# Waiau Working Party

**Meeting Location: Invercargill – Environment Southland Chambers**

**Meeting Date: Thursday 29 October 2026**

**Time: 10.00 am**

**To:** The Waiau Working Party

**From:** Jason Holland (Environment Team), Anne-Maree Schwarz (Meridian Science Advisor)

**Date:** 15 October 2026

# Briefing Paper


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# 1 Introduction

## 1.1 Purpose of this briefing

The purpose of this briefing paper is to provide information to support the Waiau Working Party (WWP) in its advisory function under conditions of five resource consents[1] ("consents") granted to the Electricity Corporation of New Zealand (ECNZ) in 1996 (now held by Meridian Energy Limited (Meridian)) associated with the Manapōuri Power Scheme (MPS).

This information includes:

- Responses to invitations from the WWP to provide it information (section 1.2)
- An overview of the last 12 months of hydrology conditions (section 2)
- Summaries of the following reports produced to meet MPS core operating consent[2] compliance obligations in the last 12 months (sections 3 and 4):
    - Manapōuri Power Scheme Long Fin Eel Mitigation Report 2025/26 Season
    - Waiau Arm[3] Water Quality Monitoring 2026
    - Managing Nuisance Periphyton in the Lower Waiau River: Management and Monitoring 2025/26
    - Upper Waiau Peg Line Survey 2026.
- An update on the following extra work undertaken by Meridian in the last 12 months relating to:
    - the migrant eel and elver trap and transfer programme (section 5)
    - *Microcoleus* in the Lower Waiau River (section 6)
    - the Manapōuri Lake Control Improvement Project (MLC IP) (section 7).
- An update on work programmes required to meet MPS core operating consent compliance obligations for the next 12 months (section 9).

## 1.2 Response to invitations from WWP to provide further information

Responses to WWP invitations to provide further information on a range of topics are set out below.

[1] Relevant consent conditions include Condition 6 of 96019, Condition 6 of 96020, Condition 3 of 96021, Condition 4 of 96022 and Condition 5 of 96023.

[2] The phrase "core operating consent" means consents granted in 1996 authorising the damming and diversion of water (96020 and 96022), discharges (96019, 96021 and 96023), and taking and use of water (96024) associated with the MPS; and consents granted in 2010 for the Manapōuri Amended Tailrace Discharge (MTAD) authorising the damming and diversion of water (206156), taking and use of water (206157) and water discharge (206158).

[3] Meridian acknowledges the Toitū Te Whenua Land Information New Zealand gazetted official and recorded place names and Appendix 1 of the proposed Southland Water and Land Plan (pSWLP) that refers to the water between the outlet of Lake Manapōuri, just upstream of Pearl Harbour, to the Manapōuri Lake Control structure (MLC) as the Waiau River. Meridian notes the MPS 1996 and MTAD 2020 Consents reference this reach of the river as the Waiau Arm. Meridian, while acknowledging the official and recorded name, and that the Waiau Arm is part of the Waiau River, refers to the Waiau Arm for compliance and compliance reporting matters, such as this report.

| Information sought | Meridian response |
|---|---|
| *Update on the Manapōuri Lake Control Improvement Project* | Section 7 of this briefing provides an update on the MLC IP. |
| *Update on Meridian's consent renewal plans for the MPS* | Meridian is currently maintaining a watching brief on the consenting environment, which is in the midst of generational change. Meridian will not reach a position on what process it will use, and what a consent proposal could look like, until it has a clearer picture of this. |
| *Tuna trap and transfer programme - stocking strategy and additional release sites* | Section 5 of this briefing provides information on the migrant eel and elver trap and transfer programme, including the stocking strategy and progress towards additional release sites. |
| *Tailrace an attractant for migratory fish* | Meridian previously provided verbal feedback on this issue at the 2025 meeting of the Guardians of Lakes Manapōuri, Monowai and Te Anau ("Lakes Guardians"). In summary, based on current knowledge, it is not expected that large numbers of longfin elvers would be attracted to the tailrace. This is based on the overall recruitment dynamics across NZ, where glass eels are not being attracted to natal rivers or streams, but rather drift on ocean currents and being more heavily driven by oceanic processes and water temperatures rather than the amount of freshwater being discharged into the ocean. The predicted distribution for longfins shows a low probability of occurrence in Fiordland.[4] However, it is noted that there are scarce records of longfin eels in Fiordland to populate the models and with an absence of any recorded observations of glass eels and elvers near the tailrace, experts are not currently able to provide a definitive answer to the question. It is a matter Meridian intends looking into further with a view to reporting on it to a future meeting of the Fiordland Marine Guardians (noting this issue relates to Deep Cove rather than any of the WWP's focus areas). |

[4] See: https://niwa.co.nz/freshwater/nz-freshwater-fish-database/niwa-atlas-nz-freshwater-fishes/longfin-eel

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| *Te Wae Wae Bay shoreline and erosion science* | We are unsure specifically what information is being sought, but welcome clarification from the WWP on that at the meeting. As an advance contribution to that discussion, we note Meridian has supplied a considerable amount of information on this topic in recent times, including:<br>• In 2024, in the context of applications to ES for consents associated with the MLC IP, provision of evidence from Dr Martin Single on coastal process issues in response to submissions from property owners and residents of the Bluecliffs community.[5] Dr Single found (p.6) that "Monitoring of the river flow and sediment movement as part of the MTAD consent conditions shows that the changes measured between 2009 and 2017 showed no evidence of the consented flow regime having an effect on shoreline behaviour at the coast that was detectable from the variable behaviour of the coastal system due to changes in natural processes. From my assessment of the processes and historical observations of the Waiau River hāpua, I consider that recent changes to the Waiau River hāpua and river mouth are consistent with hāpua process theory and with historical variability that predates and postdates the construction of the MPS and the MLC. Recent erosion at Bluecliffs is not unique or a direct consequence of the MPS."<br>• In 2025, as part of briefing material for the WWP's 2025 meeting, the Lower Waiau River Geomorphic Monitoring 2024 Report by consultants AECOM. This report summarised the results from 7-yearly compliance monitoring, including of four cross-sections at the Te Waewae lagoon and barrier beach. The authors found (p.113) that the monitoring data "shows the expected range of variability of a high-energy coastal environment that is mainly driven by persistent wave action, with occasional pulses of sediment delivered by the Lower Waiau River. The record of direct monitoring is short, at 15 years from 2009, and it is not possible to identify robust trends in shoreline behaviour. Currently there is no evidence that flow regulation more than 100 km upstream at MLC is having a detectable effect on recent shoreline behaviour along Te Waewae Bay." |
| *Microcoleus* | Section 6 of this briefing provides information on *Microcoleus*. |

[5] Available from the ES website: https://www.es.govt.nz/repository/libraries/id:26gi9ayo517q9stt81sd/hierarchy/environment/consents/notified-consents/2024/Meridian%20Energy%20Limited%20APP-20233670/6%20PreCirculation%20Applicant%20Evidence/09%20Statement%20of%20Applicant%20Evidence%20%20Dr%20Martin%20Single%20-%20Coastal%20processes

| | |
|---|---|
| *Opportunities for backwater/wetland restoration* | We are unsure specifically what information is being sought, but welcome discussion with the WWP at the meeting.<br>As an advance contribution to that discussion, Meridian currently supports ecological restoration in the Waiau catchment in two ways:<br>• By carrying out native plantings on a project-by-project basis to remediate areas affected by earthworks; and<br>• By funding community-led restoration initiatives, including through Meridian's Power Up fund.<br>We also acknowledge the significant role of the Waiau Fisheries and Wildlife Habitat Enhancement Trust in habitat (including backwater.wetland habitat) restoration within the Waiau catchment. |
| *Novel approaches to water take parameters* | We are unsure what is being sought or proposed, but welcome clarification from the WWP at the meeting. If WWP has specific proposals it has assessed we would welcome receiving these. |

### 1.3 Provision of certain information

Other information in this briefing is provided for continuity with past briefings, rather than necessarily being relevant to the WWP's function. We plan to include in future briefings information about:

- *Reports relating to Doubtful Sound / Patea* (section 4.4 of this briefing), noting these reports are substantively discussed by the Fiordland Marine Guardians.
- *Reports relating to Lakes Manapōuri and Te Anau produced to meet MPS core operating consent compliance obligations* (sections 4.5, 4.6 and 4.7 of this briefing), noting these reports are substantively discussed by the Lakes Guardians.
- *Updates on Meridian's current consent applications and confirmation of consents granted by ES to Meridian in the last 12 months* (section 8 of this briefing), noting that information about any other Meridian consents is not strictly relevant to the WWP's advisory function.

## 2 Waiau Hydrology, Lake Level Management and Generation

Figure 1 to Figure 9 below provide a visual representation of the Waiau hydrology from 1 October 2025 to 30 September 2026.

September, October and November 2025 monthly rainfall totals recorded in the Doon Valley off the Middle Arm of Lake Te Anau were the second highest for all three of these months (1415mm, 1504 and 1211mm respectively). Lake Te Anau recorded its highest four-month inflow starting 28 August, resulting in Lake Te Anau peaking at 204.73m on 24 October (fourth highest) and Lake Manapōuri peaking at 180.80m on 25 October (third highest). The Lower Waiau River recorded its second highest October mean flow in October 2025 and its second highest mean November flow in November 2025. High inflows continued into mid-January 2026. From October and November 2025, the extraordinary hydrological conditions led to eight departures from the Operating Guidelines for the Levels of Lakes Manapōuri and Te Anau ("Guidelines").

Generally dry conditions then prevailed from February to May 2026. Lake Te Anau level briefly reached the low operating ranges on 31 May, while Lake Manapōuri was in the low operating ranges

from 16 May to 31 May. Regular high inflow events then returned from 31 May to 20 September resulting in Lake Te Anau level rising into the high operating ranges on five occasions, returning to the main operating ranges again on 1 October 2026.

On 18 February 2026, MLC flow was set to ensure at least a five cubic metres per second (cumec, or $m^3/s$) positive flow (i.e. toward MLC) ahead of the initiation of parallel channel excavation works under the MLC IP. This is discussed further in Section 7.

