

# Proposed new rules and regulations Dunedin & Coast FMU

This summary provides an overview of the provisions relating to the Dunedin and Coast Freshwater Management Unit (FMU). This includes environmental outcomes, target attribute states and area-specific rules and limits. The rules and limits are in addition to those in the region-wide rules covered in the other summaries.

If you are unsure of any particular terms, there is a glossary of terms.

Recent content updates:

- 26 September 2023:

Added proposed environmental flows, level and take limits for lakes, rivers and aquifers and added information regarding whether further allocation of water is available

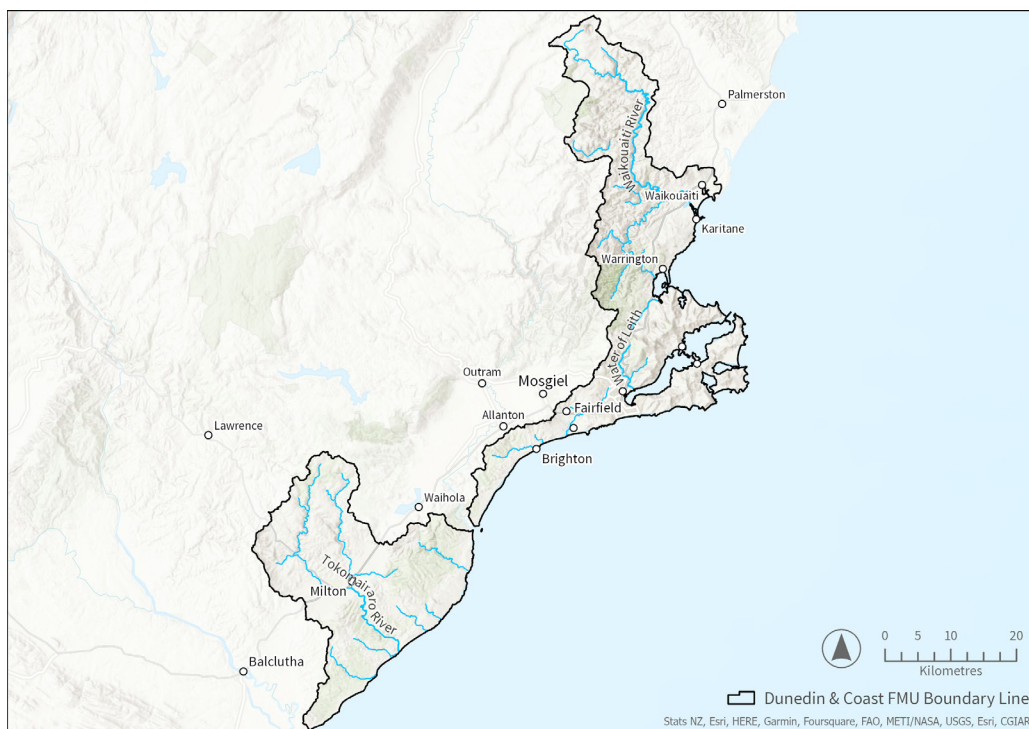
- 25 September 2023:

Added Dunedin & Coast FMU boundary map

- 24 September 2023:

Added timeframe for achieving the environmental outcomes for target attribute states  
Added information regarding 'matters of control' in table 2

A map of the Dunedin and Coast FMU boundary is shown below.



## Environmental outcomes

In its new Land and Water Regional Plan ORC must set environmental outcomes for the freshwater values identified in the Dunedin and Coast FMU. An environmental outcome statement describes the desired future state that communities in the Dunedin and Coast FMU and tangata whenua would like to see for a specific value.

The environmental outcome statements are very similar across all FMUs and rohe in Otago, which reflects the fact that the aspirations that tangata whenua and the different communities have for the environment are largely consistent across the region. Table 1 sets out the draft environmental outcomes for the Dunedin and Coast FMU.

Value	Environmental Outcomes for Dunedin	Attributes to measure and monitor
<b>NPS-FM compulsory values (apply to every FMU/rohe)</b>		
<b>Ecosystem health</b>	Freshwater bodies support healthy freshwater ecosystems with thriving habitats for a range of indigenous species, and the life stages of those species, that would be expected to occur naturally.	<p><b>Rivers:</b></p> <ul style="list-style-type: none"> <li>Ammonia</li> <li>Nitrate</li> <li>Suspended fine sediment</li> <li><i>E. Coli</i></li> <li>Dissolved reactive phosphorus</li> <li>Periphyton</li> <li>Macroinvertebrates (MCI/ASPM)</li> <li>Fish IBI</li> <li>E. Coli primary contact sites</li> <li>Macroinvertebrates (QMCI) score*<sup>1</sup></li> <li>Deposited fine sediment*</li> <li>Dissolved oxygen*</li> <li>Ecosystem metabolism*</li> </ul> <p><b>Lakes:</b></p> <ul style="list-style-type: none"> <li>Phytoplankton (Chlorophyll-a)</li> <li>Total nitrogen</li> <li>Total phosphorus</li> <li>Ammonia</li> <li>Cyanobacteria*</li> <li>Submerged plants (natives)*</li> <li>Submerged plants (invasive)*</li> <li>Lake-bottom dissolved oxygen*</li> <li>Mid-hypolimnetic dissolved oxygen*</li> </ul>

