In Confidence

Office of the Minister for Primary Industries
Office of the Minister for the Environment

Chair

Cabinet Economic Growth and Infrastructure Committee

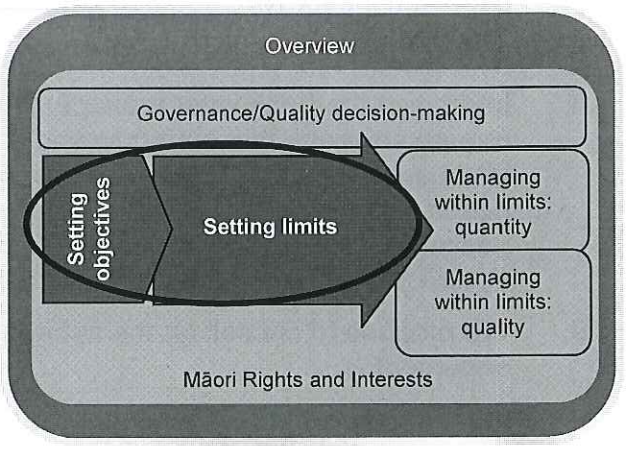
Water Reform Paper Two: Objective and Limit Setting under the National Policy Statement for Freshwater Management 2011

Proposal

1. This paper seeks agreement to an approach for improving freshwater objective and limit setting under the National Policy Statement for Freshwater Management 2011 (NPS-FM), for inclusion in a water reform discussion document in early 2013 that sets out proposals for implementing a water reform strategy. For objective and limit setting this would include:
   a. setting out a vision for effective objective and limit setting under the NPS-FM
   b. proposals for a national objectives framework, a limited number of national bottom-lines that elaborate on NPS-FM requirements, and changes to address short-term issues with the Water Conservation Order (WCO) mechanism
   c. signalling that proposals will be developed later in 2013 for national methods and toolkits for regional setting of objectives, limits and adjustment timeframes, expectations for monitoring and reporting, and expectations for defining and identifying outstanding water bodies and the significant values of wetlands
   d. a longer-term review process to assess the implementation of the objective and limit setting requirements of the NPS-FM, and in particular the need to retain WCOs as a mechanism for protecting outstanding water bodies.

Executive summary

2. This is the second paper (of four) on the core policy elements of an overall package for a water reform strategy (see Annex A). This paper outlines the proposed direction for objective and limit setting reform. Improving the water management system will require solutions that start now and adapt over the long term. We recommend introducing changes over the next year and signalling that we will build on these progressively over time.



NPS-FM requirement to set objectives and limits

3. Implementation of the NPS-FM requires freshwater objectives and limits to be set (but not necessarily met) by the end of 2030. Objectives and limits relate to both water quality and water quantity.

    - 'Freshwater objectives' describe the environmental outcomes that iwi/Māori and the community wants from a water body. Although objectives need to be expressed in environmental terms, they can also provide for economic outcomes.
    - 'Freshwater limits' are constraints on resource use to ensure the objectives for the water body are achieved.

4. Timeframes and pathways for adjustment must also be set where current resource use means that iwi/Māori and the community's objectives are not being achieved. Adjustment does not have to be completed by 2030 – longer adjustment timeframes can be chosen.

5. When agreeing to the release of the NPS-FM, Cabinet also agreed to the development of further measures to achieve effective implementation of the NPS-FM [CAB Min (11) 18/8 refers]. As councils are setting objectives and limits under the NPS-FM now, it is not an option to do nothing or wait longer to introduce the measures proposed in this paper. Proposals for further measures relating to managing within limits are made in papers three (water quality) and four (water quantity), including the role of good management practice.

6. There is potential for wide interpretation of some of the NPS-FM provisions, and a lack of clarity about some of central government's expectations. As a consequence, there are significant risks that implementation will be inefficient and inconsistent, as well as ineffective. We are concerned that some regional councils are setting limits and adjustment timeframes without sufficient information, particularly sufficiently robust economic analysis, or transparency of decision making. This means that the desired balance between environmental and economic outcomes may not be achieved.

7. Most regional councils are still in the early stages of implementing the NPS-FM (see Annex B) so there is an opportunity to address key risks and maximise benefits if reform is progressed quickly. Proposals in paper one (governance) explore some tools for intervention if local government is not meeting central government's expectations for NPS-FM implementation.

Proposals for discussion document

8. Improving the freshwater management system is a generational change that will require solutions that start now and adapt over the long-term. Setting objectives and limits are a critical first step. To support the efficient transition to an effective limits-based regime for freshwater management under the NPS-FM, we propose a package of reform that builds on the recommendations of the Land and Water Forum (the Forum), with implementation staged from 2013.

9. We propose to consult on the following proposals in the water reform discussion document:

    - a national objectives framework to support regional objective setting
    - a limited number of national bottom-line objectives to apply to all freshwater bodies

- opportunities to address process issues associated with the Water Conservation Order mechanism.

10. We also propose to signal in the discussion document that proposals will be developed later in 2013 for:
    - national methods and toolkits for regional setting of objectives, limits and adjustment timeframes
    - national expectations for monitoring and reporting against objectives and limits
    - national expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified.
11. These proposals have built on the platform provided by the Forum's reports, which seek more central government direction and national consistency in relation to the NPS-FM objective and limit setting requirements.
12. The views of the Freshwater Iwi Advisors Group are noted in this paper.

Impact of proposals

13. Most of these proposals seek to guide planning processes to set objectives and limits as we transition to a limits-based regime for freshwater management. Proposals are expected to improve the efficiency, consistency and effectiveness of objective and limit setting by regional councils.
14. Any approach that sets limits to achieve iwi/Māori and community objectives will result in adjustment costs in some catchments. Meeting limits may require more efficient resource use, changes in existing land use practice (including redesign of farming systems) and a limited amount of land use change in some catchments. Proposals in paper three (water quality) and paper four (water quantity) explore options for cost effectively managing within limits and maximising the value to society of water use.
15. Initial work undertaken on potential national bottom-lines has enabled us to start testing the level of adjustment that could be required nationally For example, 15% of rivers (measured by length) have an even chance of failing to meet a bottom-line related to the impacts of slime on ecological health (based on modelled assessment). The actual percentage of rivers failing may be about half this level). Its estimated that 46% of the economic output (in terms of value add) for the dairy farming sector falls within those river catchments.
16. Officials are working with regional councils to research the economic impacts of the adjustment that could be required. More detailed analysis on the potential impacts of national bottom-lines will be provided when final decisions are sought for the implementation of a water reform strategy in mid 2013.
17. Adopting a consistent approach to the setting of a limited range of national bottom-lines will ensure the costs and benefits are well targeted and calibrated to be appropriately precautionary in terms of both economic and environmental risks. Impacts can be managed through choices about timeframes and pathways for adjustment, which we propose to provide national direction on in the short-term.

Background

18. This paper is one of four papers on the core policy elements for a water reform strategy. On 19 November 2012 Cabinet agreed in principle that Government consult, through a discussion document in early 2013, on proposals to implement a

water reform strategy that includes reforms to governance, setting objectives and limits, and managing limits for both quality and quantity [EGI Min (12) 26/2].

Development of objective and limit setting proposals

19. When agreeing to the release of the NPS-FM in May 2011, Cabinet envisaged further water policy reform and agreed to the development of further measures to achieve effective implementation of the NPS-FM, including processes for the setting of water quality and quantity limits and detailed work on the nature of limits through FSFW [CAB Min (11) 18/8 refers].

20. The Forum provided relevant recommendations in its three reports which the proposals in this paper have built on. The general direction sought by the Forum was for the provision of greater central government direction on the objective and limit setting requirements of the NPS-FM. This includes the establishment of a national objectives framework and the setting of some national bottom-lines.

21. As part of further analysis of the objective and limit setting components of FSFW tranche two, we asked officials to work with a reference group of stakeholder representatives (including iwi and regional councils, resource users, scientists and NGOs) to test and further develop the Forum's recommendations. This further work has demonstrated that iwi and stakeholders are willing to build on the Forum's consensus recommendations to develop measures for improving objective and limit setting under the NPS-FM and see them implemented.

The current situation

22. The National Policy Statement for Freshwater Management 2011 (NPS-FM) requires regional councils to set objectives and limits for all bodies of fresh water by the end of 2030 as an essential step toward improving the way we manage New Zealand's fresh water resources. Objectives and limits relate to both water quality and water quantity.

    - 'Freshwater objectives' describe the environmental outcomes the community wants from a water body (e.g. the ability to swim or to support freshwater aquaculture). They are set at a level that provides for both environmental and economic outcomes.
    - 'Freshwater limits' are constraints on resource use to ensure the objectives for the water body are achieved (e.g. pathogen or nutrient load, or minimum flows/levels).

23. Timeframes and pathways for adjustment must also be set where current resource use means that iwi/Māori and the community's objectives are not being achieved. Adjustment does not have to be completed by 2030 – longer adjustment timeframes can be chosen.

24. The process for objective and limit setting is not prescribed in the NPS-FM. In order for well-informed decisions on objectives and limits to be made, regional councils will need to work with iwi/Māori, communities and resource users to:

    - articulate the outcomes expected for different water bodies, which may vary at different locations across the water body
    - consider what environmental state is needed to provide for desired outcomes
    - understand and account for the full range of takes, discharges and naturally occurring inputs that impact on the environmental state (in relation to desired

outcomes) from all sectors (urban and rural), including those that are non-regulated or permitted under the RMA or regional plans

- understand and account for the impact of historical issues on the environmental state, including what the impact will be in the future
- calculate the limits on resource use and identify other management methods required to achieve that state and where over-allocation is an issue, the timeframes and pathways for gradually adjusting existing resource use back within limits
- understand the impacts on different sectors of those limits, and whether the management approaches required to achieve them are realistic
- consider whether expectations for environmental and/or economic outcomes (or the timeframes and pathways for addressing over-allocation) need to be adjusted – this will need to be an iterative process
- set limits at a level that will ensure the freshwater objectives are met, including setting timeframes for gradual adjustment if necessary.

25. Indications are that this process has not always been followed when setting existing objectives and limits, or that there has been insufficient information to support transparent decision-making. As a result, economic growth could be overly constrained due to the choices about objectives, limits, adjustment timeframes and/or adjustment pathways, or desired outcomes may not be achieved.

26. Even with a good process, quality decision-making requires values-based judgements supported by a mix of science and technical information, including information on economic impacts. These are all matters that could become the subject of time-consuming and costly science, evidence and debate through regional council planning processes, with uncertain and potentially inconsistent outcomes (see paper one on governance). These costs fall to submitters and appellants, as well as regional councils and the courts. For example, recent water plans have taken 5-10 years to finalise; the costs to the Horizons Regional Council of the One Plan notified in May 2007 are approximately $9.4 million. This does not include costs to the courts, submitters and appellants, or council costs before the 2006/07 financial year.

The water reform strategy for objective and limit setting

27. The water reform strategy is a generational reform that, over time, will create headroom for economic growth and provide for environmental, social and cultural values. Effective implementation of the objective and limit setting requirements of the NPS-FM can contribute to this by ensuring:

- objectives are set for all water bodies that reflect the values of iwi/Māori, communities, and resource users
- limits for achieving these objectives are also set
- adjustment timeframes and pathways are set where current resource use exceeds limits and objectives are not being achieved
- the impacts of the objectives, limits, adjustment timeframes and adjustment pathways are well understood and factored into decisions

- a clear and useful picture of progress against objectives and limits is available at national and local levels that can inform wider evaluation of water reform.

28. To achieve these results, and ensure effective and efficient implementation of the NPS-FM, we propose a package of reform that builds on the recommendations of the Forum, with implementation staged from 2013.

29. We propose to consult on the following proposals in the water reform discussion document:

    a. a national objectives framework to support regional objective setting

    b. a limited number of national bottom-line objectives to apply to all freshwater bodies

    c. opportunities to address process issues associated with the Water Conservation Order mechanism.