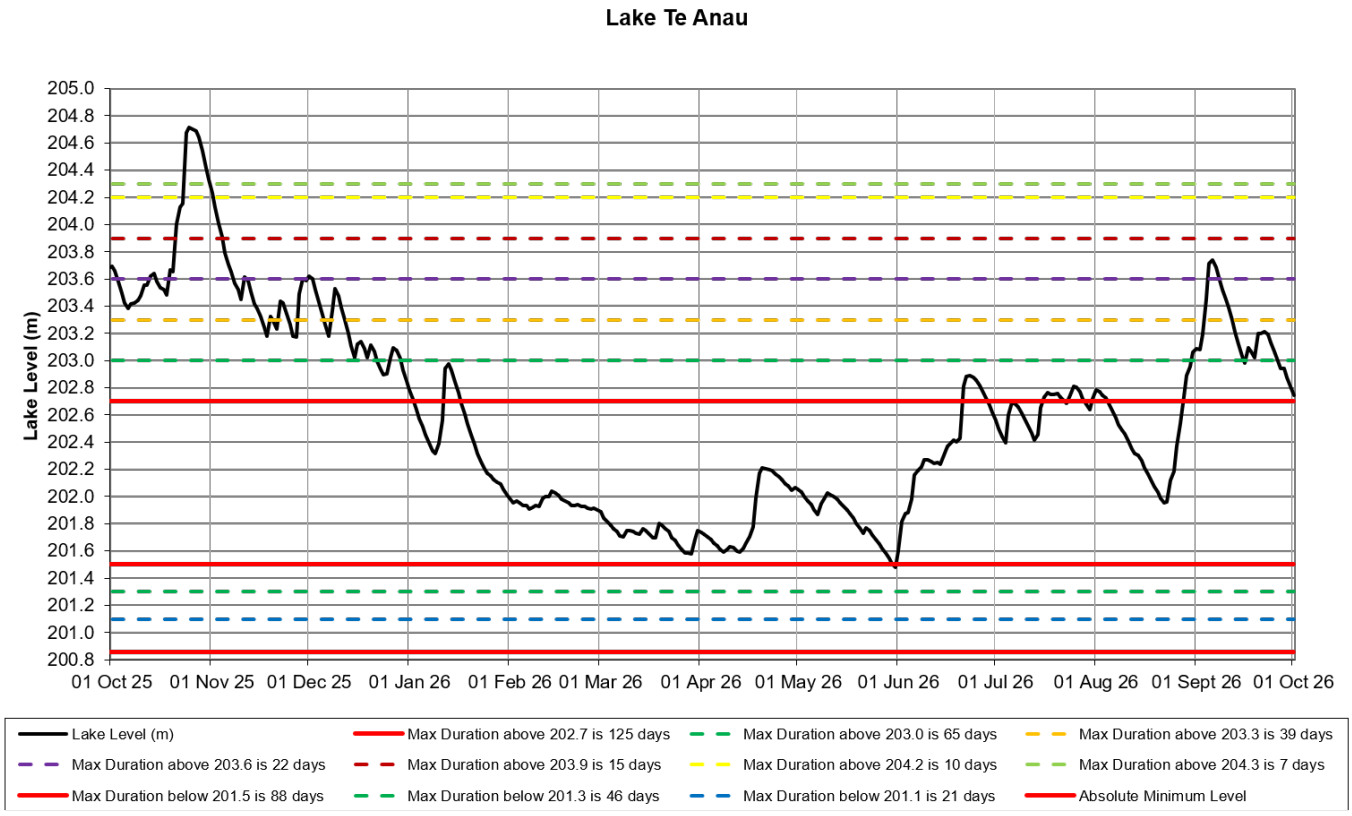



***Figure 1*** *Lake Te Anau levels 1 October 2025 to 30 September 2026*

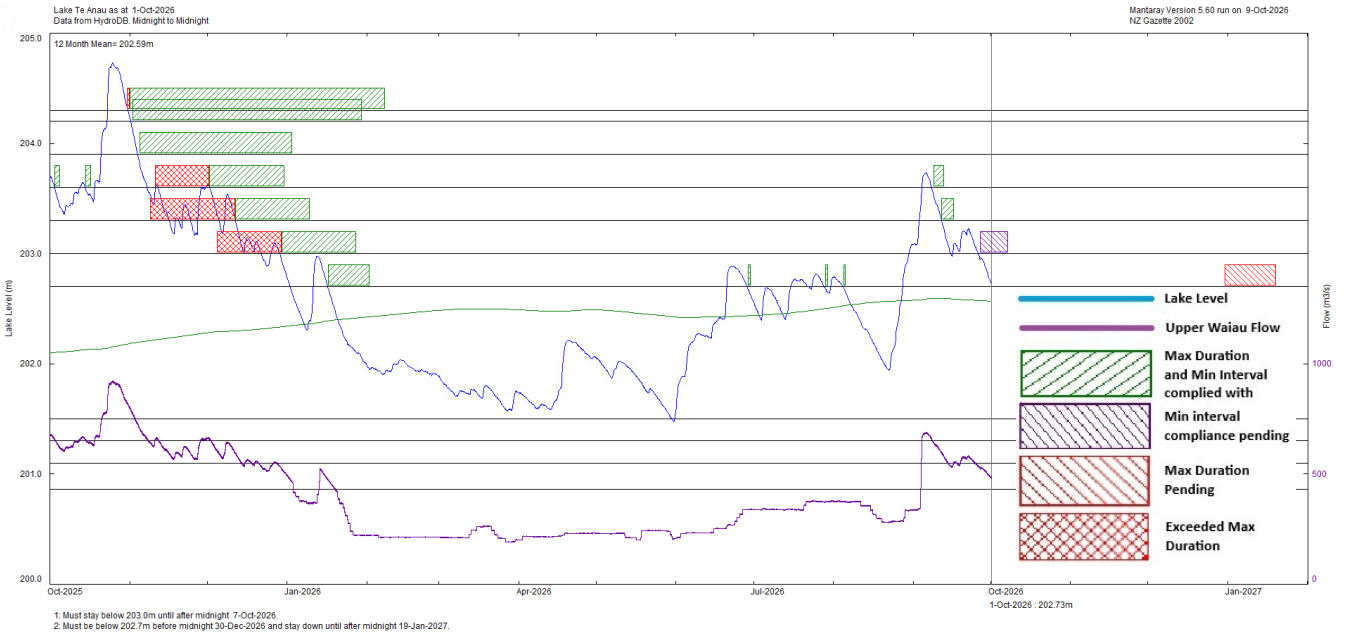



***Figure 2*** *Lake Te Anau levels 1 October 2025 to 30 September 2026*

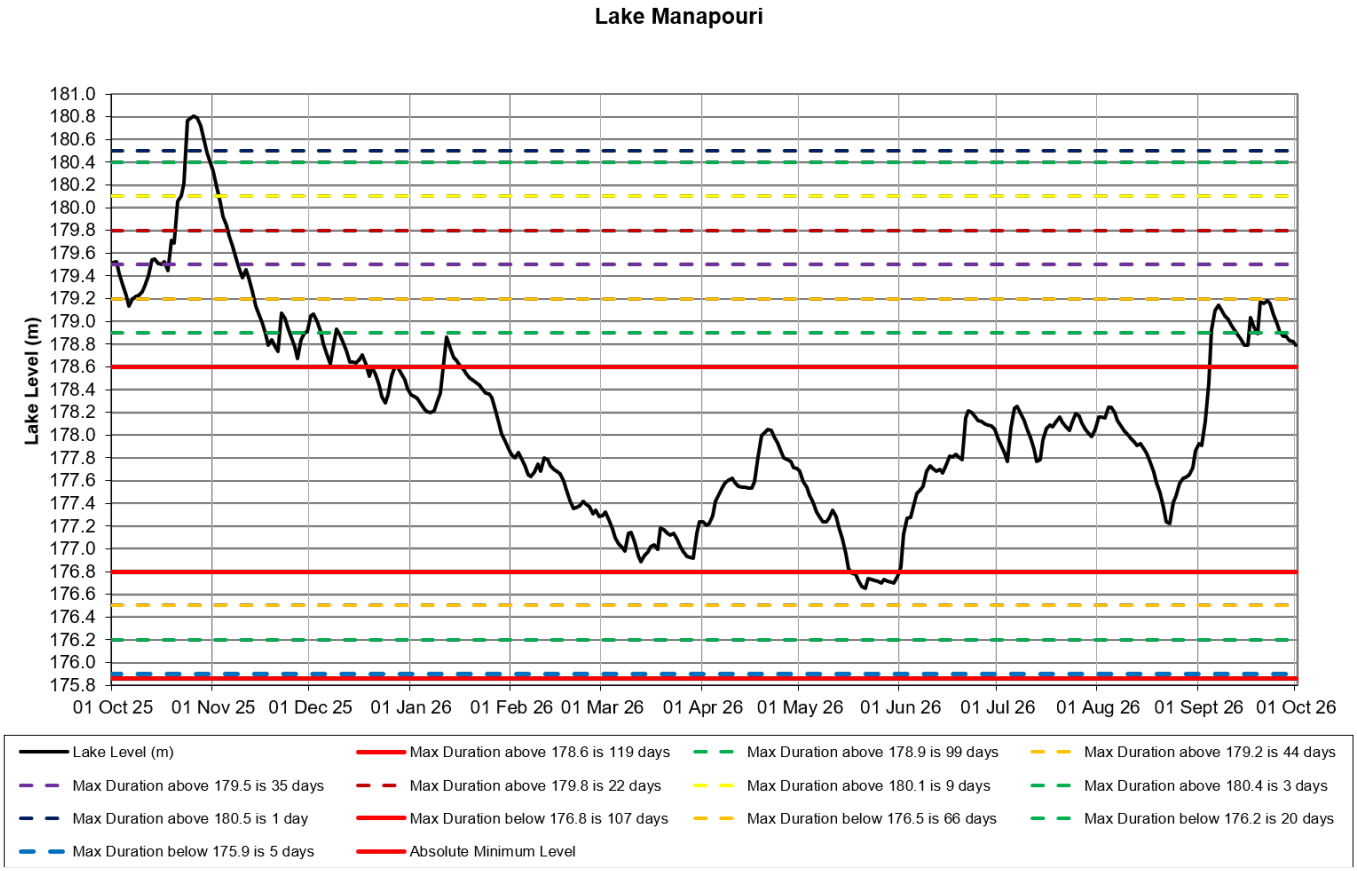



***Figure 3*** *Lake Manapōuri levels 1 October 2025 to 30 September 2026*

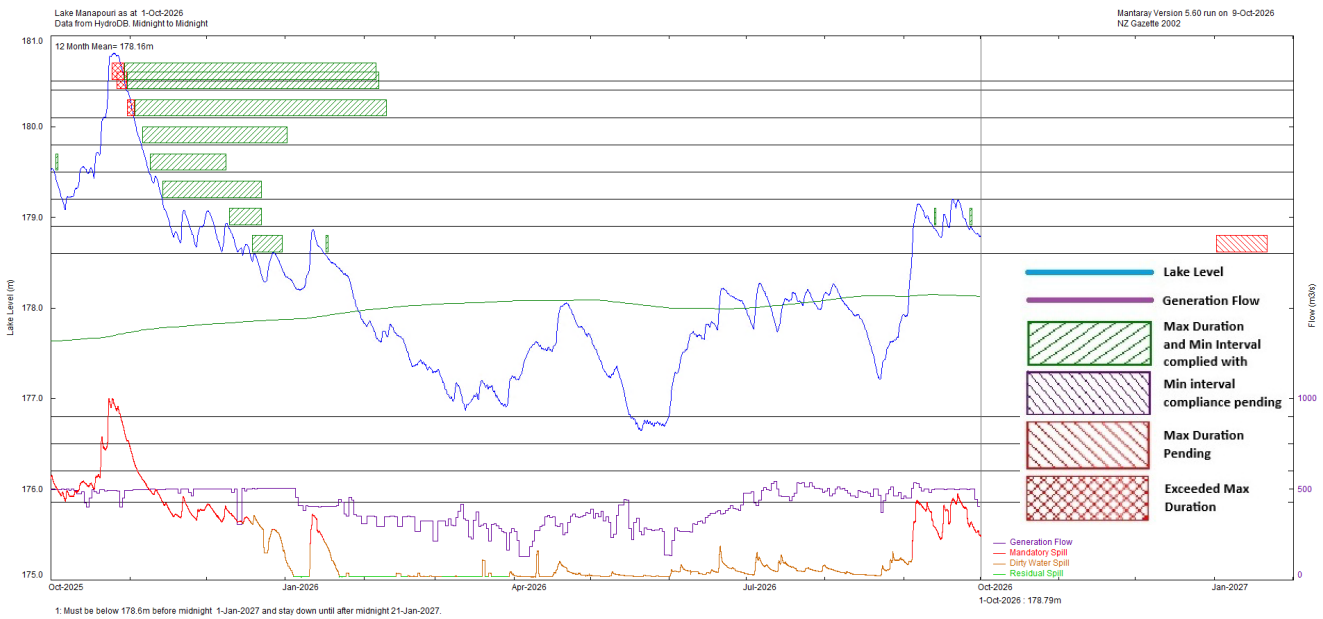



***Figure 4*** *Lake Manapōuri levels 1 October 2025 to 30 September 2026*

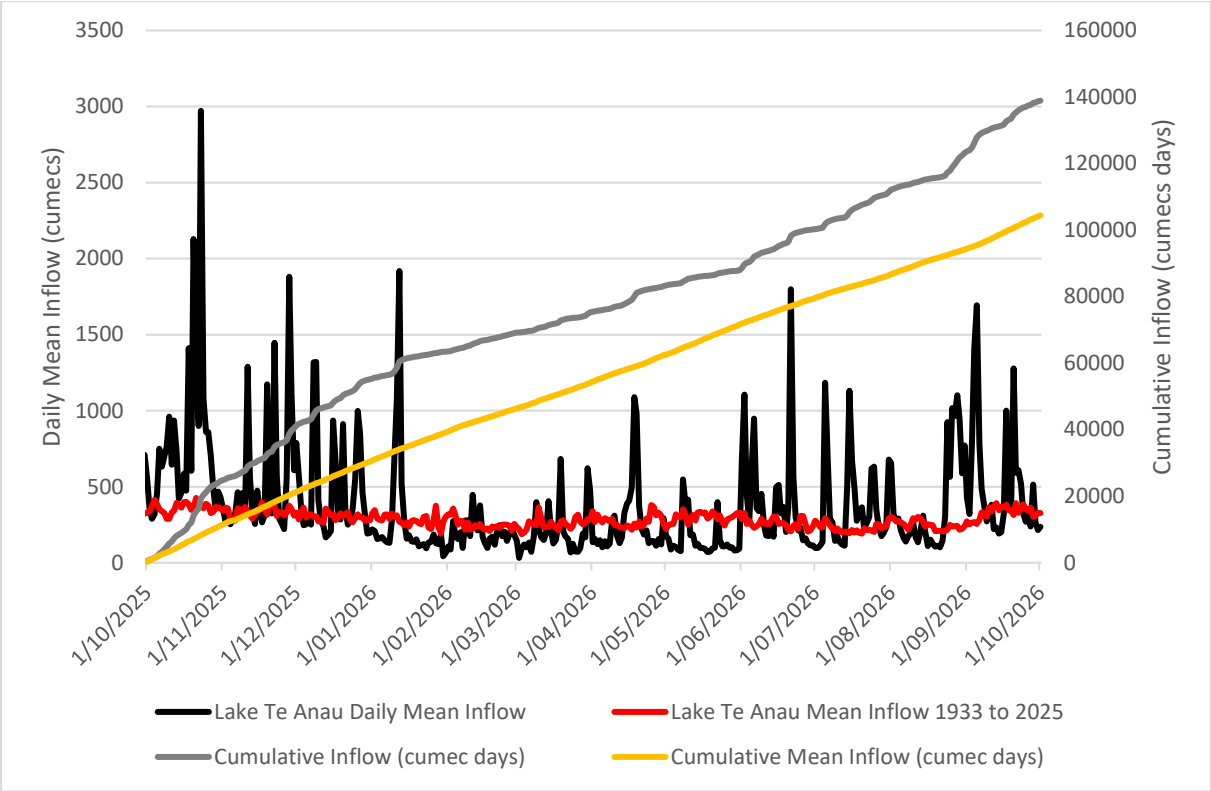



***Figure 5*** *Lake Te Anau inflow 1 October 2025 to 30 September 2026*

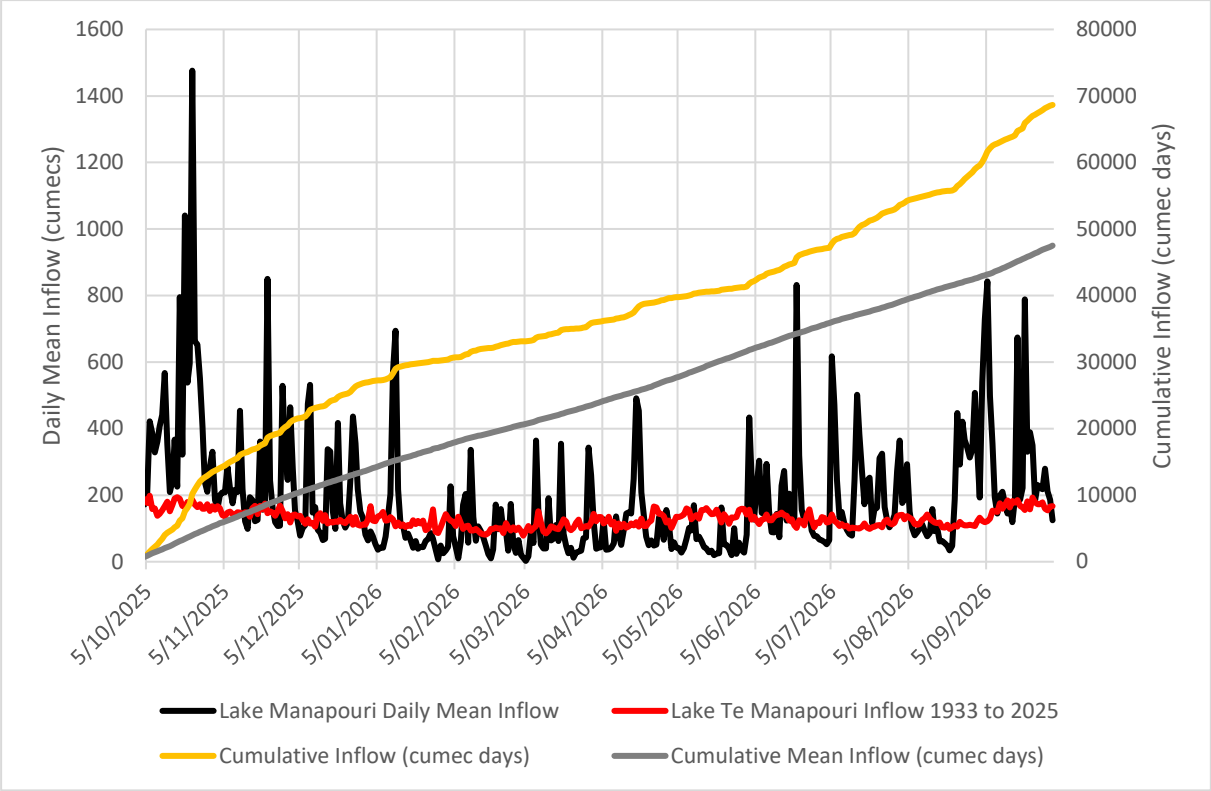



