

LakeSPI Assessment of 7 West Coast Lakes, 2026

Prepared for the West Coast Regional Council



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Introduction

The West Coast Region supports a large and diverse range of lakes, each varying with levels of access, use and exposure to environmental pressures. These lakes are subject to multiple stressors affecting ecological condition, including catchment land use and invasive aquatic species. Ongoing water quality, ecological and biosecurity monitoring is undertaken to assess lake conditions, meet national monitoring requirements, and inform management decisions aimed at protecting freshwater values.

To complement broader aquatic weed surveillance, the West Coast Regional Council and Department of Conservation utilise LakeSPI as a biomonitoring tool across selected West Coast Lakes. LakeSPI assessments are used to evaluate lake ecological condition and detect changes over time, with surveys repeated as frequently as every three years.

This report presents LakeSPI results alongside a brief overview of submerged vegetation in seven West Coast Lakes surveyed during February and March 2026 (Figure 1). This includes repeat surveys of Lakes Brunner, Kaniere, Ianthe, Mapourika, Paringa and Moeraki, as well as an initial LakeSPI assessment of Lake Ahaura. Recommendations for future surveys are provided based on current lake conditions, observed changes over time and identified threats.

Methods

LakeSPI has been developed as a management tool that utilises Submerged Plant Indicators (SPI) to assess the ecological condition of New Zealand lakes (Clayton & Edwards, 2006). The method is designed to be repeatable over time, enabling the monitoring of trends in lake condition, and is intended to complement other ecological assessment methods.

A more comprehensive understanding of the LakeSPI methodology can be obtained from the user manual and technical report:

https://niwa.co.nz/sites/niwa.co.nz/files/import/attachments/lakespi_report.pdf

https://niwa.co.nz/sites/niwa.co.nz/files/import/attachments/lakespi_manual.pdf

The LakeSPI method was applied to six lakes in the West Coast Region at previously selected sites, and at baseline sites in Lake Ahaura between February and March 2026 (Figure 1). The five baseline sites were selected as representative of the lake vegetation and located away from strong local influences such as streams and rivers.

At each site, scientific divers recorded native and invasive submerged vegetation characteristics along a transect extending from the maximum depth of vegetation to the shoreline, utilising a waterproof LakeSPI datasheet template (see the LakeSPI report and manual for further details).

Field observations were used to manually calculate the Native Condition, Invasive Impact, and LakeSPI indices, which were used to determine overall lake condition status. Higher Native Condition and LakeSPI Index values indicate better ecological condition, whereas higher Invasive Impact values indicate poorer condition. These results provide a baseline for future assessments and enable comparison with previous scores to assess changes over time.

To minimise the risk of inter-lake spread, all diving equipment and vessels were decontaminated between surveys, and lakes containing *Lagarosiphon major* were scheduled for survey last.

LakeSPI Interpretation

Following calculation of the indices, the LakeSPI Index score is used to assign a condition category, representing the lake's ecological status at the time of survey (Table 1).

General guidelines for detecting change over time from repeated LakeSPI assessments have been developed by Clayton and Edwards (2006). In the absence of new invasive species, the magnitude of change in the LakeSPI Index is used to assess both the significance and direction of change in lake condition, with direction inferred from shifts in submerged macrophyte composition. A change of 0–5% is interpreted as no change, >5–10% as possible change, >10–15% as probable change, and >15% as indicative of a significant change in condition.

Table 1. Lake Condition Categories based on the LakeSPI Index Score

LakeSPI Index Score	Category
> 75%	Excellent
>50% - 75%	High
>20% - 50%	Moderate
>0% - 20%	Poor
0%	Non-vegetated

