Podzol Soil

New Zealand Soil Classification (NZSC) orders

Otago Regional Council

Description

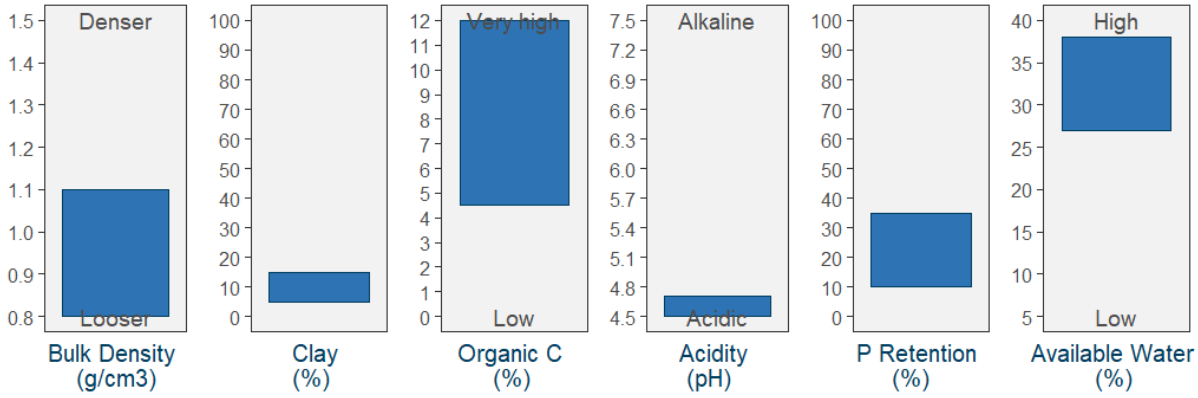
Podzol soils are formed in areas with both extremely high rainfall and acid-forming vegetation, which promotes acid leaching forming the characteristic bleached E horizon. Typically found on unconsolidated, silica-rich, well-drained parent material.

They make up 5% of soils in Otago.

Key characteristics

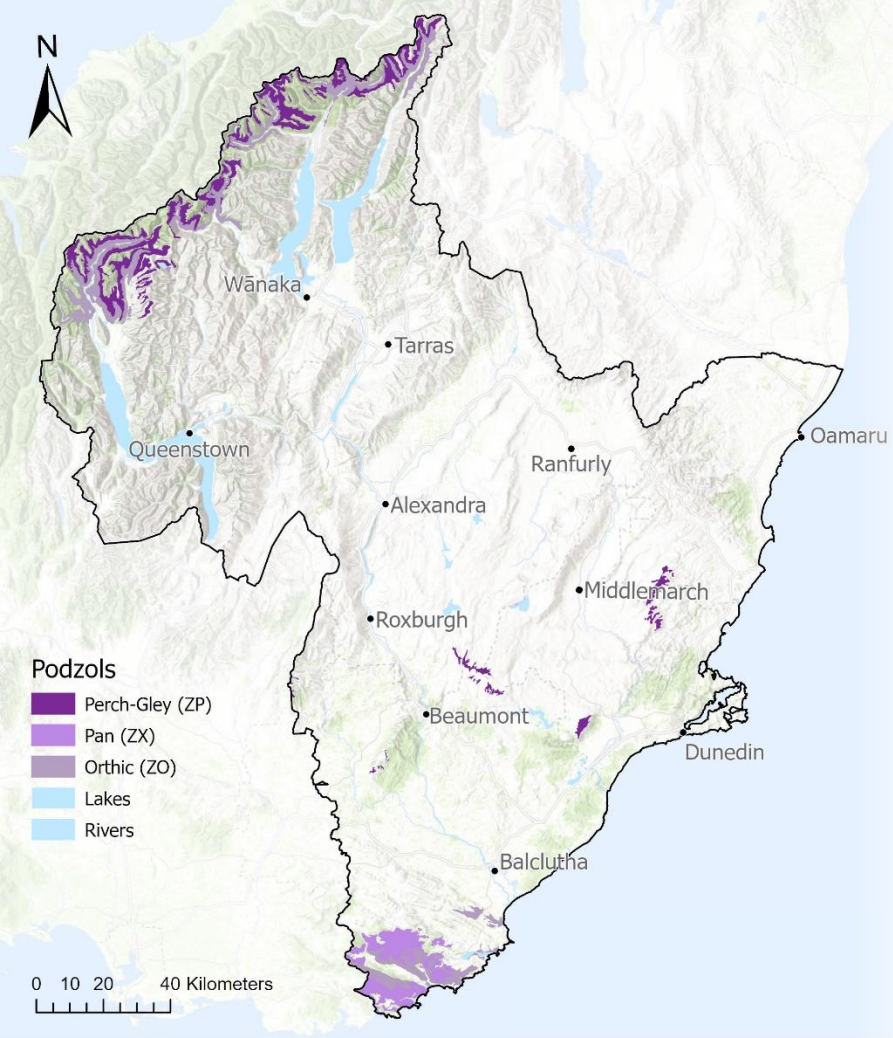
- **Parent material** — Sand from schist, greywacke, sandstone
- **Drainage** — Poorly to well
- **Fertility** — Low
- **Rooting depth** — Limited due to density, acidity and wetness

