Clutha Mata-Au Freshwater Management Unit (FMU): Lower Clutha Rohe

Te Ao Marama Inc.

Aukaha
KIA KAHA, AU KAHA

Otago Regional Council

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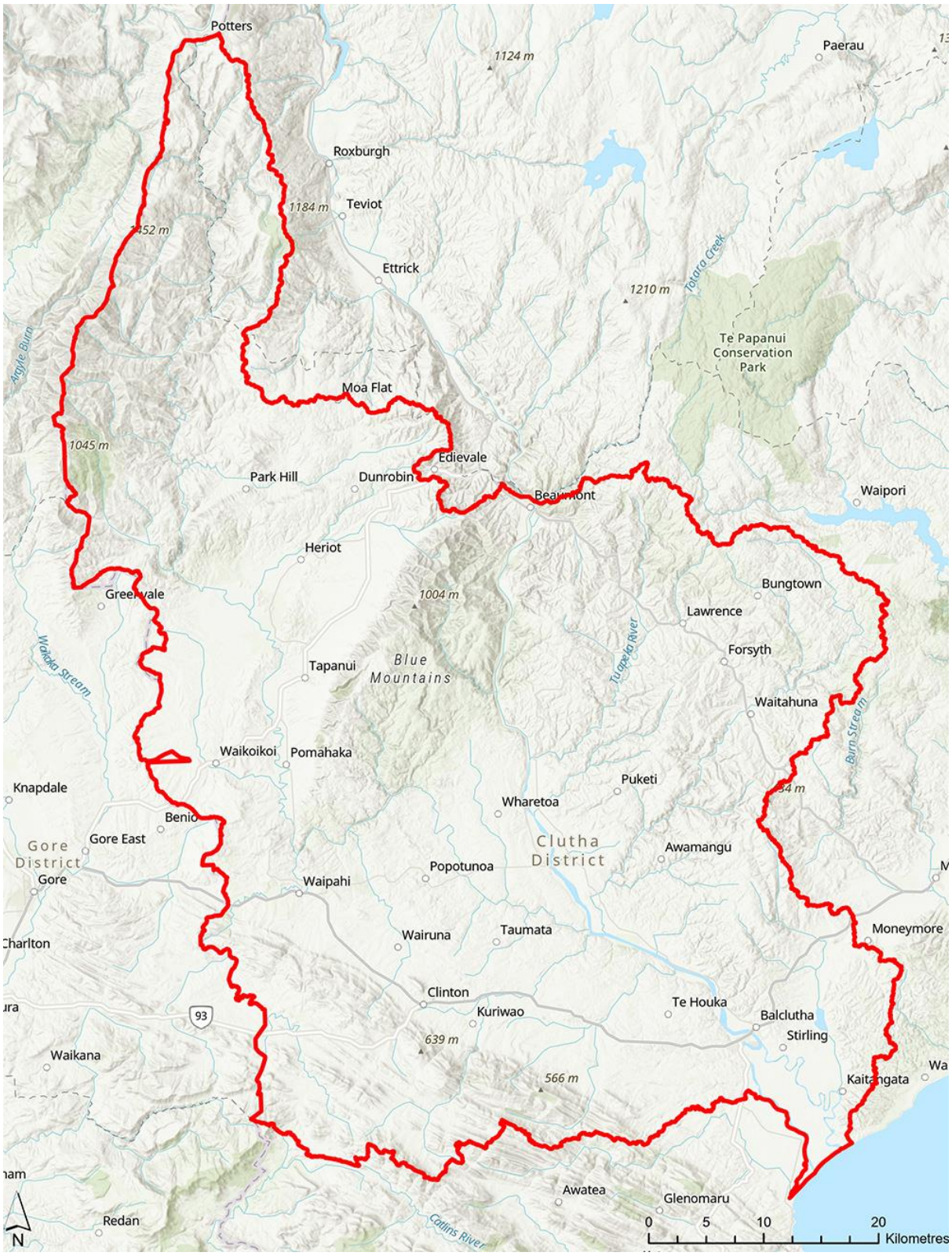

Introduction

The Clutha Mata-Au River is the largest in Aotearoa, New Zealand, by catchment and volume. As the Clutha Mata-Au FMU (Freshwater Management Unit) is large, it has been further divided into five rohe (areas).

