



CENTRAL SOUTH ISLAND REGION

# Hydro Canal Fishery Management Strategy 2025-2027

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## Table of Contents

1. Executive Summary.....	2
2. Introduction .....	2
3. Canal Management Achievements 2021-2024.....	3
4. Canal fishery knowledge – 2024 revision.....	5
4.1 Value of fishery .....	5
4.2 Habitat and ecosystem .....	6
4.3 Sports fish populations .....	7
4.4 Sports fishery productivity.....	7
5. Fishery management considerations.....	8
5.1 Threats to the fishery.....	8
5.2 Angler and stakeholder management .....	8
6. Management and knowledge gaps.....	9
7. Project Prioritisation Hierarchy 2025 – 2027.....	10
8. Schedule of projects.....	11
9. Top Five projects 2025-2027.....	12
10. Recommendations .....	13
11. Acknowledgments.....	13
<b>12. Appendix: Schedule of historic, current, and potential canal fishery Operation Work Plan projects – 2024-2027 strategy .....</b>	<b>14</b>

### 1. Executive Summary

This canal fishery management strategy proactively and transparently progresses the management of the hydro canal fishery by presenting fishery management considerations, highlights canal fishery management achievements from the preceding three 2021 – 2024 period, presents Operational Work Plan (OWP) based project options, and identifies priority projects for the 2025-2027 period.

Recommended Top Five Projects for 2025-2027, in priority order are:

1. Project 1.1 - Annual sonar survey to provide an index of sports fish population size.
2. Project 3.2 - Annual canal fishery angler use and catch survey.
3. Project 5.4 - Put-and-take salmon stocking programme.
4. Project 4.4 - Catch and release best practice campaign.
5. Project 4.19 - Reactionary ranging protocols.

### 2. Introduction

The immense productivity and popularity of the Mackenzie Basin hydro-canal fishery (hereafter ‘canal fishery’ or ‘canals’) has established it as one of the foremost freshwater sports fishing destinations of New Zealand. The sustainability of the canal fishery is the statutory responsibility of the Central South Island Fish and Game Council (CSIFGC).

The canal fishery has formed within the manmade hydro-canals situated on private land. The primary purpose of the hydro-canals is to support the generation of renewable electricity. To the extent compatible with this purpose, the two energy generators (Meridian Energy Limited and Genesis Energy Limited) have agreed to provide controlled access to the hydro-canals for the purposes of the management of, and participation in, a sports fishery and to support this fishery.

The Central South Island Fish and Game Council's Sports Fish and Game Management Plan 2023-2033 (SFGMP) sets out objectives to address issues and achieve its statutory responsibilities. SFGMP objectives are achieved through projects undertaken in the annual Operational Work Plan. The SFGMP set out 54 objectives, of which three specifically reference the canal fishery – all relating to species management, those objectives are:

- 8.3.1 The current quality, population and harvest of the sea-run salmon, trout, land-locked sockeye and canal fisheries are understood and recorded.
- 8.3.10 Areas of the canal fishery that are declining in quality are identified and interventions are implemented to stem or reverse the decline.
- 8.3.11 Anglers' harvests are monitored and regulated to support the sustainability of the canal fishery.

The purpose of this canal fishery management strategy is to proactively and transparently progress the management of the hydro canal fishery by documenting its Operational Work Plan (OWP) based project options, identifying priority projects for the next three years, and highlight and incorporate achievements from the preceding three years.

The first iteration of this management strategy, the 'Hydro Canal Management - Scoping Document' was adopted by CSIFG in September 2021. This updated version of the document, the 2025-2027 management strategy, was compelled by resolution of CSIFGC to undertake a scheduled 3-yearly review. Incorporated updates include:

- Summarising new knowledge and achievements gained during the 2021 to 2024 period.
- Incorporating the 2023-33 CSIFG SFGMP canal fishery specific objectives.
- A review of canal fishery management project prioritisation hierarchy.
- The incorporation of new project options.
- Updating the status of existing projects.
- Setting the Top Five priority projects for the period 2025-2027.

### 3. Canal Management Achievements 2021-2024

Since the former strategy, the Canal Management – Scoping document, was received by CSIFGC in September 2021 several canal management achievements have been made by CSIFG, Fish & Game NZ and stakeholders. The achievements and key findings and outcomes of CSIFG led projects are summarised as follows:

*Note: \*Top Five projects from 2021-2024*

#### **Project 6.1: Statutory protection\***

Key findings and outcomes:

- Legal advice recommends the most appropriate way to ensure the sustainability of the canal fishery is to undertake research projects and set appropriate regulations which have direct impacts on the catching and taking of fish.

#### **Project 4.4: Survey of night angling use and compliance rate**

Key findings and outcomes:

- Increased understanding of the prevalence of “unauthorised bait” and “exceeding bag limit” offences.
- Increased understanding of catch of night anglers.
- Ranging protocols changed to focus on detection of “unauthorised bait offences”.
- Annual scheduling of night ranging operations.

#### **Project 4.6: 2021/22 National Angler Survey (NAS)**

Key findings and outcomes:

- Canal angler use at record high levels in 2021/22 season.
- Popularity of canals has increased dramatically between 2007/08 and 2021/22 NAS surveys.

#### **Project 4.1: Canal Angler Values Survey\***

Key findings and outcomes:

- Salmon are the highest value sports fish of the canal fishery.
- Under the theoretical scenario of salmon farms being absent in the canals, about 66% of anglers would reduce or cease their canal fishing activity due to perceived loss of salmon and likely reduction in catch of large trout.
- The social aspects of canal fishing ranked highly as a reason why anglers fish the canals and was similar in ranking to the presence of big fish.

#### **Project 4.11: Increase staff ranger presence**

Key findings and outcomes:

- Temporary ‘summer’ ranger completed 604 anglers checks during 2023/24 summer and their presence was noted and well-receive by canal anglers.
- Additional full time Fish & Game Officer position established from 2024/25 with canal-ranging focus.

