



Ministry for the
Environment
Manatū Mō Te Taiao



Investigation of Freshwater Management and Allocation Functions at Otago Regional Council

Report to the Minister for the Environment

by

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New Zealand Government



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Executive Summary

The Otago region is at a critical juncture for freshwater planning.

Existing planning provisions to manage freshwater are inadequate and the expiry of the Otago mining privileges (deemed permits) is only two years away. There are also growing challenges for the state of the freshwater resource in Otago in view of the high level of water abstraction and the significant alteration of natural flows, ecosystems and habitat for indigenous flora and fauna.

The Minister for the Environment has asked me to investigate the freshwater management and allocation functions exercised by the Otago Regional Council.

This report provides an overview of the state of the planning regime for freshwater in Otago. It examines the existing Regional Policy Statement and the existing Water Plan, and the Council's organisational capability and capacity.

The investigation has been informed by input from the Otago Regional Council, including its Chief Executive and staff; Aukaha (representing Kāi Tahu); and a range of stakeholders, including local farmers and water users, environmental groups, the Department of Conservation (DOC), Federated Farmers, the Otago Fish and Game Council, and two district council mayors.

The immediate issue facing the Council is the challenge of developing a fit for purpose planning framework ahead of the expiry of the deemed water permits on 1 October 2021.

It will be important to complete a new regional policy statement and a new land and water regional plan before undertaking the assessment of any new or replacement water consent applications. This will enable applications to be considered under the new freshwater planning framework and will halt the current unsatisfactory situation of ad hoc 'planning by consent'. This report recommends a pathway for achieving this.

In the interim, I consider the Minister for the Environment should recommend that the Otago Regional Council gives high priority to a planning process (which it has already commenced) to provide short-term measures for managing freshwater until the new regional policy statement and the new land and water regional plan are completed. This includes Plan Change 6AA, the Omnibus Plan Change, and a robust resource consenting regime which will avoid the granting of long term consents during this interim period.

While interim measures are necessary, the major focus of the Council should be the significant upgrade of the planning framework. I consider that the Minister for the Environment should recommend to the Otago Regional Council that it takes all necessary steps to develop a fit-for-purpose freshwater management planning regime. This regime should give effect to the relevant national instruments and set a coherent framework for assessing all water consent applications, including those that are made to replace any deemed permits.

To achieve this, the Minister should recommend that the Otago Regional Council adopts a comprehensive programme of work which will involve a complete review of the Regional Policy Statement by November 2020, and a new land and water regional plan by 31 December 2023.

It will be essential that the Council's policy and planning programme remains on track. To ensure that this occurs, I recommend that the Otago Regional Council provides 6-monthly progress reports to the Minister summarising the:

- organisational capability and capacity in science, planning, consenting, monitoring, enforcement and land management
- development of the new regional policy statement and new land and water regional

- plan, and
- freshwater consenting activity.

A comprehensive freshwater planning framework, however, will not be in place before the deemed permits expire. I am therefore recommending that the Minister for the Environment initiates the necessary legislative process to change the date for expiry of the deemed permits in section 413(3) of the Resource Management Act 1991 from 1 October 2021 to 31 December 2025. This will ensure that the replacement consent applications are assessed against a robust policy framework.

Since this inquiry began, I have noted a significant change for the better in the way the Otago Regional Council and the stakeholders are now working together towards developing an effective and sustainable freshwater management framework in the region. In particular, I have observed the way the Council and Kāi Tahu are developing a close partnership relationship.

Introduction

Letter of appointment

By letter dated 16 May 2019, I have been engaged by the Hon David Parker, Minister for the Environment (the Minister), acting under section 24A of the Resource Management Act 1991 (the Act or the RMA), to investigate whether the Otago Regional Council (the Council or ORC) is adequately carrying out its functions under section 30(1) of the RMA in relation to freshwater management and allocation of resources. This includes implementation of the current National Policy Statement for Freshwater Management 2017 (NPS-FM).

A copy of the letter of appointment is attached to this report as Appendix 1.

Timeline

In a subsequent letter, dated 2 September 2019, the Minister agreed to my request for the report back time to be extended to 1 October 2019 (copy attached as Appendix 2).

My role

For transparency, I wish to make it clear that, while I am an appointed Councillor on the Canterbury Regional Council, I have undertaken this investigation in my private capacity. My Regional Council responsibilities, together with my former roles as an Environment Court Judge and a university Professor of Environmental Law, are relevant only insofar as they have enabled me to bring certain insights and experience to the investigation.

Council co-operation

In carrying out this investigation, I have had free access to all relevant Council information, including a large number of documents. I have also had the full co-operation of Otago Regional Councillors and staff, and I am confident that I have been able to make all the necessary inquiries to enable me to complete this investigation.

Focus of the investigation

The Minister wants to know if the Council has, or will have, an RMA-compliant planning and consenting framework in place to process and make decisions on new water permit applications by 1 October 2021. This is when the region's remaining 356 historic deemed permits expire, together with approximately 180 standard water permits.

This investigation has therefore focused on the Council's Regional Plan: Water for Otago (the Water Plan) and its associated documents and processes, including the Regional Policy Statement (RPS) and the Council's science, plan-making, and consenting capacities. The Terms of Reference for the investigation are set out in Appendix 3.

Scope of the investigation

The investigation centres on the Manuherekiā, Arrow, and Cardrona (MAC) river catchments. However, it also considers the need for an RMA-compliant water planning and consenting regime across all Otago catchments, particularly where deemed permits and over-allocation occur together, as in the Taieri catchment.

The investigation has examined:

1. the adequacy of the current planning framework from an RMA and NPS-FM standpoint
2. the adequacy of the performance by the Council of functions relating to planning for the management of water quality and water quantity issues in the Otago Region
3. whether, in the Manuherehia, Upper Cardrona and Arrow catchments, the planning framework will be appropriate and sufficient to consider applications for new water permits once deemed permits expire
4. the adequacy of the Council's resources, including its capacity to develop and implement an adequate planning framework that gives effect to the NPS-FM
5. the views of Kāi Tahu and stakeholders.

The investigation has involved reviewing relevant documents and interviewing a range of relevant Council staff, Aukaha staff (representing Kāi Tahu), stakeholders and interested parties. Appendix 4 to this report lists the people I have interviewed either in person or by telephone for the purposes of compiling this report. The process included:

1. a context-setting field trip to the Manuherehia catchment accompanied by Council staff
2. two Council workshop sessions to inform and update Councillors about the investigation and seek their views
3. various workshops and discussions with Council staff, including the chief executive, policy, strategy, science and planning managers and senior policy, planning and science staff
4. discussions with Aukaha, representing Kāi Tahu
5. discussions with the following stakeholders and interested parties:
 - (a) Department of Conservation
 - (b) Federated Farmers Otago
 - (c) Otago Fish and Game Council
 - (d) Central Otago District Council (the Mayor)
 - (e) Waitaki District Council (the Mayor)
 - (f) Otago Water Resource Users Group
 - (g) Central Otago Winegrowers
 - (h) Manuherehia Catchment Water Strategy Group (former Chair)
 - (i) Upper Clutha Water Group
 - (j) Irrigation NZ, plus local irrigators and their consultants
 - (k) Central Otago Environmental Society
 - (l) An unaffiliated Manuherehia resident and author

Term of investigation

The investigation began on 25 June 2019 and has been completed with the presentation of this report to the Minister on 1 October 2019.

Context

Managing freshwater quality, quantity and ecology

The freshwater in our streams, rivers, lakes and aquifers is a national treasure which needs to be carefully managed to ensure that it can continue to meet a multiplicity of needs without becoming degraded or depleted. These include the habitat needs of our first freshwater users, the indigenous fish, fowl and invertebrates, and the more recent demands created by human activities, such as the need for clean drinking water, recreation, hydroelectricity generation, and farm irrigation.

The task of managing these needs and demands is challenging. One set of challenges relates to water quality. It requires the management of nutrient discharges, sediment and other water contaminants that arise from human activity. Another set of challenges relates to water quantity. It requires measures to ensure that the amount of water extracted for human use does not endanger the minimum flow needed for ecological processes, such as providing habitat for wildlife, and for recreational use.

These are pressing issues throughout much of New Zealand and particularly in Otago where tension exists between historic water use and current attempts to manage it. Hence this investigation. Responsibilities for managing water quality, and for setting minimum flow levels and allocating water takes, are set down in New Zealand's major planning statute, the Resource Management Act 1991 (RMA).

RMA planning regime

Under the planning regime introduced by the RMA in 1991, the use of natural and physical resources is managed by regional and district councils. They do this through objectives, policies, rules and other methods specified by regional policy statements (RPS), regional plans, and district plans – in that order.

This hierarchical set of policies and plans determines which activities or environmental effects are permitted and which are not. Those which are not permitted may only be undertaken pursuant to a resource consent which stipulates conditions that the consent holder must comply with in order to avoid, remedy or mitigate particular adverse environmental effects.

In Otago, the Otago Regional Council is responsible for managing freshwater in approximately one hundred catchments. These include New Zealand's second and fourth longest rivers, the Mata-Au (Clutha) and the Taieri; and many small catchments with names like Gentle Annie, Dead Horse Creek, and Poison Creek.

National Policy Statement for Freshwater Management (NPS-FM)

Where matters of national significance are involved, the RMA authorises the Minister to direct councils to set relevant environmental objectives, policies and rules. This national direction is achieved through national policy statements (NPS) and national environmental standards (NES). In 2011, the then Minister for the Environment established an NPS-FM which has since been revised twice, with a further revision pending

Regional water plans are required, by 2025, to show mapped areas called freshwater management units (FMUs) and, for each, to define its important values and set clear objectives and limits for water quality and quantity. These must comply with the detailed requirements of the NPS-FM, and councils must report annually on their progress towards this in progressive implementation programme reports (PIPs).

The Essential Freshwater package

On 5 September 2019, the Government proposed some further changes to the way water is managed under the RMA. The proposed Essential Freshwater package includes a revised NPS-FM and a new NES for freshwater, which together will:

- strengthen Te Mana o Te Wai as the framework for freshwater management
- better provide for ecosystem health (water, fish and plant life)
- better protect wetlands and estuaries
- better manage stormwater and wastewater, and protect sources of drinking water
- control high-risk farming activities and limit agricultural intensification
- improve farm management practices.

Resource Management Amendment Bill – freshwater hearings panel

On 23 September 2019 the Government introduced the Resource Management Amendment Bill. This Bill provides for a chief freshwater commissioner who will convene freshwater hearings panels to conduct public hearings of submissions on freshwater policies and plans prepared to give effect to the new NPS-FM. The freshwater policies and plans are required to be notified by 31 December 2023.

Implication of revised national direction and legislation

These recent changes require all councils to impose tighter controls on freshwater management and to accelerate all policy and plan changes needed to give effect to the NPS-FM by 31 December 2025. The implication for ORC is that the consideration of any applications for replacements of the deemed permits by 1 October 2021 will now have to take place within the context of a more accelerated and intensive programme of NPS-FM-driven plan changes working to shorter deadlines than previously.

Regional Plan: Water for Otago

In its 2018 PIP, the Council indicated that its Water Plan does not yet give effect to the 2017 NPS-FM but is expected to do so by 2025, consequent on a series of plan changes. However, in the Ministry for the Environment's summary of all PIPs from councils across the country it is noted that ORC's compliance with the NPS-FM by 2025 might not be able to be achieved given the amount of work the Council has yet to do.

Currently, most of Otago's 100 or so catchments are, by the Council's own estimation, over-allocated. This means the permits for water abstraction in those catchments allow more water in total to be taken than the catchment can sustain without adverse environmental effects. The Water Plan's Schedule 2 sets minimum flow and allocation limits for only 14 catchments, with the rest covered by comparatively permissive region-wide rules which set the default minimum flow at 50 per cent of mean annual low flow (MALF) – well below the national average of 75 per cent MALF.

Significantly, these rules do not apply to about a third of Otago's water takes which are authorised by the historic deemed permits. These are not subject to any of the Water Plan's allocation restrictions (see 'deemed permits' section below).

The Water Plan became operative in 2004 and has had 15 plan changes since then (see Appendix 7). Four of these plan changes set minimum flow and allocation limits for some of the larger catchments (e.g. the Taieri, upper Manuherekia, Luggate, and Pomahaka). The most recent of the plan changes (PC5A - Lindis: Integrated water management) was notified in 2013 and is still under appeal in the Environment Court where appellants have disputed its proposed minimum flow limit.

Another plan change (PC6A) on water quality became operative in 2014 but also provided for a deferment of the rules for limiting nutrient discharges until April 2020 in order to give water users time to adapt. The Council is now proposing to extend this deferment period through a new plan change (PC6AA) after recently identifying implementation problems with these rules. PC6AA will defer the nutrient rules until April 2026.

In the meantime, the Council intends to notify another plan change, known as the Omnibus Plan Change, in March 2020. This will, among other things, provide some interim water quality provisions to address some of the deficiencies in PC6A, and will also provide interim policy guidance for the issuing of freshwater resource consents.

In 2018, proposed plan change (PC7) would have set minimum flow and allocation limits in three Central Otago catchments (Manuherekia, Arrow, and Cardrona). It was withdrawn by the Council amid concerns from both water users and Council staff that the limits were not based on robust hydrological data and models. The decision to withdraw the plan change was not unanimous, and was opposed by Kāi Tahu and some environmental stakeholders whose view was that PC7 is a step in the right direction which would be able to be improved by future plan changes.

However, I consider this withdrawal was a responsible course of action to take, given the scientific uncertainty which is now being addressed. The Council has engaged the National Institute of Water and Atmospheric Research (NIWA) to provide an improved flow model for the Manuherekia catchment, referred to as the Cumulative Hydrological Effects Simulator (CHES) Model. It has expressed the intention of notifying plan changes for the three Central Otago catchments as soon as the data and modelling permit.

Even with these proposed and actual changes, however, a number of NPS-FM requirements will still not be addressed by the Water Plan. Further plan changes will be needed before all of the region's catchments are covered by FMU management plans with values, objectives and limits for minimum flow levels, allocation and water quality attributes.

The Council has recently completed the first stage of this work by dividing the region into eight FMUs which cover all of its catchments, and further subdividing some of these into rohes, or sub-FMUs. However, the Council has still to develop, in consultation with Kāi Tahu and the FMU communities, a full set of values, objectives and limits for each FMU and rohe and to then incorporate these via plan changes into the Water Plan. That work is now beginning in some FMUs, with, for example, a community meeting held on 25 September 2019 to discuss water values in the Manuherekia rohe.

Deemed permits

In addition to the 1,400 or so water takes authorised by 883 resource consents in Otago, there are nearly 600 further water takes authorised by 356 deemed permits. Prior to the RMA, these permits were known as “mining privileges” and were held as a property right (see Appendix 5: History of Regulations - the Otago Mining Privileges).

Under section 413(3) of the RMA¹, all of these permits will expire on 1 October 2021. Many of their owners are expected to apply for replacement resource consents at least six months before then. As things currently stand, in catchments without specific flow and allocation limits, the replacement applications would have to be assessed under the Water Plan’s default limits which may not be adequate to control environmental effects in a number of catchments.

The first mining privileges were established in 1858 to give gold-miners access to water and adjacent land for sluicing purposes. Later, they were re-purposed for farm irrigation. During the first half of the twentieth century, many mining privilege licences were acquired by the Government to enable economic development and employment creation through large-scale irrigation and dam construction works, such as the Falls Dam and the irrigation network in the Manuherekia catchment. While some mining privileges remained in private hands, by the 1980s, most belonged to the Crown.

Over time, the statutes governing mining privileges shifted from various mining acts and amendments to the Public Works Act, then the Water and Soil Conservation Act 1967 and finally, in 1991, the RMA. This final transition occurred during the economic liberalisation of the 1980s and early 1990s when the Crown was privatising public assets, including irrigation infrastructure.

The Crown’s mining privilege licences were sold to local farmers and private irrigation companies who, to protect their investment, negotiated a 30-year exemption from any restrictions that might have been imposed under the impending RMA.

When the RMA came into effect, it provided for the mining privilege water takes as deemed water permits - as distinct from standard RMA water and discharge permits - and ensured the continuation of their mining privilege conditions until the expiry date of 1 October 2021.

Until that expiry date, the RMA requires decisions on any replacement resource consents to have regard to the previous deemed permit water right. Any plan change, during this time, which reduces a deemed permit water right may only be instigated by the permit holder. Permit holders who consider that their right to take or discharge water has been infringed by the Council may seek compensation up to, but not beyond, the expiry date.

In Otago, several hundred deemed permits were replaced by resource consents in the period leading up to the adoption of the Water Plan in 2004. In the absence of catchment-level flow and allocation limits, many of these consents were issued with relatively permissive conditions, often for terms of 30-35 years. This has continued piecemeal to the present day. Two water permits issued earlier this year have 35-year terms extending to 2054.

The Council’s consenting team has recently indicated that, where there are no catchment-specific flow and allocation limits, it now intends to limit replacement consent terms to 5-10 years, on a case by case basis. However, many permit-holders still expect 25-35 year consents and, at present, there is no plan rule limiting consent terms.

Since the Water Plan became operative in 2004, the Council has promoted a policy of “use it or lose

¹ “Every deemed permit resulting from a mining privilege under subsection (1)(c) or (d) shall be deemed to include a condition to the effect that it finally expires on the 30th anniversary of the date of commencement of this Act.”

it”, encouraging the remaining deemed permit holders to use their water in order to demonstrate their volume of ‘historic’ usage when they apply to replace the permits. In some catchments, notably the Manuherekia, this “use it or lose it” message has reportedly had the effect of encouraging increased usage, including wasteful usage.

The Water Plan also has an “efficient use” requirement which has reportedly encouraged some deemed permit holders to shift away from flood or border dyke irrigation to more sophisticated spray and pivot irrigation, the funding of which requires greater productivity from more intensive land and water use. Dairy farming, for example, has increased in the Manuherekia from no dairy platforms in 2008 to at least 15 (refer to Table 1 below) now identified in the Agribase² database.

