

Protecting water bodies and freshwater ecosystem health

Step change is required to improve the health and well-being of water bodies and freshwater ecosystems. They cannot decline!

Our NPS-FM position in a nutshell

Protecting the health and well-being of water bodies and freshwater ecosystems is the first priority of the National Policy Statement for Freshwater Management (NPS-FM) objective. Your regional plans cannot provide for any more degradation in the health and well-being of water bodies and freshwater ecosystems¹, including no decline in water quality².

To date, New Zealand's approach to protecting water quality and quantity (which are closely connected) has not been good enough. The NPS-FM requirement to maintain the health and well-being of water bodies and ecosystems and to improve degraded water bodies³ means all water bodies in New Zealand are fully allocated.

The NPS-FM tells us to think differently about how we protect water. It tells us we must manage resources by prioritising the health and well-being of water bodies and freshwater ecosystems, then the essential health needs of people such as water to drink. Social, economic, and cultural well-being of people must be enabled, but only after the first two priorities are secured. This is a shift in freshwater management which in the past largely focused on providing for use and economic activity by incrementally reducing the health and well-being of water bodies. We must figure out how to use what we have, better – or in some cases, reduce that use.

This means when you are drafting regional plans, things will have to be done with the same or less impact on water. We cannot continue to chip away at bottom lines.

There are many benefits of improved ecosystem health. Importantly, providing healthy water bodies and ecosystems builds resilience to climate change as required by Policy 4 of the NPS-FM. The reality is that more frequent and increased rainfall and drought events will put more pressure on freshwater environments and this needs to be proactively planned for. What served us in the past as water level records will require more advance modelling and precaution to effectively respond to climate change.

One action to improve ecosystem health can advantage multiple environmental outcomes you hope to achieve. For example, by protecting wetland extent or river extent you not only provide critical habitat for many indigenous freshwater species, and trout and salmon, but create more resilience communities for people during times of flood or drought events. You will also be providing for natural form and character and mahinga kai values. Planting and protecting riparian margins provide shade, habitat and can cool water temperatures required for

¹ Policy 5 NPS-FM

² Ngāti Kahungunu v Hawkes Bay Regional Council [2015] NZENVc 50

³ [Link to:](#) Policy 5 of the NPS-FM

indigenous, as well as introduced, freshwater species such as trout and salmon to survive, while also filtering out sediment and nutrients from entering water bodies.

In some areas targeted and actionable improvements are going to be needed to restore the health and well-being of water bodies and freshwater ecosystems. Doing more of what we have always done is not going to be enough to restore and preserve the balance between the water, the wider environment, and the community – in fact, it is likely to make things worse. The good news is – there are strategic wins that can deliver multiple improvements to the quality and quantity of water bodies and freshwater ecosystems, as well as people, communities, and livelihoods.

The NPS-FM directive

Healthy water bodies and ecosystems are at the heart of the NPS-FM and form an important part of the fundamental concept of Te Mana o te Wai. The NPS-FM describes what sustainable freshwater management looks like in Aotearoa New Zealand⁴. The purpose of the Resource Management Act 1991 (RMA) includes: ‘safeguarding the life-supporting capacity of air, **water**, soil, and **ecosystems**’⁵. Safeguarding life-supporting capacity for water means protecting ecosystem health. Prioritising and protecting ecosystem health achieves the purpose of the Act.

Policy 5 of the NPS-FM directs that you cannot decrease the health or well-being of water bodies. At a minimum, their health and well-being must be improved if they are degraded below ‘bottom lines’, and elsewhere (where they are healthy) it must be maintained. You must also improve the health and well-being of freshwater ecosystems and water bodies a community wishes to improve.

Section 30 of the RMA mandates the management of land use to maintain and enhance water quality and quantity and ecosystems⁶. The National Objectives Framework (NOF) process provides steps for you to implement the NPS-FM to maintain and improve water bodies. The MfE NOF Guidance⁷ provides the policy intent and expectations for implementing the NOF.

Ecosystem health is a component of the health and well-being of water bodies. Ecosystem health is defined in the NPS-FM as a compulsory value for all water bodies and includes five components:

- Water quality
- Water quantity
- Habitat
- Aquatic life
- Ecological processes

⁴ Section 56 of the Resource Management Act 1991 sets the purpose of National Policy Statements as to state objectives and policies for matters of national significance relevant to achieving the purpose of the Act.

