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Submission to freshwaterND@mfe.govt.nz

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on behalf of
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1.0 Executive Summary

1.1 Fish & Game Submission to Package 3 National Direction, Freshwater

Fish & Game strongly supports the NPS-FM 2020 version, which aligns with our statutory obligations and priorities for managing sports fish and game bird habitat. We oppose the proposed "rebalancing" that would weaken freshwater protections and create regulatory uncertainty. Our submission emphasises that healthy ecosystems are essential for sports fish and game bird populations whilst supporting significant recreational and tourism economic benefits.

1.2 Rebalancing Freshwater Management through Multiple Objectives

Fish & Game opposes replacing the current hierarchy (Objective 2.1) with multiple, co-equal objectives. The existing hierarchy appropriately prioritises freshwater ecosystem health, which is fundamental to the well-being of species we manage and the recreational economy they support.

1.3 Problems with Multiple Objectives: Co-equal objectives would delegate critical balance decisions to regional councils, creating increased uncertainty, more appeals, lengthy delays, and higher costs. This risks undermining national coherence through regulatory inconsistency across regions and could impact organisations like Fish & Game that operate across regional boundaries.

1.4 Recommended Approach: We support flexibility in implementation timeframes and consideration of economic costs, provided ecosystem health remains the priority. Reasonable timeframes for improving water quality must be set to prevent continued degradation. Section 3.11 provides for interim targets every 10 years at most are required with a 30 year example in section 3.3. Therefore we support carrying forward the already clar timeframes from the NPS-FM2020.

1.5 Rebalancing Te Mana o te Wai

Fish & Game opposes removing or diluting the hierarchy of obligations under Te Mana o te Wai. The current framework reflects the fundamental principle that water health underpins all other values, including human and economic use.

1.6 Regulatory Impact Statement: None of the three consultation options align with the RIS recommendation to retain the NPS-FM 2020 Te Mana o te Wai

concept with clarifications. The RIS approach would address identified issues without substantially altering the existing framework.

1.7 Policy 15 Repositioning: The NPS-FM 2020 Policy 15 already clarifies that communities can provide for their wellbeing consistently with the National Policy Statement. This policy could be repositioned higher to emphasise its importance without removing the hierarchy.

1.8 National Objectives Framework Flexibility

Fish & Game opposes increased flexibility that weakens consistency and creates inefficiencies. We support retaining focus on "health and well-being" of waterbodies rather than reverting to 2017's narrower "water quality" focus.

1.9 Alternative Simplification: If change is required, we propose retaining national bottom lines whilst reducing compulsory attributes to: sediment, nutrients (nitrogen and phosphorus), microbial pathogens (E. coli), macroinvertebrates, and dissolved oxygen. This approach maintains accountability and comparability whilst reducing monitoring costs.

1.10 Scientific Basis: The Auditor-General and OECD emphasise the need for consistent, reliable environmental data and standardised national frameworks. Deviation from national standards should only be permitted where science demonstrates ecological rationale, not for economic or political expediency.

1.11 Commercial Vegetable Growing

Fish & Game conditionally supports enabling commercial vegetable growing with strict safeguards:

- No expansion in degraded or over-allocated catchments
- Integration with ecological limits and catchment capacity
- No incentivisation of large-scale water storage schemes
- Assessment of cumulative effects beyond farm boundaries

We oppose relying solely on freshwater farm plans for compliance, as effects extend beyond farm boundaries and require comprehensive cumulative assessment.

1.12 Water Storage and Security

Fish & Game supports small-scale, off-stream water storage (maximum 20,000m^3, 4m depth) for existing land use and community resilience, but opposes enabling agricultural intensification through large scale water storage.

Intensification Concerns: Many businesses will increase production to pay for storage costs, leading to higher nutrient, sediment, and microbial contamination levels. This is particularly concerning in degraded catchments.

Required Safeguards: Water storage must be limited to single users, located on the property, used only for stated purposes, with no increase in irrigated area and no change in activity character, scale, or intensity.

Environmental Flows: Storage schemes must not compromise minimum flow levels essential for trout, salmon, and game bird habitat survival. The Rangitata irrigation scheme demonstrates how poor planning can degrade key habitats and alter braided river morphology.

1.16 Wetland Provisions

Fish & Game supports differentiating between constructed and natural wetlands whilst maintaining strong protections for natural wetlands.

Wetland Construction: We support the definition of wetland construction as "artificially engineered areas that mimic wetland functions where one did not previously exist" and new permitted activity standards for wetland construction.

Natural Wetland Protections: We oppose removing mapping requirements by 2030 and support retaining established setbacks based on hydrological and groundwater expert recommendations. Removing setbacks because "landowners don't like them" won't improve water quality or increase wetland extent.

Monitoring Requirements: We oppose devolving wetland monitoring to councils without national standards. Consistent monitoring protocols are essential for national data aggregation, international reporting obligations, and effective protection of remaining wetlands.

1.17 Fish Passage Regulations

Fish & Game supports simplifying information requirements whilst maintaining essential protections. We oppose removing water velocity conditions due to their strong relationship with fish passage capability.

Culvert Length Concerns: Nothing in proposals addresses culvert length, potentially permitting very long culverts as permitted activities. We recommend maximum 5-metre length limits for permitted activity status.

Undesirable Species: As managers of sports fish, we seek stronger legislative voice for advocating fish passage for species we manage, including both salmonid and coarse fish species.

1.18 Synthetic Nitrogen Fertiliser Standards

Fish & Game argues the current 190kg N/Ha/year cap is too high, constraining only 9% of dairy farms. We recommend:

- Reducing the standard to 120kg N/Ha/year for half of dairy farms that are not irrigated; a consenting pathway is needed for irrigated farms in degraded catchments.
- Implementing soil-specific input controls
- Using fertiliser company sales data per catchment with robust environmental monitoring
- Applying non-complying resource consents with sinking lid nitrogen limits in degraded catchments

1.19 Economic Benefits and Climate Change

Angling Economics: Freshwater angling contributes $66.2-81.2 million annually to GDP, supporting 952-1,168 jobs nationwide and generating $10.6-13.0 million in GST revenue.

Climate Impacts: Fish & Game commissioned research shows nine native species face extinction risk under severe climate change, with brown trout ranges reducing by 30-40% and rainbow trout by 17-24%. Marine ecosystem decline affects salmon populations, with spawning down 31-68% across indicator rivers.

2.0 Rebalancing Freshwater Management through multiple objectives

2.1 Fish & Game supports the version of the National Policy Statement for Freshwater Management (NPS-FM) notified in 2020. The values and priorities within this 2020 version align best with our priorities and statutory obligations.

2.2 Fish & Game supports reforming the NPS-FM after the new resource management system is in place. It is inefficient to implement the freshwater reform package before the resource management reforms. The NPS-FM will need to give effect to the Resource Management Act replacement; therefore, it is logical to finalise the higher-order document before reforming National Policy Statements.

2.3 Fish & Game have provided comments and recommendations below in the event that the amendments to the NPS-FM proceed as proposed.

2.4 Fish & Game are opposed to replacing the current hierarchy (Objective 2.1) with multiple, co-equal objectives.

2.5 The proposed rebalancing involves introducing a new objective to the NPS-FM that is based on the wording of the 2017 version. The new objective would direct councils to *safeguard the life-supporting capacity of freshwater and the health of people and communities, while enabling communities to provide for their social, cultural and economic well-being, including productive economic opportunities.*

2.6 This objective would not operate as a hierarchy. Councils would be required to consider all matters equally. This leaves decision-makers to decide the balance between multiple equal objectives, which will lead to increased uncertainty, more appeals, and ultimately, lengthy delays and higher costs. The proposed changes to the objectives of the NPS-FM risk greater inefficiencies in freshwater management.

2.7 Multiple objectives also risk undermining national coherence by creating regulatory inconsistency across regions. When more discretion is delegated to regional decision-makers, the scope of interpretation and application expands. This could impact the comparability of freshwater

management systems across regions and increase ambiguity for organisations, such as Fish & Game, that operate across regional council boundaries.

2.8 The existing hierarchy under Objective 2.1 aligns with the mandate Fish & Game hold to safeguard habitats by appropriately prioritising freshwater ecosystem health. Healthy ecosystems are essential for the well-being of sport fish and game bird populations. These ecosystems support a significant portion of the recreational and tourism economy, subsequently providing for economic and social values.

2.9 Fish & Game supports flexibility in implementation timeframes and consideration of economic costs, provided ecosystem health remains the priority. Reasonable timeframes for improving water quality still need to be set to ensure degradation does not continue.

2.10 We recommend retaining a clear imperative for maintaining and enhancing ecosystem health in any revised objectives. This includes explicit safeguards that prevent the degradation of sports fish and game bird habitat when balancing competing objectives.

3.0 Rebalancing Te Mana o te Wai

3.1 Fish & Game are opposed to removing or diluting the hierarchy of obligations that sit under Te Mana o te Wai.

3.2 We note that none of the three options for rebalancing Te Mana o te Wai presented in the consultation document align with the recommended option in the Regulatory Impact Statement (RIS). The RIS proposed retaining the three components of the NPS-FM 2020 Te Mana o te Wai concept, with amendments to provide greater clarity and certainty about its meaning and operation.

This option would have included clarifications regarding progressive improvements, obligations of regional councils and the process of giving effect to Te Mana o te Wai. These components address the issues identified in the consultation document without substantially altering the NPS-FM 2020.

3.3 The current Te Mana o te Wai framework reflects the fundamental principle that water health underpins all other values, including human and economic use. There is no evidence that the current priorities are causing a problem. The consultation document suggests there is a misconception that freshwater environments must be 'pristine' before any other action can be taken. If this is the issue, further clarification on the current hierarchy of obligations could be the solution, as suggested in the RIS.

3.4 Policy 15 in the NPS-FM (2020 version) states: *Communities are enabled to provide for their social, economic, and cultural well-being in a way that is consistent with this National Policy Statement.*

This policy clarifies the weighting of ecosystem and community health and well-being. Policy 15 could be repositioned higher on the list of policies to emphasise its importance in understanding the hierarchy of obligations.

3.5 Removing the hierarchy of obligations, or reinterpreting it to exclude application to resource consents, undermines protections for fish habitat and public recreational access.

3.6 Fish & Game supports retaining the NPS-FM 2020 policy wording. The 2020 version's wording best reflects the statutory and advocacy objectives

of Fish & Game, as well as the priorities of tangata whenua and the wider community.

3.7 Clarity on the application of Te Mana o te Wai in resource consenting can be achieved without removing the obligation to prioritise ecosystem health and well-being.

4.0 Providing Flexibility in the National Objectives Framework

4.1 Fish and Game oppose increased flexibility that weakens consistency and creates inefficiencies in freshwater management at the regional council and national levels.

4.2 It is important to note that the policy document refers to 'water quality' when discussing changes to Policy 5. This is reflective of the equivalent policy direction in the 2017 NPS-FM.

Policy 5 in the 2020 version refers to managing the 'health and well-being' of waterbodies (including through the National Objectives Framework). Fish and Game assumes the reference to 'water quality' rather than 'health and well-being' is a drafting error and we would oppose the reversion to the 2017 wording.

We support a National Objectives Framework that focuses on the health and well-being of waterbodies. Limiting the focus of a framework to 'water quality' is reductive and does not capture aspects such as ecosystem structure, function and resilience.[1] Water quality as a standalone metric is not an adequate indication of the health of a water body.

We support retaining the existing suite of compulsory values (ecosystem health, human contact, threatened species and mahinga kai) because they represent the core values people hold for freshwater.

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[1] [1] Clapcott, J., Young, R., Sinner, J., Wilcox, M., Storey, R., Quinn, J., Daughney, C., & Canning, A. (2018). Freshwater biophysical ecosystem health framework. https://environment.govt.nz/assets/Publications/Files/freshwater-ecosystem-health-framework.pdf

4.3 The New Zealand Office of the Auditor-General (2019)[2]previously identified the need for consistent and reliable environmental data across councils. It was noted that variation in methods and reporting is a barrier to good decision-making and public trust. Without robust and consistent information across regions, it is difficult to determine whether freshwater management is effective and whether policies are yielding improved outcomes.

4.4 We support an adaptive management approach to regional freshwater management, complemented by a strong, standardised national framework. Freshwater systems are dynamic and complex. An adaptive management approach would allow regional councils and communities to respond to local conditions, emerging science, and changing pressures over time.

A successful adaptive management system would be implemented with clear and consistent national parameters to ensure transparency, comparability, and accountability across regions. A standardised framework – including core values, attributes, and bottom lines – provides the necessary baseline for measuring progress, protecting ecosystem health, and ensuring that local political or economic pressures do not compromise environmental outcomes.

The TAS Rivers report (attachment 2) states that allowing flexibility at the regional council level while reducing or removing nationally consistent attributes and bottom lines creates uncertainty and inefficiency.

Freshwater management will differ between regions, and consistent reporting at the national level will not be possible. In addition, investments to date will be lost if monitoring systems become regionally inconsistent.

We do not support the proposed changes to the NPS-FM attributes. There is no evidence that the existing national bottom lines are unsuitable for some catchments, and the policy direction on ‘naturally occurring processes’ provides sufficient place-based flexibility.

[2] Controller and Auditor General. (2019). Managing freshwater quality: Challenges for regional councils, Wellington.

4.5 However, if some change is required, we propose an alternative simplification, which would retain national bottom lines, but reduce the list of compulsory attributes to the following:

- Sediment,
- Nutrients (nitrogen and phosphorus),
- Microbial pathogens (*E. coli*),
- Macroinvertebrates, and
- Dissolved oxygen.

This list of attributes is justified in the report TAS Rivers (attachment 2). TAS recommendations for Lakes is included in attachment 3. Reducing the number of compulsory attributes would make monitoring protocols more cost-effective and would simply and efficiently define what is important for ecosystem health and human health. We consider the identified attributes to be critical for the health of sport fish.

Flexibility would be added to the NPS-FM through the voluntary attributes that regions can choose to monitor.

4.6 We oppose the proposed inclusion of economic cost as a trigger to deviate from nationally defined thresholds or detailed methods for monitoring attributes. Deviation from national standards should only be permitted where science can demonstrate an ecological rationale. Economic or political expediency is not an appropriate justification.

4.7 The OECD Environmental Performance Review (2017)[3] noted that a clear, enforceable, and consistent national framework for setting minimum water quality standards is critical for achieving environmental outcomes and reducing transaction costs. This report also highlighted New Zealand's historical over-reliance on regional discretion in freshwater management.

4.8 We acknowledge the importance of place-based flexibility; however, the proposed approach would remove key national protections and undermine comparability across regions. This contradicts established best practice in freshwater policy and poses substantial risks to the quality of New Zealand's rivers, lakes, and wetlands.

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[3] OECD (2017), OECD Environmental Performance Reviews: New Zealand 2017, OECD Environmental Performance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9789264268203-en. p. 38

The TAS Rivers report (attachment 2) states that freshwater policy needs to provide adequate guidance on how to approach monitoring. The report identifies the lack of clear guidance as the cause of monitoring complexities inefficiencies, not the attributes themselves. The discussion document fails to recognise that attributes and national bottom lines are based on the best available information and are scientifically factual. The Ecology Report states that the existing bottom lines are derived from toxicological research and do not vary between regions.

Our proposed alternative provides for place-based flexibility and retains the accountability and comparability that comes from standardised bottom lines. It would provide clear policy direction on where, when, and how to monitor attributes, which would resolve the issue of monitoring expensive and complicated highlighted in the discussion document.

4.9 The Office of the Auditor General and the OECD reports touch on best practice when developing freshwater policy:

- Standardised national indicators for key environmental parameters;
- Transparent, consistent reporting to enhance public accountability;
- Science-based thresholds that cannot be weakened without robust evidence and consultation;
- Adaptive management, but only within clearly defined ecological limits.

4.10 Fish & Game is concerned that the proposed changes to the NPS-FM could weaken protections for freshwater bodies with a high recreational value. This could be avoided by retaining national bottom lines and implementing our proposed amendments to the compulsory attributes list outlined above.

4.11 We have commissioned a report regarding MCI work. We would like to discuss this work with you in more detail in a follow up meeting. For now, we have a summary of the work in attachment 5.

5.0 Enable Commercial Vegetable Growing

5.1 Fish & Game conditionally supports enabling commercial vegetable growing. The conditions of our support include:

- Enabling expansion or intensification of commercial vegetable growing must not come at the expense of already degraded and/or over-allocated freshwater environments.
- Commercial vegetable growing should not be allowed to further degrade already degraded catchments, while other land uses such as dairying has to improve discharges and apply for resource consents for their discharges. All sectors need to reduce their diffuse discharges in degraded catchments.
- The chosen reforms must take into account ecological limits and catchment-specific capacity.

5.2 We acknowledge the national importance of food production and a secure, sustainable domestic supply of vegetables.

5.3 However, we hold concerns about the potential direct and indirect effects of enabling commercial vegetable growing – especially if this becomes a permitted activity through a NES. Our key concerns include:

- The potential incentivisation of off-stream water storage schemes (especially when evaluated in combination with the reforms proposed in Part 2.5).
- The risk of further over-allocation and freshwater environment degradation.
- Inadequate integration with national environmental limits.

5.4 We oppose any incentivisation of large-scale water storage to support the expansion or intensification of commercial vegetable growing. This type and purpose of water storage would have inappropriate impacts on environmental flows and would likely increase nutrient levels in freshwater bodies. These impacts would degrade any waterbody that is hydraulically connected (including wetlands) – reducing the quality of habitat available for sports fish and game birds.

5.5 The RIS states the well-known fact that catchments that support an existing large area of commercial vegetable growing are already fully- or over-allocated. This results in declining water quality and the prioritisation of economic outcomes over environmental outcomes. Any decision to enable or permit the establishment or expansion of commercial vegetable growing must not override existing allocation limits.

5.6 There is also a risk that enabling commercial vegetable growing would entrench the prioritisation of economic values over environmental and recreational values when it comes to water allocation decisions.

5.7 We reiterate our position above regarding the importance of national bottom lines for freshwater health. Any policy or NES that is developed to enable commercial vegetable growing must integrate national bottom lines and environmental limits.

In addition, we oppose the suggested reliance on freshwater farm plans to determine compliance with any new permitted activity standards. The effects of commercial vegetable growing extend beyond the farm boundary, and any assessment of that activity should consider cumulative effects.

5.8 We recommend including the following conditions in the proposed standards to address our concerns:

- A proposal to intensify or expand commercial vegetable growing must demonstrate how environmental flows will be maintained.
- Large-scale water storage schemes are not included as a permitted activity.
- Further abstraction on over-allocated catchments is not permitted.
- Cumulative effects must be assessed, not just farm-scale compliance.

5.9 Fish & Game supports a precautionary, catchment-specific approach to enabling commercial vegetable growing. Any new policy direction must allow local conditions to be considered and must require an assessment against national bottom lines.

6.0 Addressing water security and water storage

6.1 Fish & Game supports the idea of creating more out of stream storage to create better water security. This is a positive step so that in drought conditions cut offs can kick in and ecology in rivers can survive the low flow periods.

Water Storage Enabling Farming Intensification and Diffuse Source Discharge

6.2 However, Fish & Game is concerned that the proposed water storage will enable further intensification of farming. Agricultural intensification can result in higher levels of nutrients, sediment and microbial contamination of our rivers, lakes, wetlands and groundwater.

6.3 Fish & Game support efforts to better provide for water security, but fear that the permitted activity rule will just provide for intensification of the existing farming operations. Many businesses will want to increase production to pay for the cost of constructing the water storage structure.

6.4 Fish & Game is particularly concerned about intensification in degrading and degraded catchments as this will result in more nutrients in waterbodies that are already not providing for ecological health. Fish & Game is also concerned that water storage could enable the development of land that is not suitable for dairy farming, by enabling activity with access to stored water.

6.5 Figure 1 in the RIS states that small-scale water storage comprises off-stream storage that serves a single user for a single use type. In most regions, current permitted water storage activities have a maximum allowable volume of 20,000m^3 and a maximum wall height or water depth of 4m. Under the Building Act, a 'large dam' is defined as a dam that has a height of 4 or more metres and that holds 20,000m^3 or more of fluid. We support a maximum allowable volume of 20,000m^3 and a maximum water depth of 4m above ground being adopted to define small-scale water storage in the proposed standards.

Effective fish screens on the intake structure should also be a permitted activity conditions and be designed to return fish to the river unharmed.

6.6 We support the construction of small, off-stream water storage schemes to support existing land use and/or improve community resilience. Off-stream water storage is a way to increase community resilience if it is properly managed and is located outside of sensitive habitats and catchments.

6.7 We oppose the potential reliance on water storage schemes for land use change, intensification, or land use that would otherwise be non-viable or unsustainable in that location. The proposed standards, as drafted, leave too much scope for large-scale, profit-driven water storage that does not have a resilience imperative.

6.8 Fish & Game's primary concerns with the proposed standards include poorly understood indirect and cumulative impacts, reduced environmental flows, fish passage disruption and sedimentation. We are also concerned the proposed provisions will lead to the intensification of agricultural and horticultural land where that intensification would not have been viable without water storage.

6.9 Agricultural intensification can result in higher levels of nutrients, sediment and microbial contamination of our rivers, lakes, wetlands and groundwater. While we support efforts to better provide for water security, the proposed permitted activity rule could provide for intensification of existing farming operations. This is especially true where the cost of constructing the water facility structure could be covered by an increase in production. We are particularly committed to avoiding intensification in degrading and degraded catchments, as this will result in more nutrients entering waterbodies.

6.10 We recommend including the following conditions in the proposed standards to avoid enabling intensification of agricultural and horticultural land:

- The water storage will be used by a single user, or one farming enterprise.
- The water storage will be located on the property, or on land operated by the farming enterprise, to which it relates.
- The water within the storage scheme will only be used for its stated purpose.
- There will be no increase in the area of land to be irrigated as a result of the water storage.

- The effects of the activity should be the same or similar in character, scale and intensity as they were before the water storage was constructed.

These conditions will ensure further intensification of the land will not occur following the installation of the water storage scheme. They will also promote water security on site, which will result in less water being taken from groundwater and/or surface water at dry times of the year.

6.11 There is currently no consideration of the impact of changing from a 'run-of-river' take to a 'take for storage'. Taking water for storage expands how that water may be used and will have different environmental effects to using water that is abstracted directly from a waterbody. Environment Canterbury acknowledge these changes in Policy 4.53 of the Canterbury Land and Water Regional Plan:

Any change to a resource consent to abstract surface water for irrigation as a "run-of-river" take to a "take to storage", is subject to the following conditions to mitigate any adverse effects:

aa. imposition of reasonable use determined in accordance with Schedule 10;
a. a seasonal or annual allocation limit;
b. a maximum instantaneous rate of take;
c. if an environmental flow and allocation limit has not been set in Sections 6 to 15 a minimum flow that is required to sustain ecosystem or recreation values; and
d. if an environmental flow and allocation limit has not been set in Sections 6 to 15 any required cessation necessary to maintain flow variability and freshes in the river.

We propose standards that manage changes in the type of water take, intended use of that take and potential environmental effects are included in the provisions for small-scale water storage schemes.

6.12 Ecological impacts (including flow regimes) are not given enough consideration in the draft standards for off-stream water storage. Environmental flow needs must be explicitly considered in all water storage planning.

Environmental flows refer to the quantity, timing, and quality of water flows required to sustain freshwater ecosystems and the species that depend on them. These flows are crucial for maintaining habitat structure, regulating water temperature, facilitating sediment transport, and providing migration cues for fish species, including trout and salmon.

6.13 The absence of strong direction on environmental flow requirements in the proposed provisions presents a serious risk to the ecological health of rivers, streams, and connected wetlands. Altered flow regimes can impact ecological and recreational values, including:

- Degraded aquatic habitat quality,
- Disrupted fish passage, spawning cycles, and other life cycle cues,
- Loss of wetland function and biodiversity,
- Increased sedimentation and reduced water clarity.

6.14 The NPS-FM 2020 recognises the importance of environmental flows by requiring the setting of flow regimes and allocation limits that provide for the health and well-being of freshwater bodies (Section 3.16). This aligns with best practice guidance from Wai Good Policy, which states:

Along with the ecological flows that all species need throughout their entire life cycle to thrive, environmental flows also need to provide for other values, including recreational flow needs, flows sufficient for swimming where that is valued, wai tapu, and natural flows that reflect the personality of the individual water body.[4]

6.15 The direction in the NPS-FM 2020 reflects the OECD recommendation to strengthen environmental flow protections as a key priority, noting: *Adequate environmental flows are necessary to preserve aquatic ecosystems and avoid biodiversity loss.*[5]

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[4] Fish and Game, Forest and Bird, & Choose Clean Water. (n.d.). Environmental flows and levels; and take limits — Wai Good Policy. Retrieved June 27, 2025, from https://www.waigoodpolicy.org.nz/practice-notes/environmental-flows-and-levels

[5] OECD (2017), OECD Environmental Performance Reviews: New Zealand 2017, OECD Environmental Performance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9789264268203-en.

6.16 Without explicit requirements to assess and maintain environmental flows in all water storage planning, including off-stream schemes, there is a high risk that cumulative extraction and flow alteration will degrade the values that the NPS-FM is intended to protect.

6.17 There are a number of examples of water storage and irrigation facilities in Canterbury that need addressing in terms of their adverse environmental effects. The primary purpose of the scheme is to provide a reliable water supply for irrigation on agricultural land.

The Rangitata River demonstrates how a river can be affected by large-scale water storage when there is a lack of comprehensive flow management. Not only is the scheme degrading key habitats within the river, but NIWA research shows flood harvesting (as is undertaken in the Rangitata case) can substantially alter braided river morphology.[6]This has a direct effect on ecological and recreational values and public access.

This scheme also returns sediment laden water to the river which is detrimental for ecosystem health.

6.18 Fish & Game recommends that environmental flows be treated as a non-negotiable threshold in the design and approval of any water storage infrastructure. Storage schemes must not compromise minimum flow levels essential for the survival of trout, salmon, or game bird habitat.

6.19 We support the setting of rules for off-stream, small-scale water storage schemes at the national level. We support excluding large-scale water storage schemes from these rules.

Fishing Opportunity

6.20 As part of a mitigation package, where loss of trout habitat occurs it is reasonable that consented, larger water reservoirs provide for new trout habitat. Although our preference will be wild and scenic rivers, where water storage and other damming structures (such as hydroelectric

[6] NIWA. (n.d.). Flood-harvesting effects on braided river geomorphology | NIWA. Retrieved June 27, 2025, from https://niwa.co.nz/freshwater/flood-harvesting-effects-braided-river-geomorphology

schemes) we would like to see the continuation of negotiated consent conditions to provide for new habitat and access for angling recreation.

7.0 Simplifying the Wetlands Provisions

7.1 There is a need to differentiate between constructed wetlands that are created to reduce contaminant loads from stormwater runoff in urban areas from constructed wetlands in rural areas often providing water quality improvements to mitigate the impacts of agricultural land use.

Constructed wetlands are typically created in a location where a natural wetland would not exist, such as the middle of a flat or sloping paddock. Conversely, natural wetlands can be restored in wet gullies, around seeps or in low lying swampy land. Constructed wetlands are not subject to natural wetland rules or stock exclusion rules.

Fish & Game supports your definition of *'wetland construction' as 'an area that is artificially engineered to mimic the functions of a wetland where one did not previously exist'.* We also support the creation of a new permitted activity standard for wetland construction, as well as a consenting pathway and new objective and policy to encourage wetland construction.

We also support simplifying the wetland provisions but are cautious that proceeding without a prior notification process can result in further drainage and earthworks resulting in loss of wetlands.

We have suggested policy wording and provided this to Ministry for Environment (MfE) in the past, and this draft has been included as attachment 4. We are advocating particularly for constructed wetlands and maintenance of already constructed wetlands. Ultimately, Fish & Game promote the ecosystem services such as reduction in sediment and nitrogen loads associated with wetland maintenance, restoration and creation.

We also note that wetland construction within 100m of a natural inland wetland should be a permitted activity to make it easy for landowners to maintain, reinstate and create wetlands. We note that there has been some confusion around the status and in some cases a non-complying activity status has been used (where there is a hydrological connection to an existing natural inland wetland).

Sediment detention bunds can also be a useful tool to capture sediment from tracks and steeper paddocks and areas of exposed soil that is transported by overland flow during heavy rain. The bund must be carefully designed to avoid erosion, and accumulated sediment must be periodically removed to maintain ongoing capacity for future rainfall events. Conditions will need to include restrictions on dams and earthworks and vegetation clearance.

7.2 Induced wetlands can end up being significant in size. For them to do their job of improving water quality the setbacks (from agricultural land uses) for natural wetlands must be sufficient. We want wetland extent to increase, and to improve water quality for the habitat of the species we manage, as this has been degraded in many waterbodies. The more exclusions that are included in the natural inland wetland definition, the less water quality improvements will be achieved.

Fish & Game agree that there will be examples of induced wetlands that will come under the definition of natural wetlands even though they were unintentionally created, and if it involves a large area with significant habitat, it seems appropriate that they should be considered as natural wetlands. New Zealand has lost over 90% of its natural wetlands, and protecting newly developed wetlands, even those created unintentionally, may go some way to address those losses.

Fish & Game are most focused on the creation and maintenance of wetlands. However, by making the induced and constructed definitions wider, this will mean fewer wetlands will be considered a natural wetland with the associated setbacks and restrictions protecting those water bodies. This will ultimately reduce the ability for wetlands to do the job of improving water quality, especially if there is no riparian planting to assist with reducing sediment run off. This will result in more diffuse discharges into wetlands and a reduction in filtering ability of these wetlands.

7.3 Fish & Game wish to see it made easier to provide critical ecosystem services such as water filtration, flood control and habitat for diverse species.

We note that the ecosystem services that wetlands can provide work best when provisions are in place that provide for riparian planting and not irrigating or grazing too close to the wetland. There is existing science on

these setbacks which existing regional plan rules are based on. An example of setbacks is given below in section 7.5: the setbacks required in the Waikato Regional Plan are included.

7.4 Fish & Game request clarification of the definition of a wetland by excluding unintentionally created “induced” wetlands from the provisions.

Natural inland wetland discussion, as noted in page 6 of the RIS natural inland wetland definition;

- *remains complex to apply due to the multiple exclusions;*
- *often required costly ecological assessments to comply with the pasture exclusion (part (e));*
- *continues to capture induced wetlands and protect them stringently, which may lead to consenting burdens for development and infrastructure.*

We recommend that a land area protocol is used to differentiate between a natural and induced wetland. The land area that could be used could be 1 ha so that only significant induced wetlands are captured.

7.5 Fish & Game support removal of “pasture exclusion” from the wetland definition and instead permit farming activities that are unlikely to have an adverse effect

We note in page 6 of the RIS:

The NPS-FM 2020 and NES-F 2020 do not clearly and appropriately provide for farming activities (for example some councils have interpreted things like fencing in a wetland setback as non-complying) and wetland construction. This leads to confusion, over-regulation, and disincentivizing of beneficial environmental activities effect (such as irrigation, on-farm water storage and fencing) in and around wetlands.

We support removing “pasture exclusion” from the wetland definition, as we feel it is frequently misused, and requires significant resources to carry out the appropriate assessment. Permitting some activities near wetlands may be appropriate, however we note that irrigating a wetland may change the hydrology to an extent that values are lost. Therefore, we do not support the irrigation of wetlands. Modern spray/pivot irrigation allows for water to be turned off when passing over defined areas, such as wetlands.

This approach would not be particularly burdensome and would be a more efficient use of water.

The Waikato Regional Plan provides the following setbacks for specified activities near natural inland wetlands. More precise setbacks can be provided but would require soil drainage testing and advice from a suitably qualified expert to advise on the reduced setback from the wetland on site. These setbacks are benchmarks may remove the need to undertake this more technical work.

9.1 Activities in or near natural wetlands

Activity	Setback distance	WRP rule or NES-F reg number
Digging new drains or deepening existing drains in the vicinity of specific wetlands listed in table 3.7.7 of the *Waikato Regional Plan.*	200m	WRP 3.7.4.6
Digging new drains, or deepening existing drains in the vicinity of any other natural wetland in the Waikato region.	100m	NES-F 52-53
Any earthworks or other land disturbances (including those associated with building any new structures).	100m	NES-F 37-55
Any vegetation clearance (including that associated with building any new structures).	10m	NES-F 37-55
Taking, using, damming or diverting of any water.	100m	NES-F 37-55
The discharge of water where there is a hydrological connection to a natural wetland.	100m	NES-F 37-55

There are a few exceptions where you may be able to undertake these activities within the setback distances without a resource consent, if you are undertaking the activity for one of the following purposes:

- restoring a natural wetland, undertaking wetland maintenance or biosecurity activities
- maintaining certain existing lawfully-established structures, such as boardwalks, jetties and maimai
- continuing a previously established arable or horticultural land use.

However, undertaking activities for one of these purposes is subject to strict conditions, including the prior notification of the council for specified permitted activities (excluding arable or horticultural land use). The precise conditions that must be met depend on the activity being undertaken and the specified purpose.

We are also concerned about reducing the setback for irrigation to a wetland as this is likely to cause increased nitrogen run-off to the water body.

Page 16 of the RIS provides an example of irrigation within 100m of natural inland wetland as a non-complying activity and states that a regional benefit test is needed to be met to construct small scale on farm

water storage. The RIS says this would have “negligible” impacts on the wetland.

We do not agree that irrigation or water storage would have negligible impacts on the wetland. These rules have been established in regional plans based on recommendations from hydrological and groundwater experts. No evidence is provided in the RIS to dispute the established science. Changing the rules because landowners don’t like them isn’t going to result in improved water quality and increased wetland extent. Therefore, we support the status quo being retained, i.e. continuation of setbacks from wetlands.

It is not clear what *“permit farming activities that are unlikely to have an adverse effect”* means. Does this mean that stock will be reduced in number if the setback is reduced? Or does it mean that intensive winter grazing will not be allowed close to water bodies? Dairy farming activities in particular do have run-off effects on water bodies and urine from the cows are a key source of the problem. Therefore, when the cows are closer than the 100m to the water body, their urine runs directly into the stream increasing the nitrogen in the water. A key way to reduce this is to provide more horizontal distance to allow the land to absorb the nutrients.

7.6 Fish & Game support a more enabling permitted activity rule for constructed wetlands, particularly to create new habitat for game birds. Many of our staff in the regions have come across examples where the existing NES-F regulation has raised uncertainties and it is thought that resource consent has been required. This has put landowners off the idea of creating wetlands. We note that Environment Canterbury proposed a wetland development permitted activity rule in their Plan Change 8 proposal, and this may be a useful resource.

Fish & Game support the wetland construction definition here as consulted on: *“areas that is artificially engineered to mimic the functions of a wetlands where one did not previously exist”.*

Where permitted activity conditions cannot be met, a controlled activity class will likely be a suitable consenting pathway so, when necessary, consents cannot be refused.

Damming of water may require a more restrictive activity class such as a restricted discretionary activity, so that adverse effects on neighbouring

properties can be considered and controlled or refused where risk warrants this.

