



Water Quality in Te Hākāpupu Pleasant River Catchment

This factsheet summarises the current state of water quality in Te Hākāpupu Pleasant River catchment. It is based on monitoring data and assessments collected as part of the Toitū Te Hākāpupu project (2021–2025), a partnership between Kāti Huirapa

Runaka ki Puketeraki and the Otago Regional Council and in collaboration with the East Otago Catchment Group. It is intended to help landowners and the community understand what the water quality data is telling us and where action matters most.

What shapes water quality here

Te Hākāpupu Pleasant River catchment, located about 50 km north of Dunedin, covers approx. 13,000 ha. The river rises on the north-facing slopes of Mt Trotter (587m) and flows eastward towards the coast. It is joined by Ōwhakaoho Trotters Creek at Wairunga, south of Palmerston, and Watkin Creek in its tidal reaches before discharging into Te Hākāpupu Pleasant River Estuary Wetland Complex. At 84 ha in area, this estuary is the largest wetland in North Otago. The wetlands surrounding the estuary have been dramatically reduced over time, from an estimated 198 ha historically to just 5 ha today. The estuary complex provides important habitat for īnaka, tuna/eel, and migratory birds.

The catchment sits within the rohe of Kāti Huirapa Rūnaka ki Puketeraki, and the restoration of its waterways is a key aspiration of the Rūnaka.

The catchment's soils and terrain make it naturally vulnerable to erosion, as is typical

of hill country catchments. Much of the hill country has thin, erodible soils that readily generate overland flow of sediment and streambank erosion during heavy rainfall. This means sediment is an underlying challenge for waterways across the catchment, regardless of land use.

Around half of the catchment is under commercial forestry, mainly in the upper reaches, with most planting occurring since the 1990s. The remainder is largely moderate- to low-intensity sheep, beef and deer farming.

The catchment receives only around 650 mm of rainfall a year and much of it can occur in just a few rain events. This gives the rivers an ephemeral, 'flashy' character, where surface flow can stop for months at a time, before rising rapidly during heavy rainfall when most sediment, nutrients and faecal contamination enter. During dry periods, isolated pools form and become important refuge habitat for aquatic life.



How healthy is Te Hakapupu/Pleasant River system?