30. We also propose to signal in the discussion document that proposals will be developed later in 2013 for:

    a. national methods and toolkits for regional setting of objectives, limits and adjustment timeframes

    b. national expectations for monitoring and reporting against objectives and limits

    c. national expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified.

National objectives framework to support regional objective setting

31. The concept of a national objectives framework formed a core part of the Forum's April 2012 report. This concept has been developed by an officials-led Reference Group. A high-level indication of what a framework could look like is provided in Annex D. Annex D also shows those values being considered for national bottom-lines as discussed below. The draft framework:

    - identifies some common values and uses that individual water bodies could be chosen to be managed for (e.g. as a drinking water source or for swimming)
    - specifies what quality and quantity aspects of the water body state will need to be managed for each of those values and uses (e.g. slime, bacterial contamination, flows)
    - describes what it would mean for each value or use to be provided for at banded levels (Reference Group recommended levels of poor, fair, high and excellent so, for example, a 1 to 5% infection risk could potentially be considered 'fair' and a <1% infection risk considered 'high')
    - where possible, specifies minimum numeric objectives for each band (e.g. *E. coli* bacteria concentrations would need to be between 260/100mL and 550/100mL to be considered 'fair' for swimming)
    - where it is not possible to specify numeric objectives nationally, directs regional councils to do determine these for the identified quality and quantity aspects
    - integrates tāngata whenua values (using the *Mana atua mana tangata* framework included in the Forum's second report) and mātauranga māori (traditional science which may use different indicators than western science,

e.g. the health of the riparian margin rather than water chemistry) where appropriate.

32. The framework would then be used by regional councils when setting objectives with iwi/Māori and communities. They would consider which of the values and uses in the framework a particular water body (or part of a water body) should be managed for, and what band they want it to be in. The combination of values and uses desired (which is expected to be a subset of those in the framework) would determine the objectives that need to be set. The council would then need to determine the limits required to meet those objectives. The impacts of different choices would need to be tested before final decisions were made, requiring robust economic analysis for communities to balance the costs and benefits.

Impacts of a national objectives framework

33. By providing a menu of values and uses, and related objectives, a national objectives framework would:

- improve the efficiency of objective setting by regional councils by reducing the need for local technical and scientific work
- enable greater national consistency in the stringency of objectives set to provide for different values and uses (e.g. the same standard for bacterial contamination would apply for all water bodies described as 'fair' for swimming or 'high' for secondary contact recreation)
- support transparent, informed and focussed discussion about what values and uses communities want water bodies to provide for, and how compatible those different values and uses are
- reduce the scope for values-based choices to be hidden behind scientific and technical debate
- provide clarity that a variety of states of fresh water are acceptable – not all water bodies need to be 'excellent'.

34. A national objectives framework will impact on the costs for changing regional planning documents as councils implement the NPS-FM. In general, we expect an overall benefit, with savings to regional councils and participants in regional planning processes (multiplied across regions and plan changes) exceeding the cost to central government of establishing the framework. However this cannot be accurately quantified at this stage. More detailed advice on impacts will be provided when final decisions are sought for the implementation of the water reform strategy in mid 2013.

35. The framework is expected to facilitate more transparent discussion about different values and uses for which water bodies could be managed. This could result in regions setting different objectives at different levels than what might otherwise have happened (for example, they may set a mix of levels of objectives across a region rather than setting a single objective that applies everywhere). In some cases these objectives may be less stringent, in other cases they might be more stringent. The complexity of influences on decision-making means a quantifiable impact is difficult to predict, but we expect that decisions about the level of objectives set will be informed by robust analysis and consideration of the range of impacts. New Zealand research suggests that it is possible for community collaboration to result in rules for resource use that represent a compromise between differing views on how a resource should be managed and used. The

collaborative approach proposed in paper one on governance may minimise the risk of overly stringent views prevailing in decision making.

36. Some councils are already setting objectives. The National Objectives Framework will assist them in setting sensible limits and understanding the timeframes that may be required to adjust.

progressing quickly to detailed regulatory proposals will help regional councils adjust their approach to objective setting to align with central government's proposed direction. Paper one on governance explores options for central government intervention if there is concern about the objectives regional councils have set.

Implementation of a national objectives framework

37. To maximise gains in both council and court processes, we propose to consult on a regulated national objectives framework. This would require regional councils to use the framework when setting objectives (with iwi/Māori and the community) and would provide narrative and numeric objectives that must be used if there is a decision to manage water for a particular value or use at a particular band level. This would still allow for flexibility in what values or uses a water body is managed for, and in how and when the relevant objectives are to be achieved.

38. If a national objectives framework was provided as guidance only, we would expect to see the potential gains weakened where the guidance is not accepted and becomes a matter of debate through hearing and court processes. The form of regulation will need to ensure that we can amend the framework through regularly scheduled review as scientific and technical information evolves (for example, to add detailed narrative or numeric objectives that relate to sediment in the future).

39. In the discussion document we propose to seek feedback on:

- our proposal to establish a regulated national framework for objective setting
- the strengths and weaknesses of the Reference Group's approach to the detailed design of the framework as described in its report (refer Annex E).

40. Amendments to the Resource Management Act 1991 (RMA) may be required to enable the national objectives framework to be implemented via an appropriate regulatory instrument. Consequential amendments to the RMA may also be required to clarify the relationship between the national objectives framework and Schedule 3 of the RMA. Schedule 3 provides some elements similar to the proposed national objectives framework, but it has low statutory weight and has not been updated for scientific advances. There could be confusion if it sits alongside the proposed framework.

41.

42. The science panels established to support the Reference Group identified that significantly more scientific work is needed for some water quality factors (in particular sediment, which is a major contaminant) in order to support effective objective and limit setting (whether through a national objectives framework or

locally by regional councils). Our intention is that the framework will include what is possible in the short-term, and be added to over time as science evolves. Areas where additions are being worked on will be signalled to regional councils and amendments made though a regularly scheduled review process.

Limited number of national bottom-line objectives to apply to all freshwater bodies

43. We propose that a limited number of objectives from the national objectives framework be set as national bottom-lines to apply to all water bodies in relation to:

    - the NPS-FM narrative objective to safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water
    - the Forum's recommendation to add a further narrative objective into the NPS-FM for all water bodies to be managed for the effects on human health.

44. The Forum has recommended that numeric national bottom-lines be set in relation to these requirements. The Reference Group has developed this idea further and recommended that:

    - bottom-lines related to the existing NPS-FM objective should generally be set at a level of resilience above major tipping points that cause change which may be impossible or highly expensive to reverse
    - national bottom-lines in relation to human health are set at a level that relates to an acceptable level of risk to human health from secondary contact activities (such as wading or boating) – an acceptable level of risk could be a 1% or 5% infection risk.

45. The setting of national bottom-lines was an important part of the Forum's consensus, but also critical to that consensus was having no national deadlines for meeting bottom-lines – the direction of travel is important, but so is balancing the costs of getting there.

Impacts of setting national bottom-lines

46. The expectation that New Zealand's freshwater bodies will not pose an unacceptable level of risk to human health is likely to be one that resonates with all New Zealanders due to the strong role fresh water recreation plays in our identity. Determining what nationally held value applies everywhere (e.g. secondary contact recreation such as wading, rather than swimming which only applies in certain locations) and setting that expectation nationally is likely to reduce debate in the planning process.

47. National bottom-lines would also:

    - provide clarity that water bodies should not generally reach a state which puts them in danger of going over major tipping points that cause change which may be impossible or highly expensive to reverse
    - avoid more freshwater bodies going over major tipping points and the difficult and costly clean-ups involved if iwi/Māori and community values are to be restored (approximately $340 million in taxpayer dollars is already committed to clean-up of just eight lakes and rivers, and this does not reflect additional costs to ratepayers)
    - reduce risks to human health from freshwater recreational activities

- provide clarity about the minimum level of clean-up acceptable if the state of a water body has already gone below bottom-lines.

48. National bottom-lines could have a direct impact on the level of adjustment required for objectives to be met in some water bodies. This would involve management of existing discharges and land use practices, and a limited amount of change in land use. The level of potential impact depends on the choices made about where the level for bottom-lines are set.

49. Officials have undertaken some initial testing of potential choices for bottom-line objectives to help us understand the likely scale of adjustment required

Looking from a nation-wide perspective, there will be adjustment costs associated with setting limits to achieve iwi/Māori and community objectives. For example, 15% of rivers (measured by length) are 'as likely as not' to fail to meet a bottom-line related to the impacts of slime on ecological health, with 46% of the value-add for the dairy farming sector falling within those river catchments. As there are several factors which impact on slime growth (flow, nutrients and temperature), there are choices about how the objective is achieved – a mix of flow and nutrient limits (which may be nitrogen and/or phosphorus limits depending on catchment circumstances) at different levels can be used, alongside other management methods such as shading.

50. Adopting a consistent approach to the setting of a limited range of national bottom-lines will ensure the costs and benefits are well targeted and calibrated to be appropriately precautionary in terms of both economic and environmental risks. This collaboration could be changed in the future when there is more information about the impacts.

51. Economic impacts of adjusting to limits can be managed through choices about timeframes and pathways for adjustment, on which we propose to provide national direction or guidance. We are not proposing that deadlines for achievement of national bottom-lines are set. This will enable regions to choose an adjustment timeframe (if required) that delivers the optimal outcomes to their communities over time.

52. It is challenging to fully test the economic impact of potential choices for national bottom-lines due to the range of choices for adjustment pathways and timeframes. We have directed officials to undertake a joint initiative with councils to research the economic impacts of different water policy choices in a significant sample of catchments. This will enable us to provide more detailed analysis of the potential impacts of setting national bottom-lines when final decisions are sought for the implementation of a water reform strategy in mid 2013.

Implementation of national bottom-lines

53. To maximise gains, we recommend that we consult on regulated national bottom-lines as the proposed direction for reform. This would mean making some values within the national objectives framework compulsory by not allowing objectives to be set below a certain level (e.g. 'fair') except via an exception for truly exceptional circumstances (for example, historical contamination which cannot be cleaned up, or an ongoing activity providing exceptional economic benefit and operating to best practice).

54. In the discussion document we propose to seek feedback on:

- our proposal to set some national bottom-lines that all water bodies need to meet over time in relation to existing NPS-FM requirements and managing risks to human health
- our proposal that the national bottom-line for managing risks to human health should be set in relation to providing for secondary contact recreation (e.g. wading or fishing)
- the strengths and weaknesses of the Reference Group's approach to setting bottom-lines and exceptions as described in its report (refer Annex E).

55.

Opportunities to address process issues associated with the Water Conservation Orders mechanism

56. Water Conservation Orders (WCOs) are an existing mechanism for protecting outstanding water bodies, which elevates the objectives and limits setting for these water bodies to the national level. As implementation of the NPS-FM progresses, we will need to review the need for WCOs (in their current form) in the reformed freshwater management system.

57. In the shorter term, the Minister for the Environment may get requests to amend existing WCOs as regional councils consider how they fit with their wider regional planning context through implementation of the NPS-FM. There are inefficiencies in the existing WCO process (e.g. applications are considered by a special tribunal with further submissions to the Environment Court possible; the scope of proposals can be expanded during proceedings) which can result in significant costs and delays. For example:

- The WCO on the Rangitata River cost Fish & Game New Zealand (as the applicant) $543,000. Costs to submitters would also have been significant, as well as the costs of establishing and running the special tribunal.
- The ongoing hearing for the proposed amendment to the Kawarau WCO (in respect of the Nevis River), the scope was expanded through the course of the hearing, resulting in supplementary submissions and a second round of hearings. This application, notified in 2008, is now the subject of an inquiry by the Environment Court.

58. In general, we expect applications for new WCOs, or amendments to existing WCOs, to be an agreed outcome from a regional planning process. There is, however, the potential for WCO applications to be used tactically to bypass regional planning processes and/or stop infrastructure proposals. There is also a lack of clarity about the grounds on which the Minister for the Environment may reject an application.

