In Confidence

Office of the Minister for the Environment

Office of the Minister for Primary Industries

Chair

Cabinet Economic Growth and Infrastructure Committee

Freshwater Reform: Consultation on Amendments to the National Policy Statement for Freshwater Management

Proposal

1. This paper seeks agreement to consult on amendments to the National Policy Statement for Freshwater Management 2011 including a National Objectives Framework for freshwater management.
2. The amendments create standardised freshwater accounting requirements, a process for setting objectives, a common set of values and uses, two compulsory national values, associated national bottom lines, and a process to manage exceptions to national bottom lines.

Executive summary

3. We propose to consult on a set of measures to improve implementation of the National Policy Statement for Freshwater Management 2011 (National Policy Statement). The proposed amendments are based on recommendations made by the Land and Water Forum.
4. We have an opportunity to make a generational change in the way that fresh water is managed in New Zealand. The Land and Water Forum achieved a degree of consensus that has not existed in decades and recommended a package of reforms. Cabinet has already agreed to one of the key elements: a collaborative planning process for freshwater with limited rights to appeal. This paper progresses other key elements.
5. Experience of freshwater planning processes has highlighted inconsistencies in the approach taken and the outcomes sought from region to region. Other issues include a lack of transparency, adjustment timeframes that are too rapid, inefficiencies due to duplication of the science, and extensive litigation.
6. To address these issues we propose consulting on a range of amendments to the National Policy Statement. These amendments will enable better community discussions about freshwater planning, informed by robust science and information about the economic impacts and timeframes involved.
7. The first proposal requires councils to have a **freshwater accounting** system that accounts for all water takes and sources of contaminants. Councils will have the flexibility to choose the scale at which they will manage water bodies for accounting purposes, for example at the at the level of single or multiple catchments or sub catchments.

8. The second proposal is for a **National Objectives Framework** (NOF) for freshwater management within the National Policy Statement. The NOF has been developed in consultation with the scientific community and key stakeholders. The NOF will:

   a. Provide a consistent approach to developing freshwater objectives across the country.

   b. Provide a range of values and uses. Three values will be populated with attributes and numeric states to guide councils in setting freshwater objectives. Two values will be compulsory:

      i. compulsory value: ecosystem health

      ii. compulsory value: human health for secondary contact (wading and boating but not swimming)

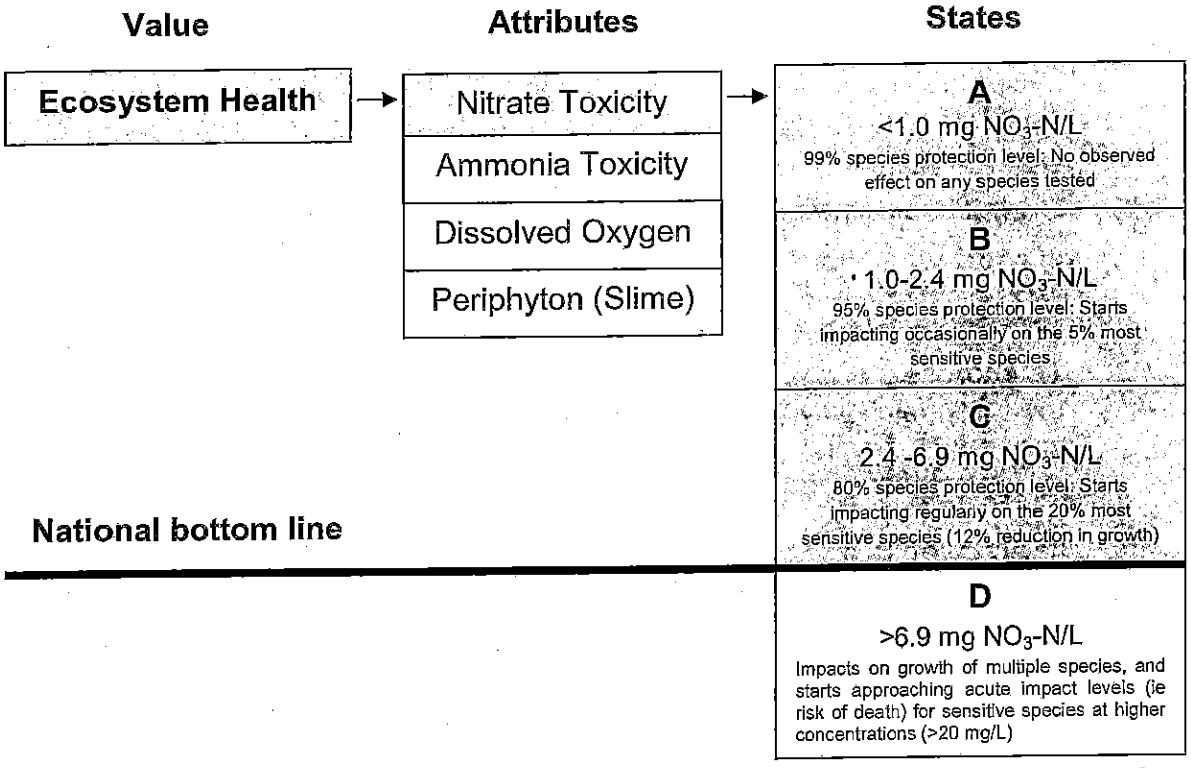
      iii. optional value: human health for primary contact (swimming).