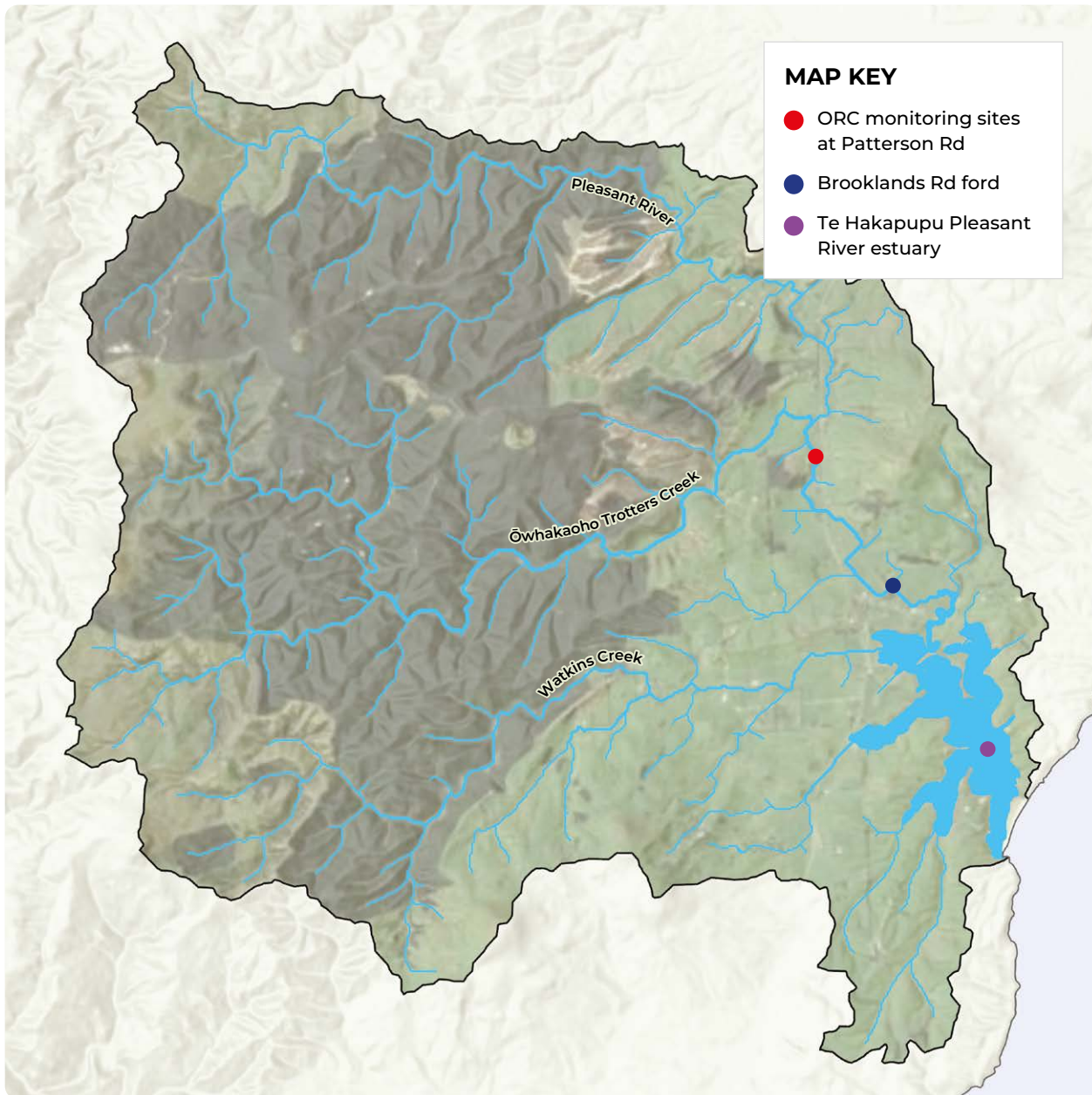
- **Overall ecological health is under some stress.** Stream habitat assessments rated eight of ten sites as 'poor' or 'fair', and only two as 'good' – both in the upper Watkin Creek. Environmental DNA results rated four of five freshwater sites as 'poor'. Aquatic invertebrate sampling by ORC at Patterson Road confirms poor ecological condition.
- **Dry periods are the biggest stress for aquatic life.** When flow stops, isolated pools warm significantly and oxygen levels can fall well below the 5 mg/L minimum recommended for fish – Trotters Creek and Watkin Creek dropped below this threshold on just over 20% of sampling occasions during the Toitū Te Hakapupu project. Groundwater seeps at some sites release low-oxygen, iron-rich water that compounds the problem.
- **Heavy rain events drive deterioration in water quality, particularly for sediment and turbidity.** At low flows, turbidity, nutrient concentrations and *E. coli* are all reasonable. During rain events this changes dramatically. A single large event can deliver the majority of a year's sediment load to the estuary in a matter of hours. In dry weather the risk for swimming is generally low, with a median *E. coli* concentration of 52/100 mL in the five years ending June 2024.
- **Freshwater fish are present but under pressure.** Ten species were detected using eDNA sampling, including longfin tuna, īnaka (whitebait) and bluegill bully – all classified as at-risk declining. Banded kōkopu, longfin eel, shortfin eel and īnaka are mahika kai species. Of concern is the detection of European perch, a pest species, in 2023, and the near-absence of juvenile tuna/eel across all sites.
- **The estuary is under significant pressure.** Te Hakapupu Pleasant River Estuary Wetland Complex is rated 'fair' to 'poor', with large areas of nuisance macroalgae, high mud content and poorly oxygenated nutrient-enriched sediment – especially in the side arms.

Targeted action gets results

Fish passage has been significantly improved. By the end of the Toitū Te Hakapupu project in July 2025, two road fords and three farm culverts had been remediated, opening fish passage to over 90% of the catchment. Before a rock ramp was installed at Brooklands Rd ford, fewer than 10 whitebait were recorded per tidal cycle; in the two months after installation, this rose to over 400 – a 40-fold increase.



Key locations in the catchment



GENERAL PATTERNS

Water quality is generally better in the upper catchment than the lower reaches. The most degraded conditions occur in lower Trotters Creek and lower Watkin Creek. The estuary receives the combined load from the whole catchment.