Table 1: Otago catchments with the most deemed permits (as at 17 September 2019) and number of dairy farms in the region

Catchments with deemed permits	Deemed Permits (takes)	RMA Water Permits (takes)	Median Expiry Date of RMA water permits	Whether over-allocated	Whether subject to Schedule 2 allocation and flow limits	Dairy farms
Taieri	74 (103)	160 (233)	2037 (2019-2023)	Yes	Yes	76
Manuherekia	71 (124)	122 (225)	2023 (2019-2052)	Yes	Yes (part of river - Falls Dam to Ophir)	15
Lindis	19 (31)	17 (28)	2029 (2021-2043)	Yes	Pending (notified and under appeal)	0
Cardrona	14 (27)	31 (55)	2038 (2020-2050)	No	Yes	0
Lowburn Creek	13 (41)	1 (2)	2046	No	Yes	0
Arrow	12 (18)	8 (19)	2030 (2021-2048)	No	Yes	0
Luggate	12 (16)	1 (1)	1 Oct 2021	Yes	Yes	0
All others (ca 50)	141 (223)	544 (836)		Approx. 60%	Approx. 30%	411
Totals	356 (583)	884 (1399)				502

Sources: Otago Regional Council (consent and plan data); Agribase (dairy farm data)

With two years to go until their expiry, there are still 356 deemed permits in the Otago region – 275 for surface water takes and 81 for groundwater abstraction. They are spread thinly over approximately 60 catchments, though the bulk of them are concentrated in seven catchments, namely: the Taieri (74), Manuherekia (71), Cardrona (14), Lindis (19), Lowburn (13), Arrow (12), and Luggate (12). Four of these, the Taieri, Manuherekia, Lindis, and Luggate catchments are considered by the Council to be over-allocated.

² AgriBase is a national spatial farms database owned and maintained byASUREQuality, a state-owned enterprise which provides specialist food assurance services covering the entire food supply chain. Agribase holds information on approximately 142,000 live (current) New Zealand farms, including 828 dairy farms throughout Otago.

The Council is expecting 96 unused deemed permits to be surrendered by the hydroelectricity company, Trustpower. This will leave approximately 270 still needing to be retired or replaced in the next two years. In addition to the deemed permits, nearly 180³ standard RMA water permits are also due for replacement on or before 1 October 2021.

In total then, the Council may receive up to 450 water resource consent applications in the next 18 months, including from catchments which are over-allocated and have no local minimum flow and allocation limits.

³ This includes 20 consents which expired between 2016 and 1 October 2019 but, subject to RMA section 124 guidelines, are still in effect until decisions are made on their replacement consents which were applied for before the expiry dates.

Overview of the Otago planning framework

Before commenting on the Regional Policy Statement and Regional Water Plan in more detail, I wish to report some observations about the state of the freshwater environment. While a comprehensive account of the state of the freshwater environment throughout the Otago region is beyond the scope of this investigation, a Ministry for the Environment summary for four key catchments (i.e. the Taieri, Manuherekiā, Arrow, and Cardrona) is provided in Appendix 6 to this report.

As noted there, trend data for a number of environmental indicators are either absent or too recent to be interpreted clearly. However, from the data available, some general observations can be made. These observations have contributed to my assessment of the adequacy of the Council's planning framework and associated science capability and capacity. Key points to note are set out below.

Water quality

While the overall water quality of most Otago rivers in the Land, Air, Water Aotearoa (LAWA) database⁴ is considered "good", there is evidence of some degradation in those catchments or parts of catchments where intensification has occurred, such as in some of the tributaries or lower reaches of some rivers, including the Manuherekiā, Cardrona, parts of the Taieri, and around Lake Hayes in the Arrow catchment.

In the Manuherekiā catchment, for example, water quality shows declining trends for phosphorus, *E. coli* and turbidity. In the Arrow catchment, the condition of Lake Hayes may be close to a tipping point. Eutrophication and pathogens are an issue, with swimming warnings becoming more frequent, and Macroinvertebrate Community Index (MCI)⁵ scores for the inflows to Lake Hayes also indicate water quality issues.

In the Cardrona catchment, nitrogen and *E. coli* appear to be the main water quality issue. MCI scores highlighted probable impact on water quality and/or habitat conditions. The Taieri catchment has variable quality along its length, with *E. coli* and phosphorus being the main water quality parameters of concern. Lake Waihola is particularly sensitive (due to its shallow nature) and has some signs of poor water quality and eutrophic status.

Water flows

There is a high level of water abstraction in Central Otago. For instance, it is estimated that 75% of the available flow in the Manuherekiā River is taken for irrigation and stock water. This compares with about 25% in other regions of New Zealand. In the Manuherekiā catchment, which has the Falls Dam, multiple water storage sites and a complex network of water races, water quantity is poorly understood, but likely to be severely over-allocated in terms of abstractions and flow.

The Arrow is also considered to be severely over-allocated, though actual usage of water is low compared to paper allocation. The Cardrona River too is considered by ORC to be over-allocated. It has a natural drying stretch which recharges groundwater while impeding the summertime passage of trout and migratory fish passage. Although the Taieri catchment has water storage on some tributaries and has minimum flow limits set at multiple places throughout the catchment, the river

⁴ LAWA is a partnership between the 16 regional and unitary councils, the Cawthron Institute, and the Ministry for the Environment. It is the most comprehensive source of water quality data in New Zealand.

⁵ Macroinvertebrate Community Index (MCI) is an index used to measure the water quality of fresh water streams. The presence or lack of macroinvertebrates such as insects, worms and snails in a river or stream can give a biological indication of the health of that waterway.

sometimes reaches these minimum flows and is described on the LAWA website as ‘heavily over-allocated, largely as a result of the use of historic deemed permits to allocate water.’⁶

The high level of water abstraction in some Central Otago catchments has significantly altered the natural flows, ecosystems and fish habitats of some streams and rivers. The full extent of these changes is difficult to quantify without naturalised baseline hydrological and ecological data, but work is currently addressing this through NIWA’s CHES model, commissioned by the Council, and also through research by Aukaha. This research will involve cultural health monitoring and habitat modelling at 90 freshwater sites during this coming summer, 30 each in the Manuherehia, Cardrona, and Taieri catchments.

Ecology and endangered species

Wetlands have been particularly affected by historic land use, with 81% having been lost in the Manuherehia catchment, 84% in the Arrow, 83% in the Cardrona and 71% in the Taieri. The condition of remaining wetlands is not well known but appears to vary. The Taieri catchment has a large wetland-lake complex in its lower catchment that holds international significance.

In some river catchments, flow and habitat changes, together with the ingress of trout, have had a severe impact on endemic non-migratory galaxiids, several of which are threatened or endangered. I was informed by a Council freshwater scientist that there have been dramatic declines, and the loss of entire populations, in recent decades in a number of catchments, including the Manuherehia and the Taieri.

The Manuherehia catchment contains rare, endemic, fish species that may be in serious trouble, including one unique galaxiid species that is found only in the Manuherehia catchment. It also has a poor representation of more common species. In the Arrow, fish diversity is very low, with only one native species having been recorded. In contrast, the Cardrona River has at least seven fish species, including rare galaxiids, as well as freshwater mussels and koura. The Taieri catchment supports a diversity of fish life, of more than 20 species, including many rare species.

The Otago Regional Policy Statement

The Otago Regional Policy Statement (RPS) was made partially operative on 14 January 2019. A number of the provisions are currently subject to High Court proceedings, including policies concerning mineral and petroleum exploration and offsetting for indigenous biological diversity.

I do not intend to comment on the overall quality of the RPS, noting that some outstanding matters are before the High Court, but I would expect freshwater management to be more prominent in the RPS which aspires to five primary outcomes:

1. resource management in Otago is integrated
2. Kāi Tahu values and interests are recognised, and kaitiakitaka (kaitiakitanga) is expressed
3. Otago has high quality natural resources and ecosystems
4. communities in Otago are resilient, safe and healthy
5. people are able to use and enjoy our natural and built environment.

These outcomes direct the framework of the RPS which covers issues of integrated management, Kāi Tahu values, natural resources and ecosystems, resilience, climate change, infrastructure, energy

⁶ LAWA website: <https://www.lawa.org.nz/explore-data/otago-region/water-quantity/surface-water-zones/taieri-catchment/>

resources, urban growth, hazardous substances, the built environment, historic heritage, and managing adverse effects.

The primary objectives relating to freshwater in the RPS are Objectives 3.1 and 3.2. In the appeals version of the plan, these objectives state:

Objective 3.1 The values (including intrinsic values) of Otago's ecosystems and natural resources are recognised, and maintained, and/or enhanced where degraded

Objective 3.2 Otago's significant and highly-valued natural resources are identified, and protected, or enhanced where degraded.

Under Objective 3.1, Policy 3.1.1 fresh water states:

Safeguard the life-supporting capacity of fresh water and manage fresh water to:

- a. Maintain good quality water and enhance water quality where it is degraded, including for:
 - i. Important recreation values, including contact recreation; and,
 - ii. Existing drinking and stock water supplies;
- b. Maintain or enhance aquatic:
 - i. Ecosystem health;
 - ii. Indigenous habitats; and,
 - iii. Indigenous species and their migratory patterns.
- c. Avoid aquifer compaction and seawater intrusion;
- d. Maintain or enhance, as far as practicable:
 - i. Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers;
 - ii. Coastal values supported by fresh water;
 - iii. The habitat of trout and salmon unless detrimental to indigenous biological diversity; and
 - iv. Amenity and landscape values of rivers, lakes, and wetlands;
- e. Control the adverse effects of pest species, prevent their introduction and reduce their spread;
- f. Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and,
- g. Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water.

Policy 3.1.3 also provides for water allocation and use:

Manage the allocation and use of fresh water by undertaking all of the following:

- a. Recognising and providing for the social and economic benefits of sustainable water use;
- b. Avoiding over-allocation, and phasing out existing over-allocation, resulting from takes and discharges;
- c. Ensuring the efficient allocation and use of water by:
 - i. Requiring that the allocation does not exceed what is necessary for its efficient use;
 - ii. Encouraging the development or upgrade of infrastructure that increases efficiency;
 - iii. Providing for temporary dewatering activities necessary for

construction or maintenance.

Other relevant policies include 3.1.4 water storage; 3.1.7 soil values; 3.1.9 ecosystems and indigenous biological diversity; 3.2.13 and 3.2.14 in relation to outstanding freshwater bodies.

Methods 3.1.3(h) and (i) for regional plans state “to provide for resource users, people and communities that rely on freshwater within environmental limits” and “to set limits and targets to give effect to the National Policy Statement for Freshwater Management 2014”.

I also note that provision is made for the habitat of trout and salmon unless detrimental to indigenous biological diversity (ie, Policy 3.1.9(b)(ii)). This has high relevance to a number of Otago catchments where I understand native fish are challenged not only by water flows and related ecological conditions, but also by competition with trout.

The Council acknowledges that the RPS does not fully give effect to the NPS-FM 2017 and I note that it will require a substantial additional update to give effect to the forthcoming reviewed NPS-FM. I consider for example, that there will need to be an explicit chapter relating to land use and freshwater management. At this stage, I understand the proposed revised NPS-FM will require amendments to the RPS relating to:

- Te Mana o Te Wai (section 3.2)
- integrated management directed at managing effects from urban development (section 3.4).
- avoiding loss and degradation of wetlands (section 3.15)
- maintaining ecosystem health in streams (section 3.16).

Other provisions will also be required as a result of the forthcoming national directions for urban development, highly productive land, and indigenous biodiversity.

In addition, the new national planning standards (planning standards) apply to all regional councils, and unitary authorities with separate regional policy statements. These must comply with all planning standards apart from the requirement for e-planning, by 3 May 2022 or at notification of a proposed RPS, whichever is sooner.

The new format will require significant changes to the current Otago RPS in terms of section headings, structure, definitions, and monitoring provisions. Further, a section heading for ‘National direction instruments’ is compulsory. This will contain all the operative national policy statements, national environmental standards, and regulations.

Regional Plan: Water for Otago

The Regional Plan: Water for Otago provides a framework for the management of water in the region and was made operative on 1 January 2004. It applies to lakes, rivers, groundwater, and wetlands. The plan includes some provisions for assessing applications for replacement water consents once the deemed permits expire and it takes an effects-based approach to managing water quality. It focuses on controlling contaminant and sediment discharges, rather than regulating or managing land use activities themselves.

I consider that overall this plan does not give effect to the NPS-FM nor does it provide a comprehensive framework within which to support the deemed permit replacement process. A number of gaps in the Water Plan have been identified through discussions with ORC staff, Kāi Tahu and stakeholders, including:

- inadequate approach to flow and allocation limit setting, including failure to underpin with appropriate hydrological modelling and freshwater science
- failure to recognise or address over-allocation in plan provisions
- lack of provisions for aquatic biodiversity and habitat, particularly threatened species such as non-migratory galaxiids
- a risk of adverse effects on waterbodies arising from the efficiency policy which appears to have encouraged at least some users to maximise rather than minimise their water use.

Allocation

Policy 6.4.2 of the plan defines the primary allocation limit for each catchment as the greater of the catchment limits set in:

- Schedule 2A (includes limits for Taieri and Manuherekia); or
- 50% of the 7-day Mean Annual Low Flow (MALF); or
- The sum of the consented maximum takes.

This (particularly the ability to determine primary allocation based on the sum of the consented maximum takes), in combination with Policy 6.4.2A (which provides for granting “*from within primary allocation, no more water than has been taken under the existing consent in at least the preceding five years*”) can provide a perverse incentive to maximise water use prior to applying for consents to replace expiring deemed permits, in order to obtain maximum allocation. In a situation where deemed permits are to be replaced on a “use it or lose it” basis, this can lead to spilling of unused water, as reported in discussions with Kāi Tahu and several other stakeholders.

Allocation is a significant issue in the Manuherekia catchment where the level of abstraction significantly exceeds the primary allocation in the plan, with paper allocation an order of magnitude higher⁷ than Schedule 2A.

Minimum flows, residual flow and efficiency

Minimum flow setting in the region has been protracted and remains in process for a number of catchments including those that contain the majority of the remaining deemed permits.

Where minimum flows have been set, whether or not they are sufficient is questionable due to a lack

⁷ ORC Briefing Note: Minimum flows plan change for priority Otago catchments and deemed water permit replacement process.

of consistent methodology and insufficient hydrological investigations and investment in the freshwater science which underpins ORC's limit-setting process. (Policies 6.4.3 and 6.4.4 and Method 15.9.1.3).

With respect to deemed permits, the Mitchell Daysh consent review notes that the existing planning framework does not appear to provide clarity and certainty on the minimum flows that are likely to be applied. As a consequence, minimum flows will be contentious in respect of each application.

Policy 6.4.7 relates to the requirement to maintain a residual flow at the point of take.⁸ The policy does not adequately protect instream values or reliability of supply, and does not consider downstream effects.

Policy 6.4.0A relates to water efficiency in terms of water transport, storage and application. However, the policy neither requires nor guides users to reduce the volume of water used. Without this, the adoption of more efficient application methods can enable the irrigation of larger areas and intensification of farming operations with no reduction in water take.

This has the potential to increase economic dependence on existing water takes and, in combination with the allocation policies outlined above (which enable deemed permit replacement consents to be based on inflated historic use), can heighten the risk of adverse environmental outcomes in terms of contaminant and sediment discharges. This risk is further heightened by the plan's failure to regulate land use activities (eg, intensive winter grazing, dairy intensification).

Provisions pertaining to threatened species, fish passage and fish screening

Maintaining an up-to-date inventory of native fish is a core requirement for the effectiveness of a regional water plan. DOC has advised that the Threatened Species Schedule in the Water Plan is out-of-date (see Table 2 below).

⁸ "The need to maintain a residual flow at the point of take will be considered with respect to any take of water, in order to provide for the aquatic ecosystem and natural character of the source water body."

Table 2: Freshwater Fish Status in the Water Plan

SCHEDULE 1AA: OTAGO RESIDENT NATIVE FRESHWATER FISH THREAT STATUS		
1AA Schedule of Otago Resident Native Freshwater Fish - Threat Status		
Common name	Scientific name	Threat Status
Lowland longjaw galaxias	<i>Galaxias cobitinis</i>	Nationally Critical*
Canterbury mudfish (Kōwaro)	<i>Neochanna burrowsius</i>	Nationally Critical
Teviot flathead galaxias	<i>Galaxias</i> 'Teviot'	Nationally Critical*
Dusky galaxias	<i>Galaxias pullus</i>	Nationally Endangered*
Alpine galaxias	<i>Galaxias</i> aff. <i>paucispondylus</i> 'Manuherikia'	Nationally Endangered*
Eldon's galaxias	<i>Galaxias eldoni</i>	Nationally Endangered*
Central Otago roundhead galaxias	<i>Galaxias anomalus</i>	Nationally Vulnerable*
Clutha flathead galaxias	<i>Galaxias</i> sp. D.	Nationally Vulnerable*
Smeagol galaxias	<i>Galaxias</i> aff. <i>gollumoides</i> 'Nevis'	Nationally Vulnerable*
Longfin eel (<i>tuna</i>)	<i>Anguilla dieffenbachii</i>	Declining
Giant kokopu (Taiwharu)	<i>Galaxias argenteus</i>	Declining
<i>Galaxias gollumoides</i>	<i>Galaxias gollumoides</i>	Declining
Lamprey (kanakana)	<i>Geotria australis</i>	Declining
Torrentfish (<i>Piripiripōhatu</i>)	<i>Cheimarrichthys fosteri</i>	Declining
Koaro	<i>Galaxias brevipinnis</i>	Declining
Inanga (<i>inaka</i>)	<i>Galaxias maculatus</i>	Declining
Bluegill bully	<i>Gobiomorphus hubbsi</i>	Declining
Redfin bully	<i>Gobiomorphus huttoni</i>	Declining

*NB: Fish marked with an * are only found in the Otago Region.

