CENTRAL SOUTH ISLAND REGION

Comparisons of sports fish catch and angler use of the upper Tekapo Canal fishery during the trout spawning season, May to September – before and after the implementation of the winter closure

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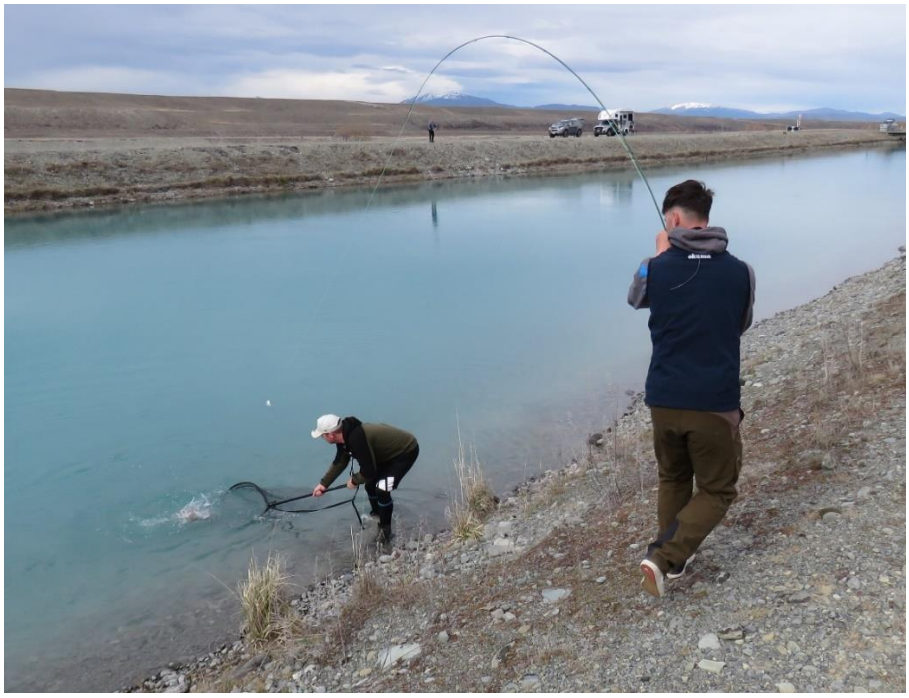
August 2022



Prepared for the Central South Island Fish and Game Council

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Introduction

The Central South Island Fish and Game (CSIFG) Council introduced a "winter" closed season for all sports fishing upstream of the State Highway 8 (SH8) Bridge on the Tekapo Canal from June 1 to August 31, 2021. The closure was justified as representing a conservation-minded measure to address anglers' concerns that the targeting of spawning-run trout at the upper Tekapo Canal was unsustainable. The concerns of anglers were partially driven by the dramatic increase in angler use of the upper Tekapo Canal observed between 2016 and 2019.

The closure targeted the peak-season spawning-run fishing period as identified in the 2019 survey of angler use and catch across the June to October period (Adams 2020). The June to August closure was seen as an appropriate duration of spawning protection across the trout spawning period of May to October. Highly valued spawning-run fishing opportunities were maintained in the shoulder-season spawning-run fishing periods of May, September, and October, albeit at times of reduced popularity and productivity for fishing. CSIFG staff anticipated that with the winter closure in place in 2021, the shoulder-season month spawning-run fishing activity in May and September would increase as anglers adapted their spawning-run fishing activity to the reduced opportunities.

To enable comparisons of shoulder-season fishing activity before and after the closure, the month of May was included in the June-September 2020 surveys of angler use and catch at the upper Tekapo Canal, before the closure was in place, as presented in Adams 2021. The shoulder-season month of October was omitted from the 2020 survey according to the 2019 survey findings that angler use and catch were relatively low. In 2021, with the winter closure in place, angler use and catch surveys were undertaken in May and September only to enable comparisons of shoulder-season fishing activity and the overall reduction of angler use and catch across the spawning-run fishing period (May-September) before and after the winter closure.

Unfortunately, Covid-19 restrictions partially affected angler access to the fishery, internationally and domestically, and the ability of CSIFG staff to undertake angler interviews during Level-3 restrictions of parts of both 2020 and 2021 surveys. Level-3 restrictions enabled only anglers considered local to the waterway and within the Canterbury Region to fish the upper Tekapo Canal. Despite this setback for data collection, it was deemed appropriate to undertake the surveys to provide estimates of angler use and catch while recognising that the survey results were compromised by Covid and limited in their scope to direct management decisions. Continuation of the survey was also motivated by the need for ranging presence and the licence holder interactions achieved.