Impacts of changes to address process issues associated with WCOs

59. The purpose of any change in this area would be to:

- ensure the outcomes sought from WCO applications (including for amendments to existing WCOs) are generally agreed through the regional planning process
- reduce costs to central government, applicants and submitters when applications are made
- reduce the time taken for a decision to be made on an application.

Implementation of improvements to the WCO process

60. It is possible improvement may be made through guidance. If we decide to proceed with changes to the WCO process following consultation, amendments to the existing provisions in the RMA could also be required. There is an opportunity to progress any changes through the 2013 amendments to the RMA 2013.

61. In the discussion document we propose to seek feedback on what parts of the WCO process could be clarified or amended to address process-related issues. Examples could include:

- providing clear circumstances in which the Minister for the Environment might refer an application to a regional council or put it on hold., e.g. if regional council advice is that the matters the application covers are being (or will be) considered through a regional planning process
- aligning the process with Board of Inquiry processes for matters of national significance (e.g. having similar appointment provisions and/or only allowing appeals on points of law)
- requiring a clear scope for the application to be established at the start of the process and preventing changes to that scope once consideration is underway
- requiring WCO processes to involve iwi and hapū and ensure that tāngata whenua values and interests are identified and reflected.

62. The discussion document would emphasise that feedback is sought only on short-term opportunities for clarifying the process for making and amending WCOs, not changing their purpose or scope, or reducing the level of protection.

Longer term considerations

63. Effective implementation of the NPS-FM, including giving effect to the NPS-FM requirement to protect the quality of outstanding water bodies (discussed below), may mean that the role of WCO needs to be reviewed in terms of their role in the reformed freshwater management system However, any proposals that could be seen to weaken the mechanism will be highly controversial. The Forum was unable to make any consensus recommendations in relation to WCOs.

64. There have also been recent reports from the Parliamentary Commissioner for the Environment and the New Zealand Conservation Authority making recommendations to increase the effectiveness of WCOs in protecting outstanding water bodies. For example:

- WCOs cannot currently include land use rules and therefore cannot protect all the values recognised by the order

- the process does not ensure that the best candidates are considered for protection
- the types of values they can protect are limited.

65. Conversely, WCOs have been criticised as overly constraining development. This criticism arises in part because they are subject to an 'outstanding' and 'protection' test rather than the balancing approach applied to all other decisions under the RMA.

66. We propose that we signal in the discussion document that, in the longer term, we will be considering the role of WCOs and that this will happen alongside the planned 5-year review of the implementation and effectiveness of the NPS-FM. Having the discussion later, once people can see how implementation of the NPS-FM is progressing, may mean that there is more ability for consensus to be reached about what changes are required.

National methods and toolkits for regional setting of objectives, limits and adjustment timeframes

67. The Forum and Reference Group have also recommended development of standardised approaches and methodologies for objective and limit setting. This would support the planning process (regardless of whether that is using the existing Schedule 1 process or the alternative collaborative approach proposed in paper one on governance) to help ensure efficient and effective implementation of the NPS-FM. We recommend that we signal in the discussion document that we will be developing proposals later in 2013 for:

- a step by step process for regional objective and limit setting
- methods for setting numeric objectives and limits for different parameters
- methods for setting the timeframes for adjusting to limits where objectives are not being achieved.

68. Objective and limit setting requires a sound information base and tools to support good decision making. Although some scientific and technical information needs to be location specific, there is a significant opportunity to increase the efficiency of objective and limit setting by creating a national information base and toolkit for use by regional councils in their local decision-making. These can be developed jointly with regional councils, as with the current joint venture already underway to better understand the economic impacts of different water policy choices. Officials will continue to identify opportunities for the national development of such information bases and tools for the setting of objectives and limits, as well as managing within them (refer paper three on water quality).

Impacts of national methods and toolkits

69. The development of national methods and toolkits would affect the costs and processes for making changes to regional planning documents as councils transition to a limits-based regime for freshwater management, and also ensure more effective implementation of the NPS-FM. We would expect an overall benefit with savings to regional councils and participants in regional planning processes (multiplied across regions and plan changes) exceeding the costs to central government, but this cannot be accurately quantified until detailed proposals are developed. More detailed advice on impacts will be provided when final decisions are sought for the implementation of a water reform strategy in mid 2013.

Implementation of national processes, methods and toolkits

70. Reform is likely to be a mix of regulation, guidance and support, but we cannot make recommendations until further design and analysis is undertaken of the different components (including the desirability of consistency versus need for flexibility). We will make recommendations when final decisions for implementing a water reform strategy are sought in mid 2013.

71. In the discussion document we propose to signal our intent to develop proposals for consultation later in 2013/early 2014 and seek feedback on what should be included in those proposals. The discussion document would outline what relevant recommendations have already been made by the Forum and Reference Group. Their recommendations include:

    - ensuring the impacts of different choices are considered and inform final decisions
    - ensuring objectives meet the NPS-FM requirement to maintain or improve overall water quality within a region
    - accounting for all takes and discharges
    - ensuring limits are binding without being unnecessarily constraining.

72.

73. Following this initial consultation, proposals will be developed for Cabinet consideration in mid-2013. If Cabinet decides to proceed with any components as regulation, detailed regulatory proposals and impacts analyses will be prepared for public consultation over 2013 to 2015. We anticipate that it would take approximately 12 months for regulation to be in force following the release of detailed proposals.

National expectations for monitoring and reporting against objectives and limits

74. Although a national objectives framework could include minimum monitoring requirements to ensure national consistency, we believe that clarity on central government monitoring and reporting expectations in relation to the NPS-FM more generally would address risks that:

    - monitoring is insufficient to understand whether objectives and limits are being achieved and if so, what changes to limits (and/or other methods) may be necessary to better meet iwi/Māori and the community's desired outcomes
    - inconsistent monitoring and reporting makes it difficult to draw conclusions at the national level about state and trends for fresh water or the effectiveness of NPS-FM implementation and water reform
    - implementation of the NPS-FM increases the level of monitoring undertaken without sufficient return on investment.

Impacts of national expectations for monitoring and reporting

75. Under the RMA, regional councils are already required to monitor and report on the state of the environment and effectiveness of planning documents. We anticipate

that national expectations would help target and prioritise that monitoring effort, and ensure that it is able to be readily used to form a national level picture of the effectiveness of NPS-FM implementation by councils and water reform policy.

Implementation of national expectations for monitoring and reporting

76. Joint local and central government projects are already underway to improve consistency in resource management monitoring and reporting, including in relation to water. At this stage, we recommend that we feed into this broader work by providing guidance on our monitoring and reporting expectations in relation to the NPS-FM. If stronger direction is desirable in the future, Cabinet has already agreed to provide for regulation making powers that can be used to require local authorities to monitor the environment according to specified priorities and methodologies [CAB Min (12) 33/11] as part of the 2012 amendments to the RMA.

77. In the discussion document we propose to signal that we intend to develop guidance in relation to the monitoring and reporting requirements of the NPS-FM, with officials beginning work later in 2013/early 2014.

National expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified

78. The NPS-FM requires outstanding water bodies (with outstanding values, including ecological, landscape, recreational and spiritual values) and significant values of wetlands to be protected. The potential for wide interpretation means it is likely to be an area of debate through regional planning processes and that risks exist that too many water bodies are considered outstanding (leading to missed development opportunities) or that too few are considered outstanding to adequately protect regional and national interests.

79. The proposed national objectives framework could be used to help identify water bodies that are outstanding because of their 'excellent' state for ecological, landscape, recreational or spiritual values. However, such water bodies should not automatically be classed as outstanding as other judgments would be necessary. Other criteria should also be developed to ensure there is a nationally consistent approach to identifying water bodies that are outstanding. For example, a water body may not be considered to be in an 'excellent' state in terms of ecological health, but it may be a nationally important rare species habitat that requires protection from further degradation.

Impacts of expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified

80. Reform in this area would affect the costs and processes for making changes to regional planning documents as councils transition to a limits based regime, with the expectation that an overall benefit would arise from reduced debate, but this cannot be quantified at this stage. More detailed advice on impacts will be provided when final decisions are sought for the implementation of a water reform strategy in mid 2013.

Implementation of expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified

81. Reform could be a mix of regulation, guidance and support, but we cannot make recommendations until further design and analysis is undertaken of the different components.

82. This is not an area that the Forum or Reference Group made any recommendations. In the discussion document we propose to signal our intent to develop proposals for consultation later in 2013 and seek feedback on what matters should be considered when developing those proposals.

Iwi/ Māori interests in objective and limit-setting

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Officials' engagement with iwi advisors will inform matters being advanced through Ministers' discussions with Iwi Leaders.

Risks and mitigations

89. Any approach that sets limits to achieve iwi/Māori and community objectives will result in adjustment costs in some catchments (as described earlier).There are risks that setting national bottom-lines could result in greater economic costs in some catchments if an increased level of adjustment is required over time for bottom-lines to be met. Initial analysis suggests that, at a national level, the adjustment required to meet bottom-lines will be of a similar magnitude to any other limit-setting approach. Impacts can be managed through choices about timeframes and pathways for adjustment, which we propose to provide national direction on in the short-term. If we recommend the release of detailed regulatory proposals to implement national bottom-lines in late 2013, this will be accompanied by more detailed analysis of the risks and impacts.

90. There is also a risk that setting bottom-lines could be perceived as allowing a widespread drop to those bottom-lines. The NPS-FM requirement for overall water quality to be maintained or improved across a region prevents this. Proposals for guidance or direction on the objective and limit setting process that includes expectations for how the 'maintain and improve' requirement is given effect help mitigate this risk.

91. If national bottom-lines are not set, the national objectives framework could still create de facto bottom-lines as there may be a reluctance to choose objectives in a 'poor' band for values that relate to existing NPS-FM requirements (to safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water). If there is a decision to progress the national objectives framework without setting national bottom-lines, the impacts of only having objectives set in the fair band or above will still need to be understood before final decisions are made.

92. Some of the proposals in this paper have not built on consensus recommendations from the Forum. This includes the proposals in relation to outstanding water bodies and significant values of wetlands, WCOs and the national interest in specific water bodies. The Forum had intended to consider the relationship between WCOs and other water policy and planning instruments, but was unable to reach consensus. Although change in this area is likely to be highly controversial, this is a question that central government needs to consider as part of our overall consideration of the nature of central government direction. The discussion document will signal that we will be considering this in the longer term.

Release of the National Objectives Reference Group Report

93. As set out in the Overview paper [EGI Min (12) 26/2 refers], the paper we will bring to EGI on 12 December 2012 will bring together the package of proposals for the water reform strategy, provide an overview of how iwi/Māori rights and interests may be accommodated and guide the preparation of the discussion document. In early 2013 we will seek agreement to release a discussion document and to the process for consultation.

94. Ahead of this, we are considering releasing the Reference Group report to regional councils 'in confidence'. Although more work on the population of a national objectives framework is needed, we believe that the general framework design and overall approach to objective setting recommended by the Reference Group is sound. Regional council representatives on the Reference Group have indicated that their participation has helped inform thinking in their own regions about how to approach objective setting to balance environmental and economic outcomes, and we would like to see other regions similarly benefiting from the work of the Reference Group.

Consultation

95. The following agencies have been consulted in the development of this paper: The Treasury; State Services Commission; Ministry of Business, Innovation and Employment; Department of Conservation; Office of Treaty Settlements; Te Puni Kōkiri; Department of Internal Affairs; Ministry of Health. The Department of Prime Minister and Cabinet was informed.

96. The proposals in this paper have been informed by the recommendations of the Land and Water Forum with subsequent stakeholder input from the National Objectives Framework Reference Group. The Reference Group included representatives from: regional councils, Iwi Advisors, National Institute of Water and Atmospheric Research, Mighty River Power, Fish & Game New Zealand, DairyNZ, Federated Farmers, Horticulture New Zealand, Straterra, and Scion.

97. The views of the Freshwater Iwi Advisors Group are noted in this paper.

98. As set out in the Overview paper, we propose to take a package of proposals for implementing a water reform strategy out for public consultation early next year.

