) | Wakatipu Junior Rugby | Wakatipu | 130 | 64 | $335.00 | $3300.00 income raised for the Glenorchy Riding Clubs new storage facility. |
| 22nd Nov 2020 | Lake Dunstan Fishing Competition (27) | Rotary of Cromwell | Dunstan | 126 | 92 | $193.00 | $615.00 profit applied to costs associated with the maintenance of the 45th Parallel Track. |
| 2nd January 2021 | Lake Dunstan Fishing Competition (11) | Cromwell Town and Country Club | Dunstan | 215 | 105 | $375.00 | Clyde voluntary Coast Guard $500.00 Cromwell Town and Country Club building fund $1000 |
| 13th February 2020 | Lake Hawea Family Fishing Classic (25) | Family Fishing Classic Committee | Hawea | 401 | 206 | $732 | Wanaka Toy Library $500, Riding for the Disabled Wanaka $500, Hawea Kindergarten $500, Luggate Toy Library $500, Wanaka Cat Rescue $300, Hawea Volunteer Fire Brigade $1000, Hawea Wanaka Pony Club $500, Hawea Tennis Club $500, Hawea Flat School $500, St John Youth Wanaka $500, Hawea Playgroup $500, Upper Clutha Children's Medical Trust $800, Food for Love Wanaka $500, Kahu Youth Wanaka $500, Thursday Group - Hawea Community Assn $500, Hawea Community Food Garden $500 |

## 14.4 2021 New and Reactivated Angler Survey

**Introduction**

Otago Fish & Game staff led a national survey of new and reactivated anglers in July 2021.

The survey aimed to discover what motivated new anglers to buy a licence for the first time, and what prompted previous anglers who had given up the sport to come back. We also wanted to learn about their fishing experiences and find out what information they needed to help them continue in the sport. The survey collected data from more than 1500 licence holders. What we learned will be used to inform marketing efforts in the 2021-22 fishing season.

New anglers were defined as those who bought a freshwater sports fishing licence for the first time in 2020-21. Reactivated anglers were those who bought a fishing licence in 2020-21 having lapsed for the previous three seasons.

Questions were peer-reviewed by Fish & Game staff at Otago, Southland, and Eastern regions and the New Zealand Council before the survey was launched. Otago F&G obtained consent from the 12 regional managers to access licence holders from their areas.

A pilot survey was trialled in June 2021, and questions then fine-tuned. The main survey was conducted online from July 6-13, 2021. The survey was sent to 5682 licenceholders nationwide and received 1567 responses, a positive response rate of 27%.

The data was analysed by Southland Fish & Game field officer Cohen Stewart, whose large input into the following information is acknowledged.

**Method:**

The analysis:
- Broke down the success and satisfaction results by experience (new anglers vs long term lapsed anglers) (See Appendix, Table 10 and 11)
- Compared the motivators of lapsed vs new anglers (Table 12 and 13)
- Assessed differences in satisfaction and success by region (Table 15 and 16)
- Assessed differences in satisfaction for the differing licence types (Table 14)
- Compared success, satisfaction and licence buying intentions (Table 17)
- Tabulated the results (Table 1-9)

**Summary:**

There was not much difference in success, satisfaction and motivations for new and lapsed anglers. However, reasons for participating differed substantially. New anglers wanted to participate because they 'just wanted to give it a go'. Lapsed anglers participated because fishing could be easily added to their holiday plans, and they were encouraged by family/friends. Key motivators were to (1) enjoy nature/get outdoors; (2) escape everyday stress; and (3) spend time with friends/family. T he thrill of the catch ranked only fourth.

Licence type purchased did not overly affect satisfaction. Significant numbers of day licence holders were satisfied/very satisfied with their angling experience last season. There is an opportunity to market full season or family licences to last season's day licence holders. New anglers have also indicated the kind of information they want most: where to go fishing; general tips and tricks; and instructional videos for the areas they fish. This has important, practical applications.

More work is being done with the data to identify key marketing opportunities, develop targeted strategies, and deliver relevant, timely messaging and information as the fishing season progresses into summer. The clear objective is to attract new anglers and retain 2020/21 new or reactivated licence holders for the long-term benefit of freshwater sports fishing.

**Findings:**

***Experience***

- Almost 30% of respondents found trout fishing difficult or very difficult. For new licence holders, approximately one third found fishing difficult, one third found fishing easy and one third found fishing neither easy nor difficult.
- Eighty percent of surveyed anglers fished more than once this season. Just under half of the anglers surveyed fished more than four times.
- New anglers fished with a fairly even split between friends, spouses, alone, and children.

***Information and advice***

- When asked about the information Fish & Game could provide to help anglers with their fishing and encourage them to participate more often, anglers identified (1) ideas on where to go fishing, (2) general tips and tricks, and (3) specific instructional videos for the areas they fish.
- However, only 25% of respondents had watched instructional fishing videos produced by F&G. For Otago licence holders, only 20% had seen our instructional videos.
- Most anglers (72%) sourced their fishing information from friends/family. Where anglers sourced their information did not influence success rates.

***Motivation***

- The main reasons new/long term lapsed anglers took up fishing this season was (1) they were encouraged by friends/family, (2) fishing was easily added to holiday plans, and (3) they 'just wanted to give it a go'.
- The main reasons new anglers go fishing is to (1) enjoy nature/get outdoors, (2) escape everyday stress, (3) spend time with friends/family, and (4) the thrill of the catch.

***Satisfaction and Success***

- Almost 70% of new anglers were satisfied or very satisfied with their freshwater fishing experience. The main reason for dissatisfaction was lack of success.
- Thirty-eight percent of new anglers did not catch a fish.
- Although anglers who found fishing easy were more likely to be satisfied or very satisfied, over 50% of anglers who found fishing difficult were still satisfied with their fishing experience.
- Satisfaction levels were broadly consistent by region. Sixty-five per cent of Otago anglers were satisfied. Forty per cent of anglers in Otago were unsuccessful. Anglers from Northland, CSI and North Canterbury were the most unsuccessful with more than 50% of anglers failing to catch a fish.

***Intentions***

- Just over one half of the new anglers surveyed said they would buy a licence next season whilst 42% of anglers were undecided on whether they will buy a licence.
- The more successful anglers were, the more likely they were to indicate that they would buy a licence next season.
- Thirty-nine percent of new anglers who did not catch a fish indicated they would buy a licence next season.
- Anglers who found fishing easy were more likely to indicate they would buy a licence next season while anglers who found fishing difficult were more likely to be undecided on whether they would buy a licence next season.

**Recommendation:**
**This report be received**

Bruce Quirey
Otago Fish & Game
September 2021

**Appendix:**

**Beginner angler results tables**

**Table 1: Relationship between success and satisfaction. When interpreting the percentage column, 12.3% of anglers who did not catch a fish were very satisfied.**

| Level of success and satisfaction | Very satisfied | (%) | Satisfied | (%) | Neither satisfied nor dissatisfied | (%) | Dissatisfied | (%) | Very dissatisfied | (%) | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No fish | 64 | 12.3 | 184 | 35.3 | 189 | 36.3 | 63 | 12.1 | 21 | 4.0 | 521 |
| One to five | 162 | 27.7 | 300 | 51.4 | 95 | 16.3 | 25 | 4.3 | 2 | 0.3 | 584 |
| Six to 10 | 50 | 38.8 | 61 | 47.3 | 12 | 9.3 | 3 | 2.3 | 3 | 2.3 | 129 |
| 11 to 20 | 36 | 50.0 | 29 | 40.3 | 4 | 5.6 | 2 | 2.8 | 1 | 1.4 | 72 |
| More than 20 | 38 | 63.3 | 19 | 31.7 | 3 | 5.0 | | 0.0 | | 0.0 | 60 |
| **Grand Total** | **350** | | **593** | | **303** | | **93** | | **27** | | **1366** |

