Department of Conservation
Te Papa Atawhai

Māniatoto Basin

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 Māniatoto Basin 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 Māniatoto

We defined the Māniatoto as the area from the headwaters of the Taiari starting at Taiari Falls (west of Loganburn and just upstream of the confluence with Bullocky Creek) down to Tiroiti just downstream of the confluence with the Kye Burn where the river begins to bend around the north of the Rock and Pillar range. This area consists of several important wetlands, tributaries, and freshwater ecosystems, including the Taiari scroll plain.

< Map of the Māniatoto Basin

Grey Teal © Sabine Bernert

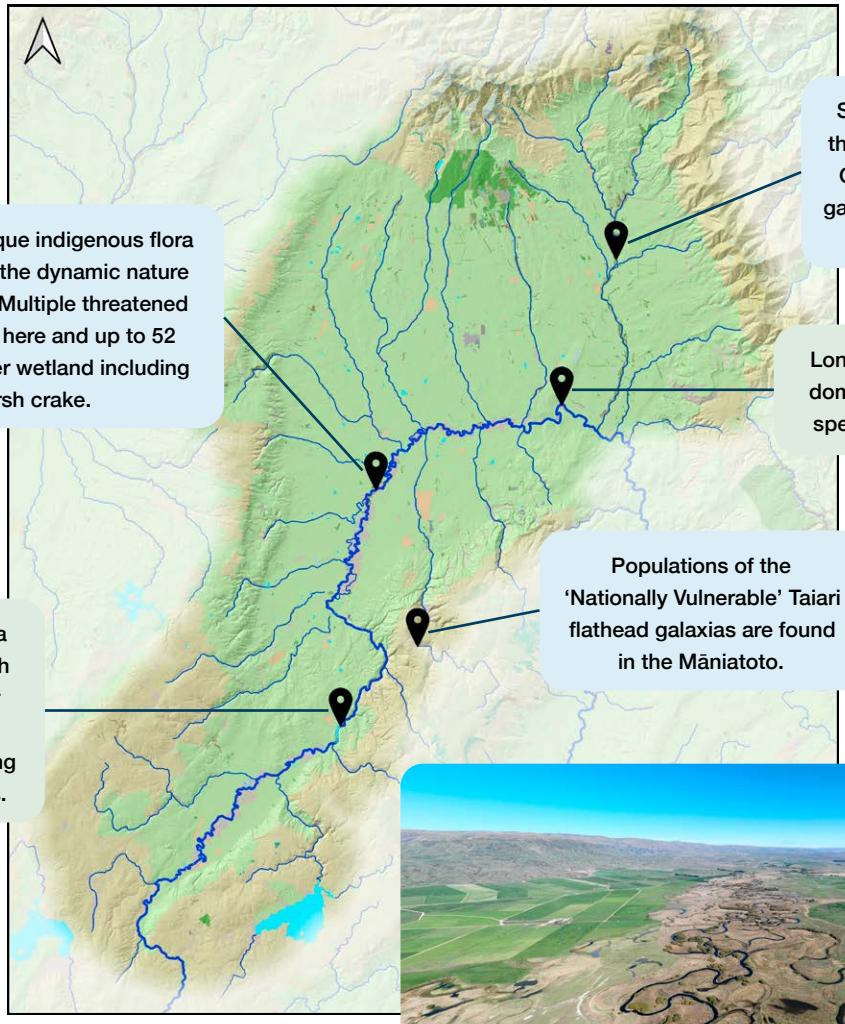
Key freshwater values

The Taiari River in the Māniatoto Basin is a relatively slow-flowing river with a low-gradient that winds its way across the plain. The wider Māniatoto area includes some of the driest parts of the Taiari catchment (and New Zealand) with high levels of water demand for agriculture.

The Māniatoto is also home to the extensive Taiari scroll plain, one of the only inland scroll plains in Aotearoa New Zealand and by far the largest of its kind in the country. The complex is recognised as an internationally, nationally and regionally significant wetland. It is made up of many wetlands, ponds, and oxbow lakes which provide habitat for rare and endangered plants, fish, birds and insects.