⁵ [Link to:](#) Section 5(2)(b) of the RMA 1991

⁶ [Link to:](#) Section 30(1)(c)(ii); (iii); and (iiia) of the RMA 1991

⁷ [Link to:](#) Ministry for the Environment. (2022). Guidance on the National Objectives Framework of the National Policy Statement for Freshwater Management. Wellington: Ministry for the Environment.

Each of the five components that make up ecosystem health are equally important and essential to achieving the ecosystems health⁸.

All five components of ecosystem health must be maintained or improved across the entire country, and one cannot improve or degrade at the expense of another component.

You will need to identify attributes for each of the five components of ecosystem health, for each type of water body, and set Target Attribute States (TAS) for each attribute. These TAS must be set at a level that reflects a healthy waterbody - i.e., they must provide for ecosystem health. Target Attribute States describe the measurable goal that provides for the value. Target Attribute States must be set at a level at or above the 'baseline' or current state (whichever is more stringent). This means there can be no degradation.

You must also identify environmental flows and levels for rivers, lakes, wetlands, and aquifers that provides for ecosystem health.

The NPS-FM has only identified some attributes and TAS for river and lake 'type' water bodies. These don't capture all components of ecosystem health sufficiently (for example, 'habitat' only has one NPS-FM attribute). You will need to identify more attributes and TAS for rivers and lakes to build a complete picture of ecosystem health. You'll also need to identify extra attributes and TAS for other types of water bodies, including wetlands, groundwater, and estuaries.

Target attribute states must be set at a level at or above the national bottom line, however, national bottom lines do not always describe a healthy, thriving state. Instead, they often describe an unstable state of stress with a risk of sensitive species being lost, and that may not be consistent with Te Mana o te Wai or sufficient to support the compulsory Ecosystem Health value. You should set your TAS above bottom lines to ensure you are providing for health and well-being of water bodies.

Once TAS and environmental flows and levels have been set, limits⁹ and action plans¹⁰ must be implemented to achieve those target attribute states¹¹. Limits must be achieved, allocating or using a resource beyond a limit, or making it less able to provide for its ecosystem health value is over-allocation¹². Over-allocation must be avoided¹³.

⁸ Appendix 1A – Compulsory values of the NPS-FM, pg. 39

⁹ [Link to:](#) Clause 3.14 of the NPS-FM: Setting limits on resource use

¹⁰ [Link to:](#) Clause 3.15 of the NPS-FM: Preparing action plans and [Link to:](#) Preparing action plans PN

¹¹ [Link to:](#) Clause 3.11 of the NPS-FM: Setting target attribute states

¹² [Link to:](#) Definition of over-allocation NPS-FM

¹³ [Link to:](#) Policy 11 NPS-FM

What do we want to see?

As the first priority of the NPS-FM objective, the health and well-being of water bodies and freshwater ecosystems are paramount. We expect this to be front of mind when drafting your regional plans. A healthy freshwater system is the state that is sought for all of New Zealand, now and for future generations. What is good for the health of water bodies and freshwater ecosystems is good for everyone indefinitely.

Environmental outcomes for the ecosystem health value should reflect an ecosystem that has:

- a) a healthy structure and function; and
- b) a diversity and abundance of flora and fauna (excluding pests, domestic and farmed plants, and animals), appropriate to the location and time, that can grow and reproduce, and
- c) resilience and ability to adapt and recover from change and disturbance, including climate change; and
- d) functioning natural connections and interactions between interconnected freshwater, coastal and terrestrial ecosystems.

Target attribute states should be set at a level that provides for those healthy thriving ecosystems. In many cases this will mean setting TAS well above the national bottom line that reflect a state in the A or B band.

Where there are values with more stringent requirements, these should replace the general ecosystem health TAS we recommend here. The habitat of trout and salmon, trout fishing or trout spawning habitat often demand higher water quality and quantity TAS than other species (in part because we understand more about these species requirements than native species), and those should be used where those values are identified. Please refer to the specific 'Habitat or Trout and Salmon' practice note for specific TAS.

The compulsory attributes in Appendix 2A and 2B of the NPSF-FM do not cover all the components of ecosystem health, for all the different types of water bodies. Your regional plan must include attributes and TAS that address all components of ecosystem health for all waterbody types (and as noted above, this means you will need more attributes to build a complete picture of ecosystem health in many cases). There are several important indicators of ecosystem health that should be used alongside the compulsory attributes. We have set these out in Table 1 below. Many of the attributes were recommended by the Science and Technical Advisory Group¹⁴ that advised the Minister as part of the development of the NPS-FM. They are well researched and there is wide scientific agreement that they are appropriate indicators.