Source: Regional Plan – Water for Otago

DOC has provided a more recent table of non-migratory Galaxias in the Otago region and their current threatened species status (see Table 3 below). Notable changes in fish status are:

- **The Central Otago roundhead** galaxias, *Galaxias anomalus* (found in the Taieri and Manuherehia tributaries) are now nationally endangered, previously nationally vulnerable
- **The Clutha flathead** galaxias, *Galaxias* sp. D. (found in the Cardrona River, Lindis River, Clutha tributaries above Lake Dunstan, Bannock Burn, Manor Burn, Pool Burn and Benger Burn) are now nationally critical, previously nationally vulnerable, and
- **The Gollum** galaxias, *Galaxias gollumoides* (found in the Clutha/Mata-Au), are now nationally vulnerable, previously declining.

Table 3: Non-migratory galaxias in the Otago region

Taxa	Common name	Distribution in Otago
Nationally Critical		
<i>Galaxias</i> “species D”	Clutha flathead galaxias (Clutha River)	Cardrona River, Lindis River, Clutha tributaries above Lake Dunstan, Bannock Burn, Manor Burn, Pool Burn, Benger Burn
<i>Galaxias</i> “Teviot”	Teviot flathead galaxias (Teviot River)	Teviot River tributaries
<i>Galaxias cobitinis</i>	Lowland longjaw galaxias	Kauru and Kakanui Rivers
Nationally Endangered		
<i>Galaxias anomalus</i>	Central Otago roundhead galaxias	Taieri and Manuherehia tributaries
<i>Galaxias eldoni</i>	Eldon’s galaxias	Taieri and Tokomairiro River tributaries
<i>Galaxias pullus</i>	Dusky galaxias	Lower Clutha and Taieri River tributaries
<i>Galaxias</i> “Nevis”	Nevis galaxias (Nevis River)	Nevis River
<i>Galaxias</i> aff. <i>paucispondylus</i> “Manuherikia”	Alpine galaxias (Manuherikia River)	Manuherikia River above Falls Dam
Nationally Vulnerable		
<i>Galaxias depressiceps</i>	Taieri flathead galaxias	Shag, Waikouaiti, Taieri, Tokomairiro river tributaries, Akatore Creek
<i>Galaxias gollumoides</i>	Gollum galaxias	Clutha/Mata Au
<i>Galaxias</i> “Pomahaka”	Pomahaka galaxias (Pomahaka River)	Pomahaka River
<i>Galaxias</i> “southern”	Southern flathead galaxias (Southland, Otago)	Upper Clutha River tributaries
<i>Galaxias</i> aff. <i>paucispondylus</i> “Southland”	Alpine galaxias (Southland)	Von and Lochy Rivers

Source: Department of Conservation



The nationally endangered Alpine galaxia (Manuherekia River)

Source: Creative Commons

DOC also advises that the fish passage and screening provisions of the plan are inadequate, falling short of national best practice and failing to provide specific measures to protect non-migratory galaxiid fish, such as fish barriers and eradication methods to exclude invasive species.

The damming provision (rule 12.3.2) is seen by DOC as permissive in providing a pathway for multiple small dams to be constructed as a permitted activity. In a small catchment this is likely to impact on non-migratory galaxiids by removing or reducing their habitat.

There are clearly opportunities to strengthen the existing provisions and afford greater protection to the region's unique galaxiid species.

National planning standards requirements for regional plans

In addition to having to comply with the NPS-FM, the Water Plan will need to be updated to comply with the national planning standards (in particular *3. Regional Plan Structure Standard*). I am advised that the timeframes are: within 10 years of the planning standards coming into effect (2019), or notification of a proposed regional plan (but not a change or variation) for submissions, whichever is sooner.

The planning standards encourage an integrated region-wide approach to planning for a region's resources. A catchment-scale approach is provided for in the structure. Cost and resource implications for councils can be reduced by adopting 'regional-scale' responses where appropriate, and overlaying catchment-scale processes where required. Environmental benefits can be achieved by ensuring regional provisions are in place to prevent further degradation of freshwater resources until limit-setting processes can be initiated.

The standards do not prevent a separate Water Plan being created, but all the other required parts of the regional plan standard will need to be included. I note that most regions have, or are moving to, integrated regional plans.

Current Council capacity and capability

For the Water Plan to give effect to the NPS-FM, the Council needs sufficient capacity in not just one, but all, of the following key areas: policy and planning, science, consenting and CME (compliance, monitoring and enforcement). Although ORC is fiscally strong, these key areas are seriously under-resourced and will need significantly more investment if the Council is to cope with the resource management tasks that currently face it, including compliance with the NPS-FM.

The new Council senior managers are aware of this and are beginning to address the capacity gaps within their current budget envelopes, but more investment is vital to fully address all of the identified shortfalls in capacity and capability. The Council's CEO Sarah Gardner is also aware of this and has told me that this investment will be provided for in forthcoming annual and long term planning processes.

Science capacity and capability

Critical to the success of ORC's water management planning and implementation is a robust scientific evidence base. At present, the Council has 9.4 full-time equivalent (FTE) scientist positions comprising the science manager, 2 groundwater scientists, 2 freshwater ecologists, 2 minimum flows scientists, 1.4 hydrologists, and 1 air quality scientist.

An independent review⁹, commissioned by the Council, recently reported that, for a region the size of Otago, this number of scientists is quite inadequate to support all of the Council's critical resource management functions. The reviewers also identified a shortage of scientific technical support staff. Approximately two technical staff are needed per FTE scientist to collect, process, store, and analyse data. ORC has insufficient technical staff to support even the current under-strength science team.

The reviewers' key findings were:

- capacity gaps in land, wetlands, coastal and catchment modelling are top priorities
- freshwater science (both quality and quantity) is under-resourced
- science, monitoring and data, overall, are under-resourced compared with other councils,

The high priority gaps are in:

- **land environments** (farm systems, irrigation, nutrient modelling, soil quality, sediment generation/transport)
- **coastal environments** (wetlands and estuaries)
- **catchment modelling** (land and water quality limits setting)
- **biodiversity** (terrestrial and wetland ecosystems)
- **cultural values** (Kāi Tahu environmental indicators and monitoring).

Looking specifically at water, the reviewers found a shortage, provisionally estimated at 2-3 water quantity FTEs (1 senior, 1 scientist, 1 support), for work on practical hydrology (flow naturalisation) and hydro-ecology (minimum flows), and a shortage, provisionally estimated at 2-3 water quantity FTEs (1 senior, 1 scientist, 1 support), for work on catchment processes and limits setting.

Overall, the review recommended a doubling of the Council's scientists from 9.4 to 19.4 FTE positions, including:

⁹ Aquanet Consulting Ltd. (2019) *Otago Regional Council Science Capability and Capacity Review*. Presentation to the Executive Leadership Team, 20 August 2019.

- **a water quantity/hydrology team** with 6.4 scientists
- **a water quality/ecology team** with 5 scientists
- **a catchment process team** with 2 scientists (1 land, 1 modelling)
- **a biodiversity and coastal wetlands team** with 3 scientists.

The reviewers acknowledge the difficulty in finding suitably qualified staff at a time when the Essential Freshwater package is creating high nationwide demand for water and catchment expertise. They note therefore that strategic use of external consultants will be critical to the successful delivery of the Council's water resource management programme.

The reviewers also note that the deficiencies in science staffing are exacerbated by deficient staff training, a lack of development pathways and consequent staff turnover leading to loss of institutional knowledge. The impacts of lost institutional knowledge are exacerbated by a lack of robust data collection and databases to which staff can refer.

From my discussions with staff, the Council expects to take in-house ownership of the CHES hydrological flow model for the Manuherehia which is being developed by NIWA under contract. The final model will include various layers, each with differing assumptions and baselines, including a natural flows layer which will model ecological baselines in the absence of water storage and abstractions. The development of the CHES model is behind deadline due to the complexity of the Manuherehia catchment and its network of water races. However, once completed, the model is expected to be able to be adapted for the modelling of other river systems in the region.

Other parties are also contributing to the Council's scientific database on the Manuherehia. As mentioned earlier, Aukaha is undertaking cultural health monitoring and habitat modelling over the 2019-2020 summer, when the river is at its lowest flows; and the Manuherehia irrigators have made available their hydrological model, developed several years ago by Golder Associates.

The Council is aware of the capacity and capability deficiencies discussed here and has already begun advertising three new water science positions. However, without a substantial increase in in-house scientific capacity I consider that the Council will be insufficiently prepared to meet the NPS-FM Water Plan notification deadline of December 2023, and will certainly not have all the catchment data it needs to set allocation and flow limits before the expiry of the deemed permits on 1 October 2021.

Planning Policy capacity

At present, to cover all its planning and policy functions, I understand that the Council employs seven planners with varying levels of seniority and experience and also contracts the services of consultant policy planning staff with extensive water planning experience.

The water policy and planning workload between now and 2023 is beyond the resources of such a small team and will require additional experienced planning staff. From my discussions with staff and management, it would appear that the planning team will need five additional planners to meet the coming workload – three with experience in water plan writing, and two with the skills to facilitate FMU community consultations on water values.

These are challenging requirements. Experienced water resource planners are in short supply nationally and will become even harder to recruit as the Essential Freshwater package drives up demand for their services across the country. Earlier this year, the Council received only four responses when it invited tenders from experienced plan writers to assist with its draft plan change for the Manuherehia catchment. Three of the responses were from outside the region and none had particular experience in water planning.

I consider that without a significant increase in resourcing and proactive recruitment initiatives by the

Council, the necessary planning capacity will not be achieved.

Consenting capacity

The Council's consenting capacity and processes were reviewed earlier this year in an independent report¹⁰ commissioned by the Council's chief executive. Among the report's findings was that there has been an upswing in consent applications in the past two years, with annual numbers now exceeding those of the previous peak year of 2012.

The reviewers concluded that this trend is almost certain to continue as new planning requirements under the NPS-FM come into effect and the deemed permits approach their expiry date. They considered that the Council's consenting and science capacity was insufficient to deal with the increase. They observed that:

First, there does not appear to be much internal expertise in respect of processing of applications relating to water quality (farming land use consents/diffuse discharge consents). Secondly, there is a potential gap with respect to the processing of replacement consents for the deemed permits.

The reviewers recommended that the Council appoint two additional consent officers and that it dedicate part of one senior level job description to regularly projecting and planning for future consent application volumes.

The Council's response to this recommendation has been to advertise for additional consenting staff and to develop a programme of continually updated projections of consent volume. The Council's consenting managers are confident that they will have sufficient capacity to deal with the influx of replacement resource consent applications. As a back-up resource, in the event of staff overload, they have contracted Mitchel Daysh Ltd to process the more complex consent work.

I am satisfied that the Council is taking on board the recommendations of the independent report and improving its consenting capacity and processes.

Compliance, monitoring and incident response capacity

According to Council management, the compliance team does not have the capacity to deal with the additional workload that will arise when the regional water quality rules of Plan Change 6A (PC6A) become operative. For this, the monitoring team will need to be doubled from the current five staff to 10.

As noted earlier the PC6A rules were decided back in 2013 with a deferred implementation date of April 2020. However, they are now recognised as deficient so the Council is proposing to further defer implementation until April 2026 while it makes the necessary interim corrections through an omnibus Water Plan change early next year.

I understand that the Council also needs dedicated incident response officers to deal with the increasing number of incidents (almost 1,200 per year – or 24 per week) which are currently diverting compliance officers away from their core roles.

Accommodation capacity

An additional constraint on the Council's staffing capacity which ought to be acknowledged is the physical inability of the current offices in Dunedin to house additional staff on the scale discussed

¹⁰ Maw P, Daysh S. 2019. *Consents Function Review*. A report prepared for the Otago Regional Council by Wynn Williams and Mitchel Daysh Limited.

here. If staff capacity-building is not to be delayed or compromised, temporary office premises for some staff may need to be considered in the short to medium term.

Kāi Tahu perspectives

Kāi Tahu expects a partnership relationship with the Council and to share in the policy-making process on resource management matters. Although the iwi has a positive relationship with ORC, it considers that, to date, its environmental and relationship aspirations have not been met by the Council. In the past, it was treated less as a partner and more as a stakeholder, interested party, applicant, submitter or appellant, depending on the issue. When treated as one party among many, in groups such as the Manuherekia Technical Advisory Group (TAG), Kāi Tahu's voice and values are inevitably diminished.

However, this may be changing. ORC Chief Executive, Sarah Gardner, supports a partnership role for Kāi Tahu and the Council recently made two seats available for them at the Policy Committee (a Committee of the whole Council), enabling them to participate in the setting of FMU and rohe (sub-FMUs) boundaries. Kāi Tahu played a key role in ensuring that the boundary of the Mata-Au FMU encompasses the entire Clutha catchment from the mountains to the sea.

Kāi Tahu employs a stand-alone commercial consultancy, Aukaha, to advocate for its environmental and cultural aspirations in resource management, to facilitate consultation with Kāi Tahu Papatipu Rūnanga, and to support Māori hauora (health) and wellbeing. Aukaha has protocols with the ORC Council and all district councils in Otago setting out the process for facilitating Kāi Tahu engagement in the Council's resource consent and plan change processes.¹¹

My discussions for this investigation were with Aukaha's Chair, staff and advisors at their offices in Stuart Street, Dunedin.

ORC's current planning framework

Aukaha has concerns about the adequacy of the current water planning framework from an RMA and NPS-FM standpoint. It does not see the Water Plan and its associated consenting practices as providing adequate direction or protection. Major concerns include:

- piecemeal processing of resource consents with no assessment of cumulative effects
- inadequate provision for ecological and cultural values, including:
 - the lack of a natural ecological baseline for water flows when determining the "existing environment" and
 - the acceptance of consent applications for water use that do not address ecological values, fish habitat and species distribution
- the "use it or lose it" policy which has incentivised permit holders to ramp up their metered water use in order to create a false history of inflated use when applying for new consents
- the "efficiency gains" policy which, instead of saving river water, perversely incentivises greater use of it, leading to more intensive farming and greater economic dependence on irrigation.

Aukaha considers that the "use it or lose it" policy has encouraged permit holders to "game the

¹¹ Aukaha, formerly known as Kāi Tahu ki Otago Ltd (KTKO Ltd), was established in 1997 to represent Kāi Tahu in RMA consent matters. It is wholly owned by the four Papatipu Rūnanga of Otago - Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga (ngā Rūnanga/Rūnaka).

system” in preparation for the replacement of their deemed permits. Knowing that their excessive “paper” allocation will be replaced by one based on historic water use, rather than on “what the river needs”, the permit holders’ natural response has been to maximise their historic use.

Similarly, Aukaha sees the plan’s “efficiency gains” policy as also encouraging greater water use. Instead of encouraging farmers to use less water for their existing activities, it encourages them to expand their activities with more efficient use of their water takes. This is because to pay for the expensive spray irrigation systems, such as centre pivots, which replace flood or border dyke irrigation, farmers must use more intensive farming practices and irrigate previously dry paddocks.

ORC’s performance of functions

In Aukaha’s view, the Council has yet to develop adequate planning and consenting processes for the management of freshwater use, despite discussing this and the deemed permit issue with Kāi Tahu since the early 1990’s. Aukaha considers that since 2004, the ORC’s consenting practices have been deficient in failing to publicly notify consent applications with “more than minor” effects and granting RMA water permits for unreasonable durations of 25-35 years.

Aukaha also noted that ORC has managed water and natural resources in general under the paradigm of Otago exceptionalism, expressed as “we are different” with no place for central government interference. One result has been a failure to acknowledge over-allocation as an issue.

Manuherehia, Upper Cardrona, and the Arrow (MAC) catchments

Aukaha does not consider the Water Plan fit for purpose for the assessment of applications for replacement water consents once the deemed permits expire. It opposed the withdrawal of the 2018 MAC plan change only because, despite the data inadequacies, this plan was a step in the right direction after such a long period of inaction. However, Aukaha is now undertaking work in the catchment to contribute to the information base for a revised MAC plan change.

Aukaha is sceptical of the CHES model, having serious doubts about the data quality and data gaps, and the assumptions of the model itself. There is some concern that the Council’s adoption of the CHES model as the basis for setting flow and allocation limits is a foregone conclusion, despite it still having not been independently assessed or approved by the Technical Advisory Group (TAG).

Aukaha also noted that many other catchments with deemed permits, not covered by the MAC plan change, will remain problematic for the Council to resolve by the expiry date of 1 October 2021.

Council capacity

Aukaha considers that the council is struggling to meet its RMA responsibilities and is not adequately resourced for the scientific and planning challenges of giving effect to the NPS-FM by 2025, or of addressing deemed permits by 1 October 2021. The Chairman of Aukaha, Edward Ellison, expressed the following in a recent letter:

We believe it is critical, given the state of planning instruments in the region and the pending influx of deemed permit replacement applications, that decisions get made in the right order. Statutory changes and national direction, including the newest proposals, will determine the form and content of a revised Regional Policy Statement, which in turn will direct amendments to the relevant regional plans, enabling decisions on deemed permits to be made within a framework that is appropriately future focussed.

We need to be able to see that pathway clearly, which has been a significant difficulty over the last year as we have discussed. Knowing the timeframes around each statutory process will enable us to plan and constructively resource our responses, working with

our local authority partner. We are mindful that momentum must be maintained and that concluding all processes in an efficient and timely manner is a priority.

Fundamental to making decisions in the right order is to ensure that deemed permit replacement applications are decided after all other processes have been completed. We understand that this would necessarily involve introduction of a legal mechanism that addresses the pending 2021 deadline for replacement resource consents. We need to know that deemed permit replacement decisions will be effectively “on hold” awaiting establishment of a robust decision-making framework.¹²

State of the Environment

Aukaha has raised serious concern about the state of the threatened galaxiid species in Otago rivers. It is the position of Aukaha that the starting point for establishing a minimum flow and allocation regime should be based on naturalised baseline flows which reflect the river’s original state, rather than modified baseline flows which understate the impacts of water use on natural values.

Aukaha will conduct cultural health monitoring and habitat modelling over the summer (2019/2020) in the Manuherehia Catchment. This information will be used to inform the Councils’ flow modelling.

