3

Regional Description

3.1 Introduction to the water resources of Otago

Water is an integral part of Otago's natural environment. The region has a very significant water resource, as surface water (in lakes and rivers), as groundwater (in aquifers), and as wetlands. Groundwater is water that occupies or moves through spaces in geological formations under the surface of the land. Surface water results either directly from precipitation, or from groundwater that has come to the surface. Wetlands are treated as a distinct water resource in this Plan. The Otago Regional Council is responsible for promoting the sustainable management of these water resources.

This chapter provides background information on the characteristics of surface water, groundwater and wetland resources of Otago, and gives a brief overview of the region's major water bodies. It also describes the subregions as defined for the Plan, providing a short summary of the environmental context in which the water resources occur. Schedule 1 of this Plan provides greater detail on the natural values of the lakes and rivers in each of the subregions listed in this chapter.

3.2 The water resources of Otago

3.2.1 Surface water

Otago's distinctive character is often derived from its lakes, rivers and wetlands. For centuries, Otago's people and communities have used water to provide for their social, economic and cultural well being. This is evidenced in the wide range of heritage values associated with lakes and rivers: from the use of rivers as transport routes by Polynesian settlers, through to their importance in gold mining, some early remnants of which are still visible. The character of the region's water bodies is diverse, reflecting the variation in environmental conditions throughout.

Otago contains many lakes of varying size. Approximately 23% of New Zealand's lake surface area, occurs in Otago. The Clutha River/Mata-Au drains much of the Otago region and is the largest river in New Zealand in terms of the quantity of water carried each year. Seventy five percent of the total flow of the Clutha River/Mata-Au at Balclutha results from the catchments of the three major features of Otago's Lakes district: Lakes Hawea, Wanaka and Wakatipu. Important rivers feeding into the Clutha catchment include the Cardrona, Lindis, Shotover, Nevis, Fraser, Manuherikia and Teviot. The Clutha and its principal tributary, the Kawarau River, pass through spectacular gorges, two of which are dammed for hydro-electricity generation. One of the larger tributaries of the Clutha in its lower reaches is the Pomahaka River, which rises in the mountains above Tapanui.

The second largest catchment in Otago is that of the Taieri River. Rising in the uplands of Central Otago, it snakes among the block mountain ranges before passing through an incised gorge and crossing the Taieri Plain. There it joins the waters of the Lake Waipori and Waihola catchments and becomes tidal before making its way through another gorge to the sea at Taieri Mouth. Its catchment area totals 5650 square kilometres.

Other significant Otago rivers drain the coastal hills in catchments of varying character. In the north, the Kakanui, Waianakarua, Shag and Waikouaiti Rivers rise in high country and pass through predominantly dry downlands. The Tokomairiro River drains rolling country between the Taieri and Clutha catchments. Rivers to the south of Otago, particularly the Catlins area, emerge from wetter, often forested hills.

The environmental context in which Otago's water bodies exist is characterised by:

- High rainfall in the Southern Alps,
- Occasional very low rainfall in the semi-arid Central Otago valleys, with high seasonal evaporation rates and no guarantee of irrigation water availability, and
- High erosion risk in places.

These conditions leave their mark on Otago's water bodies, such as the Shotover River's distinctive colour resulting from a combination of high rainfall and erosion.

Despite the generally large water volumes present in the region, some parts of Otago are among the driest areas in New Zealand. Several rivers in Otago are characterised as being water-short, including the Taieri, Shag and Kakanui Rivers and tributaries. The lack of water is observable in the many small stream stretches, which completely dry up each summer.

3.2.2 Groundwater

Groundwater occurs in many parts of the region and many of Otago's people and communities have come to rely upon this water to provide for their social, economic and cultural well being. There are a number of localities in Otago where groundwater is of particular significance due to existing use or potential demand. At present all of Otago's many aquifers have water of useable quality.

3.2.3 Wetlands

Wetlands are an important component of Otago's water resource. They provide a diverse set of landscape elements, including high altitude blanket bogs and string bogs, saline areas, swamp forest remnants, shallow lake complexes, estuarine saltmarshes and valley floor swamps. These are of particular significance due to their scarcity and ecological and cultural values.

