Water Quality in the Stony Creek Catchment

East Otago Catchment Group

STONY CREEK CATCHMENT

This factsheet summarises what is known about water quality and ecological health in the Stony Creek catchment – from the creek's upper reaches on the slopes of Puketapu down to Andersons Lagoon at the coast. It draws on a desktop review of available monitoring data and research, supplemented by field observations made in February 2026.

Water quality data for Stony Creek itself is limited, but the lagoon has been studied and tells an important story. This summary is intended to help landowners and the community understand what is happening in this small but sensitive catchment, and where action matters most.

What shapes water quality here

Stony Creek drains a small catchment of just 9 km², rising on the seaward slopes of Puketapu and flowing east to the coast. Several small tributary streams draining farmland enter the creek downstream of Bushy Hill Road in the lower catchment. From here, the creek flows alongside Anderson Road and into Andersons Lagoon – a shallow coastal lagoon of around 24.5 hectares, contained behind a sand dune barrier.

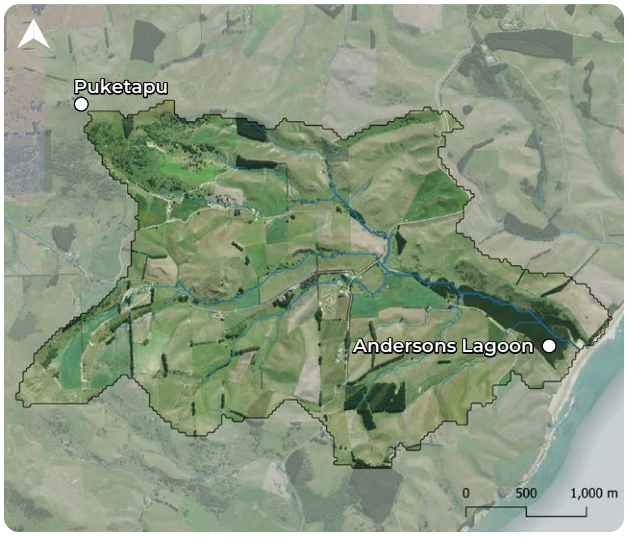
The catchment is naturally water-short. Flows are low and seasonal, and the stream's lower reaches were observed to be either dry or stagnant in February 2026. The terrain in the upper catchment is hilly with most soils pallic and poorly to imperfectly drained, and may crack in dry conditions. In summer, any cracks create a natural soil bypass pathway where water – along with nutrients and contaminants – can move rapidly through the soil profile, bypassing the root zone and entering shallow groundwater or waterways directly. The flip side is equally important: because these soils are poorly drained, they saturate quickly in wet weather. Once saturated, water can no longer soak in and instead runs off the surface as overland flow – carrying sediment, nutrients and *E. coli* through swales and gullies and into the creek and lagoon.

These soils work against water quality in two ways: they can crack in dry summers, creating fast pathways for nitrogen to leach into groundwater, and they saturate quickly in wet weather, sending overland flow – carrying sediment, nutrients and *E. coli* – straight to the creek and lagoon.

Most land in the catchment is used for sheep and beef farming. A QEII covenant near the lagoon includes native plantings and a popular walking track. Recreational uses of Andersons Lagoon include duck hunting, fishing and walking.

Andersons Lagoon – a sensitive receiving environment

Monitoring at Andersons lagoon mouth. Photo: ORC.



Aerial photo of the Stony Creek catchment showing the stream network (blue). Palmerston is visible to the upper left; Andersons Lagoon at the coast to the right.

Andersons Lagoon is the catchment's receiving environment – the place where everything from upstream ultimately ends up. Unlike most estuaries, which are open to the sea, the lagoon's mouth is closed by a sand barrier most of the time, opening naturally only after periods of very heavy rainfall. Based on a review of satellite imagery over a 20-year period, the mouth is estimated to be open only around 4% of the time.