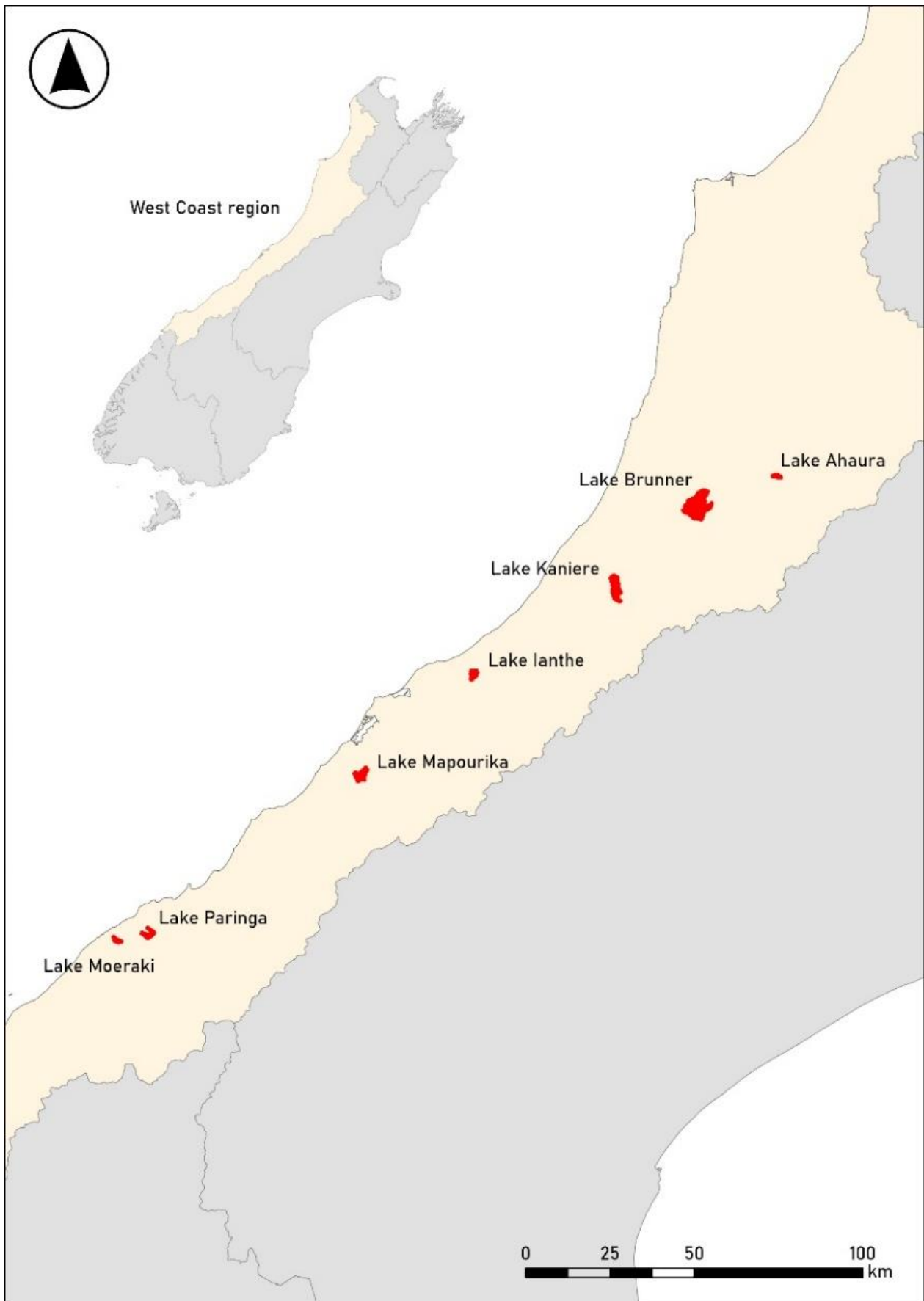


Figure 1. Map of the West Coast Region showing location of seven Lakes assessed using LakeSPI in 2026

Results and Discussion

Table 2 presents LakeSPI results for each lake, with condition categories ranging from moderate to excellent. This overview is followed by individual lake summaries describing submerged macrophyte communities and highlighting any changes identified relative to previous assessments.

Table 2. LakeSPI scores and current condition. Indices expressed as a percentage of the lake maximum potential.

Lake	Max Lake Depth (m)	Condition	LakeSPI Index (%)	Native Condition (%)	Invasive Impact (%)
Ahaura	33m	High	59.2	36.6	7.4
Brunner	109	Moderate	41.2	46.7	63.7
Iveagh/Cashmere	197	Moderate	37	40.6	65.9
Kaniere	197	High	54	52.7	38.5
Ianthe	28	Moderate	44.8	46.7	52.6
Mapourika	77	Moderate	42.4	46.7	55.6
Paringa	52	Moderate	38.4	40.7	62.2
Moeraki	41.5	Moderate	30.4	31.3	71.9

*When interpreting LakeSPI results, natural limiting factors – particularly maximum lake depth – are considered, as deeper lakes generally support more diverse and extensive submerged plant communities. For dystrophic lakes further refinement of LakeSPI scores may be possible when additional data on water clarity and photic depth are available.

Lake Ahaura

In 2026, Lake Ahaura was assessed as being in high ecological condition, with a LakeSPI Index of 59% (Table 2). A Native Condition Index of 37% reflects the dominance of native milfoils, pondweeds, *Isoetes*, and several turfing species. The Invasive Impact Index of 7% indicates a limited influence of invasive species.

Overall, native macrophyte vegetation extended to a maximum depth of 2.5 m, consistent with light limitation associated with the lake's dystrophic conditions. Charophytes were recorded at only one site, while bryophytes were common, further reflecting these environmental constraints. Site A supported very limited submerged vegetation and was characterised by a benthic algal mat. Freshwater mussels, eels, and bullies were also observed within the lake.

Juncus bulbosus was the only invasive species observed during the survey and was present at two LakeSPI sites (C and D), reaching 1m tall, but <10% coverage. Within the eastern embayment, it was observed around the shallow littoral margin (Figure 2). The current LakeSPI assessment suggests *J. bulbosus* has a minor influence on native submerged vegetation.

Previous surveys of Lake Ahaura are limited to one to two vegetation transects undertaken in 2004 (Champion and Clayton, 2004), during which only indigenous vegetation was recorded; however, this dataset was not used for comparison due to its limited spatial coverage and data availability.

Environmental DNA (eDNA) sampling conducted at the Lake Ahaura outlet during this survey also detected the presence of *Utricularia* sp.; however, no underwater survey was undertaken at this location to verify the detection. *Utricularia geminiscapa* has been recorded as a minor component in other surveyed West Coast lakes.