7.7 Fish & Game do not support the proposal to remove the requirements for councils to map wetlands by 2030

Page 6 of RIS "*the mapping requirements of clause 3.23 of the NPS-FM 2020 are proving difficult for some councils to implement, particularly in regions where there is extensive forest cover e.g., the West Coast where wetlands are hard to map aerially or ground truth due to accessibility".*

The West Coast is unlikely to be the region who has had the largest decrease in area, abundance, distribution and type of wetlands (for example compared to Southland). If they can't accurately map their wetlands, it is not reason to not map wetlands for the whole of New Zealand.

We note recommendation 14 of the STAG report to

Amend the national framework for freshwater management to require regional councils to:

a. identify the extent and evaluate the condition of existing wetlands;

b. prevent any further reductions in the extent of existing wetlands;

c. address the management of wetlands with reference to specified numeric attribute bands, introducing a requirement to lift the wetland condition index to at least 10 and to maintain or improve the condition of existing wetlands where the condition score is greater than 10.

No new science-based recommendations have been sought or provided. It appears that the reasoning for removing the requirements for mapping are unjustified and not based on any scientific reasoning.

Spatial planning requires location and mapping the activities you want to develop as well as the activities and values that you want to protect. Failing to do so will result in failure to protect environmental and natural values from inappropriate use and development. Therefore Fish & Game oppose the proposal to remove requirements for councils to map wetlands by 2030.

7.8 Artificial Waterbodies: the RMA definition of 'waterbody' does not include artificial watercourses such as farm drains. Therefore, only areas where wetlands have developed around a modified watercourse (and rivers and streams) are excluded from the definition and wetlands that have developed alongside constructed farm drains are included.

Fish & Game note that there are a lot of fish living in these artificial water bodies, however we agree that farm drains should be excluded from the definition of natural inland wetlands.

7.9 Fish & Game oppose devolving to Councils how they monitor wetlands. So much wetland habitat for game birds has already been lost due to inappropriate use and development that the NPS-FM2020 was set to tolerate no further loss of wetland extent. Fish & Game also promote the creation of new wetlands.

Monitoring is a critical part of protecting existing wetland extent and planning to restore future wetland areas. A spatial data inventory will need to be developed using aerial photography as a baseline for all wetlands identified in the region. This baseline can then be used to monitor changes in extent. Critically, the use of various monitoring methods across the country does not allow for data aggregation and reporting at a national level. This will be a critical data gap for MfE and others in the future (as it is currently) and does not allow NZ to contribute to international data sets (RAMSAR, CBD etc).

Likewise, a condition assessment should be undertaken 5-yearly or more regularly as needed to monitor the improvement or decline of wetland condition. Appropriate management action will then need to be implemented to meet the target attribute state of wetlands, as identified by regional plans. These recommendations and many others were covered in the STAG report 2019[7].

Failing to map and monitor wetlands and continuing to argue over how they are defined will not result in the retention of existing wetlands. NPS-FM policy requires the council to protect and restore the extent of wetlands and the values that natural inland wetlands have.

[7] Freshwater Science and Technical Advisory Group (June 2019) STAG report to the Minister for the Environment.

The Wetland Condition Index (WCI) should be included, and each region should aim to restore wetland cover to at least 20% of its original extent. Wetlands' condition should be improved to a score greater than 10 on the WCI and prevent any further reductions in the extent of existing wetlands.

Key attributes for monitoring wetlands include:

- Environmental flows and levels
- Nutrient status. Total Phosphorus and Total Nitrogen, with specific numbers within a healthy range for the specific wetland type. You will need to set nutrient outcomes in upstream waterbodies that will achieve ecosystem health in downstream wetlands as nutrient sensitive receiving environments.
- Inputs of external sediment are within a healthy range for the specific wetland type
- Vegetated riparian margins and setbacks for stock exclusion from all wetlands and their margins.
- Upstream fertiliser application limits are within a healthy range for the specific wetland type.

7.10 Case Study: Southland Wetland Destruction. Fish & Game support ELI's High Court case challenging Environment Southland for its failures to monitor and take action to protect wetlands. The ruling makes it clear that Councils need to have in place the resources to monitor and take action to protect wetlands[8]. The following summary is provided on the ELI website:

"Less than 10% of original wetlands in Aotearoa remain. Wetlands provide flood protection, habitat for important biodiversity, and store large amounts of carbon.

Half of the total loss of wetlands between 1996 and 2018 was in Southland, with 2709 hectares lost. Most were from lowlands near or adjacent to the internationally significant Awarua-Waituna wetland.

Wetlands are legally protected under the RMA, and by Environment Southland's own plan but this was not leading to protection on the ground. That's why we took Environment Southland to the High Court."

[8] Holding Environment Southland accountable on wetland loss — Environmental Law Initiative

Fish & Game is mandated to advocate for habitat protection and therefore we support the decision of the court in this example.

8.0 Simplifying the fish passage regulations

8.1 Reducing information requirements: we agree that some of the information requirements in the NES-F are unlikely to significantly inform how well a structure will provide for fish passage. For example, regulations related to the material that the structure is made of is unlikely to be particularly useful in many situations, although we note that culverts constructed with corrugated material or particularly rough materials are likely to allow for better fish passage with similar design parameters compared to smooth culverts. (see https://www.doc.govt.nz/documents/science-and-technical/culverts02.pdf). We agree that culvert shape does not have a significant impact on fish passage if installed correctly (depth/substrate etc).

We note that allowing permitted activity status for larger boxed culverts may have consequences that negatively impact fish passage, as discussed below. In this regard, we support Option 1 in the RIS (Page 2). We do not support removing conditions related to water velocity, given the strong relationship water velocity has with how easily a culvert can be passed by fish. We also note that water velocity in culverts is frequently higher than that in the contributing waterway due to the constriction of flow. In this regard, we feel it is an important determinant of how passable a culvert is.

8.2 Culvert length. Fish & Game are concerned that nothing in the proposals addresses culvert length. This would potentially mean that very long culverts would be a permitted activity. Boxed culverts in particular tend to be longer and larger. For example, the boxed culvert under the Tekapo

canal for Fork Stream is approximately 130m long. While fish can sustain burst speeds for short distances, they cannot sustain them indefinitely and may succumb to higher velocities in longer culverts. We suggest there is a need to have a permitted activity condition related to culvert length. A length of approximately 5m would allow for a one way crossing approximately 3.6m wide, with room on either side for a slope or riprap to the stream. This would allow for most rural and industry needs. Very long culverts also increase the risk of scour at the downstream end and can fragment aquatic species populations. Further, while the impact of darkness on fish passage is best described as contentious, it certainly impacts on instream primary productivity and other fish behaviour.

8.3 Temporary structures. We acknowledge that some culverts are only required for short periods, and that requiring these culverts to meet the permitted activity status for permanent structures may not achieve significant environmental gains. We agree that a timeframe of less than 60 days as a definition for a temporary structure is appropriate, and support the other conditions proposed in Option 4. Our preference would be for temporary structures to be added to the permitted pathway in the NES-F, as it would provide for greater consistency. We also recognise that fish migration timing varies across the country and we would expect DOC, Regional Councils and regional Fish and Game Councils to be able to provide more focused guidance/direction on this aspect.

8.4 Undesirable species. Fish & Game notes that section 3.26 of the NES-F allows for the prevention of fish passage for species considered undesirable. As managers of, and advocates for, sports fish in New Zealand, we frequently find ourselves needing to retroactively fight for fish passage for both salmonid and coarse fish species. We would like a stronger legislative voice to allow us to advocate for fish passage for the species we manage. Current engagement on this matter is best described as symbolic and frustrating.

9.0 Addressing remaining issues for farmer facing regulations

9.1 Stock Exclusion Regulation changes

F&G comments in Primary Sector submission attached in attachment 6 of this submission.

9.2 NES-F rules for Synthetic Nitrogen Fertiliser (N-Cap)

The existing standard allows for 190 kg of N per Ha per year. From July 2022 use of synthetic nitrogen fertiliser had to be reported. It only applied to grazed vegetation and the cap does not apply to fertilisers whose nitrogen is from biological sources such as compost, dairy effluent and chicken manure.

Fish & Game argue that the N-Cap is still set too high. This standard needs to be reduced and correlated with soil type to ensure the minimum amount of N will run off into waterbodies.

The reporting for the N cap has been very low and therefore the data has not formed a reliable source of information on N use.

Fish & Game promote the use of environmental data i.e. monitoring the receiving water bodies to show that many catchments have unacceptable levels of N contamination. The census data based on N sales has been the most useful source of data by area.

Nitrates are not only a problem for the species that we manage and the health of waterbodies generally, but high N in drinking water is also a human health issue.

Fish & Game support aligning the reporting date for dairy farms with the farming calendar; however, we note that this will not improve the percentage of farmers providing this data or reduce the N applied. If N-Cap reporting is removed, we would like to see more robust environmental monitoring datasets setup to monitor receiving waters.

Fish & Game oppose repealing the 190kg N limit and suggest that a lower, soil specific input control is used. This rule was set so high that it would in practice only constrain 9% of dairy farms synthetic N usage in New

Zealand. A further reduction to 120Kg N/Ha limit would still be sufficient for most farms.

In the second year of reporting (2022-23 season), only 50% of dairy farms reported via the portal to ECAN, or via their fertiliser companies Ballance (N reporting tool) and Ravensdown (Hawkeye). ECAN collated the national information and reported it to MfE. Of note, the information cannot be validated or reconciled. We are concerned that this self-reporting has the potential to be inaccurate by 30%.

If reporting of usage from fertiliser companies was to occur, anonymously, catchment by catchment, then this rule would still miss out small company sales (Source and Farmlands) and would not account for Synthetic N sales to Horticulture, or Non-Dairy Pastoral blocks. Therefore, catchment-based tonnage reporting for N sales by fertiliser companies would also be of no use.

The only mandatory reporting by fertiliser companies to central government is for Stats NZ reporting and that covers all land uses and regions across NZ.

9.3 Fish & Game Recommendations on N Limit Setting

Therefore, Fish & Game recommend:

- that a lower standard is set of 120kg N per Ha per year will be sufficient for non-irrigated farms which comprise approximately half of the dairy systems. A lower than 190kg N per Ha per year needs to be sought for irrigated systems, particularly in catchments degraded with N runoff.
- that fertiliser company sales (per catchment), together with receiving environment monitoring, is the best way to report on fertiliser use. We note however that many catchments have insufficient environmental monitoring programs in place to accurately capture the N loss.
- regardless of whether N-Cap reporting is removed, we would like to see more robust environmental monitoring datasets setup to monitor receiving waters.
- Freshwater Farm Plans also have the ability to review and reduce N use in a stepwise fashion over time. However, in already degraded catchments, these plans have already proven ineffective at reducing point source discharges.
- in degraded catchments we recommend the use of non-complying resource consents with consent conditions that may include a sinking lid

for N limits. Conditions should be reviewed by the catchment on a 5-yearly basis so that no further degradation occurs.

10. **Including Mapping Requirements for drinking water sources**

Fish & Game support the spatial mapping of *land areas* posing a risk to drinking water supplies. We assume you mean “land uses” rather than “land areas” in the above sentence.

We note that this mapping would not be a one-off tool for managing drinking water, as land use changes over time, and therefore the continuous updating of this mapping would be required.

If many future activities are to be permitted, and not require consent, at what time in the process would the mapping be updated? Water takes and discharges are usually added to council mapping systems when a resource consent is lodged/approved, so that other applicants can see where new and consented activities are located. This is particularly important when a setback is required, e.g. setback from existing water take to a new proposed on-site wastewater tank.

Therefore, consents should continue to be needed for on-site wastewater disposal, or at least a prior notification Permitted Activity pathway, including suitable setbacks from water bodies and the water table.

It is also important for this reason that water takes of larger volumes for human drinking is also a consented activity, so that they can be mapped and activities with adverse effects on water takes can thereby be avoided.

Fish & Game support the mapping of all three risk management areas (i.e. immediate risk of infection, microbial risk area and area with persistent contaminants).

Fish & Game are neutral on the population threshold setting (options being 500- or 100-person threshold) and will leave this matter to other submitters to discuss relevant pros and cons.

11. **Why Freshwater Farm Plan and GMP Will Not Be Enough in degraded or degrading catchments.**

Ashburton Lakes[9] notes that if the N loss standards are set too high, the resulting farm N Loss will not be sufficient. This system overly relied on an outputs control regime that used N loss limit rule as the primary lever to control nitrogen. This resulted in increased uncertainty and failed to achieve good lake outcomes. Critical decisions were devolved to farmers and their advisors. Good Management Practices failed to provide actions to stay within the limit. Outcomes should be the focus, not processes, which Farm Environmental Plans tend to be.

The report noted that "90% or more" of the drop in water quality was due to leaching and runoff of nitrogen and phosphorus from surrounding farmland. The regulations had been set too low and had resulted in the decline in the water quality in the lakes.

Improved policy was due to be delivered by December 2024 with the NPS-FM 2020 plan changes. This was supposed to set target states and resource limits. The notification of all the NPS-FM plan changes has been put on hold until the new RMA and national direction instruments are in effect. Regardless, future consenting pathways need to be able to provide councils with the ability to rapidly pivot and respond to "unexpected" environmental outcomes so that we can learn from the Ashburton Lakes example.

12. Economic Benefits of Freshwater Angling.

Fish & Game contracted NZIER to carry out research regarding the economic contribution of freshwater angling[10]. Note this work does not include the Lake Taupo Fishery, so it relates specifically to the rest of New Zealand, which Fish & Game manage.

Economic Contribution

- Angler Participation: Domestic and international anglers spend around a million days on angling trips each year.
- Expenditure (direct spending by anglers): Anglers spend between $113.0 million and $138.6 million annually on their trips. This represents the actual money spent by anglers at tackle shops, accommodation, food, transport, and other related purchases.

[9] Ministry For the Environment, A Case Study Examining Ongoing Deterioration of Water Quality in the Otuwharekai Lakes, 2023.
[10] NZIER-economic-contribution-of-freshwater-angling_Final-report_external_29112024.pdf

- Economic Output (value of supply): This spending results in $96.0 million to $117.7 million in total output. This figure is lower than expenditure because it excludes taxes and imports (e.g., imported fishing equipment). Output represents the value of goods and services produced domestically as a result of the angler spending.
- GDP Contribution (value added): Freshwater angling contributes $66.2 million to $81.2 million in total value added (GDP). This represents the economic value created after subtracting the cost of inputs used in production. It's the difference between the value of outputs and the cost of inputs, showing the true contribution to New Zealand's economy.
- Employment: The economic activity supports between 952 and 1,168 jobs nationwide.
- GST Revenue: Angling activities generate $10.6 million to $13.0 million in GST.

13. Climate Change and National Direction

Fish & Game have recently commissioned an assessment of how climate change severity may affect the end-of-century distributions of New Zealand's native and non-native freshwater fish. The findings are grim, with nine native species at risk of extinction under severe climate change, the range extent of brown trout to reduce by 30—40% and the range of rainbow trout to reduce by 17-24%. The most significant geographic change is expected in the North Island, Southward and inland range reductions: in lowland areas there is the potential for increases in warm water species, including aquatic pest species.

Therefore, reduction in climate change severity through emissions reduction is paramount. We also advocate for improving land-use practices that affect freshwater ecosystems. More information about this study can be found via the link to our website[11].

14. Climate Change, Marine Ecosystem Decline and Salmon.

The marine ecosystem is declining, and NZ's marine waters are warming 25% faster than the global average. Wild sea-run salmon populations[12] face unprecedented decline, with spawning populations down 31-68%

[11] summary-the-implications-of-climate-change.pdf

[12] North Canterbury's and Central South Island's wild sea-run populations.

across indicator rivers and harvest down 59-78% in just one year. Freshwater-based management interventions such as harvest limits and spawning stream enhancement by Fish & Game have not been able to stem the ongoing decline of salmon populations.

Salmon spend approximately two–thirds of their life in the marine environment. In 1998, NIWA was contracted by Fish & Game to investigate whether Chinook salmon run size could be predicted from annual variation in oceanographic conditions. They concluded, “It appears that salmon survival and thus run size into the Rakaia River is correlated with at least the Southern Oscillation Index, and that good and poor runs can be predicted up to two years in advance[13].

West Coast Fish & Game report “After reviewing scientific literature, historic reports, and graphing environmental data against salmon returns, there is strong evidence to suggest that ocean conditions are the lead cause of fluctuations in the salmon fishery.[14]

The following provides an overview of the multiple pressures affecting wild salmon populations:

Marine Environment Challenges:

- Unknown diet and feeding conditions at sea
- Physical and water quality conditions negatively affecting salmon
- Predation at sea contributing to population decline
- Climate change impacts on ocean productivity

Freshwater Habitat Issues:

- Water abstraction and flow modifications
- Sediment deposition in spawning streams
- Water quality degradation
- Fish passage barriers
- Habitat fragmentation

[13] Prediction of salmon runs from variability in oceanic conditions, James et al 1999. NIWA Client report: CHC99/82

1. [14] West Coast Fish & Game Salmon Management Review, B Kersten. Internal report (2023)

Harvest Pressure:

- Recreational fishing harvest rates accelerating population decline
- Commercial bycatch in marine fisheries

Case Study: Rakaia River. Even waterways with specific legal protection face degradation challenges. The Rakaia River, protected under the National Water Conservation (Rakaia River) Order 1988, has experienced[8]:

- Reductions in river flow from historical levels
- Changes in flood flow patterns with faster floodwater recessions
- Increases in fine sediment deposition
- Reduction in the number of braids
- Decreased water depths
- Changes in the Hapua area with sediment build-up and river mouth closures
- Increasing algae
- Decline in smelt, brown trout, and chinook salmon
- Adverse impacts on wildlife, particularly black-billed gulls

We await the Statutory Declaration decisions to confirm the various issues raised in that process including responsibility for upholding the WCO.

15.0 Conclusion

Fish & Game is prepared to work collaboratively with the Government and continue to discuss the new national direction packages. We are mindful that to be sustainable, development needs to be carried out within environmental limits.

15.1 Fish & Game do not agree that the proposed 're-balancing" will achieve a balance. Greater confusion and uncertainty will result. We are already concerned about the existing degradation of many of our game bird hunting and fishing sites. We are concerned that the proposed policy will result in more intensification and more degraded habitat for the species that we manage.

15.2 As follow up from this submission we would very much appreciate the opportunity to discuss attachment 2, 3 and 5 in more detail with relevant

officials at MfE and MPI. We would also like to discuss further consenting pathway for primary industry. Another key issue we would like to discuss is flow allocation.

15.3 We would also like to be invited to discussions regarding the replacement RMA legislation. We are particularly interested in the retention of provisions that provide for

- good water quality and quantity in the habitats that our species live including the habitat of trout and salmon.
- Natural values
- access to waterbodies
- Water Conservation Orders

Attachments

Attachment 1: About Fish and Game and the species that we manage
Attachment 2: Recommended TAS Rivers
Attachment 3: Recommended TAS Lakes
Attachment 4: Draft Constructed Wetlands Permitted Activity rule
Attachment 5: MCI Report highlights
Attachment 6: Copy of Primary Industry Submission
Attachment 7: Copy of Infrastructure and REG Submission

About Fish and Game

1.1 Fish and Game is the statutory manager for sports fish and game, with functions conveyed under the Conservation Act 1987. The organisation is an affiliation of 12 regional Councils and one national Council. Together, these organisations represent approx. 130,000 anglers and hunters.

1.2 The sports fish and game resource managed by Fish and Game are defined and protected under the Conservation Act and the Wildlife Act 1953. The species within include introduced sports fish and a mix of native and introduced waterfowl and upland game[1].

1.3 Our vision, purpose and values are illustrated below:

1.4 Fish and Game is entirely funded by licence holder fees and private contributions, meaning the delegated function of managing the species for the public good is funded entirely by the users. It is a democratic '*user pays, user say*'s organisation. Using this system, Fish and Game funds public good research to ensure fisheries and game populations are managed sustainably; undertakes compliance with the licencing system; and contributes to public planning processes to ensure that hunters and anglers values are recognised and provided for.

1.5 In relation to planning, Fish & Game have the statutory function to advocate for hunters and anglers values and ensure that the habitats of gamebirds and sports fish are provided for. At any one time we may have around 150,000 licence holders, and a larger number (approximately 300,000) that are transient licence holders. The habitat we specifically advocate for includes lakes and rivers that contain trout and salmon (and other sports fish) and wetlands where game bird hunting occurs.

[1] Most New Zealanders refer to these species as 'game birds', distinguishing them from other types of large game, such as deer or pigs. The Wildlife Act 1953 defines these birds simply as 'game' and this phrase is used in the context of this submission.

Fish and Game in Resource Management

2.1 Fish and Game works to provide for the ongoing enjoyment of hunting and freshwater fishing assets, the maintenance (or enhancement) of public access to rivers, lakes, and wetlands for hunting and fishing, and the protection of the habitat of trout and salmon.

2.2 Hunting and angling require legal and physical access both to habitats and the resource itself. Maintenance and enhancement of access is critically important to the pursuits of our licence holders. The maintenance and enhancement of public access to and along lakes and rivers is listed in the RMA 1991 as a matter of national importance.

2.3 We see the opportunity for proposals to be required to provide improved access both to their sites and other nearby areas that involve hunting or fishing values as a form of mitigation for any loss of values on site. We seek that Fish and Game are consulted as an expert advisor where gamebird and or sports fishery values could be impacted. We can work with government officials to ensure outcomes that achieve both economic imperatives, along with recognising and providing for hunting and fishing values.

2.4 We specifically seek the protection of:

i. habitat of trout and salmon.
ii. maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers where sports fishing and game bird values exist.
iii. preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, lakes and rivers and their margins where sports fishing and game bird values exist.
iv. Recognition and provision for freshwater angling/game bird hunting and amenity values.

What does Fish & Game do?

Fish & Game NEW ZEALAND

Who are we? **Fish & Game New Zealand manages, maintains and enhances sports fish and game birds and their freshwater habitats in the best long-term interests of anglers, hunters and all New Zealanders.**

Our vision

A New Zealand where freshwater habitats and species flourish, where game bird hunting and fishing traditions thrive and all New Zealanders enjoy access to sustainable wild fish and game resources.

Together, let's ensure a thriving future for fishing and game bird hunting!

What we do

- Manage fishing and hunting regulations
- Conduct research to monitor fish and game bird populations
- Collaborate with communities to protect natural habitats
- Provide educational programmes and resources
- Advocate for valued habitats and species
- Negotiate and maintain access for anglers, hunters and all New Zealanders

fishandgame.org.nz

#ReWild

What does Fish & Game do?

Species management: We monitor and survey species populations; set season regulations; and sustainably manage pressure on the resource.

Habitat protection: Advocate and take action to protect and enhance lakes, rivers, streams and wetlands; and secure 'national park' status to important rivers through Water Conservation Orders.

Access and participation: Negotiate and advocate so all New Zealanders can access our natural places; maintain access signage, information and brochures; organise fishing and hunting events and classes.

Public awareness: Maintain public advocacy; schools programmes; website and newsletters; community liaison; promote the right of licensed anglers and game bird hunters to pursue their chosen pastime.

Compliance: Recruit, train, equip and coordinate warranted rangers, to educate and enforce regulations to ensure the fish and game resource is sustained.

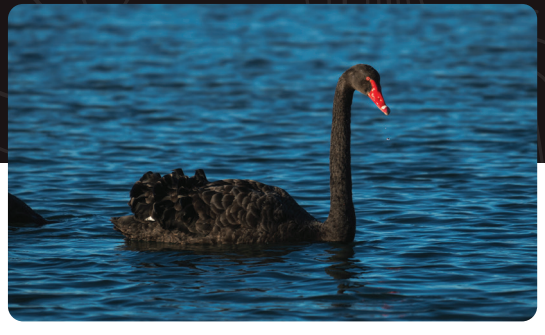
Licensing: Provide a nationwide licensing system with a range of licence categories and sales channels that makes it easy to buy a licence. We are solely funded by licence holders.

Council: Hold public meetings of elected licence holders to approve regulations and budgets, set policies and provide governance for the Fish & Game system.

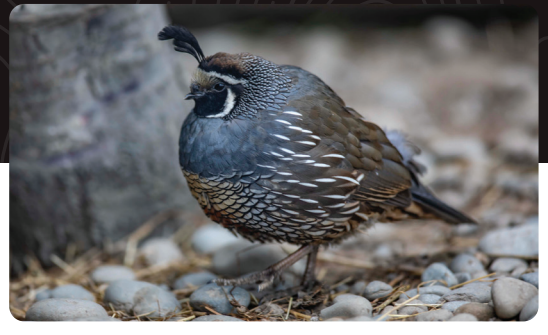
Coordination and planning: Provide research, planning and reporting; financial management and general coordination across Fish & Game New Zealand.

fishandgame.org.nz **#ReWild**

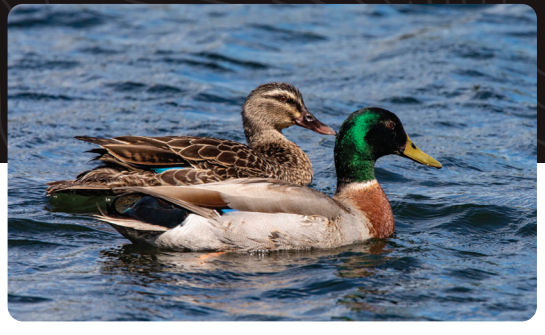
Species we manage



Black Swan Kakianau

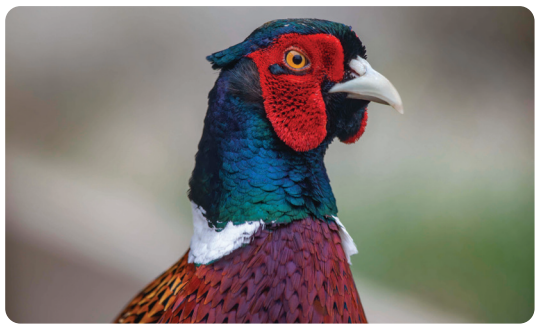


Californian Quail Koitareke



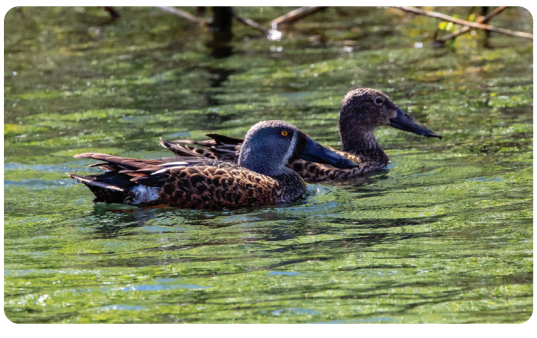
Mallard Rakiraki

Paradise Shelduck Pūtakitaki



Pheasant Peihana

Pūkeko



Shoveler Kuruwhengi

Chukar

Grey Duck Pārera

Brown Trout

Rainbow Trout

Chinook Salmon

Sockeye Salmon

Brook Trout

Tiger Trout

Perch

Tench

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KM Water
Expert Water Advice

Memorandum

To: Helen Brosnan – New Zealand Fish and Game Council

From: Kate McArthur

Date: 17 July 2025

Re: Review of NPS FM (2020) attributes and target attribute states – rivers

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Recommendations on NPS FM attributes and target attribute states (TAS) for rivers

Scope of advice

1. I have been asked by The New Zealand Fish and Game Council (**Fish and Game**) to review the attributes in Appendices 2A and 2B of the National Policy Statement for Freshwater 2020 as amended in October 2024 (**NPS FM**). I have also been asked to provide advice on the government's proposals for changes to the NPS FM, section 2.3 of the 'Package 3 - freshwater discussion document' (**discussion document**). In providing this advice I have reviewed:

    a. Surface Water Integrated Management (SWIM) technical comment on the merits of the NPS FM (2020) attributes (**the SWIM report**)
    b. Reviews of lake attributes dated 17 March and 7 April 2025 by Deniz Ozkundakci for Fish and Game
    c. Interim regulatory impact statement – replacing the NPS for freshwater management (**the RIS**)
    d. Science and Technical Advisory Group reports to the Minister for the Environment, June 2019 and supplementary report April 2020
    e. Previous versions of the NPS FM and associated technical reports

2. The national objectives framework (**NOF**) sets out the method for regional councils to determine and apply attributes to provide for compulsory values set out in Appendix 1 of the NPS FM, and any other freshwater values deemed relevant to freshwater management units (**FMU**) for each region.

Freshwater values

3. The attributes in Appendix 2 of the NPS FM relate to the compulsory national values for Ecosystem health and Human contact. While there are other nationally compulsory values i.e., threatened species and mahinga kai, there are no specified attributes for these values in Appendix 2. That is not to say that many of the attributes set in the NOF will not have relevance to and benefit many other values for freshwater in some ways. In my opinion, the national compulsory values are appropriate, fit for purpose and should remain a core part of the NOF/NPS FM. I have seen no evidence or justification warranting their change or removal.

4. The description for ecosystem health in Appendix 1 of the NPS FM is based on the work of Clapcott et al. (2018) that defines a biophysical framework to assess ecological integrity/ecosystem health. That framework identifies the five core components of ecosystem health as:

a. aquatic life,
b. physical habitat,
c. water quality,
d. water quantity and
e. ecological processes.

5. Freshwater ecosystems are complex and there isn't always a clear linear or mechanistic relationship between different variables in an ecosystem (STAG 2020). Freshwater indicators of habitat, water quantity, water quality, ecological processes and aquatic life have complex interrelationships, and freshwater ecosystems are usually multi stressor environments. The holistic approach to ecosystem health and the range of attributes in the NPS FM are intended to reduce the complexity of these interrelationships. However, it is important to note that regardless of any simplification of the attributes in the NPS FM, scientific expertise will still be required to assess the results of monitoring and identify likely causes of degradation of ecosystem health and other freshwater values.

Best information

6. Section 1.6 of the NPS FM (2020) requires councils to use the best information available at the time to give effect to the NPS FM. Best information is defined as complete and scientifically robust data. In the absence of such data the best information may include modelling, partial data, local knowledge or other information and councils must prefer information that provides the most certainty and take steps to reduce uncertainty through monitoring or model validation.

7. The process outlined in section 1.6 was the process used at the time the Appendix 2 attributes were developed following advice provided by the STAG. The attributes, attribute bands and NBLs suggested by STAG represent the best information at the time, not all STAG recommendations made it into the final version of Appendix 2. Below I suggest some changes, acknowledging that monitoring, along with advances in complete and robust science have provided more certainty with respect to the attributes, bands and NBLs.

8. Any future changes to the NPS FM attributes, bands or NBLs must be informed by complete and scientifically robust information, which, in my opinion, is readily available with respect to the current body of freshwater scientific knowledge and the calibre of New Zealand's freshwater science practitioners.

9. The best available information on the state of freshwater ecosystems shows that there is widespread degradation across the country; many sites are getting worse, not better. More than 90% of rivers in urban, pastoral, and exotic forest areas have water quality below recommended guidelines, ~90% of wetlands have been drained, and ~75% of our native fish are at risk of or threatened with extinction.[1] The current state of freshwater provides important context when considering changes to national policy direction and bottom lines or ecological limits.

Naturally occurring processes

10. Naturally occurring processes were raised as an important issues by the STAG in their reports to the Minister for the Environment. The NPS FM definition of a naturally occurring process is a

[1] https://environment.govt.nz/assets/Publications/Files/our-freshwater-2020-summary.pdf

process that "occurs, or would occur, in the absence of human activity". Naturally occurring processes are also referenced in the definitions of degraded and degrading, whereby waterbodies with attribute states affected by naturally occurring processes are exempted from consideration as 'degraded' or 'degrading' for those attributes. This is referenced again in section 3.19 on assessing trends, whereby a deteriorating trend in an attribute that is part of a naturally occurring process does not trigger section 3.20 requirements for councils to respond to degradation.

11. Section 3.32 of the NPS FM specifically addresses naturally occurring processes with respect to setting TAS, and how waterbodies affected by those processes are exempted from NBLs for affected attributes.[2] Councils must set a target attribute state on a trajectory of improvement (even if this is below NBLs) to the extent practicable, given the naturally occurring process.[3] From a technical perspective, target attribute states can be set that proportionately respond to 'degradation' beyond that which occurs naturally in circumstances where attribute states are exacerbated by human activities or land use (e.g., suspended sediment or phosphorus).

12. In addition to the provisions for naturally occurring processes within the NOF, and notwithstanding my review of individual attributes below, many attributes make specific provision for naturally occurring processes. Periphyton attributes (Table 2) have a 'productive class' numeric attribute state which provides for a larger number of exceedances at monitoring sites in River Environment Classification (**REC**) classes likely to have naturally phosphorus-enriched geology.[4] Suspended fine sediment attributes (Table 8) refer to examples of streams with clarity naturally affected by brown-water, glacial flour and phytoplankton. Table 25 lists REC classes that are naturally soft bottomed to provide guidance for interpretation of section 3.25 and deposited sediment attributes (Table 16).

Naturally occurring processes are provided for throughout the NPS FM (2020). Criticisms of the NOF and attributes because they 'do not provide for naturally occurring processes' are entirely unfounded.

Attribute bands and NBLs

13. Attributes in the NPS FM are expressed in a four-band A to D schema that is not meaningful or relevant for all attributes.[5] Forcing attributes to fit into four bands has resulted in some attribute bands that do not pass a sense-check, for example suspended and deposited fine sediment (see below). There is no policy or scientific reason requiring an attribute be expressed as four bands. In many cases a binary, single threshold NBL or two band approach are acceptable.[6]

Attributes should not be required to fit a four-band approach where this is not meaningful to the attribute or the outcome.

[2] NPS FM (2020) 3.32(1)(a).
[3] NPS FM (2020) 3.32(1)(b).
[4] Volcanic and soft-sedimentary geology, often found in North Island catchments, provide mineral sources of naturally elevated dissolved phosphorus.
[5] Except *E. coli*.
[6] Previous environmental guidelines e.g., MfE 1992, ANZECC 2000, ANZG 2018, used two-band upland/lowland or single threshold approaches depending on the individual attribute/indicator.

Simplifying the attributes

14. The discussion document expresses a desire for greater regional flexibility whilst also simplifying the attributes in the NPS FM. In my view these two aims are in direct conflict. Allowing regional councils flexibility in how they monitor, measure and report will significantly increase costs and complexity for all parties involved in freshwater management. A lack of nationally consistent monitoring methods and environmental standards (i.e., attributes and NBLs) will create considerable uncertainty for resource users and time-consuming and chaotic freshwater management that differs from region to region. Consistent and transparent national reporting will not be possible.

15. I do not subscribe to the view that the NPS FM is unnecessarily complicated or hard to interpret as it is currently drafted; it is my primary opinion that the NPS FM (2020) is fit for purpose and does not require wholesale changes. Notwithstanding this, there are opportunities to streamline some attributes and attributes states. As requested by Fish and Game I have reviewed each of the current attributes and made recommendations for their potential improvement below, in some cases suggesting deletion of attributes or attribute bands (Appendix 1).