As a result, flushing capacity is limited, causing sediment, nutrients and algae accumulate in the lagoon rather than being regularly flushed out to sea by tidal flows. This makes Andersons Lagoon a particularly sensitive receiving environment – where relatively small inputs from the catchment can have disproportionately large effects on water quality.

How healthy is the Stony Creek system?

Absence of flow in a tributary of Stony Creek (left) at Andersons Road, and stagnant water downstream where the stream enters the lagoon. 27 February 2026. Photo: J. Milne.

No water quality or ecological monitoring data exists for the freshwater reaches of Stony Creek itself. Modelled estimates from NZ River Maps suggest aquatic invertebrate community health is likely poor – with predicted macroinvertebrate community index (MCI) scores in the low 80s. A site visit in February 2026 found the lower reaches of the creek choked with weed and the water stagnant. Very few fish are expected to be present given the lagoon mouth is usually closed.

The picture is clearer for Andersons Lagoon, which has been the subject of several pieces of research. Key findings include:

- The lagoon has been assigned a predicted Estuary Trophic Index (ETI) rating of D – equating to a very high eutrophication (nutrient enrichment) risk. This is based on estimated nutrient loads entering the lagoon and its lack of flushing.
- Macroalgae and aquatic plant (macrophyte) growth is often at nuisance levels. During a February 2026 site visit, significant macroalgae was found floating on the water's surface. Research found the lagoon had the highest macroalgae and macrophyte biomass of four East Otago estuaries studied.
- Water column pH was above 9 at times, likely linked to the abundant plant growth in the lagoon.
- Sediment at the lagoon's margins showed black, oxygen-depleted (anoxic) conditions just below the surface. These low-oxygen conditions favour a less diverse community of bottom-dwelling invertebrates. However, other than patches of elevated manganese – also linked with anoxic conditions (and not contamination), concentrations of trace metals in lagoon sediments are low.
- Fish and invertebrate diversity are lower than in estuaries open to the sea. Amphipods (crustaceans) dominate the lagoon's benthic fauna, alongside worms and midge larvae.
- After a major winter flood event in 2013 that forced the lagoon mouth open, the lagoon reset – algal biomass was flushed out and nutrient concentrations decreased. This illustrates the importance of periodic opening to the sea.

Significant macroalgae and macrophyte growth in Andersons Lagoon, 27 February 2026. Sediments at the lagoon's margin were devoid of oxygen close to their surface (top right). Photos: J. Milne.

Andersons Lagoon is locally valued – for fishing, duck hunting, walking, and its coastal character. Its current condition reflects the pressures it faces from a catchment where water moves quickly off the land and becomes trapped within a poorly flushed lagoon.

Is water quality getting better or worse?

The honest answer is that we don't know for Stony Creek itself – it has never been monitored. What we do know from modelling and research is that the lagoon is already under significant stress.

Modelled estimates of annual total nitrogen concentration place Andersons Lagoon among the poorest third of Otago's 27 intermittently closed estuaries – a group that includes estuaries with known water quality problems. For suspended sediment, the lagoon sits in the better third. While this might suggest sediment is less of an issue than nitrogen, sediment will still accumulate in the lagoon.

A preliminary assessment of Otago's intermittently closed estuaries in 2023 identified Andersons Lagoon as one of five currently unmonitored estuaries that should be considered a high priority for monitoring and management. The lagoon is not currently recognised in any ORC regional plan, despite the aquatic biodiversity values it supports. and the saltmarsh wetland habitat associated with it.

Without monitoring, we cannot track whether things are getting better or worse. Establishing a baseline now – before conditions deteriorate further – is a key priority.

The EOCG and landowners in this catchment have an opportunity to get ahead of further decline, and to make the case for Andersons Lagoon to receive greater recognition and protection.

How are contaminants getting into the water?

This is a small, responsive catchment – when it rains, water likely moves quickly off the land and into the creek. Understanding the main pathways helps target the right actions in the right places:

- Sediment and *E. coli* likely enter the creek primarily through overland flow during rainfall events, particularly from areas where stock have direct access to waterways or where the ground is bare or compacted. Light rain shouldn't cause visible sediment flow – if it does, that's a sign of a problem worth investigating.