Value	Environmental Outcomes for Dunedin and	Attributes to measure and monitor
<p><b>Human contact</b></p>	<p>Water bodies are clean and safe for human contact activities and support the health of people and their connections with water bodies.</p>	<p>Rivers:</p> <ul style="list-style-type: none"> <li>E. Coli</li> <li>Suspended fine sediment</li> <li>Periphyton</li> <li>E. Coli primary contact sites</li> </ul> <p>Lakes:</p> <ul style="list-style-type: none"> <li>Phytoplankton (Chlorophyll-a)</li> <li>Cyanobacteria (Biovolume cubic millimetres per litre)</li> </ul>
<p><b>Threatened species</b></p>	<p>The freshwater habitats of threatened species are protected and support the persistence and recovery of threatened species over time.</p>	<p>All the attributes listed for Ecosystem Health above.</p> <ul style="list-style-type: none"> <li>Recency of presence</li> <li>National conservation category and status</li> <li>Regional conservation category and status</li> <li>Number of sub-populations</li> </ul>
<p><b>Mahika kai (food and resource gathering)</b></p>	<p>Mahika kai resources are restored to a condition in which populations of valued mahika kai species are self-sustaining and plentiful enough to support cultural take.</p> <p>Mana whenua are able to safely access, harvest and use these resources now and in the future.</p>	<p>All the attributes listed for Ecosystem Health above.</p>

Other values (apply to every FMU/rohe)		
<p><b>Natural form and character</b></p>	<p>Freshwater bodies and their riparian margins, and any connected receiving environment including any estuaries and hāpua (lagoon) are able to behave in a way that reflects their natural form and character to the greatest extent practicable, and the natural form and function of unmodified water bodies is protected.</p>	<p><b>Rivers:</b></p> <ul style="list-style-type: none"> <li>Suspended fine sediment</li> <li>Periphyton</li> <li>Macroinvertebrates (QMCI) score*</li> <li>Deposited fine sediment*</li> </ul> <p><b>Lakes:</b></p> <ul style="list-style-type: none"> <li>Phytoplankton (Chlorophyll-a)*</li> <li>Cyanobacteria*</li> <li>Submerged plants (natives)*</li> <li>Submerged plants (invasive)*</li> <li>Lake-bottom dissolved oxygen*</li> <li>Mid-hypolimnetic dissolved oxygen*</li> </ul>
<p><b>Drinking water supply</b></p>	<p>Provided the health and wellbeing needs of water bodies and freshwater ecosystems are met, source water from water bodies (after treatment) is safe and reliable for the drinking water supply needs of the community.</p> <p>Activities do not introduce or increase the concentration of contaminants in water, so that, after existing treatment, it no longer meets drinking water standards</p>	<p>Information available soon.</p>
<p><b>Wāhi tūpuna (sites of significance to iwi)</b></p>	<p>Cultural associations with wāhi tūpuna are maintained, visible, and whānau are able to access, use and relate to wāhi tūpuna now and in the future.</p>	<p>Information available soon.</p>

<p><b>Fishing</b></p>		<p><b>Rivers:</b></p> <p>E. Coli</p> <p>Suspended fine sediment</p> <p>Periphyton</p> <p>Nitrate</p> <p>Suspended fine sediment</p> <p>Macroinvertebrates (MCI/ASPM)</p> <p>Fish IBI</p> <p>Macroinvertebrates (QMCI) score*</p> <p><b>Lakes:</b></p> <p>Phytoplankton (Chlorophyll-a)</p> <p>Cyanobacteria (Biovolume cubic millimetres per litre)*</p>
<p><b>Irrigation, cultivation and production of food and beverages</b></p>	<p>Provided the health and wellbeing of water bodies and freshwater ecosystems and human health needs are met, the cultivation and production of food, beverages and fibre is enabled.</p>	<p>Suspended fine sediment</p> <p>Periphyton</p> <p>Water quantity</p>
<p><b>Wetlands</b></p>	<p>Wetlands are protected, and their ecosystem health, indigenous biodiversity, and hydrological functioning is restored where degraded.</p>	<p>Information available soon.</p>
<p><b>Taoka species (treasured species)</b></p>	<p>Thriving, connected habitats for indigenous species are restored and sustained for ever and their mauri is intact.</p>	<p>Information available soon.</p>
<p><b>Values that apply to specific FMU</b></p>		
<p><b>Commercial and industrial use</b></p>	<p>Provided the health and wellbeing of water bodies and freshwater ecosystems and human health needs are met, commercial and industrial activities are enabled.</p>	<p>Suspended fine sediment</p> <p>Periphyton</p> <p>Water quantity</p>