UPPER CATCHMENT

- Trotters Creek headwaters; contributes the highest proportion of total suspended sediment discharged to the estuary; this proportion is likely to change as forestry harvest cycles unfold.

- Watkin Creek headwaters; Pīwakawaka and Harakeke monitoring sites, rated 'good' habitat; best ecological health scores in the catchment.
- Paru site (mid Watkin Creek); elevated deposited sediment, approximately three times higher than any other site; linked to erosion following aerial spraying for forestry establishment on steep slopes upstream in 2017–2019.

MID & LOWER CATCHMENT

- Patterson Road ford – ORC monitoring site (established 2018).

- Brooklands Road ford – fish passage remediated during Toitū Te Hākapupu project.
- Lower Trotters Creek and lower Watkin Creek – rated ‘poor’ for stream habitat; channel modification, bank erosion, and lack of riparian vegetation.

ESTUARY

- Te Hākapupu Estuary Wetland Complex – 84 ha, largest wetland in North Otago; now reduced to less than 3%

Is river health getting better or worse?

River health in Te Hākapupu is inherently dynamic and can vary markedly within a single year, particularly in response to droughts and floods. The ORC’s monitoring site at Patterson Road ford has only been operating since 2018, limiting long-term trend assessment. However, for the five-year period ending June 2024, the Land Air Water Aotearoa (LAWA) website reported improving trends across most water quality indicators, although the confidence in the direction of these trends was generally low.

Broader ecological monitoring – habitat scores, environmental DNA, invertebrate and fish surveys – only began with the Toitū Te Hākapupu project in 2023. This monitoring information provides an important baseline, but it is too early to identify trends. At least 10 years of monitoring is needed before reliable conclusions can be drawn about ecological change.

The trajectory of restoration actions is positive. Fish passage has been opened at

of its original extent; rated fair to poor condition; condition further affected by flap-gates restricting tidal exchange and livestock grazing within wetland margins; important habitat for īnaka, tuna/eel, sand flounder, kahawai, yellow-eyed mullet, and migratory birds.



critical points to facilitate fish access to the rest of the catchment. Riparian planting, fencing, and sediment control work have been carried out across many properties. The 40-fold increase in whitebait at Brooklands Road ford shows that well-targeted actions can produce rapid, measurable results.

However, the fundamental drivers of poor water quality – erodible soils, flashy hydrology, the forestry harvest cycle, and limited riparian buffering – will take many years of sustained effort to address. Sediment accumulation in the estuary is an ongoing concern, and the estuary’s already severely reduced extent means it has limited capacity to absorb further pressure.



How are contaminants getting into the water?



Understanding how contaminants reach the river helps target management actions:

- **Sediment** is the dominant water quality issue in this catchment. It enters the waterways primarily through bank erosion and overland flow during heavy rainfall, driven by the catchment's naturally erodible hill country soils. Across the catchment as a whole, streambank and subsoil erosion are the primary sources of deposited sediment at most sites. Trotters Creek, which drains much of the upper catchment planted under exotic forest, contributes the highest proportion of total suspended sediment discharged from the catchment – reflecting both the erodibility of its sub-catchment and the elevated risk during forestry harvest.
- **Nitrogen** enters waterways primarily through leaching from pastoral soils into groundwater and subsurface flow, with concentrations typically higher during and after high flow events.
- ***E. coli*** can enter the water from multiple sources – stock access to waterways, wildfowl, poorly performing septic tanks and from overland flow during rainfall. The relative contribution of each source is not yet well understood.
- **Low dissolved oxygen** during dry periods is driven by the ephemeral nature of the rivers – when flow stops, isolated pools become warm and stagnant, and oxygen is depleted. This is worsened by fine sediment and organic material on the streambed consuming oxygen, and by groundwater seeps releasing low-oxygen water at certain sites.



Actions you can take to help water quality

The Toitū Te Hākapupu project shows the catchment is under stress, but also that well-targeted actions work. Sustained effort across many properties – on fencing, riparian planting, sediment management and fish passage – is providing a positive path to long-term improvement.

