INFO SHEET 10

TOITŪ TE HAKAPUPU
PLEASANT RIVER CATCHMENT RESTORATION PROJECT

The Flow of Te Hakapupu

The flow of Te Hakapupu / Pleasant River in the 22 months to January 2025 varied from no flow to flood. This natural fluctuation drives biodiversity patterns, water quality changes, and sediment levels in the catchment's waterways and estuary.

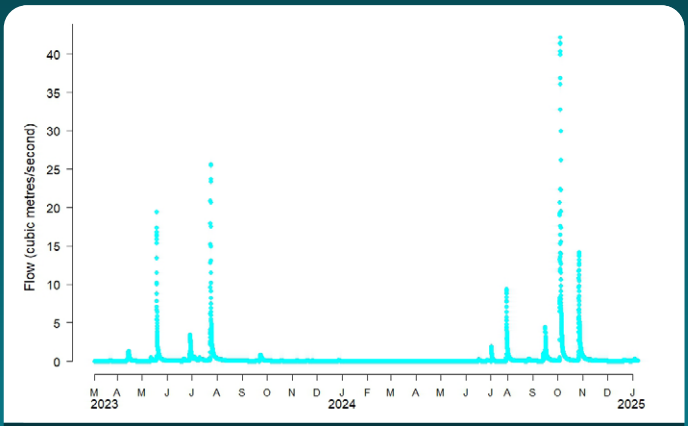

Figure 1. Te Hakapupu / Pleasant River flow between March 2023 and January 2025 at the Patterson Road ford, showing the occasional spikes of high rainfall. © Solis Norton, Whirika Consulting

Te Hakapupu / Pleasant River catchment and its estuary are the key focus of the Toitū Te Hakapupu / Pleasant River Restoration Project (2021–2025). The project aims to improve water quality and enhance conservation, cultural and community values throughout this 13,000-hectare catchment in East Otago.

Flow trends in Te Hakapupu / Pleasant River, investigated from March 2023 to January 2025 (Figure 1), were characterised by the typically dry climatic conditions (approximately 650 mm of rainfall per year), interspersed with periods of high rainfall and successive floods.

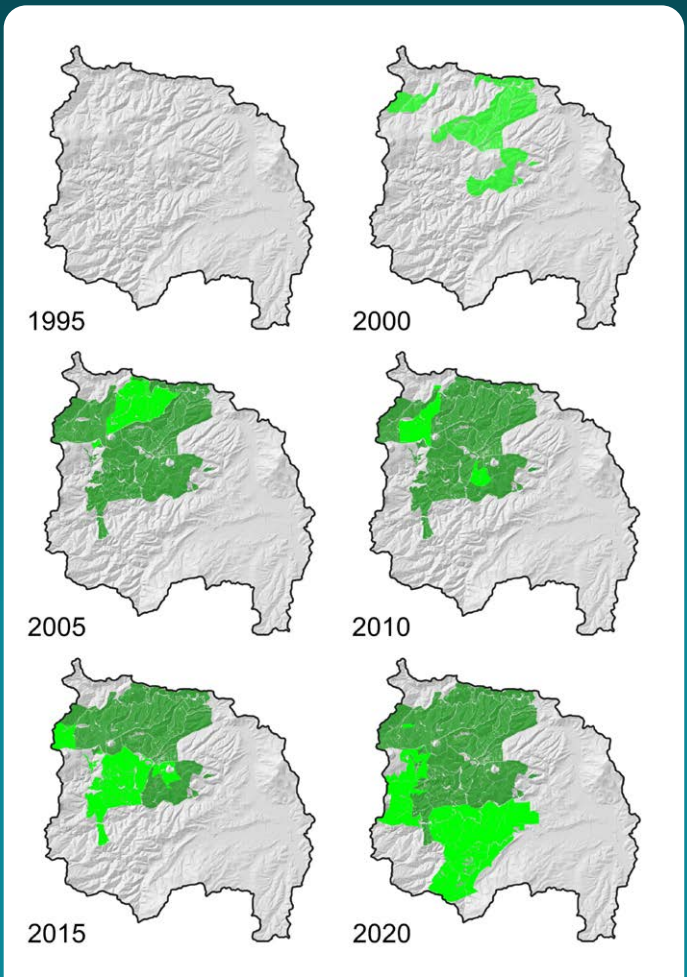

Figure 2. Expansion of commercial forestry since the 1990s in Te Hakapupu / Pleasant River catchment. © Solis Norton, Whirika Consulting

Te Hakapupu / Pleasant River has naturally low flow

The river had extreme low flow (five litres per second or less) 18% of the time. The mid-point of flow values (median) was 40 litres per second.