16. If the government are determined to make sweeping changes to the suite of NPS FM attributes (which I do not recommend or support), there are critical bottom lines for freshwater that as a minimum must be managed and measured consistently across all regions to ensure the future sustainability of freshwater resources and the ecosystems that support them. These components are:

    a. Sediment
    b. Nutrients (nitrogen[7] and phosphorus)
    c. Microbial pathogens (*E. coli*)
    d. Macroinvertebrates
    e. Dissolved oxygen

17. I make recommendations with respect to the inclusion of these attributes and suitable NBLs in the sections which follow, also summarised as Appendix 1 to this memo.

Critical attributes for sustainable freshwater management are sediment, nutrients, microbial pathogens macroinvertebrates and dissolved oxygen. National bottom lines are needed for these attributes as a minimum. Nationally consistent monitoring of additional attributes is also required for state of the environment reporting and policy effectiveness monitoring.

Appendix 2A attributes for rivers

Table 2 – Periphyton (trophic state)

18. Periphyton is the community of algae, microbes, fungi and cyanobacteria on the bed of rivers and streams and sometimes on submerged wood or macrophytes. It is the primary productive base of the aquatic food chain. Nuisance periphyton has negative effects on ecosystem health, affecting water quality (causing fluctuations in dissolved oxygen and pH), macroinvertebrates, ecological processes and habitat. Periphyton proliferation also adversely affects recreational,

[7] Ammonia and nitrate are components of nitrogen.

aesthetic, amenity and cultural values. Periphyton in rivers is primarily driven by flood frequency and magnitude and then by nutrient concentrations. Other factors, including light, substrate type, grazing invertebrates and water temperature affect periphyton growth, but to a significantly lesser degree.

19. Periphyton was included in the 2014 NPS FM and the attribute bands and NBL have not changed. In 2020 a note was added to Table 2 "*At low risk sites monitoring may be conducted using visual estimates of periphyton cover. Should monitoring based on visual cover estimates indicate that a site is approaching the relevant periphyton abundance threshold, monitoring should then be upgraded to include measurement of chlorophyll-a.*" This note recognised the significant advantages of monitoring periphyton cover by visual assessment, as opposed to chlorophyll-a. There are no laboratory costs for visual assessments, a trained observer can make repeatable observations, results are instantly available, and percent cover of the bed is closely aligned with many of the values periphyton is managed for e.g., aesthetic, recreational, cultural.

20. The NPS FM attribute bands for periphyton as chl-a were not directly developed from relationships with ecosystem health. The 50 mg/m^2 threshold for the A band was an annual maximum guideline for protection of benthic biodiversity (Biggs 2000).[8] Biggs (2000) recommended the B band chl-a of 120 mg/m^2 for trout habitat/angling protection, relevant only to green filamentous algae and equivalent to the recreational filamentous algae cover guideline of 30%. The NBL of 200 mg/m^2 chl-a is taken from the equivalent trout habitat guideline for diatom/cyanobacteria mat cover i.e., excluding green filamentous algae (see Appendix 2).[9]

21. The original Biggs (2020) guidelines, on which the NPS FM attribute bands were erroneously based, were <u>maximum</u> annual chl-a concentrations, because effects occur at peak periphyton biomass. Snelder et al. (2013) arbitrarily added 17% and 8% exceedance criteria to the periphyton attribute, allowing for uncontrolled exceedances of 6 or 2 monthly observations over three years. This approach is not supported by strong scientific evidence, given maximum biomass is closely linked to effects but is exempted from NBLs.

22. Concern has been expressed by the STAG and the New Zealand Freshwater Science Society (NZFSS) about inclusion of periphyton exceedance criteria, with both groups of technical experts recommending the criteria be removed. Few rivers exceed the chl-a bottom line with a 17% exceedance criteria, and 8% exceedance is also relatively uncommon. The current NBL with the exceedance criteria does not manage nuisance periphyton or protect freshwater values from peak biomass events; exceedances are so rare that the NBL is meaningless. Over the last 25 years these combined changes have created a shifting baseline for what is an acceptable level of periphyton to avoid impacts on ecosystem health.

23. Matheson et al. (2012 and 2016), reviewed national instream plant and periphyton guidelines and developed a weighted composite cover index which uses visual assessment information, collected using standardised methods (Kilroy 2011). Matheson et al. (2012 and 2016) supported retaining the 30% cover threshold for recreational values developed by Biggs (2000). Matheson et

[8] Biggs' (2000) recommendation was actually a mean monthly biomass of 15 mg/m^2 Chl-a with a peak biomass not exceeding 50 mg/m^2 Chl-a to protect the benthic biodiversity of streams.
[9] Biggs (2000) guidelines for different type of algae (i.e., green filaments vs mats) were impractical as most periphyton communities are comprised of a mixture of types. This was later addressed by Matheson et al. (2012) through the development of the weighted composite cover standards.

al. (2012) related cover class thresholds to macroinvertebrate indices, to determine effects on ecological condition from percent cover of the bed by periphyton (Table 1). The 90th percentile of the regression plots of Matheson et al. (2012; Fig. 4-2) yields a periphyton cover equivalent to macroinvertebrate NBLs of ~50% WCC. Fifty per cent weighted composite cover is a periphyton NBL that is relevant to the impacts of periphyton on the ability to achieve macroinvertebrate NBLs.

Table 1. Periphyton weighted composite cover (periWCC) classes – note these are not directly correlated with periphyton biomass chl-a bands in the NPS FM. Source Matheson et al. (2012 and 2016).

Periphyton cover % (periWCC) Annual maximum	MCI classes	QMCI classes	Ecological condition (periWCC)
<20	>120	>5.99	Excellent
20 - 39	100 – 119	5 – 5.99	Good
30*	n/a	n/a	n/a
40 - 55	80 – 99	4 – 4.99	Fair
50**	90	4.5	n/a
>55	<80	<4	Poor

* Aesthetic and contact recreation cover threshold from Biggs (2000).
** Estimated periWCC% matched to MCI/QMCI NBL using the relationships from Matheson et al. (2012).

24. Periphyton is an important attribute, but attribute bands and exceedance criteria are arbitrary and may result in relatively meaningless implementation. Visual assessment of periphyton cover is a viable and cheaper alternative to chl-a. I recommend an NBL of 50% WCC to correspond with the MCI/QMCI NBL.

NPS FM NBLs for periphyton should be 50% weighted composite cover (%periWCC). PeriWCC is simpler and cheaper to implement. If chl-a is retained as the periphyton attribute the NBL should be 120 mg/m^2 chl-a. If a national bottom line of 200 mg chl-a/m^2 is retained exceedance criteria should be deleted.

Table 5 – Ammonia (toxicity)

25. Ammoniacal nitrogen (**ammonia**)[10] has been an attribute in the NPS FM since 2014. It is found in low concentrations in most surface waters (e.g., NPS FM A band) and has few 'natural' sources. Ordinarily, ammonia concentrations are near or below levels of laboratory detection in unimpacted waters (~0.005 mg/L) and few river sites in New Zealand show ammoniacal nitrogen concentrations that exceed the B band (2020 NBL). The exceptions are sites impacted by contaminants from poorly treated point source discharges, diffuse sources of anoxic wastewater and poorly managed agricultural land use, usually in areas dominated by peat soils.

26. Ammonia is a nitrogenous toxicant that can cause lethal or sub-lethal effects on aquatic life. Effects can occur from short-term (hours to days) or long-term (weeks, months, years) exposure.

[10] The term 'ammonia' has been used colloquially in the NPS FM as Table 5 describes the attribute in terms of (total) ammoniacal nitrogen. The toxic effects of ammonia generally come from the unionised form, although ionised ammonium can be responsible for some toxicity at lower pH (ANZECC 2000). Temperature and pH have a significant effect on the fraction of total ammoniacal nitrogen comprised of ammonia and the toxicity of ammonia generally, so the numeric attribute states, are defined and standardised to an equivalent toxicity at pH 8 and 20 degrees C.

Ammonia toxicity has no 'safety margin' between concentrations that have lethal and sublethal effects across the range of aquatic organisms tested. For example, the ammonia concentration that provides protection of 80 per cent of species from chronic exposure[11] may not protect some sensitive freshwater mussel juveniles (glochidia), or Sphaeriid fingernail clams, from lethal effects. Freshwater shrimps are also sensitive to ammonia and low dissolved oxygen, both separately and in combination (Richardson et al. 2001) and along with fish will actively avoid contaminated waters. For species that have been tested in New Zealand, macroinvertebrates were generally more sensitive than fish (Hickey 2000).

27. Acute ammonia toxicity can cause loss of equilibrium, hyperexcitability, increased breathing rate, cardiac output, and oxygen uptake and in extreme cases, convulsions, coma and death in fish. Chronic effects of ammonia toxicity include a reduction in hatching success, reduction in growth rate and morphological development, and pathological changes in gill, liver, and kidney tissue (USEPA 1986 in ANZECC 2000). Ammonia is not only directly toxic to aquatic life but can cause adverse behavioural effects including avoidance behaviour by juvenile fish and crustacea, potentially disrupting migration (Richardson et al. 2001).

28. Aquatic ecosystems are subject to multi-stressor effects (e.g., pH, temperature, dissolved oxygen, sediment, other toxicants, habitat, climate change). But toxicity testing occurs in controlled laboratory environments that are not representative of real-world ecosystems and the pressures they face. Setting ammonia NBLs requires caution, because the effects of toxicity in combination with other stressors are largely unknown but are likely to be additive, if not synergistic.

29. Ammoniacal nitrogen is immediately bioavailable for plants and algae, contributing to enrichment, nuisance proliferation, and eutrophication of surface waters. At NPS FM (2020) NBLs, concentrations of ammoniacal nitrogen will be making a measurable contribution to nutrient enrichment and potentially cause or contribute to eutrophic effects and nuisance growths. Eutrophication in its own right can negatively affect aquatic ecosystem health (Camargo and Alonso 2006; Canning and Death 2021; Canning et al. 2021), in addition to the influences of nutrients (including ammoniacal nitrogen) on plants and periphyton.

30. Changes to the NPS FM in 2020 increased the stringency of the NBL from the bottom of the C band to the bottom of the B band to provide a more protective bottom line. However, the numeric attribute state that manages the upper concentrations of ammonia (as opposed to the median) was relaxed from an annual maximum i.e., a 'do not exceed' threshold, to the annual 95th percentile, which allows for some exceedance of the NBL threshold roughly 5% of the time. In other words, low frequency exceedances of the B band threshold are now allowed.

31. The negative and toxic effects of ammonia on aquatic life, water quality and nutrient enrichment warrant inclusion in the NPS FM, with stringent NBLs, despite the discrete number of rivers and sites potentially affected.

Ammonia should be retained within the NPS FM without any change to Table 5 because of the significant and pervasive nature of toxic effects that can occur in contaminated rivers.

[11] The NPS FM 2014 and 2017 national bottom line for ammonia.

Table 6 – Nitrate (toxicity)

32. Nitrate nitrogen can be toxic to aquatic life at high concentrations. Nitrate toxicity effects range from chronic effects on growth to acute lethal effects, depending on the sensitivity of the organism and the concentration of nitrate. Chronic (sub-acute) nitrate toxicity affects the growth of sensitive fish and fish fecundity (the number of eggs produced), and thereby their population sustainability over time. However, the concentrations at which nitrate is toxic significantly exceed the concentrations at which nitrate has adverse enrichment and eutrophication effects on ecosystem health. The A band threshold for nitrate toxicity is consistent with New Zealand and international literature on the upper limit for nitrogen to avoid significant trophic effects on ecosystem health.[12]

33. Nitrate has been included as an attribute in the NPS FM since 2014 to manage toxic effects on aquatic life. In 2020 the NBL for nitrate was raised from the C/D band threshold to the B/C band. The change was made in recognition that, as a national bottom line, growth effects on up to 20% of sensitive species such as fish was insufficiently protective of ecosystem health.

34. Control of lower concentrations of nitrate and other forms of nitrogen including ammoniacal nitrogen is important to maintain or improve ecosystem health and enable other target attribute states to be met e.g., periphyton, phytoplankton, macroinvertebrates. However, toxic effects on aquatic life still need to be controlled where nitrate concentrations exceed enrichment-based thresholds. Therefore, I recommend the nitrate attribute, attribute bands and NBLs remain unchanged.

Nitrate should be retained as an attribute within the NPS FM without any change to Table 6. This is justified by the nature of potential toxic effects on the growth of sensitive species and the contribution nitrate makes to eutrophication and negative impacts on ecosystem health.

Table 7 – Dissolved oxygen

35. Dissolved oxygen (**DO**) in water is critical to aquatic life. Hypoxia (low DO) and anoxia (no DO) can have chronic (long-term) or acute (short term) effects depending on the concentration of oxygen dissolved in water and how long reduced concentrations persist. Fish and macroinvertebrates experience behaviour change, avoidance, increased respiration or gulping air at the surface, and adverse effects on metabolism, feeding, growth, reproduction, and survival from reduced DO. Absence of DO can be lethal to aquatic life.

36. Dissolved oxygen attributes have been part of the NPS FM since 2014. The 1-day minimum and 7-day mean minimum DO concentration attributes in the NPS FM were based on Davies-Colley et al. (2013) and protect against acute and chronic effects of low DO concentration on ecosystem health. They are the most scientifically robust and best available thresholds to manage the effects of reduced DO, particularly during times of greatest stress to aquatic life (i.e., during warm summer periods).

37. Dissolved oxygen less than a 7-day mean minimum of 7 mg/L and a 1-day minimum of 5 mg/L (bottom of band B) are likely to result in poorer ecosystem health outcomes. Concentrations less

[12] In a global review of the ecological and toxicological effects of inorganic nitrogen pollution, Camargo and Alonso (2006) recommended levels of total nitrogen lower than 0.5 – 1.0 mg/L to prevent eutrophication effects on aquatic ecosystems.

than a 7-day mean minimum of 5 mg/L and a 1-day minimum of 4 mg/L (bottom of band C) are likely to have significant adverse effects on ecosystem health and cause sensitive macroinvertebrates and fish to be lost. The current NBLs for DO are suitable only to avoid the worst effects of reduced DO in rivers.

38. Low dissolved oxygen in freshwater results from two main impacts. The first is from discharge of high organic or chemical loads in wastewater or stormwater which consume the available oxygen, known as the biochemical (BOD) or chemical (COD) oxygen demand.[13] The second impact is the reduction in dissolved oxygen resulting from eutrophication. Nuisance plant and algal growth reduce DO in the water column overnight, when cellular respiration dominates and oxygen-producing photosynthesis has ceased. Eutrophication that drives low DO can be caused by enriched wastewater discharges as well as enrichment from diffuse sources.

39. The DO attributes in Table 7 are stated to apply to 'Rivers (below point sources only)', although the STAG (2019) recommended that DO attributes apply to all rivers more generally, not just in relation to point sources. I agree with this recommendation because rivers that do not receive point-source discharges are also significantly affected by low dissolved oxygen and consequent effects on aquatic life and ecosystem health.

Dissolved oxygen should be retained as an attribute in the NPS FM without any change to Table 7 except that (continuous) dissolved oxygen should apply to all rivers and therefore the reference to 'below point sources' should be deleted. Table 17 can be deleted as it is redundant.

Table 8 – Suspended fine sediment

40. Sedimentation is one of New Zealand's most pervasive habitat and water quality issues. Sediment is particularly detrimental to aquatic life and freshwater ecosystems, and affects recreational, aesthetic and cultural uses of water. Suspended sediment clogs and abrades the feeding and gill structures of invertebrates and fish and is known to reduce fish diversity and abundance, also causing avoidance behaviour in some fish and at different life stages. Suspended sediment reduces the ability of fish to sight-feed and can cause disruption to food-web and other ecological processes. Sediment was not addressed within the NPS FM prior to 2020, despite its detrimental effects on freshwater ecosystem health and human use values.

41. Suspended and deposited sediment are critical attributes for inclusion in the NPS FM to manage significant negative effects on ecosystem health and other freshwater values nationally. However, I agree with the concerns raised by the SWIM group with respect to the derivation of the attribute bands and NBLs for the four suspended sediment classes in Table 8. The differences in water clarity between each band are minor and the range between A bands and NBLs for each sediment class are also small (i.e., Class 1 = 0.44 m, 2 = 0.32 m, 3 = 0.73 m and 4 = 0.40 m). Not all attributes are meaningful if forced to fit within a 'four band' framework, as discussed above. Linkages between attribute bands and ecological effects are not strong enough to warrant a four-band system using the current attribute numerics. Instead, NBLs that reflect a precautionary safety margin from a known ecological tipping point will be more meaningful and practical to implement, at least until further work has been completed. One option for continuing to use the current framework for suspended fine sediment is to apply only the NBL, without attribute bands.

[13] Oxygen depletion can also occur from the nitrification of ammonia in freshwater.

42. Other examples of sediment thresholds can be found in default guideline values in the ANZG (2018) for the 20th percentile of clarity by REC class. ANZECC (2000) had a blanket visual clarity standard of 1.6 metres for recreational water use. Amenity, aesthetic and recreational values can be significantly affected by suspended sediment and poor water clarity, swimmers and anglers cannot safely enter the water if the bed and any obstructions are not clearly visible through the water column. This aspect of water clarity for human contact has not been addressed in previous versions of the NPS FM.

43. An attribute for suspended fine sediment is needed in the NPS FM, given its pervasive effect on water quality, ecosystem health and human uses of freshwater. Further work is needed to ensure the attribute bands are ecologically meaningful and reflect the range of natural clarity conditions, noting that naturally occurring processes are already provided for by the NPS FM (2020).

Suspended fine sediment should be retained as an attribute in the NPS FM. Possible interim approaches include 1) retain the NBLs from Table 8 and delete the other attribute bands, or 2) apply the 1.6 m recreational clarity standard as an NBL for human contact and recreation, and to provide some degree of ecological protection.

Table 9 – *Escherichia coli (E. coli)*

44. *E. coli* is a key indicator of human health risk from microbial pathogens such as Campylobacter, Giardia, Cryptosporidium and Salmonella, during recreational use of freshwater. *E. coli* enters water directly from discharges of undisinfected wastewater, municipal stormwater and sewage overflows and from livestock access to waterways. Diffuse *E. coli* contamination comes largely from the faeces of animals in the wider landscape, predominantly ruminant livestock, carried into waterways via overland flow and runoff.

45. *E. coli* has been part of the NPS FM since inclusion in 2014, with a controversial national bottom line of 1,000 E. coli/100 ml, described as a moderate risk for wading and boating. The 2017 version contained a five band (A – E) Campylobacter-risk approach, four attribute state statistics and no NBL, along with the 'National Target' for improvement in the proportion of large rivers and lakes that are suitable (C band or better) for primary contact. National targets were set at 80% of rivers to be suitable for primary contact by 2030 and 90% suitable by 2040. The E. coli attribute was retained in the 2020 NPS FM in this form, with the NOF also requiring a trajectory of improvement for all waterbodies below the A band when setting TAS for *E. coli*, as an alternative approach to an NBL.

46. The current version of Table 9 is fit for purpose to track changes in *E. coli* contamination of freshwater at various spatial and temporal scales and to assess progress towards meeting national targets for primary contact.

E. coli should be retained as an attribute in the NPS FM without any change to Table 9.

Appendix 2B attributes for rivers

Table 13 – Fish IBI

47. Fish are a critical indicator of the health of freshwater ecosystems as they are often the top trophic level predators. Fish IBI allows for an understanding of the integrity of the fish community at a site, without the confounding influences of elevation and distance from the sea. These factors heavily effect fish abundance and diversity in New Zealand due to the proportionately large migratory

fauna. There is no NBL for Fish IBI and thus it operates as a monitoring requirement of councils and as an input to 'action plans'.

48. National monitoring standards describe methods for consistent fish monitoring (Joy et al. 2013). Many councils also currently use environmental DNA technologies as a cost effective method of monitoring fish communities. Inclusion of eDNA as an adjunct to regular fish monitoring e.g., five yearly monitoring using national protocols augmented by annual eDNA monitoring, may assist councils to monitor more effectively, improving understanding of the integrity of fish communities. However, I do not recommend allowing councils to monitoring fish using primarily or solely eDNA techniques. Regular quantitative monitoring is needed to understand fish population health and trends (David et al. 2010).

49. An alternative to the current fish IBI attribute is to apply an approach similar to the NPS FM 2017 section CB (described below with respect to macroinvertebrates) by requiring councils:

    a. Monitor the state of fish communities and populations across regions
    b. Use the methods and frequency of monitoring with reference to national protocols of Joy et al. (2013)
    c. Allow for adjunct eDNA monitoring but not as a sole monitoring method
    d. Respond if fish IBI ≤18[14] by requiring investigation and implementation of actions for improvement

Retain Fish IBI as a monitoring requirement with reporting against fish IBI attribute bands to inform management. Include the ability to supplement monitoring with new technologies such as eDNA but not rely solely on these methods. Alternatively require councils to monitor fish communities and populations and respond to fish IBI ≤18

Table 14 – Macroinvertebrates (1 of 2)

QMCI and MCI

50. Benthic macroinvertebrates are relatively long-lived aquatic organisms that indicate the state of multiple aspects of the health of freshwater ecosystems as they integrate the variability of water quality and instream conditions over their lifespans (e.g., weeks to months). Individual invertebrates have variable responses to instream conditions (tolerance/sensitivity) and this is reflected in their presence or absence (MCI) and relative abundance (QMCI) in a sample. The advantages of biological monitoring and the use of biotic indices like MCI/QMCI are well-established in freshwater science.

51. In comparison to single grab-samples of water chemistry, which are only a snapshot in time, macroinvertebrates indicate the effect of multiple stressors and integrate the impacts of water quality on aquatic life over time. Annual sampling is an efficient method for gathering this data, when compared to the requirement to take regular samples over long time periods to understand water chemistry characteristics. However, both type of monitoring are necessary for determining cause and effect relationships in freshwater environments.

52. The presence or absence of tolerant versus sensitive organisms allows for discrimination of water quality conditions (Stark 1985, 1993, 1998; Boothroyd and Stark 2000; Stark and Maxted 2007) as

[14] This is the fish IBI NBL recommended by STAG (2019).

described in Table 2. Tolerance scores are assigned to each species and form the basis of the index results. Providing a result that can be interpreted and compared nationally requires consistent tolerance scores across New Zealand,.

Table 2. Interpretation of MCI-type biotic indices from Stark and Maxted (2007).

Water quality classes Stark and Maxted (2004 and 2007)	Stark (1998) descriptions	MCI score	QMCI score
Excellent	Clean water	>119	>5.99
Good	Doubtful quality or possible mild pollution	100 – 119	5 – 5.99
Fair	Probable moderate pollution	80 – 99	4 – 4.99
Poor	Probable severe pollution	<80	<4

53. The macroinvertebrate community index (MCI) and its quantitative variant QMCI are monitored by most regional councils and were added as attributes to the NPS FM in 2020. Macroinvertebrates were included in the 2017 version[15] of the NPS FM, but not as attributes. The preamble spoke of macroinvertebrates in 'monitoring plans', which were governed by section CB. Objective CB1 provided for monitoring plans to monitor progress towards, and achievement of, freshwater objectives and values. Policy CB1 (aa)(ii) required the monitoring of macroinvertebrate communities, while Policy CB3(a) specified the use of MCI and CB3(c)(i) and (iii) required investigation of declining trends or MCI scores below 80, and improvement if this was the case (with some exemptions including naturally occurring processes). MCI therefore operated as a quasi-attribute in the 2017 version with a bottom line of 80.

54. The NPS FM (2020) version included MCI and QMCI as attributes in Appendix 2B for wadeable rivers. The notes below Table 14 specify the timing of sample collection, sample analysis method (fixed counts or full counts), sample statistic (five-year median), and the ability to use the soft-bottomed variant for relevant streams with cited references for nationally accepted protocols. Other important sampling protocols are included in Stark and Maxted (2007) with respect to withholding sampling following high flow events and the habitats from which samples should be collected (i.e., riffles). The STAG also noted that there could be exceptions to the attribute band thresholds in the case of naturally occurring processes like geothermal streams, high altitude glacial streams or low pH streams. As described above, the NPS FM (2020) already provides for these circumstances so the exceptions do not need to be specified again within the macroinvertebrate attribute tables.

55. The attribute bands and descriptions in the NPS FM (2020) version differ slightly from Stark and Maxted (2007). The STAG were of the opinion that gross pollution and probable severe pollution were not an appropriate place to set a national bottom line for macroinvertebrate health. An MCI bottom line of 80 (QMCI of 4) has reduced discriminatory power at this value. In other words, there is little change in the community from degradation below a national bottom line of 80. Therefore, improvements in MCI/QMCI scores at or below 80 (QMCI 4) are unlikely to be ecologically relevant and will not provide evidence of an improving trajectory. I support the STAG recommendations for

[15] The NPS FM (2014) did include the following reference to macroinvertebrates in the definition of ecosystem health as follows: "*The health of flora and fauna may be indicated by measures of macroinvertebrates*."

NBL of 90 and 4.5 for the MCI and QMCI respectively and these should be retained as the NBL for this important attribute.

56. A NBL of 90 does not necessitate also raising the band thresholds for B/C and A/B and I recommend these bands are bought down to reflect the thresholds of Stark and Maxted (2007), while retaining the more protective NBL of 90, as drafted in Table 3.

Table 3. Recommended change to NPS FM attribute bands for QMCI and MCI macroinvertebrate scores.

Attribute band	QMCI	MCI
A	>5.99	>119
B	5 – 5.99	100 – 119
C	4.5 – 4.99	90 – 99
NBL	4.5	90
D	<4.5	<90

57. The STAG supplementary report to the Minister for the Environment (April 2020) clarified that MCI and QMCI should be assessed together and the lower of the two results should apply for the purposes of determining the band. This recommendation was not carried through to the final version of Table 14 and this has created some confusion with respect to interpreting the results of the two indices. I recommend Table 14 is updated to reflect this recommendation.

MCI and QMCI should be retained in the NPS FM with slight changes to the attribute bands but retaining the NBLs of 90 and 4.5. Methods and tolerance scores should remain as in Table 14 NPS FM (2020) adding the following: "*MCI and QMCI should be assessed together and the lower of the two results should apply*".

Table 15 – Macroinvertebrates (2 of 2)

ASPM

58. Average score per metric (**ASPM**) was a macroinvertebrate attribute added to the NPS FM (2020) alongside MCI and QMCI. ASPM was developed by Collier (2008) using 511 stream samples in the Waikato catchment. The score is determined from the standardised average of three separate metrics: MCI, EPT[16] richness (number of EPT species) and %EPT (number of EPT species divided by total number of invertebrates). The STAG noted that MCI primarily measures the impact of organic enrichment whereas ASPM is a more general measure of macroinvertebrate community health. MCI/QMCI and ASPM are complementary metrics and are calculated using the same raw data, so having ASPM in addition to MCI/QMCI does not incur any additional monitoring expense whilst providing a broader understanding of macroinvertebrate health.

59. I agree with the STAG report that using complementary macroinvertebrate metrics to better understand benthic invertebrate health benefits and deepens our knowledge of freshwater ecosystems. However, if a simplification of attributes is desirable it is pragmatic to remove ASPM, given the long-established use of MCI/QMCI and its broad understanding outside of the scientific community. Calculation of ASPM scores from existing raw macroinvertebrate data can be

[16] EPT are the ephemeroptera (mayflies), plecoptera (stoneflies), and trichoptera (caddisflies) which make up the bulk of the pollution sensitive taxa in a macroinvertebrate sample.

explored at any time in the future if more complete national-level macroinvertebrate attributes are again considered.

ASPM Table 15 can be removed from the NPS FM attributes for macroinvertebrates.

Table 16 - Deposited fine sediment

60. The general effects of sedimentation are discussed above for suspended fine sediment. Deposited sediment effects are also a product of excess fine sediment contamination of water. The key threats of deposited sediment for aquatic life and ecosystem health are the loss of aquatic habitat by in-filling the interstitial places between substrates and the direct smothering of and damage to aquatic life, including periphyton, invertebrates and fish.

61. Deposited fine sediment has wide-spread detrimental effects on aquatic ecosystems, particularly across New Zealand's lowland waterways. A four-band deposited fine sediment attribute may be too fine a scale to discriminate different ecological impacts. Instead, NBLs that reflect a precautionary safety margin from a known ecological tipping point, although coarser, may be more meaningful and practical to implement.

62. Clapcott et al. (2011) developed a national deposited fine sediment guideline for hard bottomed streams at the request of, and in consultation with, regional councils. They assessed what level of sedimentation corresponded to significant adverse effects on three key instream values: macroinvertebrate community health, trout spawning, and aesthetic, amenity and contact recreation values. Clapcott et al. (2011) recommended the following thresholds for deposited sediment, using the same methods currently required by NPS FM Table 16 (SAM2 protocols for instream visual assessment):

    a. Instream biodiversity (aka aquatic life) <20% cover by deposited sediment or within 10% cover of reference condition
    b. Salmonid spawning <20% cover by deposited sediment or within 10% cover of reference condition
    c. Amenity (recreation and human contact) <25% cover by deposited sediment

63. The NBLs in Table 16 range between 21 and 29 per cent cover depending on REC sediment class and are roughly equivalent to the well-supported 20% guideline of Clapcott et al. (2011). The current NBLs are unnecessarily complex in applying REC classes, and attribute bands are not necessarily ecologically meaningful. In my view the methods and thresholds from Clapcott et al. (2011) remain fit for purpose and a deposited sediment NBL of 20% cover is a suitable threshold to manage effects on ecosystem health. Several regional plans already contain this threshold as a limit/target, including the Canterbury Land and Water Plan, Horizons One Plan, Natural Resources Plan for Greater Wellington, Tukituki Plan Change 6 and the proposed TANK Plan, Hawkes Bay.

Retain deposited fine sediment as a critical attribute but remove attribute bands and change the NBL to 20% cover for hard bottomed rivers

Table 17 – Dissolved oxygen

Dissolved oxygen is already captured by Table 7. If recommendations for Table 7 are accepted, Table 17 becomes redundant and should be deleted from the NPS FM.

Table 20 – Dissolved reactive phosphorus

64. Dissolved reactive phosphorus is an important determinant of ecosystem health, alongside dissolved inorganic nitrogen. Together these nutrients contribute to nutrient enrichment and can cause eutrophication, not just to periphyton and macrophytes (plants) but also contributing to impacts on macroinvertebrate community health, water quality and ecosystem metabolism. Nutrient enrichment negatively affects aquatic ecosystem health beyond the influences on plants and periphyton (Camargo and Alonso 2006; Canning and Death 2021; Canning et al. 2021).

65. Table 20 has no NBL for DRP, and 95th percentiles of concentration have no direct relationships with the attribute bands and descriptions of impacts on ecological communities. 95th percentiles should be removed and Table 20 replaced with NBLs for median DRP and DIN that are consistent with the NBL for macroinvertebrates (see below).

Table 20 should be deleted in its current form and replaced with alternative median DRP and DIN NBLs or alternatively removed altogether if NPS FM (2020) section 3.13 is determined to be the preferred approach to nutrient management. If Table 20 is retained the 95th percentile criteria should be deleted.

Table 21 – Ecosystem metabolism (gross primary production and ecosystem respiration)

66. Ecological processes are an important component of freshwater ecosystem health. Ecosystem metabolism measures the rate at which carbon is processed through aquatic ecosystems, using continuous dissolved oxygen measurements as input data. Table 21 includes ecosystem metabolism as an attribute requiring monitoring, no attribute bands or NBL are included, although these were recommended by the STAG and were included in the NPS FM exposure draft in 2019.

67. The SWIM paper identifies two issues with ecosystem metabolism as a monitoring attribute. Firstly, that a single '7-day continuous monitoring period' is inadequate to reflect the state of ecosystem metabolism. I note that Table 21 specifies this period as a minimum and councils can undertake additional monitoring to have more certainty in the results. Ideally, several weeks of data would be collected at each site. Secondly, the SWIM paper notes that ecosystem metabolism is costly to monitor. Ecosystem metabolism monitoring relies on continuous dissolved oxygen data, there is no additional monitoring cost to councils beyond monitoring dissolved oxygen, which is critical to monitoring the health of aquatic life.

68. Ecosystem metabolism is the only attribute directly associated with the ecological processes component of ecosystem health, and it is therefore an important attribute to monitor and understand.

Table 21 should remain as a monitoring method with no changes – there are no additional monitoring costs as dissolved oxygen data is used and already collected.

Table 22 – *Escherichia coli (E. coli)* (primary contact sites)

69. Table 9 does not have a bottom line but instead sets a long-term trajectory of improvement of microbial pathogens. This is insufficient to manage the immediate risks to safe human contact at frequently used sites. Table 22 sets out the *E. coli* attribute specific to identified 'primary contact sites'. Section 3.27 sets out the process for regional councils to monitor *E. coli* at primary contact sites and actions to be taken if *E. coli* exceeds the Table 22 NBL. The process in section 3.27 was in the 2017 NPS FM as Appendix 5. In combination with Table 22, section 3.27 codifies some

recommendations from the Ministry of Health microbiological water quality guidelines for marine and freshwater recreational areas (2003).

70. By international standards, New Zealand has high incidence rates of waterborne diseases, particularly Campylobacteriosis, Cryptosporidiosis, and Giardiasis (Weinstein et al., 2000). Monitoring and managing effects on human contact are necessary.

Table 22 should remain in the NPS FM with no changes, in the absence of an alternative framework to manage the risk of microbial pathogens for human contact with freshwater.

Nutrient attributes and NBL

71. Nutrient enrichment from elevated DIN and DRP increase the likelihood of eutrophic effects on aquatic life and ecosystem health. Adequate management of excess nutrients is needed to achieve dissolved oxygen, macrophyte, fish, macroinvertebrate, and ecosystem metabolism attribute states for ecosystem health. Both DIN and DRP contribute to growth of nuisance periphyton (algae) and macrophytes (aquatic plants). High levels of algal and plant growth adversely affect ecosystem health, reduce dissolved oxygen concentrations and disrupt ecosystem metabolism.

72. There are well-documented economic, societal and environmental costs of inaction or delaying actions to reduce nutrient loads and concentrations in freshwater environments (Graham et al. 2020). Nutrient limits and standards to manage the effects of eutrophication in freshwater are commonplace internationally. In a global review of the ecological and toxicological effects of inorganic nitrogen pollution, Camargo and Alonso (2006) recommended levels of total nitrogen lower than 0.5 – 1.0 mg/L to prevent eutrophication effects on aquatic ecosystems.

73. For New Zealand, Matheson et al. (2012 and 2016) recommended DIN concentrations of up to 0.63 mg/L to control nuisance plant and periphyton risk (with 85% compliance) and DRP of 0.011 mg/L. However, nutrient limits to control periphyton growth at NBLs are unlikely to adequately protect macroinvertebrate community health.

74. Canning et al. (2021) recommended bottom lines for nutrients in New Zealand rivers of 0.6 mg/L for DIN and DRP of 0.02 mg/L. These bottom lines were set to provide for macroinvertebrate health consistent with an MCI bottom line of 90. These limits are within ranges similar to the recommendations of Matheson et al. (2012 and 2016) and Camargo and Alonso (2006).