High altitude wetlands, such as those on Otago's block mountain ranges, are often considered important for supporting summer stream flows, as well as their near-pristine ecosystems. Wetlands in more developed landscapes are also valuable sanctuaries for wildlife and mahika kai for Kai Tahu.

Otago contains several large wetland systems of significance for wildlife including the Upper Taieri scroll plain wetland complex and the Waipori/Waihola wetland complex. Lake Tuakitoto has considerable values,

which have been recognised by a Local Water Conservation Notice, the elements of which are carried through into this Plan.

3.3 Subregions of Otago

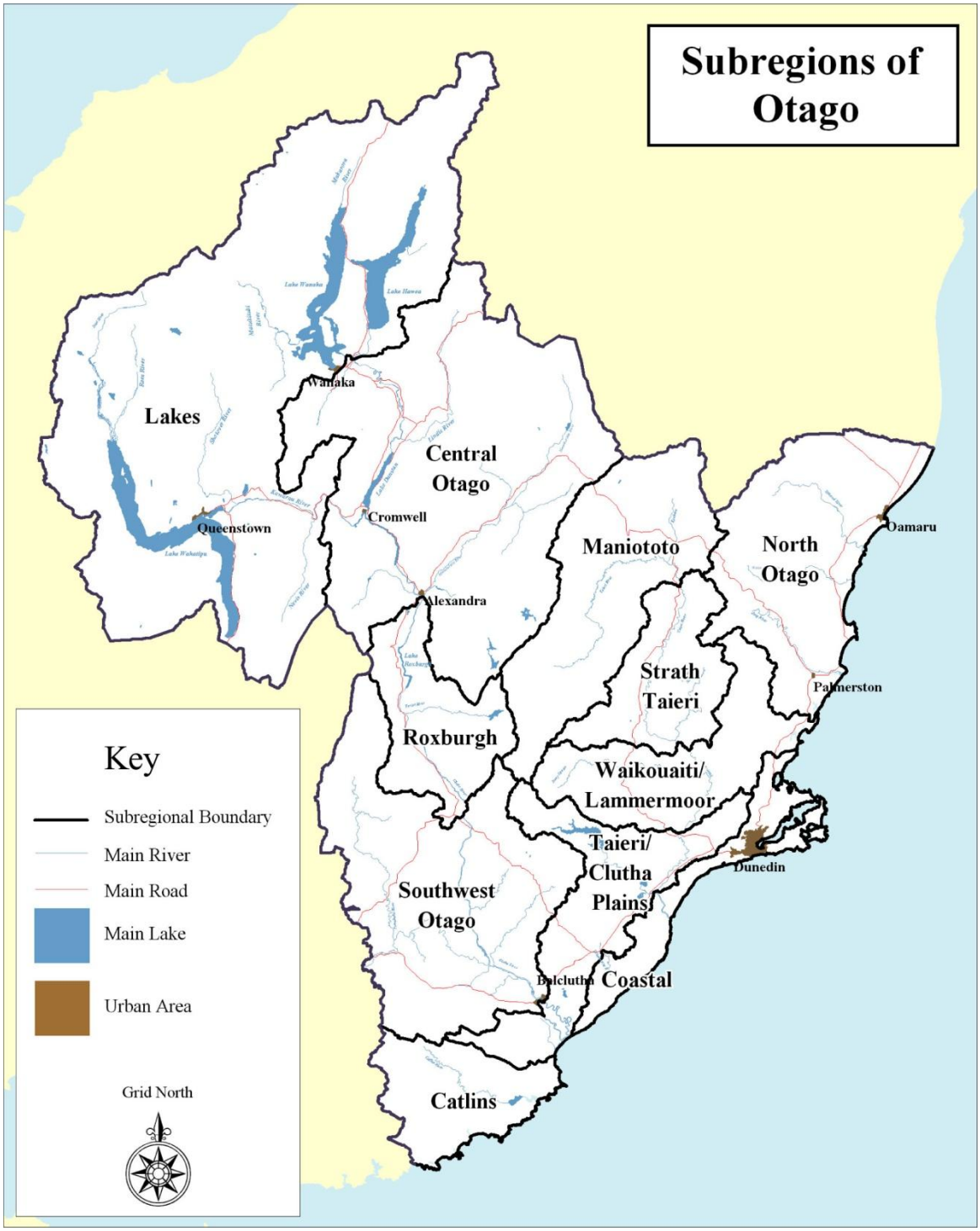

Figure 3: Map of subregions of Otago

3.3.1 North Otago subregion

The North Otago subregion extends from the Waitaki River in the north to the Pleasant River in the south and includes the catchments of the Shag, Waianakarua and Kakanui Rivers. These and other catchments in the subregion are naturally subject to low flows, particularly between November and April, due primarily to climatic factors.

North Otago is not as dry as some inland areas but still experiences a relatively low rainfall. Rainfall varies from less than 600 mm per annum near Oamaru, to in excess of 1000 mm per annum in the Kakanui Mountains. The majority of the coastal downlands have rainfalls in the order of 600 to 700 mm per annum.

The subregion's most highly used aquifers are:

- Lower Waitaki Plains Aquifer;
- Papakaio Aquifer;
- North Otago Volcanic Aquifer;
- Kakanui-Kauru Alluvium Aquifer; and
- Shag Alluvium Aquifer.

3.3.2 Maniototo subregion

This subregion comprises the upper catchment of the Taieri River and is defined by Rough Ridge to the west, the Rock and Pillar Range to the east and the Mount Ida Range and Kakanui Mountains in the north.

The Maniototo Basin experiences very low rainfalls, approximately 400 mm per annum, although higher rainfalls occur in the block mountain uplands surrounding the basin (e.g. 1600 mm per annum on the Rock and Pillar Range). Numerous small streams rising around the basin, for example the Hogburn, are fed by snow-melt, but often have dry stretches by late summer.