**Table 2: Relationship between an angler's satisfaction and their licence buying intentions next season. When interpreting the percentage column, 69.1 percent of very satisfied anglers intend to buy a licence next season.**

| Licence buying intention and satisfaction | Very satisfied | (%) | Satisfied | (%) | Neither satisfied nor dissatisfied | (%) | Dissatisfied | (%) | Very dissatisfied | (%) | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | 239 | 69.1 | 323 | 54.7 | 119 | 40.3 | 25 | 8.0 | 2 | 27.5 | 708 |
| No | 4 | 1.2 | 15 | 2.5 | 23 | 7.8 | 14 | 60.0 | 15 | 15.4 | 71 |
| Maybe | 103 | 29.8 | 253 | 42.8 | 153 | 51.9 | 52 | 32.0 | 8 | 57.1 | 569 |
| **Grand Total** | **346** | | **591** | | **295** | | **91** | | **25** | | **1348** |

**Table 3: Relationship between success and whether a person intends to buy a licence next season. When interpreting the percentage column, 39.8% of anglers who did not catch a fish have indicated they will buy a licence next season.**

| Level of success and licence buying intention | Yes | (%) | No | (%) | Maybe | (%) | Grand Total |
|---|---|---|---|---|---|---|---|
| No fish | 204 | (39.8) | 44 | (8.6) | 264 | (51.6) | 512 |
| One to five | 308 | (53.3) | 23 | (4.0) | 247 | (42.7) | 578 |
| Six to 10 | 83 | (66.4) | 2 | (1.6) | 40 | (32.0) | 125 |
| 11 to 20 | 58 | (81.7) | 0 | (0.0) | 13 | (18.3) | 71 |
| More than 20 | 55 | (93.2) | 2 | (3.4) | 2 | (3.4) | 59 |
| **Grand Total** | **708** | | **71** | | **566** | | **1345** |

**Table 4: Relationship between success and primary fishing information source. When interpreting the percentage column, of those anglers who caught no fish, 76.8% sourced most of their information from friends and family.**

| Level of success | Friends or family | (%) | Online videos | (%) | Websites | (%) | Books | (%) | Brochures | (%) | Social media | (%) | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No fish | 388 | 76.8 | 53 | 10.5 | 43 | 8.5 | 13 | 2.6 | 4 | 0.8 | 4 | 0.8 | 505 |
| One to five | 423 | 78.2 | 55 | 10.2 | 38 | 7.0 | 15 | 2.8 | 2 | 0.4 | 8 | 1.5 | 541 |
| Six to 10 | 97 | 78.9 | 15 | 12.2 | 6 | 4.9 | 2 | 1.6 | 1 | 0.8 | 2 | 1.6 | 123 |
| 11 to 20 | 47 | 69.1 | 12 | 17.6 | 6 | 8.8 | 1 | 1.5 | | 0.0 | 2 | 2.9 | 68 |
| More than 20 | 36 | 69.2 | 7 | 13.5 | 4 | 7.7 | 3 | 5.8 | 1 | 1.9 | 1 | 1.9 | 52 |
| **Grand Total** | **991** | | **142** | | **97** | | **34** | | **8** | | **17** | | **1289** |

**Table 5: Relationship between difficulty and satisfaction. When interpreting the percentage column, of those anglers who were very dissatisfied, 52.9% found angling very difficult.**

| Relationship between difficulty and satisfaction | Very easy | (%) | Easy | (%) | Neither easy nor difficult | (%) | Difficult | (%) | Very difficult | (%) | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Very dissatisfied | 0 | 0 | 0 | 0 | 1 | 5.9 | 7 | 41.2 | 9 | 52.9 | 17 |
| Dissatisfied | 3 | 6.1 | 4 | 8.2 | 14 | 28.6 | 22 | 44.9 | 6 | 12.2 | 49 |
| Neither satisfied nor dissatisfied | 4 | 2.4 | 25 | 15.0 | 87 | 52.1 | 42 | 25.1 | 9 | 5.4 | 167 |
| Satisfied | 24 | 8.0 | 86 | 28.8 | 109 | 36.5 | 74 | 24.7 | 6 | 2.0 | 299 |
| Very satisfied | 44 | 24.3 | 49 | 27.1 | 59 | 32.6 | 29 | 16.0 | 0 | 0.0 | 181 |
| **Grand Total** | **75** | | **164** | | **270** | | **174** | | **30** | | |

**Table 6: Relationship between perception of difficulty and future licence buying. When interpreting the percentage column, of those anglers who intend to buy a licence next season, 14.3% found fishing very easy.**

| Relationship between perception of difficulty and future licence buying | Very easy | (%) | Easy | (%) | Neither easy nor difficult | (%) | Difficult | (%) | Very difficult | (%) | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | 51 | 14.3 | 98 | 27.5 | 123 | 34.6 | 80 | 22.5 | 4 | 1.1 | 356 |
| No | 1 | 2.4 | 6 | 14.3 | 14 | 33.3 | 13 | 31.0 | 8 | 19.0 | 42 |
| Maybe | 21 | 7.7 | 56 | 20.6 | 105 | 38.6 | 73 | 26.8 | 17 | 6.3 | 272 |
| **Grand Total** | **73** | | **160** | | **242** | | **166** | | **29** | | |

**Table 7: How easy was fishing for first time licence holders?**

| Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Grand Total |
|---|---|---|---|---|---|
| 79 | 180 | 295 | 189 | 37 | 780 |
| 10.1% | 23.1% | 37.8% | 24.2% | 4.7% | |

**Table 8: F&G video viewing by region**

| Video viewing | SOU | OTA | A/W | CSI | EST | HB | N/M | NC | NOR | TAR | WEL | WC | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yes | 20 | 54 | 49 | 43 | 77 | 18 | 24 | 36 | 1 | 7 | 36 | 14 | 379 |
| No | 78 | 213 | 97 | 122 | 196 | 56 | 76 | 101 | 8 | 17 | 54 | 29 | 1047 |
| % viewed | 20.4 | 20.2 | 33.6 | 26.1 | 28.2 | 24.3 | 24.0 | 26.3 | 11.1 | 29.2 | 40.0 | 32.6 | |
| **Grand Total** | **98** | **267** | **146** | **165** | **273** | **74** | **100** | **137** | **9** | **24** | **90** | **43** | **1426** |

**Table 9: Relationship between participation effort, satisfaction and success. When interpreting, there were 165 anglers who fished for one day and didn't catch any fish. Of those 165 anglers 11/165 were very dissatisfied.**

| Success, satisfaction and participation effort | None - I didn't fish at all. | One day | Two to three days | Four to 10 days | More than 10 days | Grand Total |
|---|---|---|---|---|---|---|
| **No fish caught** | **32** | **165** | **174** | **124** | **26** | **521** |
| Very dissatisfied | 4 | 11 | 3 | 3 | | 21 |
| Dissatisfied | 3 | 18 | 21 | 19 | 2 | 63 |
| Neither satisfied nor dissatisfied | 21 | 60 | 55 | 43 | 10 | 189 |
| Satisfied | 2 | 50 | 75 | 48 | 9 | 184 |
| Very satisfied | 2 | 26 | 20 | 11 | 5 | 64 |
| **One to five** | | **108** | **197** | **201** | **78** | **584** |
| Very dissatisfied | | | | 1 | 1 | 2 |
| Dissatisfied | | | 10 | 9 | 6 | 25 |
| Neither satisfied nor dissatisfied | | 12 | 33 | 37 | 13 | 95 |
| Satisfied | | 52 | 97 | 108 | 43 | 300 |
| Very satisfied | | 44 | 57 | 46 | 15 | 162 |
| **Six to 10** | | **9** | **25** | **45** | **50** | **129** |
| Very dissatisfied | | | | | 3 | 3 |
| Dissatisfied | | | 1 | 1 | 1 | 3 |
| Neither satisfied nor dissatisfied | | | 1 | 4 | 7 | 12 |
| Satisfied | | 6 | 11 | 27 | 17 | 61 |
| Very satisfied | | 3 | 12 | 13 | 22 | 50 |
| **11 to 20** | | **4** | **5** | **21** | **42** | **72** |
| Very dissatisfied | | | | 1 | | 1 |
| Dissatisfied | | | 1 | 1 | | 2 |
| Neither satisfied nor dissatisfied | | | | 2 | 2 | 4 |
| Satisfied | | 3 | 2 | 7 | 17 | 29 |
| Very satisfied | | 1 | 2 | 10 | 23 | 36 |
| **More than 20** | | **2** | **4** | **8** | **46** | **60** |