#### **Project 6.4: Stocking of canals system with tagged salvaged trout**

Key findings and outcomes:

- Canal trout growth data established.
- Interconnected fisheries migration pathways data established.

#### **Tekapo Power Scheme salvage**

Key findings and outcomes:

- Genesis Energy Implemented Salvage Management Plan.
- Improved outcomes for stranded trout.
- Increased opportunity to stock canal with trout and associated tagging research.

#### **Hydro scheme resource consenting**

Key findings and outcomes:

- Relationship Agreements signed with Genesis Energy and Meridian Energy.
- Increase in annual funding available for sports fish and game projects in the Waitaki Catchment including for the canals, upon consents being granted.

#### **Project 4.14 Controlled Fishery Management**

Key findings and outcomes:

- Controlled fishery and ballot established for Spring Season at Upper Ōhau River.
- Annual Spring Season monitoring and reporting of catch, harvest, angler satisfaction and spawning developed to provide long-term assessment of sustainability of Spring Season and Ōhau B Canal trout population.

### 4. Canal fishery knowledge – 2024 revision

CSIFGC and their predecessors the South Canterbury and Waitaki Valley Acclimatisation Societies, have overseen the canal fisheries establishment and development. Canal fisheries management knowledge has been gained through staff observation, CSIFGC projects and surveys and review of stakeholder practices and research, including:

- Observation of the canal fisheries establishment and growth, which began with the construction and commissioning of the canals and then introduction of the first of many salmon farms in 1992.
- Population and recruitment dynamics observed through the salvage of sports fish during the de-watering of canals and associated parts of the greater hydro scheme, drift dives, sonar surveys, spawning surveys, creel surveys, mark-recapture projects and observation of harvest of escaped farmed salmon.
- Ecosystem and habitat dynamics researched by canal operators to understand the existing environment, fisheries and the effects of their operations.
- Observation of angling trends, catch and perceptions through ranging, stakeholder interactions and fishing community media including TV, print, and social media.
- Assessment of angler use through the National Angler Survey and creel surveys.
- Assessment of angler activities, preferences and values of the fishery through angler surveys.
- Assessment of the economic impact of the canal fishery to the Mackenzie Basin economy.

An updated summary of the current knowledge of the canal fishery is presented below and includes new knowledge gained by CSIFG projects and those of stakeholders in the 2021-2024 period.

#### 4.1 Value of fishery

The canals are a destination fishery for anglers from throughout New Zealand and internationally. The canals attract immense use from Central South Island and North Canterbury based anglers and significant use by Otago and Southland anglers. The 2021/22 National Anglers Survey demonstrates the canals have grown dramatically in popularity between the 2007/08 and 2021/22 sports fishing seasons with an approximately ten-fold increase in use. In 2021/22 the four canal units that make up the fishery all ranked in the top ten most fished individual waters under Fish & Game NZ's management. Collectively, the usage of canals equates to approximately 12% of all freshwater fishing activity managed by Fish & Game NZ.

The canal fishery's popularity is primarily based on anglers highly valuing the ease of access to salmon fishing. Most reaches of the canals offer publicly accessible canal bank roads. This offers 'park-and-cast' style fishing access not commonly available at lake and river fisheries. Most canal angler use both spin and bait methods, primarily bait fishing but preferring to spin fish. The canals offer some of the most productive salmon fishing in New Zealand and canal salmon are highly prized for their eating

qualities. There are many other reasons why the fishery is immensely popular including high-ranking reasons such as; scenic setting, uniquely large fish, and social opportunities unique to the fishery.

The canal fishery is a significant driver of the Mackenzie Basin economy. During the 2021/22 fishing season anglers contributed \$13.6m to the local economy, centred around the townships of Tekapo / Takapō, Twizel and Omarama. A large proportion of canal anglers' expenditure in the Mackenzie Basin was on accommodation and food and beverage.

#### 4.2 Habitat and ecosystem

The canals are electricity generation structures that convey the waters of lakes to power stations. The Tekapo Canal sources its water from Lake Tekapo / Takapō via the Tekapo A power station and Lake George Scott and discharges to Lake Pūkaki via the Tekapo B power station. The interconnected Pūkaki-Ōhau A canals source their water via lakes Pūkaki and Ōhau and discharge to Lake Ruataniwha via the Ōhau A power station. The Ōhau B canal sources its water from Lake Ruataniwha and Wairepo Arm and discharges to the Ōhau C Canal via the Ōhau B power station. The Ōhau C Canal discharges to Lake Benmore via the Ōhau C power station tail race.

Canal habitat has the characteristics of a highly stable spring fed river ecosystem, albeit with artificial substrate in the form a canal lining materials. The Tekapo canal is a uniform canal habitat apart from its stilling basin (aka 'Fish Bowl') at its downstream extent which provides a relatively deeper low-flow habitat akin to a pond or small lake. The Pūkaki-Ōhau A canals, and Ōhau C canal are discrete canal habitats. The Ōhau B Canal is interconnected with the diverse habitats of the Upper Ōhau River, the Ōhau A Tail Race, Lake Ruataniwha, and Wairepo Arm (lake) including Kellands ponds and minor tributaries. Sections of uniform canal habitat are occasionally interrupted with instream and surface water structures such as bridge pillars, salmon farm rafts and water offtake structures.

Canal flows are relatively stable being controlled through control gates and power station turbines within their respective operational ranges. There are no floods in the canals as flood waters are first contained by the headwater lakes and then controlled to bypass the canals through spillways to rivers and lakes. Canal flows vary within the operational capacity of each canal/power station and as a result, and to a limited extent, the shallow canal edge habitat is ephemeral in some parts of the system, this is most pronounced in the Tekapo Canal. On rare occasions parts of the canal system are fully dewatered for maintenance.