## Target attribute states

Attributes are indicators that we can measure and monitor. Attributes tell us about the state of a river or lake. A target attribute state (TAS) is the state that an attribute must achieve to make sure that an environmental outcome is met. The timeframe for achieving the TAS for each FMU is set by the environmental outcomes for the FMU. For the Dunedin and Coast FMU, the environmental outcomes are to be achieved by 2040. By monitoring attributes and comparing their baseline state with their TAS we learn how well we are on track towards achieving the environmental outcomes for this FMU.

While the environmental outcome statements are largely consistent across Otago, baseline states and TAS are usually specific to each FMU and rohe. Attributes for each value and baseline states for those attributes have been identified along with trends derived from the Otago Regional Council's State of the Environment (SoE) monitoring data.

The baseline state and TAS for the Dunedin & Coast FMU are in the map below.

Zoom into an area and view the various locations of proposed monitoring sites in an area(s).

Select the yellow dot representing a proposed monitoring site to see the Target Attribute States.

You can further select the Target Attribute States table to view a larger version of the table.

(Note: If you are on a mobile device, tap on the arrow next to the 'X' icon for the table to show.)

A map of these water bodies is available online for you to view:

[www.orc.govt.nz/landwatermaps](http://www.orc.govt.nz/landwatermaps)

## FMU provisions

National direction requires Council to set limits as rules or action plans (as appropriate) to achieve the environmental outcomes. This can be done at a region-wide level or at FMU/rohe level. The draft region-wide rules are set out in different chapters, including Primary Production, Wastewater Management, Stormwater Management, Earthworks and Drilling, Environmental Flows and Limits (Water Quantity) and various others. However, for the Dunedin and Coast FMU a number of specific rules are proposed that are needed to make sure the environmental outcomes for this FMU are achieved overtime. These additional rules, which will be included in the Dunedin and Coast FMU chapter of the new Land and Water Regional Plan, are shown in the table below.

Table 2: Overview of proposed additional provisions for Dunedin and Coast FMU

Contaminants of concern	Draft LWRP
<p><b>Rivers:</b></p> <ul style="list-style-type: none"> <li>• Periphyton (TNTP)</li> <li>• MCI and ASPM</li> <li>• E. Coli</li> <li>• NNN</li> <li>• DRP</li> <li>• Suspended fine sediment</li> </ul> <p><b>Groundwater:</b></p> <ul style="list-style-type: none"> <li>• Arsenic</li> </ul>	<ul style="list-style-type: none"> <li>• Consent required for dairy farming and dairy support which allows all activities on farm to be considered in order to require reductions in contaminant losses. Controlled activity status with conditions:             <ul style="list-style-type: none"> <li>• the dairy farm is existing</li> <li>• has a freshwater farm plan</li> <li>• average stocking rate no greater than 2.5 cows per hectare</li> <li>• livestock are wintered on the land</li> <li>• synthetic nitrogen fertiliser cap of 100 kgs per hectare per year</li> </ul> </li> <li>• Matters of control are:             <ul style="list-style-type: none"> <li>• the content of, and compliance with, the farm’s certified freshwater farm plan</li> <li>• the timing of any actions or good management practices proposed to achieve the environmental outcomes for the FMU</li> <li>• methods to avoid or mitigate adverse effects of the activity on water quality</li> <li>• methods to reduce contaminant loss</li> <li>• stocking rates</li> <li>• If controlled activity conditions cannot be met, the activity requires a discretionary consent.</li> </ul> </li> <li>• Increase setbacks for high-risk activities, such as intensive winter grazing and stock access near waterways.             <ul style="list-style-type: none"> <li>• all livestock (including sheep) on low slope land of 10 metres from the beds of wide rivers (over 1 metre) and 3 metres from smaller continually flowing rivers</li> <li>• with a transition time of 10 years for existing fences.</li> </ul> </li> <li>• Cultivation permitted subject to conditions relating to setbacks from waterbodies, depending on slope.             <ul style="list-style-type: none"> <li>• 5m on a slope of less than 10 degrees</li> <li>• 10 metres on slopes between 10 and 20 degrees</li> </ul>             Cultivation on slopes over 20 degrees, only permitted if the following conditions are met:             <ul style="list-style-type: none"> <li>• for the renewing or establishing of pasture only,</li> <li>• using no tillage or direct seed drilling only</li> <li>• 10 m setbacks from water bodies and wetlands.</li> </ul>             If the permitted activity conditions cannot be met the activity requires a discretionary consent.             <ul style="list-style-type: none"> <li>•</li> </ul> </li> <li>• More stringent management of harvesting of plantation forestry, for example by requiring wider setbacks from water bodies, or requiring consent where activities are currently permitted under the NES-PF.</li> </ul>

