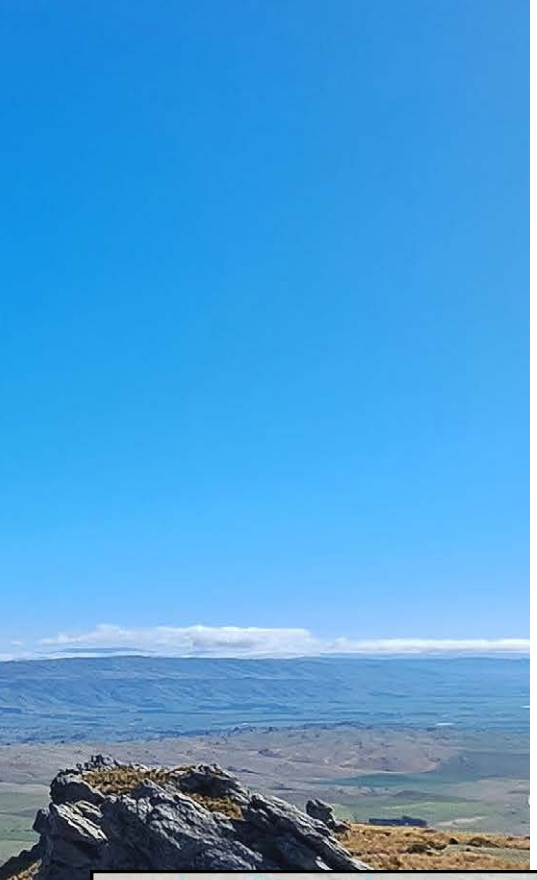
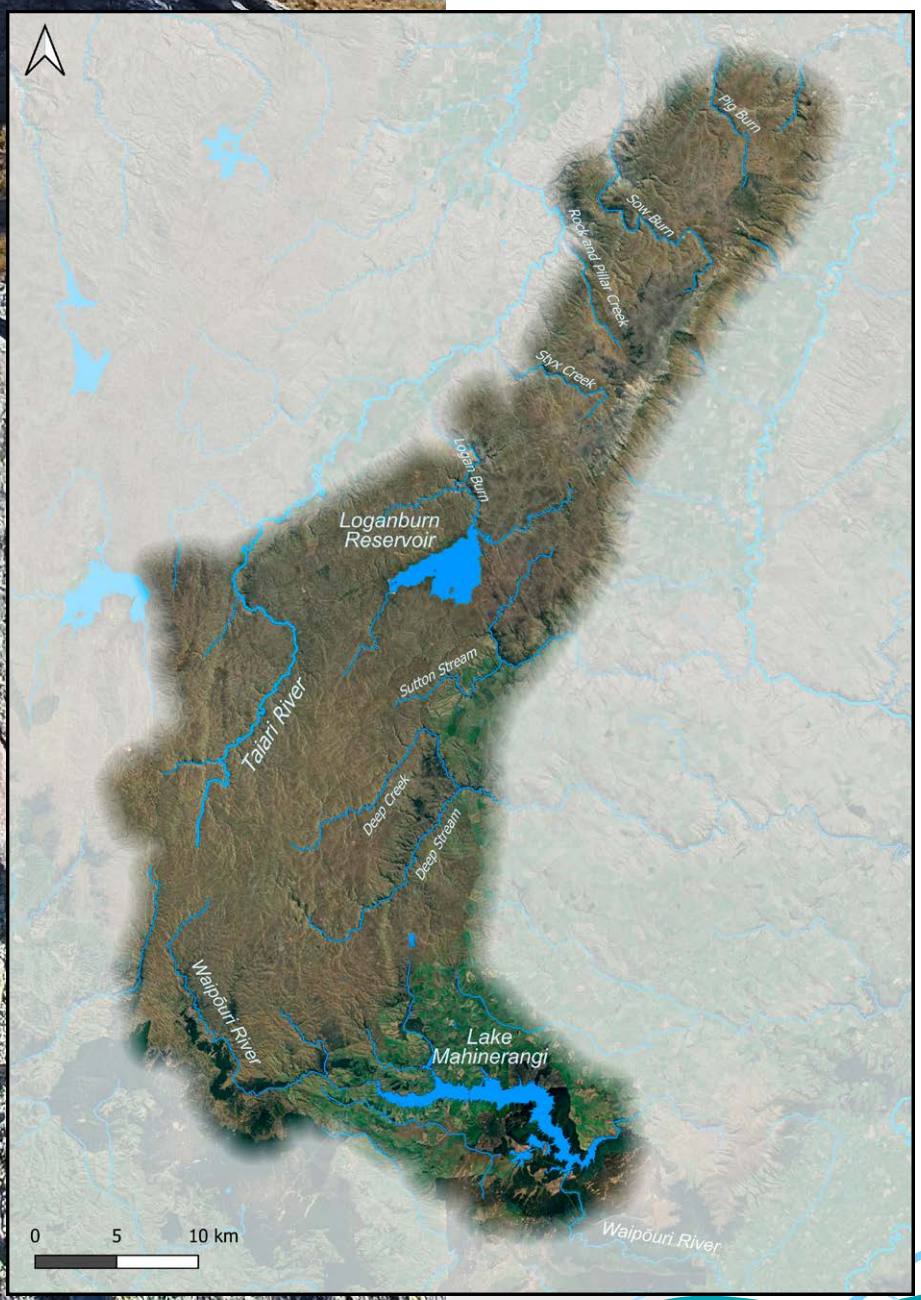