Previous reports (Adams 2021, 2020) of angler use and catch at the upper Tekapo Canal during spawning-run fishing have provided detailed accounts of many aspects of anglers and their catch. This report presents a much narrower set of results, focussed on the comparisons of total angler use

(angler days), and catch (fish successfully landed) to broadly quantify and assess the outcomes of the winter closure of the upper Tekapo Canal on angler use and catch during the popular spawning-run fishing period of May to September.

Survey Programme

The 2021 survey programme was based on the 2020 survey to enable direct comparison, with one main difference — for obvious reasons the closed-season months of June, July and August were omitted from the survey in 2021.

During the months of May and September 2021, on the upper Tekapo Canal, CSIFG's four Fish & Game Officers collected angler interview and angler count information spanning 17 dates. Survey effort was divided into 6 strata that were broken down by month, and type of day including weekday, weekend and holiday weekend and opening day. Nine randomly selected dates were surveyed to capture all stratum types. Additional data were collected where possible with angler counts occurring on one non-scheduled date, and fishing information collected on 7 non-scheduled dates. One survey date, being the reopening day, 1 September, was within covid level-3 restrictions that allowed angler counts and observations to occur but not angler interviews.

The boundary for the upper/lower canal was the State Highway 8 Bridge. The upper canal section makes up 45% or 11.9km of the Tekapo Canal. Four canal sections were identified within the upper canal: Tekapo A Power Station to Tekapo Powerhouse Road Bridge (0.85km), Tekapo Powerhouse Road Bridge to the anglers' carpark at the locked road gate (5.78km), anglers' carpark/locked gate to pine tree block (2.35km), and pine tree block to the State Highway 8 Bridge (2.92km). The section of canal from the anglers' carpark/locked gate down to the pine block incorporated part of the canal that is colloquially known as the "Magic Carpet". This area of canal is a hotspot for fishing and is mainly visited by anglers who park their vehicles at the anglers' carpark.

Angler interviews were undertaken in addition to regular licence and regulation compliance checks by CSI Fish & Game Officers. Anglers were asked if they wished to participate in a survey, which most anglers (~95%) agreed to. Questions were asked at the time of the compliance check and a phone number was collected so that the angler could be interviewed once their current day's fishing had been completed — by phone either later that day/evening or the next day. The interviewers collected information on time spent fishing and fish species caught (successfully landed). During the field interview, anglers were asked if they fished the canal the day prior, and if so, a full record of that day's fishing information was collected. Not all anglers present on the canal were approached for interview, and not all that agreed to be surveyed could be later contacted to provide their catch information. Comparing the number of anglers observed and the numbers of angler successfully interviewed, it is estimated that 50% to 90% of the anglers observed were successfully interviewed on a given survey day.

Angler counts were undertaken to estimate the total angler effort (angler days) at the upper Tekapo Canal on each survey day. The length of the canal to the locked road gate was driven and all active anglers observed from the road were counted. Binoculars were used at times for assistance and a spotting scope used to count anglers on the downstream sections from the locked gate. Six to eight counts were completed daily during visible day-light hours on scheduled survey days. Two additional counts were completed on the non-scheduled survey day. The angler counts were spread throughout the day to capture variability of angler use. No night-time angler counts, or interviews were completed due to staff resourcing, perceived angler detectability issues, and CSIFG staff assessment that the

occurrence of night fishing at the upper Tekapo Canal is infrequent. Therefore, the survey only estimated harvest and angler use from approximately dawn until dusk within visible day-light hours.

A trail camera was set up to count vehicles at the anglers' carpark. This information was used to estimate angler counts at the Magic Carpet sections only and was combined with all other non-Magic Carpet sections to estimate angler numbers. The vehicle counts were approximately hourly records and were converted to angler counts using a factor of 1.268 anglers per vehicle in 2020 and 1.273 anglers per vehicle in 2021. This factor was established during each survey using the average number of anglers per vehicle observed during the angler counts undertaken by CSIFG staff.

Angler use was estimated by calculating representative "angler days". An "angler day" represents the average effort (hours spent fishing/ residency time) of one angler over a single day. Angler days were estimated by using an 'Area Under the Curve' (AUC) method. This method predicts a pattern or 'curve' of angler counts over a specified day length from actual angler counts recorded at individual times within each stratum. Specified day length was standardised for each month to match the day length of the middle day of each month. During review of 2020 data for this survey, it was discovered that a small error had been made on the standardised morning start time for some of the data. This resulted in a slight underestimate (~1%) of angler activity and catch being presented in Adams (2021). This underestimate error has no appreciable effect on the results, nor the recommendations of that report. 2020 data presented in this report has been corrected.