Stakeholder perspectives

The stakeholders spoken to addressed a wide range of perspectives and insights. This summary does not reflect the views of any one stakeholder in particular, unless stated otherwise, but conveys my impression of the variety of views around the particular questions posed in the Terms of Reference for this investigation.

Adequacy of the current planning framework from an RMA and NPS-FM standpoint

All stakeholders who expressed a view on the planning framework acknowledged that it does not yet give effect to the NPS-FM and will need further plan changes to achieve this. However, they differed in their views on whether the framework, as it currently stands, is adequate for assessing RMA water and discharge consents.

The Federated Farmers and the Otago Water Resource Users Group (OWRUG) consider the current plan to be generally adequate for replacing water consents and deemed permits, provided it is implemented properly by knowledgeable staff. They expressed the view that implementation is being undermined by staff turnover which has resulted in a loss of in-house knowledge and, in their view, misinterpretation and misapplication of some plan provisions.

The Department of Conservation, NZ Fish and Game, and the Central Otago Environmental Society (COES) considered the planning framework to be inadequate from an RMA perspective. They contend that the current framework does not give due consideration to all of the matters required by the RMA, particularly as it does not yet have catchment-level minimum flow and allocation limits in a number of over-allocated catchments.

Fish and Game also noted that the purpose of residual flows in the Water Plan (Policy 6.4.7) is overly restrictive in its focus on ‘aquatic ecosystems and natural character’ while ignoring amenity and cultural values.

These stakeholders also shared the view that the plan’s efficiency provisions were encouraging

¹² Reference: Edward Ellison, Chairman – Aukaha to Peter Skelton, 19 September 2019.

increased use of irrigation water and driving environmentally undesirable land use intensification.

They were of the view that new, or forthcoming (replacement) water consent applications should be put on hold while these issues are addressed through necessary plan changes.

An unaffiliated local landowner, Mr William Cockerill, informed me that over the last 30 years there has been significant change in land and water use in the Manuherekiā catchment. He has observed the attrition of the Central Otago dryland landscape as a consequence of irrigation enabled by deemed permits. As an example of the change in water use, the historic Black's Station at Ophir had a gold dredging operation which held 10 heads of water under a mining privilege.¹³ This privilege was divided between two brothers - one ended up inheriting four heads of water and the other obtaining the remaining six heads. As a sheep farm, one of the four heads was used for watering stock, with this later increasing to about two heads. However, when the farm was sold for a dairy farm 10 years ago, it was sold with the value of the property having the original four heads. The dairy farm now uses much of the four heads of water for irrigation. Mr Cockerill's view is that the effect has been a significant change in land use enabled by irrigation under deemed permits during the transitional period.

The Council's performance regarding planning for discharges of contaminants to land and water, and taking, using, damming or diverting water

All stakeholders who expressed a view on the Council's performance of their statutory functions under the RMA, considered it to be under-performing with respect to water management.

A common concern was that, in recent years, the Council has withdrawn from community and stakeholder engagement on water use, showing a lack of leadership or guidance. Now it is attempting to recover lost ground, but against challenging timeframes and national requirements and still with no clear sense of what it is seeking to achieve.

COES and Fish & Game saw the various consultation groups set up by the Council as being focused primarily on irrigator needs with community and environmental input either ignored or minimised.

They also raised concern about consents with 'more than minor' effects being processed by the Council on a non-notified basis. These stakeholders felt the Council was reluctant to consider environmental groups as affected parties, and failed to adequately consider instream values, such as amenity, recreational, and cultural (Kāi Tahu) values of waterbodies.

The environmental stakeholders also criticised the Water Plan's efficiency criterion which has encouraged farmers to convert to spray irrigation often taking on considerable debt to do so, and intensifying both water and land use, with potential adverse effects in the catchment.

They also shared similar concerns about the Council's "use it or lose it" policy, which COES characterised as having triggered a "rush to ruin" by creating an incentive to use more water in order to prove historical usage for consent replacements. An example was given of one property in Chatto's Creek being water-logged by deliberate spilling of water by adjacent irrigator properties over 3 sets of 14 days in autumn (42 days in all).

¹³ One 'head' equates to one cubic foot of water per second or approximately 100 cubic metres per hour.

Whether the planning framework in the Manuherehia, Arrow and Cardrona catchments will be appropriate and sufficient to consider applications for new water permits once deemed permits expire

Federated Farmers, the Otago Water Resource Users Group (OWRUG) and some irrigators from the Manuherehia considered the planning framework appropriate and sufficient to consider new applications, but the other stakeholders did not.

Understandably, the Manuherehia Water Users Group and other deemed permit holders are looking for certainty about the process to transition from deemed permits to replacement resource consents. A number of irrigators were not supportive of any extension of the deemed permit deadline, citing the uncertainty of time delays as a factor in the reluctance of banks to finance irrigation development.

Contrasting views were expressed by other stakeholders on how to define the starting point for setting flow limits and for assessing environmental effects. These views related to the baseline for hydrological modelling when determining a minimum flow and allocation regime to establish ecological flows.

Water users expressed a view that the starting point should be the river in its existing state (ie, subject to damming and current levels of abstraction). Other stakeholders, including DOC, Fish and Game, and COES, shared Aukaha's view that the starting point should be the river in its natural state without damming and abstraction. The Council's Water Plan should use that as the baseline for setting a minimum flow and allocation regime, based on robust modelling.

These stakeholders also criticised the Council's lack of a method to determine historic usage, the assessment of effects at the point of take rather than the whole river, and its inadequate assessment of cumulative effects.

On the withdrawal of the MAC plan change in 2018, all stakeholders agreed that the evidence base for the proposed allocation and flow limits was scientifically flawed. However, COES felt that the plan change should have gone ahead anyway on the basis that it would at least improve on the current situation. The irrigators supported the withdrawal of the proposed plan change.

The adequacy of Council resources, including its capacity to develop and implement an adequate planning framework that gives effect to the NPS-FM

All stakeholders had a similar view that the Council has not invested adequately in its science, technical, planning, and consenting capabilities. As a consequence, the Council lacks robust scientific models and data to set minimum flow and allocation limits, and also sufficient planning and consenting staff to develop the necessary plan changes and implement them.

Findings and recommendations

This report focuses on the issues for freshwater planning and the particular challenges posed by Otago's deemed permits. Although its findings and recommendations are directed towards the ORC, some will also have relevance more broadly for freshwater planning across New Zealand.

Findings - catchment planning, science and deemed permits

- The Council's existing water planning framework has suffered from a lack of investment in science, planning, and hydrological modelling.
- There is a lack of clear and robust minimum flows and a failure to address over-allocation.
- The existence of the deemed permits has also limited the ability of the Water Plan to manage water quality and quantity.¹⁴
- There is large variation in the planning frameworks for the region's catchments to deal with the expiry of deemed permits.
- Only the Pomahaka catchment is underway for transition to an RMA consenting process with an established primary allocation limit, minimum flows for primary allocation, supplementary allocation blocks, and minimum flows for supplementary allocations. This catchment, however, has only three deemed permits. Progress is also being made on the Arrow and Cardrona catchments which have started a planning process to set minimum flows and allocations
- Most other catchments are not so prepared. A minimum flow and allocation regime was proposed for the Lindis catchment some five years ago but has yet to be decided on by the Environment Court.
- A minimum flow and allocation regime for the Manuherekia catchment is still about two years away and even further is the Taieri catchment where hydrological modelling has yet to be started. The status of the Taieri catchment is significant since it includes the highest number of deemed permits (75).
- Due to the under investment in science and planning, I do not consider that the ORC is in a position to provide for the smooth transition from water allocation based on mining privileges to allocation based on RMA consents which are subject to appropriate flow and allocation limits before 1 October 2021. This is a major concern since we are now in 2019 – 'Year 28' of the 30 year transition period for the deemed permits.

National Direction and Legislation

- National direction under the RMA is due to be strengthened. While this investigation was underway, the Government unveiled a range of new initiatives.¹⁵
- While most of these proposals are 'draft' and have been released for consultation, the

¹⁴As stated in Policy 6.2.8 of the Water Plan, 'opportunities for establishing minimum flow regimes on a number of streams and rivers are constrained by mining privileges (now called deemed permits)'.

¹⁵ Proposed National Policy Statement for Freshwater Management and proposed new National Environmental Standards for Freshwater; new freshwater planning process under the Resource Management Amendment Bill 2019; proposed National Policy Statement on Urban Development to replace the existing National Policy Statement on Urban Development Capacity; proposed National Policy Statement for Highly Productive Land. The Government is also planning to release a proposed National Policy Statement for Indigenous Biodiversity later in 2019.

combined impact of the proposed national direction and potential legislative changes will have a fundamental impact on the future planning framework in Otago.

- The Council will need to make a substantial investment to update the RPS and the Water Plan to provide for existing and proposed national direction and legislative changes.
- The RPS will need to adopt the National Planning Standards three years from when the planning standards come into effect (3 May 2022), or at notification of a proposed RPS, whichever is sooner.
- The RPS will require amendments to identify areas of highly productive land within the Otago region under Proposed Policy 1, National Policy Statement for Highly Productive Land. Strengthened urban development provisions are also likely to be required.
- A reviewed Water Plan will need to be notified by 31 December 2023 to give effect to the NPS-FM. This will also be required to be restructured into the National Planning Standards template.
- The forthcoming freshwater planning process, currently proposed under the Resource Management Amendment Bill, will make a significant contribution to RMA practice in New Zealand and will become a primary vehicle to give effect to the NPS-FM.
- I am hopeful that legislation to implement the new freshwater planning process will be enacted by mid-2020 in time to progress the urgently required Otago planning programme. This will be of critical importance.
- One particular matter that will require attention in the design of the freshwater planning process is how the RPS will be progressed as a whole. Under section 59 of the RMA, the RPS must be designed to achieve 'integrated management of the natural and physical resources of the whole region.' This purpose is supported by the National Planning Standards requirements. If only the freshwater-related changes to the RPS are to be 'carved out' and sent to the freshwater planning process, then this could potentially undermine the integrated management structure of the RPS. It seems to me the scope of how the RPS and other combined RMA planning documents are treated in the Resource Management Amendment Bill under the freshwater planning process needs to be reconsidered in order to ensure integrated management.

Future planning framework

A new planning framework is required for Otago. This framework, amongst other things, needs to provide a robust process for assessing any applications that are made to replace the deemed permits and set plan provisions, as guided by national direction, especially the NPS-FM.

In the Otago context, it is also important that consent applications are processed on the basis of a more adequate and robust planning framework that involves a minimum flow and allocation regime. This has relevance to both deemed permits and existing resource consents that are due to expire before the new planning framework is in place.

Importantly, the establishment of plan provisions for minimum flows and allocation must come before the processing of resource consents to replace the deemed permits. This is a critical matter.

Further, all the deemed permits within a sub-catchment should be considered together as a 'block'. Ad-hoc or individual processing of consents in advance of a robust policy and rule framework should be avoided.

Ideally, the planning framework will:

- provide certainty for the community with clear timeframes and processes

- avoid undue delay and duplication of planning effort and multiple community consultations
- establish minimum flows and limit setting based on robust science and hydrological modelling, including fair allocation within ecological limits
- ensure implementation of the NPS-FM and other national direction
- provide for the principles of the Treaty of Waitangi and the interests of Kāi Tahu in resource management.

After my discussions with a number of holders of deemed permits, I am confident that, provided they are given certainty of direction, there is sufficient good will among them to participate in the planning programme recommended in this report.

In the light of discussions I have had with the consenting staff at ORC it is my understanding that any water consents granted from now, whether new or replacement consents, will be granted for a short-term of 5 to 10 years. This is to ensure that, in the longer term, resource consents will be aligned with the new planning framework. The intent will be to avoid 'locking in' long term water resource use that will make it difficult to achieve new freshwater limits and allocation when set in the reviewed land and water regional plan.

Short-term interim planning initiatives

Before making my formal recommendations to the Minister, I need to refer again to some planning work that is already underway in the form of two plan changes. I have referred to this briefly earlier in this report. The first is Plan Change 6AA to be notified in October 2019 to amend the starting date for discharge provisions affecting water quality in the region that are due to take effect from 1 April 2020.

Because the discharge provisions are defective and, in particular, because they rely on an Overseer version that no longer exists, the Council is proposing to extend the date when these provisions take effect to April 2026 by Plan Change 6AA. I understand that this date is likely to become academic, because the present defective rules in plan 6A will be replaced by new rules in the omnibus plan change which is anticipated to be notified in March 2020. Plan Change 6AA is necessary now because the water quality rules due to come into effect on 1 April 2020 are recognised to be defective.

The second plan change known as the 'omnibus plan change' is due to be notified in March 2020. My current understanding of the contents of this plan change is that it is intended to immediately remedy the deficiencies in the water management provisions of the current operative plan, in particular those relating to water quality, and provide for interim provisions relating to the management of freshwater resource consent applications.

In addition to the above, the ORC is developing a planning programme going forward that I have discussed with staff and which I will now summarise.

Future comprehensive framework

By November 2020 ORC intends to publicly notify a complete review of its current Regional Policy Statement, first to give effect to the National Planning Standards and secondly to provide, amongst other things, objectives and policies for water management across the region ahead of a review of its Water Plan. The intention is to have this reviewed RPS operative before the reviewed Water Plan is notified.

By 31 December 2023, ORC intends to notify a complete review of its Water Plan to provide for a new Land and Water Regional Plan for Otago. This plan is to include region-wide objectives, strategic policies, region-wide activity policies, and provisions for each of the FMU sections that will cover all

the catchments within the region.

Given this timeframe, which I note is a tight one, it is clear that the new plan will not be ready in time to deal with applications for new and replacement consents arising from the expiry of the deemed permits. The result will be that these consent applications are assessed under the Water Plan's current default minimum flow limits which, as noted earlier, are inadequate.

Possible extension of Otago deemed permits expiry

I consider that the only way to ensure that new and replacement consent applications will be assessed under the new planning framework is to defer the expiry date for deemed permits in Otago to a period when it can reasonably be expected that the new land and water plan will be in place. In my view extending the expiry date is justified on several grounds:

- first, it will enable the new planning framework to be put in place beforehand so that future resource consent applications can be properly assessed.
- secondly, it will ensure that all new and replacement water permits are subject to catchment level minimum flow and allocation limits
- thirdly, subjecting all consent applications to the new plan will avoid “planning by resource consent” in which ad-hoc resource consent decisions are made in the context of an inadequate planning regime
- fourthly, extending the deemed permits in conjunction with the interim measures and a revised planning framework will provide certainty for Kāi Tahu, permit holders, and stakeholders about the planning pathway going forward.

I also note that time is required for investment in the science that underpins the planning and this is needed to properly inform the plan rules and the assessment of future resource consent applications for freshwater.

Further, I gathered from my discussions that an extension is likely to be supported by the Council, Aukaha and at least several of the stakeholders who also see merit in having consent applications assessed under a fit for purpose planning framework.

I also note that this proposed extension would apply only to the Otago region and so is of limited interest or application in a national sense.

Recommendations

In the light of the above comments and earlier discussions in this report I now make the following recommendations to the Minister for the Environment:

1. that pursuant to section 24A of the RMA, the Minister recommends to the Otago Regional Council that it provide an adequate interim planning and consenting framework without delay to manage freshwater in the intervening period up to 2025. This will include Plan Change 6AA and the Omnibus Plan Change
2. that pursuant to section 24A of the RMA, the Minister recommends to the Otago Regional Council that it takes all necessary steps to develop a fit for purpose freshwater management planning regime that gives effect to the relevant national instruments and sets a coherent framework for assessing all water consent applications including those that are made to replace any deemed permits
3. that pursuant to section 24A of the RMA, in order to achieve recommendation 2, the Minister recommends to the Otago Regional Council that it adopts the following policy and planning programme of work:
 - by November 2020 a complete review of the current Regional Policy Statement is publicly notified with the intention that it be made operative before the review of its Water Plan is notified
 - by 31 December 2023 a new land and water regional plan for Otago is publicly notified. This plan is to include region-wide objectives, strategic policies, region-wide activity policies, and provisions for each of the FMU sections that will cover all the catchments within the region
4. that pursuant to section 27 of the RMA, the Minister requires the Otago Regional Council to provide 6-monthly progress reports in relation to the following matters:
 - progress made in developing science, planning, consenting, monitoring and enforcement, and land management organisational capability and capacity
 - progress in achieving recommendations 1, 2 and 3
 - a summary of freshwater resource consenting activity for the reporting period
5. that the Minister initiates the necessary legislative process to change the date for expiry of the deemed permits in section 413(3) of the RMA, from 1 October 2021 to 31 December 2025, being the date by which the Otago Regional Council's new land and water regional plan is to be operative. For the avoidance of doubt this recommendation to amend section 413(3) of the RMA applies only to the Otago region
6. that if the new freshwater planning legislative process is delayed for any reason, consideration be given to promoting special legislation for the Otago region to establish a special hearing process to achieve completion of the Otago Regional Policy Statement by 2022 and the new land and water regional plan by 2025. This special legislation would need to provide for the hybrid hearings panel model and restricted appeals to the Environment Court.

Dated at Christchurch this 1st day of October 2019



.....
P R Skelton

Honorary Professor Peter Skelton CNZM; D.Nat.Res (Hon); LLB; FEIANZ

Appendix 1

Letter of Engagement

Hon David Parker BCom, LLB

Attorney-General

Associate Minister of Finance

Minister for Economic Development

Minister for the Environment

Minister for Trade and Export Growth



16 May 2019

19-M-00702

Honorary Professor Peter Skelton

skeltonp@xtra.co.nz

Dear Peter

Resource Management Act 1991, section 24A investigation, Otago Regional Council

In accordance with 24A of the Resource Management Act 1991 (RMA), I am appointing you to investigate whether the Council is on track to adequately perform its functions under section 30(1) of the Act, in relation to freshwater management and allocation of resources.

The investigation will focus on whether Council has, or will have, an appropriate planning framework in place that gives effect to the National Policy Statement on Freshwater Management, in time to consider all applications for new water permits before deemed permits expire. It will also look at what support Council might need to achieve this.