   c. Be updated in 2016 and 2019 to further populate attributes and numeric states once scientific work has been completed.

9. The ecosystem health value is already reflected in the current National Policy Statement, which requires the life-supporting capacity, ecosystem processes and indigenous species of all water bodies to be safeguarded.

10. The Land and Water Forum proposed amendments to the National Policy Statement to add human health as a compulsory value. We propose that human health for secondary contact (wading and boating) be added as a value that must be protected.

11. For each value there will be associated attributes and four bands or states to guide objective setting – A, B and C state will all provide for the associated value and the D state represents a level that will not achieve the value. For example:



12. For compulsory values there will be a requirement to have a goal of being above the line between states C and D. This requirement is therefore a **national bottom line** that is to be exceeded over time. There is no obligation to exceed national bottom lines immediately or within any defined period. For ecosystem health the bottom line provides protection for eighty per cent of species. For human health the bottom line provides a less than five per cent infection risk from secondary contact.

13. Councils will group water bodies into management units for the purpose of planning and will identify the appropriate points within each unit at which monitoring will be undertaken. The scale of the unit chosen for planning will be the same as that used for the purpose of freshwater accounting. Freshwater objectives (at or above national bottom lines) will apply at the scale of the management unit, rather than individually to each component part of that unit (i.e. not to every tributary individually).

14. Detailed case studies have been undertaken on the **economic impacts** of national bottom lines in Canterbury, Southland and Waikato. The modelling showed that economic growth, particularly conversion of land to dairying, could continue in these regions without breaching proposed national bottom lines if good management practice is applied. For the limited number of water bodies that do not currently meet national bottom lines, there will be costs associated with adjusting to bottom lines over time. There is one catchment in Canterbury where costs cannot be mitigated by good farm practices and some intensive land use proposals, including planned dairy conversions, may not go ahead unless significant capital is invested or new technologies developed.

15. The current National Policy Statement requires that "the overall quality of freshwater within a region is maintained or improved". This recognises that maintaining or improving all aspects of water quality within a region is not possible. The changes proposed to the National Policy Statement will not affect the requirement to maintain or improve overall water quality. Councils will continue to have the **flexibility** to trade-off water quality between waterways across a region, provided that national bottom lines are not breached.

16. Freshwater objectives are the goal conditions for the water body. Councils and **communities will choose timeframes** for meeting freshwater objectives. The National Policy Statement and guidance material will support and encourage long timeframes, to minimise immediate impacts on communities and incentivise innovation. Where a community is concerned about significant impacts of adjusting to national bottom lines they may approach central government to agree on a transitional period, during which the community may temporarily set their freshwater objective below bottom lines. Following any agreed transitional period, a plan would be required to set freshwater objectives that comply with national bottom lines.

17. Some freshwater management units will not meet national bottom lines, even in the long term, for example due to natural causes, the effects of historical activities, or existing infrastructure. We propose to consult on a mechanism to provide for **exceptions to national bottom lines** in narrowly defined situations.

18. New amendments will make it clear that **monitoring** of progress towards freshwater objectives need only be undertaken at a range of representative sites within each management unit as identified by regional councils. The NOF will also describe how attributes are to be measured, for example using an annual median (to account for seasonal and single event fluctuations).

19. We propose releasing a package of documents in late October 2013 with consultation open until early February 2014. Consultation will target both key stakeholders and the general public through a range of technical workshops, public meetings and hui across New Zealand.