What to look for and some options:

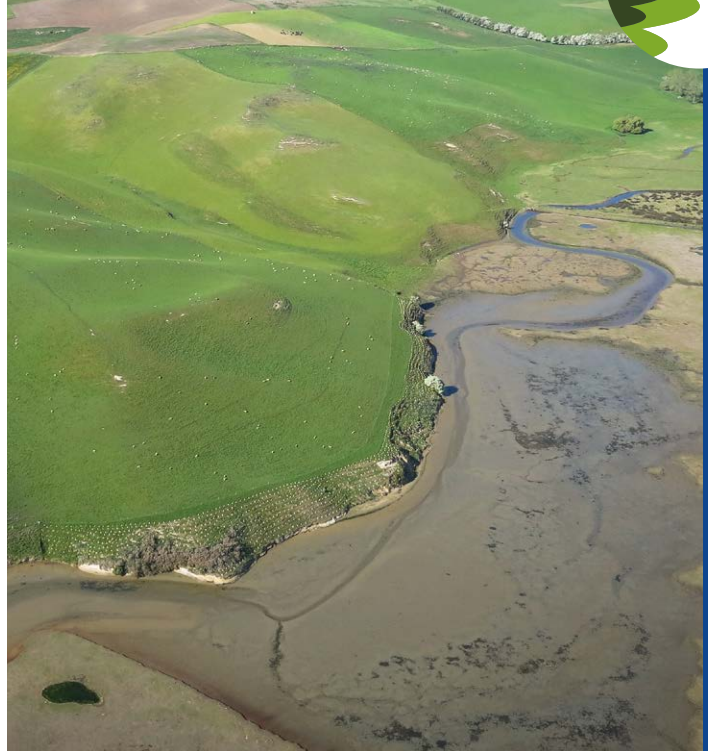
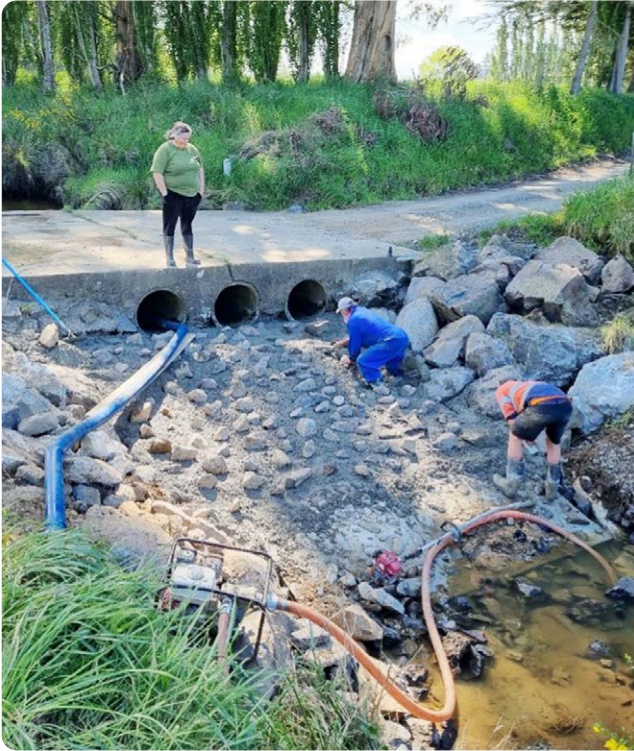
- **Manage the forestry harvest ‘window of vulnerability’.** The years during and immediately after harvest pose the highest risk for sediment loss. Maintain sediment buffers, manage how much bare ground is exposed at any one time, maintain controls on earthworks and roading, protect stream crossings, and avoid harvest during extended wet weather. Encourage rapid revegetation on steep sites.
- **Check your property during or after heavy rain** to find critical source areas – places where muddy water flows directly into streams. Consider ungrazed grass buffer strips, small detainment bunds in swales, or wetland areas to slow and filter runoff.
- **Keep stock out of waterways and drains.** Stock access is a major contributor to bank erosion and *E. coli* contamination. Fence waterways and leave rank grass along edges of drains and creeks, including small or seasonal ones. Where hill country fencing is not feasible, consider troughs away from the creek, rocky crossings, lighter stock classes, or a hot wire to allow drinking without creek entry.
- **Plant and maintain riparian margins.** Riparian planting stabilises banks, provides shade that lowers water temperatures during summer low flows, and improves the quality of refuge pools that tuna and whitebait depend on during drought.
- **Install sediment traps in erosion-prone swales and drains.** Sediment traps can capture significant volumes of material before it reaches waterways. A trap installed during the Toitū Te Hākapupu project captured over 1,000 cubic metres in less than a year. Check and clean traps regularly.