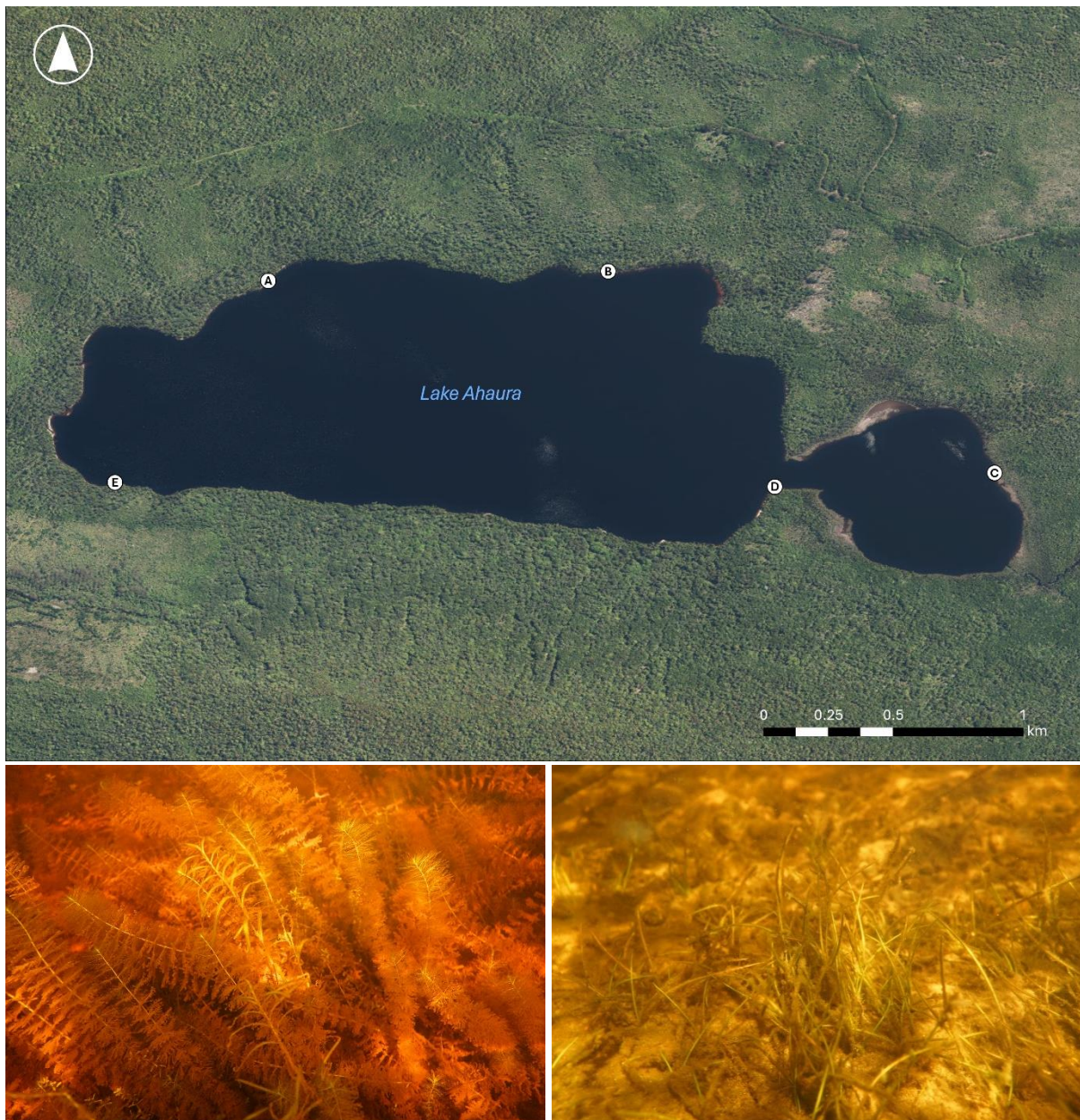


Figure 2. LakeSPI sites in Lake Ahaura 2026 and images of native submerged vegetation observed in the lake.

Lake Brunner

Lake Brunner was assessed as two separate water bodies: the main basin and the Iveagh/Cashmere Arm, consistent with the 2009 LakeSPI assessment (de Winton et al., 2009). A total of 11 sites were surveyed, with some adjustments made to site locations within the main basin (Figure 3). The condition of Lake Brunner (excluding the Iveagh Arm) remains moderate, with a LakeSPI Index of 41.2% (Table 3). The Native Condition Index (46.7%) shows little change from previous surveys, while the Invasive Impact Index (63.7%) reflects the continued dominance of *Elodea canadensis*, which has been established in the lake since 1961. Overall, these results indicate that lake conditions have remained stable over time.

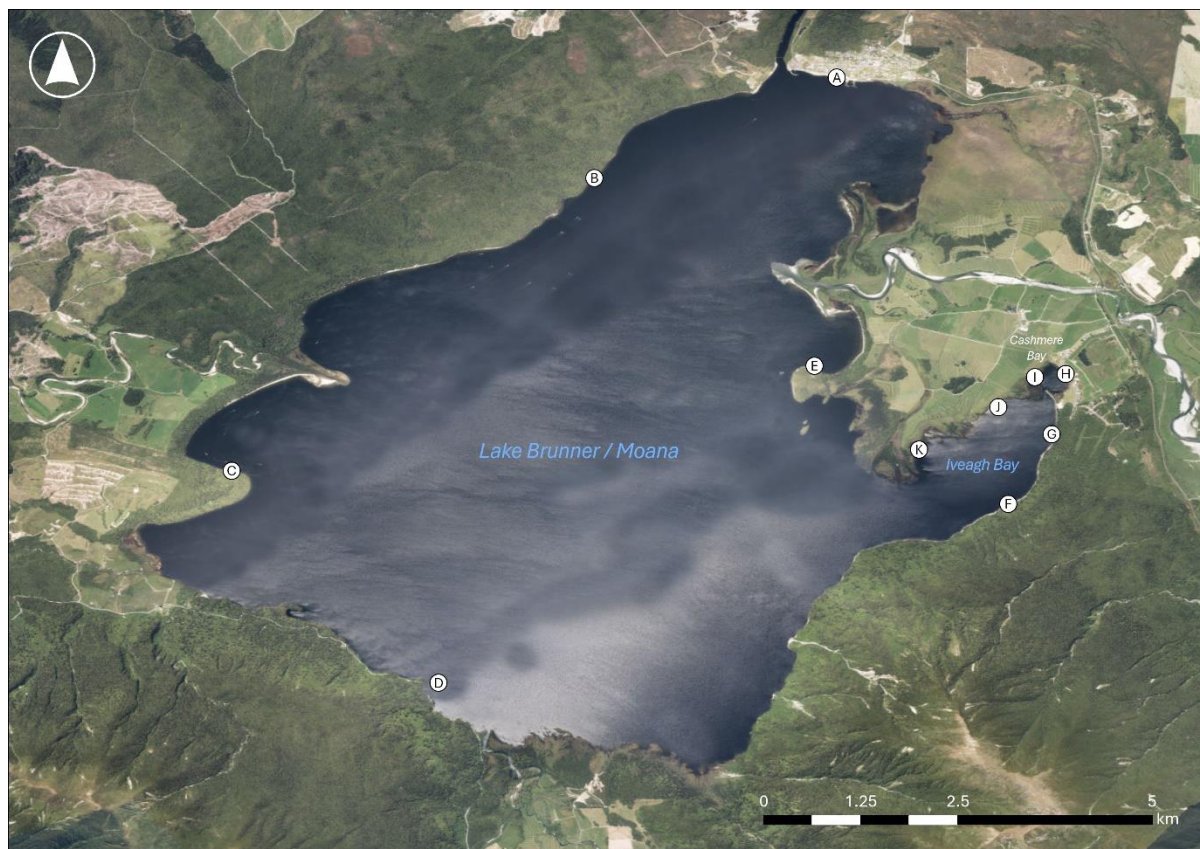
Table 3. Historic and current LakeSPI results for the main body of Lake Brunner. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
*2002	Moderate	41.2	44.7	60.7
*2009	Moderate	42	48	59.3
2026	Moderate	41.2	46.7	63.7

*Alterations were made to recent LakeSPI site locations and do not strictly correspond with previous surveys.

A diverse native plant community was present including charophyte meadows, milfoils, pondweeds, *Isoetes*, turfing communities and emergent species. While *E. canadensis* dominated the mid-depth zone across large areas at some sites, native pondweeds and milfoils persisted within these stands. A diverse turf community also characterised the shallow margins. The maximum depth of native vegetation was shallower than recorded in previous surveys; however, this may reflect lake level fluctuations and differences in some site locations. Notably, native charophytes and pondweeds extended past the vegetation extent of *E. canadensis* (>10% cover) at most sites.