Canal water clarity varies subject to rain events. After flood events in the Main Divide, the headwater lakes can carry the turbid flood into the canals for many months. During extended spells of minor rainfall and snow/glacier melt, the canals have relatively high-water clarity, with residual colour and haze influenced by glacial flour. There are indications water clarity in the glacial lakes, and therefore canals, is increasing as a result of glacial recession.

Canal water quality is generally excellent, reflecting that of the respective headwater lakes. Slightly elevated nutrient concentrations detected in the canals are most likely attributed to the combination of land use intensification in the Wairepo Arm Catchment and salmon farming in canals, even so, 'A-grade' water quality monitoring standards are usually met.

The canals substrate is determined by the condition and type of the canal, and currently typically have gravel, cobble and boulder benthic habitat which supports an algae/periphyton and macroinvertebrate community that is more representative of a lake environment than a river. Native and introduced macrophytes are present, noting the canal operators control macrophytes as part of their canal management regime. The periphyton didymo is present but is usually not dominant in cover. Macroinvertebrate communities are dominated by snails and worms with a lesser presence of

chironomids and caddisfly. There is little evidence to suggest mayfly or stonefly taxa are present in appreciable abundance, nevertheless, the relatively high density of macroinvertebrates such as snails provide an abundant food source for native fish and sports fish.

Native fish abundant in the canals include common bully and upland bully. Adult longfin eel are present in low abundance and are occasionally observed. Juvenile galaxiids observed as schools of 'whitebait' are likely to be juvenile kōaro migrating downstream into the canals from the headwater lakes.

### 4.3 Sports fish populations

The canals sports fish populations are a mix of canal residents, headwater migrants, and enhanced/release populations. For fishery management perspective the populations can be split based on those that are wild and self-sustaining and those that are temporary and only available due to aquaculture and human intervention.

#### **Wild self-sustaining sports fish populations**

The canals rainbow and brown trout populations have historically been assessed to be self-sustaining and reliant on downstream migration of juvenile and adult trout from the headwater lakes. Downstream migration through spillways, control structures and power stations turbines can be fatal, but the total number of survivors is thought to be sufficient to sustain the canal trout populations.

Within-canal trout spawning has been observed to be successful to the parr life stage in the Tekapo Canal with the boulder margins of the Stilling Basin providing some refuge from predation by adult trout and salmon. Although unquantified, within canal spawning is assessed to be of limited value to the fishery's sustainability due to the habitat limitations imposed by the canal shape, structure and management requirements. These limitations include suboptimal redd substrate, occurrence of redd dewatering in ephemeral habitat at the Tekapo Canal, the limited extent of observed redd creation in the Pūkaki and Ōhau canals, and likely high predation of juveniles by larger trout and salmon and other predators due to lack of shallow water/ high cover rearing habitat available on the canal margins.

Sockeye salmon are infrequently observed and caught in the Pūkaki and Ōhau canals. They migrate downstream into the canals from lakes Pūkaki and Ōhau and possibly Ruataniwha. Sockeye have been observed to occasionally spawn in the Upper Ōhau River but it remains unknown if a proportion of these spawners are a self-sustaining sub-population of Lake Ruataniwha/ Upper Ōhau River or if they all originate from lakes Ōhau and Pūkaki.

#### **Sport fish populations reliant on aquaculture and human intervention**

The canals Chinook salmon populations are reliant on occasional accidental releases from the salmon farms and to a limited extent downstream migration from fishery enhancement releases to Lake Tekapo / Takapō by CSIFG. Historically, some fishery enhancement releases of mixed sex and all-female commercial salmon stock were made directly to the canals and Upper Ōhau River by CSIFG. Currently the canals Chinook salmon are effectively all-female. No self-sustainable wild Chinook salmon populations are evident in the headwater lakes, canals or interconnected fisheries.

### 4.4 Sports fishery productivity

The canals are famously productive, regularly producing extremely well-conditioned 10lb / 4.5kg + trophy-sized trout. Trout growth rates can be high with many trout growing at rates of around 10lb / 4.5kg per year or more for part of their lives. A select few of New Zealand's lake and river fisheries occasionally produce trophy-size trout, often reaching a maximum size of around 18lb / 8.2kg. The high productivity of these river and lake trophy trout fisheries usually related to the predation of seasonally

abundant large prey items such as mice or prey fish such as common smelt. What really sets apart the canals from other trophy trout fisheries is the consistent production of trout weighing more than 20lb / 10kg trout. While canal rainbow trout do occasionally exceed 30lb/ 14.5kg at the canals, IGFA records show larger rainbow trout are caught internationally. On the other hand, the current IGFA all tackle world record brown trout, weighing 44lb / 20.01 kg, was caught at the Ōhau B Canal in 2020.

The natural prey items available like snails, bullies, and juvenile trout can provide for a relatively productive fishery, and potentially even produce trout of trophy size on rare occasion. However, the unique ability of the canals to consistently produce relatively high numbers of extremely fast-growing trout of trophy size and the occasional brown trout at world-record size is assessed to be partially reliant on both direct and indirect salmon farming inputs.

## 5. Fishery management considerations

To prioritise canal management projects, the threats to the fishery, angler management issues, and gaps in knowledge and management must be recognised.

### 5.1 Threats to the fishery

The threats to the fishery are possible fundamental changes or events that would cause catastrophic loss or constant decline in the fishery including:

- Decommissioning of canals.
- Cessation of salmon farming.
- Changes in salmon farming practices leading to:
  - reduced salmon availability,
  - reduction in discharges affecting direct and indirect food sources for wild fish.
- Disease outbreak of farmed fish affecting wild fish or vice versa.
- Loss or significant reduction of access.
- Fish screens on intakes reducing/eliminating migration/ recruitment from headwater lakes.
- Reduction in trout recruitment of headwater lake tributaries.
- Environmental/ operational changes resulting in fish kills from high water temps and/or low dissolved oxygen levels.
- Operational changes resulting in no or minimal flow in the canals.
- Severe degradation in water quality.
- Catastrophic events like AF8 earthquake adversely affecting trout recruitment, hydro scheme and salmon farms operation and access to canals.