***Figure 6*** *Lake Manapōuri inflow 1 October 2025 to 30 September 2026*

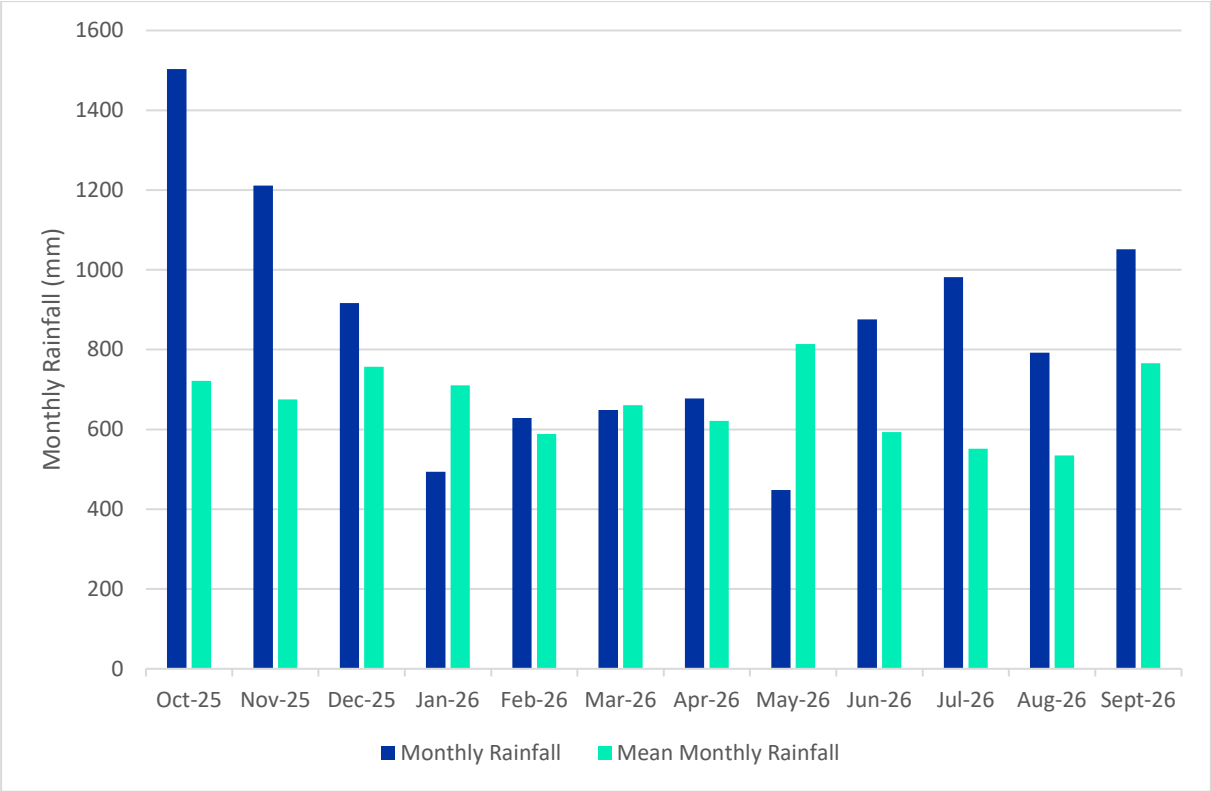



***Figure 7*** *Monthly rainfall total- Doon Valley (Middle Arm of Lake Te Anau) October 25 to September 26*

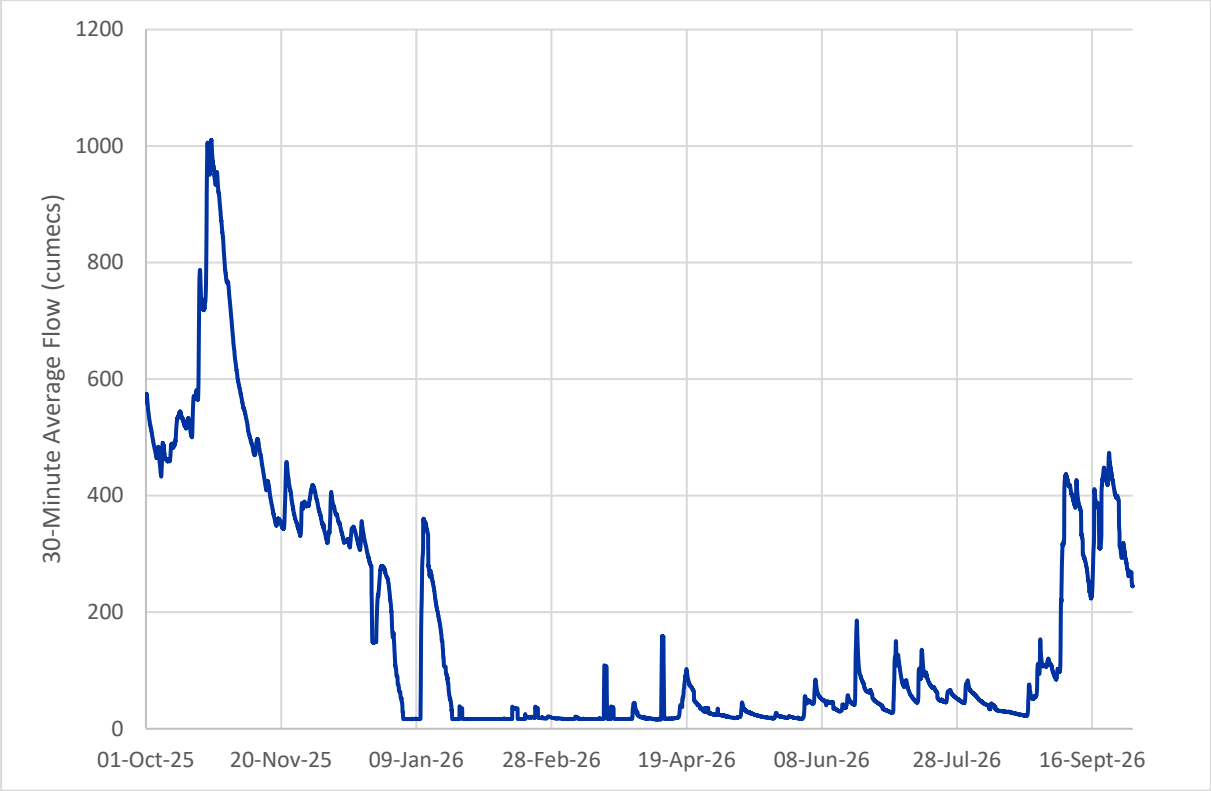



***Figure 8*** *- Lower Waiau River flow below MLC 1 October 2025 to 30 September 2026*

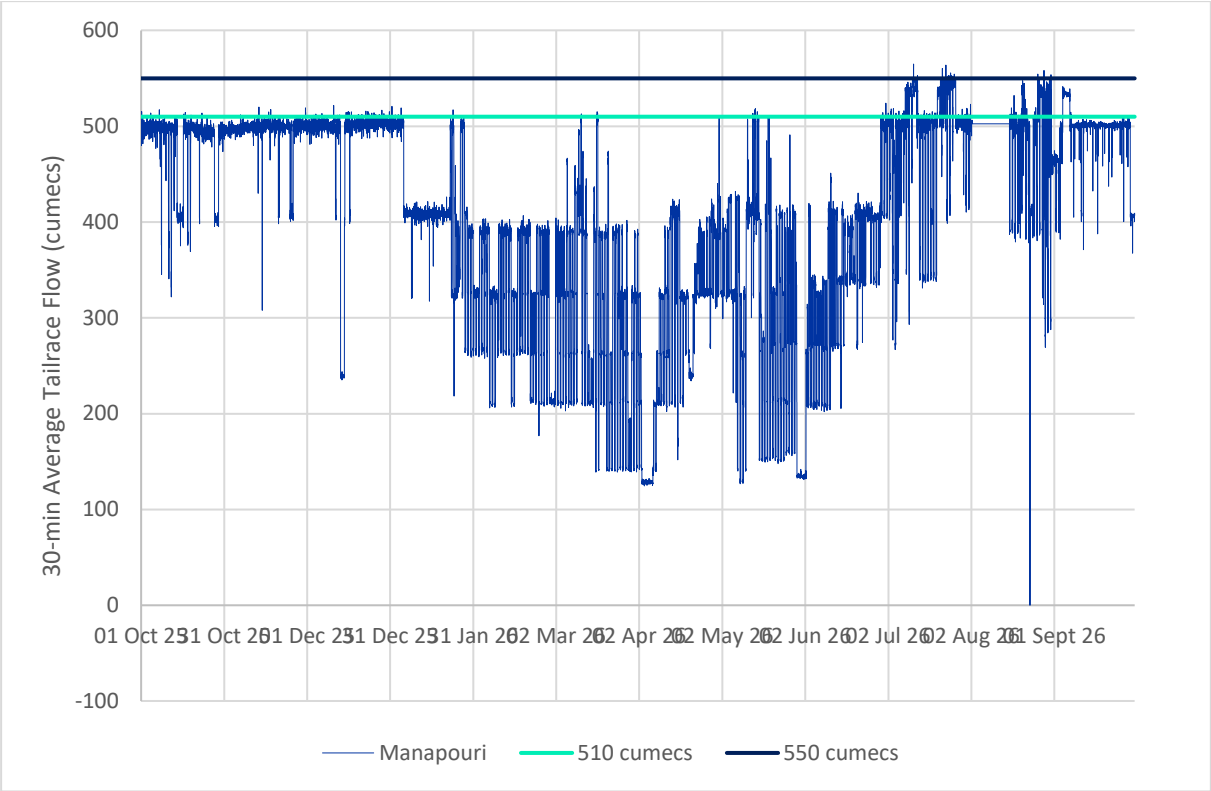



***Figure 9*** *Manapōuri Power Station Tailrace Discharge 1 October 2025 to 30 September 2026*

# 3 Reports Produced to Meet Manapōuri Power Scheme Compliance Obligations

In the past 12 months, the following reports have been prepared to meet compliance obligations under Meridian's core operating consents for the MPS.