20. This will be the first public exposure of the NOF and the proposed amendments to the National Policy Statement. For national bottom lines and the optional value of human health for swimming, this consultation will be the first time that the science and attribute states have been published and tested by the public.

21. We will report back to Cabinet in early 2014 to seek final agreement, taking account of the input received during consultation. At that time, we propose publishing more detailed information on the timeframes and deliverables for implementing freshwater reforms.

22. The Ministry for the Environment and Ministry for Primary Industries will need to partner with councils and communities to ensure the effective implementation of these reforms in the long term. We may seek additional funding through the 2014 Budget.

23. A scheduled review of the National Policy Statement in 2016 will provide an opportunity to consider the impacts of these proposals and further populate the NOF as the science develops.

Background

24. The proposals in this paper are part of a comprehensive package of freshwater reforms, including a new collaborative planning model, a NOF, and managing to quality and quantity limits.

25. In March 2013 the Government released *Freshwater reform 2013 and beyond* (the Freshwater Reform document), which sought feedback on freshwater reform proposals [CAB Min (13) 5/11 refers]. Stakeholders, including councils, iwi, the primary production sector, industry, and environmental and recreational NGOs were broadly supportive of the concepts in the Freshwater Reform document including freshwater accounting, a NOF, and national bottom lines for ecosystem health and human health.

26. The proposals in the Freshwater Reform document and in this paper are based on the recommendations of the Land and Water Forum. The NOF Reference Group (which includes members of the Land and Water Forum) has been further involved in developing the NOF. The Iwi Advisors Group and expert science panels have also worked on the proposals.

27. On 4 June 2013 Cabinet agreed to amend the RMA to clarify empowering provisions for the establishment of a NOF in the National Policy Statement [CAB Min (13) 18/8 refers]. The amendments to the RMA will provide certainty that the NOF can be implemented using the National Policy Statement. The

amendments to the RMA will also provide the collaborative planning process that is a key element of the freshwater reform package.

28. The freshwater reforms proposed in this paper align with the overall intent of reforms to the Resource Management Act 1991 to provide for more efficient planning and greater central government direction and guidance.

Status quo

29. The current National Policy Statement came into effect on 1 July 2011. It requires councils to amend regional plans as soon as reasonably possible before 31 December 2030 to implement the National Policy Statement. The 2030 timeframe enables councils, which are in different phases of their planning cycle, to implement the changes when they next review their regional plans (this must happen at least every ten years).

30. Currently the National Policy Statement requires councils to:

    a. maintain or improve the overall quality of fresh water within a region; and

    b. safeguard the life-supporting capacity of fresh water, ecosystem processes, and indigenous species including their associated ecosystems (ecosystem health).

    How councils give effect to these requirements currently varies significantly, for example in the Tukituki catchment Hawke's Bay Regional Council have proposed three different objectives for nitrate toxicity (90, 95 and 99 per cent species protection). A number of plans have no numeric objectives.

31. Once freshwater objectives have been set in regional plans, councils and communities have further discretion over the time period within which objectives need to be achieved as well as any adjustment timeframes. This allows for gradual regional change and may minimise economic impacts.

Issue with implementation

32. Under the current process councils may either be conservative in setting objectives or insufficiently define objectives, making them difficult to measure or achieve. Conservative objectives may lead to inefficient resource use, while a lack of defined objectives can result in investment uncertainty and management of water bodies through costly and litigious consent processes rather than clear plans. There is also regional duplication of the science behind freshwater objectives.

33. Under the status quo the Environment Court is likely to hear appeals against plans and (within scope of the appeal) decide what environmental state is to be achieved. Part of the function of the proposed NOF would be to assist councils to give effect to the National Policy Statement, thereby reducing the risk of plan changes being litigated unnecessarily.

34. A survey conducted in December 2012 asked regional councils about any difficulties they were having with interpreting and implementing the National Policy Statement. All councils cited difficulties with defining life supporting capacity. Half of all councils cited issues with capability and capacity with

regard to resourcing the technical investigations and science required to inform objective and limit setting.

Comment

35. The proposals in this paper support the implementation of the existing National Policy Statement by providing clear direction and simplifying planning processes for regional and unitary authorities.