Department of Conservation
Te Papa Atawhai

Taiari/Waipōuri Uplands

Climate change impacts on freshwater ecosystems & values, and management options

The Taiari is one of 14 rivers in DOC's Ngā Awa river restoration programme. DOC commissioned an assessment of the impacts of climate change on freshwater values and ecosystems of the Taiari catchment. This summary focuses on the Taiari / Waipōuri Uplands and highlights management opportunities to protect freshwater species and ecosystems likely to be impacted. For more in-depth analysis, please refer to the full report linked at the end of the document.



The Taiari/Waipōuri Uplands

The Taiari/Waipōuri Uplands comprise the extensive area representing the headwaters of the Taiari and Waipōuri Rivers, much of it over 800 metres above sea level and tussock-covered. The area is mostly encompassed by Te Papanui Conservation Park and is difficult to access. There are extensive wetland and bog systems throughout the uplands, although there is limited information on any of them. Similarly, there are many small streams throughout the area, but due to access challenges, few have been sampled.

< Map of the Taiari/Waipōuri Uplands area

Key freshwater values

A single population of introduced brook char occurs upstream of Lake Mahinerangi, in what was likely dusky galaxias habitat.

The Loganburn Reservoir and Lake Mahinerangi represent the two significant artificial waterbodies of the uplands.

Eldons and dusky galaxiids are both Nationally Endangered (like the South Island kākā) and are found only in fragmented populations in the upland streams of eastern Otago. Their total remaining habitat would fit in 5.4 ha for Eldons and 7 ha for duskys.

The uplands contain several unique and important alpine wetland systems with rare native plants.

Streams draining into Mahinerangi support important kōaro populations. Kōaro larvae are likely reared in the lake.

The Nationally Vulnerable Taieri flathead galaxias is widespread across the catchment – although their total remaining habitat (on Earth) is only 21 ha.

The Upper Taieri above Canadian flats is one of the largest trout-free catchments containing rare non-migratory galaxiids in New Zealand.

Climate model predictions

The predicted effects of climate change on the Taiari/Waipōuri Uplands are summarised below. * The main threats from climate change in this region are vegetation changes that may result from warming, and extreme weather such as flooding and drought. Alpine wetlands are considered to be at extreme risk from climate change.

PRECIPITATION

Increases in projected annual rainfall, and heavy rain days.

Increase in annual dry days.

TEMPERATURE

Increases in projected mean annual temperature & extreme hot (+30˚C) days.

Decrease in annual frost days.

WIND

Increase in projected extreme daily wind speeds.

FLOWS

Increases in projected mean annual flows, and flood flows.

Decrease in annual low flows.