The scope and timing of the investigation is outlined in the attached Terms of Reference.

Robert McClean, Manager, RMA Practice, will be in contact with you to provide information on the investigation process. If you have any questions about this investigation before then, please contact Robert on 0220676655 or Robert.McClean@mfe.govt.nz.

Your appointment will be subject to any necessary procurement, contracting and remuneration processes as required by the Ministry for the Environment.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'David Parker'.

Hon David Parker

Minister for the Environment

Appendix 2

Letter of extension

Hon David Parker BCom, LLB

Attorney-General

Associate Minister of Finance

Minister for the Environment

Minister for Trade and Export Growth



02 SEP 2019

19-M-01732

Honorary Professor Peter Skelton
skeltonp@xtra.co.nz

Dear Honorary Professor Peter Skelton

Resource Management Act 1991, section 24A investigation, Otago Regional Council

Thank you for your letter dated 20 August 2019 requesting an extension of the final report back date for this investigation to 1 October 2019.

I am pleased that the investigation is making good progress and I understand the complexity of the matters that the subject of your inquiry. I agree with you about the importance of the forthcoming decisions of the Environment Court relating to the Lindis catchment, which involve both water limits and allocation (including the deemed permits).

I also agree on the need to ensure that your report provides direction on the development of a new freshwater planning framework for Otago that aligns with the current initiatives to be outlined in the forthcoming discussion document on freshwater policy.

For the reasons outlined above, I agree to extend the final report back date to 1 October 2019. I have attached the revised Terms of Reference to this letter.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'David Parker'.

Hon David Parker
Minister for the Environment

Appendix 3

Terms of Reference for Section 24A Investigation of Otago Regional Council Performance under the Resource Management Act 1991

Purpose of Investigation

1. The purpose of this investigation is to identify whether the Otago Regional Council (ORC or the Council) are adequately carrying out their functions under section 30(1) of the Resource Management Act 1991 (RMA) in relation to freshwater management and allocation of resources.
2. This investigation is focused on the exercise of the Council function in relation to its planning framework, and its ability to process and transition deemed permits in a consistent way under the RMA and National Policy Statement for Freshwater Management (NPS-FM). This matter relates particularly to the Manuherehia, Upper Cardrona and Arrow rivers before the deemed permits expire in 2021.

Context

3. When the Resource Management Act 1991 (RMA) was enacted mining privileges granted or authorised under the Water and Soil Conservation Amendment Act 1971, and the Water and Soil Conservation Act 1967, were deemed to be water permits, discharge permits or a permit that confers on its owner rights over land in respect of which the holder is not the owner. These permits expire on the 30th anniversary of the date of commencement of the Act (this will be 1 October 2021).
4. Around 300 deemed permits remain in the Otago region. A significant number of the permits that have not yet been transitioned to standard resource consents are in the catchment areas of the Manuherehia, Upper Cardrona, and Arrow rivers.
5. In 2018, the ORC intended to notify a significant plan change to set minimum flow rates for the Arrow, Cardrona and Manuherehia catchments. This proposed plan change was halted and the Council is now planning to prepare a comprehensive minimum flows and allocation plan change in December 2025.
6. In August and December 2018, the Minister for the Environment (the Minister) wrote to ORC expressing concerns about the decision not to proceed with the plan change and met with ORC to discuss this on 22 March 2019. The Minister also noted an expectation that the ORC establish a framework that provides for a plan change to set minimum flows, ahead of the deemed permit expiry.
7. To date, no plan change has been notified. Until this occurs all applications to replace deemed permits will be considered under the current operative plan which does not contain minimum flow rates or other specific limits.
8. As the timeframe from notification to decisions on an RMA plan is 2 years, there is an increasing likelihood that the large volume of applications to replace the deemed permits will occur under the existing operative plan.
9. The Minister requires an understanding of the ability of ORC to carry out their functions

under section 30(1) of the RMA in relation to freshwater management and allocation of resources. In particular, the adequacy of the current planning framework and the capability of the ORC to process and make decisions on consents in a manner consistent with the obligations on the Council to set minimum water flows and allocation limits in their regional plan (as required by the National Policy Statement for Freshwater Management 2014 (NPS-FM)) .

Scope of the Investigation

10. The investigation will address the following:
 1. adequacy of the current planning framework from a RMA and NPS-FM standpoint;
 2. adequacy of the performance by ORC of functions relating to planning for discharges of contaminants to land and water, and taking, using, damming or diverting water. This will focus particularly on the Manuherekia, the Upper Cardrona and Arrow Rivers, and whether the planning framework will be appropriate and sufficient in time to consider applications for new water permits once deemed permits expire;
 3. adequacy of ORC resources, including its capacity to develop and implement an adequate planning framework that gives effect to the NPS-FM;
 4. Treaty partners and stakeholder perspectives; and
 5. any other relevant contextual matters.

Methodology

11. The investigator will:
 1. spend the time needed with ORC to inform Councillors of the investigation and then undertake discussions with council staff with a focus on Senior Leadership, Planning Policy Manager, relevant Policy Planners, and technical staff;
 2. the discussions with the ORC will be based around a set of investigation questions, prepared by the investigator. These questions will be pre-circulated to the ORC and the interested parties consulted;
 3. undertake any additional research and analysis to the discussions required to complete the investigation;
 4. seek the views of Ngāi Tahu as tangata whenua;
 5. seek the views of the Department of Conservation, Federated Farmers (Otago Division), Otago Fish and Game Council, and any other stakeholders the investigator deems necessary;
 6. complete a draft findings report, including recommendations for the Minister for the Environment on the options for addressing any issues identified in the investigation; and
 7. finalise and present a copy of the report to the Minister for the Environment.

Term of investigation

12. The investigation must begin no later than 1 July 2019 and be completed by 1 October 2019.
13. The Investigator must report back to the Minister with their final opinion by 1 October 2019.

Costs

14. The cost of the salary of the investigator will be covered by the Ministry for the Environment.

Appendix 4

The list of interviewees

Organisation	Interviewee	Position
Otago Regional Council	Sarah Gardner Andrew Newman Peter Constantine Peter Winder Julie Everett-Hincks Joanna Gilroy Anita Dawes Sylvie Leduc Tom de Pelsemaeker Peter Ravenscroft	Chief Executive Acting GM Policy, Science & Strategy Planning Consultant Acting General Manager Regulatory Science Manager Consenting Manager Acting Manager Policy Senior Policy Analyst Senior Planner Environmental Resource Scientist – Freshwater
Central Otago District Council	Tim Cadogan	Mayor
Waitaki District Council	Gary Kircher	Mayor (telephone discussion)
Aukaha, Kāi Tahu	Edward Ellison Phillip Broughton Maria Bartlett Gail Tipa Kathryn Gale	Chair Rūnaka Executive Member Planner Consultant Kairangahau Māori Freshwater Researcher
Central Otago Winegrowers	Nick Paulin	President
Manuherekia Catchment Water Strategy Group	Allan Kane	Former Chair
Upper Clutha Water Group	Mandy Bell	Chair
Local irrigators	Gary Kelliher Matt Hickey Geoff Crutchley	Acting Chair, Manuherekia River Ltd (MRL) Scientific consultant Chair, Maniototo Irrigation Company

Appendix 4

The list of interviewees - continued

Organisation	Interviewee	Position
Federated Farmers	Simon Davies Andrew Patterson Sally Dicey Kim Rielly	Otago chair High Country chair Consultant Resource Management Planner Regional Policy Manager, South Island
Otago Water Resource Users Group (OWRUG)	Ken Gillespie Chris Hansen Tony Strain Susie McKeague Graeme Martin	Chair, OWRUG & Chair, Hawkdun/Idaburn Irrigation Co. Chair, Arrow Irrigation Co. Arrow Irrigation Co. Consultant for MAC catchments Adviser
Otago Fish & Game	Niall Watson Monty Wright Nigel Paragreen Ian Hadland Colin Weatherall	Former CEO Chair Environmental Officer CEO Councillor
DOC	Marie Long Neil Deans John Roberts	Director, RMA planning & regulatory Policy - freshwater liaison South Island Manager
Irrigation NZ	Elizabeth Soal	CEO
Central Otago Environmental Society	Ray Wright Evelyn Skinner Graye Shattky Matthew Sole	Acting Chair
Individuals	William Cockerill	

Appendix 5

History of regulation – the Otago mining privileges

Authored by Robert McClean, Ministry for the Environment

Early gold mining legislation

Early gold mining legislation established and maintained a miner's right to use water. This right is often called a 'mining license' or 'mining privilege'. Under the RMA, the water right is called a deemed permit.

The earliest gold mining legislation dates from 1858 and was drafted in response to the discovery of gold in Nelson. The Gold Fields Act 1858¹⁶ provided the power to grant leases for mining. This included the use of water.¹⁷ Under section 7 of that Act, it was stated:

It shall be lawful for the Governor in Council to demise to any person, for any term not exceeding fifteen years from the making of the Lease, any auriferous Crown Land for mining purposes, and also to grant water rights and other easements for such purposes, and to fix the amount to be paid by way of Rent or Royalty for the same respectively.

This provision set the basis for the granting of mining leases (later called privileges) by the Crown.

After the discovery of gold in Otago in 1861, a new Gold Fields Act was established in 1862 along with regulations for the administration of the Otago gold fields. The key sections of the Otago gold fields regulations relating to water are set out at the end of Appendix 5. The regulations prescribed:

- authorisation by a Court Warden for the construction of any water race
- the priority system based on 'superiority of right' determined by priority of occupation. This became connected to the date and time of a certificate or authority granted by a Warden
- the owner of a superior right could regulate less-superior rights during periods of insufficient water supply
- the Warden could regulate water supply during periods of low flow, provided that the allocation did not affect the superior right holder
- sluice heads (or 40 inches of water) are to be measured by the use of a gauged water box with dimensions of 12 feet long, 10 inches deep, and 20 inches wide
- the number of sluice heads allowed was established as one sluice head for 1 or 2 miners, two sluice-heads for 4 or additional miners; and so on at the rate of one sluice head to every additional two miners
- the holders of water rights were not allowed any water to run to waste; but such water was to be appropriated to the use of the next holder of a right, according to the date of their respective registrations
- two sluice heads of water were, if required, allowed to flow in the natural course of a creek or river for general use at all times.

This approach to regulating water use on the goldfields was codified in law in the Gold Fields Act 1866.

¹⁶ Gold Fields Act 1858: http://nzlii.org/nz/legis/hist_act/gfa185821a22v1858n74240/.

¹⁷ V.B. Gray, *An Examination of the Administrative System on the Otago Goldfields 1861-8*, MA Thesis, 1949.

This Act defined a 'sluice head' as equalling '40 inches of flowing water' and crystallised the nature of a miner's right whereby the Warden of the Court could authorise the construction of water races. One 'head' equates to one cubic foot of water per second or approximately 100 cubic metres per hour.

The Act also provided that 2 sluice heads of water be allowed to flow in the natural course of the stream 'if required' for general use. The Gold Fields Act 1866 also attempted to tackle the issue of miners' rights and land ownership and provided that the right to mine and use water was preserved even if the land was sold. It also allowed for the use of water (as part of a miner's right) to be sold.

Gold mining legislation after 1866 maintained the miners' rights system to water.¹⁸ Annual renewal provisions were introduced and after 1882 owners of mining privileges had to reapply to the Court Warden for a fresh licence, but without the loss of priority.

Shift from mining to farm irrigation

With the decline in mining in the later 19th century, water races became adapted for farm irrigation over large areas of Central Otago. This purpose was recognised in mining legislation from 1877 onwards which provided that water could be taken for irrigation, mill and industrial uses (in addition to water for gold mining). Permission could also be obtained to change the purpose of the water take from mining to irrigation or industrial uses. These provisions were supported by the Public Works Act 1876 which empowered the Government to supply water for gold fields.

Importantly, the Public Works Act 1876 (and subsequent public works laws) provided the Crown with the power to make dams and water races without any established water limit or renewal – the rights were perpetual.

In contrast, mining legislation contained limitations on licence terms for private gold miners and farm irrigators. In particular, the 1891 Mining Act stated that the Warden could not grant a licence for more than 15 years. It set out the priority of rights system which held that it was determined by the date of application for the water race licence (section 105(12)). The Mining Register was to note the day and time of the application.

The Mining Act 1891 reduced the amount of water that was to remain in the natural water course from 2 sluice heads of water to 1 sluice head (section 105(19)). This legislation continued to recognise that every interest in a water race was deemed to be a chattel interest.

In 1898, the legislation was amended to include a provision that the water supply of any city or town was not to be polluted.

The Mining Act of 1926 extended the quantity of water allowed to 10 heads, which could not be granted for more than 42 years.

Management under the Water and Soil Conservation Act 1967

Mining privileges effectively remained unaltered until the Water and Soil Conservation Act 1967 (WSCA). This Act, which introduced a new national system for the regulation of water, was administered by the National Water and Soil Conservation Authority and regional water boards. Section 2 of the Act was amended in 1969 to provide for existing water uses. This required that every person taking water on 9 September 1966 (where this had been happening at any time for a period of 3 years up to 9 September 1966) was to give notice to the regional water board before 1 April 1970. If notice was given, then the water use was deemed to be a lawfully existing water use.

The Water and Soil Conservation Act was again amended in 1971 to explicitly provide for current mining privileges granted under the mining legislation. This provided for existing mining privileges to

¹⁸ Peter Farley, *Irrigation Scheming, A History of Government Irrigation in New Zealand*, Peter Farley, 2013, p 23.

be authorised under section 2 of the Act. The amendment also transferred the administration of the mining privileges from the Court Wardens to the water boards. Key aspects of this transfer involved:

- retention of the priority right system (section 11)
- regional Water Board to issue certificates of priority (section 12)
- regional Water Board may direct a specified quantity of water not exceeding one cubic foot per second be allowed for public use before the point of intake (section 15)
- all records were transferred to Regional Water Board from the Warden (section 17)
- upon the expiry of a current mining privilege, the Board may grant, on application, the right to continue the use and maintenance of any water race that was authorised under the expired privilege (section 24).

The Water and Soil Conservation Act continued the exemption from expiry terms for mining privileges held by the Crown.

Overview of irrigation in the Manuherekia

Alluvial gold mining started in the Manuherekia in 1863 and the Manuherekia Gold Field was proclaimed in August 1864. While mining was initially started by individuals with ‘picks and shovels’, the need for sluicing and the diversion of large quantities of water influenced the establishment of mining corporations and collectives and their decision to build water races and sluicing operations.¹⁹ The Government also stepped in and subsidised the construction of large water races.

One of the longest water races was the Mt Ida Water race which was built between 1873 and 1877 to supply water to the Naseby township. The water race is 108 km long and takes water from the upper Manuherekia in the Hawkdun Range.²⁰ It was designed and supervised by the Otago Provincial Engineer and authorised by the Government Proclamation on 17 October 1873.

The conversion of water races for farm watering and irrigation purposes started in the late 19th century. The Government also had a keen interest in using the mining privileges to establish farm irrigation schemes. The first surveys of irrigation in the Manuherekia, Ida and Maniototo were undertaken in 1906 and by 1913-1914. The Crown had obtained grants of water amounting to 140 heads in the Manuherekia and had started the construction of large irrigation water races.²¹ One of the projects was the reconstruction of the Mt Ida water race during the mid-1920s. This race had been abandoned and a storm in 1918 had washed away many stream crossings.

The Ministry of Public Works actively opposed the granting of new individual water rights in the Manuherekia in order to build the irrigation schemes. An example was an application by Mr Davies who applied for a change in water intake out of the Manuherekia in September 1921. At this time, Davies had the rights for 12 heads of water granted in 1908 for irrigation purposes. The water race, however, had never been built. The District Engineer commented to the Engineer in Chief at the Public Works Department:

To allow the applicant to revive this old right of twelve heads unconditionally would rob the Government scheme of that quantity of water and consequently make a considerable portion of the expenditure on the Government scheme a dead loss.

Altogether, it would not be in the interests of the eventual future progress of irrigation to

¹⁹ Olssen, Erik. *A History of Otago*. Dunedin, N.Z.: J. McIndoe, 1984, p 65.

²⁰ D J Hamilton, Early Water Races in Central Otago, 3rd Australian Engineering Heritage Conference, 2009.

²¹ Omakau Irrigation Scheme, AATE W3397 Box 24, Archives New Zealand.

permit the applicants to hold a grant of water unconditionally.²²

By 1930, large irrigation schemes were underway in the Manuherehia catchment. One of the largest was the Omakau Area Irrigation Scheme which was comprised of one main race and five creek schemes. This involved the construction of the Falls Dam to deliver water to about 3,600 hectares of farm land via a 93km network of water races. To achieve this, the Government had acquired most of the water rights in the upper Manuherehia. The Omakau scheme provided 1 head of water to be allocated per 150 acres over a 150 day period.²³ At the time, the estimated cost of obtaining the remaining water rights held by the late John Wilson (14 heads of Lauder Creek water) was £17,000 (including compensation).²⁴

The decision to progress an expanded Manuherehia Irrigation Scheme and the construction of Falls Dam as an unemployment relief project was made on 23 October 1931.

