Factsheet

SOUTHLAND SCIENCE PROGRAMME

Physiographic zones:

Understanding our water quality from the mountains to the sea

We are putting in the effort to understand Southland's unique physical geography and geology first, as well as our water quality issues, before work can begin to determine what limits need to be set.

The Southland Science Programme is a significant part of the People, Water and Land programme - Te Mana o te Tangata, te Wai, te Whenua.

Our scientific research has developed physiographic zones, which will underpin many of the changes to the proposed Southland Water and Land Plan. It is a major piece of work that improves our understanding of the relationships between Southland's water origin, soils, geology and water quality. This work is innovative and provides a new approach to understanding catchments and our water quality issues. The physiographic zones will inform the policies developed for the proposed Southland Water and Land Plan.

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What are physiographic zones?

The physiographic zones are a way of grouping areas of Southland that have similar landform types and water.

Southland's waters have a range of 'types' or 'varieties' just like wine. Water composition varies according to where it originates and the materials it passes through. For example, water from high altitude snowmelt has a very different composition to that of coastal rainfall. Soils and aquifers also vary in their makeup. For example, water passing through limestone will pick up different characteristics to water passing through peat.

How did scientists identify these zones?

Scientists looked at the key features relating to the rainfall, geology, soil, water chemistry and how water moves between different parts of the landscape. This information was then used to group these features into nine different physiographic zones.

Local and expert knowledge of the landscape and how water interacted with it also played a role in defining the extent of each physiographic zone.

How is this work relevant to water quality?

By using this approach, we can see what affects water quality in different areas – as opposed to a Southland-wide broad-brush approach.

Southland's water quality issues vary depending on the water origin, soils and the geology water passes through. For example, some areas show elevated levels of nitrate, some not; others show issues with E.coli.

The zones allow us to see why we have variations in nitrogen, phosphorus and E.coli levels. If land use intensity was the same across all areas, this research tells us that we would still see variations in contaminant levels because of the water origin, soil types and underlying geology.

It is important to note that while issues with nutrients differ across the physiographic zones, those zones in the upper reaches of Southland can still have a substantial impact on those downstream.

How will this research be used?

Policies developed for the proposed Southland Water and Land Plan will use the information in the physiographic zones research as a basis for targeting rules to issues and risks identified in each zone.

This research will also be used to further the work being done as part of the Southland Science Programme.

Physiographic zones and the proposed Southland Water and Land Plan

Our existing Water Plan will soon be replaced with a more comprehensive Water and Land Plan that focuses on the connection between land (and what happens on it) and our region's waterways. Council is currently considering zone-specific policies and rules based on outcomes of the Physiographics of Southland research, making them more relevant at a local level.