| | | | | | | |
|---|---|---|---|---|---|---|
| Neither satisfied nor dissatisfied | | | 1 | | 2 | 3 |
| Satisfied | | | 1 | 4 | 14 | 19 |
| Very satisfied | | 2 | 2 | 4 | 30 | 38 |
| **Grand Total** | **32** | **288** | **405** | **399** | **242** | **1366** |

**Table 10: Relationship between experience and success. When interpreting the percentage column, 37.5% of long term lapsed anglers did not catch a fish.**

| Success and experience | Long term lapsed | (%) | New anglers | (%) | Grand Total |
|---|---|---|---|---|---|
| No fish caught | 256 | 37.5 | 265 | 38.8 | 521 |
| One to five | 297 | 43.5 | 287 | 42.0 | 584 |
| Six to 10 | 66 | 9.7 | 63 | 9.2 | 129 |
| 11 to 20 | 34 | 5.0 | 38 | 5.6 | 72 |
| More than 20 | 30 | 4.4 | 30 | 4.4 | 60 |
| **Grand Total** | **683** | | **683** | | **1366** |

**Table 11: Relationship between experience and satisfaction. When interpreting the percentage column, 1.7% of long term lapsed anglers were very dissatisfied.**

| Experience and satisfaction | Long term lapsed | (%) | New anglers | (%) | Grand Total |
|---|---|---|---|---|---|
| Very dissatisfied | 12 | 1.7 | 17 | 2.4 | 29 |
| Dissatisfied | 50 | 7.0 | 49 | 6.9 | 99 |
| Neither satisfied nor dissatisfied | 145 | 20.4 | 168 | 23.5 | 313 |
| Satisfied | 322 | 45.2 | 299 | 41.9 | 621 |
| Very satisfied | 183 | 25.7 | 181 | 25.4 | 364 |
| **Grand Total** | **712** | | **714** | | **1426** |

**Table 12: Relationship between experience and motivation. Importance ranking ranks motivators by total number of anglers in a group that indicated motivators were important or very important.**

| **New anglers motivation** | **Catching big fish** | **Challenging myself** | **Enjoying nature/getting outdoors** | **Escaping from stress** | **Enjoying time with friends/ family** | **Harvesting fish for the table** | **Experiencing something new** | **Thrill of the catch** |
|---|---|---|---|---|---|---|---|---|
| **Not very important** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Somewhat important** | 132 | 113 | 28 | 48 | 32 | 84 | 42 | 54 |
| **Neutral** | 253 | 178 | 30 | 97 | 84 | 191 | 158 | 98 |
| **Important** | 120 | 267 | 267 | 277 | 263 | 176 | 352 | 335 |
| **Very important** | 37 | 61 | 378 | 263 | 293 | 56 | 116 | 194 |
| **Importance ranking** | **8** | **6** | **1** | **3** | **2** | **7** | **5** | **4** |
| **Lapsed anglers motivation** | | | | | | | | |
| **Not very important** | 159 | 79 | 6 | 17 | 30 | 192 | 32 | 25 |
| **Somewhat important** | 125 | 104 | 28 | 45 | 31 | 81 | 41 | 52 |
| **Neutral** | 235 | 166 | 27 | 92 | 78 | 178 | 149 | 93 |
| **Important** | 114 | 256 | 249 | 260 | 246 | 162 | 334 | 315 |
| **Very important** | 35 | 60 | 361 | 251 | 280 | 56 | 110 | 185 |
| **Importance ranking** | **8** | **6** | **1** | **3** | **2** | **7** | **5** | **4** |

**Table 13: Relationship between experience a reason for participation. Ranking of top three reasons for participation in brackets.**

| Participation and experience | Encouraged by friends or family | Easily added to holiday plans | Learned of opportunities | Moved to an area with good fishing opportunities | Few overseas anglers | Take the kids | Watched a video on fishing | More time | Just wanted to give it a go | Attend a F&G event | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Long term lapsers** | 220(2) | 227(1) | 40 | 101 | 45 | 151 | 12 | 187(3) | 95 | 10 | 91 |
| **New anglers** | 297(2) | 200(3) | 94 | 137 | 25 | 107 | 46 | 99 | 316 (1) | 6 | 57 |

**Table 14: Relationship between satisfaction and licence type. Percent anglers satisfied re those that were satisfied or very satisfied.**

| Licence type and satisfaction | Adult day | Adult WS | Family | Local Area | Winter | Long break | Short break | Grand Total |
|---|---|---|---|---|---|---|---|---|
| Very dissatisfied | 9 | 9 | 4 | 3 | 3 | | 1 | 29 |
| Dissatisfied | 21 | 38 | 11 | 12 | 7 | 2 | 8 | 99 |
| Neither satisfied nor dissatisfied | 88 | 108 | 44 | 25 | 14 | 5 | 29 | 313 |
| Satisfied | 204 | 183 | 89 | 42 | 43 | 3 | 57 | 621 |
| Very satisfied | 144 | 92 | 49 | 19 | 23 | | 37 | 364 |
| **Grand Total** | **466** | **430** | **197** | **101** | **90** | **10** | **132** | **1426** |
| **% anglers satisfied** | **74.7** | **64.0** | **70.1** | **60.4** | **73.3** | **30.0** | **71.2** | |

**Table 15: Relationship between region and satisfaction. Percent Dissatisfied = dissatisfied + very dissatisfied. Percent Satisfied = satisfied + very satisfied.**

| Region and satisfaction | A/W | CSI | EST | HB | N/M | NC | NOR | OTA | SOU | TAR | WEL | WC | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Very dissatisfied | 6.0 | 4.0 | 3.0 | 2.0 | 2.0 | 4.0 | | 5.0 | 3.0 | | | | 29 |
| Dissatisfied | 11 | 12 | 5 | 3 | 7 | 17 | 2 | 21 | 11 | | 7 | 3 | 99 |
| Neither satisfied nor dissatisfied | 30 | 51 | 47 | 16 | 27 | 31 | 2 | 67 | 14 | 8 | 13 | 7 | 313 |
| Satisfied | 64 | 63 | 125 | 26 | 42 | 63 | 2 | 115 | 43 | 13 | 44 | 21 | 621 |
| Very satisfied | 35 | 35 | 93 | 27 | 22 | 22 | 3 | 59 | 27 | 3 | 26 | 12 | 364 |
| Grand Total | **146** | **165** | **273** | **74** | **100** | **137** | **9** | **267** | **98** | **24** | **90** | **43** | **1426** |
| **% Dissatisfied** | 11.6 | 9.7 | 2.9 | 6.8 | 9.0 | 15.3 | 22.2 | 9.7 | 14.3 | 0.0 | 11.6 | 9.7 | |
| **% Satisfied** | 67.8 | 59.4 | 79.9 | 71.6 | 64.0 | 62.0 | 55.6 | 65.2 | 71.4 | 66.7 | 67.8 | 59.4 | |