Other mining privileges in the area, which remained in private hands, were made submissive to the main irrigation schemes. As an example, the Thompson's Block water race mining privilege (No. 4363, Thurlow and Others) had a condition which made its water priority subservient to the 75 heads required for the Manuherehia Scheme. Further, the privilege was conditional on the owner entering an agreement to 'sell the right to the Crown on demand at fair valuation for the actual construction of their proposed main race in so far as it would be useful for inclusion in the Government Scheme, no claim being made for the value of water'.²⁵ Later in the 1940s, as irrigation works continued, the Crown obtained the Thompson's Block water race for £1,520 including the cost of building new race structures.²⁶ Further licences were obtained over Thompsons Creek (No. 253 and 564) in 1945 for £300. It was commented at the time that 'they are in fact the only remaining private rights of any value and should be acquired by the Crown'.²⁷

The irrigation construction phase in 1910-1940s resulted in six main schemes being constructed in the Manuherehia-Taieri catchments:

- Hawkdun Ida Burn Irrigation Scheme (1929-1931), incorporating the reconstruction of the historic Mt Ida water race, which takes water from tributaries in the Hawkdun Range and delivers water to the upper catchment of the Ida Burn and Ewe Burn catchments
- Ida Valley Irrigation Scheme (1917), which is sourced from two large dams, the Poolburn and Manorburn reservoirs
- Blackstone Irrigation Scheme (1920), which takes water from the main stem of the Manuherehia River and discharges water into the lower Ida Burn
- Omakau Irrigation Scheme (1936), which takes water from the main stem of the Manuherehia River and also takes from Dunstan Creek, Lauder Creek, Chatto Creek and Thomsons Creek
- Manuherehia Irrigation Cooperative (1922), which takes water from the Manuherehia main-stem at the Ophir Gorge and some smaller takes from Chatto Creek
- Galloway Irrigation Scheme (1920), which takes water from the Manuherehia main-stem, lower Manor Dam and Dip Creek.

²² *District Engineer to Engineer in Chief*, Public Works Department, 21 September 1921, Omakau Irrigation Scheme, AATE W3397 Box 24, Archives New Zealand.

²³ Ministry of Works, *Irrigation in Central Otago*, 1954, p 33.

²⁴ *Irrigation Omakau Scheme, 1930-1933*. W1 W2550 8 64/69, Archives New Zealand.

²⁵ *Ibid.*

²⁶ *Omakau Irrigation Scheme, Matokanui Water Rights*, AATE W3397 Box 26, Archives New Zealand.

²⁷ *Resident Engineer to District Engineer*, PWD, 23 May 1945, Omakau Irrigation Scheme, Matokanui Water Rights, AATE W3397 Box 26, Archives New Zealand.

The bulk of these schemes were constructed by the Ministry of Works, and their water takes (except for the Hawkdun/Ida Burn) were largely dependent on the mining privileges held by the Crown.

Since the 1940s, there have been various calls to increase irrigation and water storage in the Manuherekiā. An example of this was a meeting between Manuherekiā farmers and the Minister of Works in 1956.²⁸ It was commented at the time that the valley was desperately short of water and that the Falls Dam had not been completed to its originally intended height (as it was considered to be 42 feet short). The dam would also require strengthening. It was commented that the capital cost was very high and funding to upgrade the dam was not supported by the Minister of Works at the time.

Increasing costs to maintain the water storage and races continued to be a major hurdle in Central Otago from the 1950s onwards. A variety of studies carried out by the Ministry of Works (later Minister of Works and Development) noted the challenges around the cost of maintenance, reliance on run-of-the-river intakes, difficulty in management of small schemes and inadequacy of flow to meet summer water demands.²⁹ A 1954 report also highlighted that the government irrigation schemes in the Manuherekiā were entirely dependent on the mining privileges authorised under mining legislation.³⁰

Irrigation restructuring in the 1980s

Government restructuring in the late 1980s radically changed the irrigation landscape in Central Otago and elsewhere around New Zealand. Faced with mounting costs to maintain the historic irrigation schemes, the Government made a decision to end the construction and maintenance of farm irrigation and embarked on a plan to sell the schemes to farmer cooperatives or corporations. This coincided with the disestablishment of the Ministry of Works and Development in 1987.

Negotiations for the sale of the Crown irrigation schemes started in the late 1980s. Groups of irrigators established incorporated societies, such as the Galloway Irrigation Society Incorporated which was created in 1986. It was the Crown's policy to transfer all the mining privileges to irrigation companies or adjacent landowners by 31 May 2000.³¹

A primary concern of the irrigators was the fate of mining privileges. As indicated above, the Crown irrigation schemes were built on the basis of the Crown holding perpetual rights to the water under the mining privileges. These perpetual rights were to be extinguished during the sale of the irrigation schemes.

As an example, the Omakau Scheme included a number of primary expired mining privileges for the taking of water as outlined in the table below. The primary deemed permits included No. 5785 (the 5th Priority) which provided a take of 70 heads from the Manuherekiā and the Falls Dam share of 80 heads (No.5768N). These water takes had been continued by the Crown under the Public Works Act exemption. In addition to these takes, there were a number of bywash or discharge privileges. The most significant of these discharges was the No. 1 to the Manuherekiā River (providing a maximum discharge of 200 cusecs).

²⁸ 12 March 1956, Notes of interview between Hon Minister Goosman, Minister of Works and a deputation representing people served by the Falls Dam area (Roxburgh), Omakau Irrigation Scheme, Matokanui Water Rights, AATE W3397 Box 26, Archives New Zealand.

²⁹ MWD, Working Party Report, Central Otago Irrigation, 1981.

³⁰ Ministry of Works, Irrigation in Central Otago, 1954.

³¹ Peter Farley, *Irrigation Scheming, A History of Government Irrigation in New Zealand*, Peter Farley, 2013, p 26.

Summary of Omakau Scheme Water Takes (estimates only at 1987)

Mining privilege no.	Water take	Original expiry date	Maximum usage (cusecs)	
			Summer	Winter
5768N	Falls Dam in Manuherekia River	2.5.1980		
WR4363	Manuherekia River		12	2
WR5785N	Manuherekia River (5 th priority)	3.10.1959	80	-
	Two Public Works Act takings, Becks Creek (unknown)		6	-
	Two Public Works Act takings, Thompsons Creek (unknown)		4	
WR1464B, 3033, 289, 295	Thompsons Creek	Expiry dates from 1941-1966	15	3
WR5784N	Dunstan Creek (2nd priority)	3.10.1959	18	-
WR513B	Lauder Creek (2nd Priority)	30.8.1948	15	-
WR219B	Muddy Creek	24.7.1944	1	
	Two Public works Act taking, Blackbush Creek (unknown)		4	1
WR518	Middle Creek	28.5.1945	3	1
WR516	Coal Creek		1	-
WR515	Scotts Creek	30.8.1948	2	1
WR301	Devonshire Creek		1	-
WR306, 1240	Thompsons Creek		10	3

Source, Archives New Zealand³²

In addition to the water takes listed in the table above, the Omakau scheme involved many other expired and unused mining privileges relating to Thompsons Creek, Blackbush Creek, Devonshire Creek and other streams.³³

For most of the negotiations based on mining privileges in Central Otago, the irrigator societies requested a 30 year security of water supply. The 30 year period was chosen on the basis that the new private owners would need to invest funds to upgrade the historic water races and the 30 year period

³² ALLR W5427 873 Box 719 Irrigation Schemes South Island Omakau, Archives New Zealand.

³³ ALLR W5427 873 Box 719 Irrigation Schemes South Island Omakau, Archives New Zealand.

would give time to recover the capital expenditure incurred.³⁴ As explained by Peter Farley:

The approach taken was to sell the government-owned schemes, including all “Headworks,” on an “as is, where is” basis with the purchaser being given a period of statutory access rights to enable them to complete at their own cost, matters such as the definition and registration of access rights which would otherwise have to have been done by the government. The sale process did not involve altering the nature of the water rights held by schemes except to limit the term of any water right to its current term or to 30 years, whichever was less. Access rights were also preserved.³⁵

It was intended that the period of transition would influence the sale price of the irrigation scheme:

As the schemes were sold as going concerns, the water rights were included as one of the scheme assets. There was no attempt to use the sale process to extend or modify water rights except to set a limit of 30 years on the Mining Rights. In some cases, major schemes faced applying for new water rights within two years of the sale. This issue was addressed by allowing for the expected costs of applying for renewal of the rights when negotiating the sale price.³⁶

The Crown agreed to the 30 year period during the individual irrigation negotiations and a clause was inserted in the purchase agreements for those irrigation schemes based on mining privileges. This clause promised that the Crown would introduce legislation to secure the 30 year water right term. As an example, the Agreement for Sale and Purchase of Omakau Irrigation Scheme of 23 August 1989 stated:

5.2 The Crown shall pass legislation providing for the Mining Privileges, Water Rights and Dam Licence (called ‘the Rights’) to be transferred to the Purchaser with the same conditions, priorities, privileges and terms upon which they are held by the Crown PROVIDED THAT the terms of the Rights shall expire on the earlier of the date of termination of those Rights upon the terms as now held by the Crown or 30 years from the settlement date.³⁷

All the major Central Otago irrigation schemes were sold to local farmer cooperatives and corporations during 1989, including the Manuherekia, Omakau, Hawkdun, Blackstone and Galloway schemes. The Ida Valley scheme was not sold until 1996. The schemes were sold for either nothing or \$1 and involved substantial grants by the Crown to upgrade the historic water race infrastructure.³⁸

The Omakau, Manuherekia and Blackstone irrigation groups ended up with shares in the Fall Dam (managed by the Falls Dam Company Ltd) and the bulk of the water managed by the irrigation schemes (except for Hawkdun) was held under mining privileges.

The irrigation sales were followed by the Irrigation Schemes Act 1990 which delivered the promised legislation to transfer the mining privileges. For mining privileges acquired by the Crown for the construction of the irrigation schemes, the Irrigation Schemes Act confirmed the 30 year transition period whereby any water rights acquired would continue to exist for a 30 year period after acquisition of the scheme.

³⁴ ALLR W5427 873 Box 719 Irrigation Schemes South Island Omakau, Archives New Zealand.

³⁵ Peter J Farley, *Privatization of Irrigation Schemes in New Zealand*, International Irrigation Management Institute, 1994, p 7.

³⁶ *ibid*, p 8.

³⁷ ALLR W5427 873 Box 719 Irrigation Schemes South Island Omakau, Archives New Zealand.

³⁸ The Manuherekia Irrigation Scheme was purchased for \$125,000 but the sale price included two houses and a depot as part of the irrigation assets. Reference, Peter Farley, *Irrigation Scheming, A History of Government Irrigation in New Zealand*, Peter Farley, 2013, p 224.

Under section 6(1) of the Irrigation Schemes Act 1990, the transfer of mining privileges was provided for:

Where an irrigation scheme is sold or otherwise disposed of by the Crown pursuant to this Part, any mining privilege held by the Crown in relation to the scheme shall be deemed to be transferred to the person to whom the scheme is sold or otherwise disposed of.

Section 6(2) of the Act also provided that 'any such mining privilege deemed to be transferred...shall continue in force for a period of 30 years commencing on the date of transfer and shall then expire.' Later, the Resource Management Act 1991, amended this provision to state:

Except as otherwise provided in section 413(3) of the Resource Management Act 1991, any such mining privilege deemed to be transferred pursuant to subsection (1) shall continue in force for a period of 30 years commencing on the date of transfer and shall then expire.

Mining Privileges under the RMA

At the same time as the Government was in the process of privatising the irrigation schemes, the Resource Management Law Reform (RMLR) process was overhauling environmental laws. A key concern of the reform was a review of water management and the need to ensure sufficient instream flows, especially for the habitat of trout and salmon. Another key concern was a shift away from 'water rights and private ownership' to 'water management' especially in view of the principles of the Treaty of Waitangi.

In terms of the mining privileges in Central Otago, the Resource Management Law Reform (RMLR) papers indicate that the Crown considered that the mining privileges needed to be phased out due to the impact of over allocation (leading to insufficient instream flows), loss of environmental water quality, and lack of transferability as the privileges are 'tied to a piece of land'.³⁹

Initially, the Ministry for the Environment proposed that the Resource Management Bill establish a 10 year expiry date for the mining privileges. This period was strongly opposed by the Treasury and the Ministry of Agriculture and Fisheries (MAF) on the basis of the Crown irrigation sales and the negotiated 30 year period for the mining privileges. At the time, Treasury estimated that a 10 year term would reduce the value of irrigation schemes and sales and revenue to the Crown by around \$7 million.⁴⁰ It was stated that the 30 year transition period was to provide for the 'reasonable expectations of the current generation to realise their investment in their present irrigation arrangements.'

To enhance minimum water flows, it was proposed to promote voluntary acquisition of the deemed permits by the regional council. It was also envisaged that compulsory taking of the mining privileges would be considered with the provision of compensation to the owners.

Consequently, when the Resource Management Bill was being considered by Cabinet in April 1990 (POL (90) M 11/6), a 30 year transition period had been decided and it was agreed:

That Government's concern is for the establishment of flows that are sufficient to meet minimum standards and that protect the national interest in instream values in Central Otago rivers and streams.

Cabinet also noted that the 'detailing of this national interest for instream flows will require the collection of basic data on flows, uses and instream needs over the next two years'.

Despite the recent sale of the mining privileges as part of the disposal of the Crown irrigation schemes,

³⁹ RMLR: Funding and Accountability Mechanisms for Conversion of Mining Privileges, POL(90) 81, 10 April 1990.

⁴⁰ Peter Farley, *Irrigation Scheming, A History of Government Irrigation in New Zealand*, Peter Farley, 2013, p 101.

the Government was interested in buying-back the privileges to protect the rivers of Central Otago. Cabinet noted that ‘water and soil block subsidy is able to be allocated to fund the national interest in the investigation and measures of purchase and compensation for the Otago mining privileges conversion programme and that the Minister for the Environment determines the priorities.’ If the water and soil block subsidy programme was to be discontinued (which it was), or funds were insufficient, then officials were to report back on ‘how to fund the achievement of these national interest outcomes in the Otago mining privilege conversion programme.’⁴¹

With the enactment of the RMA in 1991, all the mining privileges became deemed permits. In 2014, it was estimated that in the Manuherehia catchment, ‘the six irrigation schemes (Blackstone, Galloway, Hawkdun Idaburn, Ida Valley, Manuherehia and Omakau) have entitlement to 68.7% (on a volume basis) of the available water allocation in the catchment.’⁴² The water takes and discharges for all the irrigation schemes, with the exception of the Hawkdun Idaburn, are authorised by deemed permits. With reference to the Omakau Irrigation Scheme as an example, 15 deemed permits provide for the use of 3,850 L/s of water.⁴³ All of the deemed permits are set to expire on 1 October 2021.

⁴¹ RMLR: Funding and Accountability Mechanisms for Conversion[?] of Mining Privileges, POL(90) 81, 10 April 1990.

⁴² Golder Associates, Manuherehia Feasibility Study – Consent Review – Current Resource Consents, 2 April 2014.

⁴³ Ibid.

Extract from Rules and Regulations of the Otago Goldfields 1862

<http://nzetc.victoria.ac.nz/tm/scholarly/tei-Stout63-t13-body-d1.html>

IV.—WATER RIGHTS AND RACES.

1.—Head Races.

Any person intending to divert and use water for mining purposes by means of any Head Race, shall give notice thereof, in writing to the Warden, and to the holder or holders (if any) of a prior right or rights to divert and use water from the same source; and such notice shall be in the form hereinafter set forth; and copies of such notice shall be posted and maintained for 14 clear days at the source whence it is proposed to obtain water, and at the proposed termination of such race; and the intended course thereof shall be indicated by pegs not less than 2 inches square, or by large stones marked ↑, and placed not more than two hundred yards apart. And if no valid objection be entered against such races within 14 clear days from the posting of such notices, a Certificate of Registration may be granted by the Warden to the applicant.

FORM OF NOTICE.

(District and date.)

To the Warden at

I hereby give notice that I intend to construct a Head Water Race for Mining Purpose, commencing at a point (*) and terminating (*) The length of each Race is _____ or thereabouts, and its intended course is (*).

[Signature and address in full of applicant]—

* Here describe precise localities. * Do. * Do.

2.—Races already constructed.

Races constructed prior to the Proclamation of any Gold Field, or of these Rules and Regulations, must be registered with the Warden, as provided by Section 1.

8.—Superiority of Right.

Superiority of right to a supply of water shall be determined by priority of occupation, the earlier occupant having the superior right. In all cases when the occupier claims under a certificate or other authority in writing granted by a Warden or Commissioner, occupation shall be taken to have commenced at the date of such certificate or authority.

4.—Races to be commenced within one month.

The cutting and formation of races must be commenced within one calendar month from the date of registration, and the occupiers shall continue cutting and forming the same until the work is completed, otherwise any superiority of right to which they may be entitled by virtue of such registration shall be deemed to be forfeited.

5.—Superiority of Right Forfeited by Disuse.

If any race shall be entirely unused for a full period of thirty days at a time when water is available for it, occupation of the right shall be deemed to have recommenced at the last re-occupation thereof.

6.—Abandonment of Races.

All rights to any race shall become forfeited if abandoned for the space of one calendar month, unless

in cases of sickness or unavoidable absence, or in consequence of failure of water; but it shall be lawful for the Warden in his discretion, upon sufficient cause being shown, to suspend the operation of this Regulation for a further period of one month, and a certificate of such suspension shall be given in writing to the occupiers.

7.—Heads of Races.

All races that may hereafter be cut, shall have a point specified at which they shall be taken from the creek or river. In races already cut, this point shall be taken to be the spot from which the race now heads. No person shall shift or alter the head of any race without the written sanction of the Warden, nor to the prejudice of any existing right.

8.—Alteration of Races.

The alteration or extension of a race at any time shall not in any way affect any right or privilege attached to such race; and the holders thereof shall, during such alteration or extension, be deemed to be in occupation of all the rights and privileges attached to such race: provided that such alteration or extension shall first be approved by the Warden.

9.—Insufficient Supply of Water.

If the water flowing in any creek or river is insufficient to supply all the races connected therewith, the owner of any right shall—on receipt of a written notice from the owner of a superior right, stating that the supply of such superior right is less than he is entitled to—immediately cease to use the water, or such portion thereof as may be necessary to make up the supply of the superior right.

10.—Water Gauge.

If any dispute shall arise between holders of water-rights deriving their supply from the same creek or water-course, relative to the quantity of water to which each of them, the said holders, is or may be entitled, the following shall be taken to be a head of water, and such holders shall be limited thereto:—

A stream of water gauged by a box, 12 feet long, 10 inches deep, and 20 inches wide, all measured in the clear. The box shall be covered throughout. The upper or entrance end of such box may be left entirely open; but the lower end, or end of exit, shall be fitted with a bar 2 inches high, affixed to the floor of the box, and with a pressure or headboard, 6 inches deep, affixed to the top of the box, leaving an aperture of 2 inches in depth, and of the full width of the box.