36. We recommend consultation on the details of the following amendments to the National Policy Statement:

    a. a requirement to account for all water takes and sources of contaminants

    b. a National Objectives Framework (NOF) including a process and relevant considerations for its use in freshwater objective-setting

    c. a new objective to safeguard the health of people and communities as affected by their secondary contact with fresh water

    d. national bottom lines for compulsory values that describe the minimum acceptable state that should be achieved over time

    e. an exceptions mechanism, which includes narrow criteria for when exceptions from national bottom lines may be permitted.

    Each of these amendments is discussed in detail below.

37. Additional detail on the proposed amendments is contained in the documents attached to this paper:

    a. draft *Amendment of the National Policy Statement for Freshwater Management 2011: A discussion document* (Appendix 1)

    b. draft amendments to the National Policy Statement (Appendix 2)

    c. draft section 32 analysis (Appendix 3)

    d. draft Regulatory Impact Statement (Appendix 4).

Freshwater accounting

38. Good planning decisions require good information about how much fresh water is taken, the sources of relevant contaminants, and the extent to which those sources of contaminant contribute to water quality issues. Freshwater accounting provides information councils can use in setting objectives and limits and efficiently targeting their management of fresh water.

39. Accounting information is also important for resource users to identify catchments where there is capacity for increased resource use or intensification. Accounting also supports managing within limits, which will drive efficient use of fresh water. In time this will lead to improved reliability for water takes, increased investment certainty, reduced over-allocation, reduced conflict, easier monitoring and highest value use.

40. We propose to consult on amendments to the National Policy Statement to require councils to have a system in place to account for all water takes and sources of contaminants. A two year grace period will apply, after which

councils will be required to have an accounting system in place prior to developing regional plans. Where limits have been set, accounting information will be required annually for water quantity and five yearly for water quality.

41. Regional councils will determine the appropriate spatial scale for freshwater accounting within their region. Councils will group water bodies into management units, for example at the level of single or multiple catchments or sub catchments. The management unit applied for the purpose of accounting will be the same management unit to which objectives are applied.

42. The proposed freshwater accounting requirements will complement existing requirements on consent holders to measure and report significant takes under the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.

43. Most councils already account for water quantity and some have sophisticated systems in place. There is much less accounting for water quality. Councils that have adequate accounting systems in place already will not face additional costs while councils with no systems in place will incur additional one-off and on-going costs.

44. It is difficult to estimate potential costs to councils due to uncertainty about what would have been undertaken anyway under the current National Policy Statement. One-off costs relate to developing accounting infrastructure and methods, which depend on sophistication and catchment size. Top end costs are estimated at $22.1 million nationwide spread over sixteen regions and a number of years. The estimate assumes that sophisticated accounting systems will always be developed, whereas in practice the detail of accounting systems will vary depending on the significance of the water quality and quantity issues in each catchment. There will also be on-going costs relating to the operation and maintenance of freshwater accounting systems.

National Objectives Framework

45. The NOF is a decision support tool that will assist regional councils and communities to more transparently plan for freshwater objectives and limits.

46. The overall concept of a regulated NOF was set out in the Freshwater Reform document and received wide support. We propose to consult on the next level of detail with reference tables that provide:

    a. a set of national values and uses for which communities would consider managing (for example swimming).

    b. a set of attributes (for example *E. coli* concentration) that would need to be managed to provide for a value or use.

    c. for each attribute, a range of associated states (A, B, C, and D) that represent a range of environmental states. A region may choose to manage to attribute state A, B, or C depending on community aspirations.

    d. for each attribute, a numeric minimum acceptable state (bottom of state C). State D would not be acceptable because it represents a state that falls below what is required to provide for a value or use.

47. Councils will group water bodies into management units for the purpose of planning using the NOF. The scale of the unit chosen for planning will be the same as that used for the purpose of freshwater accounting. Councils and communities will be able to choose different objectives (at or above bottom lines) for different management units. A single objective can cover a management unit that spans multiple catchments, for example all alpine rivers. Objectives can also be applied to individual catchments or sub-catchments. For example, a council may choose to apply one set of objectives to the upper reaches of a river and another to the lower reaches.

48. Freshwater planning using the NOF will require an iterative approach that tests a range of possible objectives and means for their achievement, including alternative timeframes, so that the implications of proposed objectives are clear for councils and communities as part of the objective setting process.

Process for population of the NOF

49. A multi-stakeholder Reference Group has been engaged in the development and testing of the NOF, including the policy options and incorporation of underlying science. The NOF Reference Group incorporates a number of members from the Land and Water Forum including representatives from iwi, regional councils, the primary sector and non-governmental organisations. Work with scientific experts and the NOF Reference Group will continue in order to further populate later iterations of the NOF.