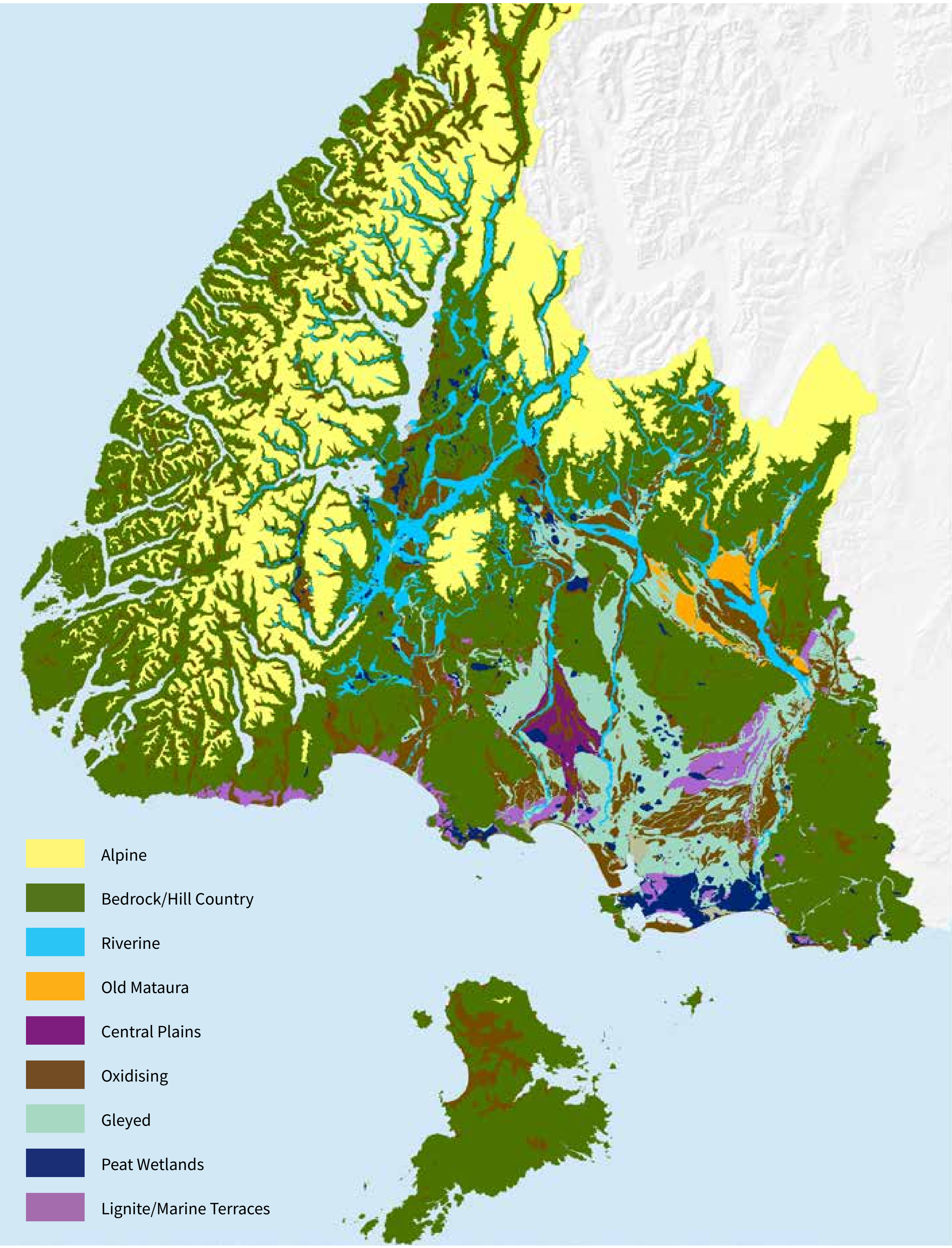
Further assistance

Every farm is different, so having the expert advice of a land sustainability officer is recommended. To arrange a free visit please contact Environment Southland's land sustainability team on (03) 211 5115 or 0800 76 88 45.

Physiographic zones and key features:

Zone	Area	Location	Features	Risks to Water Quality
Alpine	685,339 ha	All land above 800m in the Southland region	Major source of pristine water to Southland's four main rivers	A large volume of pristine water dilutes contaminants in downstream rivers
Bedrock/Hill Country	1,557,019 ha	Rolling and steep land up to 800m elevation and underlain by bedrock rather than alluvium	Largest zone. Large variety of rock types forming features including Hokonui Hills, Taringatura, Catlins	Runoff from rainfall events during winter poses considerable risk to water quality Where undeveloped, water dilutes contaminants in downstream rivers
Riverine	152,961 ha	Northern inland basins and Southland's main rivers	High levels of alpine-sourced water mixes with small portions of connected lowland water	This zone receives and moves contaminants via mainstem rivers Intensive land use next to rivers poses a high risk to water quality
Old Mataura	20,594 ha	Wendonside, Balfour and Knapdale	No rivers within this zone Aquifers recharge via rainfall through old and weathered alluvial material	Soil zones and underlying aquifers are particularly prone to nitrate accumulation Groundwater moves very slowly
Central Plains	181,151 ha	Small but significant zone in the central Southland Plains	Soils show a 'shrink/swell' behaviour in response to soil moisture levels	In autumn, aquifers receive direct input of nitrogen-rich water via cracks in soil zone In winter contaminant-rich water moves overland or through mole/pipe drainage
Oxidising	342,585 ha	Broad regional distribution but predominantly lowland Southland and the Te Anau Basin	Aquifers are recharged almost exclusively by rainfall with varying connections to smaller rivers and streams	Soil zones and underlying aquifers are particularly prone to nitrate accumulation
Gleyed	234,340 ha	Northern and Southern Plains between major river systems	Dense network of open drains and smaller streams and tributaries supplemented by an extensive drainage network	Risks are largely associated with soil zone losses of nutrients following periods of heavy rainfall Groundwater generally has low nitrogen levels due to some ability to remove nitrogen
Lignite-Marine Terraces	49,194 ha	South coast and areas of eastern and western Southland	This zone has a very strong ability to remove nitrogen as aquifer and soils have high organic content	Risks are largely associated with soil zone losses following periods of heavy rainfall Groundwater nitrogen levels are low due to strong ability to remove nitrogen
Peat Wetlands	55,285 ha	Lowland coastal areas and isolated sub-alpine areas	Artificial drainage is extensive in this zone	Soils and aquifers are very effective at removing nitrogen but prone to phosphorus and E.coli losses.

Physiographic zones:



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