(a.) If more than one sluice head of water requires to be gauged, the gauge-box should be enlarged horizontally to ensure accurate measurement. But when this cannot be done owing to natural obstacles, or other sufficient reasons, the gauge-box may be enlarged perpendicularly, in which case the depth of the pressure or headboard shall be reduced at the rate of 1 inch for every additional head of water that is perpendicularly measured.

(b.) The gauge-box shall at all times be placed on a level. When water is taken from one source only, the supply shall be gauged at the head of the race, or the source of supply. But if the race is fed, or supplied in part, by any side stream, or streams, the gauge-box shall be placed immediately below such side stream, or the last of such side streams.

(c.) The velocity of the water above the gauge-box shall, if required, be lessened by the construction of a dam bank, or by levelling the race for a distance of 30 feet; and such velocity shall not exceed an average of 1 foot per second in the said 30 feet, to be gauged by a float.

11.—Supply of Water may be Reduced.

When the supply of water from any creek or stream shall be insufficient for the use of all the holders of water rights thereon, it shall be lawful for the Warden, upon adequate cause being shown, to reduce the quantity, in due and equal proportion, which the said holders shall be entitled to draw therefrom, and to regulate the time and mode in which such water may be used.

Provided that nothing herein contained shall be deemed or taken to affect the rights of the holder or holders of a first water-right hereafter granted on any stream; but such holder or holders shall at all times be entitled to the full supply of water for which he or they shall be registered.

12.—Number of Sluice Heads allowed.

The number of sluice heads allowed for any such race, as aforesaid, shall be as follows:—One or two miners, one sluice head, or 40 inches of water; four or more miners, two sluice-heads; and so on at the rate of one sluice-head to every additional two miners.

13.—Water not to be wasted.

Holders of rights shall not allow any water to run to waste; but such water shall be appropriated to the use of the next holder of a right, according to the date of their respective registrations.

14.—Transfer or assignment.

The transfer or assignment of any race, or of any interest therein, shall not affect any right or privilege attached to such race; provided that, any such transfer or assignment shall have been duly registered at the office of the Warden, and a memorandum thereof made upon the back of the original certificate.

15.—Keeping Races in Repair, Bridging, &c.

The holder or occupier of any race shall keep the same in repair, and shall make an efficient bridge where any road in ordinary use crosses the race, upon being required to do so by the Warden.

16.—Working Ground occupied for Races.

Any person desirous of working the ground on which any race or portion of a race is situated, may do so by first providing an equally good race for the use of the occupier; provided that the consent of the Warden thereto be first obtained.

17.—Reservations.

No water-right shall be granted for the use or diversion of any water which is, or may be, required for public purposes, or for the use of the miners generally.

18.—Water for General Use.

Two sluice-heads of water shall, if required, be at all times allowed to flow in the natural course of a creek or river for general use.

19.—Causing Claims to be flooded.

No person shall back the water of any creek, river, race, or water-course, upon any claim, or otherwise cause any claim to be flooded, either wilfully or by neglect.

20.—Obstructions to Water Courses.

No person shall deposit any earth, stones, tailings, or other substance in the bed of any water-course, to as to obstruct the flow of water therein.

21.—Side streams.

Where a race crosses any water-course, the use of which is required by holders of Miners' Rights, it shall be carried either over or under the same, so as not to interfere with the natural flow of water therein.

22.—Construction of Tail-races.

Before any person shall construct a tail-race, he shall first proceed by notice in the same manner as is directed in Section 1, for headraces. But such notice shall only require to be posted for seven (7) clear days; at the expiration whereof the applicant shall return to the Warden a copy of the notice, which shall be signed by the holders of the four (4) nearest claims, as expressing their assent to or dissent

PAGE 10cient size to carry off the sludge or water), shall be constructed and kept in repair by the owner of the machine whence such sludge or water proceeds.

8.—Forfeiture of Dams or Machines.

The site of any dam or machine not commenced within seven days from the date of the grant thereof, or not completed within a reasonable time, or any dam or machine unoccupied for one calendar month during a period when sufficient water has been available, shall be deemed to be forfeited, and may be granted by the Warden to any person who may apply for the same.

9.—Injury to Property by Dams.

If any claim shall be flooded, or property injured by the bursting of any dam-bank, the owner of such dam shall be liable for any loss or damage occasioned thereby; provided that it is proved to the satisfaction of the Warden that such breaking away resulted from the faulty construction of such dam.

10.—Sites proving Auriferous.

If it shall be proved that the ground occupied by any dam or machine contains auriferous earth or quartz, the owner of such dam or machine may be compelled to leave or remove the same: Provided that adequate compensation for such leaving or removal shall first have been estimated by assessors and paid by the person desirous of working the ground.

VI.—CREEK CLAIMS.

1.—Notice of Diversion to be given.

Any person desirous of diverting the course of a permanent stream for the purpose of working the bed thereof as a creek claim, shall first give notice of his intention to the Warden, and to all parties wording in, or occupying claims adjoining the proposed line of diversion. Such Notices shall be in the form hereinafter prescribed, and copies thereof shall be posted and maintained, for a period of Ten clear days, at the points proposed for the commencement and termination of such diversion, as aforesaid, and if no valid objection be entered there against within the aforesaid period, the Warden may issue a Certificate of Registration to the applicant.

FORM OF NOTICE.

(District and data)

No.

I hereby give notice that I intend to divert the course of (name of stream) and to form a new channel therefor, commencing at a point situate (*), and terminating at a point (*)

(Signature, &c.)_____

*Here insert, with sufficient accuracy, the localities.

2.—Wall to be Allowed.

Holders of creek claims shall be allowed a sufficient wall between the channel of diversion and the bed of the stream; and the width of such wall shall be defined by the Warden.

Appendix 6

Summary of the state of the freshwater environment for the Manuhereikia, Arrow, Cardrona, and Taieri catchments

Authored by Isaac Bain, Ministry for the Environment

Introduction

This report aims to provide a brief summary of the state of the freshwater environment for the Manuhereikia, Arrow, Cardrona, and Taieri catchments. It focusses on drivers, pressures, state (including trends) and impact. We are limited to only reviewing existing state of the environment information and no new field data were collected.

Manuhereikia catchment

Overview

The Manuhereikia is a large catchment (3035 km²) located near Alexandra, central Otago.⁴⁴ It has a long history of water abstractions, and a convoluted network of structures has been developed to abstract, store, and transport water around the catchment. There is widespread concern over water quantity and to a lesser degree water quality in the catchment.

Key drivers and pressures

Land cover in the Manuhereikia catchment, as of 2012, was dominated by grassland (90% of total land area)⁴⁵ and much of this was exotic grassland (62%). Tussock grassland extent was around half of exotic grassland (27%). There was a significant increase in the extent of cropland between 1996 and 2012, increasing by 306ha or 24%. This appears to be mostly conversions from grassland or shrubland into cropland.

Land use of the grassland systems is dominated by sheep and beef grazing, with the lower catchment able to support more intensive uses due to irrigation.⁴⁶ There has also been recent expansion of dairy.

State and trends of wetlands

No assessment of wetlands in the Manuhereikia catchment is provided by ORC in state of the environment reports found on their website.⁴⁷ This lack of reporting is concerning as wetlands are an

⁴⁴ <https://www.lawa.org.nz/explore-data/otago-region/river-quality/manuherikia-river/>

⁴⁵ <https://www.lawa.org.nz/explore-data/land-cover/>

⁴⁶ <https://www.orc.govt.nz/media/6188/water-quality-and-ecosystem-health-in-the-manuherikia-soe-web.pdf>

⁴⁷ <https://www.orc.govt.nz/media/6129/2018-wq-report-card-lower-manuherikia-pdf.pdf>

<https://www.orc.govt.nz/media/6143/2018-wq-report-card-upper-manuherikia-pdf.pdf>

<https://www.orc.govt.nz/media/6188/water-quality-and-ecosystem-health-in-the-manuherikia-soe-web.pdf>

https://www.orc.govt.nz/media/6957/final_orc_so_e_report_2006_to_2017.pdf

<https://www.orc.govt.nz/media/6296/2017-2018-soe-report-card.pdf>

important type of freshwater ecosystem and are sensitive to changes in hydrology and land use change.

A search of the Freshwater Ecosystems of New Zealand⁴⁸ (FENZ)'s wetland layer revealed current wetland extent to total 1,598ha. Historic wetland extent totalled 8,508ha, which means 81% of wetlands have been lost throughout the catchment.

Field data is not available for us to comment on the condition of remaining wetlands. However the FENZ index of condition (overall index of integrity from completely degraded: 0 to pristine: 1) had a mean value for all wetlands in the catchment of 0.645 (range: 0.203 – 0.967) which indicates a moderate level of impact.

ORC does publish a wetland inventory which contains some information about the location, values and size of various wetlands (especially regionally significant wetlands). However, this is lacking in information about the condition of remaining wetlands.

State and trends of lakes

ORC states that there are 63 lakes in Otago that are greater or equal to 10ha in size. It monitors nine of these lakes as part of its state of the environment programme,⁴⁹ none of which are located in the Manuherehia catchment. The Council mentions that these nine lakes provide a good representation of lake types and lake-catchment land-uses across the region.

A search of the FENZ lake layer revealed 42 lakes greater than 1ha (including dams and reservoirs) in the Manuherehia catchment. If dams are excluded, this number drops to nine lakes; the largest of which is a 10.5ha glacial-type lake at the head of the west branch of the Manuherehia River (upstream land cover: 100% natural). Also of note is the man-made 8ha Blue Lake (upstream land cover: 12.8% natural, 64.9% pasture).

None of the nine SOE monitored lakes in Otago are similar to the lakes found in the Manuherehia catchment. Of the two reservoir-lakes monitored, these are both large (> 1000ha) and have predominately natural catchments (> 90%). The smallest monitored lake (26ha) has a predominately natural catchment (97.6%). Thus, the reservoirs in the Manuherehia catchment are poorly represented in monitoring because they are much smaller and of dissimilar catchment land cover. The small lakes of the Manuherehia catchment are also poorly represented because ORC does not monitor small lakes that are likely to be affected by pasture catchments. The smallest lake that ORC monitors that has predominately pasture catchment (80%) is 130ha in size, many times larger than the lakes of the Manuherehia.

Sufficient data are not available for us to comment on the condition of lakes in the Manuherehia catchment. In addition, ORC does not monitor lakes representative of the ones found in the catchment.

State and trends of streams/rivers

Water quality

Numerical limits for water quality are set in Schedule 15 of the ORC Regional Plan: Water. The relevant statistics are five-year 80th percentiles, when flows are at or below median flow.

<https://www.doc.govt.nz/our-work/freshwater-ecosystems-of-new-zealand/>

https://www.orc.govt.nz/media/6957/final_orc_soe_report_2006_to_2017.pdf

⁴⁸ <https://www.doc.govt.nz/our-work/freshwater-ecosystems-of-new-zealand/>

⁴⁹ https://www.orc.govt.nz/media/6957/final_orc_soe_report_2006_to_2017.pdf

Results as of June 2018 show that phosphorus, *E. coli* and turbidity have the most exceedances.⁵⁰ Exceedances of these parameters are associated with poor land management.⁵¹ Nitrogen appears to be of less concern in this catchment given current concentrations.

Parameter	Number of sites that exceed limit
Nitrogen (NNN)	1 (20%)
Ammonium (NH ₄ -N)	0 (0%)
Dissolved phosphorus (DRP)	3 (60%)
<i>E. coli</i>	2 (40%)
Turbidity	2 (40%)

Data from Environment Aotearoa 2019⁵² for ten-year trends indicate that, at one site, *E. coli* trends were indeterminate, and likely worsening at the other site. For total nitrogen and nitrate nitrogen, trends were either indeterminate or improving. For ammoniacal nitrogen, trends were either indeterminate or very likely worsening. Note that indeterminate trends do not mean trends were remaining stable, simply that sufficient data were not available to provide statistical significance of direction. Information received from ORC highlights similar trends, with the addition of worsening trends for DRP and turbidity.

Water quantity

Our assessment of the state of water quantity has been restricted by the lack of good hydrological information in the Manuherekia catchment. Two critical pieces of information are unable to be reliably estimated; (1) naturalised flows in the river, (2) actual water usage. With better investment in hydrological modelling these barriers could be overcome.

Notwithstanding the lack of reliable hydrological information, it is clear that the water quantity of the Manuherekia catchment is severely impacted – the point of contention surrounds the exact degree of impact. This impact is due to landscape characteristics (arid climate, high evapotranspiration, low precipitation) mediated by a high degree of hydrological modification (abstractions and transport).

Consented primary surface water takes are estimated to total approximately 32 cumecs, which is eight times the naturalised Mean Annual Low Flow (MALF) (3.9 m³/s), or twice the naturalised mean flow (18.5 m³/s). Actual water use is estimated to be lower than consented use, at 16 m³/s when flows are favourable or 7-9 m³/s during peak summer conditions.

Aquatic life

Macroinvertebrates

Macroinvertebrates were measured during the summer of 2017/18 as a snapshot at two sites in the Manuherekia.⁵³ Manuherekia at Ophir scored a 111 for MCI (good) and 5.4 for SQMCI (good). Dunstan Creek scored a 119 for MCI (good) and 7.6 for SQMCI (excellent). Care must be taken in interpreting a

⁵⁰ <https://www.orc.govt.nz/media/6129/2018-wq-report-card-lower-manuherikia-pdf.pdf><https://www.orc.govt.nz/media/6143/2018-wq-report-card-upper-manuherikia-pdf.pdf>

⁵¹ <https://www.orc.govt.nz/media/6188/water-quality-and-ecosystem-health-in-the-manuherikia-soe-web.pdf>

⁵² <https://www.mfe.govt.nz/environment-aotearoa-2019>

⁵³ <https://www.orc.govt.nz/media/6296/2017-2018-soe-report-card.pdf>

single snapshot of macroinvertebrates as it may not reflect a true overview of the long-term state of macroinvertebrates in the Manuherehia catchment.

Periphyton

Relatively low abundances of algae were reported in 2017/18. However, two sites had both *Didymo* and *Phormidium*.

Fish

Electric fish monitoring was conducted at Thompsons Creek in 2017/18 which found 4 different species, mostly upland bully and brown trout with longfin and shortfin eels also present. These results show low diversity and abundance of fish species relative to what would naturally be expected under reference conditions.

It is known that Central Otago, including the Manuherehia catchment, is a hotspot of diversity for endemic galaxiids, with 13 described and undescribed taxa recognised in the region. Non-migratory galaxias are threatened by water abstraction, land-use change, and salmonids. Their remaining populations are highly fragmented, typically occurring in smaller tributary streams and wetlands.

Habitat

Information on habitat is not available from routine state of the environment reporting by ORC. An investigation of water quality and ecosystem health was conducted between late 2009 and early 2011.⁵⁴ This report found that the majority of the Manuherehia catchment had minimal fine sediment build-up on the stream bed, with the exceptions of Pool Burn upper and Lauder Creek, which were covered in fine sediment.

Fish passage is an issue, due to water infrastructure, both in the Manuherehia catchment and downstream in the Clutha main-stem. This has led to connectivity of habitat being reduced for fish.

Ecological processes

Ecological processes are the interactions among biota and their physical and chemical environment, including biogeochemical processes. Indicators of ecological processes in rivers provide a measure of how well a stream is functioning, as opposed to how the ecosystem is structured.⁵⁵

No information is available to assess ecological processes in the Manuherehia catchment. This probably reflects a lack of monitoring, though simple indicators of ecological processes are now available and are used by other regional councils (such as cotton strip assay).

State and trends of groundwater

ORC recognises various aquifers in the Manuherehia catchment. These are the Alluvium Aquifer, Manuherehia Groundwater Management Zone, Ida Valley Groundwater Management Zone, and the Manuherehia Clay Bound Aquifer. Their water quality allocation limit has been set at 50% of MAR.

Information could not be found to assess the state of groundwater quality in the Manuherehia catchment.

⁵⁴ <https://www.orc.govt.nz/media/6188/water-quality-and-ecosystem-health-in-the-manuherehia-soe-web.pdf>

⁵⁵ <https://www.mfe.govt.nz/sites/default/files/media/Fresh%20water/freshwater-ecosystem-health-framework.pdf>

Conclusions

- Wetlands remain in the Manuherekia catchment, but their condition is not well understood.
- The lakes of the Manuherekia catchment are not SOE monitored, nor does representative monitoring take place in the region. These lakes are likely to be in poor condition given surrounding land use.
- Water quality in rivers is poor and declining for phosphorus, *E. coli* and turbidity.
- Water quantity is poorly understood, but likely to be severely over-allocated in terms of abstractions and flow.
- The Manuherekia contains many rare, endemic, fish species that may be in serious trouble. Other common species are also poorly represented.

Arrow catchment

Overview

The Arrow is a small catchment of 240km² that feeds into the Kawarau River just east of Arrowtown. If the Arrow/Wakatipu Basin is considered part of the area, then this includes Lake Hayes, though this is not part of the catchment of the Arrow River.

The Arrow catchment has steep headwaters draining the Harris mountain range.

Key drivers and pressures

Land cover in the Arrow catchment is dominated by low producing grassland (80%) which includes tussocklands, with large areas of high producing grassland in the lower catchment (7.3%). The settlement of Arrowtown covers approximately 1.2% of the catchment – but urban areas can have a disproportionate impact on freshwaters relative to their areal extent.

State and trends of wetlands

A search of the Freshwater Ecosystems of New Zealand⁵⁶ (FENZ)'s wetland layer revealed current wetland extent to total 3.66ha. Historic wetland extent totalled 22.9ha, which means 84% of wetlands have been lost throughout the catchment.

Field data is not available for us to comment on the condition of remaining wetlands. However the FENZ index of condition (overall index of integrity from completely degraded: 0 to pristine: 1) had a mean value for all wetlands in the catchment of 0.818 (range: 0.296 – 0.905) which indicates low levels of impact.