### 5.2 Angler and stakeholder management

The canal fishery has a broad range of anglers and stakeholders, and each inherently can pose individual and interdependent views of issues within the scope of CSIFGC's statutory management of the fishery. Where possible and appropriate, CSIFGC may respond and implement active management of such issues.

Canal angler and stakeholder management issues are summarised below under broad categories of angler concerns for fishery sustainability; angler compliance, satisfaction and interactions; and habitat, stakeholders and access.

Angler concerns for fishery sustainability:

- The canal fishery cannot sustain a continual increase in angling pressure and harvest.
- The dramatic increase in the targeting and harvest of the Tekapo Canal spawning run between 2016 and 2020 was affecting recruitment by removal of trophy-sized spawning trout.
- A lack of management in place to assess the fishery's long-term sustainability.



- High catch and release occurrence when paired with poor fish handling techniques is contributing to a reduction in the trout population.
- Unnecessary management intervention to address other angler's concerns.
- A reduction in the availability of salmon due to Improvements in salmon farming practices.
- A reduction in the availability of 20-pound plus trophy trout due to constant harvest pressure not allowing trout to reach appropriate age/size.
- That protecting within-canal spawning is critical for sustaining the trout fishery.
- Concern that fishing guides, social media influencers, retailers, Fish & Game, and others that benefit or profit from promoting the canals are causing increased angling pressure leading to a diminished angler experience and an unsustainable fishery.
- Concern that anglers fishing at night are offending at high rates, are going unchecked by rangers, and effecting the sustainability of the fishery.

Angler compliance, satisfaction and interactions:

- Overly complicated regulations leading to unintentional offending.
- Anglers unsatisfied with level of ranging and compliance activities.
- High offending rates around salmon escapement events.
- Particular methods and fishing locations are conducive to high rates of foul hooking.
- Angler conflict caused by spatially incompatible methods.
- The fishing experience has diminished due to crowding.
- Angler opinion that bait fishing is not sporting or appropriate for catch and release.
- Angler opinion that bait fishing supports unsustainable levels of harvest.
- Angler opinion that the canals should be managed as a catch and release trophy trout fishery.
- Angler opinion that spawning-run fishing is immoral.
- Unrealistic expectations of catch created by positive media of 'catch highlights' without showing the many hours spent fishing.
- Concern that anglers are exposing the fishery to unsustainable pressure through social media.

Habitat, stakeholders and access:

- Historical and ongoing loss of vehicle, walking and wheelchair access.
- The poor behaviour of a few anglers risking loss of access in specific areas.
- Removal of Pukaki-Ōhau A Canal salmon farm reducing productivity of fishery and shifting angling pressure to other canals.
- Concern that salmon farming is impacting water quality.

## 6. Management and knowledge gaps

To ultimately achieve CSIFGC's SFGMP canal specific objectives, evidence-based and robust assessment of trends of populations and catch in the short- and long-term are required to assess and manage the fishery's sustainability. Robust trend assessment ideally requires the implementation of structured and consistent annual monitoring programmes. Currently, there is only one established annual monitoring programme of catch/harvest and population (spawning surveys) in place at the canal fishery – the Upper Ōhau Spring River's Spring Season monitoring — related to the Ōhau B Canal. Beyond population and catch monitoring, many key aspects of the canal fishery remain unmonitored and unquantified, and their evidential assessment would assist to endorse or disprove long-held fundamental management principles and/or angler perceptions .

Key gaps in canal fisheries management and knowledge include:

- Annual estimates or indexes of sports fish populations.
- Annual estimates or indexes of sports fish catch, harvest and related angler use.

- Quantification of the relative contribution of the two recruitment pathways to sustaining the satisfactory catch of adult trout. Those pathways being within-canal spawning and downstream migration from headwater lakes.
- Distribution and quantity of spawning in the Pūkaki and Ōhau canals.
- Further evaluation of anglers' canal-specific values needed to maximise angler satisfaction.
- Assessment of the diet of trout required to maintain the exceptional trophy trout fishery.
- Growth and replacement rates of trophy trout.
- Mechanisms for local community and businesses to support the sustainable management of the canal fishery.
- The viability of a put-and-take salmon stocking programme.
- A quantitative assessment of the nutrient contribution of the salmon farms to wild salmonid populations.

## 7. Project Prioritisation Hierarchy 2025 – 2027

Canal management project options can be ranked in a three-tier priority hierarchy to support the selection of projects to resource, whereby:

High priority projects:

- Provide annual monitoring and evidential basis for long-term trend assessment of sports fish populations, catch, and related angler use and satisfaction.
- Provide annual put-and-take salmon stocking.
- Maintain or improve access.

Moderate priority projects:

- Provide cyclical but not annual comparisons of sports fish populations, catch, and related angler use and satisfaction.
- Quantify relative contribution to trout recruitment of headwater and within-canal spawning.
- Assesses the diet of trophy trout.
- Medium scale one-off or short-term put-and-take fish stocking.
- Assesses the viability of stocking juvenile trout and salmon.
- Spawning enhancement.
- Evaluate the canal-specific values of anglers.
- Enhance social aspects of the fishery.
- Incorporate community support and involvement.
- Obtain evidence that supports or disproves key long-held management assumptions.
- Assess trends in the quality of the habitat.
- Provide notable improvements to angler compliance rates through increased ranging and compliance activities.
- Improve angler behaviour that can impact on fish populations.
- Support community funding and involvement with canal fishery management.
- Provide improved opportunity or experience for most anglers.
- Simplification of regulations.
- Support the social license of anglers.

Low priority projects:

- Provide small scale short-term opportunities to increase catch, participation, or interaction with stakeholders.
- Decrease opportunity by imposing regulations that restrict participation.
- Summarise pre-existing published information.