75. If DIN and DRP attributes with NBLs are not included in amendments to the NPS FM, the current section 3.13 process for councils to set appropriate instream concentrations and loads for nitrogen and phosphorus must remain. The stepwise process outlined in section 3.13 for nutrient criteria development is a progression from the process provided for in the 2017 NPS FM as a note appended to the periphyton attribute. Section 3.13 describes a robust and logical stepwise process for councils to develop catchment-specific nutrient criteria, in the absence of national criteria.

Add an attribute for DIN and DRP with respective NBLs consistent with NBL for macroinvertebrates of 90 i.e., 0.6 mg/L for DIN and DRP of 0.02 mg/L. In the absence of nutrient NBLs, retain the section 3.13 process for development of nutrient criteria.

Monitoring is too expensive and complicated

76. Most regional council state of the environment (**SOE**) monitoring programmes already collect the majority of the NPS FM attribute data and have done for many years. Once a monitoring network is set up, adding attributes to the same sites costs disproportionately less because a large cost of SOE monitoring is staffing and the associated overhead costs of regularly visiting each site.

77. The STAG supplementary report from April 2020 notes and agreement that it is technically feasible to generate a comprehensive picture of ecosystem health without having to measure and monitor the state of all metrics of ecosystem health in all monitoring locations within a given management area. The STAG added that central government support, guided by worked examples can clarify the necessary level of monitoring to inform local management and implementation decisions. This agreement was never carried through to the framing of the NPS FM (2020), policy makers did not complete the task of providing adequate guidance and policy direction on how to approach the issue with any nuance, as per the STAG (2020) recommendation.

78. Cross-region collaboration can assist in reducing inequities in resourcing and improve access to technologies or experienced staff, this should be encouraged and resourced e.g., the Envirolink tools programme. Support and guidance to councils can and should be provided, without requiring wholesale changes to the NPS FM.

Section 2.3 of the discussion document 'providing flexibility in the NOF'

79. The discussion document notes that councils need flexibility in what they measure and manage and that some bottom lines are 'arguably' unsuitable for some catchments. This is followed by the statement that government wants to ensure the scope of the NOF and national bottom lines are focused only on matters critical at the national level.

80. The discussion document provides no evidence that national bottom lines are unsuitable for some catchments. Having worked in freshwater management across most regions in New Zealand I have seen little evidence that attributes are unsuitable, particularly given the number of ways that the NPS FM allows for exceptions for naturally occurring processes. The discussion document conflates the unsuitability of attributes and NBLs with the difficulties facing councils in implementing plans to achieve them. This is not because NBLs are 'wrong' but that freshwater is degraded to the point where NBLs are exceeded, freshwater values are affected, and action is needed to reverse degradation.

81. The current suits of compulsory values (ecosystem health, human contact, threatened species and mahinga kai) should be retained as it is, as the discussion document notes these values cover the core aspects that matter to people. Experienced practitioners in the field of freshwater management (for more than 20 years) are confident that people's core values for freshwater have not and are not likely to change over time. There is no evidential basis that a change to the compulsory values is warranted. Removing compulsory values will inevitably result in relitigating core freshwater values at the regional level, which will be a waste of time and resources for all concerned and will result in significant uncertainty for resource users.

82. As discussed above the critical freshwater attributes that are degraded at a national level are sediment, nutrients, microbial pathogens macroinvertebrates and dissolved oxygen. However, my primary view is that all current attributes should be retained in the NPS FM. Management of the critical attributes should be a requirement of a plan developed under regulation to provide

some certainty of the outcome. Action plan outcomes are highly uncertain and not suitable to managing degradation for critical attributes.

83. Allowing councils to deviate from nationally defined thresholds will result in the complete inability to understand and report on the state of freshwater nationally. Significant prior investment has been made at regional and central government levels to build a nationally consistent state of the freshwater environment monitoring and reporting network. Returns on investment in monitoring accrue over time, as the length of data records grow and certainty in results and statistical power increase. Previous investment will be wasted if monitoring systems become unreliable and regionally inconsistent. This is the most likely result of allowing regions flexibility in the attributes they monitor, the thresholds they apply and report against and the methods they use to measure those attributes.

84. The discussion document outlined four purposes for allowing councils to deviate from nationally defined thresholds or monitoring methods. Responses to each of these purposes are:

    a. Advances in the science underpinning a threshold or monitoring method may be a suitable reason for changes to attributes or NBLs, but any such change should be at the national level. There is no justification for a regional approach to address scientific advances.
    b. Local conditions are already addressed through the naturally occurring processes exceptions throughout the NPS FM.
    c. Like advances in the underpinning science, if more effective or efficient monitoring methods are developed there is benefit in addressing this at a national level rather than a regional one.
    d. Social, cultural or economic costs of achieving a bottom line must also take into account the cost of not achieving a bottom line, delaying or not taking any action (see Graham et al. 2020)

85. The discussion document completely misses the fact that the attributes and NBLs are based on the best available scientific information at the time and were developed specifically for the national context. The example given at Fig. 2 (page 20) appears to indicate that regions could deviate from any of the numeric attribute states, methods and bottom lines to assess ammonia toxicity (in orange in the diagram). This fails to understand that the concentrations at which various proportions of species are protected (i.e., 99%, 95%, 80%) from ammonia toxicity is scientific fact, based on toxicological research, not just a matter of opinion that could differ from region to region.

86. A summary table of responses to section 2.3 of the discussion document can be found at Appendix 3 to this memo.

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Appendix 1

Summary of recommendations for Appendix 2 NPS FM attributes

Attribute	Recommendation
Periphyton chl-a	NPS FM NBL for periphyton should be 50% weighted composite cover (%periWCC). PeriWCC is simpler and cheaper to implement. If chl-a is retained as the periphyton attribute the NBL should be an annual maximum of 120 mg/m^2 chl-a. If a national bottom line of 200 mg chl-a/m^2 is retained exceedance criteria should be deleted
Ammonia	Ammonia should be retained within the NPS FM without any change to Table 5 because of the significant and pervasive nature of toxic effects that can occur in contaminated rivers
Nitrate	Nitrate should be retained as an attribute within the NPS FM without any change to Table 6. This is justified by the nature of potential toxic effects on the growth of sensitive species and the contribution nitrate makes to eutrophication and negative impacts on ecosystem health
Dissolved oxygen	Dissolved oxygen should be retained as an attribute in the NPS FM without any change to Table 7 except that (continuous) dissolved oxygen should apply to all rivers and therefore the reference to 'below point sources' should be deleted. Table 17 can be deleted as it is redundant

Suspended fine sediment	Suspended fine sediment should be retained as an attribute in the NPS FM. Possible interim approaches include 1) retain the NBLs from Table 8 and delete the other attribute bands, or 2) apply the 1.6 m recreational clarity standard as an NBL for human contact and recreation, and to provide some degree of ecological protection.
E. coli	*E. coli* should be retained as an attribute in the NPS FM without any change to Table 9
Fish IBI	Retain Fish IBI as a monitoring requirement with reporting against fish IBI attribute bands to inform management. Include the ability to supplement monitoring with new technologies such as eDNA but not rely solely on these methods. Alternatively require councils to monitor fish communities and populations and respond to fish IBI ≤18
Macroinvertebrates QMCI/MCI	MCI and QMCI should be retained in the NPS FM with slight changes to the attribute bands but retaining the NBLs of 90 and 4.5. Methods and tolerance scores should remain as in Table 14 NPS FM (2020) adding the following: "MCI and QMCI should be assessed together and the lower of the two results should apply"
Macroinvertebrates ASPM	Delete ASPM and rely on nationally consistent application of MCI/QMCI
Deposited fine sediment	Retain deposited fine sediment as a critical attribute but remove attribute bands and change the NBL to 20% cover for hard bottomed rivers

Dissolved oxygen (Table 17)	Delete
Dissolved reactive phosphorus	Table 20 should be deleted in its current form and replaced with alternative median DRP and DIN NBLs or removed altogether if NPS FM (2020) section 3.13 is the preferred approach to nutrient management. If Table 20 is retained the 95th percentile criteria should be deleted
Ecosystem metabolism	Table 21 should remain as a monitoring method with no changes – there are no additional monitoring costs as dissolved oxygen data is used and already collected
E. coli primary contact sites	In the absence of an alternative framework for managing recreational risk from microbial pathogens in freshwater Table 22 should remain in the NPS FM with no changes.
Nutrients (to be added)	Add an attribute for DIN and DRP with respective NBLs consistent with NBL for macroinvertebrates of 90 i.e., 0.6 mg/L for DIN and DRP of 0.02 mg/L. In the absence of nutrient NBLs, retain the section 3.13 process for development of nutrient criteria

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Appendix 2

Table 14 reproduced from Biggs (2000) periphyton guidelines subsequently used as attribute bands in the NPS FM

Table 14: Provisional biomass and cover guidelines for periphyton growing in gravel/cobble bed streams for three main instream values.

Instream value/variable	Diatoms/cyanobacteria	Filamentous algae
Aesthetics/recreation (1 November – 30 April)		
Maximum cover of visible stream bed	60 % >0.3 cm thick	30 % >2 cm long
Maximum AFDM (g/m^2)	N/A	35
Maximum chlorophyll *a* (mg/m^2)	N/A	120
Benthic biodiversity		
Mean monthly chlorophyll *a* (mg/m^2)	15	15
Maximum chlorophyll *a* (mg/m^2)	50	50
Trout habitat and angling		
Maximum cover of whole stream bed	N/A	30 % >2 cm long
Maximum AFDM (g/m^2)	35	35
Maximum chlorophyll *a* (mg/m^2)	200	120

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Appendix 3

Summary of responses to section 2.3 of the package 3 discussion document

Issue	Response
Various attributes do not allow for exceptions for naturally occurring processes/variability	Naturally occurring processes are provided for throughout the NPS FM (2020). Criticisms of the NOF and attributes because they 'do not provide for naturally occurring processes' are entirely unfounded. Exceptions are found throughout the NPS FM (2020) e.g., the definitions of degraded/degrading, s3.19, s3.20 and s3.32.
Bands are not meaningful	Attributes should not be required to fit a four-band approach where this is not meaningful to the attribute or the outcome. There is no planning or technical reason why an attribute must fit into four bands.
There are too many attributes, and the NOF is too complex	Critical attributes for sustainable freshwater management are sediment, nutrients, microbial pathogens macroinvertebrates and dissolved oxygen. National bottom lines are needed for these attributes as a minimum. Nationally consistent monitoring of additional attributes is also required for state of the environment reporting.
Monitoring is too expensive and complicated	Cross-region collaboration can assist in reducing inequities in resourcing and improve access to technologies or experienced staff, this should be encouraged and resourced e.g., the Envirolink tools programme. Support and guidance to regions can and should be provided without requiring wholesale changes to the NPS FM.

Compulsory values should be changed	There is no evidence that New Zealand's core values for freshwater have changed over time. There is no evidential basis that a change to the compulsory values is warranted. Relitigating values at the region level will waste valuable time and resources and create uncertainty for resource users.
Councils should be allowed to deviate from NBLs	The discussion document conflates the unsuitability of NBLs with the difficulties facing councils in implementing plans to achieve them, not because NBLs are 'wrong' but because freshwater is degraded to the point where NBLs are exceeded, freshwater values are affected, and action is needed to reverse degradation. NBLs are underpinned by the best available science, this does not change from region to region. The effects of various concentrations of toxins in freshwater are scientific facts, not a matter of community opinion.
Councils should be allowed to deviate from monitoring methods	Any advances in science or monitoring technologies will be appropriate to change at the national level. There is no benefit to improving technologies region by region. Allowing for variable monitoring methods will result in inconsistent measurement and reporting. Investment and gains in nationally consistent monitoring networks will be lost. State of the Environment reporting at the national level will not be possible.

restoration
ecological potential
assessment

New Zealand Fish and Game Council 7 April 2025
c/- Helen Brosnan
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per email to: Helen Brosnan (HBrosnan@fishandgame.org.nz)

Our Ref.: 010/25

Assessment and recommendations for attributes in the NPS-FM 2020 for New Zealand lakes – Part 2

Dear Helen,

1. Introduction

This letter draws on part 1 of reviewing attributes in the National Policy Statement for Freshwater Management 2020 (NPS-FM) for New Zealand lakes (document "Review of NPS-FM 2020 TAS for Lakes"), which examined the suitability of the lake-specific attributes and their associated target attribute states, assessing whether they remain scientifically robust, ecologically meaningful, and practically implementable. Part 2 of this review offers a more detailed analysis aimed at identifying attributes that require further technical development and refinement. It also highlights which attributes should be retained and which may need reconsideration for inclusion in the NPS-FM. The specific objectives of this review are to:

- Identify lake attributes that would benefit from additional technical work to ensure their scientific robustness and ecological relevance.
- Outline potential methodologies and scope for further development.
- Pinpoint key gaps in scientific understanding and identify areas where research is needed to strengthen the evidence base.
- Provide recommendations on how to improve monitoring guidance and implementation strategies to ensure effective use by regional councils in freshwater management.

2. Summary of recommendations

The following summary outlines key recommendations based on the detailed assessment, with further information provided in the attachment to this letter.

- **Phytoplankton (trophic state), total nitrogen (trophic state), and total phosphorus (trophic state):** It is recommended that these attributes remain integral within the NPS-FM. These attributes are considered critical for monitoring and managing eutrophication and nutrient loading. It is also noted that further clarification is needed regarding the application of attribute thresholds for total nitrogen, particularly in relation to the different thresholds for seasonally stratified versus brackish and polymictic lakes.
- **Ammonia (toxicity):** It is recommended that ammonia toxicity not be included as a universal attribute in the NPS-FM framework until more targeted research is conducted to assess its ecological significance in New Zealand lakes. In the interim, efforts should focus on developing context-specific monitoring guidelines for ammonia toxicity.
- **Escherichia coli (*E. coli*):** Given the high temporal and spatial variability of *E. coli* concentrations in lakes, as well as existing monitoring programmes to address more specific issues (e.g., contact recreation), it is recommended that the inclusion of *E. coli* as a mandatory attribute under the NPS-FM be reconsidered (as described in Table 9 of the NPS-FM). Key concerns that need to be addressed include developing clear guidance on sampling protocols and understanding redundancy with existing programmes (human contact as described in Table 22 of the NPS-FM). If these concerns are addressed, *E. coli* could potentially be considered for inclusion.
- **Cyanobacteria (planktonic):** It is recommended that the NPS-FM retains planktonic cyanobacteria as an attribute, but with providing guidance on robust sampling regimes. This should ensure that temporal and spatial variability are adequately captured. It will also be critical to align the attribute band with the updated Aotearoa New Zealand Guidelines for Cyanobacteria in Recreational Freshwaters.
- **Submerged plants (Native Condition Index and Invasive Impact Index):** Given the challenges and potential for misleading conclusions, it is recommended to reconsider the inclusion of the Native Condition Index and Invasive Impact Index as attributes within the NPS-FM, unless clearer and more unambiguous guidance is provided to address the concerns raised. Furthermore, it is suggested that alternative indicators that are more aligned with internationally recognised standards, such as those used in the EU Water Framework Directive, would provide a more consistent and comprehensive approach to assessing ecological health using macrophyte based indicators.

- **Lake-bottom dissolved oxygen:** It is recommended that the lake-bottom dissolved oxygen attribute be retained in the NPS-FM, as it provides a valuable early warning system for identifying the likelihood of nutrient release from sediments.
- **Mid-hypolimnetic dissolved oxygen (seasonally stratifying lakes):** Given the significant refinements required and the exclusion of polymictic lakes, it is recommended that the inclusion of this attribute in the NPS-FM be reconsidered. A review of the attribute's overall fitness for purpose is warranted, including whether it can realistically support effective policy implementation across New Zealand's diverse lake types. There is a need for updated guidance that encourages lake-specific, ecologically grounded definitions of hypolimnion depth and the development of comparable metrics for polymictic lakes.

This review underscores the importance of ensuring that the lake attributes within the NPS-FM are scientifically sound, ecologically meaningful, and practically implementable. While several attributes are well-aligned with current knowledge and management needs, there are notable gaps and uncertainties that require further technical development, research, and refinement. The recommendations presented in this assessment emphasise the need for clearer guidance on attribute thresholds, improved monitoring frameworks, and targeted research to strengthen the scientific basis of these attributes.

Additionally, alignment with internationally recognised standards could enhance the consistency and applicability of the NPS-FM across New Zealand's diverse lake systems. These improvements would help ensure that the NPS-FM effectively supports the sustainable management of freshwater ecosystems, enabling regional councils to make informed decisions that protect and enhance New Zealand's lake environments.

Please do not hesitate to contact me if you have any questions regarding this assessment or require further information.

Kind regards,

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Attachment I

Assessment and recommendations for lake attributes

Phytoplankton (trophic state), total nitrogen (trophic state), total phosphorus (trophic state)

Phytoplankton biomass, total nitrogen, and total phosphorus are essential attributes for assessing trophic state and managing eutrophication in New Zealand's freshwater ecosystems. These attributes have a long history of monitoring in New Zealand, with the Trophic Level Index[1] (TLI) serving as a key indicator of eutrophication for several decades. The TLI, which integrates measurements of phytoplankton biomass, nitrogen, and phosphorus (and Secchi depth, which is not included in the NPS-FM), has become a well-established and widely accepted method for tracking and managing nutrient enrichment across the country. Retaining these attributes within the NPS-FM ensures alignment with this scientifically grounded framework, providing a consistent and effective approach to managing freshwater quality.

Managing both total nitrogen and total phosphorus is essential for maintaining water quality and ecosystem integrity in freshwater systems. However, further clarification is needed regarding the application of attribute thresholds for total nitrogen, particularly in relation to the different thresholds for seasonally stratified versus brackish and polymictic lakes. While it is reasonable to expect that seasonally stratified lakes remove more nitrogen through denitrification during stratification, it is unclear whether the current threshold values adequately account for this process across New Zealand's diverse lake types. A clearer rationale for these differing thresholds, and their application across various lake types, would improve the consistency and accuracy of the attribute banding system.

Furthermore, while managing total nitrogen and phosphorus concentrations is critical for addressing eutrophication, it is important to consider the specific context of naturally eutrophic lakes[2]. These lakes often experience inherently higher nutrient levels, which may not necessarily result in the same ecological risks or degradation as seen in nutrient-enriched systems.

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[1] Burns B., Bryers G., Bowman E. 2000. Protocol for monitoring trophic levels in New Zealand lakes and reservoirs. Lakes Consulting Client Report 99/2 prepared for the Ministry for the Environment. Pauanui, New Zealand.

[2] Abell, J. M., van Dam-Bates, P., Özkundakci, D., & Hamilton, D. P. (2020). Reference and current Trophic Level Index of New Zealand lakes: benchmarks to inform lake management and assessment. New Zealand Journal of Marine and Freshwater Research, 54(4), 636–657.

Recommendation

It is recommended that phytoplankton biomass, total nitrogen, and total phosphorus remain integral attributes within the NPS-FM. These attributes are critical for monitoring and managing eutrophication and nutrient loading,

Ammonia (toxicity)

Ammonia toxicity is a key water quality concern in freshwater ecosystems, particularly in relation to its potential impact on aquatic life. The attribute is typically assessed based on ammonia concentration thresholds. While well-established global thresholds for ammonia toxicity exist, its ecological relevance for New Zealand lakes remains uncertain. Most New Zealand lakes, particularly those that are oligotrophic or not heavily influenced by nutrient enrichment, do not experience ammonia concentrations that approach toxic levels (Figure 1). Consequently, applying a blanket ammonia toxicity threshold across all lakes in New Zealand may not be scientifically justified, as the likelihood of toxicity occurring in these lakes is low. Most lakes assessed so far fall within the A and B bands of water quality, suggesting that ammonia toxicity is not a widespread problem (Figure 1). However, this may be due to the limited scope of monitoring, as many lakes lack sufficient data for accurate grading and assessment of ammonia toxicity risks. Without consistent monitoring across New Zealand's lakes, it is difficult to determine whether the absence of toxicity problems reflects the true situation or simply reflects the limitations in current monitoring efforts.

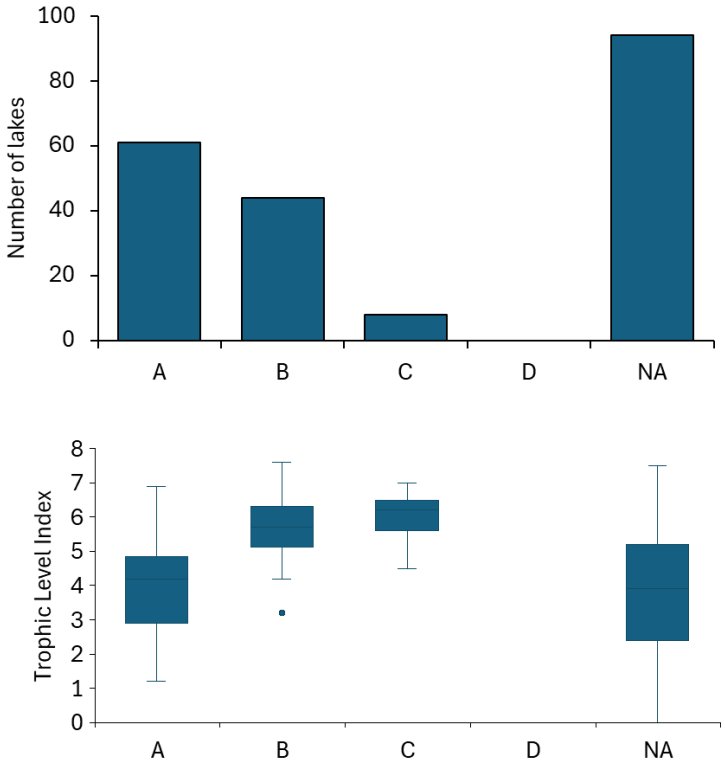

Figure 1 Number of lakes within respective ammonia toxicity bands (top panel) and the distribution of ammonia toxicity bands along a Trophic Level Index (TLI) gradient (lower panel). Oligotrophic and mesotrophic lakes (lower TLI values) generally exhibit better ammonia toxicity bands compared to highly eutrophic lakes, although no lakes assessed fall within a D band. Data are taken from LAWA - Datafile published on 21 October 2024. https://www.lawa.org.nz/download-data.

Ammonia toxicity is also highly context-dependent, influenced by environmental factors such as pH, temperature, dissolved oxygen levels, and nutrient dynamics. These factors vary considerably across New Zealand's diverse lakes, meaning that ammonia toxicity risks are not uniform. For example, eutrophic or stratified lakes may be at greater risk during periods of low oxygen, while lakes with different characteristics may not face such risks. Therefore, applying a general ammonia toxicity standard without considering these local variations may lead to ineffective management or misallocation of resources. Interestingly, lakes that fall within B and C bands ammonia toxicity (no lake currently falls into D band) are extremely eutrophic (average TLI values of > 5; Figure 1) and suggests that ammonia toxicity is a side effect of extreme nutrient enrichment (which is reliably measured using trophic state indicators) in these lakes.

Given the uncertainty surrounding ammonia toxicity's ecological significance in New Zealand lakes and the context-dependent nature of its toxicity, broader inclusion of this attribute in the National Policy Statement for Freshwater Management (NPS-FM) may not be appropriate at this stage. More targeted research is needed to assess under which conditions ammonia toxicity becomes a concern, and which lake types are most at risk. Research should focus on understanding the interactions between ammonia and other water quality parameters, such as nitrogen, phosphorus, and oxygen, to provide a more comprehensive understanding of its ecological relevance.

Recommendation

It is recommended that ammonia toxicity not be included as a universal attribute in the NPS-FM framework until more targeted research is conducted to assess its ecological significance in New Zealand lakes. In the interim, efforts should focus on developing context-specific monitoring guidelines for ammonia toxicity, particularly in lakes with known risk factors such as eutrophication. This will ensure that the NPS-FM framework is based on robust, evidence-based science and provides effective management strategies for New Zealand's freshwater ecosystems.

Escherichia coli (E. coli)

Under the NPS-FM, *E. coli* is used as a key indicator of human health risks related to recreational water use. While this attribute helps assess potential risks to human health, there are significant concerns about the suitability of *E. coli* as an indicator of human health risk in lakes. This evaluation focused primarily on using *E. coli* as described in Table 9 in the NPS-FM (as a human health indicator) rather than *E. coli* as described in Table 22 (human contact), which serves a very specific purpose and is a comparably well-established protocol.

Temporal and spatial variability

One of the major challenges with using *E. coli* in lakes is the high degree of temporal and spatial variability that can occur. *E. coli* concentrations in lakes can fluctuate significantly due to factors like rainfall events, stormwater runoff, wildlife activity, or localised discharges. These episodic spikes do not necessarily reflect the overall long-term water quality or management success. For example, rainfall can wash contaminants into the lake, causing brief but sharp increases in *E. coli* levels. Similarly, wildlife, such as waterfowl, can introduce high levels of *E. coli* into lakes. Because *E. coli* is largely driven by external inputs, these fluctuations can make it an unreliable metric for assessing sustained changes in water quality over time.

Beyond temporal variability, spatial variability is also a significant factor in lake monitoring. *E. coli* concentrations can vary widely across different areas within the same lake, depending on the proximity to contaminant sources such as stormwater inflows, wildlife gathering areas, or nearshore activities. For instance, mid-lake monitoring sites, which are typically used for water quality assessments, may not accurately reflect the *E. coli* concentrations at locations that are more directly affected by human activities or environmental factors. This spatial variability can lead to misinterpretations of the lake's overall condition, especially when relying on data from a single site that may not be representative of the whole lake.

Redundancy in existing monitoring programmes

E. coli is already being monitored for human health purposes through established recreational water quality programmes at designated swimming sites (which is recognised in the NPS-FM Table 22). These programmes provide essential data for assessing and managing infection risk to swimmers, and their data are regularly used to inform public health advisories. Including *E. coli* as a mandatory lake attribute under the NPS-FM could lead to duplication of efforts and unnecessary additional monitoring. Since *E. coli* concentrations are already being tracked for public health purposes, adding it as a required lake attribute under the NPS-FM would not provide new insights into human health risks but would instead divert resources away from monitoring more directly relevant indicators of water quality or contaminant sources. A more effective approach to managing human health risks in lakes would be to retain *E. coli* monitoring as part of site-specific recreational water quality programmes, where it can be used to assess the infection risk for swimmers at popular bathing sites. These programmes already provide the data needed to support public health advisories, making it unnecessary to include *E. coli* as a mandatory attribute for the entire lake under the NPS-FM.

Progress in *E. coli* reporting across New Zealand

Across New Zealand, there has been limited progress in adopting monitoring programmes that enable consistent reporting of *E. coli* levels as required under the NPS-FM (Table 1). In many regions where grading is possible, *E. coli* does not appear to be a major issue for most lakes. For instance, in Auckland, Bay of Plenty, and Waikato, while there are some reported incidences of *E. coli* in a small number of lakes, the majority of lakes do not present *E. coli* as a critical concern. This trend is evident in the regional breakdown, where the grading for *E. coli* shows relatively low occurrences compared to other water quality issues. In fact, this data suggests that, in most cases, *E. coli* may not be a significant driver of water quality concerns for many lakes in New Zealand. This highlights the redundancy of adding *E. coli* as a mandatory lake

attribute, as it would only serve to duplicate efforts already covered by existing recreational water quality programmes.

Table 1 Regional distribution of lakes with E. coli grading under the **NPS-FM***, highlighting the limited occurrences of E. coli as a major issue in most lakes across New Zealand. Data are taken from LAWA - Datafile published on 21 October 2024. https://www.lawa.org.nz/download-data.*

	Number of lakes within respective band				
Region	**A**	**B**	**C**	**D**	**NA**
Auckland					4
Bay of Plenty					14
Canterbury	4	3		3	37
Hawke's bay	2				11
Manawatū-Whanganui					15
Northland					26
Otago	5		1		2
Southland	8	4	1		5
Taranaki				1	15
Waikato	6				33
Wellington					4
West Coast					3

Recommendation

Given the high temporal and spatial variability of *E. coli* concentrations in lakes, as well as the existing monitoring programmes already assessing human health risks at recreational sites, it is recommended that the inclusion of *E. coli* as a mandatory attribute (as described in Table 9 in the NPS-FM) under the NPS-FM be reconsidered.

Key concerns that need to be addressed before considering its inclusion include developing clear guidance on sampling protocols to address temporal and spatial variability in lakes and understanding redundancy with existing programmes where *E. coli* is already being monitored at recreational sites as part of public health programmes (as in Table 22 of the NPS-FM, which appears largely fit for purpose). If these concerns are addressed, *E. coli* could potentially be considered for inclusion under the NPS-FM.

Cyanobacteria (planktonic)

Planktonic cyanobacteria are a critical attribute for assessing the ecological health of freshwater lakes, as their presence and growth can significantly impact water quality and biodiversity. Blooms of cyanobacteria are often indicative of nutrient enrichment and can lead to adverse ecological effects, such as oxygen depletion and the release of toxins harmful to aquatic life and human health.

Temporal and spatial variability of planktonic cyanobacteria

Planktonic cyanobacteria are an important indicator of ecological health, with the potential to significantly impact freshwater ecosystems. However, like *E. coli*, their concentrations can exhibit substantial temporal and spatial variability. Blooms often respond to environmental conditions such as nutrient availability, temperature, and hydrological events like rainfall, and as such, their biovolume can fluctuate rapidly. These episodic blooms may not reflect the long-term trends in a lake's ecological health and could be driven by short-term factors that are not indicative of overall lake management success. For instance, cyanobacterial blooms can be triggered by nutrient loading following rainfall events, leading to temporary increases in biovolume that do not necessarily reflect chronic or systemic water quality problems.

Moreover, spatial variability is crucial when monitoring planktonic cyanobacteria. Concentrations can differ dramatically across various areas of a lake due to differences in nutrient availability, depth, and other local factors such as water temperature and light penetration. Monitoring at only a few points within a lake may not capture this spatial variation and could lead to misinterpretations of the overall health of the waterbody, especially if these sites do not coincide with areas more prone to blooms. Therefore, the spatial extent and temporal frequency of sampling are critical for obtaining an accurate assessment of cyanobacterial dynamics.

Clarification of sampling regime

Given the ecological significance of planktonic cyanobacteria, it is essential that a robust and consistent sampling regime is established to ensure that this attribute under the NPS-FM is meaningful and accurately reflects the ecological health of lakes. This would involve clarifying both the temporal and spatial sampling strategies:

- Temporal sampling should be frequent enough to capture the variability of cyanobacterial blooms, particularly during high-risk periods such as late spring and summer when blooms are more likely to occur.

- Spatial sampling should be designed to account for the heterogeneity within lakes. Monitoring should extend beyond mid-lake sites to include areas more prone to blooms, such as nearshore zones or locations affected by nutrient inflows. This will help avoid the potential for misinterpretations based on incomplete data from a limited number of monitoring points.

Redundancy in existing monitoring programmes

It is important to acknowledge that planktonic cyanobacteria are already being monitored under various regional and national programmes aimed at assessing harmful algal blooms (HABs). These programmes collect valuable data on cyanobacterial biovolume, especially in recreational areas where blooms may pose health risks. Including planktonic cyanobacteria as a mandatory attribute under the NPS-FM could risk redundancy, diverting resources from more targeted management efforts. Given that cyanobacteria monitoring is already in place for health advisories, a better approach would be to refine the NPS-FM's requirements to focus on the ecological significance of planktonic cyanobacteria, based on the clarity of the sampling regime, and ensure that monitoring resources are used effectively.

Challenges in monitoring and managing cyanobacteria blooms: Contrasting eutrophic lake dynamics

In oligotrophic lakes, which are typically nutrient-poor, HABs are less common but may still occur under specific conditions. Cyanobacteria growth in such systems can be more sporadic, often driven by occasional nutrient pulses (such as those resulting from runoff after rainfall) or shifts in environmental conditions like temperature changes. This makes it difficult to differentiate between a transient, episodic bloom and a consistent, long-term ecological issue. The challenge here lies in the fact that cyanobacterial blooms in oligotrophic lakes might not be symptomatic of systemic nutrient enrichment but rather of short-term environmental fluctuations. The limited nutrient availability means that when blooms occur, they may be more difficult to detect or predict due to their irregularity and transient nature.

In contrast, in eutrophic lakes, those rich in nutrients, cyanobacterial blooms are more persistent and may occur more regularly. The nutrient levels (particularly nitrogen and phosphorus) in these systems support more consistent and frequent cyanobacteria growth. Here, blooms are often more closely tied to ongoing nutrient loading, making them easier to identify as part of a broader, chronic problem related to nutrient enrichment. The stability of blooms in eutrophic lakes makes them more predictable and easier to monitor in comparison.

The implications for management are significant. In eutrophic lakes, management actions may focus on reducing nutrient loads to mitigate the frequency and severity of blooms, and monitoring efforts can be concentrated on tracking these recurring blooms. In contrast, in oligotrophic lakes, distinguishing between a natural fluctuation and a potential HAB may require more nuanced approaches, including more frequent sampling, comprehensive spatial coverage, and careful interpretation of environmental factors.

Recommendation

It is recommended that the NPS-FM retains planktonic cyanobacteria as an attribute, but with a clearly defined and robust sampling regime. This should ensure that temporal and spatial variability are adequately captured, thereby providing meaningful data on the ecological health of lakes. Without such clarification, the attribute may not accurately reflect lake conditions, and resources could be misallocated to redundant monitoring efforts. It will also be critical to align the attribute band with the updated Aotearoa New Zealand Guidelines for Cyanobacteria in Recreational Freshwaters[3].

Submerged plants (Native and invasive species)

The Native Condition Index and Invasive Impact Index are two key attributes used within the NPS-FM to assess lake ecological health. These indices aim to provide insights into the state of native submerged vegetation and the impact of invasive species, respectively, but they come with inherent challenges when used in tandem.

Conflicting purposes and potential for misleading conclusions

One of the main challenges with an indicator that serves both as a biosecurity tool and an ecological health indicator is the risk of conflicting conclusions when applied to the same ecosystem.

When viewed primarily as a biosecurity indicator, the focus is on controlling invasive species to prevent further ecological degradation. In this context, a good outcome for invasive macrophytes would be the removal or reduction of invasive macrophytes like *Lagarosiphon major*, *Egeria densa*, or *Elodea canadensis*. The goal is to halt or reverse the spread of these species and prevent further ecological harm.

[3] Ministry for the Environment and Health New Zealand. 2024. Aotearoa New Zealand Guidelines for Cyanobacteria in Recreational Freshwaters. Wood SA, Puddick J, Hamilton DP, Paul WJ, Safi KA, Williamson WM, Thomson-Laing G, Hawes I, McBride G, Kelly LT, Holloway M, Cridge B, Cressey P, Fairbrother P (Eds). Wellington: Ministry for the Environment.