## Environmental flows and levels and limits on take, diversion and damming of water

The Dunedin and Coast FMU chapter will also include take limits and environmental flows and levels for rivers, lakes and aquifers in this FMU.

Take limits reflect the total quantity of water that can be taken, dammed or diverted from a stream, river, lake or aquifer. Once the combined rate of take for all consented water takes, diversion or damming activities from a water body matches this take limit no further water can be allocated in new consents.

Environmental flows (for rivers or streams) or environmental levels (for lakes and aquifers) include minimum flows or levels that when reached all consented (and some permitted) takes, diversions and damming activities must cease. These restrictions on water taking, diversions or damming activities typically occur during dry periods and are needed to make sure after important values, such as threatened fish, drinking water supply or mahika kai (food and resource gathering) values, are looked after.

## Lakes

Environmental levels and take limits for the lakes in the Dunedin and Coast FMU are shown in the table below.

Given its high values and uniqueness, it is proposed that a narrative take limit is set for Tomahawk Lagoon. This limit will prohibit any new takes, damming or diversions that could impact water levels in this lagoon (except for takes that are permitted under the Resource Management Act 1991). As there are currently no consents for the taking, damming or diversion of water from the lagoon, the prohibition will ensure that this water body will continue to behave naturally.

The Dunedin and Coast FMU also contains three controlled lakes or reservoirs: the Ross Creek Reservoir, Sullivans Dam and the

Fishing	Environmental level(s)	Take limit (l/s)	Further allocation available (estimate based on best available information)
<b>Natural lakes (unmodified)</b>			
	Natural minimum water level	Narrative - no new taking, diversions, damming or discharges from the lake or upper catchment	No
<b>Controlled lakes</b>			
Ross Creek Reservoir (Water of Leith catchment)  Sullivans Dam (Water of Leith catchment)	Lake level managed by the minimum flow of the Water of Leith (tbc)	Subject to the take limit of Water of Leith	No
Southern Reservoir (Kaikorai Stream catchment)	Lake level managed by the minimum flow of Kaikorai stream (tbc)	Subject to the take limit of Kaikorai Stream catchment	No



# River catchments

Environmental flows and take limits for the Dunedin and Coast FMU’s rivers are shown in the table below. Take limits and environmental flows are often set as a percentage of the 7-day Mean Annual Low Flow (7-day MALF). The 7-day MALF is a flow statistic that provides an indication of how low the flow gets in a typical year.

For smaller rivers or streams with a mean flow of 5,000 l/s or less, such as Orokonui Creek or Otokia Creek, a total take limit is set as 20% of 7-day MALF. For larger rivers with mean flow of more than 5,000 l/s, such as the Tokomairiro River, a larger take limit is set at 30% of the 7-day MALF.

Restrictions on water takes, diversions and damming activities in catchments of smaller rivers or streams are triggered when flows are at 90% of the 7-day MALF, whereas for larger rivers these restrictions do not kick in until flows are at 80% of the 7-day MALF.

Table 4 provides estimates of the actual minimum flows and take limits for different catchments based on the default method using the best available information to determine the 7-day MALF of each catchment. The numeric minimum flows and take limits will not be included in the LWRP. Instead, the LWRP will refer to the relevant % of 7-day MALF.

Name	Environmental flow	Take limit (l/s)	Further allocation available (estimate based on best available information)
<b>River catchments with a mean flow ≤ 5,000 l/s and managed by default limits</b>			
Minimum flow set as 90% of 7-day MALF			
Take limit set as 20% of 7-day MALF			
Abernethys Creek	92	92	Yes
Akatore Creek	373	373	Yes
Alexanders Creek	90	373	Yes
Battery Creek	105	373	Yes
Baynes Creek	126	373	Yes
Big Creek	335	373	Yes
Bull Creek	107	373	Yes
Carey’s Creek	129	373	Yes
Coutts Gully	11	373	Yes
Craigs Creek	124	373	Yes
Drivers Creek	199	373	Yes
Fern Stream	258	373	Yes
Finnies Creek	123	373	Yes
Flax Stream	224	373	Yes