Financial implications

99. There are no financial implications arising directly from this paper. If proposals in this paper are progressed, financial implications are likely to arise. Cost estimates (excluding FTEs) for departments are estimated as follows:

Proposal	Financial implications (estimate)
National objectives framework	$0.25-0.75m
National bottom-lines	$0.10-0.20m
Changes to the process for considering WCOs	<$0.10m
National methods and toolkits	$0.50-2.50m
National expectations for monitoring and reporting	$0.10-0.20m
Expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified	$0.10-0.20m

100. Cost estimates and any funding proposals for the full water reform package will be further developed in advance of final decisions on water reform and, where appropriate, considered in agencies' 2013 Four-Year Plans and associated reprioritisation processes. At this stage, it is unclear how these costs may be distributed across Votes. Officials' objective is to manage within baselines where possible.

101. If proposals in this paper are progressed, the financial implications of the NPS-FM on planning are expected to reduce (at the time the NPS-FM was released implementation costs were estimated at $33 – 49 million for regional councils and $35 – 52 million for communities, stakeholders, local authorities and industry participating in planning).

102. Adjustment to limits set under the NPS-FM will also have financial implications as described in this paper . These cannot be quantified at this time, but we have directed officials to undertake a joint initiative with councils to research the economic impacts of different water policy choices in a significant sample of catchments. This will enable us to provide more detailed analysis of the financial impacts of setting limits when final decisions are sought for the implementation of a water reform strategy in mid 2013.

Human rights

103. The proposals in this paper are consistent with the Human Rights Act 1993.

Legislative implications

104. There are no direct legislative implications arising directly from this paper.

Regulatory impact analysis

105. The Regulatory Impact Analysis (RIA) requirements apply to the national objectives framework and national bottom-lines proposals in this paper and a Regulatory Impact Statement (RIS) has been prepared and is attached. No Regulatory Impact Statement has been prepared for other proposals as this paper does not seek any policy decisions at this time.

106. The Regulatory Impact Analysis Team (RIAT) has reviewed the RIS prepared by the Ministry for the Environment and the Ministry for Primary Industries and associated supporting material, and considers that the information and analysis summarised in the RIS meets the quality assurance criteria, given the early stage of this policy development process. As outlined in the RIS, further consultation will be required on the detailed proposals. We have carefully considered the analysis and advice of our officials, as summarised in the attached Regulatory Impact Statement. We are satisfied that regulation is likely to be required in the public interest but, as further policy details and implementation issues still need to be considered, we cannot yet be certain that the regulatory proposals in this paper will deliver the highest net benefits of the practical options available or are fully consistent with our commitments to deliver better regulation and less regulation. Consequently, this paper seeks only in principle policy decisions, and agreement to further policy development work and consultation.

Publicity

107. No publicity is proposed.

Recommendations

108. The Minister for Primary Industries and the Minister for the Environment recommend that the Committee:

1. note on 2 July 2012, Cabinet noted that the Ministry for the Environment and the Ministry for Primary Industries would undertake further design and analysis on providing more national direction on the objective and limit setting requirements of the NPS-FM [CBC Min (12) 5/5]
2. note on 19 November 2012 Cabinet agreed in principle that Government consult, through a discussion document in early 2013, on proposals to implement a water reform strategy that includes reforms to governance, setting objectives and limits, and managing limits for both quality and quantity [EGI Min (12) 26/2 refers]
3. note this paper should be considered alongside parallel papers on: governance arrangements for freshwater management; and tools and processes for managing to limits for both water quality and quantity
4. note this paper has built on the platform provided by the Land and Water Forum's recommendations in their second and third report; discussions with the Iwi Leaders Group and Iwi Advisors; and further work undertaken by the National Objectives Framework Reference Group and officials
5. note this paper sets out a vision for effective objective and limit setting under the NPS-FM and identifies proposals for:
    5.1. a national objectives framework
    5.2. a limited number of national bottom-lines that elaborate on NPS-FM requirements; and
    5.3. changes to address short-term issues with the Water Conservation Order (WCO) mechanism
6. agree effective implementation of the objective and limit setting requirements of the NPS-FM requires:
    6.1. objectives set for all water bodies that reflect the values of iwi/Māori, communities, and resource users
    6.2. limits set for achieving these objectives
    6.3. adjustment timeframes and pathways set where current resource use exceeds limits and objectives are not being achieved
    6.4. the impacts of the objectives, limits, adjustment timeframes and adjustment pathways to be well understood and factored into decisions
    6.5. a clear and useful picture of progress against objectives and limits to be available at national and local levels that can inform wider evaluation of water reform
7. agree the discussion document in early 2013 include the following in relation to more effective and efficient objective and limit setting

    Proposals for measures to be progressed in 2013

    7.1. a regulated national freshwater objectives framework to support regional objective setting

7.2. setting a limited number of national bottom-line objectives to apply to all freshwater bodies

Measures that may be progressed in 2013

7.3. opportunities to address issues associated with the Water Conservation Order mechanism

Measures signalled for development of proposals later in 2013

7.4. national methods and toolkits for regional setting of objectives, limits and adjustment timeframes

7.5. providing guidance on national expectations for monitoring and reporting against objectives and limits

7.6. national expectations for how outstanding water bodies and/or significant values of wetlands are defined and identified

Matters signalled for consideration alongside the 5-year review of the NPS-FM

7.7. the role of Water Conservations Orders in the freshwater management system

8. note in December 2012 the Ministers for Primary Industries and the Environment will report to Cabinet with an overview of the package of proposals to be included in the water reform strategy discussion document, as decided in this and the companion papers, and an overview of how iwi/Māori rights and interests may be considered

9. note the report of the National Objectives Framework Reference Group provides a sound approach to objective setting that regional councils should consider

10.

11.

12. note the Ministers for Primary Industries and the Environment will report to Cabinet in early 2013 seeking approval for the release of the public discussion document on water reform in early 2013

13.

Hon David Carter
Minister for Primary Industries

_____/_____/_____

Hon Minister Adams
Minister for the Environment

_____/_____/_____

Annex A: Schedule of Cabinet papers

14 November 2012

LAWF Report

Strategic Overview

5 December 2012

Governance

Objective & limit setting

Managing within limits: quantity

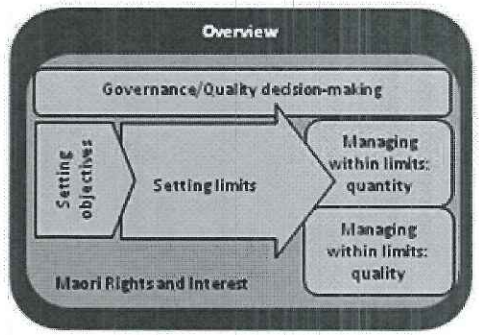
Managing within limits: quality

Wrap-up

12 December 2012

Discussion document

February 2013



Annex B: Update on council timeframes for NPS-FM implementation

The NPS-FM came into effect on 1 July 2011. Regional councils can choose to complete compliance (i.e. change its plans to give effect to the NPS-FM):

- by 31 December 2014; or if this is 'impracticable'
- by no later than 2030. Where this option is chosen, Policy E1 of the NPS-FM required councils to develop implementation programmes by 12 November 2012 including timings and stages for completing steps necessary to comply.

Figure 1 below shows timeframes over which each council is looking to comply with the NPS-FM.[1] Note that many councils consider that 'completion' of compliance occurs when a proposed plan change is notified; but that it may be several more years before the statutory process for finalising that change is completed.

Figure 1: Council timeframes for completing compliance with the NPS[2]

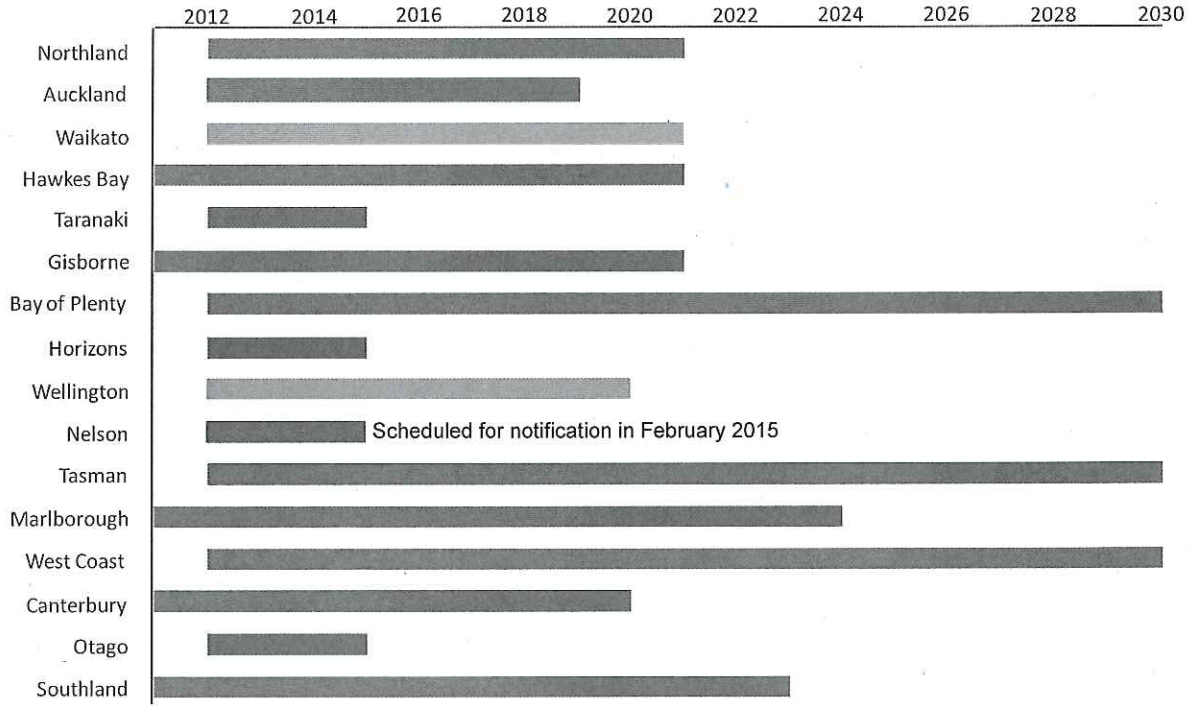


Figure 1 shows that only three of the 16 regional councils (Otago, Taranaki and Horizons) consider its notified plans will fully reflect the NPS-FM by 2014.