Angler catch was estimated by multiplying the known average catch rate of each species by the average number of hours fished (residency time) and by the total number of angler days calculated for stratum. Statum catch totals were added together to provide monthly or period/seasonal total of angler catch.

No angler interviews were undertaken in May 2020 and on 1 September 2021 (Opening Day) due to limitations on ranger-to-public contact associated with Covid-19 lockdown level-3 restrictions. Estimates of angler use and catch for this May 2020 and 1 September 2021 required substitute data to be applied.

Results

During the 2021 survey, 67 angler counts were undertaken over 10 dates and 659 trail camera photographs were reviewed spanning 61 dates total in May and September. This compares to 81 angler counts over 13 dates and 1,203 trail camera photographs reviewed over 119 dates for the 2020 survey spanning May to September. The trail camera was inoperable for parts of June and July 2020.

During the 2021 survey, a total of 162 anglers were successfully surveyed on 8 scheduled survey dates, providing 198 records of daily angling activity across the two months of May and September. This compares to the 2020 survey outcomes of 336 anglers being successfully surveyed on 12 scheduled survey dates, providing 441 records of daily angling activity across the four months of June to September.

Angler use of the upper Tekapo Canal fishery

May

In May 2020, no angler interviews were undertaken subject to Covid-19 restrictions, therefore the average time spent fishing (residency time) could not be established. To provide comparative assessments of angler use (angler days) between May 2020 and May 2021, the residency times of May 2021 survey strata was applied to the May 2020 angler count data.

Angler use measured in "angler days" shows that angler use was similar in May 2020 and May 2021 despite the impending winter closure for June to August 2021 (Table 1). It should be considered that there is insufficient evidence to conclude that there is any difference in total angler days estimated for May 2020 and 2021.

While very few Covid-related travel restrictions were in place during May 2021, for May 2020 Covid level-3 was in place until May 14th. Covid level-3 restrictions prohibited inter-region travel for recreation. This was likely to have had some effect, reducing angler use to only those anglers from the Canterbury Region and those from neighbouring regions flouting the restrictions under Level-3. Conversely, the lifting of restriction on May 14th, 2020, could have caused an increase in angler use as national travel restrictions were lifted, motivating anglers to make dedicated trips to target the area.

September

On September 1st Opening Day 2021, no angler interviews were undertaken subject to Covid-19 restrictions, therefore the average time spent fishing (residency time) could not be established. To provide comparative assessments of angler use (angler days) between September 2020 and September 2021, the residency time of anglers that fished the first full survey day in September 2021 (Saturday 11/09/2021) was applied to 1st September.

Angler use measured in "angler days" shows that angler use was appreciably higher in September 2021 than September 2020 (Table 1). September angler days were estimated at 683 in 2020 and increased by approximately 41% to 961 in 2021. September 2021 angler days were the highest on record by a relatively small margin, being 102 angler days or approximately 12% higher than the 859 angler days estimated for September 2019 as presented in Adams 2020.

September 2021 angler days (961) compared to the pre-closure peak angler use period of June, July and August 2020, shows that angler use was comparable to June (1,005) but notably reduced on the highest levels of angler use on record for July (2,105) and August (1,582) 2020.

Due to Covid-19 restrictions, during September 2020 travel from the Auckland Region was restricted until 5th September. During 2021, Level-3 restrictions were in place until 8th September and remained for the Auckland Region for September, meaning inter-region travel was restricted. The CSIFG staff ranger undertaking the opening day survey (angler counts only) on 1 September 2021 commented that angler numbers were most likely reduced due to Covid Level-3 interregional travel restrictions.

Effect of winter closure on trout spawning season angler use

Assessing the change in angler use of the upper Tekapo Canal during the trout spawning season associated with the winter closure can be achieved by comparing the total angler use during May to September before and after the closure. Pre closure in 2020, May through September angler days were estimated at 6,072 total (Table 1). For 2021, with the June-August closure in place, estimated angler days totalled 1,643 combined for only May and September. An approximate 73% reduction in angler use of the upper Tekapo Canal during the trout spawning season, May through September, was observed 2021 with the closure in place. Although there are many factors that can cause angler use change between years, the significant reduction in angler use estimated can be largely attributed to the winter closure implemented in 2021.

Table 1. Estimates of angler days for stratum, total monthly strata and total survey period for 2020 and 2021 upper Tekapo Canal surveys. Some differences due to rounding error are presented. *Queen's Birthday Weekend occurred over the transitions between May and June in 2020 – the two days that occurred in May were attributed to June.