On the other hand, when used as an ecological health indicator, the attributes measure the presence and condition of native submerged vegetation, which plays an essential role in maintaining lake health. However, the presence of invasive species is often associated with the degradation of native plant communities, making it difficult to assess ecosystem health accurately if the primary focus is on the invasive species themselves. For example, even in lakes where invasive species are present, they might still provide critical ecosystem services such as habitat or water quality regulation, albeit at a lower ecological value than native species.

When an attribute serves both purposes, there is a risk that management actions might become misaligned, with a focus on eradicating invasive species potentially conflicting with the broader goal of ecological restoration. For instance, attempting to completely eradicate invasive plants from a lake that has already undergone significant ecological degradation may lead to an ecological vacuum, where the removal of invasives leaves no other vegetation (native or non-native) to perform key ecosystem functions. In such cases, the Native Condition Index score could become artificially low, not because of true ecological degradation but because of the absence of any submerged vegetation, leading to misleading conclusions about the lake's health.

This latter issue is particularly problematic when a devegetated lake could receive an A band for invasives (indicating minimal impact of invasive species) due to their complete removal but also receive a D band for natives (indicating poor native vegetation health) because there is no remaining submerged vegetation. In such a case, the lake may be scored as having both optimal conditions for invasives (A) and poor conditions for natives (D), creating conflicting and potentially misleading conclusions about the lake's actual ecological health. This paradox demonstrates the difficulty of using these indices in isolation without the context of ecosystem function.

Challenges in grading and interpreting ecological health using the current attributes

The EU Water Framework Directive (EUWFD), a cornerstone of water management policy in Europe, emphasises the importance of using ecologically relevant metrics to assess the health of water bodies. Specifically, the EUWFD includes macrophyte indicators as part of its biological monitoring programmes. These indicators are designed to reflect the functional health of ecosystems, not only through species composition but also by assessing the ecological

functions macrophytes perform, such as nutrient cycling, sediment stabilisation, and habitat provision. Under the EUWFD, the macrophyte indicators serve multiple purposes[4]:

- Species composition – A key metric to track the diversity of macrophyte communities, with an emphasis on sensitive species that indicate high water quality and diverse ecological conditions.
- Biomass – Reflects the total plant mass, which is linked to nutrient availability and trophic status, providing a broader view of nutrient dynamics.
- Vegetation depth limits – Used to gauge water transparency and the overall ecological potential of the water body, as macrophytes are typically limited by light availability.

The EUWFD's approach is comprehensive, focusing not just on the presence of species but also on their functionality in terms of supporting a healthy ecosystem. This aligns with the broader objectives of the EUWFD, which aims to maintain or restore Good Ecological Status by ensuring that water bodies function according to their natural or near-natural state. In this context, macrophytes are seen as integral components of lake ecosystems, providing a suite of ecosystem services such as nutrient uptake, sediment stabilisation, and habitat for aquatic fauna.

In comparison, New Zealand's NPS-FM uses a more narrow, species-centric approach when assessing the ecological health of lakes, focusing specifically on the Native Condition Index and the Invasive Impact Index. These two indicators are used to determine the health of submerged vegetation in New Zealand lakes, but they differ significantly from the EUWFD's more functional approach to lake health assessment.

- Native Condition Index: This index measures the extent and condition of native submerged macrophytes. While important for assessing the health of native plant communities, this index provides limited insight into the functional health of the ecosystem, particularly in lakes where invasive species may dominate but still provide essential ecological functions.
- Invasive Impact Index: This index assesses the impact of invasive species, particularly how they alter the structure of submerged vegetation communities. This index does not account for the functional roles invasive species may play in maintaining certain

[4] Poikane, S., Portielje, R., Denys, L., Elferts, D., Kelly, M., Kolada, A., ... & Van den Berg, M. S. (2018). Macrophyte assessment in European lakes: Diverse approaches but convergent views of 'good'ecological status. Ecological indicators, 94, 185-197.

ecosystem functions in degraded lakes, such as stabilising sediment, improving water clarity, or providing habitat for aquatic fauna.

A significant limitation of the NPS-FM's approach is its focus on species composition, especially the dominance of invasive species, without considering the broader functional role of these species within the lake ecosystem. The main distinction between the NPS-FM's use of the Native Condition Index and Invasive Impact Index and the EUWFD's approach is the functional perspective on macrophytes. Under the EUWFD, the goal is to assess the ability of the water body to support healthy ecological functions, including nutrient cycling, sediment stabilisation, and habitat provision. This approach acknowledges that some invasive species, while disrupting native biodiversity, may still contribute positively to ecosystem services in degraded systems. For instance, an invasive species like *E. densa* may increase water clarity and provide habitat, despite its negative impact on native plant species.

In contrast, the NPS-FM framework largely separates the two dimensions of ecological health into the Native Condition Index (focused on the extent and health of native plants) and the Invasive Impact Index (focused on the presence and dominance of invasive species). This separation can lead to a reductionist view of lake health, where a lake with a high presence of invasive species and low native plant cover might receive poor grades across both indices, even if the invasive species are maintaining important ecological functions.

Moreover, the NPS-FM framework does not fully account for lakes that have already been heavily altered by invasive species, where native species may no longer be viable. In such systems, an aggressive focus on removing invasive species to improve the Invasive Impact Index could result in a loss of all submerged macrophytes, which would complicate the ability to apply a meaningful grading system. This is a critical issue, particularly for lakes that have already undergone significant ecological changes, where complete removal of invasive species might not always be a desirable management goal.

Recommendation

Given these challenges, it is recommended to reconsider the inclusion of the Native Condition Index and Invasive Impact Index as attributes within the NPS-FM, unless clearer and more unambiguous guidance is provided to address the concerns raised. Without such clarification, there is a significant risk of misinterpretation and mismanagement of freshwater ecosystems, especially in cases of already degraded or devegetated lakes.

Furthermore, alternative indicators that are more aligned with internationally recognised standards, such as those used in the EUWFD, would provide a more consistent and

comprehensive approach to assessing ecological health. These indicators, which focus on the overall ecological status and provide a more holistic view of ecosystem function, may better reflect the condition of New Zealand's freshwater systems and support more effective management decisions.

Lake-bottom dissolved oxygen

The monitoring of lake-bottom dissolved oxygen is a key component of freshwater ecosystem management, providing critical insights into biogeochemical conditions that influence nutrient cycling in lake environments. One of the primary functions of lake-bottom oxygen monitoring is its ability to predict the likelihood of nutrient release from sediments under low oxygen conditions. When oxygen levels drop below critical thresholds, microbial processes in the sediment shift from aerobic to anaerobic conditions, which can lead to the release of nutrients, particularly phosphorus and nitrogen, from the sediment into the water column. This release can contribute to increased nutrient concentrations in the water, thereby exacerbating eutrophication, promoting harmful algal blooms, and reducing water quality over time.

Effective monitoring and management of lake-bottom oxygen levels enable more targeted approaches to mitigating nutrient cycling from lake sediments. For example, lakes with persistently low oxygen concentrations may benefit from strategies aimed at improving oxygenation, such as artificial aeration or reducing external nutrient loading through catchment management practices. Early identification of low oxygen conditions also allows for timely adjustments to lake management plans, thereby enhancing the likelihood of successful long-term restoration.

Recommendation

It is recommended that the lake-bottom dissolved oxygen attribute be retained in the NPS-FM, as it provides a valuable early warning system for identifying the likelihood of nutrient release from sediments. By doing so, it will help ensure more effective management and mitigation of nutrient enrichment.

Mid-hypolimnetic dissolved oxygen (seasonally stratifying lakes)

This attribute relates to mid hypolimnetic dissolved oxygen (NPS-FM Table 19). The attribute table provides a description for the impacts of dissolved oxygen changes on lake ecological communities and biogeochemical functions in the hypolimnion.

Monitoring considerations

Dissolved oxygen is typically measured directly in the lake by regional councils. Some regional councils carry out monthly profiling of dissolved oxygen, and high frequency autonomous monitoring stations are in few lakes across the motu. Monitoring design is an important consideration for accurately assessing this attribute, as the spatial resolution (i.e., vertical profile depth increments) and temporal resolution (i.e., number of vertical profiled during the stratification period) will largely determine accurate estimates of the annual minimum. Modern autonomous hight frequency monitoring stations that collect detailed vertical profiles on sub-daily time scales are currently the most accurate way of measuring temperature and dissolved oxygen concentration profiles in lakes, but the deployment of these comparably costly devices in all lakes within monitoring networks is unlikely to be realistic in the foreseeable future. In many lakes that are seasonally stratified, monthly profiles are generally considered to be adequate, but careful consideration must be given to the start and end of the stratification period to accurately capture the timing of minimum oxygen concentrations.

Clarifying the need for better definition and measurement of the hypolimnion in stratified lakes

Accurate identification of the hypolimnetic zone is critical for the effective interpretation of the mid-hypolimnetic dissolved oxygen attribute in the NPS-FM. This attribute is intended to reflect ecological processes linked to oxygen depletion in the deeper layers of stratified lakes, processes that include benthic respiration, organic matter decomposition, and internal nutrient cycling. However, the current policy and technical guidance offer limited direction on how to define the "mid-hypolimnion" in a consistent and ecologically meaningful way. Given the diversity of lake types in Aotearoa New Zealand, a generic or poorly defined approach to selecting this monitoring depth risks misrepresenting the actual oxygen dynamics within individual lakes.

The hypolimnion itself can vary substantially in both thickness and duration depending on lake morphometry, climatic conditions, and catchment influences. The oxygen conditions within the hypolimnion are not uniform. Often, the most critical oxygen depletion occurs closest to the sediment–water interface, where it directly influences habitat availability for benthic organisms and drives phosphorus release under anoxic conditions. Consequently, choosing a depth that does not correspond to this ecologically sensitive zone may result in the attribute failing to detect degradation, or falsely suggesting improvement, over time.

In the absence of clear methodological guidance, regional councils may adopt different conventions for defining the hypolimnion and selecting a "mid-point" for oxygen

measurements. This lack of consistency undermines the comparability of results across lakes and regions, and introduces uncertainty in trend analyses, compliance assessments, and in the setting or review of TAS. The use of a fixed depth, a mid-point between the thermocline and the lake bottom, or a value arbitrarily chosen from profile data each carry different assumptions and implications, none of which may align with the actual zones of ecological risk.

For the mid-hypolimnetic oxygen attribute to be meaningful and actionable, there is a need for updated guidance that encourages lake-specific, ecologically grounded definitions of hypolimnion depth. This could be based on temperature or density profiles, thermocline depth tracking, or hypsographic information, potentially supported by stratification metrics such as Schmidt stability or the relative depth of stratification. Standardising approaches while allowing for flexibility based on lake type would strengthen the scientific integrity of this attribute.

Addressing the exclusion of polymictic lakes from hypolimnetic oxygen assessments

The current NPS-FM attribute for mid-hypolimnetic dissolved oxygen focuses exclusively on seasonally stratified lakes. While this is defensible for the subset of lakes that develop persistent thermal stratification, it overlooks a large number of shallow, polymictic lakes that also experience low-oxygen conditions in periodically formed hypolimnion with relevant ecological implications. These lakes, which mix frequently and do not maintain a stable hypolimnion for extended periods of time, are still susceptible to hypoxia, particularly under high nutrient loads, warm temperatures, or extended calm periods. Yet, the current framework provides no mechanism to assess or manage oxygen depletion in these systems, despite their ecological importance and vulnerability.

Regional information from the Freshwater Ecosystems of New Zealand (FENZ) dataset highlight the scale of this omission (Table 2). In regions like Northland, Waikato, and Manawatū-Whanganui, approximately half of all lakes are polymictic. Wellington and Auckland show even higher proportions, with 80% and 44% of lakes, respectively, falling into this category. In these regions, the exclusion of polymictic lakes from the dissolved oxygen attribute means that many shallow lakes (often in populated, lowland areas) lack a clear hypolimnetic oxygen-related management metric under the NPS-FM. This creates a disparity in how oxygen dynamics are monitored and managed across the country, potentially leading to blind spots in freshwater ecosystem protection.

Table 2: Number and proportion of polymictic and seasonally stratified lakes in each region of New Zealand based on the Freshwater Ecosystems of New Zealand (FENZ) database. Also shown is the total number of FENZ lakes per region and their proportion relative to the national total.

Region within FENZ	Number of polymictic lakes (proportion of lakes within region)	Number of seasonally stratified lakes (proportion of lakes within region)	Number of FENZ lakes* (proportion of FENZ lakes relative to the national total)
Auckland	12 (0.44)	15 (0.56)	27 (0.01)
Bay of Plenty	23 (0.39)	36 (0.61)	59 (0.03)
Canterbury	38 (0.15)	222 (0.85)	260 (0.11)
Gisborne	1 (0.06)	16 (0.94)	17 (0.01)
Hawkes Bay	25 (0.3)	59 (0.7)	84 (0.04)
Manawatu-Whanganui	49 (0.51)	48 (0.49)	97 (0.04)
Marlborough	11 (0.28)	28 (0.72)	39 (0.02)
Northland	60 (0.52)	55 (0.48)	115 (0.05)
Otago	25 (0.16)	132 (0.84)	157 (0.07)
Southland	42 (0.05)	839 (0.95)	881 (0.39)
Taranaki	5 (0.14)	32 (0.86)	37 (0.02)
Tasman	7 (0.09)	68 (0.91)	75 (0.03)
Waikato	56 (0.51)	53 (0.49)	109 (0.05)
Wellington	24 (0.8)	6 (0.2)	30 (0.01)
West Coast	68 (0.24)	220 (0.76)	288 (0.13)

*Number of lakes was based on Schallenberg L, Thomson-Laing G, Steiner K, Shchapov K, Hampton H, Brasell K, Pearman J, Wood S. 2024. Review of 'lakes' in the Freshwater Ecosystems of New Zealand database. Nelson: Cawthron Institute. Cawthron Report 4039. Prepared for Ministry for the Environment. The geomorphic type for artificial lakes was excluded for this analysis.

Historically, one of the challenges in including polymictic lakes has been the difficulty of consistently measuring and interpreting short-lived or spatially variable hypoxia in shallower systems. However, advancements in modern monitoring technologies, such as high-frequency water quality sensors and automated profiling buoys, now allow for continuous tracking of oxygen dynamics, even in lakes with highly variable stratification and mixing regimes. These tools make it feasible to establish representative metrics for oxygen conditions in the hypolimnion of polymictic lakes, such as minimum daily oxygen or the proportion of time that oxygen drops below ecologically relevant thresholds.

Inclusion of polymictic lakes in the dissolved oxygen attribute would represent a more equitable and comprehensive approach to managing lake health under the NPS-FM. While the metrics and thresholds may need to differ from those used in seasonally stratified lakes, the principle of managing oxygen availability in the hypolimnetic waters should apply across all lake types. Ignoring this risks undermining the objective of protecting ecosystem health in some of the most vulnerable lake systems in the country.

Naturally occurring processes

The deoxygenation of the hypolimnion in lakes occurs due to several interacting factors. These include the biochemical oxygen demand (BOD) from organic material, both autochthonous (produced within the lake) and allochthonous (originating from the surrounding watershed), which sinks into the hypolimnion. Additionally, the oxygen demand from lake bottom sediments plays a crucial role. The influence of certain chemicals, such as ammonia and biodegradable organics, on deoxygenation has also been noted but is not addressed further due to the limited research available on the topic. These factors interact in complex ways, and their relative significance remains a subject of debate in the literature.

Organic carbon delivered to lakes from their catchments comes through multiple pathways. Vegetation and soils are the primary contributors, with vegetation providing organic material via the leaching of litter and live plants, and soils contributing through microbial processes, root exudation, and leaching and erosion of organic matter. In pre-human times, many lakes in New Zealand would have been surrounded by native forest ecosystems, with wetlands contributing organic carbon inputs. However, following European settlement and subsequent land use changes, including farming, dairying, horticulture, and forestry, the composition and quantity of organic carbon entering the lakes have shifted. The ongoing modification of landscapes significantly alters the mixture of organic carbon sources to these lakes.

Land use changes have altered the delivery of organic carbon to lakes throughout New Zealand. Studies have shown considerable variability in the proportion of natural land cover in catchments, with some lakes surrounded by highly modified landscapes and others by more intact natural ecosystems. Organic carbon inputs from catchments have not always been directly quantified, but land use practices such as forestry can increase the export of dissolved organic carbon (DOC) from catchments. Research indicates that in clear-cut forests, DOC concentrations are much higher compared to undisturbed native forests, especially when slash is left unburned. While organic carbon from non-natural land uses may be more readily exported to lakes, the reactivity and decomposition of this carbon differ from that of natural organic matter. Studies suggest that organic matter from native vegetation may have higher

respiration rates, potentially leading to greater oxygen consumption than that from non-native land uses, though this remains untested in many New Zealand lakes.

A key question in understanding deoxygenation is the relative importance of autochthonous versus allochthonous organic carbon. Studies in temperate lakes have shown that autochthonous carbon typically dominates the oxygen demand in hypolimnia. For example, in northern temperate lakes, autochthonous carbon has been identified as the primary source of oxygen consumption in the hypolimnion. However, other studies have found that allochthonous carbon, particularly in its more recalcitrant forms, can also significantly influence oxygen dynamics. It is likely that the relative importance of autochthonous and allochthonous carbon may vary across time and space, influenced by factors such as the composition of organic material and the specific conditions within each lake.

Sediment oxygen demand is another critical factor in the deoxygenation of the hypolimnion. Organic matter deposited in lake sediments plays a substantial role in oxygen consumption. The amount and type of organic matter in the sediments are primarily determined by the organic carbon produced either in the watershed or within the lake. Eutrophic lakes, with their higher phytoplankton productivity, tend to have greater carbon deposition rates in sediments. The majority of the organic matter in the sediments of these lakes is typically autochthonous in origin, reflecting the high primary productivity driven by nutrient enrichment.

Lake morphology also influences the processing of organic matter in the hypolimnion. Deeper, more voluminous lakes typically have a larger reserve of oxygen, which can help mitigate deoxygenation in the hypolimnion, particularly in monomictic lakes, where mixing during autumn replenishes oxygen in the entire water column. In contrast, shallow lakes, where organic particles quickly settle into anoxic sediments, rely on less efficient anaerobic respiration, leading to a more rapid depletion of oxygen. The area of lake sediment in contact with the water below the epilimnion can also influence oxygen dynamics, with larger areas of sediment in contact with the oxygenated waters promoting greater oxygen consumption from sediment organic matter. In lakes with more extensive metalimnions, oxygen depletion from organic matter decomposition is less likely to be replenished by surface mixing, exacerbating hypolimnetic deoxygenation.

Groundwater inputs can also influence hypolimnion oxygen dynamics, although this effect remains poorly understood. Groundwater contributes a significant portion of the water balance in many New Zealand lakes. The impact of groundwater on oxygen dynamics is complex and depends on factors such as the timing, location, and oxygen content of the groundwater entering the lake. Although the overall effect of groundwater inputs on hypolimnetic oxygen is

uncertain, localised impacts near geothermal areas, where groundwater may have higher temperatures and different oxygen levels, could potentially influence microbial activity and oxygen consumption in those regions.

Finally, elevated temperatures, particularly those associated with geothermal activity in some regions, can stimulate microbial activity, leading to increased organic matter decomposition and higher oxygen demand. While elevated temperatures in the hypolimnion may not significantly affect overall oxygen dynamics in most lakes, localised geothermal effects could lead to increased microbial respiration and oxygen depletion in specific areas. Therefore, while temperature-induced increases in microbial activity may be important in certain parts of a lake, their overall impact on hypolimnetic oxygen levels is likely to be context-dependent.

Recommendation

Given the significant refinements required to ensure the mid-hypolimnetic dissolved oxygen attribute is both scientifically robust and consistently applicable to stratified lakes, as well as the conceptual and technical work needed to develop comparable metrics for polymictic lakes, it is recommended that the inclusion of this attribute in the NPS-FM be reconsidered. In its current form, the attribute is limited in scope, excludes a substantial proportion of shallow lakes, and lacks guidance on key implementation details (e.g., hypolimnion delineation). A review of the attribute's overall fitness for purpose, including whether it can realistically support effective policy implementation across New Zealand's diverse lake types, is warranted.

NES-F Permitted Activity Rule

The scope of this work is narrow – it does not involve a full review of the NES. The only outcome we are asked for is an improved permitted activity rule to better allow for access, creation and maintenance of wetlands. No changes to definitions are proposed or other existing discretionary / non complying rules.

Scope of work:

Regulation 38 – restoration, wetland maintenance and biosecurity of natural inland wetlands

Regulation 42 – NEW – Wetland utility structures

Alternative Restricted Discretionary rule

Regulation 52 - 1 change suggested

Regulation 53 & 54 – no changes proposed

Regulation 55 General conditions – proposed amendments

Regulation – NEW – Dams and Weirs to enhance, restore or create wetlands

Restoration, wetland maintenance, and biosecurity of natural inland wetlands

Heading: replaced, on 5 January 2023, by regulation 12 of the Resource Management (National Environmental Standards for Freshwater) Amendment Regulations (No 2) 2022 (SL 2022/320).

Regulation 38 Permitted activities

(1) Vegetation clearance within, or within a 10 m setback from, a natural inland wetland is a permitted activity if it—

(a) is for the purpose of natural inland wetland restoration, wetland maintenance, or biosecurity; and

(b) complies with the conditions.

(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural inland wetland is a permitted activity if it—

(a) is for the purpose of natural inland wetland restoration, wetland maintenance, or biosecurity; and

(b) complies with the conditions.

(3) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural inland wetland is a permitted activity if—

(a) the activity is for the purpose of natural inland wetland restoration, wetland maintenance, or biosecurity; and

(b) there is a hydrological connection between the taking, use, damming, diversion, or discharge and the wetland; and

(c) the taking, use, damming, diversion, or discharge will change, or is likely to change, the water level range or hydrological function of the wetland; and

(d) the activity complies with the conditions.

Conditions

(4)The conditions are that—

(a) the activity must comply with the general conditions on natural inland wetland activities in regulation 55; and

Regulation 42 – new

Construction, use, reconstruction, placement, alteration or maintenance of Wetland Utility Structures

Permitted Activity

The construction, use, reconstruction, placement, alteration or maintenance of a wetland utility structure in, on, under, or over the bed of, or within a 10 metre setback from, a natural inland wetland, and associated bed disturbance, earthworks and vegetation clearance are permitted activities provided the following conditions are met –

(1) The wetland utility structure is –
    (1) A maimai, bird watching hide or game bird shooting structure with a floor area of less than 10 square metres, or
    (2) A boardwalk with a floor area of less than 30 square metres height of less than 1.5m or
    ~~(3) A bridge less than 5 metres in length, or~~
    (4) A sign.
(2) The overall (maximum) height of the structure must not exceed 3 metres.
(3) The floor of the structure must be no higher than 0.5 metres above maximum water level.
(4) The structure shall be maintained in a structurally sound condition for the purpose that it was constructed at all times.
(5) The structure must be open piled.
(6) The erection or placement of the structure does not impede:
    ~~(a) Any legal access to the wetland; or~~
    (a) Fish passage.
(7) No clearance of vegetation must occur as a result of the activity, other than immediately underneath the structure, or within 1 metre of the structure, and the minimum clearance necessary to maintain single file foot access to the structure.
(8) Any bed disturbance or earthworks is kept to the minimum to undertake the activity and the bed is returned as near as practicable to its original shape, area, depth, and gradient on completion of the activity (except for revegetation).
    ~~The activity must comply with the general conditions on natural wetland activities in regulation 55.~~
(9) the activity must not result in the discharge of a contaminant if the receiving environment includes any natural inland wetland in which the contaminant, after reasonable mixing, causes, or may cause, 1 or more of the following effects:
    (i) the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials:
    (ii) a conspicuous change in colour or visual clarity:
    (iii) an emission of objectionable odour:

(iv) the contamination of freshwater to the extent that it is not suitable for farm animals to drink:

(v) adverse effects on aquatic life that are more than minor

(10) The activity must not;

(a) disturb the roosting or nesting of indigenous birds during their breeding season; or

(b) disturb an area that is listed in a regional plan or water conservation order as a habitat for threatened indigenous fish; or

(c) during a spawning season, disturb an area that is listed in a regional plan or water conservation order as a fish spawning area.

(11) The general condition relating to historic heritage is that the activity must not destroy, damage, or modify a site that is protected by an enactment because of the site's historic heritage (including, to avoid doubt, because of its significance to Māori), except in accordance with that enactment.

(12) The general conditions on the use of vehicles, machinery, equipment, and materials are as follows:

(a) machinery, vehicles, and equipment used for the activity must be cleaned before entering any natural inland wetland (to avoid introducing pests, unwanted organisms, or exotic plants); and

(b) machinery that is used for the activity must sit outside a natural inland wetland, unless it is necessary for the machinery to enter the natural inland wetland to achieve the purpose of the activity.

Alternative suggested restricted discretionary activity rule:

The construction, use, reconstruction, placement, alteration or maintenance of a wetland utility structure in, on, under, or over the bed of, or within a 10 metre setback from, a natural inland wetland, and associated bed disturbance, earthworks and vegetation clearance that is not permitted by Rule X, is a restricted discretionary activity.

The discretion of a consent authority is restricted to the following matters:

1. Any effects on wetland ecosystems and habitats (including fish passage), flood risk, the spiritual and cultural values and beliefs of tangata whenua, taonga species, landscape, natural character and amenity values, navigation hazard, public access and recreation values; and

2. The actual and potential environmental effects of not meeting the condition or conditions of Rule X.

Drainage of natural inland wetlands

Heading: replaced, on 5 January 2023, by regulation 27 of the Resource Management (National Environmental Standards for Freshwater) Amendment Regulations (No 2) 2022 (SL 2022/320).

Regulation 52 Non-complying activities

(1) Earthworks outside, but within a 100 m setback from, a natural inland wetland is a non-complying activity if it—

(a) results, or is likely to result, in the complete or partial drainage of all or part of a natural inland wetland; and is not already excluded as a permitted activity for maintenance work.

(b) does not have another status under any of regulations 38 to 51.

(2) The taking, use, damming, or diversion of water outside, but within a 100 m setback from, a natural inland wetland is a non-complying activity if it—

(a) results, or is likely to result, in the complete or partial drainage of all or part of a natural inland wetland; and

(b) does not have another status under any of regulations 38 to 51.

Regulation 53 Prohibited activities – no change out of scope

Regulation 54 Non-complying activities – no change out of scope

General matters

55 General conditions on natural inland wetland activities

(1)This regulation applies if a regulation in this subpart refers to the compliance of an activity with the general conditions in this regulation.

General condition for permitted activities: prior notice of activity

(2) If this regulation applies in relation to a permitted activity, the 1 or more persons responsible for undertaking the activity must, at least 10 working days before starting the activity, provide the relevant regional council with the following information in writing:

(a) a description of the activity to be undertaken; and

(b) a description of, and map showing, where the activity will be undertaken; and

(c) a statement of when the activity will start and when it is expected to end; and

(d) a description of the extent of the activity; and

(e) their contact details.

General conditions: water quality and movement

(3) The general conditions relating to water quality and movement are as follows:

(a) the activity must not result in the discharge of a contaminant if the receiving environment includes any natural inland wetland in which the contaminant, after reasonable mixing, causes, or may cause, 1 or more of the following effects:

(i) the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials:

(ii) a conspicuous change in colour or visual clarity:

(iii) an emission of objectionable odour:

(iv) the contamination of freshwater to the extent that it is not suitable for farm animals to drink:

(v) adverse effects on aquatic life that are more than minor; and

(b) the activity must not increase the level of flood waters that would, in any flood event (regardless of probability), inundate all or any part of the 1% AEP floodplain (but *see* subclause (4)); and

(c) the activity must not alter the natural movement of water into, within, or from any natural inland wetland (but *see* subclause (5)); and

(d) the activity must not involve taking or discharging water to or from any natural inland wetland (but *see* subclause (5)); and

~~(e)~~

~~debris and sediment must not be placed —~~

~~(i)~~

~~within a setback of 10 m from any natural inland wetland; or~~

~~(ii)~~

~~in a position where it may enter any natural inland wetland.~~

(4)

Subclause (3)(b) does not apply if the person undertaking the activity—

(a)

owns or controls the only land or structures that would be affected by a flood in all or any part of the 1% AEP floodplain; or

(b)

has—

(i)

obtained written consent to undertaking the activity from each person who owns or controls the land or structures that would be affected by a flood in all or part of the 1% AEP floodplain, after informing them of the expected increase in the level of flood waters; and

(ii)

satisfied the relevant regional council that they have complied with subparagraph (i).

~~(5)~~

~~Despite subclause (3)(c) and (d), the temporary taking, use, damming, or diversion of water around a work site, or discharges of water into the water around a work site, may be undertaken if the following conditions are complied with:~~

~~(a)~~

~~the activity must be undertaken during a period when there is a low risk of flooding; and~~

~~(b)~~

~~the activity must be undertaken only for as long as necessary to achieve its purpose; and~~

~~(c)~~

~~before the activity starts, a record must be made (for example, by taking photographs) of the original condition of any affected natural inland wetland's bed profile and hydrological regime that is sufficiently detailed to enable compliance with paragraph (d) to be verified; and~~

~~(d)~~

~~the bed profile and hydrological regime of the natural inland wetland must be returned to their original condition no later than 14 days after the start of the activity; and~~

(e)

if the activity is damming, the dam must be no higher than ~~600 mm~~ 4m or impound 20,000m3 of water and

~~(f)~~

~~if the activity is a diversion that uses a pump, a fish screen with mesh spacing no greater than 3 mm must be used on the intake.~~

~~(6)~~

~~In subclauses (3) and (4), **1% AEP floodplain** means the area that would be inundated in a flood event of a size that has a 1% or greater probability of occurring in any one year.~~

~~*General condition: earth stability and drainage*~~

~~(7)~~

~~The general condition relating to earth stability and drainage is that the activity must not create or contribute to—~~

~~(a)~~

~~the instability or subsidence of a slope or another land surface; or~~

~~(b)~~

~~the erosion of the bed or bank of any natural inland wetland; or~~

~~(c)~~

~~a change in the points at which water flows into or out of any natural inland wetland; or~~

~~(d)~~

~~a constriction on the flow of water within, into, or out of any natural inland wetland; or~~

~~(e)~~

~~the flooding or overland flow of water within~~, ~~or flowing into or out of, any natural inland wetland.~~

General conditions: earthworks, land disturbance, and vegetation clearance

(8) The general conditions on earthworks, land disturbance, and vegetation clearance are as follows:

(a) during and after the activity, erosion and sediment control measures must be applied and maintained at the site of the activity to minimise adverse effects of sediment on natural inland wetlands; and

(b) the measures must include stabilising or containing soil that is exposed or disturbed by the activity as soon as practicable after the activity ends; and

(c) the measures referred to in paragraph (b) must remain in place until vegetation covers more than 80% of the site; and

(d) if the activity is vegetation clearance, it must not result in earth remaining bare for longer than 3 months.

General conditions: vegetation and bird and fish habitats

(9) The general conditions relating to vegetation and bird and fish habitats are as follows:

~~(a)~~

~~only indigenous species that are appropriate to a natural inland wetland (given the location and type of the natural inland wetland) may be planted in it; and~~

(b)

~~the activity must not result in the smothering of indigenous vegetation by debris and sediment; and~~

(c) the activity must not disturb the roosting or nesting of indigenous birds during their breeding season; and

(d) the activity must not disturb an area that is listed in a regional plan or water conservation order as a habitat for threatened indigenous fish; and

(e) the activity must not, during a spawning season, disturb an area that is listed in a regional plan or water conservation order as a fish spawning area.

General condition: historic heritage

(10) The general condition relating to historic heritage is that the activity must not destroy, damage, or modify a site that is protected by an enactment because of the site's historic heritage (including, to avoid doubt, because of its significance to Māori), except in accordance with that enactment.

(11) In subclause (10), **enactment** includes any kind of instrument made under an enactment.

General conditions: machinery, vehicles, equipment, and construction materials

(12) The general conditions on the use of vehicles, machinery, equipment, and materials are as follows:

(a) machinery, vehicles, and equipment used for the activity must be cleaned before entering any natural inland wetland (to avoid introducing pests, unwanted organisms, or exotic plants); and

(b) machinery that is used for the activity must sit outside a natural inland wetland, unless it is necessary for the machinery to enter the natural inland wetland to achieve the purpose of the activity; and

~~(c)~~

~~if machinery or vehicles enter any natural inland wetland, they must be modified or supported to prevent them from damaging the natural inland wetland (for example, by widening the tracks of track-driven vehicles or using platforms for machinery to sit on); and~~

~~Where machinery or vehicles are required to carry out works in natural inland wetlands, restoration of the access track that they have created to do the works will be necessary.~~

(d)

~~the mixing of construction materials, and the refuelling and maintenance of vehicles, machinery, and equipment, must be done outside a 10 m setback from any natural inland wetland.~~

General conditions: miscellaneous

(13) The other general conditions are as follows:

(a) the activity must be undertaken only to the extent necessary to achieve its purpose; and

(b) the activity must not involve the use of fire or explosives; and

(c) if there is existing public access to a natural inland wetland, the activity must not prevent the public from continuing to access the natural inland wetland (unless that is required to protect the health and safety of the public or the persons undertaking the activity); and

(d) no later than 5 days after the activity ends,—

(i)debris, materials, and equipment relating to the activity must be removed from the site; and

(ii) the site must be free from litter.

Reg X – Dams and weirs to enhance, restore or create wetland habitats

1. The placement, erection or reconstruction of any dam or weir in, on or over the bed of a wetland, modified watercourse or artificial drain and any associated bed disturbance and discharge resulting from the activity, is a permitted activity provided the following conditions are met:

    a. The primary purpose must be to enhance, restore, or create wetland habitats;

    b. If the dam or weir exceeds 4 meters in height or 20,000 cubic meters in water impoundment volume, a building consent must be obtained prior to construction;

    c. The dam or weir must be in a catchment area of less than 500 hectares;

    d. The dam or weir must not be located upstream of any railway, formed public road, or residence that could be affected by its failure;

    e. The dam or weir must have a spillway or auxiliary spillway capable of safely conveying flood flows;

    f. The dam or weir must not impound water or adversely affect drainage beyond the landholding unless agreed in writing by the affected landowner;

g. The dam or weir must allow fish passage for species that exist in the catchment, except for pest fish[1] species;

h. The discharge from the dam or weir must return to the original channel without causing significant erosion or deposition downstream;

i. The dam or weir must not be within any mātaitai, nohoanga, or taiāpure areas; and

j. For Reg X(1)(b), the height of a dam or weir is measured from the crest to:

i. The natural bed of the wetland at the lowest downstream point; and

ii. The lowest elevation at the downstream limit for a modified watercourse or drain.

2. The use of any dam or weir is a permitted activity provided the following conditions are met:

a. The primary purpose must be to enhance, restore, or create wetland habitats;

b. The structure is lawfully established;

c. The activity must allow fish passage, except for pest fish species; and

d. The structure is maintained in a good state of repair.