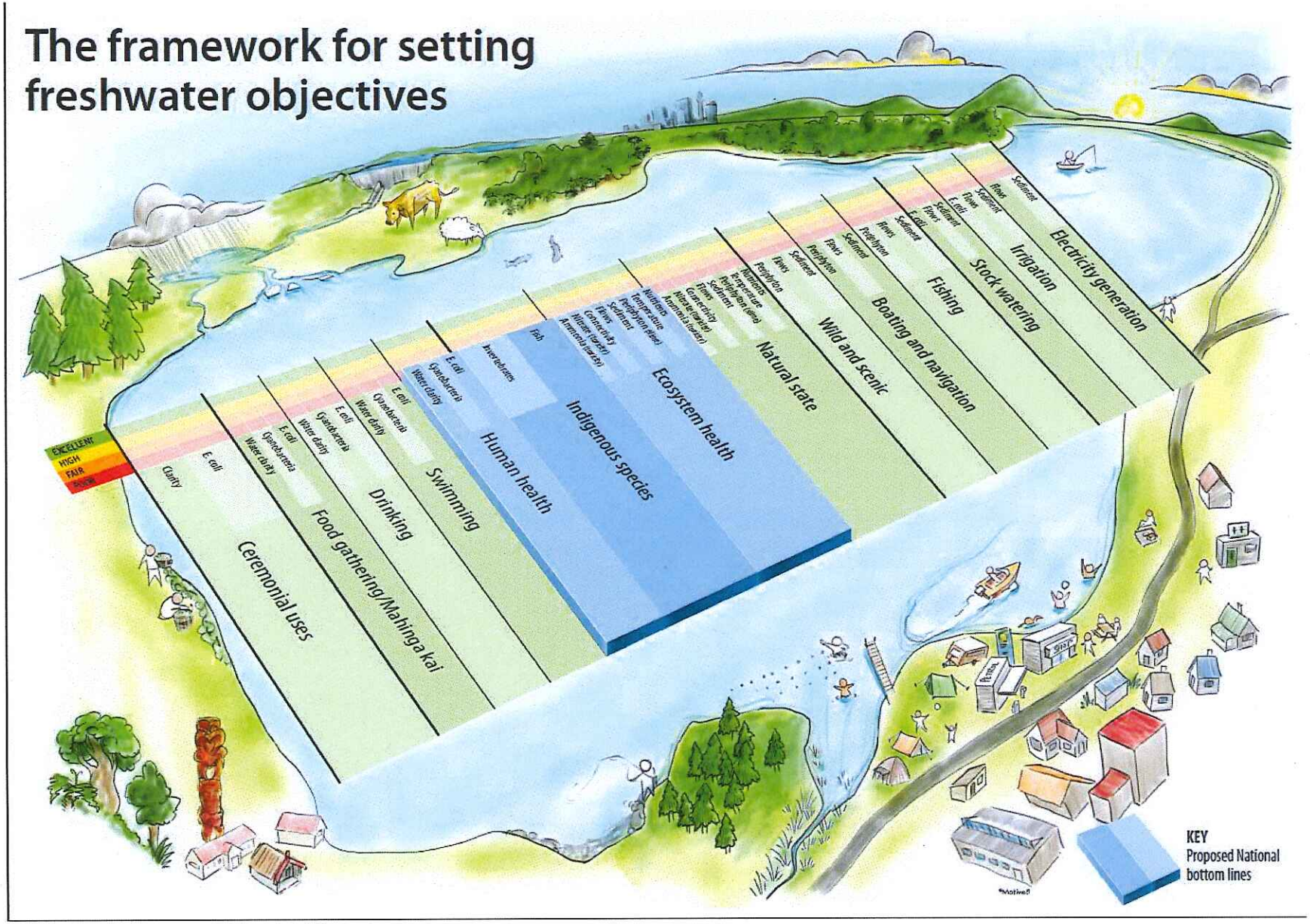
- Otago and Horizons consider plan change processes that are already underway will, once finished, provide the necessary updates to their existing regional plans to give effect to the NPS-FM.
- In Taranaki's case, its whole regional plan is now 10 years old meaning it is due for a review under the RMA [section 79(1)]. Taranaki sees this as an opportunity to complete NPS-FM implementation in one step.

[1] Information taken from implementation programmes and other council data sources.
[2] Dark blue means timetable confirmed. Light blue means an implementation programme has been drafted but has yet to be formally adopted by the council.

The other 13 regional councils are aiming to complete implementation after the end of 2014. Pending more detailed analysis, initial indications are that:

- most of these councils will progress a number of separate plan changes, rather than one complete overhaul of their existing plan
- councils are prioritising objectives and limit-setting in catchments under high pressure, to avoid existing problems getting worse, and will deal with less pressured water bodies later.

Annex D: Overview of a potential national objectives framework



Annex E: Report of the National Objectives Framework Reference Group

October 2012

Background

In April 2012, the Land and Water Forum (the Forum) made recommendations to Ministers on further measures to support implementation of the objective and limit setting requirements of the National Policy Statement for Freshwater 2011 (NPS-FM). Amongst other things, the Forum's recommendations included the establishment of a national objectives framework (including national bottom-lines) to support and guide objective setting by regional councils.

Ministers requested that further work be undertaken by officials to test some of the Forum's recommendations (see Appendix 1) and populate a potential national framework, including consideration of the impacts of various bottom-lines. To inform officials' work, a reference group including representatives from iwi, regional councils and key stakeholder groups was formed. This report summarises the work of this group, including identifying some potential bottom lines, and recommendations for further work.

Summary of view on Forum recommendations

Recommendation 1a: Acknowledge tāngata whenua relationships with fresh water and their connections with formal objectives	Support this recommendation. A series of objectives are proposed (see below) which would collectively address the key elements of mana atua and mana tangata set out in Appendix 2.
Recommendation 1b: Add an objective of managing risks to human health to apply to all waterbodies.	Support this recommendation. It should be a national objective that all surface waters are safe for secondary contact recreation values (eg wading, boating). In addition provision for protection of human health will also be relevant to a number of other objectives that regions may adopt for specific management units and sub- units. Numeric objectives should be provided at the national level (to apply only where adopted) for primary contact recreation (swimming), mahinga kai (food gathering), fisheries, or untreated irrigation water used on fresh food crops.
Recommendations 4 and 5: Establish a national framework, within which regional objective setting is undertaken, which includes some numeric bottom-lines with bands (eg fair, high, excellent) above this.	Support this recommendation. Testing has found the creation of a national framework using the broad approach provided by the Forum to be feasible and useful. Some potential population of this framework is included in this report, but further scientific input is needed[6]. The group considers that using such a framework would enable national consistency and increase the efficiency and transparency of regional conversations on freshwater management. The framework would include: • Some national objectives that would apply to all water

[6] Some matters can be progressed quickly with further work by the science panels. Other matters (eg sediment) require more significant scientific consideration and will require work over a longer period.

	bodies (national bottom-lines). A 'poor' numeric objective could not be adopted except via exception[7] (see below). • Objectives for a range of other important values and uses. Regions would be required to consider which, if any, of these should apply to a water body. For adopted values or uses, the region would be required to apply any relevant narrative and numeric objectives, and could not adopt a 'poor' objective[8]. The minimum monitoring and reporting requirements to demonstrate that objectives are being met at a management unit scale should be specified to assist with national consistency and to assist resource managers to prioritise monitoring investment (including reflecting resource use intensity). National protocols would also be provided to ensure consistent methods of monitoring are used.
Recommendation 6: Maintain or improve could mean that an objective for a waterbody cannot be set in a band lower than the current state except by way of an exception.	This reference group recommends an alternative to this recommendation. Firstly, whether or not water quality is maintained or improved should be determined at the scale of the management unit. A management unit may be multiple or single catchment(s), a sub-catchment, zone or aquifer. The selected management unit should reflect community and iwi interests as well as biophysical realities. The group notes that water quantity is also relevant to how well a water body provides for particular values or uses and so common management units should be used for both water quality and quantity. Each management unit would be further defined by management sub-units eg a tributary may be a sub-unit of the catchment management unit. 'Maintain' with regard to a management unit or sub-unit is defined as staying within an objective band for a value/use, but allows for movement within the band. Break points between bands are set so that movement within the band does not result in a major change in objective outcomes for the value/use being managed for. 'Improve' means to move up a band. Decisions to set objectives in regional plans that would result in the state of the water body moving within and between bands (relative to existing condition) may be acceptable at the management sub-unit scale provided that: • Objectives are above any bottom-lines for values and uses that have been nationally determined to apply to all water bodies (unless by way of exception).

[7] The reference group recognizes that the existing water body condition may be below a bottom line value in some instances but that the NPS-FM allows for long adjustment time frames to enable the water body be brought above the bottom line.

[8] If a region cannot adopt at least a 'fair' objective for a given value or use then they cannot claim that the water body is being managed for that value or use.

	• Objectives are above any bottom-lines for regionally adopted uses and values a water body is to be managed for. • The overall water quality of the management unit of which that water body is a part is maintained or improved (ie the movement of a water body within the management unit to a higher band offsets the movement of another water body within the management unit to a lower band[9]). • Community and iwi are involved at all stages of the decision making so that: o Relevant iwi and communities are well-informed o And are satisfied that, for the management unit, the objectives adopted will result in overall water quality being maintained or improved. Principles to support the regional processes to achieve the requirements above should be developed nationally. Some possible principles are provided in this report. Regions should have regard to state and trends, including forecasted state and trends, informed by state of the environment reporting, when considering whether or not the NPS-FM requirement to maintain or improve overall water quality has been given effect to. Monitoring and evaluation of water quality should be undertaken in a robust and nationally consistent way.
Recommendation 7: Criteria for exceptions to bottom-lines that have been nationally determined to apply to all waterbodies are: a. the inability to meet a minimum state objective due to natural conditions of a waterbody; OR b. a regional decision to set a numeric state objective in a water quality band lower than the current state because: i. an exceptional economic benefit will result from the relevant activity AND ii. a net environmental gain will result, taking into account compensatory	The reference group supports (a), but notes that where possible, the need for exceptions should be avoided through the use of appropriate objectives for different water body classes that reflect natural conditions.[10] The group supports (b), but it should apply only where this occurred within a management unit (see the modified framework provided under recommendation 6 above). The group also recommends that a third circumstance in which exceptions could apply would be where the lower quality results from historic events where it is not practicable to address the effects of those events. Further consideration of exceptions may be needed as population of the national objectives framework is completed and impacted areas are identified. The group notes that, if a water body is below a bottom-line, regions can choose to set a timeframe for adjustment as an alternative to using the exceptions process. Timeframes for achieving objectives should also be used to allow for known deterioration to come due to time lags.

[9] Movements may relate to the same or different values and uses.

[10] An example would be if a river reaches below a native bird nesting colony of high value exceeds the bottom line *E. coli* values for secondary contact recreation because of the birds. The exception in this case would be that secondary contact recreation would not be an objective applied to this reach.

actions.	
Recommendation 8 and 9: Aquifers should be classified to recognise their connections (or lack of) with surface and sea water and for locally identified uses.	The national objectives framework has been developed without a detailed aquifer classification system. However, in implementing the framework regional councils will need to understand the relationship between ground and surface waters.
Recommendation 10: Constraints associated with hydrologically altered catchments need to be accommodated within the national objectives framework.	Support this recommendation. The reference group considers that the framework needs to include a clear definition of 'hydrologically altered catchment', which should include sub-catchments or catchments where there have been substantial and long-term changes to the hydrological regime resulting in a fundamental change to a water body type (eg from river to lake, or to a diverted river and canal). In this case the objective setting process would recognise that the change has occurred and, where relevant, there would be an appropriate class that the water body would fit into based on its current type. Objectives for future management would be selected from those that are appropriate for that class. There are other circumstances where the reference group considers that water bodies have been altered but have retained characteristics that allow it to function ordinarily within the classification of its water body type. If the use to which the water body was put has ceased and the alteration of the water body is no longer of value to the community, objectives relating to the original class of the water body may be adopted where it is practical and desirable for it to be restored.

Design and population of national objectives framework – progress to date

The reference group considers that a national objectives framework should include objectives that relate to all iwi, and common values and uses. Only a few objectives would apply to all water bodies. In the case of the other objectives, iwi and the community would determine whether or not they applied to each water body. The reference group anticipates that objectives would generally be set though a collaborative community based process as recommended by the Forum.

The national bottom-line objectives that should be set for all water bodies relate to the following values and uses:

- The protection of human health during secondary contact recreation[11] (refined Forum recommendation)
- Ecosystem health (including ecosystem processes – NPS-FM objective A1/B1[12])
- Indigenous species including their associated ecosystems of fresh water (NPS-FM objective A1/B1)

[11] Based on *E. coli* only. Toxicants are covered by more stringent ecological thresholds.
[12] To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water…

The group discussed including 'life-supporting capacity' which is part of NPS-FM objective A1/B1 (and section 5 of the RMA) but considered that there was so much variability and complexity within the concept that it could not be satisfactorily defined to a level of specificity that allows for the setting of bottom-lines and bands. However, the group considers the national bottom-line objectives listed above to represent important components of life-supporting capacity. In particular, the reference group considers that the management of risks to human health is an important part of life supporting capacity, as the definition of life-supporting capacity of a water body could not exclude the interaction of humans with that water body.

The national objectives also cover significant parts of 'mana atua' within the Tangata Whenua Values and Relationships with Fresh Water framework included in the Forum's report (see Appendix 2).