Also see the practice note on setting in stream nutrient outcomes¹⁵. Nutrient outcomes must be identified to support ecosystem health and the compulsory attribute indicators of ecosystem health potentially affected by nutrients, such as periphyton and the Macroinvertebrate Community Index (MCI). There is good evidence linking nutrients to freshwater ecosystem

¹⁴ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment

¹⁵ [Link to: Setting in stream nutrient outcomes PN](#)

health¹⁶, so nutrient outcomes or stand-alone nutrient attributes should be developed to support ecosystem health. Note that the compulsory attributes are not exhaustive, and you will need to identify all relevant attributes to achieve ecosystem health.

Where empirical baseline data is not available, modelling, or incomplete data should be used¹⁷. A lack of information is not an appropriate reason to not include a target attribute state in your regional plan. If a numeric attribute is not available or there is insufficient data to determine one, a narrative (qualitative) attribute should be determined, rather than no attribute at all. Narrative attribute states still need to be specific so they can be assessed and improved.

¹⁶ Canning, A. D., Joy, M. K., and Death, R. G. (2021). Nutrient criteria to achieve New Zealand's riverine macroinvertebrate targets. PeerJ. doi: [10.7717/peerj.11556](https://doi.org/10.7717/peerj.11556)

¹⁷ [Link to:](#) Best information available PN

Table 1 List of additional TAS to be included in regional plans to support ecosystem health. These are in addition to the compulsory attributes in the NPS-FM. This table is under development and will be added to as research is reviewed and incorporated.

Ecosystem health component	Attribute	Waterbody type				
		<u>Rivers</u>	<u>Lakes</u>	<u>Wetlands</u>	<u>Groundwater</u>	<u>Estuary</u>
Water quality	Nutrient criteria	See more detailed Practice Note on nutrient criteria. Dissolved inorganic nitrogen (DIN) should be no higher than 0.63 mg/L DIN as an annual median ¹⁸ and dissolved reactive phosphorus (DRP) should be no higher than 0.018 mg/L DRP as an annual median (and 0.054 mg/L as a 95th percentile) ^{19 20[20]} , to achieve macroinvertebrate bottom lines. More stringent criteria may be needed for more sensitive values. Table on page 26 of the STAG report ²¹ provides direction on Total Nitrogen and DRP for different REC classes to manage periphyton. More stringent criteria may be required to	TBC	Wetland condition index of at least 10 ²² .	Groundwater nutrient levels should support the ecosystem health of connected surface water bodies rather than be set at drinking water quality levels. DIN limits/targets should be < 1.0 mg/L to protect ecosystem health and drinking water. ²³	TBC

¹⁸ Canning, A., D., Joy, M. K., Death, R. G. (2021). Nutrient criteria to achieve New Zealand's riverine macroinvertebrate targets. <https://peerj.com/articles/11556/>

¹⁹ Canning, A., D., Joy, M. K., Death, R. G. (2021). Nutrient criteria to achieve New Zealand's riverine macroinvertebrate targets. <https://peerj.com/articles/11556/>

²⁰ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 13 (Link to: <https://environment.govt.nz/assets/Publications/Files/freshwater-science-and-technical-advisory-group-report.pdf>)

²¹ <https://environment.govt.nz/assets/Publications/Files/freshwater-science-and-technical-advisory-group-report.pdf>

²² Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation

²³ <https://www.greenpeace.org/static/planet4-aotearoa-stateless/2022/03/6ae88aa1-submission-on-proposed-amendments-to-national-environmental-standards-for-sources-of-human-drinking-water-consultation-2022.pdf>

Ecosystem health component	Attribute	Waterbody type				
		<u>Rivers</u>	<u>Lakes</u>	<u>Wetlands</u>	<u>Groundwater</u>	<u>Estuary</u>
		manage more sensitive values and attributes, such as MCI.				
	DO	DO Attributes in Table 7 of the NPS-FM apply to all parts of rivers, not just downstream of point sources ²⁴ .	TBC		TBC	TBC
	Sediment	<p>Deposited sediment cover of < 20% in naturally hard bottomed rivers to protect ecosystem health and < 10% to protect trout spawning and fisheries.²⁵</p> <p>Visual clarity (black disc) < 3.5m for ecosystem health.²⁶</p> <p>More stringent criteria may be required to manage more sensitive values.</p> <p>See practice note of setting sediment limits.</p>	TBC		TBC	TBC
Water quantity	Flows and levels	Water levels (environmental levels) within 10% of natural levels unless specific studies have been done that show greater variation can support freshwater values. See Environmental Flows and Levels; and Take Limits practice note.				