3. Despite Reg 55(3)(c) and (d), the taking, use, damming, or diversion of water by a dam or weir to enhance, restore, or create wetland habitats is a permitted activity provided the following conditions are met:

a. The primary purpose must be to enhance, restore, or create wetland habitats;

b. The activity must allow fish passage, except for pest fish species;

c. The total volume of water taken, used, dammed or diverted must be non-consumptive;

d. If the activity is damming, the dam must be no higher than 4m, or the impoundment volume must not exceed 20,000 cubic meters of water; and

e. If the activity is diverting water using a pump, a fish screen with mesh spacing no greater than 3 mm must be used on the intake.

4. The use, placement, erection or reconstruction of any dam or weir in, on or over the bed of a wetland, river, modified watercourse or drain and the associated damming of water (either inside or outside the bed), and any associated bed disturbance and discharge resulting from the carrying out of the activity, that does not meet one or more of the conditions of Reg X(1) or (2) is a discretionary activity.

5. The taking, use, damming, or diversion of water by a dam or weir to enhance, restore, or create wetland habitats that does not meet one or more of the conditions of Reg X(3) is a discretionary activity.

[1] As listed in your regional Pest Management Plan.

Note 1: In addition to this rule, weirs are managed under Regulations 72 and 73 of the Resource Management (National Environmental Standards for Freshwater) Regulations 2020.

Note 2: The Building Act 2004 specifies obligations on the owner of a dam as defined in that Act regarding classification, certification and other matters of safety.

Comments on the Macroinvertebrate attribute with respect to proposed changes to the National Policy Statement for Freshwater Management (2020)

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1. The macroinvertebrate attribute should be retained.

While some changes to the macroinvertebrate attribute in the NPSFM may be warranted, I believe it should be retained as a critical attribute for waterway management. It is well established in biomonitoring in New Zealand and is one of the best overall measures of ecological health, being relatively robust to differences in sampling effort.

2. The sampling protocol for macroinvertebrates should remain unchanged.

I understand that consideration is being given to adopting the NEMS macroinvertebrate sampling protocol (National Environmental Monitoring Standards (NEMS) Steering Group 2022) where:

"A single composite sample shall be collected comprising between four and eight unit efforts from the different mesohabitats in proportion to their abundance across the monitoring reach."

If this sampling protocol were to replace the current NPZFM sampling protocol (Stark & Maxted 2007) then, comparison of index values between sites and locations could potentially reflect differences in mesohabitats rather than potential anthropogenic impacts.

3. Regionally different MCI taxa sensitivity scores are not appropriate.

While it might appear as if there are differences in how the MCI/QMCI responds to potential anthropogenic stressors between regions (e.g., Northland Regional Council have their own sensitivity scores for taxa in their region) this is likely to reflect differences in the prevalence of those stressors between regions and/or site used to assess "unimpacted" conditions between regions.
If taxa sensitivity scores are derived separately for every region in New Zealand it will not be possible to compare these indices across New Zealand and thus impair national reporting and / or assessments.

4. The Average Score Per Metric (ASPM) can be removed.

The ASPM does not appear to have added any value to bioassessment and could be removed from the NPSFM.

5. The A-band threshold could be reduced to 120

While raising the environmental bottom line for MCI to 90 is warranted, increasing the A-band threshold to 130 seems unjustified and should be reverted to 120. However, again for national consistency, the MCI/QMCI numerics for bands should be consistent across the country.

References

National Environmental Monitoring Standards (NEMS) Steering Group. (2022). *National Environmental Monitoring Standards Macroinvertebrates: Collection and Processing of Macroinvertebrate Samples from Rivers and Streams*. Ministry for the Environment, Wellington.

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Submission to Package 2 National Direction, Primary Sector
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on behalf of
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1.0 Executive Summary

Fish & Game Submission to Package 2 National Direction, Primary Sector

Fish & Game is submitting on most elements of the primary sector proposals, emphasising the need to balance economic activity with environmental protection, particularly for water quality and habitat preservation for the species we manage. Our primary concerns centre on sediment runoff, water quality and quantity degradation, and maintaining access to waterbodies for recreation.

National Environmental Standards for Commercial Forestry (NES-CF)

Fish & Game's key concern with commercial forestry is sediment runoff into waterbodies, particularly during harvesting, afforestation, and replanting periods. Successful salmonid spawning requires stony riverbeds with minimal deposited sediment, yet approximately 20% of New Zealand rivers are currently soft-bottomed when research indicates this should be around 2%.

We support the proposed amendments that increase regulatory certainty whilst maintaining environmental protections. However, we maintain that minimum setbacks should be at least 10 metres from waterbodies. The Fish Spawning Indicator Tool requires significant improvement or replacement, as it currently provides incomplete data for fisheries assessments.

New Zealand Coastal Policy Statement (NZCPS)

Fish & Game opposes weakening Section 6(a) protections for natural character in coastal environments. Whilst we acknowledge the need for activities with functional needs to operate in coastal areas, the proposed expansion to include "operational need" risks enabling inappropriate development.

We have significant concerns about promoting aquaculture near wild salmon stocks due to risks of disease transmission, genetic contamination, and nutrient pollution. The coastal marine environment is vital for freshwater fish communities, with healthy estuarine ecosystems supporting food webs essential for large freshwater fish when catchment waterbodies are degraded.

National Policy Statement for Highly Productive Land (NPS-HPL) Our submission recommends minimum 300-metre setbacks from game bird hunting areas to residential development to prevent reverse sensitivity effects.

For Special Agricultural Areas, we are concerned that allowing additional nitrogen runoff creates unfair advantages over other consented activities and risks further degradation of already compromised waterbodies.

Quarrying and Mining Provisions

Fish & Game remains agnostic to quarrying and mining as activities but seeks to manage impacts on hunters, anglers, and the species we manage. Key concerns include direct disturbance of waterbodies, contaminant discharge, sediment runoff, and loss of access to recreational areas.

We recommend clarifying that proposed changes do not apply to river-sourced gravel extraction, which requires different management approaches. The organisation opposes expanding gateway tests to include "operational need" as this prioritises private economic interests over environmental outcomes.

For gravel extraction specifically, we advocate for gravel budgets developed by Regional Councils and support giving rivers space to adjust naturally rather than relying on hard engineering solutions.

Stock Exclusion Regulations

This submission records our opposition to the proposed amendments to Regulation 17 that would exempt non-intensively grazed beef cattle and deer from being excluded from natural wetlands. The proposal lacks quantification of environmental costs and relies on vague examples without defining key terms like "stocking density."

We recommend extending the compliance date from 1 July 2025 to 1 July 2027 for extensive beef cattle and deer, rather than creating permanent exemptions. This provides time-limited flexibility whilst maintaining long-term environmental protections.

Fish & Game Position on Agriculture

Fish and Game supports maintaining strong freshwater protections and opposes returning to the 2017 NPS-FM framework, which fails to provide adequate ecological health protections. We advocate for discretionary or non-complying consenting pathways in degraded catchments to prevent further intensification.

Key recommendations include:

- Reintroducing intensive winter grazing rules
- Maintaining 10-metre minimum riparian setbacks with appropriate vegetation
- Setting environmental flows that prioritise ecological health and precautionary approaches for water allocation limits

2.0 Primary Sector Proposals

Fish and Game submit on most elements of the primary sector proposals as follows:

Section 3 NES-CF

Section 4 NZCPS

Section 5 NPS-HPL

Section 6 Quarrying and Mining

Section 7 Stock Exclusion Regulations

Section 8 Implementation of Primary Sector Instruments

Section 9 Fish and Game Position on Agriculture

Note that this submission should also be read in association with our submission on Freshwater and Infrastructure / REG packages. We have attached a copy of the Freshwater submission to this submission for your reference.

3.0 National Environmental Standards for Commercial Forestry

3.1 Fish & Game interests in Commercial Forestry

Fish & Games' primary interests in commercial forestry relate[1] to

- Impacts on water quality
- Effects of sediment on salmonid habitats and wetlands
- Excessive slash mobilisation in waterways
- Maintenance of fish passage
- Access to waterbodies

Of these, probably the biggest single ongoing issue with regard to commercial forestry is the runoff of sediment into waterbodies from forestry activities. This is most relevant during harvesting, afforestation, replanting, and forest establishment periods.

3.2 Salmonid Spawning

Salmonid (trout and salmon) spawning requires stony riverbeds with very low deposited sediment, as eggs will generally suffer high mortality in areas with even moderate or low amounts of deposited sediment.

The key outcome we want to see in forestry operations is better sediment and erosion control and riparian planting. This will serve to ensure that deposited and suspended sediment runoff is reduced significantly.

Many streams that would have naturally had a stony bed (dominated by relatively coarse gravel or larger substrate) now appear soft-bottomed, which is leading to habitat loss and decreased ecosystem resilience. Around 20% of the length of rivers in New Zealand are currently classified as soft-bottomed. However, research indicates that the number should be around 2%. Where rivers and streams are already 'clogged', sediment entering those systems must be reduced. Ideally, all rivers and streams that originally had stony beds should be restored back to hard-bottomed streams. Thus, water degradation in many locations is caused by suspended and deposited sediment.

[1] DOC Plantation Forestry: Effects on Freshwater, Technical Guidance for RMA Applications

3.3 The Importance of Vegetated Riparian Margins

Vegetated riparian margins provide filtration that reduces sediment, nutrients, and other pollutants from entering water bodies via surface water runoff. Riparian margins of appropriate height also provide some shading which can reduce the ability of nutrients to cause excessive aquatic vegetation. Vegetated margins assist to enhance water quality and visibility which trout need to feed in.

Riparian setbacks, with appropriate permanent riparian vegetation, are a key tool to filter sediment generated from land use activities and restrict it from entering waterways. The effective width of a vegetated riparian margin varies depending on the slope of the land adjacent to the waterbody and the soil type. They should, however, be at least 10 metres. Riparian setbacks should also be vegetated with appropriate low-lying vegetation, so the vegetation is an effective filter. Vegetated riparian margins provide other benefits to waterbodies in addition to sediment filtering, such as providing shade and inputs of wood, leaves and insects into the waterbody, biodiversity benefits and carbon sequestration.

3.4 Forestry Industry and Sediment Minimisation

The role of the forest industry in minimising the export of sediment is to maintain permanently vegetated and appropriately sized riparian setbacks, manage earthworks, and maintain more permanent forest cover on the steepest and most erosion prone land. Five metre afforestation and replanting setbacks alongside wetlands and rivers less than three metres wide are the minimum width when considering mature trees are likely to be more than 30 metres tall and several tons in weight. Using large machinery to remove the forestry crop from such close proximity to waterbodies is likely to have adverse effects, particularly when the machinery can often be operated within the riparian zone as allowed by the NES-CF. Fish & Game maintains that the minimum permitted standard for revegetation and afforestation should be at least a 10m setback.

3.5 Activities Causing Disturbances in the Riverbed

Activities that directly disturb the bed of the river can also destroy spawning habitat, impede migration, and create sediment. These activities should be avoided in trout and salmon spawning and migration river reaches, especially at critical times of the year and when fry are in immobile life stages. Timing works in waterways is critical so that they do not restrict and impact fish spawning during autumn and winter months as they can wipe out younger fish stocks. Schedule

4(4)(5) of the NES-CF refers users to the Fish Spawning Indicator Tool to assess the presence of fish species and spawning habitat around commercial forestry activities. This database is incomplete and currently inadequate as a single source reference for fisheries information. It either needs to be populated with complete data or replaced.

3.6 Environmental Implications for Proposed Amendments

Overall, the discussion document amendments proposed will increase certainty and consistency of regulation around the country and reduce red tape and delays for the forest industry. However, the specific amendments do nothing to improve the adverse environmental effects of commercial forestry.

With regards to the specific amendments proposed Fish & Game have the following submission points.

3.7 Regulation 6 (1) (a) to protect sensitive and unique environments page 20 and Regulation 6 (4a) afforestation

The proposed changes to Regulation 6 reduce the circumstances in which councils can propose more stringent rules than those established in the NES-CF. Fish & Game has no fundamental opposition to this occurring.

3.8 Regulation 69 (5) – (7) to removal of slash on forestry harvest cutover

Fish & Game is not opposed to the concept of reducing the requirements for slash removal where the risk of mobilisation is low. The commercial forestry sector has recently been incurring considerable cost, uncertainty and delay in attempting to fulfil these requirements, often for minimal environmental gain. A slash mobilisation risk assessment should be required across all zones, as there are still pockets of high risk in some green and yellow zones as a result of mapping scale.

3.9 Regulation 10A permitted activity conditions: afforestation management plan

Fish and Game is not opposed to this proposal, providing that existing provisions provide similar environmental outcomes.

3.10 Regulation 77A permitted activity conditions: replanting management plan

Fish & Game is not opposed to this proposal, providing that existing provisions provide similar environmental outcomes.

3.11 Definition of “woody debris” vs “slash”

Slash is defined in the NES-CF as any tree waste left behind after commercial forestry activities. However, large quantities of production forestry waste (woody debris) can be left on the ground, within commercial forests, in high-risk areas due to events that would not be considered commercial forestry activities. This may include the effects of events such as wind throw, snow damage, fires and slips. The NES-CF should deal with the management of these materials similarly to how slash is managed.

3.12 Regulation 71A (b) drafting error

Fish & Game is not opposed to this proposal.

4.0 New Zealand Coastal Policy Statement

4.1 Coastal Marine Zone

Coastal zones form the interface between land and sea, and are dynamic, changeable, spatially heterogenous, physically and socially complex, and interchange energy, water, nutrients, and sediments[2]. The coastal environment is defined as all areas between mean high-water springs and the 12 nautical mile limit plus adjacent coastal land areas.

Section 6 (a) of the Resource Management Act 1991 (RMA) directs the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.

Currently the RMA and New Zealand Coastal Policy Statement (NZCPS) create a framework to manage coastal areas to protect natural character, healthy and sustained biological diversity, amenity values and cultural and recreational needs while sustaining resources for the future, protection the life-supporting capacity of air, water, soil, and interconnecting ecosystems, and avoiding remedying or mitigating adverse impacts of resource use and development[1].

4.2 Proposed amendments to Policy 6

The proposed amendments indicate a desire to change national legislation to better enable use and development of coastal environments for priority activities: specifically infrastructure, renewable energy generation, electricity transmission, aquaculture, and resource extraction.

This amendment also proposes moving from allowing those activities which satisfy a functional needs test *(functional need: the need for a proposal or activity to traverse, locate, or operate in a particular environmental because the activity can only occur in that environment)* in favour of satisfying a functional need or operational need *(operational need: the need for a proposal or activity to traverse, locate, or operate in a particular environment because of technical, logistical, or operational characteristics or constraints)*[3].

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[2] Hart, D. & Bryan, K. (2008). New Zealand coastal system boundaries, connections and management. *New Zealand Geographer*, 64

[3] Ministry for the Environment (2019). *Definitions Standard – Recommendations on Submissions Report for the first set of National Planning Standards*.

Further, it is proposed to amend (policy 6 (2) f) to read: in relation to (2)(c) and (d), recognise that infrastructure, renewable electricity, electricity transmission, aquaculture and resource extraction activities may have a functional need or operational need to locate in the coastal marine area.

4.3 What Fish & Game want to see in Policy 6 amendments

Fish & Game does not want to see Section 6(a) weakened to tip the balance against the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers, and their margins, in favour of inappropriate subdivision, use, and development.

It should be noted that natural character can and usually does include "such things as pasture, exotic tree species, wildlife (both wild and domestic) and many other things of that ilk"[4]. As natural character therefore does not equal pristine, then section 6 (a) of the RMA restricts avoidance only of inappropriate subdivision, inappropriate use, and inappropriate development.

It follows, therefore, that the proposed change in the NPS-CPS Policy 6 indicates a desire to allow and encourage inappropriate subdivision, inappropriate use, and inappropriate development. Fish & Game oppose this no doubt unintended ideology and remain in favour of allowing only appropriate use and development in the sensitive coastal environment.

Fish & Game acknowledge it is important that activities with a functional need to occur in the coastal environment also need to be able to use those ancillary structures and/or activities which allow it to operate. As such, including an operational need test is appropriate. However, there are concerns that, as drafted, this proposed change to policies 6 (1) e and 6(2) c and d to recognise that priority activities may have either a functional need or an operational need may inadvertently broaden the definition of priority activity to those with only an operational need to be located in the sensitive coastal environment. To avoid this, it is important that those activities with operational requirements for location within the coastal environment must be necessary for the function of activities with functional needs to be there. This applies to all instances in the proposed amendments to the NZCPS which references activities to either a functional need or an operational need to locate in the coastal marine area.

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[4] Beech, J., Daya-Winterbottom (1997) What is the "Coastal Environment?". Chapman Tripp Sheffield Young, Barristers and Solicitors, New Zealand.

4.4 What does Fish & Game want to see in Policy 8 aquaculture

Fish & Game support the inclusion in 8(b) of taking account of the environmental and cultural benefits of aquaculture activities alongside the social and economic benefits. However, there are also recognised disadvantages to aquaculture, and these also need to be assessed carefully before enabling these activities.

Fish & Game is cognizant of the potential negative environmental impact of aquaculture on the species we manage. Salmon aquaculture contributes to coastal nutrient pollution, exacerbates existing problems from agricultural runoff, sewage discharges and atmospheric deposition; can spread disease, releases toxic compounds, and can interfere with the performance of existing wild salmon stocks[5].

Considering the large gaps in knowledge and the universally acknowledged poor state of health of estuaries and coastal waters, it is recommended that regulatory agencies and policymakers apply the precautionary principle to decisions concerning expansion of finfish (including salmon) aquaculture in coastal waters and to maximising mitigation measures including, restriction on use of pesticides and use of comprehensive environmental assessments[4].

Climate change may also force salmon aquaculture, among other aquaculture activities, further southward into cooler climates, as salmonid species require cool, clean water to thrive. This may input nutrients, antibiotics, benthic waste, pathogens, and attract predators to waters which have been previously unexposed to these. Escaped farmed salmon can pass pathogens to wild stock and alter existing wild gene pools through interbreeding. Salmon pathogens can also be passed to invertebrates, birds, other fishes, plankton, sediments, and can remain in marine sediments for a long time after a salmon farm ceases operation[4].

For these reasons, Fish & Game do not wish for aquaculture to be prioritised or promoted in proximity to wild salmon stocks, or in previously unexposed environments.

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[5] Milewsky, I. (2005). Impacts of salmon aquaculture on the coastal environment: a review. retrieved from https://www.iatp.org/sites/default/files/Impacts_of_Salmon_Aquaculture_on_the_Coastal_E.pdf

4.5 The importance of the coastal marine environment to Fish & Game

Our license holders value the coastal marine environment for its wetlands, access, and riparian areas for both angling and hunting. Less well known is the wider role the coastal zone plays in allowing for the survival of freshwater fish communities. A healthy estuarine and coastal ecosystem creates food webs which are vital in sustaining large predatory fish (eel species, trout) when their food is limited due to degraded catchment waterbodies, provided connectivity between coast and headwaters is maintained[6]. This research also stated that to support national objectives for restoring freshwater fish communities suggest greater conservation protection focus should be given to restoring and/or reclaiming coastal, estuary and coastal wetland habitats and enhance connectivity to their catchments.

Stewart et al [5] notes that whitebait migrations halved after the 1940's due to fishing, flood protection, and land reclamation. This loss of whitebait also likely represents a significant decline in annual food availability for trout and eels.

Restoring freshwater fish abundance and distribution is an important aspiration for councils, government, iwi, anglers, and communities for cultural, recreational, food gathering, and sense of place reasons. Permitting activities to further impede connectivity, degrade coastal marine habitat, and prevent restoration of wetlands and estuarine habitat will harm these aspirations and are not supported by our conservation efforts.

4.6 Climate change and sea temperatures

Sports fish require cool water to spawn and thrive. Climate change is forecast to increase overall temperatures, leading to an inevitable water temperature rise. Sea warming will result in reduced abundance and survival of sports fish at lower altitudes and particularly in coastal areas. This will not be ideal for migrating species such as salmon that have a time in their lifecycle at the coast, and it should be noted that many trout mobilise throughout river systems to the coastal environment, and some even transition to the marine ecosystem before returning to freshwater as sea-run trout. It is therefore important that activities in the coastal marine zone do not exacerbate either climate change or add additional thermal pressures to estuaries or coastal waters.

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[6] Stewart, S., Holmes, R., Vadeboncoeur, Y. & Bury, S. (2022). Sea to the mountains: quantifying freshwater eel and trout diet reliance on marine subsidies from upstream migrating fish. *New Zealand Journal of Marine and Freshwater Research*.

Our Freshwater submission provides more detail about issues for salmon and should be read in conjunction with this submission.

4.7 Concluding remarks on proposed changes to the NZCPS

The RMA gives clear direction on the duty to avoid, remedy, or mitigate adverse effects. As such, any activities where the effects on the coastal environment are potentially adverse should be considered carefully for appropriateness, and ability to avoid, remedy, or mitigate these effects. When allowing and planning for future growth, subdivision, and land use, it is vital to minimise adverse effects to the fullest extent practicable and recognise and manage the effects of land uses and freshwater based activities (including discharges) on the coastal marine zone.

Activities which are consented to locate in the coastal environment should have a functional need to be there, or an operational need to allow for the operation of an activity with a functional need to be present.

Such activities should also ensure public access to and along the coastal marine area, wetlands, lakes and rivers is maintained and enhanced, as per Section 6 (d) of the RMA. These activities should also be managed to maintain amenity values, water quality, indigenous biodiversity, valued introduced species, cultural and recreational values, and wetland and riparian habitat quality and extent.

Adverse effects, including cumulative adverse effects, on the natural character of the coastal environment, wetlands, rivers and lakes and their margins, should be: avoided in areas with outstanding natural character and Water Conservation Orders; avoided where they would significantly diminish the attributes and qualities of areas that have high natural character, and avoided, remedied or mitigated in other areas.

Fish & Game look forward to reading amendments which balance requirements for infrastructure, agriculture, aquaculture and other economic and social activities within the overarching need to protect, restore, and/or maintain the natural environment which provide habitat for the species that we manage.

5.0 National Policy Statement for Highly Productive Land

5.1 Including LUC3 Land in NPS-HPL Restricts Green Field Development

The housing crisis will not be solved by including LUC3 land, and the type of subdivision that LUC3 land tends to involve is not usually “affordable”, i.e. this land is often used for lifestyle blocks, not high-density affordable housing.

Fish & Game notes that LUC3 land is often adjacent to rivers, lakes and wetlands and therefore housing in these areas can negatively impact on hunting and fishing recreation if located too close to e.g. a game bird hunting area. These reverse sensitivity effects have occurred when residential use is located without a suitable buffer between existing hunting areas on both private and public land.

Subdivision also provides an opportunity for new access to be created. Some districts provide policy for “bonus lots” or similar policy to require marginal strips or legal access when new subdivisions are created adjacent to or that are able to provide better access to water bodies. We urge you to include these requirements for any subdivision of LUC3 land to provide access through new subdivisions to natural areas and waterbodies.

If you do proceed with greenfield subdivision of LUC3 land, we would like to suggest that adequate buffers and noise protection zones are put in place around wetlands, lakes, and rivers, particularly those used for recreation. These measures are essential for safeguarding ecological values and broader game bird hunting and fishing recreational opportunities. We suggest a minimum 300m setback from game bird hunting areas to any residential development both for reverse sensitivity and as noise buffers.

5.2 New Special Agricultural Areas

Special Agricultural Areas (SAA) are proposed to protect key food growing areas like Pukekohe and Horowhenua. We are mindful that allowing additional Nitrogen run-off for this sector is unfair on other, often consented activities such as dairy farming. This should not lead to specifically identified geographical areas where degraded waterbodies are allowed to degrade further. Better setbacks and riparian planting and Nitrogen loss reduction mechanisms need to be developed to reduce these negative effects.

5.3 Mapping of Land Use Classes

Fish & Game support spatial planning and therefore also support land use classification tools and mapping as part of this body of work.

5.4 Anticipated impacts for Fish & Game

Fish & Game recommend that increased density, rather than more lifestyle living is needed to meet the stated objectives of creating more affordable housing. Fish & Game also recommend that you consider good urban design for all subdivisions: a key aspect of this is creating access through a subdivision for recreation, if there are water bodies present or not. This provides the infrastructure and incentive for people to get out and enjoy nature from their own property.

Fish & Game also promote green design and innovation in greenfield developments that lead to better attenuation of stormwater and therefore higher water quality discharges.

Fish & Game recently also submitted on the wastewater treatment plant standards. Some of our key points include:

- Minimum end of pipe standards (as opposed to maximum) should be used, that allow for more stringent standards to be set to meet receiving environment outcomes.
- Receiving environment standards that provide for community and environmental outcomes.
- Incentivisation of partial or full discharges to land in preference to discharges to water
- More stringent controls on overflows and bypasses.

6.0 Quarrying and Mining Provisions

Fish & Game's feedback on this section is targeted at achieving the policy objective. In the Interim Regulatory Impact Statement[7] sections relevant to Quarrying and Mining (RIS-QM), this is described as:

> *"… to better enable resource extraction and use, including quarrying and mining, while providing for any associated adverse effects to be considered and mitigated."*

Section 1 of the RIS-QM provides additional information which helps interpret this objective. The documents outlined in Section 1 require the consideration and mitigation of adverse effects to be at a standard of achieving good environmental outcomes, responsible environmental protection and management of environmental impacts to the highest standard.

The March 2024 Cabinet agreement directing the matter highlights that enabling resource extraction and use should be achieved while achieving good environmental outcomes:

> *"…develop or amend national direction instruments to unlock development and investment in infrastructure and primary industries including mining while achieving good environmental outcomes…"*

The Minerals Strategy for New Zealand to 2040,[8] released by the Government in January 2025, aligns with the Cabinet agreement. The strategy's vision requires minerals practices to be responsible and sustainable and this is followed through with the 2nd guiding principle of the document:

> *"Responsible: Minerals developments in New Zealand will happen in a responsible manner where environmental protection, the health and safety of our workers, and impacts on regional communities inform all sector initiatives."*

The foreword by the Minister for Resources confirms this intention:

> *"I want New Zealand to be part of the solution. I want us to contribute to resilient and sustainable global minerals supply chains. We can do it on*

[7] Interim Regulatory Impact Statement: Providing a consistent consenting pathway for quarrying and mining affecting significant natural areas, highly productive land and wetlands

[8] A Minerals Strategy for New Zealand to 2040, https://www.beehive.govt.nz/sites/default/files/2025-01/202501%20A%20Minerals%20Strategy%20for%20New%20Zealand%20to%202040.pdf

our terms, with a light touch on the environment, high employment standards, and consistent with Treaty of Waitangi settlements and commitments. The environmental impacts of mining can and will be managed to the highest standard."

With respect to the proposed policy changes, this means that achievement of the policy objective must not only be based on enabling quarrying and mining activities but also doing so in a manner which achieves good environmental outcomes, responsible environmental protection and the management of environmental impacts to the highest standard.

The changes in Package 3 – Freshwater have a significant bearing on the achievement of the policy objective with respect to the values of interest to anglers and hunters. The recommendations provided by Fish & Game below must be read in the context of its recommendations for Package 3.

In isolation, the changes discussed in Package 2 - Quarrying and Mining will not achieve the requirement to achieve good environmental outcomes.

Furthermore, reliance on the effects management hierarchy in the NPS-FM without the clear policy direction that Fish & Game recommends in its Package 3 (Freshwater) response will also not achieve the good environmental outcomes sought by Cabinet, Government and the Minister for Resources.

6.1 Relationship of quarrying with river-sourced gravel extraction and the definition of quarrying

Gravel or aggregate are often sourced from two places – quarries and riverbeds. Riverbed extraction can either be in-stream or on the dry banks of rivers. Both can be done sustainably, with little impact on other resource users such as licence holders and to the benefit of society, depending on the method of extraction and the availability of the resource.

Quarry-sourced gravel depletes a finite resource, creates potential for sediment runoff and often leaves behind a large hole; while river-sourced gravel takes from a typically replenishing resource but in a very sensitive environment. When done poorly or to an excessive extent, even dry bed river-sourced gravel literally removes the habitat for animals in aquatic ecosystems – particularly for invertebrates which are a vital part of the food chain.

There are recreational opportunities associated with gravel extraction and particularly quarrying activities. At consenting stage gravel pit projects should

be designed with remediation and decommissioning in mind. There is opportunity for game bird habitat and trout fish out ponds to be created close to town. There is also opportunity for other recreation such as swimming, water skiing, SUP and sit on top assisted fishing. Suitable planting and public access is also key to ensure that the end stage of these developments can result in environmental enhancement and recreational opportunity. Two examples of such opportunities are Waimea Ponds in Nelson and Lake Roto Kohatu in Christchurch, both decommissioned gravel pits providing fishing opportunity.

The adverse effects of quarrying and river-sourced gravel extraction are very different, and their management activities must be managed differently as a result.

However, this distinction is not clear in the National Planning Standards. The district-wide matters standard allows earthworks chapters to include *"provisions for quarries and gravel extraction where managed on a district-wide basis"*[9], suggesting that the two activities are distinct and will be managed separately. However, the National Planning Standards definition for 'quarrying activities' and 'quarry' can be interpreted to include the extraction of gravel from rivers.

Reading the RIS-QM and the Package 2 discussion document, it is unclear whether in-river gravel extraction is intended to be subject to these changes or not. Given the activities, adverse effects and management actions are so different, Fish & Game expects that this should have been clearly addressed in the supporting documents.

If in-river gravel extraction is intended to be included in these changes then it makes the consultation process particularly problematic. River-sourced gravel extraction is a controversial issue and will be of interest to the general public. In the common use of the English language, the words 'quarry' or 'quarrying' is associated with aggregate extraction from pits outside the riverbed. These words are rarely used by the public to describe in-river gravel extraction.

It is unreasonable for the public to connect the dots between quarrying and in-river gravel extraction. In all likelihood, the public will not be aware that national direction on such a controversial issue as in-river gravel extraction is subject to change as part of this package, if that is what is intended.

[9] 7. District-wide matters Standard, paragraph 29, page 34

Fish & Game recommends that the National Direction changes relating to quarrying and mining be clarified so that it does not apply to river-sourced gravel extraction. In addition, we recommend that the uncertainty in the National Planning Standards on this issue be resolved.

Fish & Game's feedback in relation to quarrying is written on the assumption that the proposed changes do not include river-sourced gravel extraction.

6.2 Fish and Game Position on Quarrying and Mining

Fish & Game is agnostic to quarrying or mining as activities. The organisation's interest extends simply to managing the impacts of these activities on hunters and anglers and the environments inhabited by the species we manage. Where the adverse effects impose unacceptable impacts on environment, anglers and hunters, Fish & Game opposes the project and/or seeks to apply consent conditions to suitably manage the impacts.

Licence holders' interests in this area centre on protecting fish and game populations and the habitats that they rely upon. Where degradation has occurred, they often want to see these populations and habitats restored. They also have a strong interest in maintaining and enhancing access to water bodies and hunting grounds.

The adverse effects of quarrying and mining that impact on these interests include:

- Direct disturbance of water bodies and hunting areas, such as clearance of vegetation, loss of wildlife habitat, removal of soil, diversion or modification of waterways, dumping of soil and overburden.
- The discharge of contaminants into water bodies. This is often from tailings ponds and rock stacks in the case of mining but can also be sourced from chemical or diesel spills in quarrying activities.
- Sediment runoff from earthworks, which can come from developing pits, roading or constructing buildings onsite.
- Loss of access to water bodies and hunting grounds when quarrying or mining operations move into a new area.

Mining in particular poses significant challenges. The contaminant discharge from mines can contain extremely toxic chemicals, such as cyanide or arsenic in the case of gold mining. In addition to this, the adverse effects of mining operations

often extend well beyond their operational life. When bonds or other mechanisms of to mitigate these long-lasting adverse effects are incorrectly implemented. The mine operator may be long gone and there is no one left to pick up the rehabilitation cost bar the taxpayer.

By way of example, at the Stockton mine on the West Coast, the rehabilitation costs imposed on the taxpayer due to the collapse of the state-owned operator totalled $57 million dollars.[10] One part of this rehabilitation effort in 2023 and 2024 was reported as costing nearly as much as the royalty earnings for coal right across the country.[11]

In another example at OceanaGold's Macraes mine, analysis of their MP4 expansion consent application by the Otago Regional Council's s42A author[12] reveals that the current consent conditions for the operation will impose significant adverse effects on surface water and aquatic ecosystems in mainstem rivers downstream of the mine due to the discharge of contaminants; that these discharges will peak up to 200+ years in the future; that the modelling underpinning the predicted discharges is not reliable; and that there is considerable uncertainty about whether even partial mitigation of future adverse effects will ever be enacted. All this is just looking at adverse effects relating to downstream surface water where licence holders will be impacted. It says nothing of the adverse effects closer to the mine site where terrestrial aquatic ecosystems will be lost completely and endangered animals placed at potential risk.

Imposing the costs of rehabilitation upon the public, through bearing the brunt of inappropriate adverse effects and/or requiring the taxpayer to directly pay for rehabilitation actions, is surely not in the interests of New Zealand as a whole. If the full costs of rehabilitation cannot be integrated into the private operation, then the project is simply uneconomic and should be regarded as such.

Returning to the policy objective, there must be scope within the freshwater national direction to manage mining operations so that the 'good environmental outcomes' can be achieved. Fish & Game's recommendations on Package 3 will provide a solid basis to direct freshwater protection in a manner to ensure mining

[10] https://newsroom.co.nz/2024/12/02/all-of-govts-2024-coal-earnings-spent-treating-damages-at-a-single-mine/
[11] As above
[12] https://www.orc.govt.nz/media/5hieewxp/otago-regional-council-s42a-report-rm24184-macraes-phase-4-9-june-2025.pdf

applications and approvals do not cause inappropriate adverse effects on licence holders and the public.

Fish & Game do not agree that the existing consenting pathway is overly restrictive for quarrying and mining activities given they have the potential for significant adverse effects as described above.

Fish & Game would like to be consulted regarding resource consent applications in the catchments of game bird habitat and trout fisheries.

6.3 Inconsistent terminology and tests across national direction instruments on quarrying and mining

Generally, Fish & Game agrees that consistent terminology across the NPS-FM, NPS-IB and NPS-HPL would be helpful.

For the most of the changes relating to the NPS-IB and NPS-HPL, Fish & Game has no position as they do not impact greatly on the interests of licence holders.

Fish & Game has the following comments on the remainder of the proposed changes with respect to quarrying and mining:

6.3.1 Aligning references to quarrying and mining:

Fish & Game agrees that consistent terminology is helpful here. However, it is important to note that 'ancillary activities' is unhelpfully vague. The example given of removing overburden is reasonable to be included; however, ancillary activities could extend much wider, such as developing roading or constructing buildings – both at the immediate mine site or far away (e.g. worker accommodation in a nearby town). Fish & Game recommends that the phrase 'ancillary activities' definition be refined so it is clear that it relates to activities at the same site as the main activity.