- Investigate the occurrence of short-term or sporadic phenomena, for example the food competition caused by salmon farm escape events.
- Provide improved opportunity or experience for a small proportion of anglers.
- Provide only imperceptible or minor improvements to angler compliance rates.
- Provide information beyond populations, ecosystem, habitat, or angler values.

## 8. Schedule of projects

An extensive schedule of historic, current and potential Operational Work Plan projects is appended. The project schedule includes a brief description for each project, and for those with relevant existing information the current status is provided.

The listing of any project is done without limitations so that all reasonably conceivable project options can be considered. For example, projects with a potential cost of tens of thousands of dollars or the need to hire a new staff member are presented under the assumption that the project may be in the best interests of improving the management of the canal fishery. Limitations of any such project will become apparent through its feasibility investigations which consider if the project should be pursued.

The schedule is a living document and to maintain the proactive nature of this strategy it should be updated at not more than 3-yearly intervals as existing projects are progressed, completed, deemed unfeasible, new projects options are created, or projects are re-prioritised.

The projects have been assessed by CSIFGC Staff under five criteria in the Schedule to provide an overview of broad aspects of each project's relevance to CSIFGC's management and to enable prioritisation. Criteria includes:

1. CSIFGC SFGMP 23-33 objectives addressed.
2. Each project's ranking on the prioritisation hierarchy.
3. Staff time.
4. Funding.
5. The likelihood of the project's ultimate success.

The action needed to progress a project towards its ultimate completion is identified as the "Next Step". Next step "actions" are defined as:

- *Feasibility report* – means subject to Council approval through OWP process, to investigate and evaluate the fundamental aspects of the project before it is undertaken as a one-off or annual project. This could be a desk-top analysis, a pilot study in the field, or both. The feasibility report must include assessment of the project's ongoing practicality and the associated staff resourcing and funding requirements for CSIFGC's consideration.
- *Undertake* – means to implement the project with reporting requirements subject to Council approval through OWP process.
- *Repeat* – means to repeat an historical project with reporting requirements subject to Council approval through OWP process.
- *Continue* – means it is a current OWP project with established reporting requirements.
- *Completed* – means the project is completed and reported. Findings and recommendations will be considered in three-year review of project schedule.

- *Unfeasible* – means the project has been determined through experience and/or documented evidence that its likelihood of success is low or too risky, and staff have concluded that it is not feasible to pursue.

## 9. Top Five projects 2025-2027

Five projects, known as the “Top Five”, drawn from the schedule have been subjectively prioritised by CSIFGC staff with consideration of the project priority hierarchy, staff resourcing, funding, and likelihood of success. It is intended that the Next Step action of all Top Five project are initiated, or that current projects are progressed or completed over the 2024-2027 period to advance canal fishery management.

Recommended Top 5 Projects 2024-2027, in priority order:

6. Project 1.1 - Annual sonar survey to provide an index of sports fish population size. Recommended Next Step: Feasibility Report. *Note: Incorporated in 2024/25 OWP.*

Brief description: CSIFG Staff or contractors to investigate feasibility of utilising sonar (fish finder) technology to count canal fish and provide for an annual index of fish abundance that can be reviewed in the long term to provide population trend analysis.

7. Project 3.2 - Annual canal fishery angler use and catch survey. Recommended Next Step: Feasibility Report. *Note: Incorporated in 2024/25 OWP.*

Brief description: CSIFG Staff to investigate survey design and resourcing required to undertake an annual angler use and catch survey that can be reviewed in the long term to provide harvest and angler use trends analysis.

8. Project 5.4 - Put-and-take salmon stocking programme. Recommended next step: Feasibility Report. *Note: Incorporated in 2024/25 OWP.*

Brief description: Secure funding, stocks, and permissions required to provide annual put-and-take salmon stocking programme.

9. Project 4.4 - Catch and release best practice campaign. Recommended next step: Feasibility Report.

Brief description: A coordinated, multi-media campaign advocating best practice catch and release.

10. Project 4.19 – Reactionary ranging protocols. Recommended next step: Feasibility Report.

Brief description: Develop ranging protocols targeting timely and highly resourced ranging of potential unlawful salmon harvest during short periods of high salmon abundance.

## 10. Recommendations

1. THAT COUNCIL ADOPT THE HYDRO CANAL MANAGEMENT STRATEGY 2025-2027 NOTING PROJECTS 1.1, 3.2, 5.4 , 4.4, AND 4.19 AS “TOP FIVE” PROJECTS TO PRIORITISE FOR THE PERIOD 2024-2027. *ADOPTED BY CSIFGC 30 JANUARY 2025*
2. THAT COUNCIL DIRECT STAFF TO INCLUDE AT LEAST TWO “TOP FIVE” PROJECT IN THE 2025/26, 2026/27 and 2027/28 OPERATIONAL WORK PLANS. *ADOPTED BY CSIFGC 30 JANUARY 2025*
3. THAT COUNCIL DIRECT STAFF TO INCLUDE A THREE-YEAR REVIEW OF THE HYDRO CANAL FISHERY MANAGEMENT STRATEGY IN THE 2027/28 OPERATIONAL WORK PLAN. *ADOPTED BY CSIFGC 30 JANUARY 2025*

## 11. Acknowledgments

Much of the information presented in this strategy was sourced from key stakeholders that have undertaken research and activities that have developed understanding of the canal fishery. We acknowledge the efforts of Meridian Energy, Genesis Energy, NIWA, Cawthron Institute and Mount Cook Alpine Salmon to support canal fishery research and management.