²⁴ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 5

²⁵ <https://www.envirolink.govt.nz/assets/R4-1-Sediment-Assessment-Methods-Protocol-and-guidelines.pdf>

²⁶ Water Quality Guidelines: To Protect Trout Fishery Values. Cawthron Report No. 1205. September 2006. <https://www.horizons.govt.nz/HRC/media/Media/One%20Plan%20Documents/Water-Quality-Guideline-to-protect-Trout-Fishery-Values.pdf?ext=.pdf>

Ecosystem health component	Attribute	Waterbody type				
		<u>Rivers</u>	<u>Lakes</u>	<u>Wetlands</u>	<u>Groundwater</u>	<u>Estuary</u>
Habitat	Extent	TAS should address natural form (Riffle/pool/run sequences) and natural form and extent (e.g., river plan and braid form and sinuosity), as well as things like area of river habitat, shading, etc. The Habitat Quality Index and Natural Character Index ²⁷ can be used to make quantitative measurements. Rapid Habitat Assessment ²⁸ and Stream Ecological Valuation ²⁹ might also be useful measures. See the natural form and character and river extent practice notes.	TBC	Wetland extent. Percent of original wetland remaining in region/FMU/catchment should be improved to at least 30%. This is equivalent to the level at which the Science and Technical Advisory Group consider "retains an adequate range of habitats and species required for a healthy ecosystem." ³⁰ Wetland condition index of at least 10 ³¹ .	Stygofauna communities are a useful indicator of ecosystem health components. More work is needed in this area, see resources for current knowledge. Water quality and quantity achieves a good state of health (including no toxic effects) in groundwater and connected surface water ecosystems. This includes ecosystem processes, aquatic life (including microbial and stygofaunal community composition in	TBC
Aquatic life	Periphyton	Only use the 17% exceedance threshold in Table 2 NPS-FM if that level of exceedance would have occurred under natural occurring processes ³² .	TBC	TBC		TBC

²⁷ <https://www.forestandbird.org.nz/sites/default/files/2023-03/Conference%20Poster%20-%20Maintaining%20River%20Morphology%20Through%20Policy%20A1.pdf>

²⁸ <https://www.cawthron.org.nz/research/our-projects/rapid-habitat-assessment-protocol/>

²⁹ <https://knowledgeauckland.org.nz/media/1398/qd2011-001-stream-ecological-valuation-sev-users-guide-reprint-nov-2015.pdf>

³⁰ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 14. <https://environment.govt.nz/assets/Publications/Files/freshwater-science-and-technical-advisory-group-report.pdf>

³¹ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation

³² Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 8

Ecosystem health component	Attribute	Waterbody type				
		<u>Rivers</u>	<u>Lakes</u>	<u>Wetlands</u>	<u>Groundwater</u>	<u>Estuary</u>
	Fish communities	Fish Index of Biotic Integrity should be no lower than 18 ³³ . Fish communities are resilient and their structure composition and diversity are reflective of a good state of aquatic ecosystem health.	Fish communities are resilient and their structure composition and diversity are reflective of a good state of aquatic ecosystem health.	Indigenous faunal communities (including those of birds, fish, lizards and invertebrates) are appropriate to wetland type, are resilient and their structure composition and diversity are within an acceptable range of that expected under natural conditions.	groundwater) and physical habitat.	TBC
	Lake Submerged Plant Index	TBC	Include LakeSPI Invasive Impact Index with a TAS greater than 90% ³⁴ .	TBC		TBC
Ecological processes	Ecosystem metabolism	Ecosystem metabolism TAS should be set above 3.0 gO ₂ m ⁻² d ⁻¹ to reflect a mild effect on ecosystem metabolism ³⁵ .	TBC	TBC	TBC	TBC

³³ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 9

³⁴ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 11

³⁵ Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. Recommendation 7 reflecting B band ecosystem health

How should the NPS-FM be implemented?