The Kye Burn is an important tributary of the Taieri River in this subregion. The Maniototo Irrigation and Hydro Electric Power Scheme (MIHEPS) is a major water augmentation system operating in the Taieri River main stem.

Much of the Maniototo Basin is underlain by an aquifer, known as the Maniototo Aquifer.

3.3.3 Central Otago subregion

Central Otago is a large subregion defined by Rough Ridge in the east, Hawkdun Range, Lindis and Cardrona river catchments in the north, Old Woman and Old Man/Kopuwai ranges to the west and Knobby Range in the south. The landscape is dominated by block mountain and basin topography.

Parts of this subregion have the lowest rainfall in New Zealand, with areas of low elevation experiencing approximately 350 mm per annum, and containing a large area of semi-arid land. Areas in the ranges, particularly in the Cardrona catchment, can however receive in excess of 1400 mm of rainfall per annum.

The Clutha/Kawarau main stem is the dominant feature of the subregion's water resources, carrying the water eastwards out of Central Otago, and is dammed at Clyde, creating Lake Dunstan. One of the more important tributaries of the Clutha here, the Manuherikia River, is used as a delivery system to provide stored water to irrigators.

There are a number of aquifers in the subregion, which are growing in importance. These are:

- Dunstan Flats Aquifer;
- Earnscleugh Terrace Aquifer;
- Hawea Basin Aquifer (part of);
- Wanaka Basin Cardrona Gravel Aquifer (part of); and
- Cromwell Terrace Aquifer.

There is also an aquifer in the Tarras area (not mapped in this Plan).

3.3.4 Lakes subregion

The Lakes subregion contains a large area of high country and is dominated by the glacial lakes: Lake Wakatipu, Lake Wanaka and Lake Hawea. Catchments are variable in size, with reliable flows.

Rainfalls vary between about 600 mm per annum in the part of the Kawarau Gorge in this subregion, to in excess of 8000 mm per annum in some parts of the Southern Alps which form the headwaters of many of the catchments feeding the Clutha River/Mata-Au system.

The Lake Hawea control structure has an influence on the water level of Lake Hawea and the flow in the Hawea River.

Aquifers in the subregion include the Wakatipu Basin Aquifer and parts of the Hawea Basin and Wanaka Basin Cardrona Gravel Aquifers. There are also aquifers in Glenorchy and Kingston areas (not mapped in this Plan).