## 12. Appendix: Schedule of historic, current, and potential canal fishery Operation Work Plan projects – 2024-2027 strategy

Code	Project options *some existing information in this area	Project description	Meets canal-specific Sports Fish & Game Management Plan Objective	Project priority hierarchy ranking	Staff time	Funding	Likelihood of the project's ultimate success	Current status	Next Step	Staff recommended priority for Next Step - Top 5 (1=highest - 5=lowest)
<b>1 - Sports fish population monitoring</b>										
1.1	Annual sonar surveys - Fish & Game Staff	Use sonar device annually to measure an index of the fish population to assess long term population trends	8.3.1, 8.3.10	High	Moderate	Moderate	unknown	Sonar trials in progress since 2021 and ongoing in 2024/25 OWP. Update report Sept 2021	Feasibility report	1 - in 2023/24 OWP
1.2	*Annual Drift Dive surveys	Annual survey of sports fish population index to assess long term population trends.	8.3.1, 8.3.10	High	Moderate	Moderate	Low	Some historical data but water clarity too inconsistent for annual application.	Unfeasible	Unfeasible
1.3	Triennial period Mark-recapture stocking and angler diary scheme/ creel survey	Stock significant numbers of tagged or fin clipped wild or hatchery sourced trout and assess their prevalence in angler catch through an angler diary scheme for population size assessment	8.3.1, 8.3.10, 8.3.11	Moderate	Moderate	Moderate	Low		Feasibility report	>5
1.4	*Sports fish stocks survey at Lake Ruataniwha	Repeat historical netting survey of Lake Ruataniwha undertaken to assess the establishment of the fishery in relation to the construction of the hydro scheme.	8.3.1, 8.3.10	Moderate	Moderate	Moderate	High	1982/84 and 1992 surveys completed and reported.	Repeat	>5
1.5	Annual Nighttime spot lighting counts of trout on canal edges	Drive canal banks counting fish observable in shallow margins at nighttime.	8.3.1, 8.3.10	High	Moderate	Low	unknown		Feasibility report	>5
1.6	eDNA analysis for sports fish biomass / abundance	Use of eDNA technology to quantify either sports fish biomass or abundance	8.3.1, 8.3.10	High	Unknown	Unknown	unknown		Feasibility report	>5
1.7	Underwater camera / drone fish counts	Use underwater camera technology to gauge the abundance and size of fish present in a localised location.	8.3.1, 8.3.10	High	Unknown	Unknown	Moderate	Technology current used by salmon farms for environmental monitoring	Feasibility report	>5
<b>2 - Trout recruitment evaluation</b>										
2.1	*Natal origin assessment using trace element and isotope analysis	Investigate the proportion of canal trout identifiable as from headwater lakes origin to provide assessment of the relative importance within-canal and headwater recruitment pathways	8.3.1	High	Moderate	high	Low	NIWA advice suggests high risk and high-cost pilot study initially required	Feasibility report	>5

2.2	*Annual spawning survey at upper Ōhau River (Ōhau B Canal)	Annual redd and live fish counts as an index of spawning activity and distribution and the utilisation of spawning enhancement.	8.3.1, 8.3.10	High	Low	Moderate	High		Continue	Currently in place
2.3	Tekapo spillway to canal migration timing and success - Radio tracking	Use radio tags to monitor the migration of trout within the Tekapo Spillway and the occurrence of reaching the canal successfully	8.3.1	Moderate	High	High	High		Undertake	>5
2.4	*Tekapo spillway to canal migration timing and success - floy tag	Undertake further floy tagging of trout stranded in Tekapo Spillway to monitor the migration of trout and the occurrence of reaching the canal successfully	8.3.1	Moderate	Moderate	Low	Moderate	Completed and reported 2021. Some questions of migration outcomes remain.	Repeat	>5
2.5	Power Station migration survivability	Review relevant literature and data of survivability of sports fish migrating through power station turbines and control structures.	8.3.1	Low	Low	Low	High		Undertake	>5
2.6	*Determine distribution of visible edge spawning redds	Assess the geographical distribution of redds visible on the edges of all canals.	8.3.1	Moderate	Low	Low	High	limited data collected Tekapo Canal 2021	Undertake	>5
2.7	Drift diving/scuba diving for redd counts	Assessment of distribution of redds during period of high water clarity	8.3.1	Moderate	Moderate	Moderate	Low		Feasibility report	>5
2.8	Closure of spawning areas	Assessment of the relevance of spawning area closures to protect recruitment	8.3.1	Moderate	Low	Low	Unknown	Dependant on spawning surveys and natal origin research	Feasibility report	>5
2.9	Juvenile trout and salmon survival and contribution to angler catch	Assessment of juvenile survival from predation and other factors to reach a size that contributes to angler catch and harvest	8.3.1	Moderate	Unknown	Unknown	Unknown		Feasibility report	>5
2.10	Annual spawning redds index surveys Tekapo Canal	Annual counts of redds visible on the banks of the Tekapo Canal as an index of annual spawning activity	8.3.1, 8.3.10	High	Low	Low	Low		Feasibility report	>5
2.11	Triennial period headwater rainbow trout recruitment assessment	Electric fishing surveys for rainbow trout juveniles in headwater lake tributaries of the canal system	8.3.1, 8.3.10	High	Moderate	Low	Moderate	Trial report to Council March 2022	Feasibility report	>5
<b>3 - Angler use and catch surveys</b>										
3.1	*Annual angler use and catch survey of upper Tekapo Canal during spawning run	Repeat existing survey but implement as an annual survey to provide long-term assessment. <i>Requires re-opening of winter season closure.</i>	8.3.1, 8.3.10, 8.3.11	High	High	Moderate	High	Completed in 2019 and 2020 and reported in July 2021.	Repeat	>5
3.2	*Annual canal fishery angler use and catch survey	Annual survey of angler use and catch at the canals to provide long-term trend assessment	8.3.1, 8.3.10, 8.3.11	High	High	Moderate	High	Included in 2023/24 OWP but currently incomplete	Feasibility report	2 - in 23/24 OWP
3.3	*Annual monitoring of catch during upper Ōhau River Spring Season	Monitor the catch of Spring Season anglers as an index of the Ōhau B Canal fishery	8.3.1, 8.3.10, 8.3.11	High	High	Low	High		Continue	Currently in place
3.4	Hydro canal angler use and catch survey	One-off Repeat of the 2015-16 survey to provide comparison	8.3.1, 8.3.10, 8.3.11	Moderate	High	Moderate	High	Completed 2015/16 and reported	Repeat	>5