Set Target Attribute States for all components

As ecosystem health is part of the priority in the NPS-FM objective, each of the five components for ecosystem health (section 1.2 above) should have TAS set for them. Target Attribute States should be set at levels that adequately provide for ecosystem health, not just at the bottom line identified in the NPS-FM. You will need more attributes than those prescribed in Appendix 2A and 2B of the NPS-FM.

Set Target Attribute States for all water bodies

All water bodies, not just lakes and rivers, should have TAS set. This includes estuaries, wetlands, and groundwater.

Set additional Target Attribute States

Once you have set TAS that provide for all compulsory values in all water bodies, check if more stringent TAS will be required for other health and well-being values. These values will include the habitat of trout and salmon, outstanding water bodies and natural form and character, among others. In many cases, TAS for ecosystem health will also provide for other values however, where they don't, any gaps should be addressed with more stringent TAS. Table 1 above outlines additional TAS we expect to see in regional plans.

Ki uta ki tai

An integrated approach³⁶ to managing freshwater is critical to give effect to Te Mana o te Wai and to protect water bodies and freshwater ecosystems³⁷. This approach should frame how the NPS-FM is implemented.

Ki uta ki tai demands that freshwater is thought of as interconnected - flowing from inland, over and under land and out to the sea. Freshwater interacts with all the elements of the environment and human activity along its path. You must apply ki uta ki tai when you set TAS. More stringent TAS need to be set where rivers flow into sensitive receiving environments such as wetlands, lakes, and estuaries. The TAS in the river or stream must ensure it achieves the sensitive environment TAS it is feeding³⁸. This may further require more stringent TAS than are needed to provide for the rivers so that a TAS in a sensitive received environment can be achieved.

This will ensure your waterways are managed as a whole catchment, within the wider context of the receiving environment and surrounding communities.

³⁶ [Link to:](#) Clause 3.5 of the NPS-FM 2020

³⁷ [Link to:](#) Clause 3.2(2)(e) of the NPS-FM 2020

³⁸ [Link to:](#) Clause 3.11(8) of the NPS-FM

How we know the NPS-FM is being achieved

Success will look like every type of waterbody having a schedule of TAS that address all the ecosystem health components and other compulsory and identified values. The policies and rules in your regional plan will be consistent with achieving the TAS. Each TAS will be set at a level that will provide for a healthy thriving waterbody - not just the national bottom line.

Additional attributes will be included in regional plans for water quality and ecosystem health (as per Table 1). The additional attributes are linked to more specific guidance, which you can read in other practice notes. You will be able to measurably demonstrate improvement across all degraded TAS.

Implementation toolbox

The toolbox will continue to be developed as new information becomes available:

Tools:	are helpful diagrams, processes, or ways to support how you should implement the NPS-FM.
Examples:	provide text suggestions to help draft objectives (values and environmental outcomes), policies, and rules (limits) in your regional plans, including how monitoring could be achieved. It includes examples of how attributes and base line states, target attribute states, environmental flows and levels, and other criteria, where appropriate, can be written or presented to help achieve environmental outcomes.
Case studies:	illustrate where the NPS-FM has been well applied (or not) throughout the country and provides national or international lessons to help implement the NPS-FM.
Evidence:	provides relevant case law to support how the NPS-FM must be applied.
Resources:	provide links to supporting literature and best information available to implement the NPS-FM.