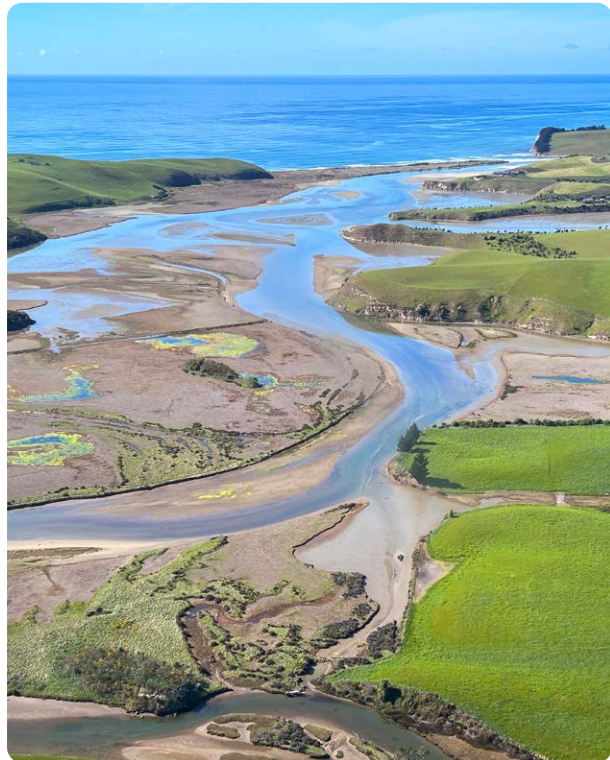
Actions you can take to help water quality (cont.)



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- **Support fish passage.** Old culverts and farm fords can completely block migratory fish. If you have a structure on a waterway, have it assessed – replacing undersized culverts with fish-friendly designs can make a dramatic difference.
- **Manage springs carefully.** Springs provide clean, cool water and continue to flow even during drought, making them critical refuge habitat. Where possible, fence springs to exclude stock.
- **Maintain grass cover** during dry periods to minimise bare ground – a key sediment source when heavy rain follows drought.
- **Winter grazing on vulnerable soils near waterways carries a high risk** for both nitrogen leaching and sediment loss. Maintain setbacks from waterbodies, avoid cropping or grazing in swales and gullies, and check paddocks in wet weather for runoff entering waterways.
- **Help protect and restore the estuary.** The estuary is a fraction of its original extent and under ongoing pressure. Keep stock out, manage weeds, avoid disturbance to margins and channels, and support efforts to restore natural tidal connectivity where practical.



TE HAKAPUPU PLEASANT RIVER CATCHMENT



Keep a record of your efforts

It can be useful to take photos of the actions you implement, not only as a record but also a way to reflect on what's worked well and where you might do things differently next time. Consider using farming software (like Resolution or FarmIQ) to link actions to map locations.

Record actions such as:

- length and location of new fencing
- culverts and stock crossings installed
- number, area and width of new plantings
- detainment bunds and wetlands installed.

More information

This summary is based on the **Toitū Te Hākapupu Pleasant River Restoration Project monitoring reports** (Whirika Consulting, 2023–2025) and the **Context Analysis** (Norton et al., 2025), prepared for the Kāti Huirapa Rūnaka ki Puketeraki, Otago Regional Council and the East Otago Catchment Group. Water quality trend information was sourced from the Land Air Water Aotearoa (LAWA) website, drawing on the ORC's State of the Environment monitoring site at Patterson Road ford.

For more information on farm planning and good management practices to improve freshwater outcomes, see:

- Beef + Lamb New Zealand Knowledge Hub: beeflambnz.com/knowledge-hub
- Otago Regional Council Farmers Guide: orc.govt.nz/consents-and-compliance/the-farmers-guide
- Toitū Te Hākapupu Catchment Action Plan (search for "Toitū Te Hākapupu"): orc.govt.nz
- NZ Landcare Trust (good management practices): <https://bit.ly/4mJiZNL>



To find out more about the East Otago Catchment Group and how they are supporting farmers and the programmes they are running please visit:

www.eocg.org.nz

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