50. The proposed consultation will be on the first iteration of the NOF. This will establish the framework and populate it with a set of values and uses for rivers and lakes. The values and uses are set out in the draft amendments to the National Policy Statement attached as Appendix 1.

51. Of the values or uses currently set out in the NOF, three will also include associated attributes, states, and minimum acceptable states:

    a. Compulsory value: ecosystem health

    b. Compulsory value: human health for secondary contact (boating and wading)

    c. Optional value: human health for primary contact (swimming).

52. These are the values for which science is available and attributes have been tested sufficiently to be able to be provided and applied nationally. For attributes of water body types not populated in the NOF, councils may use information specific to those water body types. Reviews and updates of the NOF are proposed for 2016 and 2019 to include additional attributes and minimum acceptable states once further scientific work has been completed.

Te Mana o te Wai

53. The concept of Te Mana o te Wai (the Mana of the water) represents the innate relationship between te hauora o te wai (the health and mauri of water) and te hauora o te taiao (the health and mauri of the environment), and their ability to support each other, whilst sustaining te hauora o te tangata (the health and mauri of the people). The term Te Mana o te Wai is closely aligned with life-supporting capacity, ecosystem processes and the health of people and communities as expressed in the National Policy Statement.

54. The proposed drafting of the National Policy Statement includes a preamble that clearly articulates iwi values, particularly Te Mana o te Wai. The proposed drafting also reflects the relationship with Te Mana o te Wai and Mana Tangata through the values in the NOF tables.

55. Safeguarding Te Mana o te Wai could also be expressed as an objective of the National Policy Statement. A definition for Te Mana o te Wai would then also be needed.

56. Although we are not currently proposing the new objective this is the start of a discussion on how best to incorporate Te Mana o te Wai. This discussion will occur in parallel with public consultation. We propose to consult on the drafting through *Amendment of the National Policy Statement for Freshwater Management 2011: A discussion document.* The text proposed for consultation is attached as Appendix 5.

Addition of human health

57. The Land and Water Forum proposed amendments to the National Policy Statement to add human health as a compulsory value. We worked with the NOF Reference Group to add an objective and compulsory value to safeguard the health of people and communities as affected by their secondary contact with fresh water (wading or boating but not swimming).

58. Primary contact recreation is not proposed as a compulsory national value as not every water body is valued for swimming and applying the value nationwide would come at great cost. However, councils and communities are in no way restricted and may still choose to manage particular places for swimming.

59. Pathogens are one of the biggest concerns for human health where fresh water is concerned. In their second report, the Land and Water Forum recommended making it explicit that pathogens should be managed and councils provided with clear direction on how to do so.

60. In prescribing national bottom lines for human health the NOF would provide a number of benefits to the planning process, including consistency on the minimum acceptable states required of fresh water, reduced litigation of plans, and reduced costs. Over time there will also be social benefits from safe recreational use and the reduced risk of infection caused by secondary contact with fresh water.

61. The proposal to include human health as a compulsory value was discussed in the Freshwater Reform document and was widely supported by the public, NGOs, and councils. There is also support amongst the primary production sector for a compulsory human health value. In our view this will be important for the credibility of our primary products and access to international markets.

National bottom lines

62. We recommend national bottom lines for both ecosystem health and human health. We propose to consult on numeric bottom lines including:

    a. ecosystem health, to provide for an eighty per cent species protection level (nitrate and ammonia toxicity starts impacting regularly on the twenty percent most sensitive species).

b. human health, to provide for a moderate to low risk of infection (five per cent) from exposure to water through secondary contact.

This will provide scientifically robust numerical states that are applied nationally. This is preferable to the status quo where numeric objectives are set inconsistently across regions or by the Courts.

63. The proposed national bottom lines are those proposed by the NOF Reference Group and informed by expert science panels. Where to set national bottom lines is a value judgement; however, the bottom lines reflect the consensus reached by the scientific experts involved. The national bottom lines are proposed at a level that will ensure freshwater bodies support resilient ecosystems and present only a five per cent risk to human health when used for wading or boating (except boating where there is a high chance of immersion). The bottom lines proposed are scientifically robust and environmentally sound.

