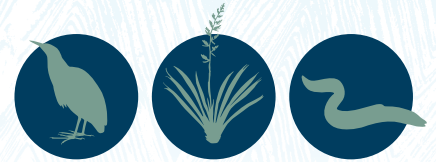


# Lake health in the Ashburton basin



**Arawai Kākāriki**  
Wetland restoration programme

*Objective 2: Maintain and enhance water regime and quality to support wetland values*



Long-term water quality monitoring at Ō Tū Wharekai has shown the health of several lakes is declining.

Ō Tū Wharekai (OTW) comprises a network of high-country lakes and wetlands that provide habitat for indigenous flora and fauna, including a range of threatened species. The Ashburton lakes are culturally significant and provide many recreation opportunities. In partnership with Environment Canterbury, Ngāi Tahu iwi, Arowhenua Rūnanga, and the local community, DOC's Arawai Kākāriki programme is monitoring water quality and helping assess options to improve lake health.

## Threats to lake health



**Eutrophication:** Excess nutrients like nitrogen and phosphorus promote excessive algal growth that leads to a decline of indigenous aquatic plants (macrophytes).



**Sedimentation:** Fine sediments from runoff reduce the availability of light for macrophytes and can build up in lakes.



**Hydrological change:** Reduced stream flows can lead to slower turnover of water in lakes, which can allow nutrients and sediment to build up.



**Pest fish:** Introduced species can prey on native fish and alter the ecosystem food webs (eg by eating zooplankton).

## Measuring lake health using TLI

A range of monitoring tools are used to build a picture of lake health: hydrology, aquatic plants (Lake Submerged Plant Index), indicator species present, nutrient levels, trophic status and cultural assessments.

The trophic level index (TLI) is one measure of lake health. TLI is calculated by combining measurements of total phosphorus (TP), total nitrogen (TN), chlorophyll *a* (algae) and secchi depth (water clarity). High TLI values generally indicate poorer water quality.

Monitoring of water quality in streams that flow into lakes also helps us understand the potential sources of nitrogen, phosphorus and suspended sediment.



## Lake health goals

The regional water quality limit for the OTW lakes is a TLI score of  $\leq 3.0$ , which indicates a more natural clear water state for these high-country lakes.

## Cause for concern

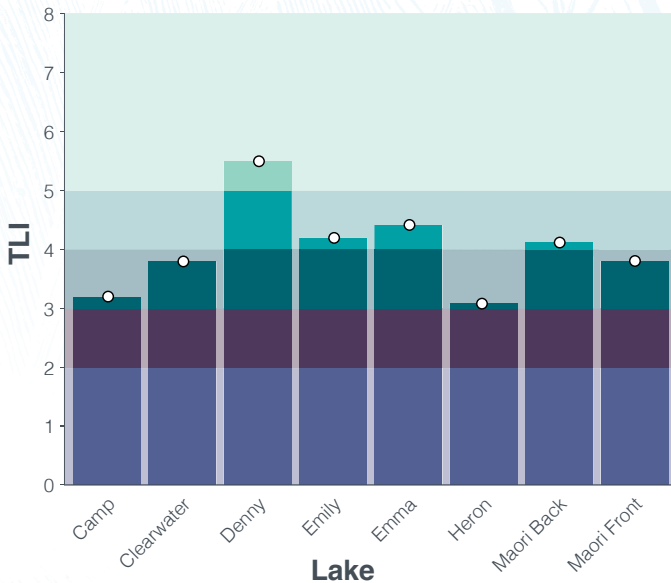
TLI scores from 2019/20 monitoring by ECan show water quality in OTW lakes is poor and exceeds regional water quality limits for Canterbury.\* Lakes Camp and Heron are in the best relative state, yet both are in mesotrophic condition (TLI >3).

\*As set by the Land and Water Regional Plan.