3.5	Annual Angler Diary scheme	Distribute diaries to active canal anglers and guides to provide index of catch rate and fish size	8.3.1, 8.3.10, 8.3.11	Moderate	Moderate	Low	Low		Feasibility report	>5
3.6	*Annual angler use and catch survey of upper Tekapo Canal during spawning run closure shoulder months	Repeat existing survey but implement as an annual survey to provide long-term assessment. Requires continuation of winter season closure.	8.3.1, 8.3.10, 8.3.11	High	Moderate	Moderate	High	Report to Council August 2022	Undertake	>5
3.7	*Effects of salmon farm changes on angler use, catch and fish size at Pukaki-Ōhau-A & Ōhau C canals	Repeat parts of 2015-16 angler use and catch survey to provided comparisons of angler use and catch at canals that have experience substantial changes in salmon farming practises	8.3.1, 8.3.10, 8.3.11	Moderate	High	Moderate	Moderate		Feasibility report	>5
3.8	Upper Tekapo Canal Opening Day Creel survey	Annual opening day creel survey on 1 September to provide long term catch and harvest trend assessment.	8.3.1, 8.3.10, 8.3.11	High	Moderate	Low	High		Undertake	>5
<b>4 - Angler dynamics</b>										
4.1	Advocate for maintenance and improvement of access.	Maintain or improve outcomes for access management with power companies and third parties through advocacy and negotiations	8.3.10	High	Low	Low	Low		Continue	currently in place
4.2	Angler values of the canal fishery survey	Survey of anglers to quantify their values of various aspects of the canal fishery		Moderate	Moderate	Low	High	Report presented at March 2024 Council Meeting	Repeat	>5
4.3	Survey of angler satisfaction	Stand-alone or add-on survey to any existing canal-based surveying like ranging and creel surveys	8.3.1, 8.3.10	Moderate	Moderate	Low	High		Undertake	>5
4.4	Catch and release best practice campaign	A coordinated, multi-media campaign advocating best practice catch and release		Moderate	Moderate	Moderate	High	Top 5 project 2021-2024.	Feasibility report	4
4.5	Survey of night angling use and compliance rate	Night-time ranging of canals throughout the year to assess angle use levels and compliance rates of angler fishing the canals during darkness.	8.3.1, 8.3.10	Low	High	Moderate	High	Report to Council May 2022	repeat	>5
4.6	Review of regulations	Review appropriateness and efficacy of regulations to provide a sustainable fishery with optimally simplified regulations and maximised opportunity		Moderate	Moderate	low	Unknown		Undertake	>5
4.7	*National Angler Survey	NIWA contracted survey of sports fishing angler effort across New Zealand, undertaken on 7-year cycle.	8.3.1, 8.3.10	Moderate	Low	High	High	Scheduled for 2028/29 season	Continue	currently in place
4.8	Trophy fishery management	The application of regulations or other management tools designed to increase the average size of catch and/or frequency of catching trophy-sized trout.		Low	Low	Low	Moderate		Feasibility report	>5
4.9	*Economic valuation of the canal fishery	Economic valuation of the canal fishery to the local economy		Moderate	Moderate	High	High	Reported to Council July 2024	Repeat	>5
4.10	External funding of canal-based ranger(s)	Assess alternate sources of funding to hire canal-based ranger(s)		Moderate	Low	Low	Unknown		Feasibility report	>5



4.11	Increase staff ranger presence	reallocate staff hours to provide an appreciable increase in canal ranging by staff to provide further deterrence to offending		Low	High	High	High	Summer ranger 2023/24, new staff position from 2024/25 onwards, increase in number of staff rangers to 7 in 2023/24	Feasibility report	>5
4.12	Closure of sanctuary areas with no fishing pressure	The closure of areas, other than for spawning protection, to prohibit localised catch in areas where fish congregate.		Low	Moderate	Moderate	Low		Feasibility report	>5
4.13	*Canal litter clean-up event	Ensure canal litter clean-up event occurs on a regular or as-needed basis		Moderate	Low	Low	High	Historically infrequently managed by third party club with some support by CSIFG and key stakeholders.	Undertake	>5
4.14	*Controlled fishery management	Controlling angler numbers to specified levels to managed angling experience.	8.3.1	Low	Moderate	Low	Moderate		Feasibility report	>5
4.15	Canal angler etiquette YouTube Video	Modernise video describing various aspects of fishing and canal use that are a common issue or concern		Low	Moderate	Low	High	Current video posted on YouTube >8 years ago	Repeat	>5
4.16	Fish & Game skills coaching and support of novice canal anglers	Staff or Fish & Game volunteers to provide on-canal how-to workshops with follow up coaching service		Low	High	Low	Moderate		Feasibility report	>5
4.17	Discount guiding	Negotiate with local guides special discount rates for anglers as a contribution towards retaining licence holders and in return for free advertising.		Low	Low	Low	Unknown		Feasibility report	>5
4.18	Social club facilitation	Support the formation and fishing efforts of canal fishing social clubs. E.g. a club for novice anglers to join, Fish & Game staff provide support online / coaching.		Moderate	Moderate	Low	Unknown		Feasibility report	>5
4.19	Reactionary ranging protocols	Develop ranging protocols targeting timely and highly resourced ranging of potential unlawful salmon harvest during short periods of high salmon abundance.	8.3.1,	Moderate	High	Low	Moderate		Feasibility report	5
4.20	canal management priority perceptions survey	Survey canal anglers on the perceptions of prioritising Fish & Games management tasks at the canal fishery.	8.3.1, 8.3.10	Low	Moderate	Low	High		Undertake	>5
<b>5 - Fishery enhancement</b>										
5.1	Assessment of carrying capacity of Ōhau C Canal.	Subject to a stocking programme, assess the maximum number of fish the Ōhau C Canal can sustain to an acceptable size and condition	8.3.1	High	Moderate	High	Moderate		Feasibility report	>5
5.2	Within-canal spawning enhancement	Improve habitat to assist the success of within-canal spawning	8.3.1	Moderate	high	High	Low		Feasibility report	>5
5.3	Upper Ōhau River spawning enhancement	Introduce spawning gravels to expand spawning areas and improve substrate type with support of Meridian Energy.	8.3.1	Moderate	Moderate	High	Moderate		Continue	Currently in place
5.4	*Put-and-take salmon stocking programme	Secure funding, stocks, and permissions required to operate annual put-and-take salmon stocking programme.	8.3.11	High	Low	High	Moderate		Feasibility report	3 - in 2023/24 OWP