3.3.5 Roxburgh subregion

The Roxburgh area is a small subregion defined by the Umbrella and Old Man ranges/Kopuwai in the west and Knobby Range and the Teviot River catchment to the east.

Rainfalls vary from 600 mm per annum in the Clutha Valley to about 1400 mm per annum on the Old Man/Kopuwai Range.

The Clutha River/Mata-Au is the dominant water feature of the subregion, and is dammed at Roxburgh, creating Lake Roxburgh. However, there are numerous small catchments in the upland areas flanking the Clutha.

The subregion's most highly used aquifers are the Roxburgh Basin Aquifer and the Ettrick Basin Aquifer.

3.3.6 Strath Taieri subregion

The Strath Taieri, a valley between the Rock and Pillar Range in the west and Taieri Ridge to the east, is dominated by the Taieri River. The subregion is defined by these block mountain uplands which have many small catchments draining into the Taieri.

The flows in these catchments vary, reflecting a range of rainfalls, from 600 mm per annum on the river flat to more than 1600 mm per annum on the often snowy tops of the Rock and Pillar Range. Catchments on Taieri Ridge frequently dry up in summer.

Groundwater occurs in an aquifer within this subregion (not mapped in this Plan).

3.3.7 Waikouaiti/Lammermoor subregion

The Waikouaiti/Lammermoor subregion is primarily hill country drained by the catchments of the Waikouaiti River, which flows to the sea, and Deep Stream and Lee Stream, which are tributaries of the Taieri River. The Taieri cuts across the middle of the subregion in the deeply incised Taieri Gorge.

Being high in elevation, most areas experience in excess of 1000 mm of rainfall per annum.

A significant proportion of Dunedin's water supply is derived from the rivers in these uplands.

3.3.8 Coastal subregion

The Coastal subregion consists of the Otago Peninsula, including Dunedin, and the Chain Hills from Swampy Summit south to the mouth of the Clutha River/Mata-Au.

Rainfalls vary between 700 mm per annum near Taiaroa Head to in excess of 1400 mm per annum on Swampy Summit and Mount Cargill.

Catchments in the Coastal subregion are characteristically small and are drained by streams which have low and unreliable flows, particularly in summer and autumn. The subregion also contains the lower gorges and mouths of two larger rivers: the Taieri and Tokomairiro rivers.

3.3.9 Taieri/Clutha Plains subregion

This subregion contains sections of the Taieri and Clutha/Mata-Au rivers as they emerge onto their floodplains, as well as the Tokomairiro and Waipori river catchments. The Waipori River was dammed at Waipori for hydro-electricity generation, creating Lake Mahinerangi. Most other catchments are

characteristically small and the streams that flow from them, such as the Puerua River and Lovells Stream, form tributaries of the above rivers.

Rainfalls vary between less than 700 mm per annum on the Lower Clutha and Lower Taieri Plains to in excess of 1600 mm per annum in the Lammerlaw Range in the north.

Some groundwater is taken from aquifers within the Taieri (Lower Taieri Aquifer) and Tokomairiro Plains (not mapped in this Plan).

3.3.10 Southwest Otago subregion

Southwest Otago consists of several catchments flowing into the lower Clutha, the largest of which is the Pomahaka. Other significant catchments in Southwest Otago are the Waiwera, Waitahuna and Tuapeka. The Clutha River/Mata-Au enters the subregion northwest of Beaumont and leaves at Balclutha.

Rainfalls vary between 700 mm per annum in the Lower Clutha Valley to in excess of 1200 mm per annum on top of the Blue Mountains, and about 1400 mm in the Umbrella Mountains at the head of the Pomahaka.

3.3.11 Catlins subregion

The Catlins subregion in southeast Otago is characterised by its native forest remnants, with several water bodies, such as the Maclennan and Tautuku Rivers, in largely unmodified, natural states. The Owaka and Catlins river catchments, like many within the subregion, are small to moderate in size, with reliable flows.

Rainfalls are among the highest in Otago and are in excess of 1600 mm per annum within forested upland areas.