The Lower Clutha Rohe merges the entire river catchment from all five rohe within the Clutha Mata-Au FMU.

The Lower Clutha Rohe covers over 4,000 square kilometres and is home to more than 7,000 people. This rohe includes the Pomahaka catchment and several other river catchments that feed the Clutha Mata-Au. They comprise Tuapeka, Waitahuna, Waiwera, the Beaumont River, Tuapeka and Waitahuna catchments, and some smaller tributaries.

The rohe also includes Lake Tuakitoto, a small shallow lake with an adjoining wetland of a type that is now rare in Otago.

The Clutha Mata-Au River is important in Kāi Tahu traditions and history. There is an ongoing relationship of mana whenua with wāhi tupuna and mahika kai values. The river and its tributaries once supported seasonal settlements and plentiful mahika kai. The Pomahaka River was important for people who settled in the Catlins and Tautuku areas. The coastal area at the mouth of the Clutha Mata-Au River offered a bounty of mahika kai, including eeling and harvest of other freshwater fish in lagoons and up the river.

The rohe encompasses the urban centres of Lawrence, Tapanui, Clinton and Balclutha. The Otago gold rush began in Gabriel's Gully near Lawrence, and the rohe still contains reminders of its mining past. The gold rush, the history of agriculture, and coal mining in Kaitangata give the area many heritage sites.

The predominant land cover throughout the rohe is high-producing grassland. Most of the intensive agriculture occurs in the middle to lower catchment. The headwater catchments of Lakes Wanaka, Wakatipu and Hawea, cover just 34% of the total Clutha Mata-Au catchment area but generate 75% of the Clutha Mata-Au flow measured at Balclutha. The remaining 66% of its catchment area provides just 25% of the flow at Balclutha.

Science Summary

Soils and land use

The main soil types in this rohe include Brown, Melanic, Gley, Pallic, Recent, Organic, Anthropic and Podzols. Brown and Pallic soils are the dominant soil types and cover 45% and 42% of the rohe. Sheep and beef farming uses a large area of the Lower Clutha. This farming is on high-producing exotic grasslands on the Brown and Pallic soils.

Melanic soils cover 5% of the rohe and occur on ranges in parts of the Kaihiku stream, Pomahaka and Waiwera river catchments. Gley soils occur on 3% of the rohe, on alluvial deposits in lower areas.

Dry-stock farming (56%) dominates land use in the Lower Clutha Rohe, including sheep and beef (41%); mixed sheep, beef, and deer (7%); and sheep farming (8%). Dairy farming occurs on approximately 17% of the rohe and has notably increased by 37% between 1990 and 2018. Forestry has risen by 39% between 1990 and 2018 and now covers 9% of the rohe. The rohe is about 7% conservation estate which has increased by 40% in the last 30 years. Dry-stock farming decreased by 9%, although it remains the dominant land use in the Lower Clutha area.

Water Quantity

The most significant water feature in the Lower Clutha Rohe is the Clutha Mata-Au River, which flows to the coast and into the Pacific Ocean downstream of Balclutha. The Clutha Mata-Au River is the largest by area and flow and the second longest river in New Zealand. The Roxburgh power station highly modifies the flows at Balclutha.

The Clutha Mata-Au has many tributaries in this rohe. The largest is the Pomahaka catchment which covers about 60% of the rohe area.

The Pomahaka can significantly affect the flows at Balclutha when it floods. About one-third of the water used in this rohe is in the Pomahaka catchment.

Other significant tributaries are the Tuapeka and Waitahuna tributaries.

Water Quality

Water quality in the Lower Clutha Rohe is generally degraded with high bacteria, high nutrient concentrations and poor water clarity. High-intensity agriculture dominates land use, and drainage via tile and mole drains has been a significant source of water contamination. ORC monitors water quality and ecology of rivers, streams, and lakes. When the results are combined, they can show the health of a water body, and long-term data is analysed to show trends in water quality over time. We have been monitoring some sites in this rohe for less than five years, so current water quality results are interim.