Invasive species recorded at LakeSPI sites during the current survey included *E. canadensis* and *Potamogeton crispus*, the latter comprising only a minor component of the overall vegetation (Figure 3). *Elodea canadensis* formed a closed canopy and dominated macrophyte cover at most sites.



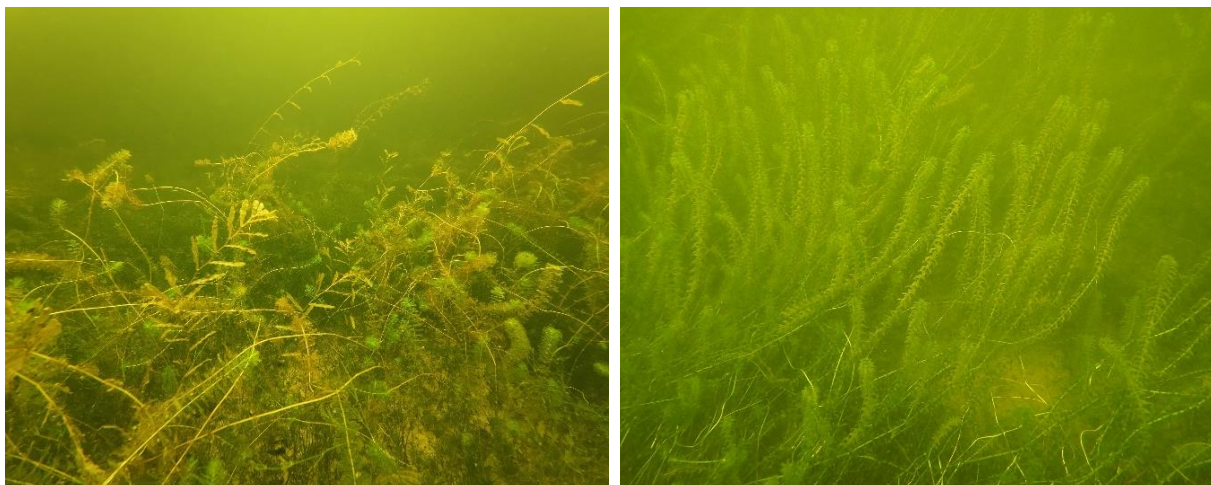


Figure 3 LakeSPI sites in Lake Brunner (A-E) and Iveagh/Cashmere Bay (F-K), 2026. Bottom images show invasive *Potamogeton crispus* amongst native species (left) and dense beds of *Elodea canadensis* (right).

Iveagh/Cashmere Bay

As a semi-enclosed bay sensitive to water quality deterioration, the Iveagh/Cashmere Arm was assessed separately for this LakeSPI survey, as recommended by de Winton et al. (2009) (Table 4 and Figure 3). In 2026, the Iveagh/Cashmere Arm was in moderate condition, with a LakeSPI score of 37%, close to the threshold for indicating possible change in ecological condition (>5-10% between multiple surveys).

There was a decrease in mean LakeSPI score from 42% to 37%, suggesting a trend toward potential ecological decline; however, a paired t-test indicated no significant difference in LakeSPI site scores between 2009 and 2026 ($p=0.59$). Given the proximity of results to thresholds for potential change, increasing monitoring frequency to three years may be appropriate as a precautionary measure.

The decrease in Native Condition Index (47% to 40.6%), coupled with an increase in Invasive Impact Index (60% to 65.9%), suggests a shift in vegetation structure toward greater invasive dominance and reduced native macrophyte condition. Although overall LakeSPI condition remains stable, the directional changes in indices may represent early indicators of emerging ecological pressure within the lake system.

Elodea canadensis was the dominant invasive macrophyte species, forming dense beds and dominating vegetation at most sites. Minor occurrences of *Juncus bulbosus* and *Ludwigia palustris* were recorded as marginal species at several sites. Despite increased invasive influence relative to 2009, native turfing assemblages, *Isoetes*, milfoils, pondweeds, and charophyte meadows remain common components of the submerged vegetation community. Filamentous algal growth was also observed in localised areas.

Table 4 Historic and current LakeSPI results for Iveagh/Cashmere Bay. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
2009	Moderate	42	47	60
2026	Moderate	37	40.6	65.9

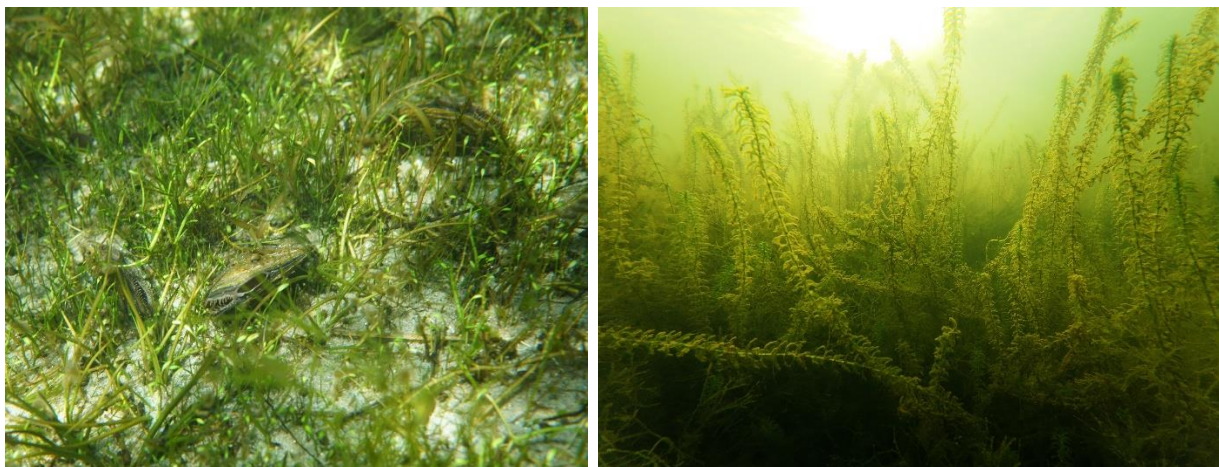


Figure 4. Native turfing species and freshwater mussels in Iveagh Bay (left) and stands of *Elodea canadensis* in Cashmere Bay (right).