Wetlands can mitigate climate change by storing carbon while also increasing resilience to flood and drought along with many other ecosystem services such as increasing aquatic biodiversity. The scroll plain could also offer world class eco-tourism opportunities. In the past the area also featured Tunaheketaka/Lake Taiari – originally a lake, this was filled in with silt and tailings from mining in the 1800s to become more akin to a wetland, before being drained. This site offers the opportunity for restoration as a wetland.

Two non-migratory fish species, the Taiari flathead galaxias and the Central Otago roundhead galaxias, are found only in the Taiari and the upper reaches of a few neighbouring catchments.



The Taiari scroll plain >

Climate model predictions

The predicted effects of climate change on the Māniatoto summarised below are projections.* Both the number and magnitude of heavy rain days are expected to increase. Overall, this suggests more intense wet periods with floods as well as more prolonged periods of drought for the area.

PRECIPITATION

Increases in projected mean annual rainfall.

Increases in heavy rain days.

Increase in annual dry days.

TEMPERATURE

Increases in projected annual temperature, minimum air temperature, and extreme hot (+30˚C) days.

Decrease in annual frost days.

WIND

Increase in projected extreme daily wind speeds.

FLOWS

No change in projected mean annual flow initially, changing to a slight increase.

Decrease in annual low flows.

Increases in projected annual flood 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

The Māniatoto is home to many rare native species, including unique fish and plants which already face multiple pressures impacting their populations. Given the arid nature of the sub catchment, and the high levels of water demand from agriculture the predicted increases in drought duration will exacerbate these pressures.

Currently, during dry summers, the mainstem of the Taiari River often remains at low levels for extended periods, reaching temperatures that can stress fish. This is likely to be made worse by an increase in both annual dry days and air temperatures. Recent monitoring by Tiaki Maniototo has shown that following floods, de-oxygenation (or blackwater events) can occur as floodwaters loaded with organic material drain off the floodplain and enter the river. Blackwater events can cause mass fish and bird kills. The climate projections for more extreme floods and droughts mean blackwater events could occur more frequently.

Key climate change related risks (cont.)

Smaller streams across the floodplain represent important habitat for many species, and are currently subject to water abstraction, and a loss of water to evaporation or groundwater. This is already threatening fish communities in these streams. Climate projections for the Māniatoto indicate that tributaries in the northern Taiari, including the Ewe Burn and Kye Burn, are at particularly high risk for reductions in flows which may impact the persistence of Central Otago roundhead galaxias in these streams.

Located midway through the Māniatoto is the Paerau weir. The weir acts as a significant barrier for European perch (which don't currently seem to be upstream of the weir), but also creates ideal habitat for perch upstream. High densities of perch can have negative effects such as increasing the likelihood of algal blooms, and outcompeting native fish. Irrigation ponds also provide good perch habitat – an increase in the number of irrigation ponds, increases the likelihood of perch invasions.

Paerau Weir © Ellis Hogan

Management options

Flow regime management

- Ongoing review and adjustment to flow regimes to manage for multiple values in the catchment i.e. agriculture, rare native fish species, sport fisheries, mahika kai (e.g. tuna, kanakana), preventing deoxygenation events and increasing resilience to climate change.
- Consider diversifying and changing to land uses with lower water/ irrigation requirements and lower debt servicing.

Protection for rare non-migratory fish

- Restore and protect core non-migratory galaxiid habitat, to raise the profile of these unique taonga, and increase engagement from landowners and irrigators. The Spec Creek galaxiid sanctuary is great example of this being done by private landowners and the local community.
- Monitor / suppress / locally eradicate perch in the Paerau Power Station impoundment upstream of the weir (should it occur) to reduce risk of transfer.
- Provide irrigation pond owners with information about pest fish species, especially with respect to rare native fish species and management options. Encourage control of perch throughout storage ponds in the catchment to reduce risk to rare native fish.

Management options

Scroll plain and wetland restoration

- Continue the protection and restoration of the scroll plain and wetlands (e.g. Tunaheketaka) by managing grazing pressure, exotic weed species (e.g. willows), and pest animals (e.g. feral geese and mustelids).

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.

Central Otago roundhead galaxias © Rod Morris