State and trends of lakes

There are no lakes greater than 1ha in the Arrow catchment. Lake Hayes is however in the wider Arrow Basin area, which had the following exceedances:

Parameter	Number of sites that exceed limit
Nitrogen (TN)	0 (0%)
Ammonium (NH ₄ -N)	0 (0%)
Phosphorus (TP)	1 (100%)
<i>E. coli</i>	0 (0%)
Turbidity	0 (0%)

Note the above *E. coli* statistic is reported as part of SOE monitoring which uses long-term measures to assess average state. However, surveillance monitoring for swimming indicates a number of breaches for *E. coli* over the last three years, which has resulted in a medium risk rating.⁵⁷

Lake Hayes had a Trophic Level Index of 3.6 as of 2017 (cf. 4.69 as of 2009). This indicates average water quality and mesotrophic lake conditions (moderate levels of nutrients and algae).

⁵⁶ <https://www.doc.govt.nz/our-work/freshwater-ecosystems-of-new-zealand/>

⁵⁷ <https://www.lawa.org.nz/explore-data/otago-region/swimming/lake-hayes-at-mill-creek-shallows/swimsite>

State and trends of streams/ivers

Water quality

SOE monitoring sites have only recently been established in the Arrow catchment (July 2018) so it will be a number of years before exceedance statistics can be calculated. There is one river site in the Arrow Basin, Mill Creek at Fish Trap, which had the following exceedances:

Parameter	Number of sites that exceed limit
Nitrogen (NNN)	1 (100%)
Ammonium (NH ₄ -N)	0 (0%)
Dissolved phosphorus (DRP)	0 (0%)
<i>E. coli</i>	1 (100%)
Turbidity	0 (0%)

Given the low intensity land use upstream of Arrowtown, water quality is expected to be good above the residential areas. There is potential for urban and agricultural contaminants to impact water quality in the lower reaches.

Water quantity

Observed 7d MALF is 1.03 m³/s compared with a naturalised 7d MALF of 1.4 m³/s.⁵⁸ This indicates relatively low levels of actual water usage from the 22 surface water takes. The average ratio of actual: consented water takes varied throughout the year, with very low (~2%) ratios in winter months to moderate during summer months (~30%).

Aquatic life

Macroinvertebrates

Macroinvertebrate results are not available yet as the new biomonitoring programme for the Arrow catchment was only established in January 2019. MCI and SQMCI results for Mill Creek both indicate “probable moderate pollution”⁵⁹ (85 and 4.1 respectively). The SQMCI results of 4.1 is close to the boundary of < 4 which indicates “probable severe pollution”.

Periphyton

Periphyton data is not available, but may be an issue during prolonged low flow periods especially below Arrowtown.

Fish

Koaro is the only native fish recorded in the catchment. Brown and rainbow trout are also present, but do not penetrate far upstream of Arrowtown. Eels are likely to be significantly impeded by fish barriers at hydro-electric dams on the Clutha River / Mata-Au.

⁵⁸ https://www.orc.govt.nz/media/4204/arrow-river-science-update-dec-2017_web.pdf

⁵⁹ <https://www.mfe.govt.nz/sites/default/files/mci-user-guide-may07.pdf>

Habitat

Data is not available to comment on for the state of habitat in the Arrow catchment. It is noted however that gravel and sand beds may be important spawning grounds for the resident trout.

Ecological processes

Data is not available to comment on for the state of ecological processes.

State and trends of groundwater

Aquifers in the Arrow/Wakatipu are not particularly well monitored in terms of quantity and especially quality. A 2017 ORC report on the Arrow-Bush Ribbon aquifer recommended a complete aquifer study is required to have better understanding of extent, capacity, recharge zones, and the effects of abstraction.⁶⁰

A 2004 investigation into Wakatipu Basin aquifers⁶¹ stated that water quality was generally very good. Nitrate-nitrogen and potassium concentrations were slightly elevated, probably because of animal grazing and fertiliser application. It is possible that water quality has declined since this time but to what extent is unknown.

Conclusion

- Small areas of wetland exist throughout the catchment, but their condition are unknown.
- The condition of Lake Hayes is concerning, and may be close to a tipping point. Eutrophication and pathogens are an issue, with swimming warnings becoming more frequent.
- Actual usage of water is low compared to paper allocation.
- Macroinvertebrate scores for the inflows to Lake Hayes indicate water quality issues.
- Fish diversity is very low, with only one native species having been recorded.

⁶⁰ <https://www.orc.govt.nz/media/4197/arrow-bush-ribbon-aquifer-report.pdf>

⁶¹ <https://www.orc.govt.nz/media/4198/wakatipu-aquifers-groundwater-investigation-report-web.pdf>

Cardrona catchment

Overview

The Cardrona River drains a moderately sized catchment of 350km² before entering the Clutha River at Albert Town.

Key drivers and pressures

The dominant land cover in the Cardrona catchment is low producing grassland (82.8%), with the next largest land cover being high producing grassland (8.5%). Much of the high producing grassland has intensified from low producing grassland between 1990 and 2008.

Irrigation is widespread throughout the flat areas of the lower catchment, with a total irrigated area of 2,850ha.⁶² Known irrigation methods include center-pivot, flood, and spray.

State and trends of wetlands

A search of the Freshwater Ecosystems of New Zealand⁶³ (FENZ)'s wetland layer revealed current wetland extent to total 3.28ha. Historic wetland extent totalled 19.40ha, which means 83% of wetlands have been lost throughout the catchment.

Field data are not available for us to comment on the condition of remaining wetlands. However the FENZ index of condition (overall index of integrity from completely degraded: 0 to pristine: 1) had a mean value for all wetlands in the catchment of 0.902 (range: 0.895 – 0.905) which indicates low levels of impact.

State and trends of lakes

There are no lakes greater than 1ha in the Cardrona catchment.

State and trends of streams/rivers

Water quality

In June 2018, the Cardrona catchment at the Mt Baker SOE site exceeded nitrogen (NNN) and ammonium (NH₄-N) limits, and is very close to exceeding *E. coli* limits (ORC advise there is a worsening trend of *E. coli* at this site).

Luggate Creek is a small, adjacent catchment that exceeds for dissolved phosphorus (DRP) and *E. coli*.

Water quantity

The Cardrona River has a natural drying reach below Mt Barker where surface flow is lost to groundwater. The loss of surface flow here often exceeds the 7d MALF of the river, so surface flow is lost most summers. When the river is dry, this prevents upstream spawning migrations for salmonids.

⁶² <https://www.orc.govt.nz/media/4379/water-quality-study-cardrona-river-catchment.pdf>

⁶³ <https://www.doc.govt.nz/our-work/freshwater-ecosystems-of-new-zealand/>

Site	Observed 7-day MALF	Naturalised 7-day MALF
Cardrona River at Mt Barker	0.8 m ³ /s	1.1 m ³ /s
Cardrona River at Clutha confluence	0.3 m ³ /s	NA

Aquatic life

Macroinvertebrates

In June 2018, the Cardrona catchment at the Mt Baker SOE site had a MCI result of 101 which indicates “doubtful quality or possible mild pollution”. SQMCI result at this site was 2.8 which indicates “probable severe pollution”. The percentage of EPT taxa was 50%, which indicates many sensitive taxa were missing.

Periphyton

Didymosphenia and *Synedra* are the dominant algae present at the Cardrona river site, and these are both in moderate abundance. Low flows may enable the proliferation of long filamentous algae.⁶⁴

Fish

Electric fishing during the summer of 2017/18 at Cardrona at Mt Barker SOE site found 5 fish species (an unidentified eel, koaro, upland bully, brown and rainbow trout). A search of the Freshwater Fish Database also found Longfin eel, Brook Char, unidentified galaxiid, Clutha flathead galaxiid (nationally critical), freshwater mussels, and Koura.

This indicates a reasonable number and diversity of species, but is probably still low compared to what would naturally be expected. Clutha flathead galaxias are restricted to headwaters of the Cardrona, likely due to the presence of trout and koaro. Koaro are able to inhabit the Cardrona catchment due to the establishment of Lake Dunstan.

Habitat

Riparian vegetation was dominated (assessed during 2014) by willows, exotic pasture grasses, and lupins.⁶⁵ There was low levels of fencing and stock generally had direct access to the stream bed.

Riffles and runs in the upper catchment were dominated by coarse gravels, while the lower catchment was dominated by fine gravels.⁶⁶

There is a risk that water abstractions are having an additional impact on the connectivity and extent of habitat in the Cardrona river.⁶⁷ A single habitat model exists, but it is old (2001) and possibly unsuitable due to lack of calibration data.

⁶⁴ https://www.orc.govt.nz/media/4496/cardrona-catchment-science-update-2011_2017.pdf

⁶⁵ <https://www.orc.govt.nz/media/4379/water-quality-study-cardrona-river-catchment.pdf>

⁶⁶ <https://www.orc.govt.nz/media/4379/water-quality-study-cardrona-river-catchment.pdf>

⁶⁷ https://www.orc.govt.nz/media/4496/cardrona-catchment-science-update-2011_2017.pdf

Ecological processes

Data are not available to comment on the state of ecological processes.

State and trends of groundwater

Only information related to groundwater quantity could be found, whilst data related to groundwater quality was lacking. Due to high levels of nitrogen and *E. coli* in surface water, it is likely that the Cardrona River is negatively contributing to aquifer quality.

Conclusion

- Nitrogen and *E. coli* appear to be the main water quality issue.
- There is a natural drying reach in the Cardrona River which makes it sensitive to further water abstractions during low flow periods.
- MCI scores highlighted probable impact on water quality and/or habitat conditions.
- Rare fish species are still present in the catchment.
- Riparian vegetation is dominated by exotic species, and stock have easy access to the river.

Taieri catchment

Overview

The Taieri catchment is a large (5,700km²) catchment which joins the Lake Waihola and Lake Waipori complex before entering the sea south of Dunedin.

Key drivers and pressures

Land cover in the Taieri catchment is dominated by grassland, both low producing (56.2%) and high producing (30.4%). Other major land covers include natural forest (2.4%) and planted forest (4.9%).

State and trends of wetlands

A search of the Freshwater Ecosystems of New Zealand⁶⁸(FENZ)'s wetland layer revealed current wetland extent to total 9,802ha. Historic wetland extent totalled 34,126ha, which means 71% of wetlands have been lost throughout the catchment.

The FENZ index of condition (overall index of integrity from completely degraded: 0 to pristine: 1) has a mean value for all wetlands in the catchment of 0.715 (range: 0.203 – 0.969) which indicates moderate levels of impact.

ORC recognises the Waipori/Waihola wetland complex as regionally significant,⁶⁹ and has a number of recorded values that indicate good condition (high degree of wetland naturalness, high diversity of indigenous wetland flora and fauna, high diversity of wetland habitat types, etc.).

State and trends of lakes

A search of the FENZ lake layer revealed 105 lakes (including dams and reservoirs) greater than 1ha in size in the Taieri catchment. If dams are excluded this number drops to 28 lakes.

ORC has one SOE lake monitoring site in the catchment at Lake Waihola. This lake is a large (650ha), shallow, tidal freshwater lake. It is located on the Taieri plains 20km from the coast, and is part of the Waihola-Waipori wetland complex. This wetland complex is internationally significant and regarded as one of the largest and most significant remaining freshwater wetlands in New Zealand.

Parameter	Lake Waihola site
Total nitrogen (TN)	Exceeds limit
Ammonium (NH ₄ -N)	Not exceed limit
Total phosphorus (TP)	Exceeds limit
<i>E. coli</i>	Not exceed limit
Turbidity	Exceeds limit

Lake Waihola generally has a Trophic Level Index (TLI) score in the range of 4-5 which indicates eutrophic lake conditions and poor water quality.⁷⁰

⁶⁸ <https://www.doc.govt.nz/our-work/freshwater-ecosystems-of-new-zealand/>

⁶⁹ <https://www.orc.govt.nz/managing-our-environment/water/regionally-significant-wetlands/clutha-district/waiporiwaihola-wetland-complex>

⁷⁰ <https://www.lawa.org.nz/explore-data/otago-region/lakes/lake-waihola/>

State and trends of streams/ivers

Water quality

Water quality is variable across the Taieri catchment.⁷¹ Most parameters exceed limits at multiple sites, except for ammonium which only exceeds at one site. Phosphorus and *E. coli* are of particular concern in this catchment.

Parameter	Number of sites that exceed limit
Nitrogen (NNN)	2 (13%)
Ammonium (NH ₄ -N)	1 (7%)
Dissolved phosphorus (DRP)	6 (40%)
<i>E. coli</i>	8 (53%)
Turbidity	2 (13%)

Trends over the period 2008 – 2017 indicate worsening *E. coli* at most sites.⁷² Turbidity trends are worsening at about half of the sites.⁷³ Nitrate-nitrogen⁷⁴ and total phosphorus⁷⁵ are improving at most sites.

Water quantity

SOE information related to water quantity could not be found. There are 74 deemed permits located in the Taieri catchment. Minimum flow limits are set at multiple places throughout the catchment, and the river sometimes reaches these minimum flows.⁷⁶

Aquatic life

Macroinvertebrates

MCI scores in five out the six monitored sites are between 100 and 115, indicating ‘good’ condition.⁷⁷ The sixth site at Silver Stream has a score of approximately 90, which indicates ‘poor’ condition.

Fish

A number of fish species have been found in the Taieri catchment, including: Perch, Brook char, Koaro, Brown trout, Koura, Rainbow trout, Inanga, Giant kokopu, Longfin eel, Yelloweye mullet, Shortfin eel, black flounder, common bully, dusky galaxis, lamprey, eldons galaxis, flathead galaxis, roundhead galaxis, upland bully, banded kokopu, freshwater mussels, and others.

⁷¹ https://www.orc.govt.nz/media/6957/final_orc_soe_report_2006_to_2017.pdf

⁷² https://statisticsnz.shinyapps.io/river_water_quality_ecoli/

⁷³ https://statisticsnz.shinyapps.io/river_water_quality_clarity/

⁷⁴ https://statisticsnz.shinyapps.io/river_water_quality_nitrogen/

⁷⁵ https://statisticsnz.shinyapps.io/river_water_quality_phosphorus/

⁷⁶ <https://www.orc.govt.nz/news-and-events/news-and-media-releases/2015/january/orc-extends-water-restrictions-to-safeguard-the-taieri>

⁷⁷ https://www.orc.govt.nz/media/6957/final_orc_soe_report_2006_to_2017.pdf

Fish densities were high in upper and lower Lug Creek, and Lower Pig Burn. Trout condition was 'fair' across most sites.

Habitat

A 2004 report on the upper Taieri⁷⁸ investigated habitat in tributaries and found the majority of sites had minimal fine sediment cover, but three sites had a high percentage of fine sediment cover.

A relatively low number of fish passage barriers probably enables good connectivity throughout the catchment from mountains-to-sea.

Ecological processes

Data is not available to comment on for the state of ecological processes.

State and trends of groundwater

The Lower Taieri Basin has a low level of water quality impact from human impact.⁷⁹ Nitrate concentrations are generally low, with highest concentrations in the north of the basin near Mosgiel – though these concentrations are still less than the drinking water standard.

Some areas of the basin have elevated iron and manganese levels, with concentrations regularly exceeding drinking water standards for “appearance, taste, and odour”.

Salinity is an issue in some small areas of the basin, and could worsen given sea level rise and further abstractions.

Conclusion

- The Taieri catchment has a large wetland-lake complex in its lower catchment that holds international significance.
- Lake Waihola is particularly sensitive (due to its shallow nature) and has some signs of poor water quality and eutrophic status.
- *E. coli* and phosphorus are the main water quality parameters of concern in rivers.
- The Taieri catchment supports a surprising diversity of fish life, including many rare species.

⁷⁸ <https://www.orc.govt.nz/media/6189/water-quality-and-ecosystem-health-in-the-upper-taieri.pdf>

⁷⁹ <https://www.orc.govt.nz/media/3809/l-t-g-allocation-study-web.pdf>

Appendix 7 Regional Plan: Water

The Council notified the Water Plan on 28 February 1998 and made it operative, after submissions, hearings and appeals, on 1 January 2004. It has made 15 plan changes since then.

Changes	Date Notified	Decision Released	Date Operative
Waitaki Catchment Water Allocation Regional Plan	19 Feb '05	30 Sep '05	3 Jul '06
Plan Change 1A (Minor amendments)	17 Aug '05	1 Apr '06	1 Aug '06
Plan Change 1B (Minimum Flows for Waianakarua River, Trotters Creek, Luggate Creek)	20 Dec '08	31 Oct '09	1 Mar '10
Plan Change 1C (Water Allocation and Use)	20 Dec '08	10 Apr '10	1 Mar '12
Plan Change 3A (Minimum Flow for Taieri River at Tiroiti)	26 Jun '10	11 Dec '10	1 May '11
Plan Change 4A (Groundwater and North Otago Volcanic Aquifer)	18 Sep '10	24 Sep '11	1 Mar '12
Amendment 1 (NPS Freshwater Management)	24 Jun '11	24 Jun 11	1 Jul 2011
Plan Change 2 (Regionally Significant Wetlands)	2 Jul '11	12 May '12	1 Oct '13
Plan Change 6A (Water Quality) Plan Change 6A Archive	31 Mar '12	20 Apr '13	1 May '14
Plan Change 4B (Groundwater allocation)	17 May '14	13 Dec '14	1 Sep '15
Plan Change 4C (Groundwater management: Cromwell Terrace)	16 Aug '14	13 Dec '14	1 Sep '15
Plan Change 3B (Pomahaka Catchment minimum flow)	16 Aug '14	14 Feb '15	1 Jun '15
Plan Change 3C (Waiwera Catchment minimum flow)	13 Dec '14	8 Aug '15	1 Mar '16
Amendment 2 (NES Plantation Forestry)	30 Jun '18	30 Jun '18	1 Jul '18
Proposed Plan Change 5A (Lindis: Integrated water management)	8 Aug '15	13 Aug '16	Under appeal