Lake Kaniere

Lake Kaniere is currently categorised as being in high ecological condition, with a LakeSPI Index of 54% (Table 5). Little change in overall lake condition has been observed since the previous assessment in 2023, suggesting the lake is currently stable. The Native Condition Index (52.7%) indicates a strong native macrophyte community, while the Invasive Impact Index (38.5%) reflects relatively limited invasive influence.

A diverse native macrophyte community was present, including turfing and emergent species, charophyte meadows, *Isoetes*, milfoils and pondweeds. Charophyte meadows extended beyond the depth distribution of *E. canadensis* at all sites, and native vegetation dominated overall macrophyte coverage across all sites. Aside from one site where *J. bulbosus* was more prevalent, *E. canadensis* was the dominant invasive species observed. Introduced *Perca fluviatilis* (European Perch) were frequently observed during the LakeSPI assessment.

eDNA analyses detected *Nymphaea* sp. (water lilies) in samples collected at Hans Bay. *Nymphaea alba* has previously been recorded in Lake Kaniere (Champion and Clayton, 2004), although it was not observed during routine biosecurity surveillance or the LakeSPI assessment.

Table 5 Historic and current LakeSPI results for Lake Kaniere. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
2023	High	53.2	51.3	39.3
2026	High	54	52.7	38.5



Figure 5. LakeSPI sites in Lake Kaniere, 2026.

Lake lanthe

Lake lanthe remains in moderate ecological condition, with a LakeSPI Index of 44.8%, indicating little change from the previous assessment (Table 6). The Invasive Impact Index (52.6%) reflects the continued presence and extent of *Lagarosiphon major* (Figure 6). A diverse native macrophyte community persists, with a Native Condition Index of 46.7%.

Site-specific variation was evident between assessments. At Sites A and B (located near the main boat ramp and eastern roadside), native vegetation exhibited increased depth extent, while invasive species (>10% cover) were restricted to shallower depths, potentially reflecting the influence of management interventions such as herbicide application. In contrast, Sites C, D and E exhibited greater invasive impact, characterised by denser stands, increased depth extent and higher proportional cover of *L. major*. While control measures may be demonstrating site-specific benefits, *L. major* remains widely distributed and has the potential to exert greater invasive impact in the future. A small amount of *Utricularia* sp. was recorded at site A, growing among native macrophyte vegetation.

Table 6. Historic and current LakeSPI results for Lake lanthe. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
2023*	Moderate	44	44.7	50.4
2026	Moderate	44.8	46.7	52.6

*2023 scores recalculated to align with a 32m maximum lake depth measure

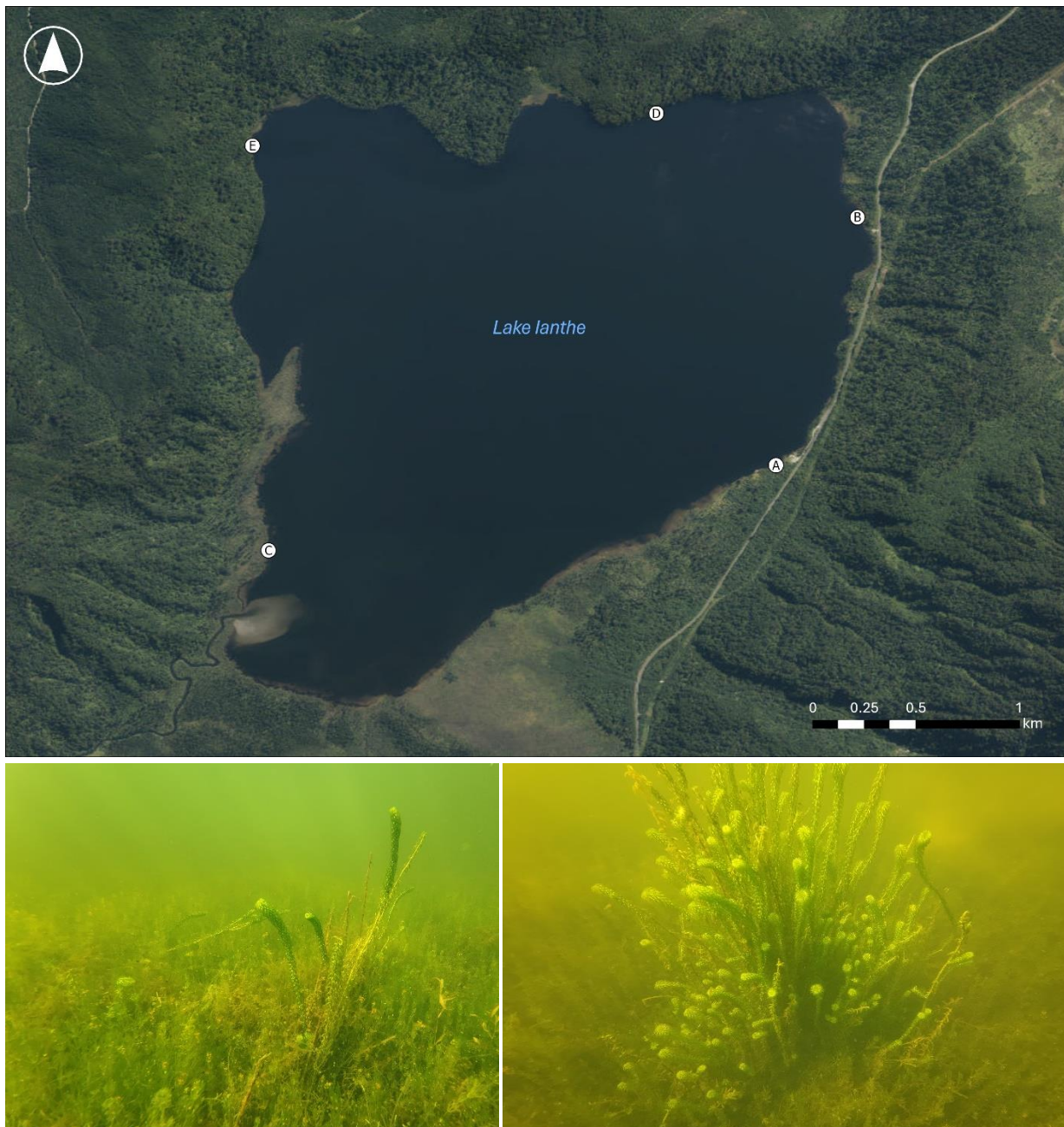


Figure 6. LakeSPI sites in Lake lanthe, 2026 (top). Invasive Lagarosiphon major surrounded by native charophytes (bottom left) and larger patches of Lagarosiphon observed at LakeSPI sites (bottom right).