Department of  
Conservation  
*Te Papa Atawhai*

## Mean TLI 2015-2019



### TLI graph key

**Supertrophic** – The lake is overly fertile and saturated in phosphorus and nitrogen, and lacks habitat for desirable aquatic species.

**Eutrophic** – The lake is green and murky. High nutrient levels increase algae, with an associated loss of biodiversity.

**Mesotrophic** – Water quality is average, with moderate levels of nutrients and algae.

**Oligotrophic** – The lake is clear and blue, with low levels of nutrients and algae.

**Microtrophic** – The lake has very low levels of nutrients and algae.

Source: **LAWA factsheet**

## Streams show high nitrogen concentrations

Streams in the Maori Lakes catchment showed concerning increases in total nitrogen levels compared to the low-impact reference site at Paddle Hill. Gentleman Smith Stream showed the highest levels, with nitrogen concentrations generally double their 2012 levels.

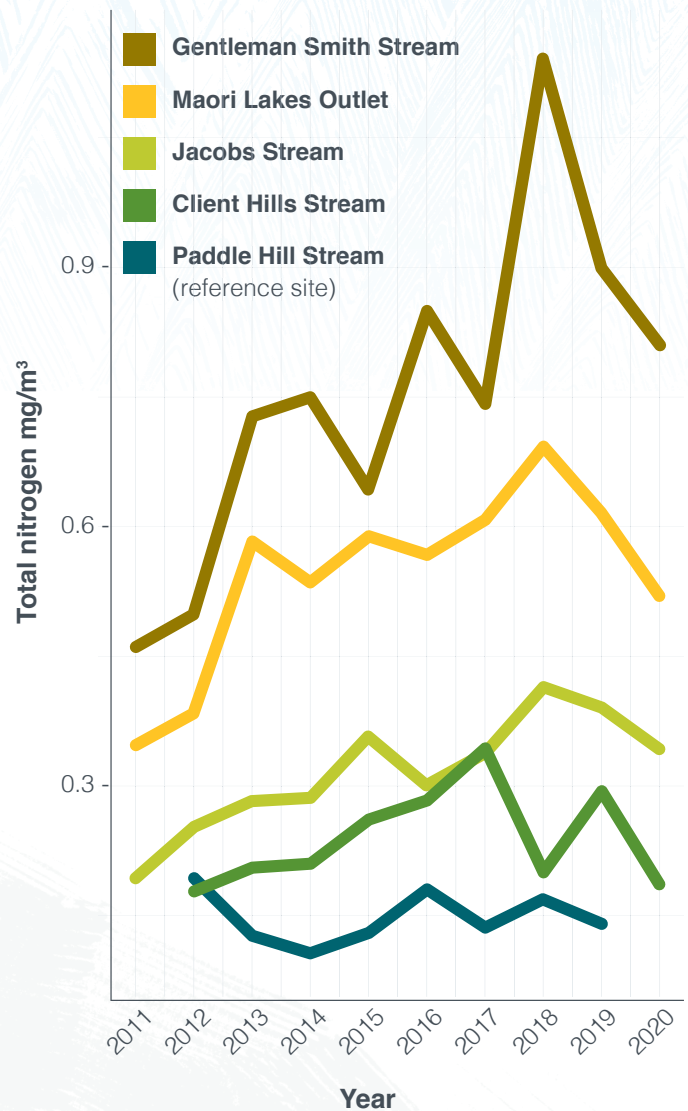
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## Stream nitrogen levels



## What we plan to do

Water quality is degrading in several lakes and streams of OTW, posing risks to biodiversity and aquatic ecosystems – an issue reiterated in a recent ECan **technical report**. We are working with key partners – iwi, ECan and landowners – to:

- take immediate, collaborative action to reduce nutrients and sediment entering the lakes
- undertake further research to understand lake ecosystem dynamics and the state of biodiversity
- promote improved management practices in farm environment plans to reduce nitrogen loss
- review TLI targets for the Ō Tū Wharekai lakes to better align the lakes with their reference trophic state and ensure consistency across freshwater goals.