Expected ranges of Podzol topsoil (0-10 cm) key properties[2]. *C is carbon, P is phosphorus.*



Vulnerabilities

Structural damage		**Medium**	Typically, low in clay with low density in the upper soil but high organic matter means Podzols have some risk of structural damage, especially as they are often wet.
Nutrient loss	**N**	**Low**	Low in N. Loss risk low in better drained groups (Orthic).
	P	**Medium**	Low in topsoil P but subsoil tends to be higher in total P. Loss from bypass and surface flow possible.
Erosion		**High**	Minimal soil aggregation, often unconsolidated parent material, intense rainfall and steep slopes makes erosion a severe risk. Constant vegetation essential.
Waterlogging		**Low**	Pan and Perch-Gley Podzols are more susceptible due to poor drainage and higher water tables, but most are on steep slopes where waterlogging rarely occurs.



Occurrence

Form in wet areas with annual rainfall greater than 1,200 mm with many in areas of over 2,000 mm per year. They generally occur in mountainous areas.

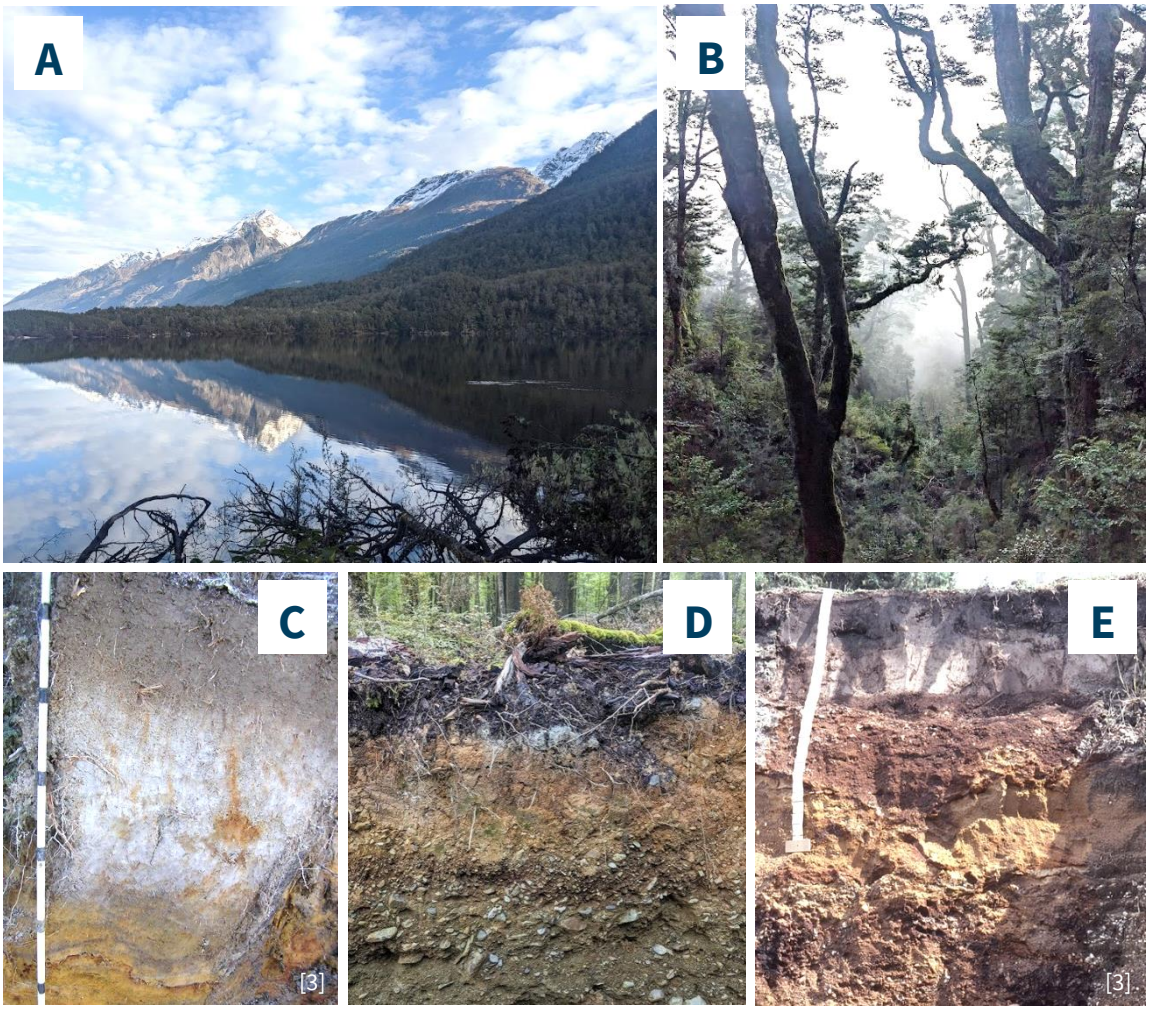
The map shows the regional extent of the different NZSC groups of Podzol soil. For more detailed mapping see page 4.