Lake Mapourika

Lake Mapourika remained in moderate ecological condition in 2026, with a LakeSPI score of 42.4%, an Invasive Impact Index of 55.6% and a Native Condition Index of 46.7% (Table 7).

LakeSPI scores increased across all sites between 2023 and 2026; however, this change remained within the 0-5% threshold typically interpreted as no significant change in condition.

A diverse native macrophyte community dominated vegetation cover, with native condition increasing slightly across all sites. All native vegetation groups were represented and extended beyond the depth distribution of *E. canadensis*. Some substrate scouring was observed at site B, which may have contributed to a localised reduction in invasive impact. Aside from dense bands of *E. canadensis* present at all sites, minor occurrences of introduced *J. bulbosus* and *L. palustris*

were also recorded. High abundances of freshwater mussels and eels were also noted during the survey.

Table 7. Historic and current LakeSPI results for Lake Mapourika. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
2023	Moderate	37.6	43.3	58.5
2026	Moderate	42.4	46.7	55.6

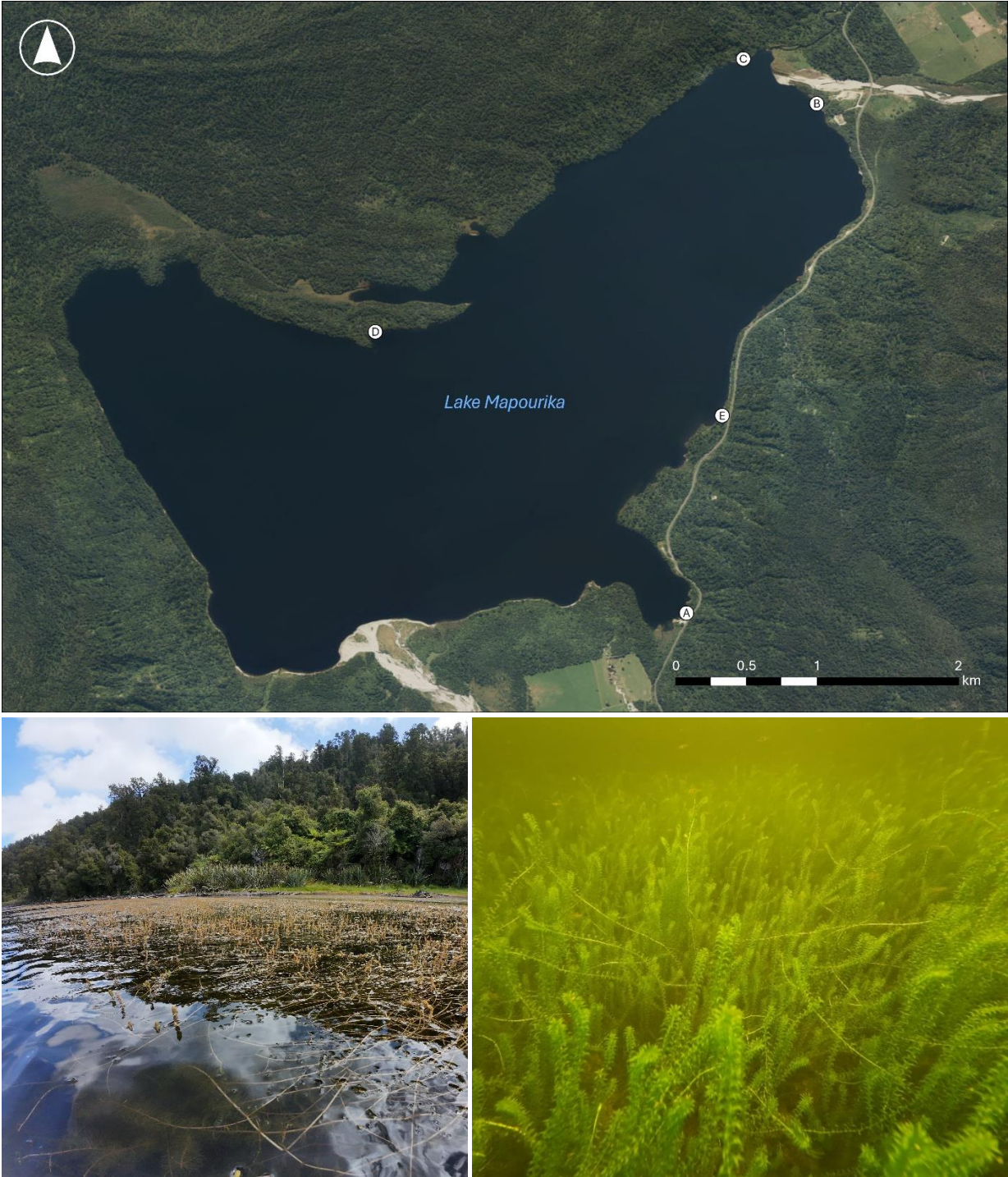


Figure 7. LakeSPI sites in Lake Mapourika (top). Emerging native milfoils (bottom left) and dense *Elodea canadensis* stands (bottom right).

Lake Paringa

Lake Paringa remained in moderate ecological condition in 2026, with a LakeSPI Index of 38.4%, increasing from 32.4% in the previous survey (Table 8). This improvement was accompanied by an increase in Native Condition Index (40.7% to 36.7%) and a reduction in Invasive Impact Index (62.2% to 71.1%). While the magnitude of change (>5-10%) suggests potential improvement in condition, these changes are likely influenced by targeted herbicide spraying at selected sites. This highlights the effectiveness of management interventions and their role in limiting further spread to other water bodies.

Lagarosiphon major remained dominant, contributing the greatest proportion of macrophyte cover at three sites. *Elodea canadensis* and *J. bulbosus* were also recorded as minor components. Although the Invasive Impact Index remains relatively high, the substantial reduction compared to 2023 is largely attributable to Site A, where weed management has been concentrated. At this site, *L. major* previously comprised 76–95% of vegetation cover and has since declined to <5%. Management at Sites A and B (main boat ramp and lodge) also corresponded with increases in Native Condition, indicating recovery of native macrophyte communities following control efforts. The remaining sites showed little to no change compared to previous assessments.

Overall, native vegetation was diverse with all native vegetation groups represented and consistently extending beyond the depth distribution of *L. major*. These results indicate improving conditions driven by management intervention, although continued control will be required to maintain gains and reduce invasive dominance.