	2020			2021		
Month-stratum	**Average Angler days**	**Days in strata**	**Total Strata Angler Days**	**Average Angler days**	**Days in strata**	**Total Strata Angler Days**
Weekday	25	21	519	19	21	398
Weekend	22	8	178	28	10	284
May Total		**29***	**697**		**31**	**682**
Weekday	17	21	364	June to August closure implemented		
Weekend	36	8	286			
Q.Birthday Holiday weekend	119	3	356			
June Total		**32***	**1,005**			
Weekday	62	23	1430			
Weekend	84	8	675			
July Total		**31**	**2,105**			
Weekday	34	21	710			
Weekend	87	10	871			
August Total		**31**	**1,582**			
Weekday	21	21	431	26	18	475
Weekend	30	7	209	41	8	328
S.Canterbury Anniversary weekend	21	3	43	46	3	138
Re-opening Day				20	1	20
September Total		**31**	**683**		**30**	**961**
Total May & September only			**1,380**			**1,643**
Total May to September spawning period		**123**	**6,072**			**n/a**

Sports fish catch

May

It is estimated that approximately 290 rainbow trout, 167 brown trout and 13 salmon were caught, meaning successfully landed, during May 2021 (Table 2). Unfortunately, no catch information was collected during May 2020 due of Covid-19 Level-3 restrictions for rangers interviewing anglers, therefore no comparison is drawn between May 2020 and 2021 catch. Compared to other months in 2020, May 2021 catch appears to be relatively low for rainbow trout which may be expected at this early point of the rainbow trout spawning-run.

September

Due to Covid-19 Level-3 restrictions, no one-on-one angler interviews were undertaken on 1st September 2021, being the opening day of the upper Tekapo Canal after the winter closure. To enable comparisons of catch between September 2020 and 2021, a substitute catchrate was applied to 1st September 2021, data based on the rangers' observations. The ranger observed anglers fishing over three separate one-hour periods at the Magic Carpet. The ranger concluded that catchrate was about 1 fish per hour. Additionally, the ranger made the casual observation that catchrate appeared to be higher than 1 fish per hour near the Powerhouse Road Bridge. Based on the ranger's observations, substitute catch rates of 0.8 rainbow trout and 0.2 brown trout per hour of fishing were applied to the September 1st opening day stratum. Applying a total catchrate of 1 fish per hour, assumes that the ranger observed an extremely high catchrate, unique to the September 1st opening.

The estimated catch for the months of September 2020 and 2021 are similar (Table 2). The most notable difference is the apparent decrease in the catch of brown trout in 2021 of approximately 37%. The increase of catch in rainbow trout in 2021 is minor, approximately 3%, therefore there is little evidence to conclude that total catch increased in 2021 from 2020 levels.

Table 2. Monthly total estimated catch (all fish successfully landed) of rainbow trout, brown trout and Chinook Salmon at the upper Tekapo Canal during the winter fishing period at the upper Tekapo Canal in 2020 and 2021.

	2020			2021		
Month	Rainbow	Brown	Salmon	Rainbow	Brown	Salmon
May	n/s	n/s	n/s	290	167	13
June	1,088	334	23	June to August closure implemented		
July	2,327	761	75			
August	1,511	293	0			
September	956	235	11	986	147	21

Effect of winter closure on catch during the trout spawning season

A reasoned assessment of the reduction of catch at the upper Tekapo Canal caused by the winter closure across the May to September trout spawning season can be achieved if a theoretical catch for the period of May 2020 is applied. For this purpose, the catch of May 2021 is applied to May 2020 based on the estimates of angler use for both months being similar.

Pre closure in 2020, total angler catch was estimated at 6,172 rainbow trout and 1,789 brown trout total for the five-month period, May to September 2020. For 2021, with the June-August closure in place, estimated catch for just May and September totalled 1,276 rainbow trout, equating to an approximate 79% reduction in rainbow trout catch, and totalled 314 brown trout equating to an approximate 82% reduction in brown trout catch.

Discussion

Despite covid-19 restrictions affecting angler access to the upper Tekapo Canal fishery and partially limiting the ability for CSIFG staff to interview anglers, this survey provides reasoned estimates of the reductions in angler use and catch at the upper Tekapo Canal associated with the implementation of the three-month winter closure in 2021. Figures of 73% reduction in angler use, 79% reduction in rainbow trout catch and 82% reduction in brown trout catch indicate that the closure made a significant reduction in angling activity and catch across the trout spawning season at the upper Tekapo Canal.