These extreme low flow conditions are likely to become more common due to both climate change and land use change. The climate is predicted to become hotter, drier, and windier in the years ahead. In addition, commercial forestry has expanded to cover 50% of the catchment's area (Figure 2). These new forest areas consume more water per hectare than the farm systems they have replaced.

Refuge pools become important

In extreme low flow conditions, visible flow stops and water mostly remains in isolated pools along the riverbed. During this time, water quality can decline as the regular flushing and regulating effect of steady flow reduces. This decline is slower in larger, deeper 'refuge' pools (Figure 3), which then become important refuges for aquatic organisms.

These can include mahika kai species that help support the practice of mātauraka Māori by Kāti Huirapa Rūnaka ki Puketeraki, who hold mana whenua status in East Otago and Te Hakapupu catchment. As mana whenua, Puketeraki have a kaitiakitaka obligation, arising from rakatirataka, to care for water bodies and protect their mauri from degradation. The refuge pools are also important for the wider community's aspiration for healthy waterways.

Figure 3. Refuge pool in Te Hakapupu / Pleasant River during extremely low flow in summer 2023/24. © Solis Norton, Whirika Consulting

Protecting and enhancing refuge pools for the future

Establishing riparian plantings of native species around the pools provides habitat with shade, food and shelter for aquatic organisms, increasing their chances of survival during periods of low flow. The plantings also help stabilise streambanks, reducing erosion and the amount of sediment that can clog the streambeds and create more stress on their inhabitants.

Establishing and enhancing wetlands, especially in the higher parts of the catchment, could help moderate flow in the tributaries. Wetlands act like sponges, retaining rainfall — which reduces flood peaks — and

Figure 4. Te Hakapupu / Pleasant River at Stenhouse Road bridge at low flow (left) and in flood (right). © Solis Norton, Whirika Consulting

Figure 5. An example of high flow levels and high levels of suspended sediment — Te Hakapupu / Pleasant River, looking downstream from Patterson Road ford in October 2024. © Hamish Mcfarlane

then releasing the water gradually over time to extend tributary flows in low rainfall periods.

Occasional floods change the nature of the catchment's waterways completely (Figure 4 and Figure 5). This is illustrated by comparing the time it takes for an Olympic swimming pool-sized volume of water to flow past the Patterson Road ford. At median flow, that time is about an hour and a half. During two different flood events, it only took 13 seconds for that much water to flow past. In another larger flood in October 2024, the time was reduced to just six seconds.

Floods contribute disproportionately to sedimentation of the catchment's waterways and estuary. The associated heavy rainfall causes slips and washes large amounts of sediment into waterways in a short time from bare ground and areas of active erosion. Areas of recently harvested forest and areas of farmland being used for winter grazing are especially high-risk sources of sediment during flood conditions. Additionally, the high flows remobilise sediment that has accumulated in the waterways during low flow conditions.

To demonstrate the impact of floods on sediment movement, we compared the time it takes for a tonne of sediment to move past the Patterson Road ford at median and at high flow. At median flow it was approximately three months (96 days). At peak flow during the October flood, it was approximately nine minutes. A difference of about 150,000 times!

Proactive management can help keep sediment out of waterways. Stabilising streambanks and active sites of erosion is a critical first step. Detailed forest and farm management plans that are fully carried out are also important for success. Guidelines and templates are available online, including:

Commercial forestry

Dairy farming

Sheep & beef farming

A partnership project by:

Otago Regional Council

Kāti Huirapa Runaka ki Puketeraki

In collaboration with:

Ministry for the Environment
Manatū Mō Te Taiao
Essential Freshwater Fund
A JOBS FOR NATURE PROJECT

East Otago Catchment Group

Find out more at orc.govt.nz/toitutehakapupu