*The 'projections' use the mid to high range RCP and a 2090-time frame. Projections vary depending on the scenario and timeframe modelled and thus impacts could differ depending on emissions. There is also likely to be seasonal and inter-annual variability (e.g. El Niño / La Niña years). See the Taiari Climate Change Risks & Impacts report and its source material for further detail (link at end).

Key climate change related risks: Upland and alpine wetland and bog systems

The block mountain ranges of the Taiari catchment are strewn with wetlands above 800 metres in altitude. These are home to unique alpine plants, diverse and unique invertebrates, non-migratory galaxias and alpine birds. These wet ecosystems are already at risk from higher temperatures, drought, changes in rainfall, and reduced snow and ice. Further temperature increases could see some of these areas drying out completely.

Many of these wetlands are protected within Te Papanui Conservation Park, however significant areas of upland areas are held in pastoral leases or freehold titles. Weed plants (e.g., wilding pines, hawkweed) may be more invasive in upland areas with increased temperatures, and woody vegetation may become more dominant. Altered grazing and fire regimes could also dry out and degrade these upland habitats. The tall, iconic tussock vegetation that currently covers much of the headwater catchments captures water from clouds and rain, most of which is released into the water table. Loss of tussock in these areas could therefore mean less water in the river, particularly during dry times.

Key climate change related risks: **Artificial reservoirs of Lake Mahinerangi and Loganburn**

Lake Mahinerangi and the Loganburn Reservoir have managed hydrology. They are unlikely to be directly affected by climate change, but their management could have ramifications for the wider area. The Loganburn Reservoir flooded the Great Moss Swamp, and raising the water level for increased storage for irrigation would drown the last remnants of the Great Moss Swamp.

The managed discharges from these reservoirs are important to the downstream Taiari and Waipōuri Rivers and could expose downstream aquatic ecosystems to risks associated with altered patterns of water discharge and increasing saline intrusions.

Key climate change related risks: **Non-migratory galaxiids**

The Nationally Endangered Eldons and dusky galaxiids cannot coexist with trout, so most populations in the area are located upstream of barriers to trout migration. Increased flood events may present an opportunity for trout to invade areas of galaxiid habitat, which could lead to population collapse. Eldons and dusky galaxiids exist in a habitat area of less than 7 hectares each (anywhere on Earth), with the majority in the Taiari, meaning the Taiari is critical to their survival. The trout-free status of the Taiari River upstream of Canadian Flats is a point of risk for one of the most important remaining populations of nationally vulnerable Taiari Flathead galaxias. These fish are found in a total of just 21 hectares of stream habitat. Changes in vegetation through long-term succession of woody vegetation (native and introduced), could also change the hydrology of these small upland catchments resulting in loss of aquatic habitat. Increasing woody vegetation also changes fire risk - wildfire can have severe impacts on the ecology of small upland streams.

Management options

Upland and alpine wetland / bog management

- Ongoing monitoring of vegetation structure, extent of wetlands/bogs, wilding pine invasions and patterns of fire to manage risk to these upland ecosystems.
- Prioritise protection and restoration of these wetlands (e.g., landscape-scale planning and management of hydrology, grazing and planting).
- Wilding pine control and landscape scale planning to encourage planting of fire-resistant species and fire breaks, as well as species that support desirable hydrology of small streams.

Management options

Artificial reservoir management

- Dialogue and planning between stakeholders and regulatory agencies to explore the challenges and opportunities of climate change and how reservoir management could help mitigate some aspects of climate change.

Rare galaxiid management and small stream protection

- Develop a regional galaxiid conservation plan, to restore and protect core non-migratory galaxiid habitat, to raise the profile of these unique taonga and increase engagement from and options for landowners and irrigators. The Spec Creek galaxiid sanctuary is a great example of protection undertaken by private landowners.
- Wilding pine control and landscape scale planning for plantings to encourage planting of fire-resistant species and fire breaks, as well as species that support desirable hydrology of small streams.

DuskyGalaxias © Simon Madill

Download full reports:

Closs et al. (2024) Climate change vulnerability assessment of freshwater ecosystems and values of the Taiari River catchment, and management options.

Goldsmith (2023) Climate change impacts and risks – Taiari River catchment. A compilation of current research to support local decision-making.