The reference group considers that objectives relevant to all of the national values listed in the preamble to the NPS-FM could be included in the framework (at least as a narrative objective if numeric data are not available). In some cases it may be desirable to breakdown the values further, for example 'recreational activities' encompasses swimming, fishing, kayaking and waka ama (amongst other things) and these would need to have different objectives (and/or levels of bands) set to ensure they were provided for. Communities would have to decide whether they were relevant for each water body (making those decisions very transparent), and if they did adopt the objectives, then the bottom lines for that objective would have to be met. Communities could, if they wished, adopt a higher band for the objective for a particular water body to meet their desired outcomes, or they could adopt objectives relevant to other values/uses not included in the framework. See Appendix 3 for values/uses proposed for inclusion in the framework.

For each value/ use, the framework should identify:

- broad narrative objective (ie statement of values and uses that are to be delivered)
- critical factors that need to be managed if broad objective is to be achieved (water quality, quantity and physical parameters should be considered)
- for those factors, tight narrative objectives to guide nationally consistent regional objective setting
- where possible, numeric objectives expressed as bottom-lines (below which the value or use cannot be considered to be provided for) and bands of 'fair', 'high' and 'excellent' above these representing how well the value or use is provided for
- where numeric objectives are included, which numeric objectives are appropriate for what types and classes of water body (including hydrologically altered catchments)
- the measure(s) and minimum level of monitoring required (considering cost, practicality and meaningfulness) to be confident a water body is meeting a given numeric or narrative objective.[13]

Water should be managed to ensure it remains within the objective bands set through development of the regional plan. While there may be some variability in the measurements within a band, that variability should not mean that the value/use is compromised.

In the time available, it has not been possible to develop a fully populated framework for all values and uses across all water body types. But sufficient work has been done to show that the approach is workable and likely to provide a valuable contribution to nationally consistent water management. In testing the framework concept the group has focussed on rivers, lakes and groundwater, but scientific advice is that the same framework is achievable for wetlands and estuaries.

Those parts of the framework which have been indicatively populated are provided in Appendix 3.

[13] Any national protocols on monitoring included should build on existing work programmes (such as NEMAR) already underway through collaborations between MfE, the Regional Councils and the research agencies/Universities.

In testing the framework concept the group has identified a number of principles to inform further scientific and technical work needed to more fully populate the framework. These include:

- Set bottom-lines at a sufficient buffer above any tipping point, to provide resilience. For this purpose, the term "tipping point" is used to mean the point below which recovery to a higher banding would become difficult or impossible.[14]
- Set numeric objectives in a way that accounts for natural variability (for example, using a 95th percentile, annual median or a rolling average).
- Breakpoints between bands represent (where possible) thresholds where there is a meaningful difference in what is provided for by the different bands, eg a shift in the biological community or the suitability of its stated use.
- A movement within the band should (ideally) not result in any meaningful difference for the community. If that is not possible, that fact should be clearly conveyed to the community (for example, the level of risk may be a continuum rather than having clear breakpoints).
- Thresholds should be set using the best available information.
- Narratively describe what the bottom-lines and bands represent in terms of how the value or use is provided for.
- Where possible indicators that integrate a range of values and uses should be used (as long as the ability to monitor the suitability of a water body for each value/ use is not compromised.
- Use classifications to deal with geospatial variation and the new types of water bodies created by major human-induced changes (eg hydro lakes and artificial canals) where possible (in order to minimise the number of exceptions). Because management units and sub-units may not always align with biophysical classifications, existing management units and sub-units need to be considered in the development of the framework.

The group believes that there is sufficient existing science to populate the framework more fully over the coming months. Where full population of the framework is not possible, key elements should still be included at the narrative objective level, and the missing numeric objectives should be prioritised for research investment, with the results added into the national objectives framework over time.

Hydrologically altered catchments

The framework described above will incorporate separate water body classes for significantly hydrologically altered catchments. It will, however, be important to clearly define what level of alteration meets the criteria for a separate class. Defining aspects could be:

- There is a substantial hydrological change in the water body from the natural reference state to a new state at a sub-catchment or catchment level that is relevant to water management. For example, such changes may be evident as level fluctuations and residence-time variability in natural lakes (due to range or seasonal differences), reservoirs in place of rivers with different limnology and residence time, rivers diverted via canals or tunnels, modified flows or morphology in downstream river reaches (quantity or seasonal variability and timing).
- The hydrological alteration is or is likely to be intergenerational .
- There are likely to be multiple values present in the water body that are different from those provided by the natural reference state.
- There is likely to be different habitat diversity associated with the water body.

[14] For example, the tipping of a shallow lake from a macrophyte dominated state to a phytoplankton state can be difficult, if not impossible to reverse.

- There are changes to morphology and connectivity that require an alternate approach to the management of the values.

Artificial water bodies

Artificial water bodies were outside of the scope of the reference group except where they effectively replace a natural water body. For artificial water bodies that are in scope, they may be included in the separate classes for hydrologically altered catchments (see criteria above) or they may fall into the class of the natural water body they are replacing.

As the different types of artificial water bodies form a continuum from what is clearly outside of scope to what is clearly inside scope, it will be important that regions are able to readily identify 'out of scope' artificial water bodies. Principles to inform this identification could include consideration of:

- the primary purpose for which the water body has been created
- scale (both of the water body and of national vs local interest)
- connectivity to the other water bodies in the management unit and whether or not this is governed by consents (eg waters from which it is taken, modified from or discharged into)
- cumulative effects of this and similar modified water bodies in the management unit
- use of, or value for, the water body for reasons other than the primary management purpose
- use of, or value for, the water body for publicly managed resources such as wildlife and fisheries
- public and private interests in the water body.

Examples of artificial water bodies that may be 'out of scope' are:

- Ponds created for fire fighting or emergency or utility contingency purpose
- Ponds created for private irrigation storage
- Wastewater treatment ponds
- Sediment retention structures
- Drainage channels
- An artificial lake surrounded by land, that is not on a river or stream alignment and has no natural inflows or headwaters (eg an ornamental pond).

Where an artificial water body is being managed for a purpose within the national framework, the relevant objectives would apply.

NPS-FM requirement to maintain and improve overall water quality within a region

The first stage of plan development would be to define appropriate management units. These might be at a scale ranging from catchment(s), sub-catchment, zone or aquifer. The management unit should be hydrologically and ecologically coherent, and also be relevant to the way that communities of interest are geographically located (eg iwi and hapū boundaries). Common management units should be used for both water quality and quantity. Although a management unit could be at the regional scale, the expectation is that there will be a number of management units within each region. Note also that management units may sometimes cross council boundaries.

Objectives would then be set for a management unit and may also be set for management sub-units.

A freshwater objective that will allow a reduction of the water quality for a defined value or use in a management sub-unit is acceptable as long as

1. the overall water quality (ie quality of water for all defined use) of the management unit is maintained or improved.
2. the water quality in that management sub-unit remains appropriate to the objectives set (ie would not go below the bottom lines for each objective)15
3. there is a corresponding increase in water quality in another part of the management unit in order to ensure that overall water quality is at least maintained.
4. Community and iwi are involved at all stages of the decision making so that:
    a. Relevant iwi and communities are well-informed
    b. And are satisfied that, for the management unit, the objectives adopted will result in overall water quality being maintained or improved.

It is critical that relevant iwi and communities are involved in all stages of the objective setting decision making process so that they are satisfied that the overall water quality will be maintained or improved and that the distribution of costs and benefits is appropriate. Parties involved in the decisions must be well informed about the effects of any "trading off" between water bodies or objectives within the management unit, including the economic and social implications of adjustment where there is over-allocation. Any decision must reflect tāngata whenua values and interests in accordance with Objective D1 of the NPS-FM.

In setting an objective, regard should be had to how the proposed objectives compare to the current and previously existing states. State of the environment reporting and modelling should be used to determine likely future trends in the absence of changes in management, and likely effects of proposed objectives. There will need to be an efficient and workable mechanism for assessing whether there will be (and is in practice) maintenance or improvement. This should not be a highly detailed accounting system but instead build on the principles explained below. The expectation is that iwi and the community will receive ongoing information on both progress against objectives set in the plan and overall state of the environment trends. This transparency must be sufficient for ensuring that NPS-FM requirement is met over time.

"Maintain and improve quality" is to be assessed in terms of delivery of the objective rather than exact numeric figures. For example nitrogen may fluctuate significantly, while the quality in terms of periphyton and habitat does not change materially. Band boundaries are intended to reflect the points at which numeric change will generate significant quality change. The group notes that water quantity is likely to also be an important consideration in terms of delivery of the objective.

Principles for balancing objectives to support both environmental and economic outcomes

A number of principles are proposed to guide decisions within a collaborative process on how to balance between objectives and bands so that both environmental and economic outcomes are supported. This may include the setting of an objective mix that includes improvements in some management sub-units and degradation in others. The proposed principles are:

- Measurable 'like for like' exchanges are preferable. However, 'like for unlike' exchanges are acceptable so long as iwi and community agree that there will be an overall environmental gain, in terms of maintaining or improving overall water quality for defined values and uses within the management unit.
- No unique, irreplaceable, or non-transferable (in geographic location) value should be lost. This is not just ecological uniqueness. Other types of uniqueness can include the accessibility of the value/use for iwi and the community.
- Decline in water quality for particular values and uses should only be the result of best practice activities that generate significant economic benefit, not the result of poor practice.

[15] Exceptions from bottom-lines for values and uses that have been nationally determined to apply to all water bodies may be allowable. For a regionally adopted value or use, if objectives cannot be set above the related bottom-lines then the water body cannot be considered to provide for that value or use.

New activities should operate according to best practice immediately, but existing activities may need to adjust to best practice over time.

- All values and components of the system should be taken into account, even if there is poor knowledge of particular components and the values are held by parts of the community that are poorly represented in processes (eg disadvantaged communities).
- Uncertainties in predictions of change and effects must be taken into account. While outcomes can never be guaranteed, uncertainties should not be so high that there is a significant risk of unacceptable outcomes (eg irreversible environmental losses that were not intended, or economic losses that have provided no environmental gain).
- There needs to be a clear statement of what is intended, and what that would look like on the ground, so that the degree of compliance with the intent can be measured. Information used in decisions must be available to all parties and be easily understood.
- Systems are needed to ensure that those responsible for improvements are accountable for their delivery, and that they are incentivised appropriately.
- Adaptive management is essential where there is uncertainty regarding outcomes and trade offs are required.
- The relative timeframes for losses and improvements need to be factored in. If there is a long delay before improvements will be achieved, losses may also need to be delayed, or additional improvements required. Objectives for any component of freshwater (whether a stream, river, lake, groundwater aquifer or estuary) shall not compromise the objective of any other component to which it is connected.

Exceptions from national bottom-lines

The reference group agreed that an exceptions regime was necessary for:

- Objectives being set that are below a national bottom line (ie would result in the water body remaining "poor").
- Objectives being set that would result in a decline in water quality at the management unit level (ie where offsetting improvements within the management unit are not achievable).

This narrows the need for exceptions from the Forum's proposal. Note that, in line with the NPS-FM, exceptions for objectives that would result in a decline at the management unit level are only acceptable if overall water quality is maintained or improved at the regional level (ie there would need to be offsetting improvements in another management unit within the region).

In general, the effects of natural processes on water quality should be covered in the water body classification systems (eg for glacial rivers and geothermal lakes) and through the measures used for objectives (eg use of a median will allow for some natural variation). However, an exception from national bottom-lines for natural circumstances will still be needed.

The Forum's proposed additional criteria exemptions were supported, ie

i. an exceptional economic benefit will result from the relevant activity AND

ii. an overall environmental gain[16] will result, taking into account compensatory actions.

The 'principles for balancing objectives to support both environmental and economic outcomes' (above) would apply to exceptions under (ii).

There also needs to be exemptions for the effects of historical circumstances, where:

i. it is not reasonably practicable to address them; OR

ii. the activity is still generating an exceptional economic benefit, operating according to current best practice and an overall environmental gain can be provided.

[16] The reference group does, however, prefer the term 'overall environmental gain' rather than 'net environmental gain' as it does not imply that a complex accounting system is required.