Jennings Creek	92	20	Yes
Johnstons Creek	373	83	Yes
Jones Creek	90	20	No
Kaikorai Stream	105	23	Yes
Mabel Creek	126	28	Yes
Morris Creek	335	75	Yes
Nobles Stream	107	24	Yes
Okia Creek	129	29	Yes
Omimi Creek	11	2	Yes
Orokonui Creek	124	28	Yes
Otokia Creek	199	44	Yes
Reids Stream	258	57	Yes
Rocky Valley Creek	123	27	Yes
Shagree Creek	224	50	Yes
Smiths Creek	123	27	Yes
Stewarts Creek	55	12	Yes
Styles Creek	0	0	Yes
Taylor's Creek	118	26	Yes
Thomson Creek	174	39	Yes
Tomahawk Creek	200	44	Yes
Wangaloa Creek	500	111	Yes
Washpool Creek	548	122	Yes
	184	41	Yes
<p><b>River catchments with a mean flow &gt; 5,000 l/s and managed by default limits</b></p> <ul style="list-style-type: none"> <li>• <b>Minimum flow set as 80% of 7-day MALF</b></li> <li>• <b>Take limit set as 30% of 7-day MALF</b></li> </ul>			
Tokomairiro River	407	152	Yes

For the Waitati River and Water of Leith river catchments the Otago Regional Council proposes to set interim take limits and environmental flows according to the default method above. These will be implemented through the resource consent replacement process. However, prior to this resource consent replacement process Council will assess whether there is a need to set bespoke minimum flows and take limits for these rivers through a plan change process. Given the current level of water use and allocation, these rivers will in effect be either fully allocated or over-allocated and any new taking of water will not be available.

Table 5 provides estimates of the actual minimum flows and take limits for different catchments based on the default method using the best available information to determine the 7 day MALF of each catchment. The numeric minimum flows and take limits will not be included in the LWRP. Instead, the LWRP will refer to the relevant % of 7-day MALF.

**Table 5: Rivers managed by interim default minimum flows and take limits**

Name	Environmental flow (l/s)	Take limit (l/s)	Further allocation available (estimate based on best available information)
River catchments where default limits will be set as interim limits to be given effect to at the time of consent renewal, unless bespoke limits are set			
Waitati River	270	60	No
Water of Leith	294	65	No

For river catchments where a transition may be needed to achieve the environmental outcomes of the catchment and phase out over-allocation, it is proposed to set a common consent duration expiry date for any new consent granted under the LWRP framework, the proposed common catchment date for rivers where this will apply in the Dunedin and Coast FMU is 2030.

## Aquifers

The Dunedin and Coast FMU contains one known aquifer, the Tokomairiro Plain Groundwater Management Area.

For this aquifer a take limit will be set based on a proportion (35%) of the aquifer’s mean annual. National direction requires Otago Regional Council also to set environmental levels for this aquifer. The Otago Regional Council does not have sufficient groundwater level monitoring data to set environmental levels in the Land and Water Regional Plan when it will be notified. Therefore, environmental levels for the Tokomairiro Plain Groundwater Management Area will be set at a later date.

Table 6 provides an estimate of the actual takes limit for the aquifer based on the default method using the best available information to determine the aquifer’s Mean Annual Recharge (MAR). The numeric take limit will not be included in the LWRP. Instead, the LWRP will refer to the relevant % of the MAR.

**Table 6: Aquifers managed by default take limits**

Name	Environmental level(s)	Take limit (volume in m <sup>3</sup> /year)	Further allocation available (estimate based on best available information)
Aquifers managed by default limits <ul style="list-style-type: none"> <li>Take limit: 35% mean annual recharge</li> </ul>			
Tokomairiro Plain Groundwater	Not required to be included in the new LWRP at this time	1,645,000	Yes

## Outstanding water bodies

Outstanding water bodies are water bodies that have one or more outstanding values. National direction requires the Otago Regional Council to identify outstanding water bodies and protect their important values. The table below lists the outstanding water bodies in this FMU and describes their outstanding values.

Below is a map featuring all the water bodies in Otago.

You can zoom in and view the various water bodies in an area(s).

Water bodies are shown in a blue colour. Select an area to view the water body name.

(Note: if you are on a mobile device, after selecting a water body, tap on the arrow next to the 'X' icon to view more information.)