Tools

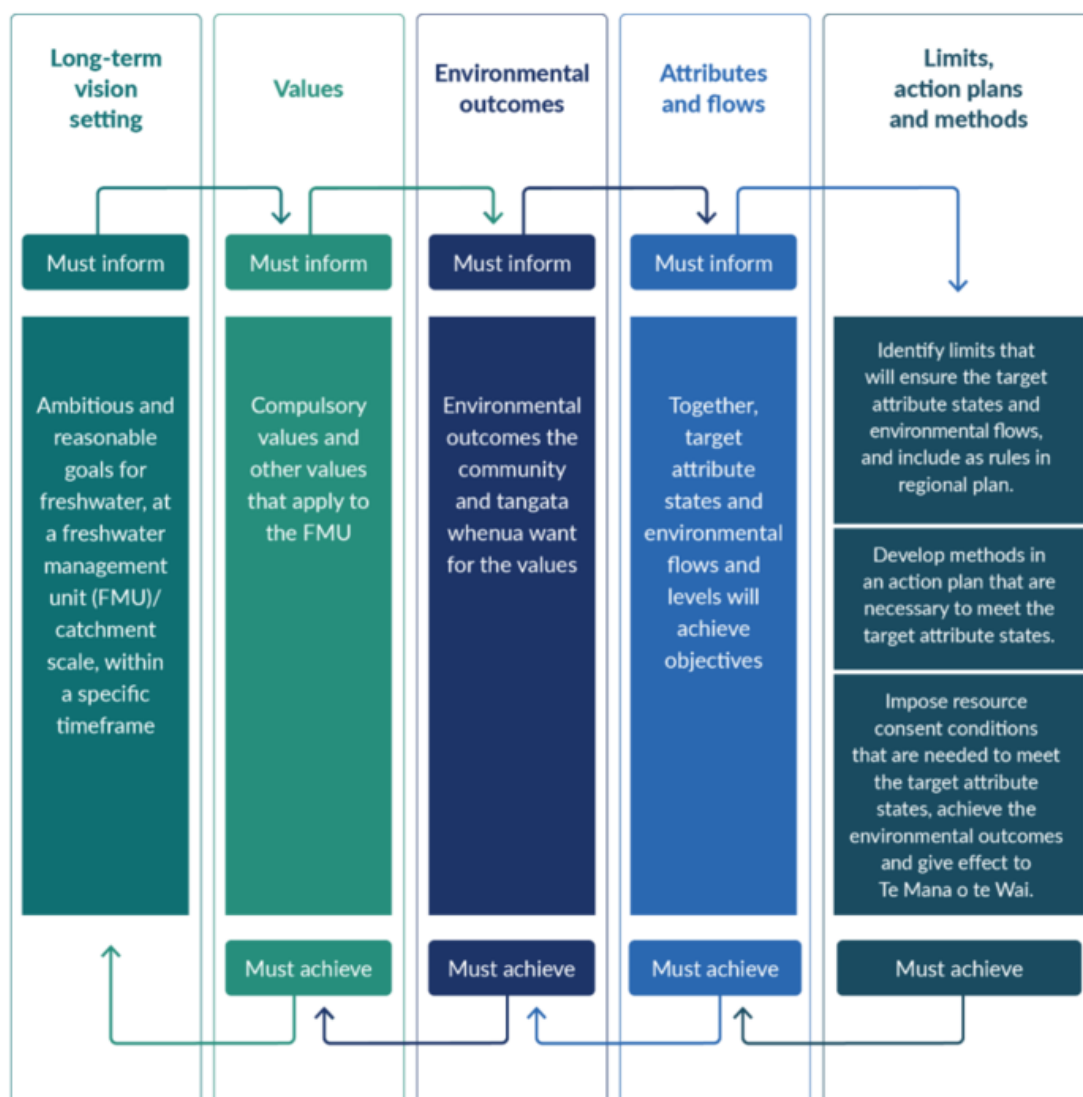


Figure 1 Diagram outlining the connection between key components required to implement the NPS-FM³⁹

Examples

[When available]

Case studies

[When available]

³⁹ Ministry for the Environment. 2022. Guidance on the National Objectives Framework of the National Policy Statement for Freshwater Management. Wellington: Ministry for the Environment, p.40.

Evidence

Ngāti Kahungunu v Hawkes Bay Regional Council [2015] NZNvC 50

In this appeal, Ngāti Kahungunu challenged Hawkes Bay Regional Councils proposal to take an overall approach to manage water quality by allowing some areas to decline if others were improved. The Court explained that it is contrary to the RMA for regional councils to balance activities by allowing one site to degrade, even if they intent to improve another site.

Resources

Canning, A. D., Joy, M. K., and Death, R. G. (2021). Nutrient criteria to achieve New Zealand's riverine macroinvertebrate targets. PeerJ. doi: [10.7717/peerj.11556](https://doi.org/10.7717/peerj.11556)

Freshwater Science and Technical Advisory Group. (June 2019). STAG Report to the Minister for the Environment. <https://environment.govt.nz/assets/Publications/Files/freshwater-science-and-technical-advisory-group-report.pdf>

Ministry for the Environment. 2022. Guidance on the National Objectives Framework of the National Policy Statement for Freshwater Management. Wellington: Ministry for the Environment

Fish and Game, Forest and Bird and Choose Clean Water have written this practice note to communicate their expectation on how regional councils should implement the National Policy Statement for Freshwater Management 2020 (NPS-FM) into their regional plans. This is one in a series of practice notes which have been prepared on various topics relating to NPS-FM implementation.