6.3.2 Gateway tests in the NPS-FM does not consider 'operational need':

Fish & Game's experience is that there are functional needs for quarrying and mining activities to occur in certain locations, such as where the resource is available. However, expanding this gateway test to include locating and operating in an environment because of *"technical, logistical or operational characteristics or constraints"* opens the door to applications which prioritise the private, economic well-being of the applicant over the public and environment. This is because it enables circumstances affecting profitability to play a much larger role

in decision making. Fish & Game advises that including operational need in the NPS-FM gateway tests threatens the good environmental outcomes sought by Cabinet and recommends against adopting this proposal.

6.3.3 Other recommendations to align the approach for quarrying and mining

Feedback on this topic has already covered a number of recommendations that are not included in the proposal but which will aid in achieving the policy objective and for which there is scope to address issues. These are:

- Adopting Fish & Game recommendations on Package 3.
- Clarifying the relationship between 'quarrying activities' and in-river gravel extraction in the National Planning Standards.
- Ensuring Fish & Game are consulted with on quarrying and mining proposals in catchment of game bird habitat and trout fisheries.
- Amend the phrase 'ancillary activities' in the National Planning Standards so that it is clear that they are only to occur on the same site as the main activity.

6.4 Significant Natural Areas

Fish & Game promote the use of Significant Natural Areas (SNAs) and oppose the removal of them from the RMA or in policy. We also support that most streams and rivers should include some kind of SNA protection to reduce diffuse discharge of sediment and nutrients into the water body. We note that there are many degraded riparian margins, but do not think that this is a good reason to not include these areas as SNA. Our view is therefore that all riparian margins to natural waterbodies have the ability to be significant natural areas, even if they have recently been degraded and stripped of vegetation. Fish & Game also support and promote the setback rules from SNAs in many planning documents. These allow the SNA to function and not become shaded or infested, for example by adjacent commercially grown pine trees.

6.5 Gravel Extraction

Key issues that Fish & Game are concerned about relating to gravel extraction include:

- Damage to natural form and function of the water body
- Scouring of the bed of the river that may inhibit fish passage

- Disturbance of the bed during trout spawning period between 31 May and 31 August.
- Generation and release of sediment and discharge of sediment to water

Applications need to identify[13] the location of activity, timing of the activity, scale, method, vales at the site, adverse effects that the activity is likely to cause and whether these effects will be avoided, remedied or mitigated.

Gravel plays an important role in the health of rivers and has a role in flood management. It is also an important resource for infrastructure development and maintenance. Our licence holders also benefit from using the roads that are surfaced with the gravel taken from quarries and riverbanks.

6.4.1 Principles

Rivers act as 'sediment conveyors', moving gravel and sediment through their catchments. This movement is not smooth — it happens in pulses, especially during floods, as waves or slugs of gravel move downstream. To manage gravel effectively, it is essential to understand where a river reach sits within its catchment, and whether it lies in a zone of sediment *production*, *transfer*, or *deposition*.

Gravel supply to rivers varies over time, and how gravel moves along the channel depends on the size and frequency of floods. Understanding these fluctuations — gravel *flux* — is critical for responsible gravel management. Reliable, quantified data on gravel loads are needed to assess whether extraction is sustainable or likely to damage river systems.

6.4.2 Recommendations[14]

Gravel budgets should be developed by Regional Councils using high-resolution survey methods to map changes in riverbed topography over time. This includes generating Digital Elevation Models (DEMs) from river channel surveys (both wet and dry) and comparing them across time periods to show how much gravel has moved or accumulated. Bathymetric LiDAR offers the accuracy and scale needed to produce meaningful data.

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[13] DOC Gravel Extraction from Rivers and Streams, Technical Guidance for RMA and Concession applications.

[14] report by Professor Ian Fuller at Massey University to Environment Southland (December 2023) regarding strategic gravel management

A growing issue in some regions, such as Southland, is vegetation colonising once-bare gravel bars due to smaller floods that deposit fine sediment without moving gravel, allowing plants to take root. Vegetation locks sediment in place, increasing resistance to flows. As a result, only very large floods can mobilise the gravel again. This can lead to the river cutting downwards (incising) or eroding its banks as it struggles to access sediment. The full impacts of this vegetation lock-up are not fully understood.

To address this, gravel management techniques such as bar-top skimming or raking could help remove vegetation and reactivate gravel movement. However, frequent interventions can also destabilise channels, so rivers treated in this way will need more space to safely accommodate increased mobility.

6.4.3 Living with the River

A more sustainable approach than hard engineering, such as rock lining, is to give rivers the space to adjust naturally; in other words, let rivers behave like rivers. This approach will likely be more cost-effective in the long term, although it may require upfront investment (e.g., retiring land to widen the river corridor)[15].

Wider river corridors support more natural processes like bank erosion, bend migration, braiding, and cutoff formation. These features build habitat diversity and resilience to larger and more frequent floods. Confining rivers to narrow channels increases risk to land, infrastructure, and life. Giving rivers space reduces the need for expensive fixes after every large flood.

This shift in river management — from a rigid 'command and control' model to one of *working with nature* — is a long-term, multi-generational change. It must be informed and involve the community. A phased approach is needed to help communities adjust. This should be formalised through Floodplain Management Plans, which map out the transition for each catchment.

6.4.4 Understanding Natural River Dynamics

Effective gravel management requires an understanding of natural river behaviour—how channels shift through erosion, deposition, avulsions, and braiding. Working with these processes means less reliance on artificial fixes, because the river does much of the work itself. While this may make the river corridor look 'messier', these 'messy' rivers are healthier and more dynamic.

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[15] We also talk about giving rivers room to roam in the National Hazards National Direction section later in this submission.

This approach must be grounded in science, using monitoring data to understand changes in channel form and gravel movement.

6.4.5 Adapting to Climate Change

Larger and more frequent floods are expected with climate change. These may help flush out vegetated channels but will require more space for rivers to move safely. At the same time, more severe droughts are predicted, leading to more unpredictable river behaviour overall.

To manage this uncertainty, we must invest in long-term monitoring of river systems. Only by understanding their natural dynamics can we develop flexible, adaptive management that works *with* rivers, not against them.

6.5 No proposed changes to Effects Management Hierarchy Fish & Game support retaining the Effects Management Hierarchy unchanged.

6.6 Avoid, remedy or mitigate tests of the RMA

Fish & Game support the retention of the avoid, remedy or mitigate tests of the RMA and recommend that these tests are carried forward to new legislation. Whilst Fish and Game may in many cases prefer avoidance of hydro-electric dams we accept that there is a consented baseline for existing developments. Fish and Game have also benefited from mitigation from Hydro Electric developments. A good example is the Mackenzie Basin hydro-canal fishery in the Central South Island region. This is a very popular put-and-take salmon fishery located within the manmade hydro canals situated on private land. The two energy generators Meridian and Genesis provide controlled access to the hydro-canals for sports fishing. Mitigation for sports fishing and other recreational opportunities should continue as consent conditions on existing consented hydro-electric developments.

7.0 Stock Exclusion Regulations – Part 2.6

It is proposed that regulation 17 is amended so that not all stock are excluded from natural wetlands that support threatened species. It is proposed that non intensively grazed beef cattle and deer be excluded. The reasoning is that in South Island high country the benefits of excluding stock from these wetlands is disproportionate to the cost.

It would be helpful if this issue was explained better using a mapping tool to describe the extent of the area in the South Island high country that “suffers a

disproportionate cost" for fencing and excluding stock. It would also be helpful to understand the stocking rate that equates to "non intensively grazed" beef cattle and deer so we can better understand what effects could result from not excluding stock.

Regulation 17 of the Resource Management (Stock Exclusion) Regulations 2020 requires that beef cattle, dairy cattle, dairy support cattle, deer, and pigs (excluding feral animals) must be kept out of natural wetlands that support threatened species, as defined in the National Policy Statement for Freshwater Management 2020, by 1 July 2025 at the latest.

The Government is proposing to amend Regulation 17, so it no longer applies to non-intensively grazed beef cattle and deer. The stated reasons are:

1. *The current rule is too rigid and doesn't allow for local circumstances; and*

2. *In some areas, such as the West Coast and South Island hill country, the environmental benefits of excluding stock may not justify the economic cost.*

For background information we have included our Stock Exclusion submission as attachment 2 of this submission.

7.1 Potential negative impacts on natural wetlands from proposed amendments

Fish & Game is opposed to the proposed amendments for the following reasons:

- There has been little to no quantification of the environmental costs of the change — particularly in already degraded catchments — and a lack of transparency around how the trade-offs between environmental benefit and economic cost to primary producers are being assessed.

- For example, the Regulatory Impact Statement assessing the proposed change does not:

- Recognise that New Zealand has lost over 90% of its original wetlands, making them one of the most threatened ecosystems in the country. While

much of this loss is historical, wetland degradation and destruction continue today—for example, in regions like Southland — putting further pressure on biodiversity, water quality, and natural flood protection.

- Provide any detail about the economic costs to the primary sector of excluding extensive beef cattle and deer from natural wetlands that support threatened species.

7.2 Costs Associated with Stock Fencing

Fences required to keep cattle out of natural wetlands which are usually on flat land may be as minimal as a 2-wire electric. Electric fences have been used in New Zealand agriculture for over 50 years and are, in many cases, a more affordable option than the non-electric fencing alternatives. The Ministry for Primary Industries (July 2016) estimated the costs of 2-wire electric fencing on flat land to be approximately $4.67/m, on rolling land to be $4.89/m and on steep land to be $5.94/m.[16]

Fish & Game acknowledge that these costs are likely to have increased since mid-2016. That said, there are also alternatives to permanent fencing, such as temporary electric fencing. The Ministry for Primary Industries estimated the cost of this at $1.27/m if reusable electric fence reels and standards had to be purchased.[17] Once these are purchased the ongoing costs are minimal – mainly labour to erect / dismantle as required and a power source, whether mains, solar, or battery.

Virtual fencing technology, like Halter, also provides practical tools to keep beef cattle out of sensitive areas such as natural inland wetlands. This shows that effective stock exclusion is possible without needing broad exemptions.

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[16] National Stock Exclusion Study: Analysis of the costs and benefits of excluding stock from New Zealand waterways July 2016 – Table 6: Maximum, average and minimum total per metre fence costs (NZ$) for five fence types over flat, rolling and steep topography. https://www.mpi.govt.nz/dmsdocument/16513- National-Stock-Exclusion-Study-Analysis-of-the-costs-and-benefits-of-excluding-stock-from-New-Zealand-waterways-July2016.

[17] National Stock Exclusion Study: Analysis of the costs and benefits of excluding stock from New Zealand waterways July 2016 – Table 7: Estimated costs of temporary fencing used to exclude stock.

7.3 Wider Benefits of Stock Exclusion Fencing

Any money a farmer spends on building and maintaining stock exclusion to natural wetlands is not lost to the national economy — it supports local rural and provincial communities by creating work for fencing contractors and generating demand for materials and equipment. This is a meaningful benefit, especially at a time when the Government has actively sought to boost regional employment through initiatives like the 'Jobs for Nature' and 'Provincial Growth' funds.

7.4 Direct Impacts of Livestock Grazing

The direct impacts of livestock grazing on natural wetlands are well documented[18] and include:

- Grazing and removal of plant biomass;
- Trampling of vegetation, including damage to roots and soil structure;
- Nutrient loading and bacterial contamination from dung and urine;
- Introduction and spread of invasive plants, weed seeds, and other propagules; and
- Damage to aquatic habitat and impacts on fauna, including birds, invertebrates and fish. Effects include damage to nests, damage to fish spawning areas and reduction in available habitat.

7.5 Light Grazing

The discussion document fails to identify the specific locations, land area, or number of wetlands, including where *"light grazing may be beneficial,"* making it hard to assess the real impact of the proposed change.

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[18] Reeves, P. N., and Champion, P. D. (2004). *Effects of livestock grazing on wetlands: Literature review.* Niwa Client Report HAM2004-059. Prepared for Environment Waikato, May 2004.

The proposed amendment suggests that light grazing may help manage vegetation, including weeds and intermittent pasture. However, it is important to recognise that grazing often causes more harm than good. For example, stock commonly spread weeds, and they usually only eat tougher weed species when under nutritional stress. Their grazing and defecation add nutrients to wetlands, creating ideal conditions for weed seed dispersal, germination, and growth. Alternatives like targeted herbicide use can effectively control problem plants without the negative impacts of livestock or harm to native wetland vegetation.

Grazing for 'conservation' is not widely accepted, and many studies have shown it can harm wetlands. A comprehensive New Zealand review by Reeves and Champion (2004) found that the effects of grazing vary greatly and should be assessed case by case, based on specific conservation goals.[19]

Fish and Game do not support light grazing of wetlands on land administered and leased by the Department of Conservation or Land Information New Zealand for pastoral grazing. Our assumption is also that the land area will be very large if it involves the above leases.

7.6 Quantify the extent to which extensive beef cattle and deer are already excluded from natural wetlands

The proposed change to Regulation 17 appears to reward extensive beef and deer farmers who have done nothing to prepare, despite the 1 July 2025 compliance date being clearly signalled since enactment in 2020, and unfairly penalises early adopters who have acted in good faith and invested time and resources to comply with Regulation 17.

The Government is proposing a nationwide exemption from Regulation 17 based on vague and unspecified examples from the geographical areas of the West Coast of the South Island and South Island High Country, without defining key terms such as "stocking density" to differentiate high and lower intensity farming of beef cattle and deer.

This blanket approach is difficult to understand given that the Stock Exclusion Regulations already provide for region-specific exemptions, such as the tailored carve-out for the Upper Taieri Scroll Plain in Otago (Regulation 3A). A consistent

[19] Reeves, P. N., and Champion, P. D. (2004). *Effects of livestock grazing on wetlands: Literature review.* Niwa Client Report HAM2004-059. Prepared for Environment Waikato, May 2004.

and transparent approach would favour targeted exemptions based on evidence and specific geographical regions or areas, not sweeping national changes.

There is no clear evidence to support a specific stocking rate of beef cattle and deer in natural wetlands that would protect water quality and ecological values against well documented adverse effects. Likewise, there is no solid basis for relying on a Farm Environmental Management Plan to justify grazing in wetlands without causing ecological harm. Management plans are only effective if they are well conceived, implemented, monitored for compliance and enforced.

7.7 Fish & Game Position on Stock Exclusion

Fish & Game note that the Stock Exclusion Regulations already incorporate a significant amount of 'environmental compromise' to accommodate primary producer interests. For example, the Stock Exclusion currently omit sheep and small or intermittent streams from stock exclusion requirements irrespective of topography, stocking rates, and waterway sensitivity / cumulative degradation.

Small streams account for an average of 77% of the national nutrient load of total river catchments.[20] The omission of small and intermittent streams from stock exclusion requirements makes it impossible to wholly address issues associated with stock access to waterways.

Fish & Game considers the proposed amendment to Regulation 17 premature, as it relies on vague examples and lacks clear evidence or transparency to support significant change.

Instead, Fish & Game recommends keeping Regulation 17 in place but extending its start date for extensive beef cattle and deer from 1 July 2025 to 1 July 2027. While this delay may risk short-term impacts on wetland quality from ongoing grazing, those effects are time-limited unlike the proposed amendment, which would allow such impacts to continue indefinitely.

[20] McDowell, R. W., Cox, N., & Snelder, T. H. (2017). Assessing the Yield and Load of Contaminants with Stream Order: Would Policy Requiring Livestock to Be Fenced Out of High-Order Streams Decrease Catchment Contaminant Loads?. *Journal of environmental quality*, *46*(5), 1038-1047.

8.0 Implementation of Primary Sector Instruments

8.1 NES Implementation

Fish & Game support the immediate implementation of NES change for wetland provisions that enable the creation of wetlands for game bird hunting and generally, both providing benefits to the wider environment from wetland creation.

However, Fish & Game ask you to consider what permitted activity water storage rules will provide for in terms of farming intensification and we ask you to limit further intensification in degrading and degraded catchments. This point is noted in our Freshwater Package 3 submission.

8.2 NPS Implementation

Fish & Game supports the status quo for change made without schedule 1 process provided they are made in accordance with the RMA if that act hasn't been repealed prior.

Overall however we recommend that all changes to national direction / NPS documents are made in one go after the RMA has also been amended.

9.0 Fish and Game Position on Agriculture

9.1 Clean Streams

The clean streams accord was signed by in 2003 by Fonterra and the Minister for the Environment, Ministry of Agriculture and forestry and the regional councils.

Public awareness of the side effects of the rapid change to dairy farming and the side effects of this was highlighted with imagery of water pollution of lakes, rivers and streams.

Fonterra's response to help resolve the situation were five standards:

- cattle must be excluded from 90% of streams, rivers and lakes by 2012;
- 90% of regular crossing points must have bridges or culverts by 2012;
- 100% of farm dairy effluent discharges to comply with resource consents and regional plans immediately;
- 100% of dairy farms to manage nutrient inputs and outputs by 2007; and
- 90% of regionally significant wetlands to be fenced by 2007

The most important and most visible, effluent discharge, hasn't improved significantly since the scheme was introduced. Regional councils that had commenced public consultation processes were reluctant to define "degraded" catchments and to formulate consenting pathways to stop further degradation in those catchments.

9.2 NPS-FM 2014, 2017 and 2020

As more widespread degradation has occurred, each NPS has become more restrictive. The STAG report was provided to inform the latest NPS and many of their recommendations were included (although not all).

Ministry for Environment has confirmed that no new science has been commissioned to argue against the STAG report recommendations. However, they have been directed to return to 2017 NPS as a starting point.

Fish & Game oppose this approach as the 2017 NPS fails to provide protections for freshwater that will provide for ecological health.

9.3 Consenting Pathway for Agriculture

We generally ask for discretionary or non complying consenting pathways in catchments with degraded water quality or overallocation. This serves to protect farmers that are already invested in the catchment but signals that further intensification (and in some cases additional conversions to dairying) is unsustainable. Regions with degraded water quality have already started using this approach. Using a consent pathway with no teeth e.g. controlled activity to control further intensification in degraded catchments will simply result in further degradation and more costs to clean up the water bodies that continue to decline.

The section 104D test in the RMA known as the gateway test will be opened by adding objectives in national direction that promote primary sector production irrespective of existing degradation. There will also be future potential for degradation where intensification is promoted in catchments that are not currently degraded.

Degradation should be defined relating back to outcomes for ecological health. If Target Attribute States provide for lower outcomes than ecological health degradation will occur and continue to deteriorate.

9.4 Protecting Riparian Margins and Stock Exclusion

Fenced and vegetated riparian margins that are wide enough provide a buffer between land use activities and water bodies. This will help protect water bodies by filtering out and processing microbial, nutrient, and sediment contamination which then enhances water quality, visual clarity, and habitat. Fencing water bodies protects them from stock defecating or urinating in them and from damage caused by stock trampling riverbeds and their banks.

The Resource Management (Stock Exclusion) Regulation 2020 (Stock Exclusion Regulations) do not go far enough to protect waterways from stock to achieve the National Objectives Framework outcomes. Regional plans will need to include rules to stop intensified stock rates and heavy hoofed animals accessing all water body types. This includes streams less than 1m in width and wetlands that do not meet the national requirements for riparian setbacks. In minority cases, where low stocking rates, with light hoofed animals, over large areas are concerned, non-fenced water bodies may be acceptable.

While stock exclusion is an important first step, those excluded buffer areas need to effectively filter runoff from land. Appropriate set back requires at least 10

metres from any permanent river, lake, or wetland, and three metres from the edge of any other river (both intermittent and ephemeral). Riparian margin widths of between 10 – 20 metres should be established and maintained next to more sensitive water bodies such as lakes and wetlands. Large setbacks also ensure there is enough room for flooding and natural erosion processes to occur without undermining fences or planting.

Once stock is excluded from all water bodies and there is enough space between the fence and the water margin to manage and treat run-off in each specific catchment, plant the right type of vegetation to supercharge this protection buffer! For example, dense (native) grasses or other ground-covering species ensure sediment is caught before water flows into streams. Vegetation can provide spawning habitat for example for īnanga, while taller tree species provide shading to keep water temperatures down and prevent algal and macrophyte growth. Vegetation can also help to stop faecal matter and phosphorous getting into water bodies and consequently provide for a range of freshwater values for the wai, freshwater indigenous species, trout and salmon, and for the community. Also think about public places and peoples access to water bodies when planting riparian margins.

We also discuss how setbacks and riparian planting can greatly reduce sediment run off into water bodies from forestry clear fell operations in section three above.

9.5 Swimming and Recreation

We want to maintain and improve water bodies for swimming, and other types of recreation. This requires planning for:

- water quality (measured particularly but not only by microbiological indicator, *E. coli*);
- water quantity;
- river form; and
- access.

In other words, healthy water bodies are places where people want to swim. Ecosystem health supports swimming and recreation.

Swimming and recreation will likely be your communities' most regular, and tangible connection to, and valued use of, freshwater. So, swimming and recreation provide an important link between your community and all other parts

of the NPS-FM and other national direction that may negatively impact on this form of recreation.

The NPS-FM establishes a national goal to make 90 percent of the total length of rivers in Aotearoa New Zealand swimmable by 2040 in Policy 12, (as set out in Appendix 3 of the NPS-FM). Human contact with water through activities such as swimming, and for other recreation or cultural purposes, has always been a central part of all iterations of the NPS-FM, alongside ecosystem health. However, safe access to clean, swimmable rivers in Aotearoa New Zealand is so highly valued by our communities that it was a key driver for redeveloping the NPS-FM.

9.6 Protecting water bodies and freshwater ecosystem health

The following example and overview is provided about the Land and Water Plan process in Otago:

"Land use such as agriculture, forestry and urban expansion increases the level of contaminants, including nutrients, heavy metals and sediment, entering our waterways. This can have detrimental effects on water quality.

Diverting, controlling and extracting water all change the natural flow in, and between, waterways. This can impact freshwater species and ecosystems.

Water quality in rivers across Otago shows a clear spatial pattern related to land cover and land use. Water quality is best at river and stream reaches located in high or mountainous areas with predominantly native vegetation cover. These sites tend to be associated with the upper catchments of larger rivers (for example, Clutha River/Matau-Au, Taieri River and Lindis River) and the outlets from large lakes (for example, Hāwea, Whakatipu and Wānaka). Water quality is generally poorer at sites located on smaller, low-elevation streams that drain pastoral or urban catchments.[21]"

"We began this journey in 2019 when the Minister for the Environment asked the Otago Regional Council to prepare a new Regional Policy Statement and Land and Water Plan. Previous planning rules and regulations were no longer deemed fit to provide protection for Otago's waterways and surrounding environment.

Between 2020 and 2022 we engaged with our community around the visions and values people wanted for our waterways and the land affecting them in this new,

[21] Lakes, Rivers, and Streams | Otago Regional Council

more in-depth Plan. We also spoke with communities about actions that would help us reach positive environmental outcomes – these were that Otago's freshwater and land activities need to be:

- *Healthy for plants, animals, and people and look after our region for future generations*
- *Safe for activities like swimming*
- *Beneficial for activities like fishing*
- *Sustainably managed; and*
- *Respectful of cultural and historical places*[22]*"*

Therefore, consultation has already occurred in many regions, with community values confirmed. These values do not prioritise primary industry over all other values. While we recognise the economic value of primary industries, we urge you to not provide for their adverse effects at the expense of the recreational values for game bird hunting and angling that rely on clean freshwater.

Protecting the health and well-being of water bodies and freshwater ecosystems is the first priority of the NPS-FM. This priority should also sit above other land uses that will have negative effects on freshwater bodies. National direction should continue to direct regional plans to not provide for any more degradation in the health and wellbeing of water bodies and freshwater ecosystems, including no decline in water quality and to phase out overallocation.

Further use and increasing economic activity may be at odds with incrementally reducing the health and wellbeing of waterbodies therefore in some cases a reduction in use is required.

Fish & Game advocates for the habitats of the species that we manage, namely game birds and sports fish. These species live in rivers, lakes and wetlands. This means policy needs to be framed at the same level (as NPS-FM 2020 and other instruments such as stock exclusion regulations, freshwater farm plan regulations) to create policy that results in improved outcomes for freshwater water.

Increasing wetland extent provides for better filtration of runoff and better resilience from flood events and drought. Planting riparian margins provides shade, habitat, increased food resources for fish, and can cool water

[22] Land and Water Regional Plan | Draft Framework to Guide Freshwater and Land Use

temperatures required for fish. Excluding stock from water bodies reduce nutrients going into water bodies.

Ecosystem health is a component of the health and wellbeing of waterbodies. Ecosystem health is defined in the NPS-FM as a compulsory value for all waterbodies and includes five components: water quality, water quantity, habitat, aquatic life and ecological processes. All five of these attributes need to be maintained or improved across the entire country. Attributes for each component of ecosystem health for each type of waterbody and Target Attribute States for each attribute.

9.7 Intensive Winter Grazing

Concerns About the Repeal of Intensive Winter Grazing Rules

Grazing livestock on forage crops such as kale, fodder beet, swedes, and rape during late autumn, winter, and early spring is a high-risk farming practice. It leads to disproportionately high losses of nutrients (nitrogen and phosphorus), faecal bacteria, and sediment across the farm system. It also causes significant soil damage through pugging and compaction and poses risks to animal welfare.

There is no soil type, slope, topography, or physiographic zone where intensive winter grazing can occur without environmental risk — the risks are inherent to the activity.

The recent repeal of key national rules in the NES-F (covering slope, pugging, and land area) has removed essential baseline protections. This has created a regulatory gap, with no consistent national approach to managing intensive winter grazing. Most regions will not address this until at least 2027 through regional plan changes. In the meantime, enforcement is only possible where regional councils already have their own intensive winter grazing rules in place within regional plans (e.g., Canterbury, Otago and Southland).

Fish & Game believes clear, consistent national regulation is essential to ensure regional councils properly manage the environmental effects of intensive winter grazing.

Recommendations:

- Reintroduce the Permitted Activity rule: Fish & Game strongly urge you to reinstate the permitted activity conditions (formerly in the NES-F), particularly covering slope and land area, especially for degraded catchments.

- Use a more cautious activity status. Intensive winter grazing activities that fail to meet permitted activity standard conditions should be classified as *non-complying* rather than *restricted discretionary*. The environmental risks of intensive winter grazing are too high to allow a more permissive status.

- Freshwater Farm Plans are not a substitute. Freshwater Farm Plans cannot currently replace the resource consent process, as there is no robust model for estimating contaminant loss, particularly sediment, from intensive winter grazing activities.

  Freshwater Farm Plans are only effective when they are well designed, properly implemented, monitored, and enforced. They should not be used to avoid resource consent for high-risk, high-impact activities like intensive winter grazing.

Slope

- Slope of the intensive winter grazing area is a key factor influencing sediment loss and should not exceed 10 degrees.

  There is very little, if any, research demonstrating the efficacy of mitigations to reduce diffuse contaminant loss on sloping land beyond a maximum threshold of 10 degrees.[23] Further, modelling by Ministry for the Environment demonstrates that sediment loss increases significantly when intensive winter grazing is undertaken on slopes higher than 10 degrees.

[23] See for example: Zhang, X., Liu, X., Zhang, M., Dahlgren, R., A. (2010). *A Review of Vegetated Buffers and a Meta-analysis of Their Mitigation Efficacy in reducing Nonpoint Source Pollution*. Journal of Environmental Quality.

Riparian Buffers and Setbacks

- Riparian margins should be vegetated and set back at least 10 metres on slopes under 10 degrees.

  Research shows that on slopes less than 10 degrees, a 10-metre vegetated buffer is significantly more effective than a 5-metre buffer, reducing nutrient loss from runoff by up to 70% and sediment loss by up to 80% — the main diffuse contaminants from intensive winter grazing.

- Near sensitive areas like wetlands, estuaries and lakes, setbacks of 20 – 30 metres should be required.

Protect Critical Source Areas

- Intensive winter grazing activities that disturb and de-vegetate soil in critical source areas should be prohibited.

- In South Otago, research shows protecting these areas during intensive winter grazing reduced sediment loss by ~80% and nutrient loss (nitrogen and phosphorus) by 60–70%.

Land Area

- The area used for intensive winter grazing on a farm must be no greater than 50 hectares or 10% of the farm's area (whichever is greater).

9.9 Fish & Game Position on Intensive Winter Grazing

Fish & Game does not support the widespread use of intensive winter grazing, particularly in degraded catchments. Its use has increased in recent decades alongside rising livestock numbers, particularly in Canterbury, Otago, and Southland. Fish & Game advocates alternative wintering practices such as composting barns / herd homes that deliver better outcomes for animal welfare, water quality, and soil health.

9.10 Environmental Flows and Flow Allocation

Fish & Game is concerned that many councils have not carried out the necessary hydrological investigations in many of their catchments and this is leading to the continuation of issuing water take consents resulting in further overallocation. As discussed in our freshwater submission, the key policy that needs to be set is the priority of water takes: who will get freshwater and who will not? Will the river be allowed to retain enough flow and flow diversity (spates, floods, and low flows in season) to provide for ecological health, or will land based activities take priority?

The NPS-FM 2020 prioritises freshwater ecology over other interests. This does not mean that the environment will be held at a pristine state with no water takes permitted. It means that we can only consent a portion of water to other out of stream uses. If we fail to do this, the health of the water body declines. The widespread degradation of waterbodies in New Zealand has elevated the importance of the debate over nutrients and Target Attribute States and setting bottom lines for defining degradation.

Our Environmental Flows and Levels and take limits policy on our waigoodpolicy.org.nz page notes that allocation of more than 20% of Mean Annual Low Flow (MALF) will have a detrimental effect on ecosystem health, while the draft National Environmental Standard for Ecological Flow (draft NES-Flows) suggested a take limit of up to 30-40%.

We note that there are many waterbodies where over 100% of MALF is already allocated, to the detriment of the ecology in that waterbody. Importantly, there is little national direction regarding flow setting and take limits. Furthermore, where a catchment is overallocated review conditions can be used to reduce the quantum or reduce the cut off to ensure that the water body is not over allocated. The NPS requires the phase out of over-allocation and to stop future over-allocation. This direction should continue into new national direction.

Allocation limits need to be set at levels that do not risk ecological tipping points. Precaution is required while setting limits. This means stopping water from being taken out of rivers and groundwater before water quality and quantity issues occur. It is extremely difficult to return water to a river once it has been allocated. Allocating a volume of 30% of MALF has been common practice. Ecosystems may survive for a short time, as they are naturally resilient, but like the human body, the longer periods of time it is under stress, the more impact it will have on the system over time.

We want to see the Presumptive Standard approach used as the method to set environmental flow which requires the allowable rate of water take for a given day is set as a percentage of the naturalised flow for that day. This rate reduces as the natural flow reduces and is applied consistently across the entire flow range.

In New Zealand there has been a heavy reliance on Instream Flow Incremental Methodology (IFIM). However, there are significant limitations to this method that need to be realised, particularly relating to different life cycles of fish species and flow dependant species. It does not consider species interactions and food availability in the system. IFIM is poor in approximating habitat quantity and habitat quality. This leaves a lot of room for interpretation and can create bias in how it is applied.

Fish & Game want to see more direction from government on how ground water and surface water will be managed and the kind of minimum datasets that councils should have to manage their consenting regime. This topic has not been raised in this round of consultation and there has been no mention of the direction that flow setting work will go in Phase 3 RMA work.

9.11 Nutrients

Consenting is the best tool in preventing and restoring degrading and degraded catchments. In degraded catchments a clear signal that further intensification is not appropriate can be signalled with a non-complying activity status.

Controlled Activity consents give no option for holding the line and not allowing further degradation. A Discretionary or Non-Complying activity status is needed to enable councils to halt further intensification and minimise nutrients entering waterbodies.

Diffuse sources of pollution cannot be disregarded when their cumulative effects cause harm to public drinking water supplies and reduce recreation and enjoyment of the natural environment.

Our waigoodpolicy page provides specific information on nutrients. Our Freshwater submission also includes recommended Target Attribute States for Lakes and Rivers. These recommendations are key to managing primary sector externalities and therefore our Freshwater submission should be read in tandem with this Primary Sector submission.

10.0 Conclusion

10.1 Fish & Game is prepared to work collaboratively with the Government to produce national direction. We are mindful that to be sustainable, development needs to be carried out within environmental limits.

10.2 Fish & Game would like to continue to work with you particularly on the solutions regarding the following issues:

- Sediment run off and forestry
- Best practice for Gravel extraction
- Avoiding contamination associated with mining
- Timeframes for stock exclusion
- Reducing discharges from Intensive Winter Grazing
- Existing overallocation
- Nutrients (although this is covered in our freshwater submission)

We look forward to continued discussion leading up to the release of the national direction instruments and new legislation.

Attachments

Attachment 1:	About Fish and Game and the species that we manage
Attachment 2:	Stock Exclusion submission 2023
Attachment 3:	Freshwater National Direction Submission

Submission to Package 2 National Direction, Infrastructure and Development

Closing date of Submission: 27 July 2025

Email submission to: ndprogramme@mfe.govt.nz

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Package 1 – Infrastructure and Renewable Electricity Development

1.0 Executive Summary

Fish & Game supports the general intent to develop infrastructure more efficiently; however, we emphasise that infrastructure activities must be managed to avoid significant adverse effects, particularly on sensitive environments. Our primary concerns centre on protecting water quality, game bird and sports fish habitat, and maintaining public access to recreational opportunities.

National Policy Statement for Infrastructure (NPS-I)

Fish & Game supports better spatial planning to enable efficient infrastructure development but oppose any weakening of environmental protections. We are concerned that proposed objectives and policies may fail to meet RMA section 7 "other matters," including the ethic of stewardship, maintenance of amenity values, intrinsic values of ecosystems, and protection of trout and salmon habitat.

Operational vs Functional Need: We strongly advocate that only the functional need test should apply under the NPS-I. The proposed inclusion of both functional and operational need tests would "open the floodgates" for infrastructure development in sensitive environments such as wetlands. The operational need test sets too low a bar and could enable projects based on cost and practical constraints rather than genuine necessity.

Consistent with our NPS-I position, we oppose applying both operational and functional need tests for renewable energy generation. Only the functional need test should apply to prevent enabling activities in sensitive locations where they wouldn't otherwise be allowed.

Spatial Planning: We support strategic spatial planning but seek amendments to broaden the definition of "Strategic Planning Documents" to include Sports Fish and Game Management Plans and Conservation Management Plans. Critical spatial mapping which identifies areas suitable for infrastructure and areas requiring protection must be completed before enabling development in sensitive environments.

National Policy Statement for Renewable Electricity Generation (NPS-REG)

Fish & Game supports the transition to renewable energy but opposes policies that prioritise rapid expansion over environmental protection. We are particularly concerned about enabling new hydroelectric generation proposals that could affect wild and scenic rivers and those protected by Water Conservation Orders.

Hydroelectric Impacts: New hydroelectric schemes pose significant threats to sports fish habitat through altered fish migration, modified flow regimes,

increased water temperatures, decreased water clarity, and barriers to fish passage. We generally oppose new proposals affecting trout habitat and note that existing run-of-river designs are preferable to compound dams.