A map of these water bodies is available online for you to view:  
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Unique identifier	Site identifier	Values and characteristics
<b>Ecology</b>		
ECL39	<b>Tokomairaro River</b>	<ul style="list-style-type: none"> <li>The Tokomairaro River catchment has a high and unusual diversity of non-diadromous galaxiids including Taieri flathead galaxias, Pomahaka galaxias and Eldon's galaxias.</li> <li>Other native fish species include Banded kōkopu, Black flounder, Common bully, Common smelt, Flathead galaxias, Inanga, Lamprey, Longfin eel, Redfin bully, Shortfin eel, Upland Bully.</li> </ul>
ECL40	<b>Ōkia Wetland Management Area</b>	<ul style="list-style-type: none"> <li>The Ministry of Environment lists Okia Flat as having sections or sites of potential national importance for aquatic biodiversity values.</li> <li>The best example of dune hollow vegetation in the Otago Coast Ecological Region with many species in decline. Very diverse native wetland vegetation within the dune hollows. Some paddocks are of special interest in having Sphagnum sp., which is only known to exist on Otago Peninsula.</li> <li>Site contains the Pyramids, a significant geological feature.</li> <li>Four species of threatened bird species have been recorded including the Yellow-eyed Penguin (<i>Megadyptes antipodes</i>), which is acutely threatened-nationally vulnerable; Blue Penguin (<i>Eudyptula minor</i>) and South Island Rifleman (<i>Acanthisitta chloris</i>), both with a threat status of gradual decline; and South Island Fernbird (<i>Bowdleria punctata punctata</i>), which is classified as sparse.</li> <li>A number of moth species are present such as <i>Diasemia grammalis</i>, <i>Pterophorus innotatalis</i>, <i>Arctesthes</i> and <i>Delogenes limodoxa</i>.</li> <li>Three species of indigenous mammal have been recorded including the Aotearoa fur seal (<i>Arctocephalus forsteri</i>); southern elephant seal (<i>Mirounga leonine</i>), which has a threat status of nationally critical; and Aotearoa sea lion (<i>Phocarctos hookeri</i>), which has a threat status of range restricted.</li> <li>Three species of indigenous lizard species and 2 exotic species of frog have been recorded: common gecko (<i>Hoplodactylus maculatus</i>); jewelled gecko (<i>Naultinus gemmeus</i>), which has a threat status of gradual decline; common skink (<i>Oligosoma nigriplantare polychrome</i>); green and golden bell frog; and whistling frog.</li> </ul>

<p>ECL40</p>	<p><b>Whawha-raupō / Swampy Summit Swamp</b></p>	<ul style="list-style-type: none"> <li>• The area is somewhat small in size (48.4 hectares) but is high elevation (720 metres) and is recorded to have outstanding site integrity (99% natural with 15% left).</li> <li>• The site scored an outstanding weighted conservation rank of 1.0 within the FENZ/WONI analysis.</li> <li>• Listed as an Area of Significant Conservation Value in the Dunedin City District Plan of national and regional significance.</li> <li>• Presence of the carabid beetle (<i>Oregus inaequalis</i>), a Category B species of Aotearoa’s threatened fauna.</li> <li>• Contains a high diversity of habitat types, with peat bogs and associated plant communities that provide important habitat for threatened South Island Fernbird (<i>Bowdleria punctata punctata</i>) and other species.</li> </ul>
<p>ECL42</p>	<p><b>Whawha-raupō / Swampy Summit Swamp</b></p>	<ul style="list-style-type: none"> <li>• The area is considered to be of international and national significance. The marsh is considered to be biologically significant both as the most important habitat for wading birds, as well as the most extensive and least modified saltmarsh in Otago.</li> <li>• The saltmarsh contains a high degree of naturalness (79%) and is considered largely intact. A complete vegetation sequence from the intertidal to dry land is a feature which most other saltmarshes in Otago no longer retain. Usually, the upper margins of salt marshes, or highest part of the sequence, are reclaimed or otherwise destroyed.</li> <li>• The saltmarsh area above mean high water springs lies adjacent to the second largest representation of dune slacks area in Aotearoa.</li> <li>• The saltmarsh grades into an oioi (<i>Leptocarpus similis</i>) and saltmarsh ribbonwood (<i>Plagianthus divaricatus</i>) community. Beyond the salt influence, some of the wet dune hollows, known as ‘slacks’ contain swamp areas dominated by Aotearoa flax (<i>Phormium tenax</i>), native rush and sedge communities.</li> <li>• Noted as breeding grounds for insects with eighty species of moth that have been recorded.</li> <li>• Marine mammals such as sea lions have been seen pupping within the Aramoana saltmarsh.</li> <li>• Identified as feeding grounds for many bird species including the Eastern Bar-tailed Godwit (<i>Limosa lapponica baueri</i>), South Island Pied Oystercatcher (<i>Haematopus ostralegus finschi</i>), Pied Stilt (<i>Himantopus himantopus</i>), Spur-winged Plover (<i>Vanellus miles novae hollandiae</i>), Banded Dotterel (<i>Charadrius bicinctus</i>), White-faced Heron (<i>Ardea novae hollandiae</i>), and various species of Ducks (<i>Anatidae</i>) and Gulls (<i>Laridae</i>).</li> </ul>
<p>ECL43</p>	<p><b>Akatore Estuary</b></p>	<ul style="list-style-type: none"> <li>• The Akatore Estuary is recognised within the Otago Coastal Plan as a nationally significant wildlife area for waterfowl, and waders such as pied stilts (<i>Himantopus himantopus leucocephalus</i>; Not Threatened).</li> </ul>