**Table 16: Relationship between success and region.**

| Row Labels | A/W | CSI | EST | HB | N/M | NC | NOR | OTA | SOU | TAR | WEL | WC | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No fish caught | 46 | 82 | 76 | 20 | 44 | 66 | 5 | 104 | 29 | 10 | 23 | 16 | 521 |
| One to five | 58 | 61 | 119 | 38 | 39 | 45 | 2 | 101 | 52 | 9 | 42 | 18 | 584 |
| Six to 10 | 15 | 5 | 28 | 5 | 9 | 12 | 1 | 28 | 11 | 1 | 11 | 3 | 129 |
| 11 to 20 | 9 | 5 | 19 | 4 | 3 | 6 | | 16 | 3 | 2 | 4 | 1 | 72 |
| More than 20 | 10 | 4 | 21 | 4 | 2 | | | 9 | | 1 | 6 | 3 | 60 |
| **Grand Total** | **138** | **157** | **263** | **71** | **97** | **129** | **8** | **258** | **95** | **23** | **86** | **41** | **1366** |
| **% unsuccessful** | 33.3 | 52.2 | 28.9 | 28.2 | 45.4 | 51.2 | 62.5 | 40.3 | 30.5 | 43.5 | 26.7 | 39.0 | |

**Table 17: Relationship between success, satisfaction and licence buying intention. When interpreting this table, 21 anglers were very dissatisfied and caught no fish. Only one of these anglers has indicated they will buy a licence nest season. In contrast, 64 anglers were very satisfied despite catching no fish and of these anglers, 35 have said they intend to buy a licence next year.**

| Success, satisfaction, licence buying | No fish caught | One to five | Six to 10 | 11 to 20 | More than 20 | Grand Total |
|---|---|---|---|---|---|---|
| **Very dissatisfied** | **21** | **2** | **3** | **1** | | **27** |
| Yes | 1 | | | 1 | | 2 |
| No | 13 | 2 | | | | 15 |
| Maybe | 6 | | 2 | | | 8 |
| Comment | 1 | | 1 | | | 2 |
| **Dissatisfied** | **63** | **25** | **3** | **2** | | **93** |
| Yes | 17 | 7 | 1 | | | 25 |
| No | 9 | 4 | 1 | | | 14 |
| Maybe | 35 | 14 | 1 | 2 | | 52 |
| Comment | 2 | | | | | 2 |
| **Neither satisfied nor dissatisfied** | **189** | **95** | **12** | **4** | **3** | **303** |
| Yes | 63 | 45 | 8 | 1 | 2 | 119 |
| No | 14 | 7 | 1 | | 1 | 23 |
| Maybe | 108 | 39 | 3 | 3 | | 153 |
| Comment | 4 | 4 | | | | 8 |
| **Satisfied** | **184** | **300** | **61** | **29** | **19** | **593** |
| Yes | 88 | 155 | 37 | 24 | 19 | 323 |
| No | 8 | 7 | | | | 15 |
| Maybe | 87 | 138 | 21 | 5 | | 251 |
| Comment | 1 | | 3 | | | 4 |
| **Very satisfied** | **64** | **162** | **50** | **36** | **38** | **350** |
| Yes | 35 | 101 | 37 | 32 | 34 | 239 |
| No | | 3 | | | 1 | 4 |
| Maybe | 28 | 56 | 13 | 3 | 2 | 102 |
| Comment | 1 | 2 | | 1 | 1 | 5 |
| **Grand Total** | **521** | **584** | **129** | **72** | **60** | **1366** |

## 14.5 Upper Clutha Catchment Land-locked Salmon Spawning Surveys

**Introduction**

Land-locked populations of quinnat salmon occur in Lakes Wakatipu, Wanaka and Hawea where they form an important component of the sports fishery. Although the salmon are relatively small in size they can be easily caught.

Landlocked salmon spawning areas in the Central Otago Lakes are not well known and there is a general lack of knowledge of the land-locked salmon fishery. The purpose of the spawning surveys is to research where salmon have been observed spawning in the past and revisit these areas and identify where salmon are currently spawning.

The salmon spawning surveys in autumn 2021 is the third year of conducting surveys in the tributaries of Lakes Hawea, Wanaka and Wakatipu. This interim report is part of a milestone activity identified in the Sports Fish and Game Management Plan for Otago Fish and Game Council (11.2.1.7 2020).

**Methodology**

Anecdotal information on past salmon spawning areas was provided by Fish & Game staff (past and present), landowners and anglers. The priority catchments are tributaries of Lake Wanaka (Priority 1) and tributaries of Lake Hawea (Priority 2). The historic spawning areas identified from previous information were surveyed first as a priority. Anecdotal observations of salmon spawning were obtained from tributaries of the Makarora River and tributaries of the Wilkin River. Salmon spawning areas were also identified in tributary streams on both the true right and true left banks of the Hunter River.

*Walking Survey*

Surveys are generally conducted from late April through until early June which was based on previous anecdotal records of when salmon have been observed present or spawning at these locations. Most surveys were a single walk-through survey focusing on covering as much spawning habitat as possible within the salmon spawning season. Surveys covered Makarora River tributaries, Wilkin River tributaries, Hunter River tributaries, lower Albert Burn main stem and lower Dingle Burn main stem.

*Helicopter Survey*

A Robison R44 helicopter was used to fly-over spawning habitat enroute to drop off two staff at the head of the Hunter River. The helicopter wasn't used to complete a survey as such but more to scout likely spawning areas. The decision to not complete a helicopter survey was

based on the observations from the 2020 survey which revealed the difficultly is observing salmon from the air and also differentiating between salmon and trout (van Klink, 2020).

*eDNA (Environmental DNA) Survey*

Following on a from a pilot eDNA study in 2020 several more samples were collected from both the Makarora, Wilkin, Albert Burn and Hunter River catchments.

Single samples were collected using the Wilderlab custom syringe sampling kit. For each sample a syringe was used to filter 500 ml of water on site and a DNA/RNA preservative solution was injected into the filter capsule keeping the genetic material stable at room temperature before it was transported to the lab for analysis.

**Results**

*Walking Surveys*

No salmon or salmon carcasses were observed during the walking survey in the Makarora River and Wilkin River tributaries (Appendix 1a–1i). No salmon or salmon carcasses were observed during the walking survey in the lower Albert Burn or lower Dingle Burn (Appendix 2a –2b). Salmon and salmon redds were observed at six locations in the Hunter River and tributaries (Appendix 3a –3h). All salmon observations were in the lower and mid Hunter River downstream of Scrubby Hut with the most salmon spawning activity observed in tributaries around Wind Pudding (Appendix 3b) and Scrubby Creek (Appendix 3e). Brown trout and brown trout spawning redds were observed and recorded in all of the surveys undertaken (Appendices 1 – 3).

*Helicopter Survey*

The helicopter flight from Green Bush hut to Ferguson hut covered low-level surveillance of several likely salmon spawning areas in side streams and tributaries of both true left and true right of the Hunter River. Live salmon and dead salmon were located on the true left near Wind Pudding and these locations were captured with GPS so they could be followed up on the ground survey.

*eDNA Sampling*


Figure 1. Four eDNA sampling sites located in the Makarora, Wilkin and lower Albert Burn.