Although Covid-19 Level-3 restrictions where very restrictive and likely caused a reduction in angler use, the opposite could be said for level-2 and 1 restrictions. Resident licence sales increased under covid restrictions, seemingly because the inability for NZ residents to holiday overseas diverted their holiday time to the local fishing options available.

It remains unknown how the angler use of the upper Tekapo Canal in the shoulder-seasons spawning-run fishing months of May and September will change in the future under reduced covid travel restriction or a return to unrestricted world-wide travel. It is probable that angler use will increase – at least for September. This contention is based on two observations. First, the general trend in increasing angler use of the upper Tekapo Canal anecdotally observed since 2016 and the measured increase between 2019 and 2021 upper Tekapo surveys undertaken by CSIFG. Second, the fact that the September Opening has yet to occur without significant inter-regional travel restrictions paired with the phenomenal fishing opportunity observed on September Opening 2021.

A potential increase in angler use and catch in the shoulder months at the upper Tekapo Canal during the spawning season is not considered likely to threaten the sustainability of the Tekapo Canal fishery. The current closure is only precautionary and not based on any measured index or trend in the trout population. Comparisons of angler use, catch and satisfaction across the 2019 and 2020 June to September periods, pre-closure showed the fishery in 2020 experienced higher angler use and catch than 2019 and most anglers were satisfied with their fishing experience (Adams 2021). This was contrary to the beliefs of some concerned anglers that the fishery was trending for the worse. Hypothetically, if the angler use and catch levels observed in May and September 2021 were to double, for the total May to September period angler catch would still only equate to about 54% angler use and 40% of catch compared to 2020 pre-closure. Put simply, the three-month winter closure provides a significant reduction in angler use and catch at the upper Tekapo Canal.

The effects of the winter closure on the lower Tekapo Canal and angler use were not part of the survey. It is likely that anglers displaced from the upper Tekapo Canal during the winter months simply went to the lower Tekapo Canal. This was anecdotally observed during the winter of 2021 as the angler use of the uppermost open section of canal from the SH8 Bridge downstream approximately 3km to the private Irishman Station bridge appeared to increase substantially. In 2021 this section was commonly occupied by several anglers, where in the past it was seldom fished. In effect the winter closure may not have made a significant impact on the overall spawning season angler use of the Tekapo Canal fishery, but rather changed the sections anglers fished in June, July and August.

The Winter closure is likely to have significantly reduced overall Tekapo Canal May to September spawning season catch. This statement is based on the assumption that a majority or significant proportion of the total trout population was located in the closure area during the Winter closure period due to their migratory urge to migrate (run) upstream to the upper section of the canal to spawn or their attraction to spawning activity with a spilt egg food source on offer.

This survey has exposed some of the challenges Fish & Game face when undertaking surveys and monitoring that rely on direct ranger to angler interviews in the field. The unpredictable nature of Covid-19 and the restriction placed on travel, work and social interactions must now be considered when setting up angler use and catch surveys or more simplified creel surveys. This is a critical consideration when establishing annual surveys designed assess trends as gaps in the data may cause notable limitations in assessment of short- and medium-term trends.

A repeat of this shoulder-season survey is not considered to be a priority for canal fishery management currently. Consideration of repeating this survey or incorporating it in an angler use and catch survey that is to be applied on a wider scale at the canal fishery should be made after a feasibility study is undertaken to review establishing an annual canal angler use and catch survey for long-term trend analysis. Such a feasibility study is a top five priority as adopted by the CSIFG Council under the Hydro Canal Fisheries Scoping Document (Adams and Webb 2021).

The current number one priority for canal fishery management is the work being undertaken by CSIFG to assess the use of sonar devices to provide an annual and long-term trend assessment of canal sports fish populations. As described in Adams and Webb, (2021), an annual sonar survey takes precedence over an annual angler use and catch survey. Assessment of the viability of sonar surveys for implementation as an annual programme should be made before resourcing is committed to assessing the feasibility of implementing annual angler use and catch surveys.

The key advantage of the sonar survey over the angler use and catch survey is that it estimates the fish populations directly, rather than through the indirect results of surveying angling activity. The angler survey reported here under the constraints of Covid-19 restrictions, highlights a further advantage of a sonar survey, being that ranger to angler interviews are not required.

At the time when either annual sonar surveys or annual angler use and catch surveys have been completed for at least three years on the Tekapo Canal, then re-opening the winter closure could be considered. The prior annual surveys would provide an evidential basis on which to assess the long-term sustainability of the Tekapo Canal trout fishery and the effects of peak-spawning-run fishing.

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