- Nitrogen leaches through the soil profile and likely travels via subsurface flow or shallow groundwater to the creek. The pallic soils common in this catchment are likely prone to cracking in dry summers, creating direct pathways for water and nutrients to bypass the root zone. Winter and spring are the highest-risk periods, when higher rainfall flushes accumulated nitrogen through the soil.

- The lagoon concentrates what arrives. Because the mouth is closed most of the time, nutrients and algae build up instead of being flushed away. What might be a passing pulse of sediment or nutrients in an open estuary can persist and accumulate here for months.

- Overland flow from steep slopes, tracks and gully heads delivers pulses of muddy, nutrient-rich water to the stream and lagoon during storms. Identifying and managing these critical source areas (CSAs) is one of the most effective things you can do.

Actions you can take to help water quality

Because Stony Creek is a small and sensitive catchment, actions taken by landowners here can make a real difference to the health of Andersons Lagoon. The key messages are: slow the flow, keep nutrients on farm, and protect waterways from direct stock access.

- Look for swales, gullies and low-lying areas where water collects before leaving the property. Planting these with long vegetation, installing small detainment bunds, or creating small wetlands can slow the flow and trap sediment and nutrients before they reach the creek.
- Check for runoff from steep tracks, gateways, culverts and bridges. Small cut-offs into the paddock help redirect water, and boards along the edges of stream crossings reduce direct runoff into the creek.

- Keep stock out of the creek, drains and springs – even small or intermittent ones, including wet areas in the upper catchment that connect directly to the stream when it rains. Fencing and leaving rank grass along edges dramatically reduces *E. coli* and sediment entering the creek.
- Manage winter cropping and grazing carefully across the catchment. Maintain setbacks from waterways, avoid planting crop in swales, and check paddocks regularly in wet weather for areas where water gathers before leaving the property.
- Planting along stream margins – even in short sections – reduces bank erosion, filters runoff, and provides shade that limits weed growth in waterways. Native plantings near the lagoon also support biodiversity and may help slow sediment reaching the water.

- The EOCG is happy to support and work with landowners in the catchment to protect and enhance the lagoon wetland and tributaries.

Small improvements each year add up to significant benefits. In a catchment this size, every action counts.

Get to know your creek – and the lagoon

One of the most valuable things in a catchment with limited monitoring data is landowners who know what's normal – and who can spot when something has changed. We'd encourage everyone farming in this catchment to take the time to look at their waterways.

- Visit Andersons Lagoon at different times of year and note what you observe – water colour and clarity, algal coverage, smell, bird activity, etc. Take photos. Changes over time are informative even without formal measurement.

- The East Otago Catchment Group has Stream Health Monitoring and Assessment Kit (SHMAK) resources available – a simple, low-cost way to start building a picture of stream health in your small creeks. Talk to our EOCG co-ordinator Steph Scott about getting started.

- Report anything unusual to ORC or the catchment group – unexpected discharges, fish deaths, or sudden changes in water colour or smell.

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 factsheet draws on the following sources:

- Juliet Milne, Traverse Environmental (2026). Stony Creek, East Otago – summary of information on water quality and ecological health. Memo prepared for the East Otago Catchment Group, 13 May 2026.
- Foote N. (2016). Environmental and biological characteristics of East Otago estuaries along a gradient of marine connectivity. Unpublished MSc thesis, University of Otago.
- Plew D. (2021). Proposed nutrient load limits for Otago's estuaries. NIWA Client Report for Otago Regional Council.
- Schallenberg M. (2023). Otago's intermittently closed estuaries: a preliminary assessment. Hydrosphere Research report for Otago Regional Council.

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**
- NZ Landcare Trust (good management practices): **https://bit.ly/4mJiZNL**
- Our Land and Water (Farm Management resources): **https://bit.ly/42KBiJi**

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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