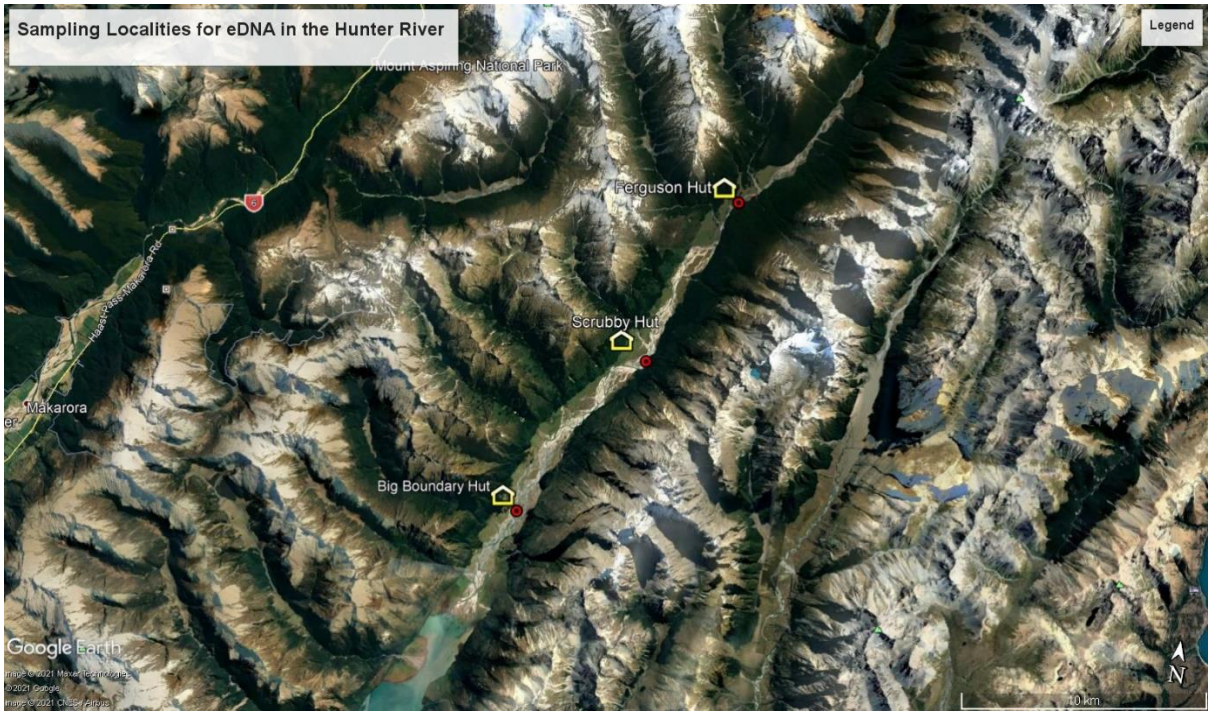



Figure 2. Three eDNA sampling sites located in the Hunter River.

No salmon eDNA was detected from the four samples collected at the Makarora (2), Wilkin (1) and lower Albert Burn (1). The three eDNA samples from the Hunter River have not yet been analysed as they are being paid for by Wai Wanaka.

In the 2020 pilot study salmon eDNA was detected in two samples (501167 & 501176) out of three samples collected in the Makarora River just downstream of the Wilkin River confluence. No salmon eDNA was detected at the other sites sampled in the Makarora which included three samples at Boiler Flat and three samples at Cameron Flat.

*Salmon caught in Lake Wanaka during the 2020/2021 season*

A total of 17 salmon were reportedly caught by anglers in the 2020/2021 season (P. van Klink, pers. comm.) and two of these salmon were measured by Fish & Game staff completing Creel Surveys on Lake Wanaka. Nine of the fish caught between mid-April to late May 2021 showed significant gonad and ovary development. Most of these mature salmon were caught near the Makarora River mouth indicating likely spawning areas were in the Makarora River catchment. The salmon caught earlier in the season were caught in Glendhu bay, Wanaka Faces, as well as Makarora Mouth area. Samples from all 17 salmon were collected for DNA analysis.

**Discussion**

Land-locked salmon over the past 5 years can be described as "rare" in Lake Wanaka with just 24 salmon samples being collected over the past three seasons. The 2020/21 season has seen the most salmon caught in recent years (17) so it appears anecdotally that the numbers are increasing. Interestingly salmon were detected in two of the three the eDNA samples (all at the same location) in the Makarora River in 2020 but no salmon were detected in the samples collected in 2021. This result highlights the variation and reliability of detecting salmon with eDNA which recommends collecting multiple samples at each location in order to filter more water (and hence eDNA). Due to limited resources it was decided to sample more sites (with fewer samples being collected) at each of the sampling locations in 2021. The pending eDNA results from the Hunter River samples may further reinforce this observation especially as salmon were observed at sites upstream from where the sample(s) were collected.

Salmon spawning areas in the Hunter River have been well documented during the 2021 spawning surveys. The walking survey undertaken built on knowledge gained in the 2020 helicopter spawning surveys which identified the difficulty in differentiating trout and salmon apart from the air. The helicopter survey also "missed" salmon spawning probably due to the size of the fish and the small streams with undercut banks that the salmon spawn in. The extensive survey results from the 2021 survey have now identified, documented and mapped salmon spawning habitat in the hunter River for the first time.

The comprehensive salmon spawning surveys also identified extensive brown trout spawning activity in many of the tributary streams surveyed. In particular surveys observed healthy populations of brown trout in the Hunter River. Some tributary stream(s) of the Makarora River were impacted by stock having access to the stream(s). There was a noticeable absence of brown trout and brown trout spawning in these tributary streams that had high silt loadings from farming operations.

**Future Salmon Spawning Surveys**

Future salmon spawning surveys will concentrate on the inflowing tributary rivers and streams of Lake Wanaka. Surveys may also cover tributaries of Lake Wakatipu if resources allow.

Environmental DNA (eDNA) techniques will be used if funding allows for the recommended number of multiple samples to be collected at each site.

**References**

*SPORTS FISH AND GAME MANAGEMENT PLAN FOR OTAGO FISH AND GAME REGION 2015-2025. Unpublished Report, OTAGO FISH & GAME COUNCIL, PO BOX 76 CNR HARROW AND HANOVER STREETS DUNEDIN*

*Halford, C. 2019. Council Report Project 1122 – Conduct Creel surveys on Lake Wanaka, September 2019. Unpublished Report, Otago Fish and Game Council, Dunedin.*

*Van Klink, P. A. 2020. Council Report. Upper Clutha Catchment Land-locked Salmon Spawning Surveys (Interim Report), unpublished, Otago Fish and Game Council, Dunedin.*

**Recommendation**
**That this report is received**

Paul van Klink
Fish and Game Officer
September 2021

## Appendices

Appendix 1a – 1i . Salmon spawning surveys, Makarora and Wilkin Rivers, 2021

Appendix 1a. Lower Makarora River (true left) tributary on Hutton Farm 09/06/2021