Ecology		
ECL44	<b>Makahoe/Papanui Inlet</b>	<ul style="list-style-type: none"> <li>• This estuary is the only estuary recognised to support breeding habitat for yellow-eyed penguins.</li> <li>• This estuary is the most heavily used site within Otago by New Zealand sea lions.</li> <li>• Makahoe/Papanui Inlet hosts extensive seagrass habitat which covers 111.1 hectares, 38.3% of the intertidal area. This habitat supports high biodiversity, ecological processes, and provides habitat for a range of estuarine species.</li> <li>• Makahoe/Papanui Inlet is adjacent to two regionally significant wetlands, the Makahoe/Papanui Inlet Saltmarsh and the Okia Flat Wetland Management Area which add to the ecological integrity of the estuary complex. Due to the outstanding wetland values which support a range of high and very high bird and fish ecological values, Makahoe/Papanui Inlet is recognised as outstanding.</li> </ul>
ECL45	<b>Blueskin Bay Estuary</b>	<ul style="list-style-type: none"> <li>• Blueskin Bay is listed in the regional plan for Otago: Coast as a coastal protection area with Kāi Tahu cultural and spiritual values. Blueskin Bay is recognised to have potential national importance for aquatic biodiversity values.</li> <li>• Provides an essential stopover supporting a significant proportion of the world's population of black-billed gulls, this ecological sub-value is recognised as outstanding.</li> <li>• Blueskin Bay supports numerous threatened and at risk native freshwater fish.</li> <li>• Blueskin Bay is recognised as significant habitat for bivalves and supports a large biomass of tuaki/cockles. The estuary supports the largest known population of cockles within the Otago region and is recognised as outstanding for invertebrate ecological values.</li> <li>• The estuary has the greatest macrofaunal richness of the monitored Otago estuaries and a high abundance of species with large numbers of invertebrates which are sensitive to habitat disturbance. This supports recognition of this estuary to hold outstanding invertebrate ecological values.</li> </ul>

Physical		
PHY21	<b>Ross Creek water supply dam, Ōtepoti</b>	<ul style="list-style-type: none"> <li>Nationally Significant The first major water supply in Aotearoa. The earth dam was opened in 1867.</li> <li>Ross Creek, Ōtepoti.</li> </ul>
PHY22	<b>Akatore gorge and estuary</b>	<ul style="list-style-type: none"> <li>Regionally Significant  Outstanding example of a narrow, deeply incised gorge cut through uplifted coastal block opening out into fault-controlled estuary.</li> <li>At mouth of Akatore Creek and for 3 km upstream. 6 km south of Taiari River mouth.</li> </ul>
	<b>Tokomairaro salt meadow</b>	<ul style="list-style-type: none"> <li>Nationally Significant  Possibly the largest and best developed high-tidal salt meadow in Aotearoa, cut by deeply incised intertidal channels.  Fills lower 1km section of small tributary on north side of Tokomairaro estuary mouth.</li> <li>At mouth of small tributary valley 2km upstream from mouth of Tokomairaro River estuary on north side.</li> </ul>
PHY24	<b>Blueskin Bay Quaternary tidal flats and coastal features</b>	<ul style="list-style-type: none"> <li>Internationally Significant Best Holocene and good Late Pleistocene section in Otago. Also important as location of many carbon dated shells used to construct Aotearoa's sea level curve.</li> </ul> <p>Tidal flats, low bluffs and cuttings around Blueskin Bay.</p> <ul style="list-style-type: none"> <li>State Highway 1, Evansdale, Warrington Spit, Blueskin Bay.</li> </ul>