Further consideration of exceptions will be needed as further population of the national framework is completed, and areas where there may be unforeseen impacts are identified. However the group notes that the exceptions criteria are not intended to prioritise any particular land uses over any others.

The group notes that, if a water body is below a bottom-line, regions can choose to set a timeframe which is fast enough to make some improvement but not so fast as to cause social and economic dislocation through adjustment as an alternative to using the exceptions process. Timeframes for objectives to be achieved should also be used to allow for anticipated deterioration to come due to time lags.

How the national objectives framework would impact on regional decision-making

When setting regional objectives regional councils would, through a collaborative process with iwi and the community:

- Determine appropriate management units, and management sub-units, for objective setting that take into account relevant connectivity (cultural, economic, environmental or social). These may be at a catchment(s), sub-catchment, zone or aquifer scale.
- Consider which of the objectives in the national framework are relevant to each water body, management unit or sub-unit. Other objectives may also be set. The objectives for each water body would have to include those that have been nationally determined to apply to all water bodies, unless an exception was agreed at a national level.
- For each objective, decide which band is appropriate. Where the chosen band is below the current state, a process to consider "maintain and improve across the management unit" would need to be initiated (or it could equally be initiated if a chosen band is above the current state). The band chosen could not be "poor" (unless by way of exception from a national bottom-line objective) as this would mean that the relevant value /use cannot be delivered.
- Consider the full range of costs and benefits (environmental, economic, social and cultural) of achieving and managing to objectives (limits and other management methods), including where those costs and benefits will fall. Consider options for different timeframes for adjustment in catchments that would be over-allocated. Assessment of these costs and benefits may lead to the desired objectives being changed.
- Acknowledge any information uncertainties regarding environmental, economic, social and cultural outcomes and identify where there are priorities to improve information in order to better inform the setting or meeting of limits.
- Ensure the objectives are measurable (in accordance with any national requirements) and able to be reported to the community in clear terms (scale and time important).

Appendix 1: Relevant Forum recommendations

Recommendation 1

The government should support and enhance the objectives currently in the National Policy Statement on Freshwater Management (NPS-FM) by:

a. the incorporation of the substantive content of the material developed by iwi on (tangata whenua) relationships with fresh water (attached as Appendix 2), into the preamble to the NPS-FM, to provide acknowledgement of those relationships and their connections with the formal objectives

b. expanding the existing objectives in the NPS-FM to include managing the risks to human health from micro-organisms and toxic contaminants, to apply to all waterbodies.

Recommendation 5

Further work is required to fully populate and finalise the sets of numeric and narrative objectives. This should be done through a collaborative process involving stakeholders, iwi, and scientists, which the Forum would be pleased to undertake, with government support. The Forum will then, as part of its September 2012 report, provide the technical basis for a national instrument. This further work should review and refine the following:

a. the list of parameters and indicators

b. the assignment of parameter levels for minimum numeric state objectives and breakpoints between the bands for 'Fair', 'High' and 'Excellent' categories

c. the classification of waterbody types, in particular for lakes, wetlands, estuaries and hydrologically modified catchments

d. an analysis of the measurable state objective options against current water quality and quantity state data

e. the options for either dealing with wetlands and estuaries through a similar framework, or to continue to deal with these classes through use of tight narrative objectives in regional plans.

Recommendation 6

In respect of NPS-FM Objective A2, the meaning of "maintained or improved" should be further defined. "Maintained" could be defined to mean that, within the national banded framework, a freshwater state objective for any parameter cannot be set in a band lower than that of its current state unless by way of an exception. "Improved" means setting a state objective higher than the existing state, and setting a limit based on that objective.

The development of the limits framework and its population with numerical state parameters (as outlined in Recommendation 5), together with catchment case studies, will provide the opportunity to analyse the effectiveness of this regime in practice. This may necessitate a revision of this recommendation on completion of that process.

Recommendation 7

Freshwater state objectives and related limits set at a regional level must comply with relevant national objectives except in exceptional circumstances. A system for applying for exceptions should be defined nationally, and criteria for exceptions to national objectives should be:

a. the inability to meet a minimum state objective due to natural conditions of a waterbody; OR

b. a regional decision to set a numeric state objective in a water quality band lower than the current state because:

   i. an exceptional economic benefit will result from the relevant activity AND

   ii. a net environmental gain will result, taking into account compensatory actions.

The Forum would welcome the opportunity to work with the government in developing a system for applying for exceptions, including on the detail of relevant criteria and processes.

Recommendation 8

The government should direct regional councils to identify aquifers and classify them into classes that recognise the following characteristics:

a. aquifers that are connected to surface water

b. aquifers that are connected to the sea

c. confined aquifers
(Note: aquifers will often be in more than one class)

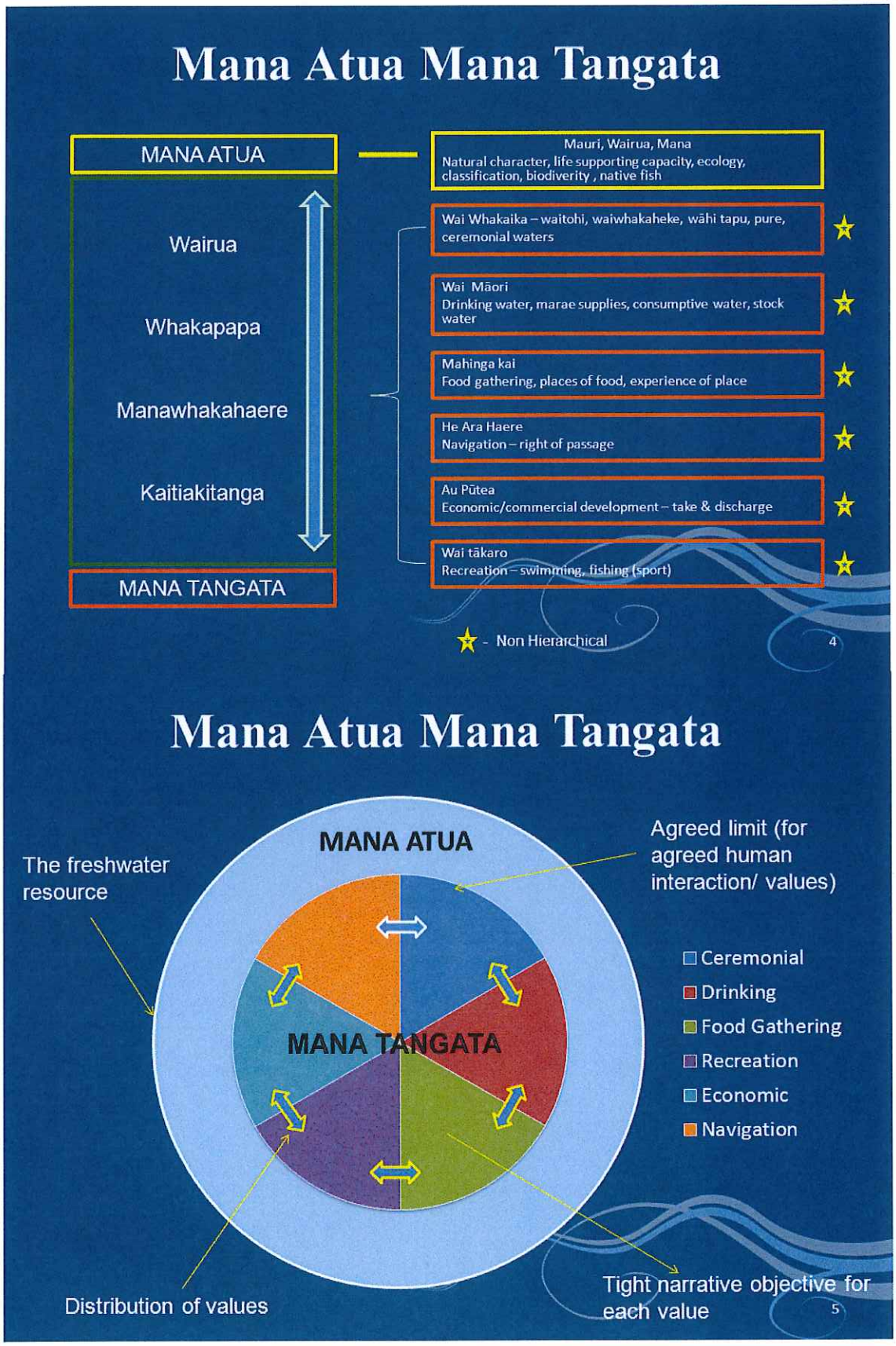
Recommendation 9

The state objectives and limits for aquifers connected to surface water should be consistent with those of the connected surface waterbody and be developed through a whole of catchment approach. Aquifers that are connected to the sea should be managed to prevent salt water intrusion. Confined aquifers that are not connected to surface water or the sea should be managed on a case-by-case basis. Local values and uses of aquifers, such as for drinking water, should be identified and taken into account.

Recommendation 10

Central and regional government should, when setting state objectives, consider the constraints in significantly hydrologically altered catchments. These catchments are those that have been modified by long-term major structures for hydro-generation, municipal water supply dams, and irrigation dams. This use category should be accommodated in a waterbody classification system.

Appendix 2: Tāngata whenua values and relationships with fresh water



Note: Some terms used in the *Mana Atua Mana Tangata* model are also defined terms in certain legislation. However, those terms are used in the model in accordance with their ordinary meaning, and are not to be interpreted with reference to their statutory meanings.

Appendix 3: Partially populated national objectives framework

This appendix summarises the current status of a populated National Objectives Framework (NOF) following deliberations of a series of science panels for different freshwater body types (rivers, lakes, groundwater, estuaries and wetlands) and specialist topics (periphyton, iwi science). A separate group of scientists has reviewed the work of all of the science panels. The science panels have initially focussed on rivers, lakes and groundwater. Within those environments, the focus has been on human health (following the recommendation of the Forum) and on the requirements of objective A1/B1[17] of the NPS-FM. However, over time the framework will be able to be more fully populated. In some cases this can be done quite readily using existing science, in other cases more extensive scientific work is needed and some indicative priorities for research have been included.

Overview of framework

National value (from NPS-FM preamble or objectives)	Component values/uses	Relationship to *Mana atua mana tangata*	Proposed application	Progress to date	Comments
Life-supporting capacity	**Ecosystem health**	**Mana atua**	**National bottom-line to apply to all freshwater bodies**	See following tables	Measures for sediment and habitat space (including flows) not yet included. Significant gaps for sediment in relation to both national and regional objective setting. There are also gaps in toxicity information specific to indigenous species and further work is needed on other measures related to general indigenous species protection.
	Indigenous species – general protection	**Mana atua**	**National bottom-line to apply to all freshwater bodies**		
	Indigenous species – rare and threatened	Mana atua	Regional decision about where applies and for what species	Not yet progressed	Science is variable for different species
Animal drinking water		Wai māori	Regional decision about where applies	Not yet progressed	
Community water supply	Untreated drinking water	Wai māori	Regional decision about where applies	Addressed by Ministry of Health Drinking Water Standards	
	Drinking water sources for treatment	Wai māori	Regional decision about where applies	Addressed by Sources of Human Drinking Water NES	
Fire fighting		Wai māori	Regional decision about where applies	Not yet progressed	
Electricity generation		Au pūtea	Regional decision about where applies	Not yet progressed	
Commercial and industrial processes		Au pūtea	Regional decision about where applies	Not yet progressed	
Irrigation	Irrigation water used on fresh food crops	Au pūtea	Regional decision about where applies	Not yet progressed	
	Irrigation water for other purposes	Au pūtea	Regional decision about where applies	Not yet progressed	ANZECC guidelines being revised by 2014
Recreational activities	Primary contact – swimming	Wai tākaro/ Wai māori	Regional decision about where applies	See following tables	Based on existing MfE 2003 guidelines used by regions
	Secondary contact – human health aspects	**Mana atua**	**National bottom-line to apply to all freshwater bodies**	See following tables	Cyanobacteria not yet included – further short-term work needed.
	Secondary contact – kayaking, boating	Wai tākaro/ Wai māori	Regional decision about where applies	Not yet progressed	
Food production and harvesting	Aquaculture	Au pūtea	Regional decision about where applies and for what species	Not yet progressed	
	Food gathering, customary fisheries	Mahinga kai	Regional decision about where applies and for what species	Initial work started	Initial work has been completed, but not yet incorporated.
	Recreational fisheries, spawning	Wai tākaro	Regional decision about where applies and for what species	Not yet progressed	Significant work required to populate.
Transport and access	Navigation	He ara haere	Regional decision about where applies	Not yet progressed	
	Tauranga waka	He ara haere	Regional decision about where applies	Not yet progressed	
Cleaning, dilution and disposal of waste		Wai Māori/ Au Pūtea	Regional decision about where applies	Not yet progressed	
Natural form and character		Mana atua	Regional decision about where applies	Not yet progressed	Could be based on 'excellent' band for national bottom-lines, or use the ecological integrity indicator developed through NEMAR[18].
Cultural and traditional relationships	Ceremonial waters	Wai whakaika	Regional decision about where applies	Initial work started	Initial work has been completed, but not yet incorporated.
	Aesthetic values	Mana atua	Regional decision about where applies	Not yet progressed	

[17] To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water…
[18] National Environmental Monitoring and Reporting project.