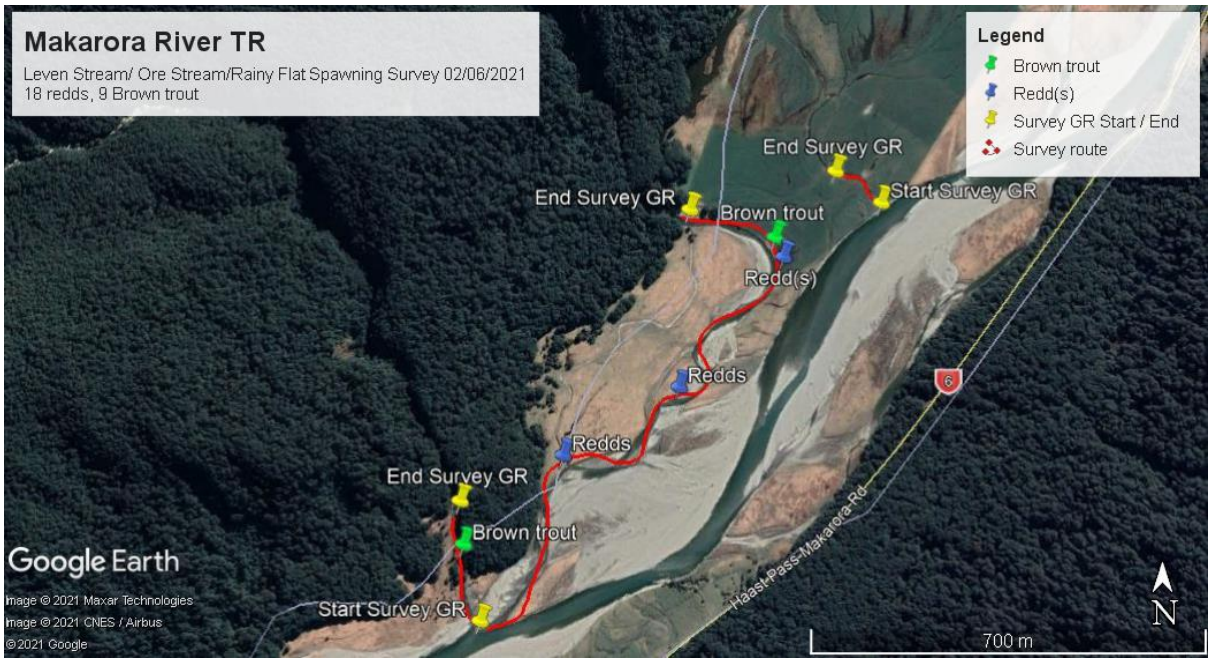

Appendix 1b. Lower Makarora River (true left) tributary on Mt Albert Station 02/06/2021

Appendix 1c. Mid Makarora River (true left) tributary on Mt Albert Station 02/06/2021


Appendix 1d. Mid Makarora River (true left) tributary on Mt Albert Station 09/06/2021

Appendix 1e. Mid Makarora River (true right) tributary on Mt Albert Station 28/04/2021


Appendix 1f. Mid Makarora River (true right) tributaries on Mt Albert Station 02/06/2021



Appendix 1g. Lower Wilkin River (true left) tributary on Mt Albert Station 19/05/2021


Appendix 1h. Lower Wilkin River (true right) tributary on Mt Albert Station 19/05/2021

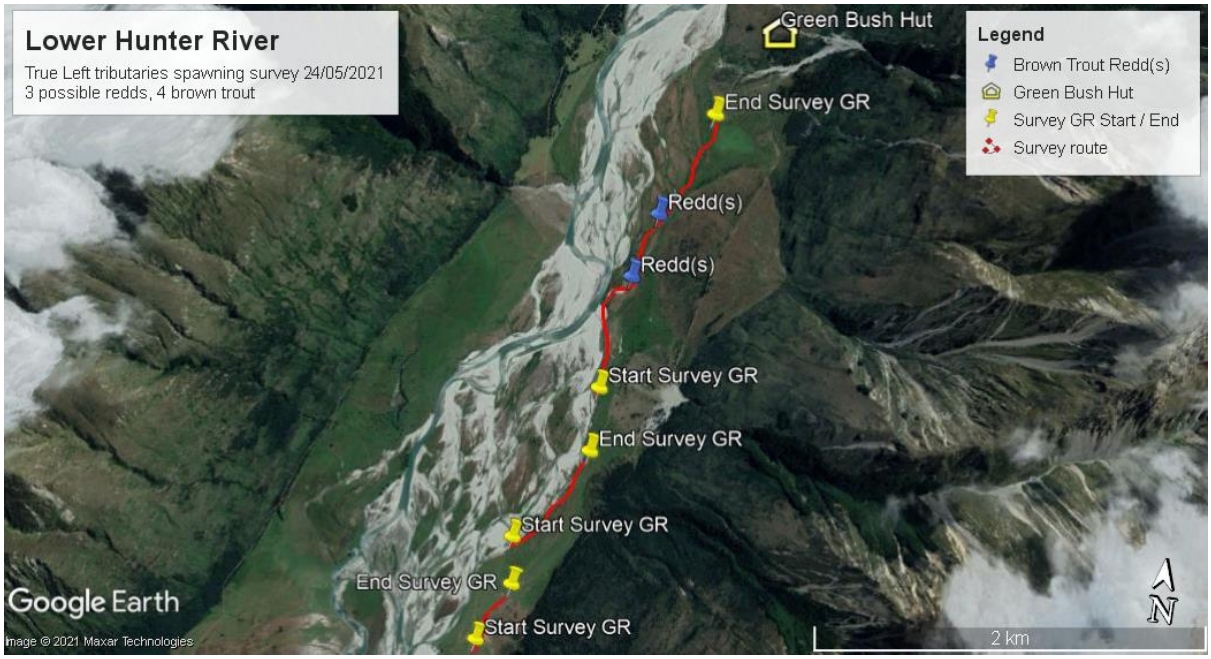
Appendix 1i. Mid Wilkin River (true left) tributary 09/06/2021


Appendix 2a. Salmon spawning survey, lower Albert Burn, 10/06/2021

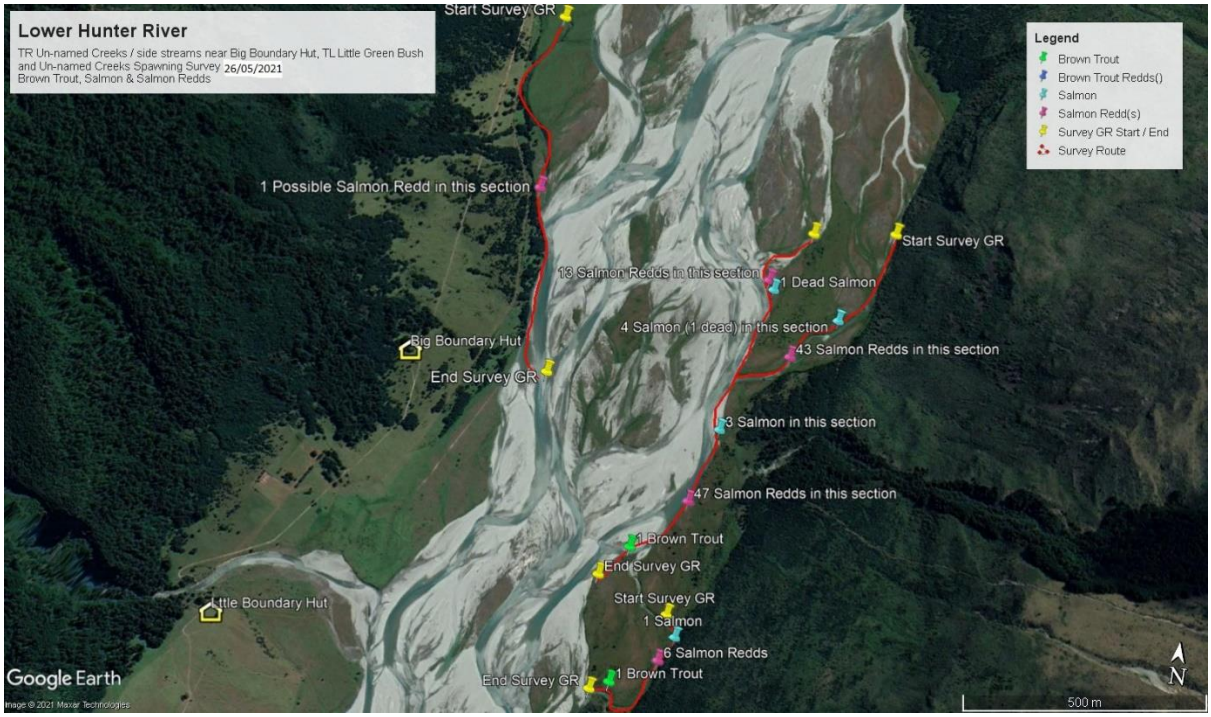
Appendix 2b. Salmon spawning survey, lower Dingle Burn, 24/05/2021