NZSC group	%*	Description[2]	Management considerations[2]
Perch-Gley	40	Prolonged wetness in the upper horizons caused by a water table perched on a slowly permeable layer (usually a pan).	**Podzol soils in Otago are almost exclusively managed for conservation and so should not be developed for any primary industry use. The below is intended for reference only.** Strongly to extremely acid soil pose a risk of aluminium toxicity to non-tolerant plants. Naturally limited in many nutrients (N, P, K, Ca) and micronutrients, though P levels tend to be higher in the B horizon where leached material accumulates with higher P retention capacity. Dense and wet subsoil layers can limit deeper rooting.
Pan	20	Firm or indurated layer that restricts root penetration and permeability	
Orthic	40	Moderately well, or well drained with no cemented or high-density pan	

*Extent of each group as a percentage relative to all Podzol soils in the Otago region.

In the region

In Otago, Podzol soils are almost exclusively under conservation management. They are found in the high rainfall zones of the Catlins and the tree-filled valleys in the Southern Alps. Some other areas containing Podzol soil are found in the upper Waikouaiti, Maungatua plateau and pockets on the Lammerlaw Range. Pan Podzols are only found in the podocarp forests of the Catlins. The Podzol soils in the Southern Alps are mostly beech-dominated and are either freely draining (Orthic) or impeded (Perched-gley) depending on their landscape positions.



A Lake Sylvan north surrounded by beech forest. **B** Podzol soils under southern beech forest. **C** Example of the pale E horizon below the topsoil that has been bleached by rainwater acidified by organic acids. **D** A more recent Orthic Podzol with the beginnings of an E horizon below the dark organic horizon. **E** The red-brown Al and Fe oxides leached from the E horizon are evident in the horizons below.

Sustainable management

Podzol soils in Otago are almost exclusively managed for conservation and so should not be developed for any primary industry use.

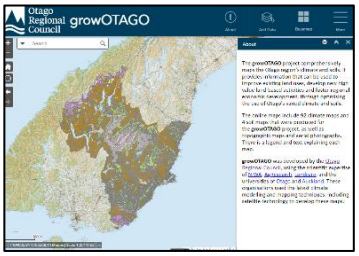
Soil maps

► Fundamental Soil Layer

Owner	Manaaki Whenua Landcare Research
Recommended use	Use at larger scales for general overview
Coverage	100%
Scale	1:50,000
Soil naming	NZSC
Development	Will be replaced by S-map
Link	soils-maps.landcareresearch.co.nz

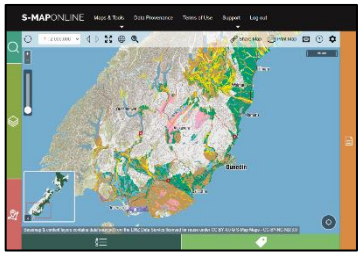
► growOTAGO

Owner	Otago Regional Council
Recommended use	Only use where S-map not available
Coverage	100% Otago (by lowland and upland)
Scale	1:50,000
Soil naming	Old regional soil series names
Development	Not planned
Link	maps.orc.govt.nz/OtagoMaps/



► S-map

Owner	Manaaki Whenua Landcare Research
Recommended use	Best available map. Use where present
Coverage	~30% of Otago
Scale	1:50,000
Soil naming	New S-map series names and NZSC
Development	Mapping ongoing
Link	smap.landcareresearch.co.nz/



For the te ao Māori of oneone (soil), including kaupapa Māori, history, and soil names, you can find more information here.

Contact

For any questions you may have contact: science.enquiries@orc.govt.nz

Note - This Infosheet generalises typical average properties of the specified soil order and groups. It has been prepared in good faith by trained staff within time and budgetary limits. However, no responsibility or liability can be taken for the accuracy of the information and interpretations. Expert advice should be sought before making decisions on individual farms. The characteristics of the soil at a specific location may differ from those described here. The vulnerability ratings given in the table on page 1 are generalised and should not be taken as absolutes for this soil in all situations. The actual risk depends on the environmental and management conditions prevailing at a particular place and time.

References

[1] Manaaki Whenua - Landcare Research 2023. The New Zealand SoilsMapViewer. https://doi.org/10.26060/9vfzhw43. Photos reproduced with permission.

[2] Hewitt, A.E., Balks, M. R., and Lowe, D.J., 2021. The Soils of Aotearoa New Zealand. Chapter 11 Podzol Soils. Springer International Publishing.

[3] New Zealand Society of Soil Science and Manaaki Whenua - Landcare Research photo library. Photos reproduced with permission