Existing Consents: We support flexibility for upgrades that improve environmental outcomes but oppose considering only "additional or different effects" during re-consenting, as this overlooks cumulative impacts. We seek continuation of access arrangements, recreational flows, and environmental protections in existing consents.

Precautionary Approach: We recommend nationally consistent rules for large-scale renewable energy activities with precautionary approaches and adaptive management, particularly for novel activities like wind and solar farms.

National Policy Statement for Natural Hazards

Fish & Game strongly supports the "room for river" concept, which prioritises natural flood management over engineering solutions. This approach involves avoiding flood hazards and restoring floodplains to natural extents, benefiting both community safety and the species we manage.

We support nature-based solutions and spatial planning to identify high-risk areas whilst limiting new development. The NPS-NH should address flood management for infrastructure and rural land uses, moving away from engineering approaches that protect pastoral activities in flood-prone areas.

Key Recommendations

Hierarchy and Integration: Critical clarification is needed regarding which National Policy Statement takes priority when conflicts arise, particularly between NPS-FM protections and infrastructure enabling policies. We promote the NPS-FM and the hierarchy of obligations taking priority over other NPS and activities.

Consultation: Fish & Game seeks statutory consultee status for infrastructure projects near habitats of species we manage, offering timely expert advice on game bird and sports fish habitat matters.

Implementation: All national direction amendments should be implemented after RMA changes are given effect, ensuring consistent integration with new legislation.

Fish & Game remains committed to collaborative solutions that enable necessary infrastructure development whilst protecting the recreational, cultural, and ecological values that depend on healthy freshwater environments.

2.0 New National Policy Statement for Infrastructure

2.1 Support General Intent of NPS-I

Fish & Game supports the general intent of the National Policy Statement for Infrastructure (NPS-I) and the intent to develop infrastructure more efficiently. We believe better spatial planning will assist with this goal.

Infrastructure projects and operations can have significant adverse effects on New Zealand's environment, wildlife and the species that we manage. So, whilst we agree that infrastructure needs to be provided for more efficiently by way of policy direction, this needs to be considered carefully keeping in mind that infrastructure activities and operations need to be managed to avoid significant adverse effects, especially on sensitive environments.

We don't necessarily agree that "there are disproportionate requirements for assessing the environmental effects of proposals" (page 12 discussion document) which directly add "considerable costs and delays to infrastructure projects".

We note that the intent is to better enable and protect infrastructure by providing

- Consistent definitions to support the proposed policies
- An objective setting out a range of infrastructure outcomes expected from the RM system.
- General policies to better enable and protect infrastructure, while managing its effects on various environments and recognising and providing for Māori rights and interests.
- Policies on managing the interface between infrastructure and other activities.
- Policies to enable infrastructure while managing its effects on the environment.

There is reference to section 6 of the RMA but not section 7 (other matters). Fish & Game is concerned that the proposed objectives and policies that seek to exploit the environment will not meet the "other matters" listed in the RMA including:

a) the ethic of stewardship
b) the efficient use and development of natural and physical resources
ba) the efficiency of the end use of energy
c) the maintenance and enhancement of amenity values
d) the intrinsic values of ecosystems
f) the maintenance and enhancement of the quality of the environment
g) any finite characteristics of natural and physical resources
h) the protection of the habitat of trout and salmon

We note that renewables are already provided for in *i) the effects of climate change* and *j) the benefits to be derived from the use and development of renewable energy.*

2.2 Fish & Game generally support the objective and benefits

The proposed objective and benefits of infrastructure as detailed in the discussion document on page 13 and 14 is broadly supported by Fish & Game. However,

we are concerned that the natural environment will not feature in decision making, and other development interests will take priority.

We understand that to partake in game bird hunting and angling recreation infrastructure needs to be in place to provide access. So, we ask, when would the adverse effects on the natural environment warrant avoiding a location as mitigation is not always possible? It appears that the policy is so positively written that there will be no infrastructure project that is amended or refused and that natural values will not be considered.

2.3 Operational and Functional Needs

We are concerned where the species we manage will be placed in a hierarchy of consenting when infrastructure projects have an operational or functional need.

An example of potential conflict is the functional need of a solar farm to locate near to an existing transformer where part of the land area has game bird and other indigenous habitat values.

It is not clear how the new NPS-I will relate to other National Policy Statements and which prevails. For example, the NPS-FM was implemented with the intention to set an environmental bottom-line of ensuring 'no net loss' of natural wetland extent or values. The NES-F then regulates activities in or near natural wetlands to ensure this bottom-line is met, such as preventing activities occurring in (and in some cases, within 100m of) wetlands, except for 'specified infrastructure' and development. Those activities may only be allowed in or near wetlands if they can show there is a **functional need** for the activity to locate there. The proposed NPS-I however allows for both the functional and operational need test.

Generally, the operational need test is easier to meet as it sets a lower bar by enabling some projects to take place in a particular place where operational or technical constraints mean it is not practical to put the project elsewhere. The functional need test on the other hand is more restrictive as it does not allow for the costs or practical constraints of alternative locations to be considered. The crucial question then remains - how will the proposed NPS-I be applied where there may be an operational but not a functional need to locate infrastructure in a wetland?

We consider the functional need test alone should be applied under the NPS-I. While the functional need test sets a higher bar than the operational test, it is not absolute. There remain pathways for enabling certain activities under the NPS-FM And NES-FW with only the functional need test, as noted above, and there is recognition that such activities may necessarily impact natural wetlands. An example is the decision made last year by the Northland Regional Council to approve a 172ha solar farm in Ruakaka, Northland, resulting in the loss of 17ha of rare dune slack wetlands which provide important habitat for game birds and rare indigenous avifauna. In that decision the functional need test was met based on the need for proximity to the existing Bream Bay substation. Clearly, from that decision, when the functional need test is applied, it can still enable pathways for infrastructure development to occur.

We are also already seeing the courts applying the functional need test in a less strict manner, such as in the case of the Mt Messenger decision – applying an interpretation of functional need that looked at issues such as cost and constructability of alternatives, instead of exclusively highlighting aspects such as the nature of the project. We consider that applying both the functional and operational needs tests under the NPS-I would go too far and open the floodgates to enable infrastructure in what are sensitive environments such as wetlands and areas with indigenous biodiversity.

2.4 Spatial Planning and other Strategic Plans

Fish & Game understand that spatial planning is a key feature of the proposed National Direction reforms. Fish & Game support the use of spatial planning generally to better plan and enable infrastructure development.

We support the proposed requirement for decision-makers to consider spatial plans and have regard to strategic planning documents for infrastructure generally. However, we seek that definition 21 be amended to broaden the scope of what is considered to be a "Strategic Planning Document" so that other strategic plans, including Sports Fish and Game Management Plans and Conservation Management Plans under the Conservation Act, which assist in identifying natural areas and species, are included. Currently, it's not clear whether these plans are included under the definition.

We also consider that before changes are made to the NPS-I, or any other National Policy Statements, further spatial analysis is undertaken that both identifies areas suitable for specific infrastructure activities as well as areas where infrastructure activities should not be developed. This is particularly important for areas with significant natural values. Until spatial mapping of existing and potential infrastructure locations and significant environmental areas is complete, we do not support the proposals that would allow for infrastructure activities to take place in areas with significant natural values.

Further, we consider that spatial planning policies and requirements should be strengthened across the proposals. Currently the requirement in P3 of the NPS-I is only to "consider relevant spatial plans" and there are no other policy requirements within the proposal that specifically direct developments away from sensitive environments. Of concern is that P2 – operational need or functional need, states that services must locate where required, regardless of whether the infrastructure has been spatially identified in advance. No amendments have been proposed in the NPS-REG regarding spatial planning. As such, Fish & Game are unsure how spatial planning will be applied practically.

2.5 Efficient and Timely Delivery of Infrastructure

Fish & Game supports the intent of this section to include more effective use of existing infrastructure, including maintenance and re-consenting. Fish & Game recognise that some infrastructure services provide valuable access opportunities for recreation in New Zealanders, including gamebird hunting and sports fishing.

Fish & Game, however, seek the inclusion of provisions for new infrastructure that provides at least legal and physical access so that the public can also benefit from recreational opportunities around regionally / nationally significant infrastructure. Hydro-electric infrastructure should be required to provide legal and physical access on existing roads, access around dams, to access rivers and lakes for recreation. This access provides for anglers to access lakes and rivers, which may include access for rafting and fishing.

However, requirements for efficiency and timeliness should not be at the expense of the environment or public participation and consultation, nor lead to poor decision-making. Where there are more than minor adverse effects, public notification is warranted and input from the public is reasonable. Rushed or hurried decision making can lead to inadequate assessment of effects and unintended consequences. This is particularly important in this proposal as it has not been made clear exactly how adverse effects are going to be assessed and managed (more on this topic below). The proposed NPS-I has included a lot of wording to support efficiency and timeliness. We consider there is an overemphasis in the proposals on efficiency and timeliness and that this wording should be scaled back.

We consider that a clearer and more efficient way to strategically direct where infrastructure should go, and hence where a more permissive and efficient consenting approach could apply, would be to complete the spatial mapping exercise recommended above.

We also note that a number of existing hydroelectric dam consents include consent conditions that work to mitigate adverse effects and provide for public access (e.g., at recreational release flows). We are very interested in how these consents are framed and re-consented as we believe at least the existing consent conditions need to be retained. However, in some cases negotiation of more stringent conditions are needed to claw back existing problems including over-allocation.

2.6 Providing for Game bird and Fishing Values

Fish & Game welcome the opportunity to provide timely advice on proposed and re-consented infrastructure located in rivers, lakes and wetlands, i.e. the habitat of the species that we manage. We manage these species that also have a functional need to exist in the habitat where we find them.

2.7 Providing for Māori Interests

Fish & Game support the proposed engagement with Māori, considering Māori values (many of which also align with those of Fish & Game) and involving Māori in decision-making around infrastructure projects, including those affecting sites of significance to Māori.

2.8 Assessing and Managing Adverse Effects of Infrastructure

Fish & Game are concerned that the discussion document fails to consider what sort of effects are going to be managed, with no mention of minor effects, cumulative effects or when effects should be mitigated.

Fish & Game urge you not to always prioritise development over the conservation and preservation goals enshrined in the RMA. Fish & Game support the retention of section 6 altogether.

Fish & Game support a simpler approach to enabling existing infrastructure to have minor upgrades or renewal, provided adverse effects are avoided, remedied or mitigated. However, we need to be mindful with the long-term nature of infrastructure consents that goal posts will change over time. Examples include cumulative impacts and worsening water quality and overallocation requiring improvements to be made to discharges at re-consenting times.

Another example is when a water resource becomes overallocated. Often the remedy is to reduce the allocation to all users of the resource, not just the non-infrastructure uses. The proposed policy would allow for hydro water takes to take precedence over farming water takes and it is not clear if that is the intent. Either way, Fish & Game would be concerned regarding the many catchments that are already overallocated for flow and nutrients.

We consider that P6 does not go far enough to manage adverse effects of infrastructure on the environment. More specifically 1a) which considers the extent to which adverse effects have been avoided, remedied, mitigated or minimised, is not a requirement in and of itself, instead it is only for decision makers to have regard to "as applicable" and then is limited to only the route, design and construction method selection.

We also oppose the qualifier "where practicable" in both P7 and P8: the term sets a low bar for managing adverse effects. It is also ambiguous and highly subjective, leaving open the question of what is practicable in terms of avoiding, remedying, and mitigating adverse effects. Any applicant could argue in any given circumstance that the adverse effects of a particular project/activity are too impractical to avoid.

2.9 Interface and Compatibility of Infrastructure and Other Activities

Fish & Game manage species whose habitat are sensitive to infrastructure uses. Design can often address these issues, but in other instances avoiding the location is the only way to avoid reverse sensitivity effects or total loss of habitat. The proposed policies fail to spell out the priority between infrastructure and other activities that use the natural environment such as recreation, for example, lakes or ponds with game birds, or lakes or rivers with sports fishing opportunities. We note that the design or location of a road or bridge could reduce the reverse sensitivity effects on recreation values whilst other proposals such as hydroelectric dams can remove recreation values entirely.

It is also unclear from the proposed policies what "other activities" are supposed to entail as these are not defined.

2.10 Anticipated Impacts of Proposed NPS-I

Fish & Game agree that there is likely to be a loss of amenity with greater infrastructure protections. New Zealand Fish & Game Council would like to be a statutory consultee for new projects proposed near the habitats of the species that we manage for example wetlands, lakes and rivers. We can provide timely advice regarding the proposed development at hand.

2.11 Consistency with the purpose of the RMA

It is not clear if the NPS-FM will take priority over NPS-I where lakes, rivers and wetlands are concerned. This is a critical consideration for us as these are the primary habitats of our species, and because of the bottom lines and protections that the NPS-FM provides for these environments. This is particularly important in that the NES-F requires only the functional need test to be met, as highlighted above.

3.0 Amendments to National Policy Statement for Renewable Electricity Generation 2011

3.1 Fish & Game understand that New Zealand has obligations to meet international emissions reduction targets and that meeting those targets, and limiting global temperature rises, will require expansion of renewable electricity generation, and that the proposals aim to provide clear direction towards meeting those commitments.

Though Fish & Game support a transition to a low-carbon, ecologically resilient economy and understand that renewable electricity generation forms a fundamental part of this transition, these projects and operations can have significant adverse effects on New Zealand's environment and wildlife. So, whilst we agree that renewable electricity generation needs to be provided for by way of policy direction, this needs to be considered carefully keeping in mind that renewable energy and climate mitigation does not necessarily override the need for a healthy environment.

Our submission includes comment about hydro-electric REG activities as well as wind and solar.

3.2 Problems that the proposal aims to address

Fish & Game does not agree that more enabling policy guidance is needed across New Zealand. This is of notable concern because of the implications that a more enabling approach would have for hydroelectric dams, which have a significantly different, and in many cases greater, environmental impact than solar and wind REG activities. For example, hydroelectric dams may act as barriers to fish migration and can alter the ecological connectivity of freshwater environments.

We are concerned about new enabling and directive policies, which permit adverse effects and doesn't manage effects on the environment. Fish & Game are concerned that this will enable new hydroelectric generation proposals. Many of the Water Conservation Orders that Fish & Game have secured have sought to ensure that wild and scenic lakes and rivers can remain and not end up as a hydro-electric power scheme.

The objective on page 21 fails to recognise that not all adverse effects can be managed.

3.3 National Significance and Benefits

Fish & Game does not support decision makers giving greater consideration and weighting to the national significance and benefits of REG projects. This emphasis put onto the national significance of REG activities effectively undermines section 6 of the RMA, "*Matters of Significance Importance*" and 6(c) "*The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna*".

Policy A effectively gives priority to the rapid expansion of REG activities with responsibility placed on regional councils to decide whether the national significance of those activities has priority over and above significant natural areas and significant environmental values.

We consider a spatial mapping approach is instead required that identifies exactly where significant environmental areas are and what needs to be protected before an assessment can be made regarding whether those areas should be put at risk.

Fish & Game supports locating REG close to demand and electricity networks. This should reduce the need for hydroelectric generation projects in the South Island, benefiting North Island cities. This would promote wind and solar farm opportunities near highly populated North Island cities.

Endless provision of increasing power per capita of population is also a very wasteful approach, and more effort should be made to enable reduced per capita consumption. Many European countries have been able to significantly reduce their reliance on grid power by promoting and subsidising the installation of solar panels on buildings, and more could be done in New Zealand to promote small-scale REG.

3.4 Cumulative Gains and Losses of REG

We note that the Amend the definition means:

the generation of electricity from renewable energy sources from solar, wind, water, geothermal, biomass, tidal, wave, or ocean current energy sources.
This amends the current definition by replacing 'hydro-electricity' with 'water'. The intent is to refer to all sources of REG in a consistent manner.

Fish & Game opposes strengthening the weight given to cumulative gains and losses of REG capacity. We are concerned that REG will be prioritised over freshwater values, including the ecology of the waterbodies. We discuss in our freshwater submission that ecosystem health needs to be the first priority before any other considerations (including national REG proposals).

3.5 Operational and Functional Need for REG

Fish & Game oppose the NPS-REG applying both the operational and functional need tests. We consider that only the functional need test should apply for REG proposals. As highlighted above under the consultation for the NPS-I, the operational need test sets a far lower bar and if applied will enable REG activities

in sensitive locations, such as wetlands and areas of indigenous biodiversity, where it wouldn't otherwise be allowed.

Again, it is not clear how this NPS will be balanced/applied against other NPS's.

Given the fundamental shifts required to give effect to the NPS-FM, it is right to consider the requirements of the NPS-FM alongside those of an updated NPS-REG in a freshwater context, with the NPS-FM directing freshwater priorities via its hierarchy of obligations. The NPS-REG should not be written to take precedence. Doing so would undermine the government's Essential Freshwater aims.

An example below from the Otago Fish and Game Council.

> *"Falls Dam, located towards the top of the Manuherekia Catchment, near Alexandra, primary purpose is to capture and store water for irrigation, though it also hosts a small hydro-generation station. The catchment has a significant allocation of water for irrigation and the entire management regime for the Manuherekia river and its tributaries will need to be reconsidered to give effect to the NPS-FW in the Land and water Regional Plan (**LWRP**). Falls Dam itself is nearing (or perhaps past) the end of its engineered lifespan. The deemed permit authorising the dam's placement and operation ceased in 2021, and a short-term consent likely has been, or soon will be, issued in order to allow for the dam's ongoing function until the catchment's management is reconsidered in the LWRP, which will be notified in 2024.*
>
> *Falls Dam is fundamentally linked with water use and environmental outcomes for water bodies and aquatic ecosystems in the catchment. Among a myriad of other issues, it fundamentally alters the hydrology of the catchment and the land use it enables, via the provision of water for irrigation, has water quality and quantity implications. If the dam were to be retained, it is likely it would need to be rebuilt or restored in some other way to be made safe. No party, even the irrigation companies of the valley who are the main beneficiaries and owners of the dam, has indicated that they are willing to fund a rebuild.*
>
> *The hydro-generation aspect of the activity is relatively minor. Yet if updates to the National Policy Statement for Renewable Generation NPS-REG required the retention of Falls Dam to retain generation capacity, it significantly constrains the management options available for the catchment. Additionally, it would require the dam's retention when no party has indicated a willingness to fund the retention of the dam infrastructure".*

3.6 Existing REG

We have concerns that only additional or different effects to those from the existing REG assets are to be considered when existing REG assets are to be re-consented, upgraded or repowered. This would result in cumulative effects being overlooked. Current hydroelectric generation projects should be

considered fully when upgrades or reconsenting is required due to the cumulative, large scale and integrated impacts of the activity. This is of notable concern because of the implications that a more enabling approach would have to hydroelectric dams, which has a significantly different and in many cases greater environmental impact than solar and wind REG activities.

We do however support providing for more flexibility in consent conditions to allow upgrades to adapt new technologies and improve resilience, particularly where such technologies will improve environmental outcomes, and this should be stated and prioritised in the policy.

Variation of consent conditions is usually a discretionary activity, and this should remain in place so that at least the existing consent conditions are carried forward. Many existing REG involve consent conditions that are important to various recreational groups and therefore prior consultation with those parties is needed, and in some cases, a hearing is warranted. Fish & Game wants to see the continuation of access arrangements and recreational and environmental flows.

In some instances, renegotiation of consent conditions is required as the ecological health of the waterbody has declined and the REG as well as the irrigation users may need to accept a sinking lid approach to their flow allocation. The Rakaia is a good example where consent conditions need to be reviewed in the catchment and steps taken to provide for the ecological health of the waterbody.

3.7 Consultation with Fish & Game

Fish & Game is available to provide expert advice on matters to do with game bird habitat and sports fish habitat. We encourage MfE and regional councils, iwi and DOC to work with us to at least maintain and, where appropriate, restore habitat for the species that we manage.

The RMA as a matter of national importance aims to maintain and enhance public access to lakes, rivers and coastal areas via section 6 (d). We are also mandated to advocate for access to water bodies which have sports fish and game bird habitat. We note that there are many opportunities for new recreation associated with existing and proposed infrastructure and we would encourage you to include provision for this in both infrastructure and REG provisions.

3.8 Managing Adverse Effects

We oppose P2 in that adverse effects are only avoided, remedied or mitigated where practicable for the same reasons above in the infrastructure section. The qualifier “where practicable” sets a potentially low compliance test and is highly subjective.

3.9 Consistency with the purpose of the RMA

The Minister responsible for RMA Reform considers the proposals to be consistent with the purpose of the RMA because they enable development, while protecting natural environmental values in accordance with relevant national direction (i.e., river/lakes/wetlands continue to be managed under the NPS-FM). However again it is not clear which NPS prevails – example of the functional need vs operational need test.

As highlighted above, we consider that Policy A effectively undermines section 6 of the RMA.

3.10 Implementation

Fish & Game submit that the priority document for freshwater environments (lakes, river and wetlands) should be the NPS-FM.

We consider that there needs to be nationally consistent rules for new large-scale REG activities. There needs to be a precautionary approach and adaptive management used as some of these activities, such as wind and solar, are novel in New Zealand. The draft NPS REG currently excludes any reference to the precautionary principle, or the need for adaptive management. We consider that until the environmental effects of large-scale wind and solar generation activities are better understood the precautionary principle should be provided for in the NPS REG.

Regarding adaptive management this should require monitoring and a trigger, whereby if monitoring reveals adverse effects are occurring on the environment, then the activity should be adapted to remediate or mitigate whatever adverse effect that is occurring.

This is supported by the Department of Conservation's literature review "Impacts of windfarms on birds" which found:

"In a meta-analysis of 19 studies into the effects of wind farms on bird abundance, Stewart et al. (2004) found that wind farms seemed to reduce the abundance of many bird species and that Anseriformes (swans & ducks) experienced greater declines than other bird groups, suggesting that a precautionary approach should be adopted to wind farm developments near aggregations of Anseriformes."[1]

3.11 Mini Hydro Proposals

Fish & Game do not support mini hydro development as they will negatively impact on trout spawning streams by preventing fish passage. Where fish passage can be provided for, including for sports fish we are more likely to support these proposals.

3.12 New Hydro Electric Power Schemes

The species that we manage are especially vulnerable to impacts of hydro-electric activities on water quality and quantity.

The following list provides a brief overview of a some of the key issues associated with hydro-electric power generations so while there are some positive impacts, there are many direct impacts on the water body and the species that live in that water body.

Impacts of hydro-electric activities on water quality and mahinga kai.

[1] Raplh G. Powlesland, Impacts of wind farms on birds: a review, Science for Conservation 289, 2009, 25.

When the natural flow and seasonal variations of a waterway are interrupted by hydro-dams extreme care must be taken to maintain the amount of water needed to support healthy ecosystems. The amount of water needed is called environmental flow, which considers maximum and minimum flow levels to support a healthy ecosystem. Failure to provide an environmental flow can have serious consequences for water quality and mahinga kai.

Potential impacts of hydro-dams on water quality and mahinga kai include[2]:

- Altered fish migration: barriers may prevent native fish that move from sea to freshwater as part of their life cycle, such as tuna, from moving upstream and downstream and accessing otherwise suitable habitat. This is also relevant for salmon.
- Increased velocity: sustained high water velocity prevents some fish access to upstream habitats.
- Modified channel form: erosion from vegetation removal along banks and changes to stream flow after construction of a road crossing or similar barrier can lead to scouring and breakdown of stream and riverbanks, impacting on mahinga kai habitat.
- Modified flow: flow changes as stream banks are modified and realigned, which can lead to changes in the benthic (bottom) structure of the stream/riverbed, coarse substrates such as gravels and boulders are replaced and covered by sand and silt.
- Loss of species habitat: many mahinga kai species need the protection and habitat provided at upstream sites inland from the sea. Barriers that make upstream habitat inaccessible to species that prefer higher elevation can result in loss of breeding and feeding sites.
- Damage to banks and floodplains: varying flows and flash floods threaten the stability of a riverbank, increasing its vulnerability at times of flooding and damaging breeding and feeding habitat for mahinga kai.
- Increased water temperature: flow effects temperature. Loss of flow means waterways can fluctuate in temperature, and if unshaded, water can reach high temperatures unsuitable for mahinga kai. Fish generally cannot tolerate temperatures over 25ºC.
- Decreased water clarity: erosion and increased sediment loading into a river due to changes in flow will decrease water clarity and reduce visibility and the ability of fish to find food.
- Increased nutrients: a decrease in flow may increase the concentration of nutrients within a river.

With so many adverse effects on the sports fish that we manage, we are generally concerned about new hydroelectric power generation proposals that involve rivers and lakes with trout habitat. We are particularly concerned about new impoundment based dams similar to those constructed in the past before impacts

[2] Impacts of hydro | Earth Sciences New Zealand | NIWA

were well understood including their severe[3] effects on freshwater ecosystems. Examples of these dams include Tongariro Power Development, the Manapouri Dam, the Patea Dam.

Compared to hydroelectric schemes using impoundment, run-of-river schemes can have lower ecological impact (particularly very small schemes). The impacts of a particular scheme will depend on[4]:

- whether the forebay is on-river (i.e. a dam) or off-river
- the design, size and positioning of the intake
- the proportion of the flow which is diverted (particularly during low flows)
- the length of the diversion reach (the distance between the intake and the turbines) which is subject to flow abstraction
- whether the water is returned to the same river or is piped to an adjacent catchment (in the latter case (double-catchment hydro), the flows in the first catchment will be permanently reduced downstream of the intake
- the design and positioning of the powerhouse (containing the turbines)
- for larger schemes, aspects such as penstock installation and access roads to intake structures (which are often in remote, forested areas) also have the potential to negatively impact on ecological values
- the existing values in the catchment
- existing ecosystem pressure from landuse and low flows and future forecasting based on climate change
- mitigation methods used

Fish and Game is mandated to advocate for the protection of the habitat of the species that they manage so we would still be concerned about a run of river scheme on locally or nationally significant waterbody.

3.13 Wetlands, Birds Strike, and Solar Farm Development

Fish & Game are likely to oppose new solar farm development in game bird habitat areas such as wetlands, depending on the specific ecological and recreational values associated with the proposed wetland location.

Through early consultation with our expert staff, setbacks or acceptable areas may be negotiated that provide suitable mitigation of the environmental effects associated with this form of REG.

Generally, we recommend that minimum solar panel separation distances are used so that the collective panels do not look like a shimmering lake to game birds. This reduces the likelihood of bird strike from birds who see the panels as a lake to land on. Additionally, we request that minimum reflectivity is used in the panels again to minimise bird strike. This issue is also relevant to glass buildings including large glass houses and glazed commercial buildings. By increasing the visibility of the glass to birds, bird strike can be minimised.

[3] DOC Structures in waterways: Hydroelectric and water storage schemes.

[4] page 38 DOC Structure in Waterways: Hydroelectric and water storage schemes.

Fish & Game staff are willing to assist developers with pre-consultation discussions to ensure that REG can proceed in suitable locations and that our species and their habitat is protected.

4.0 National Policy Statement on Electricity Transmission

Proposed National Policy Statement for Electricity Networks

In general, Fish & Game supports the proposed transition away from using fossil fuels towards more renewable energy to increase the capacity of the electricity network. However, we are also concerned about competing interests and environmental values.

We are not sure what you mean by “effects of other activities” or do you mean “effects on other activities”. We note that policy amendments, amongst other things is aiming to provide greater protection of electricity networks.

4.1 Scope and Definition

We note that you plan to include new definitions including “routine activities” and “non routine activities”.

4.2 Permissive Objectives and Inappropriate location

We note the proposed objective on page 28 of the discussion document. While it is good to note positive aspects of the electricity network, we are concerned that the permissive nature of the wording will result in decision makers not being able to refuse inappropriately located development.

4.3 National Significance and Benefits of Electricity Networks

As well as listing positive aspects of electricity networks, will there be some areas of New Zealand that are considered too remote or too far away from the network? Will it be accepted that there will be “off the grid” locations? We would anticipate that remote stations and huts on conservation estate and power will need to be derived from off grid energy sources.

4.4 Operational and Functional Need of Electricity Networks

The species that we manage ultimately have functional need to live in the habitats that they are in i.e. lakes, rivers, and wetlands.

Fish & Game does not support functional and operational need concepts as, considered together, they appear to dilute the requirement to “avoid” adverse effects and provide for wide reaching ability to locate in the proposed site.

Again, Fish & Game does not want to avoid electricity networks, but we note that siting of networks is a key concern for managing some of the game bird species that we manage. In some cases, increasing the visibility of power lines near wetland sites is also an appropriate mitigation. Careful siting of networks a minimum distance away from game bird habitats would be another example. We note that this is an area where further research is needed.

4.5 Route and Site Selection

Fish & Game is concerned that further loss of wetland habitat or ability to harvest game birds in wetlands could result when route and site selection processes only focus on operational and functional needs of the network, without also considering the needs of existing recreational activities and values.

While we don't have a specific setback recommendation for powerlines, police recommend a 300m setback from use of firearms from walking tracks and the same can be used for noise buffers from residential buildings.

4.6 Managing Adverse Effects

Fish & Game are interested in the proposal to remove reference to "sensitive activities" in Policy 8. We are waiting to see what new approach will be proposed in terms of the new legislation and the priority between national direction instruments. Proposals involving tensions between infrastructure and the natural environmental values will have ramifications for the game birds and sports fish species that we manage. Many of the habitats that our species thrive in have natural landscape protections and high recreation value.

4.7 Protection and Strategic Planning of the Electricity Network

In general, Fish & Game support the strategic planning and continued designation protections of the electricity network. We also think there is opportunity for spatial planning to assist with future planning for this sector. We are keen to see the synergies and linkages between national direction: for example, electricity infrastructure should be constructed in such a way that also ensures that natural hazards such as floods do not regularly damage or destroy their infrastructure.

4.8 Implementation

Fish & Game request that all national direction amendments are brought in after the changes to the RMA have been given effect to.

5.0 National Environmental Standards for Electricity Transmission Activities

Fish & Game are only concerned about a small number of the proposals as detailed below.

5.1 Potential new regional regulations and management plan requirements

Activities that Transpower routinely undertakes includes river crossings, groundwater takes and use, dewatering, stormwater discharges, structures in coastal marine areas, works in the bed of a lake or river.

Fish & Game does not a support a permitted activity criteria for these works. Normally at least a restricted discretionary activity would be needed to ensure that a proposal can be refused to enable a redesign if adverse effects warrant this approach. Generally, consent conditions are needed to ensure that adverse effects are minimised for example when working in the bed of a river.

5.2 Use of management plans to manage environmental impacts from blasting, vegetation management and earthworks.

Management plans cannot be used for permitted activities. They must still have at least a controlled activity status to allow for enforcement and charging the applicant for monitoring of the activity. Management plans along with consent conditions could be used in association with blasting, vegetation management and earthworks. As a very minimum, a prior notification permitted activity process should be required.

Fish & Game have no comment on:
National Environmental Standards for Telecommunication Facilities
National Environmental Standards for Minor Residential Units
National Environmental Standards for Papakainga

6.0 National Policy Statement for Natural Hazards

Fish & Game is particularly interested in natural hazards that impact on the habitat that our species live in namely, lakes, rivers and wetlands.

6.1 Room for River Concept

Fish & Game support the room for river strategy i.e. instead of using engineering to channel and control the river, allow the river space to move, flow, and flood while limiting pressure on stop banks and communities. This concept aims to keep communities and infrastructure safe from flooding while restoring health to our rivers. It involves avoiding flood hazard and the widening of floodplains closer to their natural extent.

This approach means that in areas where flood defence schemes have been put in, there should be a programme of works to manage the retreat away from this approach because sooner or later there will be an event that will not be managed by the flood defences and this could result in loss of life.

Leaving the river/ lake and wetlands to their naturally occurring high levels and low levels will also serve the species that we manage well. They can adapt to their changing environment when left in their natural state.

A focus on growth and private property rights can be inconsistent with this. However, continuing to build bigger and more expensive flood defence schemes will also not be successful or cost effective, particularly as more frequent and severe heavy rainfall events are predicted with climate change. The Room For River concept is central to climate adaptation.

We cannot continue to locate growth or existing development anywhere as the consequences cannot be cost effectively mitigated. Policy needs to prioritise nature-based solutions to reduce flood risk – such as making room for rivers which effectively requires avoiding development in high-risk locations.

Natural hazard risk assessment also needs to apply to infrastructure planning which is one of the most expensive assets and high-risk during flooding events. Risk assessment also needs to look at other sectors such as aquaculture, agriculture, pastoral, horticultural, mining, quarrying and forestry activities and the buildings that these activities use. These other sectors will also have detrimental effects on the species that we manage if not managed for climate adaptation (and more frequent and severe flooding events).

6.2 Spatial Planning to Define Risk

While Fish & Game will not get involved with the granular level detail in developing flood strategies, we support the better use and understanding of spatial planning to identify areas at risk to limit new development in those areas.

6.3 Non-residential risk

The NPS-NH should also address flood management for infrastructure and rural land uses as many flood protection schemes are for the sole purpose of protecting farming land. With more frequent severe weather events we should expect regional councils to step back from engineering approaches and remove structures that are likely to fail to protect pastoral activities. This will better enable landowners to plan for evacuation of animals in severe weather events. Location of houses and barns should not be located in these flood hazard areas.

6.4 Spatial Planning and Hazards

Clear identification of hazard areas is a responsibility of regional and district council. Unfortunately, mapping and setting clear guidance on these issues are often avoided as they are highly political. However, going forward, avoidance of building in flood / slip / fault line (and other areas of natural hazards) will be key to climate adaptation strategies.

7. Implementation of Infrastructure and Development Instruments

Fish & Game recommend that all the changes should occur after the new RMA is in place rather than these national direction changes now, and then again after the RMA is changed.

8. Waste Water Standards Submission

Fish and Game submitted to Taumata Arowai earlier this year on the wastewater standards consultation. We stated that the proposed standards were not fit for purpose. We were concerned that there would be a poo plant priority over the ecological health of a waterbody. We requested amendments on the following matters (and others):

- Minimum end of pipe standards (as opposed to maximum) that allow more stringent standards to be set to meet receiving environment outcomes and consider the cumulative effects of all contaminant sources.
- Receiving environment standards that provide for community and environmental outcomes, seasonal/flow related adjustment, allow for integrated catchment management, and drive improvements in treatment technologies
- Incentivisation of partial or full discharges to land over discharges to water
- More flexibility over consent conditions
- More stringent controls on overflows and bypasses

The full submission can be viewed on our website[5].

9. Conclusions

8.1 Fish & Game would welcome the opportunity to present this submission and answer any questions that you have.

8.2 Fish & Game would particularly like to follow up on issues to do with:

- Access to lakes, rivers and coastal areas, where appropriate via infrastructure designations or REG projects.

[5] 2025-04-Waste-Water-Sandads-Submissions-Final.pdf

- Reverse sensitivity and recreation opportunities near infrastructure projects and how they can co-exist.
- Consent conditions that may mitigate adverse effects of e.g. solar farm so that adverse effects (e.g. bird strike risk) is minimised.

Attachments

Attachment 1 – About Fish and Game