Appendix 3a – 3h. Salmon spawning surveys, Hunter River, 2021

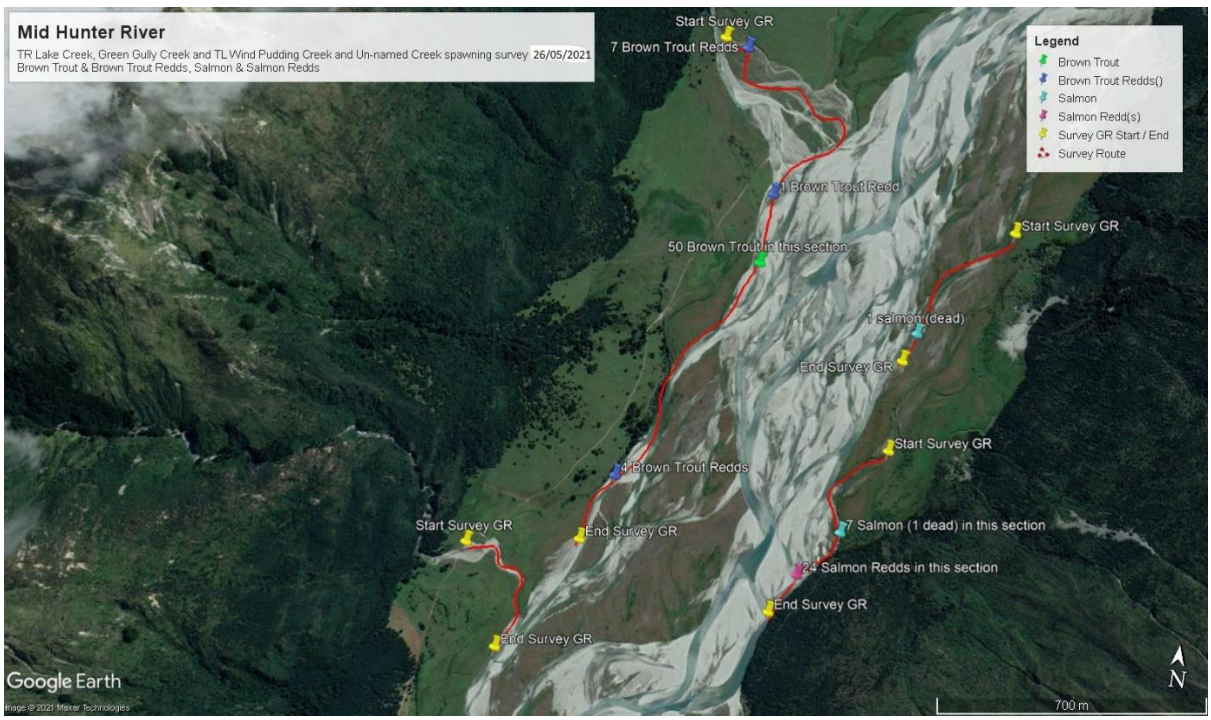
Appendix 3a. Lower Hunter River (true left) tributaries downstream of Green Bush Hut 24/05/2021



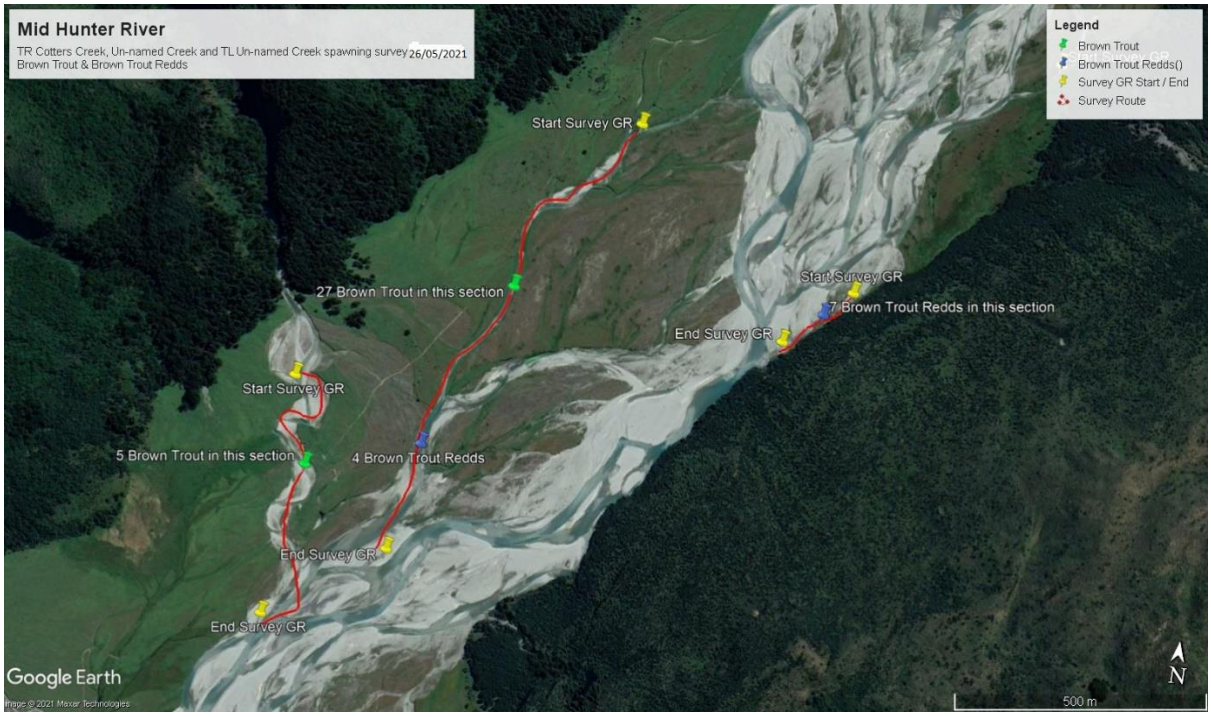
Appendix 3b. Lower Hunter River (true right & true left) tributaries upstream of Big Boundary and Green Bush Huts 26/05/2021