- **Manapōuri Power Scheme Long Fin Eel Mitigation Report 2025/26 Season** prepared by Mike Hickford and Andrew Watson of Earth Sciences New Zealand (ESNZ). This report summarises the results from the latest elver trap and transfer season that concluded March 2026, and the migrant eel trap and transfer season that ended April 2026. Consent requirements relating to these activities are in Appendix 1 to the 1996 core operating consents, and conditions 9 and 10 of the Manapōuri Amended Tailrace Discharge (MTAD) consent 206157.
- **Waiau Arm Water Quality Monitoring 2026** prepared by Kristy Hogsden of ESNZ and Nick Key (independent contractor). This report covers the season of Waiau Arm monitoring and related management responses that ended in April 2026. Consent requirements relating to these activities are in Appendix 1 to the 1996 core operating consents, Appendix A to the MTAD consents, and condition 6 of MTAD consent 206156.
- **Managing Nuisance Periphyton in the Lower Waiau River: Management and Monitoring 2025/26** prepared by Kristy Hogsden, Cathy Kilroy and Karen Robinson of ESNZ. This report covers the season of Lower Waiau River periphyton monitoring and related management responses that ended in May 2026. The consent requirement for these activities is in Condition 7 of MTAD consent 206156.
- **Physical Monitoring of Doubtful Sound / Patea: 2025/26** prepared by Paula Casanovas, Romain Chaput and Sara Jamieson of Cawthron. This report covers coastal water monitoring for

the year ending February 2026. Consent requirements for this annual monitoring are in Appendix 1 to the 1996 core operating consents and Appendix A to the MTAD consents.

- **Littoral Macrophytes in Manapōuri Power Scheme: 3-year Consents Monitoring Baseline 2026** prepared by Mary de Winton of ESNZ. This report covers aquatic macrophyte monitoring in Lakes Te Anau and Manapōuri carried out in March 2026. The timing of this scheduled monitoring was brought forward to 2026 as part of a recent change to Appendix 1 to the 1996 core operating consents.
- **Beach Changes on Moturau and Te Ana-au (Lakes Manapōuri and Te Ana-au), January 2021 – January 2026** prepared by Martin Single of Shore Processes and Management Ltd. This report covers the 5-yearly lakeshore monitoring that was carried out in January 2026. Consent requirements for this scheduled monitoring are in Appendix 1 to the 1996 core operating consents.
- **Moturau and Te Ana-au (Lakes Manapōuri and Te Anau) October-November 2025 High Lake Levels and Effects on Lakeshore Geomorphology** prepared by Martin Single of Shore Processes and Management Ltd. This report covers lakeshore monitoring carried out in January 2026 specifically in response to the October-November 2025 departures from the Guidelines high operating ranges. The consent requirement for this event-driven monitoring is set out in Appendix 1 to the 1996 core operating consents.
- **Upper Waiau Peg Line Survey 2026** prepared by Saasha Marsters, Annaliese Boot and Roseanne Coulter of AECOM. This report covers a field survey conducted in December 2025 and analysed in 2026 specifically in response to a flow event exceeding 800 $m^3/s$ at Queens Reach that occurred between 23 October and 1 November 2025. The consent requirement for this event-driven monitoring is set out in Appendix 1 to the 1996 core operating consents.

# 4 Summaries of Compliance Monitoring Reports

The descriptions below are based on the executive summaries of each completed report. Meridian science advisor Dr Anne-Maree Schwarz will present on all reports. A full copy of each report has been separately provided to the Chair for circulation to the WWP.

## 4.1 Manapōuri Power Scheme Long Fin Eel Mitigation Report 2025/26 Season

This report fulfils the annual reporting requirements for the 2025/26 season of trap-and-transfer of migrating longfin eels at the Manapōuri Power Scheme.

- Elver and juvenile eel trapping was heavily constrained by high flows and spilling at the MLC structure, limiting effort to 49 trap lifts (approximately half the 90 completed in 2024/25). An estimated 16,678 elvers (62.51 kg) and 1.81 kg of juvenile eels were transferred upstream.
- An estimated 13,048 longfin and 3,630 shortfin elver were transferred. Transfers of both species were well below their 13-year median values; while frequent high-flow events reduced trapping opportunities, the decline was greater than would be expected from reduced trapping effort alone, suggesting that other environmental or biological factors may have influenced elver recruitment or catchability during the season.[6]

[6] ESNZ advised the Waiau Eel Working Group at its annual Meridian hui on 7/10/26 that this same pattern was seen throughout the country at other locations.

- Elver migration by trap and transfer was highly concentrated, with 77.4% of transfers occurring over three days in February 2026. Limited trapping opportunities also prevented target release distributions from being achieved, with 90.4% of biomass released to the Lake Te Anau catchment and none to Lake Manapōuri.
- Adult eel trapping ran from November 2025 to April 2026, with 2,858 net-nights completed. Despite wind-related disruptions on 39 days, 2,146 migrant longfin eels were captured and transferred below the MLC, similar to 2024/25 levels. Females comprised 49.6% of migrants.
- Migrant eel catch rates peaked in January before declining from February onwards. Migration continued later than in the previous two seasons, with the last catch of 10 or more eels recorded on 21 April 2026.
- The transfer of 167 migrant eels in November 2025, together with consistently high November transfers over the past four seasons, confirms that a significant proportion of the annual migration occurs before the traditional summer peak and supports the continued inclusion of November in the trap-and-transfer programme.
- Despite significant environmental and operational constraints, the 2025/26 trap and-transfer programme successfully transferred upstream and downstream migrating eels. The results extend the long-term monitoring record and support ongoing assessment and adaptive management of eel mitigation in the Upper Waiau catchment.

Key recommendations are to retain the early-November start to migrant eel trapping, maximise elver trapping opportunities during suitable conditions, and maintain flexibility in the distribution of transferred elvers among release sites.

## 4.2 Waiau Arm Water Quality Monitoring 2026

Water quality monitoring in the Waiau Arm was established prior to the Manapōuri Tailrace Amended Discharge (MTAD) consents that were approved in 2010. MTAD was predicted to alter the flow regime in the Waiau Arm, with the potential for consequent changes in habitat condition. These flow changes were anticipated to increase the potential risk of summer phytoplankton blooms in the Waiau Arm. Aspects of water quality and clarity have now been monitored since 2013, as required by the 1996 and 2010 MTAD consent conditions.

- Surveys are conducted fortnightly (flow permitting) between 1 January and 31 March at three sites in the Waiau Arm and one site in Lake Manapōuri. Water quality data are collected by an independent contractor and assessed by ESNZ against established water quality criteria for dissolved oxygen, pH, water clarity (as Secchi disk depth) and chlorophyll a to determine if any outcomes require management action (e.g., additional surveys, need for flushing). Sampling methods, trigger criteria and the flow management action plan follow a protocol that was updated in 2025 as approved by ES. This report presents the results of water quality monitoring for the 2026 summer monitoring period.
- Six scheduled surveys were completed in 2026, from 5 January to 26 March. No additional surveys were required. The sampling methods and procedures used were the same as in previous years. Water temperature, dissolved oxygen (reported as %DO), pH and turbidity were measured at the surface and one metre intervals down depth profiles (maximum depth 15 m) at the four sites, and water clarity as Secchi disk depth was measured at each site. The pH probe was calibrated prior to each field survey. Flow in the Waiau Arm, weather conditions, and rainfall events prior to the surveys were considered in the interpretation of the monitoring results.

- MTAD was exercised (i.e., discharge of fresh water into Doubtful Sound between 510–550 $m^3/s$ when conditions permit) during the monitoring period. Mean daily flow in the Waiau Arm was 28.7 $m^3/s$ and flow was towards the MLC for 84% of the time (from 1 January to 31 March). Positive flows (i.e., flows towards MLC) were maintained, in part and at times, due to consent requirements for the MLC IP.
- Water quality and clarity were generally good to very good at all sites over the monitoring period. Based on chlorophyll a, sites in the Waiau Arm were typically classified as microtrophic to oligotrophic, except on 8 February when elevated concentrations resulted in those sites being classified as mesotrophic or eutrophic. Water clarity (as Secchi depth) also declined at the Waiau Arm sites on this date.
- On 8 February, the Secchi disk clarity criterion was triggered at all Waiau Arm sites and the chlorophyll a criterion was triggered at Site 3. The observed decline in water clarity was likely due to increased phytoplankton biomass during a period of parked and negative flows in the Waiau Arm. In response, a flow release was undertaken between 13–15 February to replace water in the Waiau Arm (35 $m^3/s$ for 48 hours). In accordance with the protocol (specifically the flow management action plan), after such a flow release, scheduled surveys are to resume. In the subsequent survey on 24 February, water clarity had improved and chlorophyll a concentration had declined, with no criteria triggered. The brief duration of these triggers and the timely and effective management response suggest that water quality conditions were unlikely to have resulted in any measurable adverse effects on aquatic ecology or habitat in the Waiau Arm.
- No other criteria for action were triggered or management actions were required.

No specific recommendations for action were identified.

## 4.3 Managing Nuisance Periphyton in the Lower Waiau River 2025/26

Since 2013, periphyton monitoring and management has been undertaken in accordance with a protocol for controlled releases of voluntary supplementary flows from the MLC structure. Supplementary flows of sufficient magnitude can reduce periphyton standing crop in the Lower Waiau River downstream of the MLC. The report covers the season from November 2025 to May 2026, which was the 20th season of regular monitoring, and the 14th since the protocol was first implemented.

The protocol (appended to the nuisance periphyton report) specifies that Meridian considers releasing four supplementary flows in each season (with a fifth considered in May) if the SCI conditions require and if the lake levels and electricity supply circumstances allow. The protocol defines a typical supplementary flow release as a flow event that peaks between 160 and 230 $m^3/s$ and achieves a mean flow of 120 $m^3/s$ over a 24 - hour period. The protocol also provides for variable supplementary flow releases, which do not meet these criteria but may still be beneficial for periphyton management.

The proactive approach to supplementary flows trialled in 2024/25 was continued during the 2025/26 season.

An additional monitoring site was trialled at Excelsior during the 2025/26 season. The site, located ~70 m downstream of the established Excelsior monitoring site, was added to investigate whether channel changes observed at the existing site may have altered its response to flow disturbances over time making it less susceptible to the effects of high flows than in the past and therefore potentially less representative of responses to supplementary flow releases.

During the 2025/26 monitoring season, mean flow at MLC (140 $m^3/s$) was more than double the long - term average (67 $m^3/s$), while the percentage of time under high flows (>three × median flow) was also

substantially higher than average (39% compared with 20%). From 18 February 2026, as part of the MLC IP, flows at MLC were managed to vary with Mararoa River flows plus five $m^3/s$ to meet consent requirements. This requirement was in place for the remainder of the 2025/26 monitoring season. The season was classed as a high flow season based on flows at MLC. Mean flow in the Mararoa River was slightly above average, whereas mean flow in the Lower Waiau River at Sunnyside was the second highest recorded since monitoring began. Elevated flows in the Lower Waiau River reflected contributions from both Lake Manapōuri and the Mararoa River, together with above - average inflows from tributaries downstream of the MLC.

Twelve periphyton surveys were carried out during the monitoring season, between 9 January and 28 May 2026. Overall, SCI in the Lower Waiau River was at green status for an estimated 61% of the time (above average), amber status for 19% of the time (about average), and red status for 20% of the time (below average). Two supplementary flow releases were undertaken, together with one augmented natural flow event. Proactive supplementary flow releases were considered at times but did not occur for different reasons. The season unfolded as follows:

- Following a prolonged lake spill from late September 2025 to early January 2026 and a second spill during January (which delayed the commencement of monitoring), the first five surveys (9 January, 23 January, 5 February, 17 February and 3 March) returned green status. Periphyton development was unusually slow at all sites, with the field team noting very little growth through January and early February. By the survey on 3 March, SCI had increased substantially at Excelsior and Monowai, but the river remained at green status.
- Based on increasing SCI and suitable lake levels, planning proceeded for a supplementary flow release. A pre-release survey on 17 March returned red status, with substantial increases in SCI across the Lower Waiau River. A supplementary flow release was undertaken on 19-20 March using a variable hydrograph (peak flow of 109 $m^3/s$, maximum 24 hour mean flow of 104 $m^3/s$, 3.46 GWh water), followed by a recreational flow release on 22 March. The post-release survey on 25 March returned amber status. SCI declined significantly at both Excelsior sites and at Clifden but increased at Monowai.
- Amber status persisted through the survey on 9 April. A second supplementary flow release was undertaken on 9-10 April using a larger variable hydrograph (peak flow of 159 $m^3/s$, maximum 24 hour mean flow of 132 $m^3/s$, 4.39 GWh water). The post-release survey on 14 April also returned amber status. SCI declined at both Excelsior sites and at Monowai but increased at Clifden where thick *Didymosphenia geminata*, (“didymo”) mats continued to develop.
- Following the 14 April survey, Meridian augmented a natural fresh in the Mararoa River by releasing additional flow from the MLC between 17 and 22 April. The combined event peaked at 103 $m^3/s$ and used 2.42 GWh of storage water. The next survey, undertaken on 30 April, returned red status. SCI increased at both Excelsior sites and at Clifden but declined at Monowai.
- Red status persisted through the final two surveys (14 and 28 May). Lake levels remained too low to enable a supplementary flow release of sufficient magnitude to meaningfully affect periphyton, and no further releases were undertaken. SCI continued to increase at Monowai and Clifden through to the end of the monitoring season.