Fourteen of 15 river sites we monitor for bacterial water quality failed to meet the required standard for *E. coli*, a faecal indicator bacteria. The required standard is the 'national bottom line' according to the National Policy Statement for Freshwater Management (2020) About half of all river sites in this rohe also did not meet the national bottom line for suspended fine sediment, which indicates water clarity. Five sites had high phosphorus, and aquatic insect life did not meet the national bottom line at three sites (measured by the Macroinvertebrate Community Index). Lake Tuakitoto did not meet the national bottom line for chlorophyll-*a* (algae) and nutrients (total nitrogen and phosphorus).

Our 20-year analysis showed degrading trends were likely across the river sites, particularly for nutrients (nitrogen and phosphorus). Our 10-year analysis indicated improving trends for most parameters across most sites in the rohe. The 10-year trends for Lake Tuakitoto show a degrading trend for phosphorus but improving trends for *E. coli* and suspended solids (water clarity).

Groundwater

The Lower Clutha Rohe contains the Pomahaka Alluvial Ribbon Aquifer and the Inch Clutha Gravel Aquifer, which straddles the Lower Clutha Rohe and the Catlins FMU.

The Inch Clutha Gravel Aquifer is a potentially significant resource for groundwater, given the aquifer's size and thickness, but generally, groundwater use is low. ORC monitoring shows that the groundwater here has high ammonia and naturally occurring arsenic compared to the NZ Drinking Water Standards (DWSNZ, 2018; ORC, 2021). Our bore log data indicates the water table is shallow, less than 3m in places on the flood plain, and 4-6m on elevated terraces. The Inch Clutha area has a network of drains and pumps, which lower the water table on arable land and help lessen the flood hazard. The aquifer is found in the 130km^2 Clutha Mata-Au Delta, an alluvium-filled valley formed by interactions between the Clutha Mata-Au River and historical sea level fluctuations. The Quaternary alluvium consists of gravels, sands, silts, mud, and peat. This complex geology means that the Inch Clutha Aquifer has variable permeability and connections with surface water. We have recently installed groundwater monitoring bores to enable us to better understand the groundwater levels and monitor for saline intrusion.

The Pomahaka Alluvial Ribbon Aquifer is a series of narrow slivers which follow the Pomahaka River from the upper Kelso basin to the lower Clydevale sub-basin. The gravels of the Pomahaka Alluvial Ribbon Aquifer occur along gravel boundaries deposited by the Pomahaka River. The aquifer connects to the Pomahaka River, so groundwater bores within the ribbon aquifer are assigned to surface water.

Groundwater is often taken from fractured rock across the rohe, especially in the Pomahaka Basins and into the Catlins FMU. This water resource is not mapped as an aquifer but is a locally important water source, particularly for stock water or servicing dairy sheds.

Biodiversity

The Lower Clutha Rohe includes rare and threatened ecosystems and species. Rare and vulnerable ecosystems include ephemeral wetlands, estuaries, and wetlands. These ecosystems contribute to national biodiversity; however land use change and invasive species often threaten them, and little is known about the extent or condition of them.

The Lower Clutha Rohe contains many species that depend on freshwater habitats and ecosystems, including fishes, invertebrates, plants, and birds. There have been 32 threatened freshwater-dependent species identified within the rohe. Threatened species include the freshwater fishes Clutha flathead galaxias, gollum galaxias, Pomahaka galaxias, dusky galaxias, and lamprey.

Freshwater invertebrates include koura and mussels, and a threatened moth, caddisfly, and stoneflies. *Carex strictissima* and *Ranunculus ternatifolius* are examples of threatened freshwater-dependent plants found here. Many native birds depend on freshwater ecosystems as permanent or transient residents, including the threatened Australasian bittern, black-fronted tern, and the at-risk, black-billed gull. Information is often missing at a species level, particularly for freshwater invertebrates, non-vascular plants, and algae.