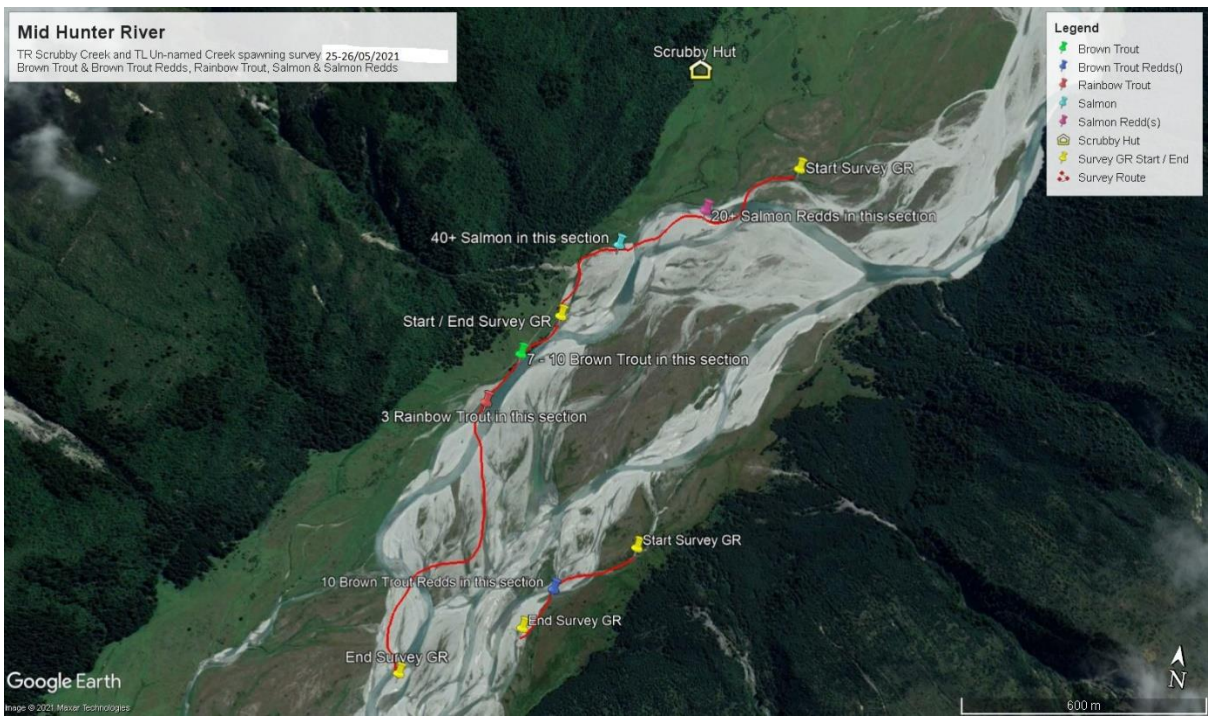

Appendix 3c. Mid Hunter River (true right and true left) tributaries Lake Creek, Green Gully Creek and Wind Pudding 26/05/2021



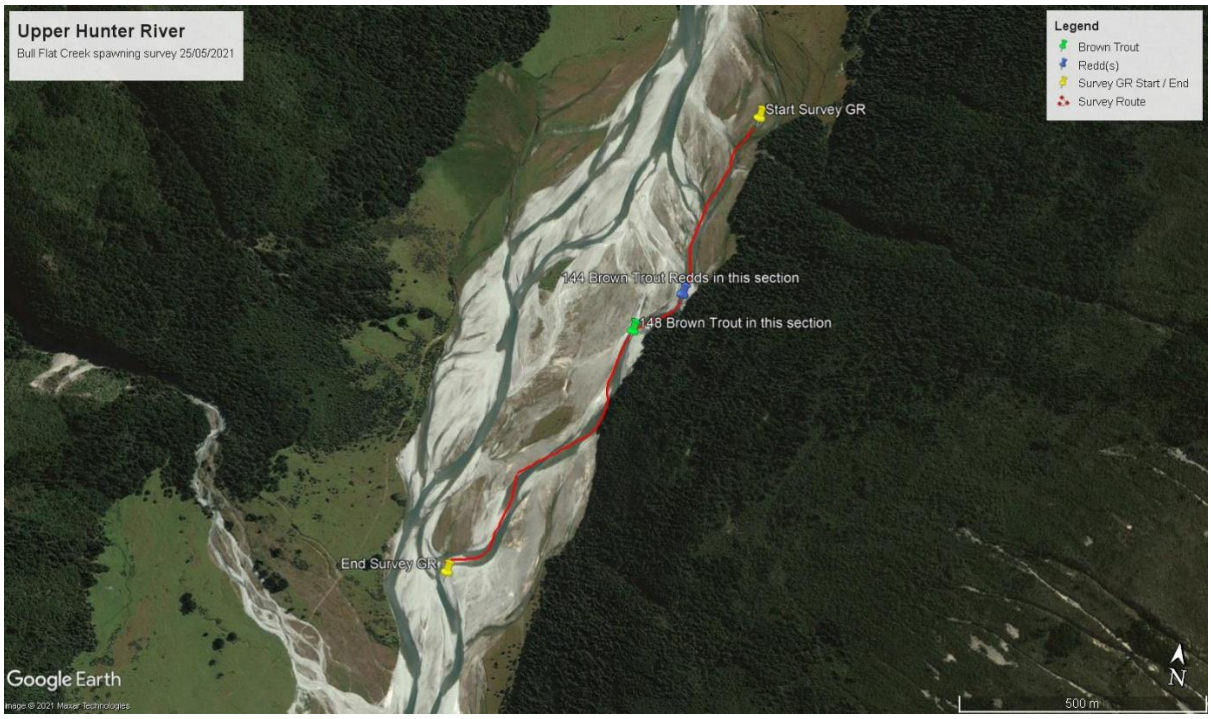
Appendix 3d. Mid Hunter River (true right and true left) tributaries including Cotters Creek 26/05/2021



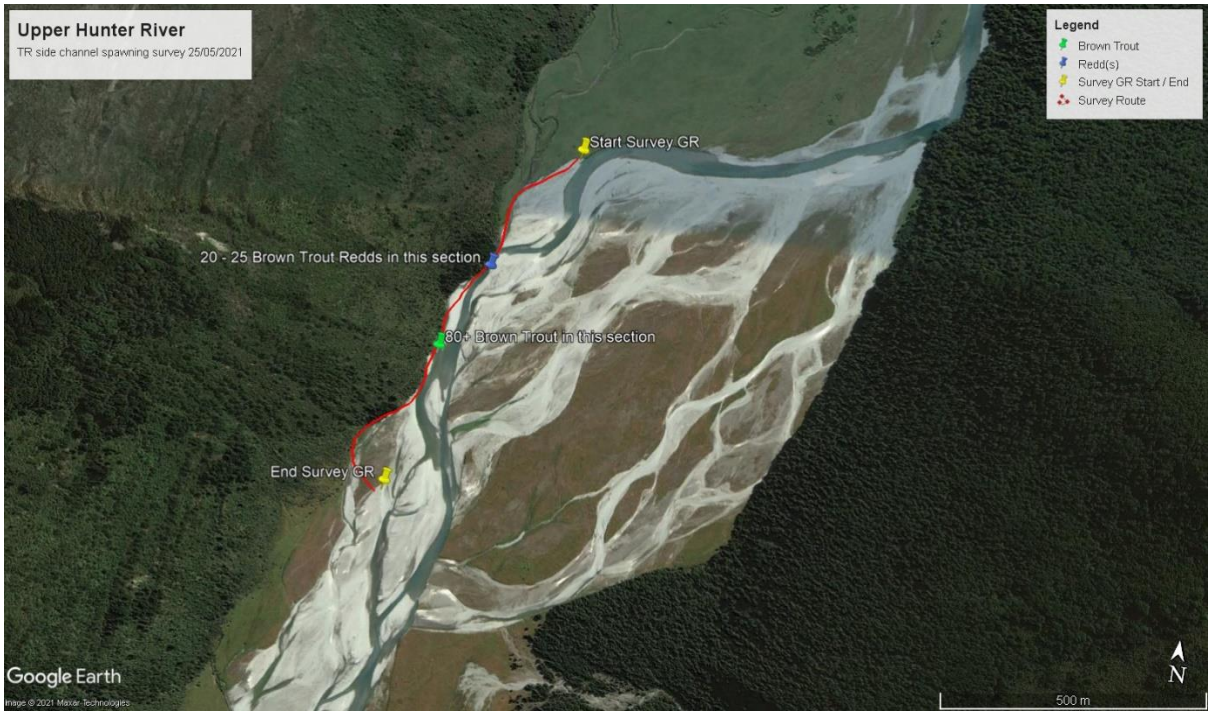

Appendix 3e. Mid Hunter River (true right and true left) tributaries including Scrubby Creek 25- 26/05/2021



Appendix 3f. Upper Hunter River (true left) Bull Flat Creek 25/05/2021




Appendix 3g. Upper Hunter River (true right) side channel 25/05/2021



Appendix 3h. Upper Hunter River (true right) side channel 25/05/2021