Periphyton development during 2025/26 differed markedly from recent years. Didymo establishment was delayed at all sites, particularly at Clifden, which remained unusually bare through much of summer. From March onwards, didymo cover increased steadily and persisted through to the end of the season. Monowai and Clifden were characterised by extensive thick didymo mats later in the season, whereas the Excelsior sites supported a greater proportion of sludge, mixed mats and *didyncoleus*. High cover of nuisance *Microcoleus* did not develop at any site during 2025/26.

The supplementary flow releases were most effective at removing loosely attached sludge and some *Microcoleus*, particularly at the Excelsior sites. Established thick didymo mats were comparatively resistant to removal, especially at Monowai and Clifden. Despite being smaller than typical protocol - sized releases, the supplementary flow releases contributed to maintaining or improving river status and likely prevented further deterioration in periphyton conditions.

Comparison of the existing Excelsior site and the downstream trial site (Excelsior_New) showed that both locations supported similar nuisance periphyton communities and followed comparable seasonal development patterns. The principal difference was the much higher cover of sludge at the existing site, consistent with field observations that it is a lower - velocity habitat. Although the downstream trial site supported healthy didymo and *Microcoleus* growth, there was insufficient evidence that nuisance periphyton removal was more effective at this site, under this season's supplementary flow releases. Consequently, relocation of the Excelsior monitoring site is not recommended at this stage.

Water clarity is included in the monitoring programme under the protocol because it is an easily measured general indicator of water quality. Water clarity was generally high throughout the season and achieved the relevant proposed Southland Water and Land Plan (pSWLP) guideline values on all but one occasion. The single non-achievement occurred at Excelsior in January following the return to minimum flows at MLC after the January Lake spill. There was no evidence of persistent water clarity issues at any site during the monitoring period.

Five recommendations arise from the programme in 2025/26, including three related to the hydrographs of supplementary flows and the timing or pre-release and post-release surveys that are carried forward from previous reports:

- where feasible, continue to release supplementary flows with variable hydrographs as well as typical hydrographs so that the comparative effectiveness of different release shapes can continue to be evaluated;
- continue to make all reasonable efforts to carry out pre - release and post release surveys as close as practicable to the commencement and completion, respectively, of supplementary flow releases to reduce variability in SCI caused by different accrual times (recognising that the delays are often unavoidable);
- continue to report on supplementary flow outcomes using additional indicators alongside SCI and river status, including the types of periphyton removed and observations of sloughing, sediment mobilisation and mat condition;
- continue, when possible, to take a proactive approach to releasing supplementary flows to potentially delay periphyton growth and extend green status; and
- continue the trial of the downstream Excelsior site for at least one further monitoring season before any decision is made regarding relocation of the long - term monitoring site. Additional monitoring under a wider range of flow conditions, including one or more typical protocol - sized supplementary flow releases, if possible, would provide a stronger basis for comparison between the two locations.

## 4.4 Physical Monitoring of Doubtful Sound/Patea: 2025/26

This report presents findings from physical monitoring of near-surface waters (to a depth of 25 m) undertaken as part of the Doubtful Sound Adaptive Management Programme (AMP) for the monitoring year 1 March 2025 to 28 February 2026. The results presented in this report are intended to build on prior monitoring observations and identify any changes that may be occurring under the ongoing

operation of the Manapōuri Power Station (MPS) and following on from the Manapōuri Tailrace Amended Discharge (MTAD).

The MTAD consent was granted in 2010, changing the maximum tailrace discharge allowed into Deep Cove from 510 $m^3/s$ to 550 $m^3/s$. Prior to MTAD, the station had a 485 $m^3/s$ operational limit so that it did not exceed 510 $m^3/s$, but it now operates at a maximum set point of 550 $m^3/s$. In 2021, Meridian's consent conditions were changed, which reduced the physical monitoring from nine to two oceanographic moorings, with additional instruments for measuring temperature and salinity added at 14 m and 25 m depths. The capability of the two moorings (M1 in Milford Sound / Piopiotahi [hereafter Milford Sound] and M4 in Doubtful Sound / Patea [hereafter Doubtful Sound]) was expanded in 2019 by adding the ability to communicate some data remotely via satellite telemetry.

This report covers physical data on the low-salinity layer (LSL) collected during the monitoring year at the two oceanographic monitoring moorings and three meteorological stations. Biological monitoring was not undertaken this year, which is in line with recommendations from reviews of the monitoring programme and the findings of last year's physical report (Schattschneider and Jamieson 2025).

Key findings from the 2025/26 physical monitoring:

- Total rainfall was close to the average total for previous years at Secretary Island and Wilmot Pass (3.6 m vs 3.7 m and 5.7 m vs 5.1 m, respectively), but among the highest recorded at Milford Sound (7.8 m vs average of 6.0 m).
- Average wind speeds and the proportion of the time winds were greater than 10 km/h were slightly higher than averages to date at Secretary Island (17.2 km/h and 59.9%, respectively). Similarly at Milford Sound, mean wind speeds were slightly higher than average (8.5 km/h) and were greater than 10 km/h for 35.8% of the time, compared with an average of 31.5%.
- Total tailrace discharge volume of 11.7 $km^3$ was equal to the mean of 11.7 $km^3$ across all monitoring years (equivalent units to 109 $m^3$).
- The rate of tailrace discharge during the 2025/26 monitoring year ranged between a minimum of 99 $m^3/s$ and a maximum of 521 $m^3/s$ based on daily means, and between 74 $m^3/s$ and 536 $m^3/s$ based on half-hourly readings. The mean rate of discharge for the 2025/26 monitoring year was 372 $m^3/s$, which was close to the mean to date for all monitoring years (371 $m^3/s$).
- Daily mean discharge rate for the 2025/26 monitoring year exceeded 460 $m^3/s$ on 127 days, which is higher than the mean of 102 days across all monitoring years. The daily mean discharge rate exceeded 485 $m^3/s$ on 108 days during the monitoring year, which was substantially higher than the average of 41 days per annum for all years to date. The daily mean discharge rate exceeded 510 $m^3/s$ on 4 days during the 2025/26 monitoring year, which was lower than the average (11 days) for all years to date (after the MTAD consent was granted).
- Characteristics of the LSL in both Doubtful and Milford Sounds remained broadly within the range observed during previous monitoring years. However, the mean 28 isohaline depth in Doubtful Sound was estimated at 4.9 m in 2025/26, the highest average value. This average value should be interpreted with caution due to considerable gaps in salinity data for Doubtful Sound.
- The maximum depth of the 28 isohaline, which is most relevant to describing the maximum depth to which the LSL penetrates, was well within the range of previous years in both Milford and Doubtful Sounds.
- The disconnect between the rainfall data and the LSL indicators for both Milford and Doubtful Sounds observed in 2024/25 did not occur this year. As would be expected, above average recorded rainfall totals in Milford Sound were accompanied by slightly lower surface salinity, while

average recorded rainfall totals in Doubtful Sound were accompanied by near-average surface salinity.

- Following the marine heatwave conditions between 2022 and 2024 and the relatively cool conditions of 2024/25, mean temperatures during the 2025/26 monitoring year returned to a range comparable to that observed before 2022 in both Doubtful and Milford Sounds. However, the long-term record shows a gradual warming trend consistent with the effects of global climate change, with temperatures in recent years generally remaining higher than those observed at the beginning of the monitoring programme.

In summary, analyses of the 2025/26 physical monitoring data indicate there are no tailrace-related effects to the Doubtful Sound system beyond those that are already well documented. These findings corroborate previous reports and observations found in the long history of this monitoring programme. To date, the programme has not identified any biological or physical changes that can be attributable to the ongoing operation of the MPS, including since the completion of the second Manapōuri tailrace tunnel (2MTT) or following the increased discharge under MTAD.

The authors recommend a continuation of current physical monitoring at the M1 and M4 moorings in Milford Sound and Doubtful Sound, respectively, as well as biological monitoring of (intertidal and subtidal) core sites and intertidal transition areas every 5 years. Following these recommendations, the next biological monitoring survey would be in 2029.

It is also recommended that Meridian purchase four spare Sea-Bird 37-Inductive Mooring CT sensors (two per mooring) to help ensure that a full payload of 24 sensors can always be in place. Ideally, these instruments would be procured prior to the March 2027 refurbishment trip.

## 4.5 Littoral Macrophytes in Manapōuri Power Scheme: 3-year Consents Monitoring Baseline 2026

The littoral margins of Lakes Te Anau and Manapōuri, situated in the Fiordland National Park, support possibly the highest diversity of amphibious (turf) and aquatic plants in New Zealand. These include species that are endemic (essentially restricted) to these lakes, other nationally threatened species, and increasingly rare native plant community types. Unlike many other New Zealand lakes, the relatively low number of weed species that have established in these lakes means that the native flora has not been outcompeted and displaced. This assumes great significance on a national scale, in terms of lake flora biodiversity.

The lake levels of Lakes Te Anau and Manapōuri are controlled for the purpose of hydro-electric generation. The lake levels are operated within their natural range according to the Guidelines. Meridian are required to undertake surveys of the macrophyte community within Lakes Te Anau and Manapōuri every five years to compare with Lake Hauroko, which is not controlled for hydro-electric purposes and where the lake level fluctuates naturally. Recently, Meridian has explored options for more flexible operations and additional lake storage opportunities. Subsequent changes to the Guidelines were agreed with the Lakes Guardians and came into force on 30 May 2025 (Gazette Notice Number 2015-go2889). These changes include increased flexibility to enable more effective use of the low operating ranges of Lakes Te Anau and Manapōuri. ESNZ were engaged to provide a baseline macrophyte survey of Lakes Te Anau, Manapōuri and Hauroko applying the same methodology used previously and against which any effects of the new lake level regime could be gauged.

- Turf and aquatic plants monitoring was repeated over 21-27 March 2026. A highly diverse turf community was recorded, although species richness was lower than that recorded in 2022. Compared to 2022, the twelve-month period prior to the 2026 survey had higher-than-average

lake levels, higher annual lake level fluctuation and higher than normal monthly inter-decile ranges, all of which would be less favourable for maximum turf species richness and development.

- There were few statistically significant differences in the upper and lower elevation limit of submerged species between 2022 and 2026. Despite higher lake water levels, the median maximum depth of vegetation with cover ≥10% had increased markedly in Te Anau and Manapōuri, but not in Lake Hauroko, and absolute minimum elevation (maximum depth) increased in Te Anau and Hauroko but slightly reduced in Lake Manapōuri. These changes may indicate higher water transparency in the lakes during the last survey.
- However, over time, elevation ranges, percent occurrence and cover of the common species in the turf, tall vascular macrophyte and characean communities have remained relatively stable since the commencement of monitoring surveys in 1993, with apparent (statistically significant) migration of species up or down the profile noted between sampling occasions, but without any recognisable trend over the entire monitoring period.
- The previous 2018 and 2022 reports documented a significant decline in the native *Isoetes alpina* in Lakes Te Anau and Manapōuri. This pattern appears to be reversed in 2026, with an apparent but not statistically significant increase in elevation range, number of sites and percentage covers of this species.
- Overall, there appears to be no significant impact on the macrophyte communities from the existing management regime compared to fluctuations that are driven by climatic-influenced factors (e.g., rainfall, storm events and air temperature variations), based on the comparison with uncontrolled Lake Hauroko. Provided that lake level fluctuation and inter-decile variance regimes continue, it is likely that the highly diverse littoral vegetation of these lakes will persist in Lakes Te Anau and Manapōuri.
- Six additional vegetation profiles were selected in the 2026 survey to substitute for various sites that had been impacted by landslides or other disturbance events over the past 33 years since the monitoring programme was instigated in 1993. The inclusion of these sites in 2026 has provided the requisite number of vegetated sites to preserve the robustness of our analysis.

In summary the extensive dataset from previous surveys, augmented by additional sites, provides a robust long-term baseline to detect possible vegetation changes resulting from more frequent use of the low operating ranges. No specific recommendations for action were identified noting that understanding sensitivity to change will be enhanced by the planned three- year interval for a 12-year period.

## 4.6 Beach Changes on Lakes Manapōuri and Te Anau, January 2021 – January 2026

This report presents the results of the January 2026 survey of beach changes on Lakes Manapōuri and Te Anau and is a continuation of the 5-yearly monitoring programme required by the conditions of consent to operate the Manapōuri Power Scheme in the 1996 consents and subsequent amendments. The present work compares shoreline conditions as of January 2026 with those last surveyed in January 2021. In addition, an event-driven survey has also been prepared as a result of high lake levels through September to December 2025. The fieldwork for the event-driven monitoring was carried out as part of the 5-yearly monitoring and is reported on separately in an accompanying report Moturau and Te Ana-au (Lakes Manapōuri and Te Anau) October-November 2025 High Lake Levels and Effects on Lakeshore Geomorphology (Single 2026).

Plotted beach profile surveys and photographs from the 2026 inspection are compared to data and observations collected from previous monitoring and used in assessing the change since 2021. The

condition of the shore geomorphology was also considered in the context of the longer record of beach changes on the lakes and inspections undertaken since 1988.