Physical		
PHY23		<ul style="list-style-type: none"> <li>Regionally Significant</li> </ul> <p>An easily accessible, almost pristine example of a small, drowned valley forming an intertidal estuary with a sand dune barrier across the entrance.</p> <p>A steep-sided inlet with salt meadows and salt marshes around the fringes. A wide barrier spit composed of numerous longitudinal dunes almost closes off the entrance to the estuary.</p> <ul style="list-style-type: none"> <li>Inlet about 4km east of Blueskin Bay and Waitati, 20km northeast of Ōtepoti.</li> </ul>
PHY26	<b>Makahoe/ Papanui Inlet drowned valley</b>	<ul style="list-style-type: none"> <li>Regionally Significant</li> <li>Excellent example of a drowned valley forming a tidal inlet. Of scenic value.</li> <li>Drowned valleys eroded in rocks of the Dunedin Volcanic Complex. Inlet is almost closed at the mouth by a sand spit formed by south to north longshore drift.</li> <li>South side of Otago Peninsula.</li> </ul>
PHY27	<b>Hoopers Inlet drowned valley</b>	<ul style="list-style-type: none"> <li>Excellent example of a drowned valley forming a tidal inlet.</li> <li>Of scenic value.</li> <li>Drowned valleys eroded in rocks of the Dunedin Volcanic Complex.</li> <li>Inlet is almost closed at the mouth by a sandspit formed by south to north longshore drift.</li> </ul>

<b>Recreation</b>		
None identified.		
<b>Natural character</b>		
None identified.		
<b>Natural features and landscapes</b>		
LAN55	<b>Aramoana Saltmarsh</b>	<ul style="list-style-type: none"> <li>Highly intact tidal to dry land vegetation sequence.</li> <li>Vegetation includes several saline and wetland species including oioi, saltmarsh ribbonwood, and harakeke.</li> <li>Highly memorable local feature within the Otago Harbour, and expressive of its formative processes.</li> </ul>
LAN56	<b>Makahoe / Papanui Inlet</b>	<ul style="list-style-type: none"> <li>Intact tidal estuary with limited structures, and consents.</li> <li>Margins include a mixture of seagrass, saltmarsh, as well as areas of farmland (Otago Regional Council, 2020).</li> <li>Habitat for a range of shore and seabirds including the white-faced heron and eastern bar-tailed godwit.</li> <li>Highly expressive of its tidal influence and formative processes.</li> <li>Makahoe is the Māori name for the Papanui Inlet, and was an area where pātiki (flounders), makō (shark), tuere (blind eel/hagfish), kōkopu (native trout), tuaki (cockle), roroa (shellfish sp.), tio (oysters) and pāua were gathered.</li> </ul>
LAN57	<b>Hoopers Inlet</b>	<ul style="list-style-type: none"> <li>Intact tidal estuary with limited structures, and consents.</li> <li>Margins include a mixture of saltmarsh, and salt meadows as well as areas cutty grass/rautahi (<i>Carex coriacea</i>), <i>Carex virgata</i>, <i>Carex gaudichaudiana</i> and knobby club rush (Otago Regional Council, 2020).</li> <li>Highly expressive of its tidal influence and formative processes.</li> <li>Public access to the inlet is available from Allans Beach Road and Hoopers Inlet Road.</li> </ul>

## Economic profile and snapshot

While freshwater policies might be designed and applied specifically to the Dunedin & coast FMU, their impacts may be felt beyond the FMU boundary. Hence the rest of the Dunedin City area (including Mosgiel and surrounding area up to Middlemarch, which are part of the Taieri FMU but are all within one hour driving from Dunedin City centre) are combined with the Dunedin & Coast FMU when presenting socio-economic information. This combined area is referred to as Dunedin and surrounds.

In 2018, the area encompassing Dunedin and surrounds was home to around 130,000 residents (or nearly 60% of the population of Otago). In the 12 years between 2006 and 2018, there was a 7% (or 8,100 people) increase in population, which is lower than the Otago Region (+16%) and New Zealand (+17%). Most residents (nearly 80%) live in Dunedin City centre area, while the remainder is split fairly evenly between Mosgiel and surrounding area (10%), and smaller towns and rural areas (10%).

Nearly two in three Otago residents' livelihoods are directly reliant on the water resources in this FMU, from domestic water consumption and discharge to commercial and industrial water use and discharge.

The economy in Dunedin and surrounds is more diverse than other parts of the Otago Region. Residents are likely to be working in Tourism Related industries, Health Care and Social Assistance, Education and Training, Construction, or Public Administration and Safety. Employment in the primary sector is relatively small, providing around 2% of jobs. The large residential population and approximate two million visitors annually (pre-COVID 19) has been putting increasing pressure on water use (water takes and discharges of pollutants or contaminants to water) and its infrastructure.

An understanding of Māori history and the Māori economy is essential for policy development and policy impact assessment. Not only does pre-European Māori history help shape modern day New Zealand, but the Māori economy is also integral to the New Zealand economic system. ORC is partnering with Aukaha and Te Ao Marama to develop an overview of Kāi Tahu history and economy.

- [View the Dunedin & Coast economic snapshot that provides local economy information](#)
- [View more regional economic information](#)
- [View the media release for new Otago economic reports](#)