Table 8. Historic and current LakeSPI results for Lake Paringa. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
2023	Moderate	32.4	36.7	71.1
2026	Moderate	38.4	40.7	62.2

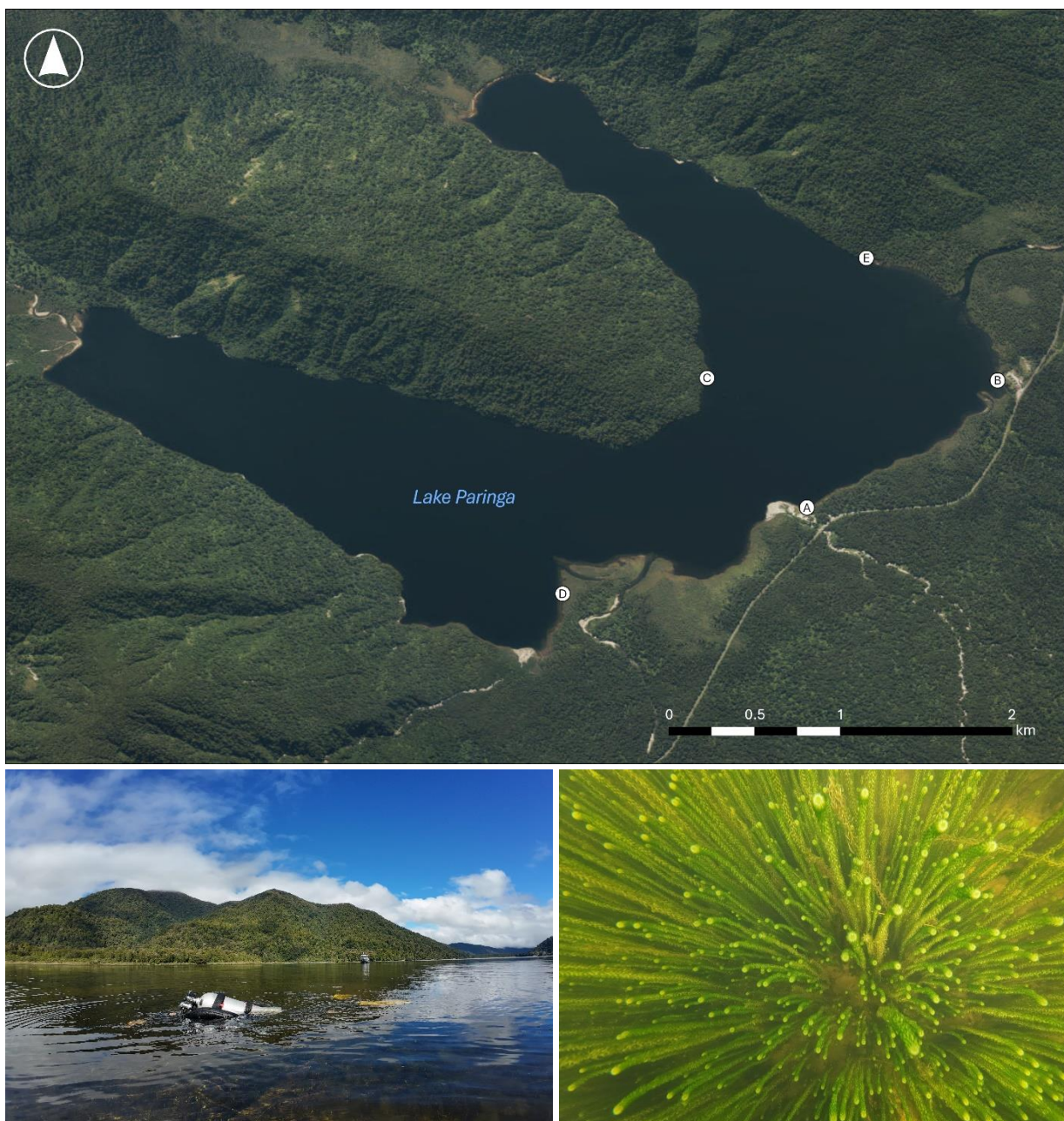


Figure 8. LakeSPI sites in Lake Paringa, 2026 (top). Diver assessing shallow submerged macrophytes (left) and birds eye view of *Lagarosiphon major* (right).

Lake Moeraki

Lake Moeraki remained in moderate ecological condition in 2026, with a LakeSPI Index of 30.4%, Native Condition of 31.3% and Invasive Impact of 71.9% (Table 9). The LakeSPI result indicates little change between surveys, suggesting a broadly stable ecological condition.

Invasive vegetation was dominated by *E. canadensis*, where it formed dense, closed-canopy stands comprising approximately 76-95% of total macrophyte cover at all sites, and in some sites extending beyond native vegetation. *Juncus bulbosus* was also present in low abundance.

Native charophytes were recorded at all sites; however, extensive charophyte meadows (>75%) were absent at several sites, indicating a reduction in the extent of this key native assemblage. Native milfoils, pondweeds, *Isoetes*, turfing and emergent species were also present. Of

particular note was a dense and extensive bed of freshwater mussels observed beyond the charophyte layer at site B (Figure 9).

Overall, Lake Moeraki represents a stable but invasive-dominated macrophyte community, characterised by persistent *E. canadensis*, which limits the full development of native macrophyte communities.

Table 9. Historic and current LakeSPI results for Lake Moeraki. LakeSPI indices expressed as a % of lake maximum potential.