The results for Lake Manapōuri show that:

- Inter-survey change over the last five years is overall of a similar magnitude and range to previous survey intervals.
- Between 2021 and 2026 there were eight sites that eroded and eight sites that accreted. Volume change was greatest at Fraser's Beach (M14) because of sediment loss across the mid-foreshore and the upper limit of wave run-up. The largest amounts of deposition occurred at Ruby Bay south (M12) and Bullins Beach (M3). Change at both sites was mainly due deposition across the upper foreshore.
- In the long term, the most dynamic beaches continue to be those exposed to the greatest wave energy (Frasers Beach and Ruby Bay), while beaches with nearby sources of sediment such as Calm Bay (M8), or have a nearshore source of sediment such as Bullins, George (M4) and Monument (M5) exhibit long-term accretion.
- For the 2021 to 2026 intersurvey period, there was no systemic pattern to the type of shore change with regard to sediment type or beach aspect to wave approach.

The results for Lake Te Anau show that:

- Inter-survey change over the last five years continues to be varied, with some sites showing very little change and some showing large increases in sediment volume.
- Over the long-term, most sites show accretion with sites close to or downdrift of the Upukerora River showing the greatest increase in beach volume. Shores exposed to high-energy waves have lost sediment.
- Sediment movement within pocket beach compartments continue to show large fluctuations in sediment volume across the monitored profiles or along the shore and don't necessarily indicate a change in beach character. However, the state of the overall beach area is sensitive to changes in sediment input from local streams due to steep offshore slopes preventing onshore sediment transport from deeper parts of the active profile.
- The beaches of Lake Te Anau are generally well-supplied by sediment and dynamically adjust to changes in the wave environment and lake level without exhibiting any adverse effects to the shore geomorphology at a systemic spatial or long-term temporal extent.

Changes along the southern shore of the Waiau River from Lake Manapōuri to Pearl Harbour appear to result from the recent high lake levels and subsequent higher velocity river flows, trees toppling from the top of the cliff face and erosion processes resulting from terrestrial slope processes such as water flows over and within the slope. Vegetation growth along the base of the cliff has resulted in stability at the water line for most of the shore.

The beaches of the two lakes remain dynamic and show responses consistent with those expected in the lacustrine process environment. The most noticeable changes between 2021 and 2026 are the effects of the high-water level event of late 2025. However, there are no adverse changes in the lakeshore geomorphology that can be attributed to the Power Scheme operation as this event was exceptional in duration and coincided with high-energy wave events. As with changes observed after the 2019 high level event, the measured effects are not considered to be adverse in the long-term.

The operation of the Manapōuri Power Station in accordance with the Guidelines continues to be effective in maintaining beach naturalness.

No specific recommendations for action were identified.

## 4.7 High Lake Levels and Effects on Lakeshore Geomorphology, Lakes Manapōuri and Te Anau, October-November 2025

Major rainfall in the spring and early summer of 2025 resulted in high lake levels in Lakes Manapōuri and Te Anau. The high lake levels resulted in departures from the Guidelines requirements set out for maximum durations in the high operating ranges.

Surveys and inspection of the beach and shoreline monitoring sites of Lakes Te Anau and Manapōuri were carried out between 3-6 January 2026. Survey sites and methods of measurement and inspection were consistent with previous five-yearly monitoring surveys and other annual inspections. All historic profiles were surveyed and photographed.

- The most noticeable geomorphological effects were concentrated on north-facing shores on Lake Te Anau, and west-facing shores on Lake Manapōuri. Minor effects included gravel movement on the beaches of Lake Te Anau resulting in accretion of the crest of the beach around Patience Bay, Te Anau, and sand movement in both on- and off-shore directions on the upper foreshore of sandy beach sites on both lakes, with deposition above the limit of vegetation.
- Erosion presented as a hazard adjacent to the Te Anau Yacht Club and Marakura Wharf and in Lake Manapōuri, along Frasers Beach Road. Erosion at the Te Anau Yacht Club caused about 4 m retreat of the backshore and about 1 m of the edge of the access road to the wharf. The erosion along Frasers Beach Road exacerbated old erosion scarps and caused retreat of the backshore to the road edge in a number of discrete pockets along a 200 m stretch of the shore.
- Both erosion hazards required remediation of the backshore. By 3 January 2026, rocks had been placed as a revetment alongside the wharf access road and erosion to the west of the Yacht Club building had been infilled with gravel. Erosion scallops along Frasers Beach Road had also been infilled with gravel as had a section of the beach and picnic area access road at the northern end of Frasers Beach. It is not known who carried out this work.
- Along the cliff shore opposite Pearl Harbour, at the outlet from Lake Manapōuri, there was erosion of the talus sediments along sections of the base of the erosional cliff. This was most prevalent where there was no protection afforded by vegetation at the water level. Erosion of these cliffs results as a combination of terrestrial slope development processes such as overloading by vegetation and groundwater flows along with removal of material from the base of the cliff by flows of the Waiau River.
- The road protection along Frasers Beach Road is likely to require further maintenance and may require bolstering with rock placed at the base of the backshore slope and/or planting of vegetation to dissipate the energy of breaking waves and swash that may occur at levels within the top part of the operating range.
- The effects of the 2025 high water level event were similar in character but of a greater magnitude than after the December 2019 event due to the coincidence of high-energy waves when the lake levels were near the event maximum. The effects were similar to those observed from the long duration high level event of October/November 1988.
- The effects on the shore geomorphology are not out of natural character for this level event as evidenced by erosion and depositional shore geomorphology features in the backshore around both lakes that predate the control of the lake levels.

No specific recommendations for action were identified.

### 4.8 Upper Waiau Peg Line Survey 2026

AECOM was engaged by Meridian to assess riverbank erosion at two peg line monitoring sites on the Upper Waiau River (Rainbow Reach and Village Pond) following a flow event exceeding 800 $m^3/s$ that occurred between 23 October and 1 November 2025. This event-triggered survey was undertaken in accordance with the Manapōuri Power Scheme consent conditions. Survey data was collected by WSP Opus on 17–18 December 2025.

- Bank retreat rates observed over the 2023–2025 monitoring period are within historic trends and do not represent a departure from long-term erosion patterns (1983–2025) at either site.
- At Rainbow Reach, overall bank retreat since 2023 has been low, with a mean retreat rate of 0.11 m/yr, considerably below the long-term average of 0.58 m/yr. Retreat is concentrated in the upstream zone, where the mean rate was 0.27 m/yr, with pegs 305 and 306 recording the highest individual rates (1.33 and 0.40 m/yr respectively). The active upstream zone has extended downstream since the 2023 assessment, with the zone boundary migrating from between pegs 304–305 to peg 308, consistent with the downstream migration of active erosion on the outside of the riverbend associated with ongoing geomorphic adjustment following the Balloon Loop cutoff. Bank steepening in the upstream zone has been observed, and continued slope adjustment and top-of-bank retreat are expected as the profile progresses toward a stable gradient. The downstream zone remains stable, with a mean retreat rate of 0.0 m/yr since 2023.
- At Village Pond, bank retreat has also been low, with an overall mean rate of 0.06 m/yr since 2023, less than half the long-term average of 0.24 m/yr. The upstream migration of the erosion zone boundary continues, with a step increase in retreat observed as the boundary passes individual pegs, a pattern consistent with historic trends at this site.
- Migration of the active area of erosion on the outside of meander bends is a natural process and expected to change over time, in particular as this reach is currently adjusting to the Balloon loop cut off. This process was occurring prior to the operation of the Manapōuri Power Scheme.
- Flows >800 $m^3/s$ trigger a survey to enable the magnitude of erosion to be monitored, implying that elevated erosion may result from flows of this discharge. No significant response in bank retreat was observed at Village Pond or Rainbow Reach during the 2023-2025 monitoring period despite the occurrence of flows exceeding this threshold. There is no geomorphic evidence to suggest that flow regimes since flow was regulated have changed erosional trends over and above those that were occurring prior to regulation. There is no visible response to changes to bank retreat related to >800 cumecs flow, which is consistent with historic trends.

No specific recommendations for action were identified.

# 5 Additional Eel Work

### 5.1 Elver Stocking and Monitoring Strategy

The Elver Stocking and Monitoring Strategy (September 2026) has been developed in accordance with Method 2.12 of the Migrant Eel Mitigation Plan (2023-2031) within the broader Migrant Eel Mitigation Programme for the Waiau Catchment.

The Elver Stocking and Monitoring Strategy is intended to support the long-term sustainability of longfin eel populations within the Waiau catchment. To achieve this, the strategy comprises a single fundamental goal to **Maintain the abundance, biomass, age structure, distribution, and reproductive output of longfin eel populations within the Waiau catchment.**

This is supported by a series of intermediate objectives required to achieve the fundamental goal.

- restore recruitment of longfin eels to suitable habitats upstream of the MLC
- maximise the survival of elvers during capture, transport, and release
- promote dispersal of transferred elvers throughout suitable habitats
- align stocking locations and stocking densities with habitat availability and carrying capacity
- maximise the contribution of stocked habitats to future silver eel production and escapement
- reduce key uncertainties through targeted monitoring, evaluation, and adaptive management.

These goals define the desired outcomes of the programme and provide the basis for the strategy design, monitoring, evaluation, and adaptive management. The strategy includes a conceptual adaptive management pathway which addresses the sequence of biological processes required for transferred elvers to contribute to the long-term sustainability of longfin eels within the Waiau catchment.

Operational improvements recommended for the next 1-3 years are:

- Re - establish stocking across existing release sites (Year 1)
- Review elver collection and transport SOPs (Year 1)
- Assess opportunities to expand the release network (Year 1)
- Prioritise release sites based on ecological and operational benefit (Year 1-2)
- Implement an expanded and adaptive stocking strategy (Years 2-3)

Operational Improvements are supported by recommendations for

- Short-term monitoring priorities (Years 2-3) and
- Long-term evaluation of programme effectiveness (Years 3–10+)

## 5.2 Optimising Migrant Eel Fishing Effort

Longfin eel migration timing varies among years and can be influenced by environmental conditions, periodic evaluation is needed to ensure trapping remains appropriately targeted and that opportunities to improve capture efficiency are identified through adaptive management.

Following discussions at the 2025 Waiau Eel Working Group and WWP meetings, Meridian undertook to investigate if there was value in increasing the number of net nights for migrant eel capture over the December / January period when CPUE has been highest in recent years.

In 2026 Meridian commissioned ESNZ to assess the MPS trap-and-transfer programme for migrant longfin eels to determine whether:

- The current trapping season adequately captures the onset of migration, and whether advancing the start date could increase the number of migrants captured and transferred downstream; and
- Trapping effort, measured as net nights, could be redistributed to better align with the seasonal distribution of eel migration.

15 years of catch and effort data including daily catch records from 2009/10 to 2025/26 were analysed after being standardised as CPUE to account for the increase in trapping effort since 2009/10. A summary of key findings and recommendations that Meridian proposes to trial in the 2026/27 season are presented here.

**Key findings**

*Trapping start date*

- To assess whether there had been changes in migration timing over the 2009/10 to 2025/26 time period, catch rates were compared within a common period (10 December to 30 April).

- The results confirmed previous observations of a significant shift towards earlier migration, with the median migration date advancing by approximately 30 days, from 15 February (2009/10) to 19 January (2025/26).
- In response to this change, the deployment start date has been brought forward in recent seasons, and the current analysis using available data, suggests that the current earlier start date of 1 November is now capturing the leading edge of the migration distribution.

*Trapping end date*

- A similar shift was observed in the end-of-season trigger date, defined in the Migrant Eel Mitigation Plan (2023-2031) as the first date after 15 April when catches decline to ≤10 eels per day. This date has advanced by about 25 days, from 21 May to 23 April, indicating that the overall migration season now occurs earlier in the year.
- There is no strong basis for advancing the 15 April minimum cessation date. First, the recent mean end-of-season trigger date is 23 April, which remains later than 15 April. This indicates that the fixed minimum date is not yet constraining the end of trapping; instead, the season continues to close in response to observed declines in catch rates. Second, some seasons show a secondary migration peak later in the season, which may have ecological importance, including possible differences in migration timing among sex or size classes. Advancing the minimum cessation date could therefore increase the risk of ending trapping before this later component of migration is captured. It is recommended retaining the current 15 April minimum cessation date.

*Trapping effort over the season*

- Trapping effort is currently spread relatively evenly throughout the season, except for the nets out exclusion period over Christmas (pink line, Figure 10). While this provides consistent coverage, it is not closely aligned with periods of highest migration activity (blue dots, Figure 10) and may not maximise migrant captures.
- The exact distribution of trapping effort should remain flexible but align more closely with the periods of elevated CPUE and the seasonal migration curve that have been observed in recent years.