Detail of framework

The parts of the framework which have been partially populated are described in more detail in the following pages. This information is a summary of the work and recommendations of the science panels, and there are a number of existing and new technical papers that underpin this work.

Ecosystem health and indigenous species (general protection) – proposed national bottom-line

These values relate to objectives A1 and B1 of the NPS-FM – to safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water.

The critical parameters to manage will vary by water body type. Those relevant to rivers and lakes are summarised below, but similar work is also underway for estuaries and wetlands. There is a lack of information on the ecosystem requirement of groundwater, so it is proposed that objectives for groundwater relate to those for connected surface water bodies.

Rivers and lakes

Critical parameters identified as needing management if this value/use is to be provided for in both rivers and lakes are:

- Nitrate (a toxicant to aquatic life at high enough concentrations) – see below.
- Ammonia (a toxicant to aquatic life at high enough concentrations) – see below.
- Heavy metals (toxicants to aquatic life at high enough concentrations) – not proposed for inclusion as they are generally a location-specific issue. Regional councils advised to use thresholds in the ANZECC water quality guidelines (currently under revision).
- Habitat space and ecological flows and levels – not yet considered but can build on proposed NES for Ecological Flows and Levels.

There are also additional parameters that are relevant to either rivers or lakes. These are discussed separately.

Nitrate (aquatic toxicity) [Rivers and Lakes]

The following bottom-lines and bands are proposed for nitrate:

Objective band	Band descriptor	Annual median mg Nitrate-N/litre	Annual 95th%ile mg Nitrate-N/litre
Excellent	99% species protection level: No observed effect on any species tested	<1.1	<2.0
High	95% species protection level: Starts impacting occasionally on the 5% most sensitive species	1.1 – 2.3	<3.6
Fair (national bottom line)	80% species protection level: Starts impacting regularly on the 20% most sensitive species (6% reduction in growth)	2.3 – 6.3	<8.7
Unacceptable - Poor[19]	Starts approaching acute impact level (ie risk of death) for sensitive species	6.3 – 20	8.7–30
Unacceptable – very poor	Acute impact level (ie risk of death) for sensitive species	20<	30<

The acceptable level of risk is a value-based judgment so, alternatively, the bottom-line could be set at a 90% species protection level for example (ie starts impacting regularly on the 10% most sensitive level). This would be a bottom-line of 3.6 mg Nitrate-N/litre. Thresholds between bands could also be adjusted for different level of species protection.

Thresholds above the bottom line are set to protect against impacts on growth and reproduction. The bottom line has been set at a safe distance above lethal thresholds (ie where fish start to die). This is largely based on international data, as data on native NZ species is lacking. Trout and salmon (while non native) show considerably higher sensitivity to all other species tested internationally to date. The proposed thresholds are highly protective of most species, which is considered to be a reasonable surrogate for native species protection until further research testing is done on the latter.

There is no need for classification based on water body type – the same standard should apply to all rivers and lakes.

[19] This additional band is proposed for nitrate toxicity, as there is significant change in impact below this threshold, where nitrate impacts on aquatic life become acute (ie deaths begin to occur).

Ammonia (aquatic toxicity) [Rivers and Lakes]

The following bottom-lines and bands are proposed for ammonia:

Objective band	Band descriptor	Annual median mg Ammoniacal-N/litre	Annual 95th%ile mg Ammoniacal-N/litre
Excellent	99% species protection level: no observable effect on any species tested	<0.02	<0.03
High	95% species protection level: Starts impacting occasionally on the 5% most sensitive species	0.02 – 0.18	<0.25
Fair (national bottom line)	80% species protection level: Starts impacting regularly on the 20% most sensitive species (6% reduction in growth)	0.18 – 1.2	0.25 – 1.6
Unacceptable	Starts approaching acute impact level (ie risk of death) for sensitive species	1.2 <	4.4<

Thresholds have been developed in a similar way to those for Nitrate, focusing on the degree of species protection from growth impacts. Freshwater mussels are the most sensitive species, but only international species have been tested; there is no data on sub-lethal impacts on NZ species. Like for Nitrate, the bottom line for Ammonia is set at a safe distance above where lethal impacts kick in, but is also a value-based judgment in terms of the acceptable level of sub-lethal effects.

There is no need for classification based on water body type – the same standard should apply to all rivers and lakes.

Additional parameters for rivers

On top of the parameters for both rivers and lakes above, critical parameters identified as needing management if this value/use is to be provided for in rivers are:

- Slime (periphyton) – see below. This drives the condition of other biological components in freshwater ecosystems.
- Sediment – further work needed. Although there is some existing science to draw on, more work is needed to inform both objectives that may be included in a national framework and local objective setting by regional councils. Progressing this work should be a priority.
- Fish and macroinvertebrate indicators – there has been some initial work, but more is needed before objectives for inclusion in a national framework can be proposed.

Slime (periphyton)

The following bottom-lines and bands are proposed for periphyton:

Objective band	Band descriptor	Mean Annual Max % WCC[20]
Excellent	Rare blooms reflecting negligible nutrient enrichment and/or alteration of the natural flow regime or habitat	<20
High	Occasional blooms reflecting low nutrient enrichment and/or alteration of the natural flow regime or habitat	20 – 40
Fair (national bottom line)	Periodic short-duration nuisance blooms reflecting moderate nutrient enrichment and/or alteration of the natural flow regime or habitat	40 – 55
Unacceptable	Frequent blooms reflecting significant nutrient enrichment and/or alteration of the natural flow regime or habitat	55<

Thresholds have been developed arising out of science currently in progress to revise the previous (MfE, 2000) periphyton guideline, which were highly conservative for many NZ streams. A bottom line of 55% cover has been developed to maintain 'fair' ecological condition in streams, mainly based on correlations with invertebrate measures of enrichment such as MCI. The 40% threshold uses similar parameters to derive a 'high' condition, although the 40% value is also close to desirable periphyton cover thresholds for contact recreational use (ie swimming)[21].

As indicated by the band descriptors, nutrients flow and habitat are drivers of periphyton growth. However it is not recommended that these be included in the national objectives framework as bottom-lines derived from the bottom-lines for periphyton growth. This is because periphyton response to nutrients and other drivers is highly variable by river type throughout the country and robust in-stream thresholds can only be generated through detailed site-specific science studies for each local river or river reach. National methodologies and tools could be developed to support regions to develop their own in-stream thresholds at an appropriate scale to achieve the perpiphyton cover thresholds outlined above.

It is not proposed to use a classification to vary the bottom-lines and thresholds by river type.

Additional parameters for lakes

On top of the parameters for both rivers and lakes above, critical parameters identified as needing management if this value/use is to be provided for in lakes are:

- Algae (see below). This drives the condition of other biological components in freshwater ecosystems.
- Nutrients (see below). Nutrient concentrations are drivers of algal growth and are more strongly correlated in a lake environment than in a river environment.
- Oxygen (see below). Supports life.

[20] %WCC = "Percentage Weighted Composite Cover" (mats and filaments) – a robust measure of periphyton cover suitable for monthly monitoring in rivers, developed as part of a recent report on review of the NZ Periphyton Guidelines (John Quinn & co-authors). The "Mean Annual Maximum" measure requires an inter-annual period to be specified, eg. 5-year rolling average.

[21] Periphyton thresholds are typically 30-40% in existing regional plans

The following bottom-lines and bands are proposed nutrients, algae and oxygen levels:

Objective band	Band descriptor	TP mg/m^3	TN (mg/m^3)		Median Chl-a mg/m^3	Max Chl-a mg/m^3	DO (%)
			SS & brackish	Mixed lakes			SS lakes only
Excellent	Lakes ecological communities are not under stress from nutrients and rarely experience algal blooms.	<10	<160	<300	<2	<10	60>
High	Lakes ecological communities are under low stress from nutrients and occasionally experience algal blooms.	10–20*	160–350*	300–500*	2–5	10–25	50–60
Fair	Lakes ecological communities are stressed from nutrients or exotic species and occasionally experience algal blooms.	20–50	350–750	500–800	5–12	25–60	40–50
Unacceptable	Lakes ecological communities are under high stress from nutrients or exotic species and frequently experience algal blooms. Lakes are at risk of flipping.	50<	750<	800<	12<	60<	<40

*Becomes the bottom line (lower bound of Fair) when Egeria macrophytes or coarse fish species are present

TP = Total Phosphorus TN = Total Nitrogen SS = Seasonally stratified lakes

Chl-a = Chlorophyll-a (a measure of green pigment in algae) DO = Dissolved Oxygen

Some variables like Total Nitrogen and Dissolved Oxygen have different thresholds applying to different lake types or classes. Note that, in contrast to rivers, national bottom lines for nutrients have been included as drivers of algal blooms. This is because the variation in lake dynamics throughout the country is considerably less than for rivers, though a decision could also be made that this should be determined locally with a methodology provided nationally as for rivers. An alternative approach could be to provide them as defaults rather than bottom-lines.

Secondary contact (human health aspects) – proposed national bottom-line

A secondary contact bottom line and thresholds are proposed to provide a minimum of protection for human health across all surface waters.

Critical parameters identified as needing management if this value/use is to be provided for are:

- *E. coli* (an indicator of microbiological contamination and infection risk) – see below.
- Cyanobacteria (a toxicant) – being developed.

Heavy metals are also a risk to human health, but have not been included because the level of protection needed for ecological health will be more stringent than that needed for human health.

E. coli

The following bottom-lines and bands are proposed for *E. coli*:

Objective band	Band descriptor	Median E.coli/100mL
Excellent	<0.1% infection risk	< 260
High	0.1% – 1% infection risk	260 – 540
Fair	1% – 5% infection risk	540 – 1000
Unacceptable	>5% infection risk	>1000

Alternatively, bottom-lines and bands could be set relative to a bottom-line of 1% infection risk as follows:

Objective band	Band descriptor	Median E.coli/100mL
Excellent	<0.1% infection risk	< 260
High	0.1% < 0.5% infection risk	260 < 460
Fair	0.5% < 1% infection risk	460 < 540
Unacceptable	>1% infection risk	> 540

These proposals are based on preliminary analysis by making an assumption about the level of ingestion compared to swimming, and re-running the analysis used to produce the primary contact standards in existing NZ guidelines. Additional work will be required to confirm the appropriateness of the thresholds and to check that all assumptions underpinning the thresholds are transparent and robust.

There is no need for classification based on water body type for entirely fresh waters– the same standard should apply to all freshwater surface water bodies. However, an alternative or additional parameter may be needed for estuaries given the saline influence from marine waters. Existing guidelines for coastal beaches and estuaries utilise the indicator *Enterococci*.

There is the potential for a national bottom-line to be exceeded in a small number of locations for 'natural state' reasons, but these cannot be managed through a classification. An example would be if a river reach below a native bird nesting colony of high value exceeded the bottom line values because of the birds.