5.5	Juvenile salmon stocking programme	Assess viability of stocking juvenile salmon to provide appreciable harvest of takeable size salmon.	8.3.1, 8.3.11	Moderate	Moderate	Low	unknown		Feasibility report	>5
5.6	Put 'n' take trout stocking of Ōhau C Canal with catchment sourced wild juvenile trout and/or hatchery stock	Undertake and monitor stocking Ōhau C Canal with catchment sourced wild juvenile trout caught by electric fishing and/or stock supplies from hatcheries.	8.3.11	High	Moderate	low	Low		Feasibility report	>5
5.7	*Install fish feeders in Pukaki-Ōhau A Canal	Increase food supply for wild sports fish to increase their size and condition		Moderate	High	High	High		Feasibility report	>5
5.8	Stocking "novelty" fish -e.g. triploid trout or sterile options	Source sterile hatchery sports fish stocks to provide novelty catches and fish that grown at exceptionally fast rates.		Low	Low	Moderate	low		Feasibility report	>5
5.9	Fishing events - tagged fish with prize rewards	Hold event to promote participation and social fishing benefits and to increase awareness of fish tagging research		Low	Low	Low	High		Feasibility report	>5
5.10	Fish & Game fishing competition	Event to promote participation and socialising with benefit of weigh-in data.	8.3.1, 8.3.10, 8.3.11	Moderate	high	Moderate	High		Feasibility report	>5
5.11	Canal licence endorsement	licence fee to fish all / part canals to fund canal management projects		Moderate	Moderate	low	Moderate		Feasibility report	>5
5.12	Support landowner-led enhancement of Wairepo creek for passage and redds	Support local land user group in enhancement projects where it benefits interconnected fisheries of the canals.		Moderate	Moderate	low	unknown		Feasibility report	>5
5.13	Community support of canal management project	Engage the local community and relevant businesses to support canal management projects by sourcing funding and doing hands-on tasks where possible.		Moderate	High	low	unknown		Feasibility report	>5
5.14	Enhanced access options for mobility impaired anglers	Provide wheelchair suitable access areas to support participation of mobility impaired anglers		Low	Moderate	high	unknown		Feasibility report	>5
<b>6 - Canal ecosystem and habitat</b>										
6.1	Statutory protection	Identify options and advocate for any potential statutory protections that maintain canal habitat and ecosystems.						Report presented at March 2022 Council Meeting	Completed	n/a
6.2	Hydro Scheme resource consents	Partake in the process of reconsult of the hydro scheme.		High	Moderate	Low	High	Agreements reached with Genesis and Meridian subject to the "2025" reconsulting	Continue	Currently in place
6.3	Trout diet analysis - gut samples	Collect gut samples from canal trout for visual assessment of contents	8.3.1	Moderate	Moderate	Low	Moderate	Included in revised 2023/24 OWP	Continue	>5
6.4	*Trout diet analysis - stable isotope	Analysis of trout tissue samples to detect various food types in diet	8.3.1	Moderate	Moderate	high	High	Similar research undertaken at Lake Benmore 2023/24	Feasibility report	>5
6.5	*Stocking of canals with tagged salvaged trout	To record and monitor angler catch rate and trout growth by mark recapture of stocked trout in the canals as opportunities arise through fish salvage and angler returns.	8.3.1	Moderate	Moderate	Low	High	Project in current workplan. Multiple tagging events have occurred since 2021 with angler returns. Unreported to date.	Continue	Currently in place

6.6	*Trout growth rate and age structure - otolith	Use aging of angler caught trout otoliths to assess the age and growth rates of angler caught trout.	8.3.1	Moderate	Moderate	Moderate	Moderate	Some otoliths previously collected	Undertake	>5
6.7	*Trends in water quality, habitat and ecosystem health	Assessment of available data on water quality and habitat to identify risks of decline.	8.3.1, 8.3.10	Moderate	High	low	High	Responsibility of ECan and resource users with discharge consents and catchment monitoring.	Undertake	>5
6.8	Establish fish and habitat information during canal dewatering and fish salvage	Assist power companies with fish salvage and the collection of relevant habitat, ecosystem and sports fish data subject to any canal dewatering operations.	8.3.1	Moderate	Moderate	Low	High		Continue	Currently in place
6.9	*Trout movement analysis radio tracking of Pukaki-Ōhau A and Ōhau C canals trout	Assess the movements of trout during the spawning season	8.3.1					Completed 2020 - Awaiting final report by NIWA	Completed	n/a
6.10	*Trout movement analysis radio tracking of Tekapo and Ōhau B Canal trout	Assess the temporal movements of trout in the Tekapo and Ōhau B Canals	8.3.1	Moderate	High	High	High	Project has been completed on the other canals	Undertake	>5
6.11	Influence of salmon farm escapees on trout food competition	Assess the diet of escaped or released salmon regarding their direct competition for food sources with trout.	8.3.1	Low	High	High	Low		Feasibility report	>5