Some exotic fishes are found in the Roxburgh Rohe including goldfish, perch and four salmonids. Many native freshwater species are under threat and continue to decline in numbers.

Wetlands

There are 28 sites in the rohe recognised as Regionally Significant Wetlands in the Regional Plan – Water for Otago (RPW). These are swamp (12 sites), marsh (7), fen (6), and bog (2). These wetlands are found within five areas: Inch Clutha, Kaitangata, Clinton, Tapanui, and Lawrence.

On the seaward end of Inch Clutha, is the Molyneux Bay Swamp (150 ha) which is a lagoon with swamp-edged fingers. Also in the Inch Clutha area is the Clutha Mata-Au River Mouth Lagoon (29 ha.), an elongated water body with marsh margins and the Clutha Matau Wetlands (21 ha.), a river-margin swamp. Further upriver, the Culcairn Oxbow Marsh (8 ha.) is a curved pond of a former oxbow channel, marsh-fringed, in farmland. Finegand Lagoon Marsh (6ha.), south of Balclutha, is a stream pond with willows and juncus marsh.

Lake Tuakitoto Wetland (546 ha.) is located near Kaitangata. It is a shallow lowland lake bordered by sedge and rush swamp but with many crack willows. Smaller wetlands occupy fingers of stream valleys, as rush marshes, some with ponds and willows, or swamps with flax, shrubs, and red tussock. These smaller wetlands include the Frasers Stream Headwaters Marsh Complex (26 ha.); Stirling Marsh Complex (11 ha.); Camp Stream Swamp (8 ha); Two Stone Hill Stream Swamp (5 ha.); and East Benhar Swamp (2 ha.).

Wetland sites in the Clinton district are remnants of former copper tussock country, which are the boggiest sites. These typically contain copper tussock, wire rush, sphagnum, sedges, some heathland, and coprosma shrubland. These are all in farmland settings: Dunvegan Fen

Complex (87 ha.); Three Stones Fen Complex (58 ha.); Hazeldale Fens (10 ha.); and Willowburn Bog (4 ha), where silver birch trees behave as weeds in the peatland. Macfarlane Road Oxbow Swamp (2 ha.) and Marana Swamp (2 ha.) are small, isolated hollows with ponds and willows. To the east of the Blue Mountains, John O'Groats Hill Fen (22 ha.) and Blackcleugh Burn Swamp (3 ha.) have red tussock wetlands on valley flats. The tops of the Blue Mountains, at around 900m altitude, have sphagnum and cushion bogs, but these are not currently listed in the RPW.

Three small marsh sites are located on farmland near Tapanui: the Clifton Hill Marshes (4 ha.) with copper tussock, the Pomahaka River Oxbow Marshes, Dalvey (4 ha.) and Koi Creek (2 ha.), both with ponds and willows.

North of Lawrence, Bungtown Bog (28 ha., and partly Scientific Reserve) is a bog with sphagnum, wire rush, and bog pine. Glendhu Swamp (22 ha.) has valley floor copper tussock, while Malones Dam Margins (2 ha.) has a small swamp at one end. In the northern portion of the rohe, there are more upland wetlands (cushion bogs, snowbanks, sedge fens), which are not currently listed in the RPW. These are found in the headwaters of the Pomahaka by the Umbrella Range.

Estuaries

The Clutha Mata-Au river has a tidal mouth where it joins the sea. It is categorised as a 'Shallow, short residence time tidal river (<3 days) with adjoining lagoon estuaries. This means the water at the river mouth is replaced regularly. In these types of estuaries, the risk of contaminants building up is lower than in estuaries where longer residence times give contaminants more time to settle out onto the estuary bed. For example, nutrients that contribute to nuisance blooms of algae. The area at the mouth of the Clutha Mata-Au is mainly freshwater due to the river's flushing; therefore, most fine sediments and nutrients are exported to the sea. No estuary exists due to these features, and no limits/attributes can be measured or set for the river/coast interface. In addition, due to the thoroughly flushed nature of the Clutha Mata-Au river mouth, no estuary nutrient modelling has been done as all nutrients and sediments are flushed out to sea.