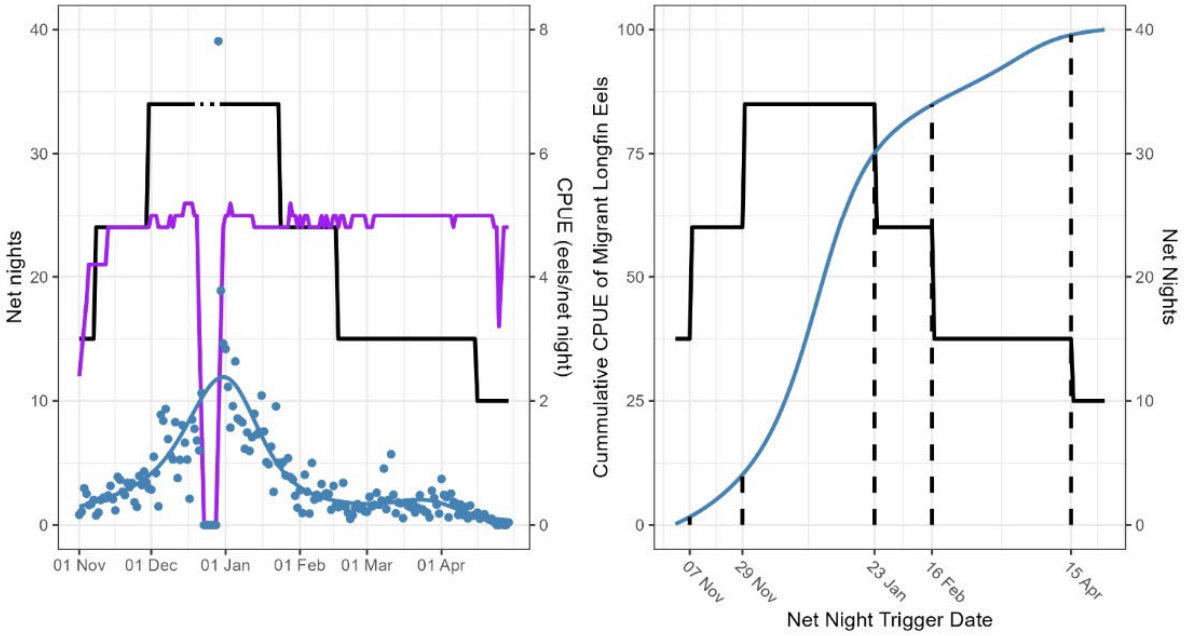



***Figure 10*** *Proposed seasonal distribution of trapping effort (black line), with steps based on the migration trigger points listed in Table 1. (Left) The purple line shows the maximum daily number of nets deployed during the 2023/24 to 2025/26 seasons. The blue line shows modelled CPUE of migrating longfin eels from a model fitted to mean daily CPUE values (blue points) from the same period. Successive days with zero catches in the pink line and dashes in the black line correspond to the Christmas holiday break. (Right) A cumulative frequency of estimated catches from the 2023/24 to 2025/26 seasons (blue line) was used to calculate the trigger dates (dashed lines) proposed in Table 1.*

Guidance was provided by ESNZ for the 2026/27 season based on average catch patterns from the 2023/24–2025/26 seasons. Meridian will seek to implement the following to test its practicability noting that within-season adjustments may depart from this schedule (e.g., a nets-out exclusion period over Christmas will be maintained to avoid clashes with the public; and 24 nets may be maintained later in the season if the contractor observes that CPUE indicates continued high migration activity).

***Table 1*** *Effort allocation framework for the 2026/27 migrant longfin eel trap and-transfer season.*

| **Trigger Date** | **Target number of nets** | **Based on average catch patterns from the 2023/24 – 2025/26 seasons** |
|---|---|---|
| 1 November (start) | 15-24 | Fixed start date |
| 7 November | 24 | 7-day effort ramp up |
| 29 November | 36 | ~10% of total seasonal catch |
| 23 January | 24 | ~75% of total seasonal catch |
| 16 February | 10-24 | ~85% of total seasonal catch |
| 15 April | 10-24 | Minimum trigger date |
| Stop condition | | The first date after 15 April when catches decline to ≤10 eels per day (equivalent to 5% of peak CPUE based on historical data). |

Additional recommendations to improve catch data consistency and allow for a better understanding of any spatiotemporal CPUE differences during the capture season.

- Begin trapping at consistent historical sites from the ~50-site pool.
- Record the specific location for every net set
- Maintain same fishing spots throughout the season even as more nets are deployed.
- Maintain more than 24 nets throughout January/February if CPUE remains high
- Only scale down during February/April as observed CPUE declines.

*Next Steps*

- In 2026/27 Meridian will trial the net night targets based on expected and observed CPUE
- Based on the outcomes of that trial, in the five-yearly review of the MEMPRG, Meridian will consider reviewing methods to provide for:
    - replacement of absolute catch thresholds with CPUE-based thresholds and to ensure trapping effort remains aligned with long-term changes in migration patterns.
    - future annual reviews of the trap and transfer programme to evaluate CPUE thresholds and deployment timing, using the mean daily CPUE from the previous three years to guide effort distribution.

## 5.3 Elver Transfer Trailer

We are pleased to confirm that construction of a new elver transfer trailer was completed earlier this year led by Invercargill engineering firm E-Type Engineering with the trailer supplied by Lochiel Engineering. Rhys Ferguson from the elver team provided valuable design oversight throughout the process. The new elver tank trailer features:

- A twin-tank design and internal baffle reducing water movement (and hence stress on elver) during transport and increasing ease of splitting up distribution of large catches to different release sites.
- 20 metres of hose stored in trailer under tanks to reduce need for manual transfer (using buckets) from tanks to the water at release sites.
- Separate washdown tank with own hose (with solar-powered pump) to flush the last elver in the tank into the main hose water at release sites.
- Many other subtle but important design features to improve elver wellbeing, and ease of use by elver team.
- Space to fit an oxygenator in future if needed.

Since construction, the new elver transfer trailer has been registered, warranted and road-tested by the elver team. Please give the elver team a friendly wave when you see them out and about with the new trailer during the upcoming 2026/27 elver trap and transfer season!



***Figure 11*** *Pictures of the new Meridian elver transfer trailer*

# 6 Microcoleus in the Lower Waiau River

At the 2025 WWP meeting, following the presentation of the results of the 2024/25 nuisance periphyton monitoring season, a discussion point focused on how effective the current flushing protocol was for the nuisance cyanobacterium *Microcoleus* and whether SCI is a good measure for *Microcoleous*. Meridian undertook to look at whether a smaller flushing flow might successfully remove *Microcoleus* if it has built up but there are insufficient lake levels to provide a flow designed to remove didymo.

In 2026 Meridian commissioned an analysis from ESNZ. The primary objective of the analysis was to better understand the status of *Microcoleus* in the Lower Waiau River compared to other Southland rivers and, in particular, the influence of high flows on reduction in *Microcoleus* cover. A secondary objective was to develop, if possible, recommendations for managing *Microcoleus* in the Lower Waiau River using supplementary flows as a complement to the existing protocol for managing nuisance periphyton (primarily dominated by didymo) in the river.

Analyses with the following aims were used to assist in developing recommendations:

1. To compare *Microcoleus* cover over time in the Lower Waiau River with that that observed in other Southland rivers.

2. To examine relationships between *Microcoleus* cover and river flows in the Lower Waiau River.

Periphyton data were obtained from two monitoring programmes. The first was ES's State of the Environment monthly monitoring programme, which included 27 periphyton sites across Southland with sufficient cyanobacteria cover for analysis, including four sites on the Lower Waiau River (ES dataset). The second was a Meridian-funded programme, based on a fortnightly monitoring schedule between November and May, undertaken at three Lower Waiau River sites to meet consent conditions for the MPS (Meridian dataset).

Periphyton data were collected using similar visual assessment methods in the two programmes, but with differing periphyton categories. ES has categories for "cyanobacteria" and "didymo" while Meridian records "*Microcoleus*" cover and measures a standing crop index (SCI), which represents both the extent and the thickness of periphyton mats (predominantly didymo when SCI is high).

**Temporal patterns (including seasonality) in Microcoleus/cyanobacteria cover**

Key findings in the comparison were:

- Seasonal patterns in *Microcoleus* cover (reported by ES as cyanobacteria but referred to as *Microcoleus* in both datasets in this summary, for clarity) in the Lower Waiau River differ from patterns in many monitored river sites in the rest of Southland in that highest cover tends to occur in spring and summer in the Lower Waiau River rather than primarily in autumn (although not at Clifden).
- Seasonal differences in *Microcoleus* cover between the Lower Waiau River and broader Southland sites may be linked to differences in sources of river flow, which can impact seasonal timing of high flows. While the source of flow was not investigated in detail (as this was out of scope), the managed flow regime in the Lower Waiau River is typically effective in reducing *Microcoleus* cover and may contribute to lower *Microcoleus* cover in the Lower Waiau River in autumn.
- Seasonal cover at nearby Lower Waiau River sites monitored by ES and Meridian were commonly similar. However, spring and summer cover at Excelsior was 3–4 times higher at the site upstream of the Excelsior tributary (ES) than at the site downstream of the tributary (Meridian). This likely reflects local habitat conditions with the upstream site more hydraulically stable and less influenced by tributary inflows.
- Although no formal trend analyses were conducted due to the short time series and often sparse data, increased *Microcoleus* cover was observed at the three Meridian sites in the Lower Waiau River and their corresponding ES sites nearby since 2017. This may relate to natural changes in community composition after the periphyton community in the Lower Waiau River was dominated by didymo in the earlier 2000s.
- At other Southland sites, high cover by *Microcoleus* (>20%) has occurred intermittently since 2014. The timing of high cover sometimes coincides across rivers, including sites on the Lower Waiau River, but with no consistent patterns.

**Relationships between *Microcoleus* cover and river flow**

Relationships between *Microcoleus* cover and selected flow metrics in Southland rivers and in the Lower Waiau River, were used to derive estimates of the sizes of flows likely to remove cover to low levels (<2%), i.e., removal flows.

The key findings were:

- The flows required for removal of *Microcoleus* cover in the Lower Waiau River were generally consistent with those at other river sites in Southland.
- Removal flows estimated from ES and Meridian data were similar at two Lower Waiau River sites, at 1.7 to 2.5 times the median flow at the nearest flow recorder. At Waiau upstream Excelsior (ES site), estimated removal flows were >3 times higher than at Excelsior (Meridian site), likely due to lower flow variability upstream of the tributary.
- Removal flows calculated for SCI in the Meridian dataset were consistently higher than those for *Microcoleus*, at 2.5 to 5.4 x median flow at the nearest flow recorder.

- In the Lower Waiau River, *Microcoleus* cover was inconsistently correlated with SCI. This indicates that flow releases specifically for *Microcoleus* could be beneficial, especially for removal of cover at Excelsior (Meridian).
- The effects of 25 supplementary flow releases provided in the Lower Waiau River since 2013 were reviewed and summarised. Most of the 16 supplementary flows released when *Microcoleus* was present at one or more sites reduced cover to <2%.
- Assessing the effectiveness of different flow release sizes was limited by survey timing, intervening flows and growth, and natural variability in periphyton condition and sloughing potential.

**Recommendations for supplementary flows**

ESNZ recommended that Meridian takes the opportunity during the last three seasons of the ten-year variable flows trial period in the existing protocol (the 2026/27, 2027/28, and 2028/29 seasons) to test the effectiveness of variable flow releases on *Microcoleus*. This testing could include both:

- Supplementary flows before *Microcoleus* reaches levels of concern, potentially using a trigger of 10% cover (lower than the Aotearoa NZ cyanobacteria guidelines national alert threshold of 20%) because blooms are already highly visible at this level and may continue to increase during the lead-in to a flow release.
- Pre-emptive supplementary flows (as trialled over the past two seasons when SCI was still green status) with a lower trigger of 2% *Microcoleus* cover, particularly in spring when *Microcoleus* can develop before other nuisance algae become abundant.

ESNZ also recommended that the minimum size for a variable supplementary flow released specifically to try to reduce *Microcoleus* cover, or to delay its development, would be **a 24-hour mean flow of 80 $m^3/s$ with a peak flow of at least 120 $m^3/s$,** measured at Waiau River at MLC.

# 7 Update on Manapōuri Lake Control Improvement Project (MLC IP)

As the WWP is aware, the MLC IP was initiated by Meridian to improve its ability to release flushing flows to the Lower Waiau River from MLC when lake levels are low. Consents authorising discharges associated with the excavation and water take activities associated with the project were granted in 2024.

Prior to works commencing, Meridian was required by consent conditions to complete a range of tasks. These tasks included (but were not limited to) establishment of monitoring systems for turbidity and deposited fine sediments also required by those consents, and completion of freshwater fisheries and erosion and sediment control management plans. In accordance with consent requirements, the WWP was sent copies of these management plans on 12 January 2026.

Site establishment activities began in early February 2026 with a site blessing. Haul roads enabling digger access to the area to be excavated were then constructed, including the installation of culverts across lacustrine channels. A temporary flood protection bund was also built around the area where the new parallel channel was to be excavated.

Parallel channel excavation works began in late February. After initially making good progress, progress slowed due to a combination of:

- A smaller-than-expected proportion of the excavated material being clean gravel, and a greater-than-expected proportion being blue clay. Blue clay is notoriously difficult to work with due to its puggy and sticky quicksand-like nature, requiring time to dry out before it can be evenly spread over the on-site spoil disposal area.
- High water levels in the Waiau Arm (as a result of high levels in Lake Manapōuri) seeping through and under the temporary flood protection bund, leading to high water levels inside the bund, exacerbating visibility issues for digger operators
- Unusually wet conditions during earthworks compounding the above difficulties.