Year of Survey	Condition	LakeSPI (%)	Native Condition (%)	Invasive Impact (%)
2023	Moderate	33.2	34.7	71.1
2026	Moderate	30.4	31.3	71.9

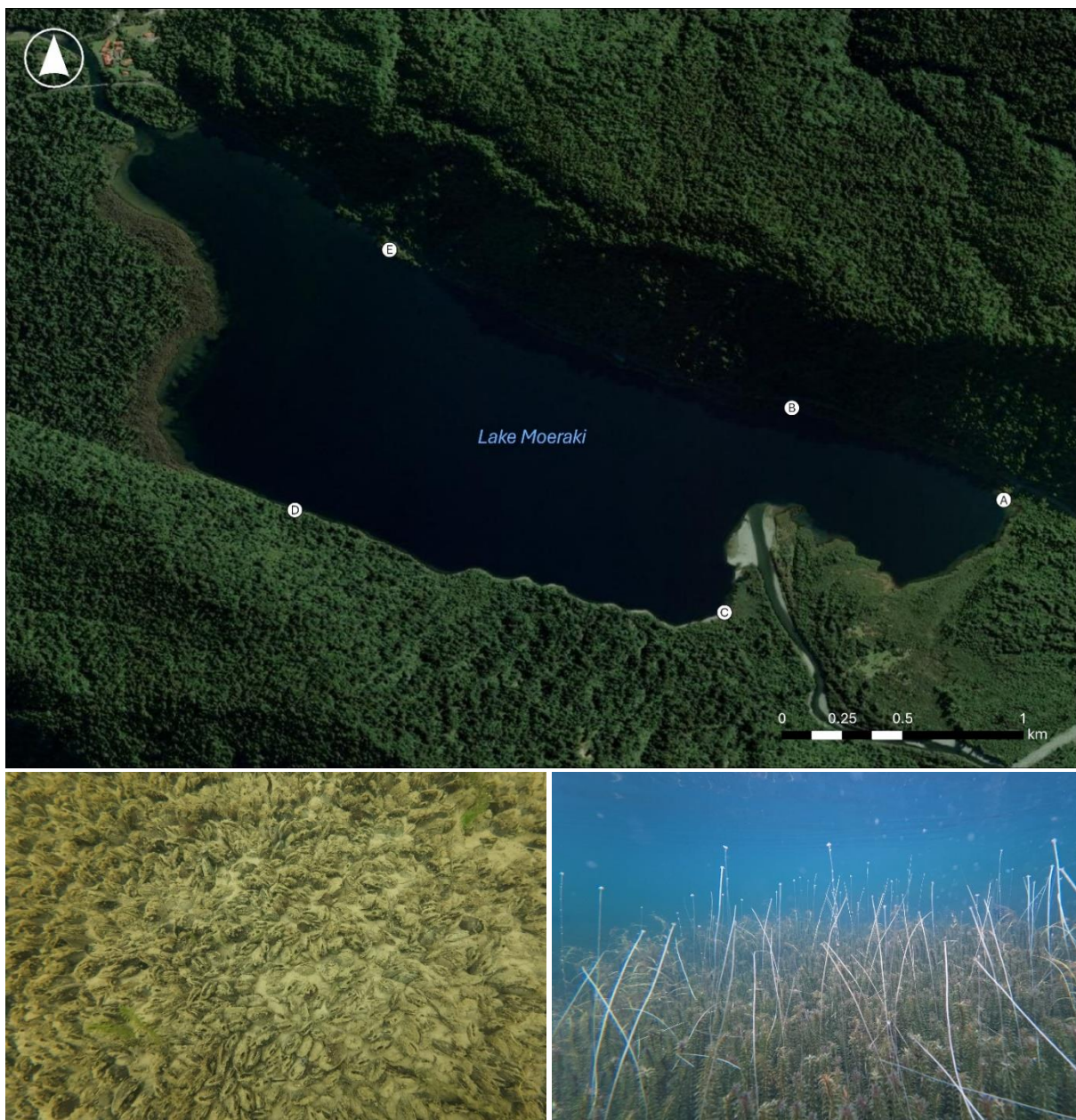


Figure 9. LakeSPI sites in Lake Moeraki, 2026 (top). Dense freshwater mussels observed below charophyte meadow (left) and flowering invasive *Elodea canadensis* (right).

Recommendations

Overall, the West Coast lakes continue to be in moderate to high ecological condition based on submerged vegetation assessments. Early detection of both new invasive weed species and the spread of existing weed species remains high priority. An integrated approach using both surveillance and LakeSPI provides a clear understanding of changes in native and invasive macrophyte communities over time.

A risk-based monitoring framework is recommended for future surveys, with more frequent surveillance and LakeSPI assessments in lakes with higher recreational use and connectivity due to their greater vulnerability to new incursions. More remote or less frequently used lakes can be monitored at longer intervals, unless new incursions are identified.

Key recommendations

- Continue targeted control of invasive *L. major*, including containment-based management where eradication is not feasible.
- Despite stable conditions in Lakes Brunner, Kaniere, Mapourika, and Moeraki, three-yearly LakeSPI assessments are recommended due to high recreational use and associated risk of new aquatic weed incursions.
- LakeSPI remains a valuable tool for monitoring lakes with established invasive submerged plants such as *L. major*, enabling assessment of management effectiveness and trends in lake condition. Continue three-yearly LakeSPI assessments for Lakes lanthe and Paringa.
- For more remote lakes where weed incursion risk is lower, 5–10 yearly LakeSPI intervals are recommended. This should be reduced following any new pest plant or fish incursions or observed changes in ecological condition.
- Continue annual surveillance of submerged vegetation as a key early detection tool, supported by eDNA monitoring, to detect new or emerging invasive species. This includes monitoring of emerging or marginal species such as *J. bulbosus*, *P. crispus*, *L. palustris*, and *U. geminiscapa*.
- Protect native macrophyte communities by minimising nutrient inputs, sediment disturbance, and shoreline modification.
- Strengthen biosecurity awareness for lake users through ongoing education, including consistent promotion of ‘Check, Clean, Dry’ practices to reduce the risk of inter-lake spread.
- Undertake baseline LakeSPI assessments in previously unsurveyed lakes to enable future detection of ecological change and improve understanding of regional lake diversity.

With specific regard to the eDNA detection of *Utricularia* sp. in Lake Ahaura:

Previous records of *U. geminiscapa* have been documented during routine surveillance across several West Coast Lakes. However, records have shown it growing with a range of indigenous species rather than displacing them, and it does not form dense, tall canopies which would greatly impact native vegetation. Continued monitoring of this species is recommended to track distribution and abundance trends; however active management is not currently warranted unless it demonstrated a shift towards dominance or begins to significantly alter submerged vegetation structure.

Utricularia geminiscapa has been recorded on the West Coast since 1975, initially from the Addison Flat area and subsequently from Westport, Shearer Swamp, Okarito Lagoon and Sponge

Swamp, where it was relatively abundant in some localities (Heenan et al., 2004). To better understand its distribution and impact, priority could be given to previously unsurveyed lakes in proximity to known occurrence sites, such as Lakes Mary and Nisson. However, management and surveillance priority should continue to focus on new incursions of high-risk invasive species in high-use lakes, such as *Lagarosiphon major*, *Egeria densa* and *Ceratophyllum demersum*.

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