Parallel channel works stopped on 10 August to address concerns about digger operator safety and are expected to restart mid-January (consent conditions prevent parallel channel excavation works in November/December). With 10-15 weeks of further work remaining on the channel, including excavation to the required depth along its length and removal of the plugs (“breakouts”) at each end, we are now targetting the 2027/28 season for first use of the new channel for flushing flows.



***Figure 12*** *Aerial photo taken in late July 2026 of the parallel channel excavation works in progress. MLC is at the top right hand corner.*

The WWP has asked for quantitative information on flow effects from the MLC IP consent condition requirement to deliver a positive flow within the Waiau Arm (from Lake Manapōuri towards MLC) during parallel channel excavation works. [7] In response, quantitative hydrology information about MLC flows since 18 February 2026 (when the positive flow was first initiated for this purpose) is provided in the following figure and table.

[7] "Positive flow" means a flow release from MLC to the Lower Waiau River that exceeds the flow in the Mararoa River at that time. The positive flow condition is condition 5 of consent AUTH-20233670-01.

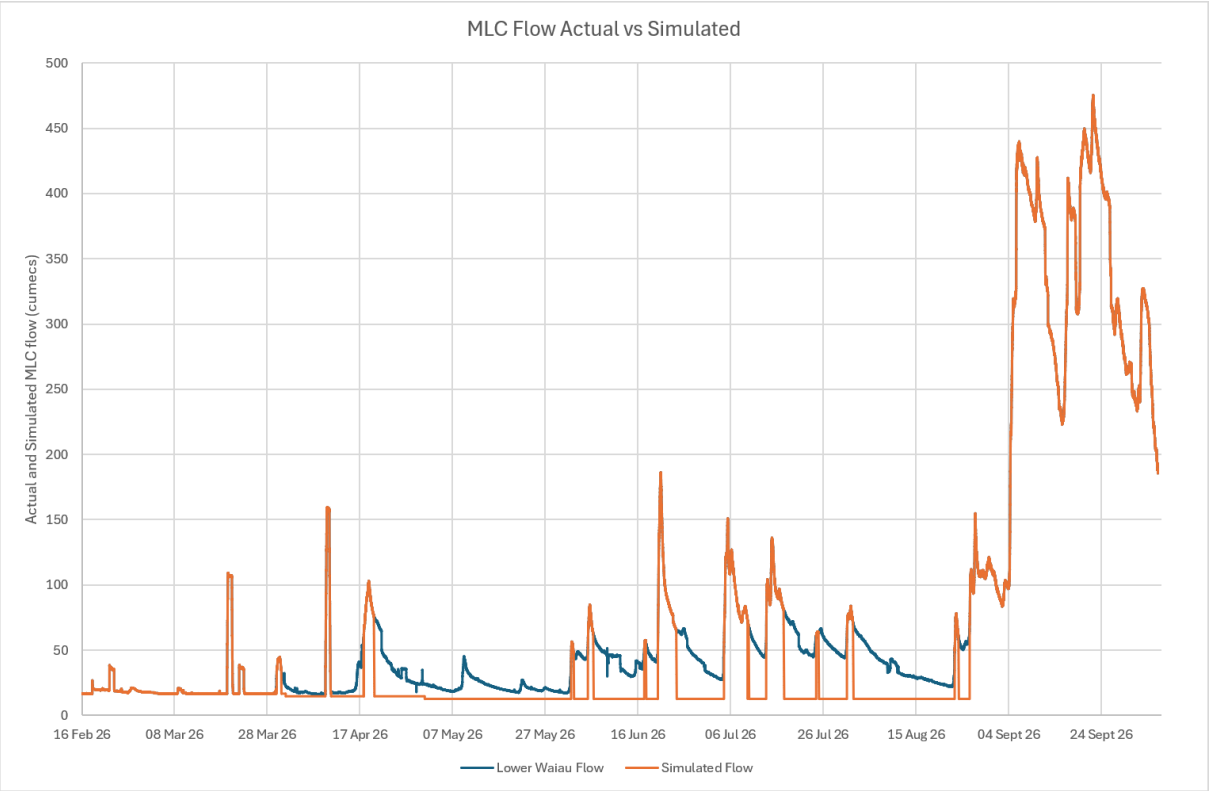



***Figure 13*** *Graph comparing the actual MLC flow release ("Lower Waiau Flow", blue line) with the flow simulated to have occurred if MLC's operation was not subject to the positive flow requirement consent condition. Where an orange line only is present, this denotes the consent condition made no difference to actual flows over that period.*

***Table 3*** *Flow statistics comparing actual MLC flows with the flow simulated to have occurred if MLC's operation was not subject to the positive flow requirement consent condition*

| | **Minimum** | **Mean** | **Maximum** | **Standard deviation** |
|---|---|---|---|---|
| ***Over the period 18 February – 1 October 2026*** | | | | |
| **Actual flow** | 15.83 | 82.18 | 475.6 | 109.37 |
| **Simulated flow** | 12.70 | 70.06 | 475.6 | 114.53 |
| ***Over the period 18 February – 31 May 2026*** | | | | |
| **Actual flow** | 15.83 | 25.49 | 159.73 | 18.71 |
| **Simulated flow** | 12.70 | 19.42 | 159.73 | 18.12 |

The WWP has also asked for qualitative information about consequential effects on the Lower Waiau River water quality and periphyton. Drawing on the findings presented in the 2025/26 Managing Nuisance Periphyton in the Lower Waiau River report ("periphyton report"), supplemented by personal communication with the author of that report (Dr Kristy Hogsden) we note that the positive flow from MLC associated with the MLC IP could have contributed to lower variability observed in water clarity at Excelsior and Monowai this season. However, as explained further below, periphyton development in the Lower Waiau River over the past monitoring season was most notably influenced by the extended lake spill and high flows from late September 2025 to early January 2026, followed by a second spill event in January (Figure 14).

The season was classed as a high flow season dominated by the high flows at the start. Mean flow at Waiau at MLC during the monitoring season was 140 $m^3/s$, more than double the long term mean of 67 $m^3/s$, and the river exceeded three times the median flow for 39% of the monitoring period (83 days), compared with a long - term average of 20% (42 days).

SCI and river status results indicated that the season was characterised by lower-than-average nuisance periphyton development despite the persistence of didymo later in the season. As described on p.7 of the periphyton report:

*Following a prolonged lake spill from late September 2025 to early January 2026 and a second spill during January the first five surveys (9 January, 23 January, 5 February, 17 February and 3 March) returned green status. Periphyton development was unusually slow at all sites, with the field team noting very little growth through January and early February.*

Most periphyton growth occurred after this period (Figure 14), and during the period of positive flows associated with the MLC IP.

In conclusion, the increase in mean flow of ~ six cumecs from 18 February 2026 to 31 May at the end of the periphyton monitoring season resulting from the positive flow requirement is unlikely to have made any meaningful difference to the development of nuisance periphyton.

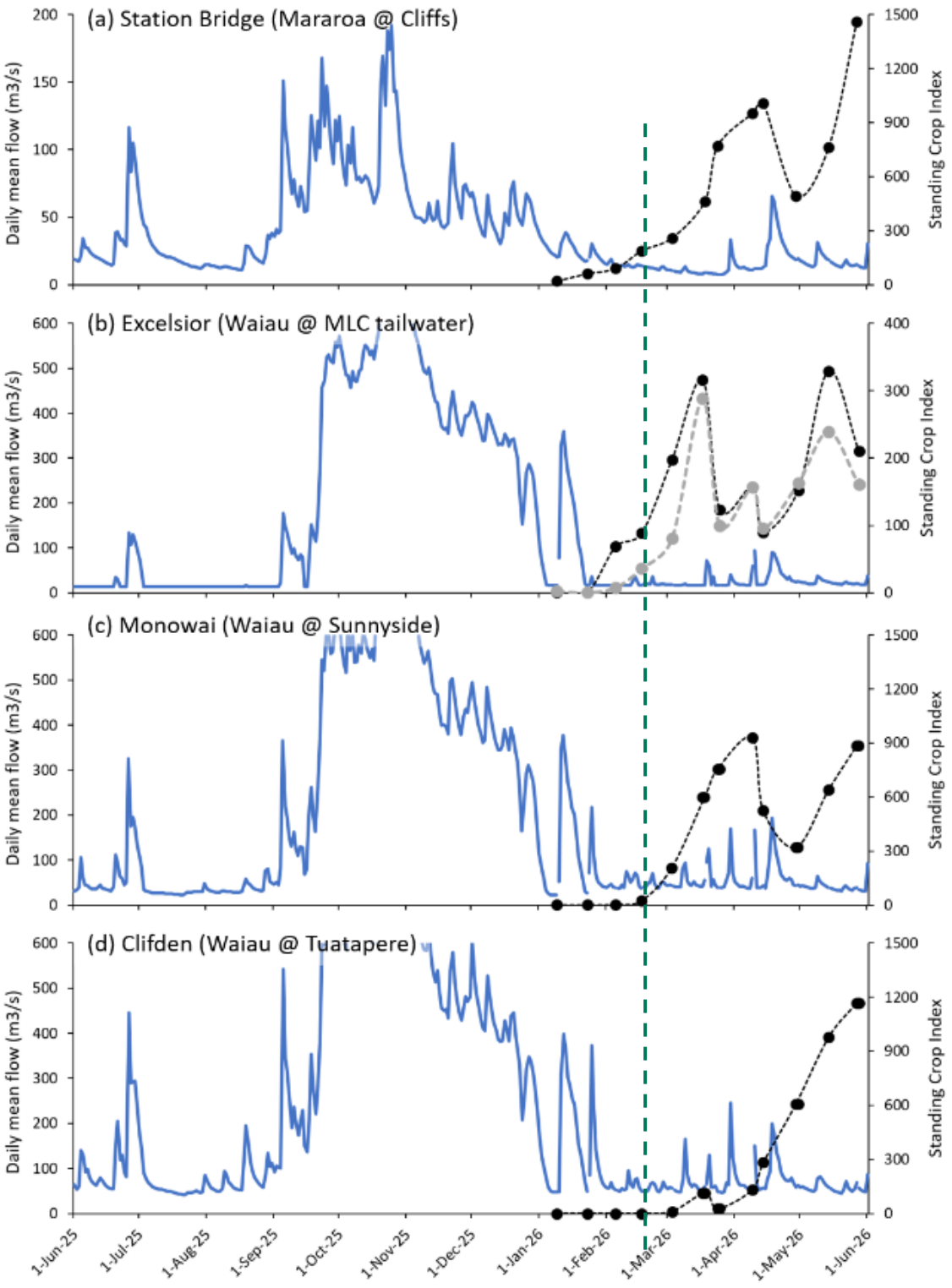



***Figure 14*** *Flow (blue lines) and SCI (black/grey dashed lines) recorded at the monitoring sites, June 2025 to June 2026. SCI data are plotted on the same scale (right hand axis) for all sites, except for the two Excelsior sites where a different y-axis is used to allow a better comparison between SCI at the original site (black) and the new site (grey). Flows are truncated at 200 $m^3/s$ (a) and 600 $m^3/s$ (b,c,d) so that the smaller flows can be seen more clearly. The vertical dashed line marks 18 February 2026.*

# 8 Update on Meridian's Resource Consents

Since the previous WWP meeting in November 2025, Meridian has been granted the following consents, or changes of conditions to current consents associated with the MPS:

- Discharge permit associated with the maintenance of existing wharves at West Arm, Lake Manapōuri and at Pearl Harbour, Waiau Arm (20252491).
- Consent to vary core operating consents 96019, 96020, 96021, 96022 and 96023. The variance was limited to targeted amendments to Appendix 1 to these consents to increase the frequency of scheduled monitoring of littoral macrophytes and shoreline vegetation from five to three yearly, as agreed with the Lakes Guardians in association with changes to the Guidelines gazetted in May 2025.

The following consent applications or changes of conditions to permits associated with the MPS have been lodged, accepted for processing and are currently in process:

- Application for a coastal permit associated with renewal of the existing Deep Cove wharf (20211640).

# 9 Upcoming Meridian Monitoring Programme 2026/27

The following field monitoring programmes associated with Meridian's core operating consents will be undertaken in the next 12 months.[8] Final reports from this monitoring programme will be available in late 2027.

| **Monitoring Programme** | **Origins** | **Timing of Monitoring** |
|---|---|---|
| Lower Waiau River Periphyton | Annual requirement of core operating consents | November 2026–May 2027 |
| Migrant Eels and Elver Trap and Transfer | Annual requirement of core operating consents | *Migrant eel:*<br>November 2026–April 2027<br>*Elver:*<br>December 2026-March 2027 |
| Waiau Arm Water Quality Reporting | Annual requirement of core operating consents | January 2027–March 2027 |
| Doubtful Sound Marine Environment Physical Monitoring | Annual requirement of core operating consents | March 2026–February 2027 |
| Shoreline Vegetation[9] | Event-driven requirement of core operating consents | Qualitative survey late 2026, quantitative survey early 2027 (dates TBC subject to lake conditions) |

[8] Assuming no events occur that would trigger requirements for additional monitoring.

[9] This monitoring is being undertaken in response to the October-November 2025 departures from the maximum durations in the Guidelines high operating ranges. The survey timing has been intentionally deferred to allow any delayed effects on woody vegetation to become evident.