64. In most cases regional councils or a collaborative planning group will choose to set objectives higher than national bottom lines. This is because the current state of most water bodies is better than the proposed national bottom lines. Councils will likely choose to maintain water quality at a higher state or aspire to higher water quality.

65. For the minority of water bodies below a national bottom line, regional councils will need to (consistent with the existing requirements of the National Policy Statement):

    a. Set a freshwater objective (i.e. a goal or state that the community aims to achieve) in their regional plan at or above the national bottom line. For example an objective for a lake may be set at no more that 1000 *E. coli* per hundred millilitres of fresh water.

    b. Set an initial limit. For example, a limit that reflects and caps the existing resource uses which contribute to *E. coli* concentrations.

    c. Set a target limit (based on national bottom lines) and associated timeframes for resource users to adjust from the initial limit to the target limit, that will eventually get the water body to the desired objective.

    d. Decide on a management regime (usually a mix of regulatory and non-regulatory methods) at the least cost to meet limits and the objective. The management options may be wide and will be specific to the catchment.

66. Setting limits based on national bottom lines will drive efficiency in the way fresh water is used and identify any capacity for further use of freshwater within the limits set.

Flexibility

67. Councils and communities will choose their own timeframes for adjusting to and meeting objectives. Flexible timeframes for meeting objectives will enable improvement over a period that is acceptable to communities and minimise the impacts of change. The Ministry for the Environment and Ministry for Primary Industries will partner with councils to provide support and guidance on the timeframes for meeting objectives.

68. Alternatively, if a community is concerned about the potential for significant impacts due to the adjustment required to meet a national bottom line, they may approach central government to agree on a transitional period. During a transitional period the community may temporarily set a freshwater objective below national bottom lines. Following any agreed transitional period, a new plan would be required to set freshwater objectives that comply with national bottom lines. The length of any transitional period and the area to which it applies would be decided on a case by case basis following the discussion with central government. During any transitional period the requirement to maintain or improve overall water quality within a region will still apply.

69. The current National Policy Statement requires that "the overall quality of freshwater within a region is maintained or improved". This recognises that maintaining or improving all aspects of water quality everywhere is not possible. The changes proposed to the National Policy Statement will not affect the requirement to maintain or improve overall water quality. Councils will continue to have the flexibility to trade-off water quality between waterways across a region.

70. We propose an amendment to the National Policy Statement to provide an approach for the monitoring of progress against freshwater objectives and limits (including bottom lines) over time. The new requirement will make it clear that monitoring progress toward objectives need only be undertaken at representative sites within each catchment as identified by regional councils. The result will be practical and affordable monitoring regimes implemented by councils. The proposed NOF also describes how attributes are to be measured (for example an annual median for nitrate toxicity).

71. Feedback on the Freshwater Reform document indicated broad support for national bottom lines. Where exactly the national bottom lines are set is likely to generate debate. However, the proposed consultation on the NOF will enable this debate to occur once at a national level rather than being duplicated on a region by region basis.

72. Councils must implement the National Policy Statement by setting objectives and limits in regional plans by 31 December 2030. The long timeframe for setting objectives enables councils to implement the changes when they next review their regional plans.

73. Once objectives have been set in regional plans, councils will have further discretion over the time period within which objectives will be achieved. Where management measures or land use practices need to change this may be done over a long adjustment timeframe, spreading costs and ensuring a gradual, regional adjustment.

Impacts of national bottom lines

74. Detailed work has been done on the impacts of national bottom lines, including:

    a. the economic impact of national bottom lines in regional case studies (summarised in Appendix 6)

    b. the number of water bodies currently below the proposed national bottom lines (summarised in Appendix 7).

75. Economic impact studies have been carried out in Southland, Canterbury and Upper Waikato. These regional studies provide valuable information on the likely impacts in a given catchment. The three regions were selected because they:

    a. face challenges with water quality

    b. are at an appropriate stage of developing regional plan changes

    c. have significant dairy expansion underway

    d. are likely to be the most impacted by proposed national bottom lines.

76. The **Southland** study provides information on the impact of national bottom lines for both ecosystem health and human health through the attributes of periphyton (slime), nitrate toxicity and microbial contamination (*E. coli*) in rivers. The study evaluated the potential impacts on the agricultural sector, the municipal and industrial sectors and on non-market values. For agriculture, the Southland study tested various scenarios against a 2037 baseline of forecast growth in total agricultural production and in dairying, without action to reduce nutrient leaching. Results of the Southland study indicate:

    a. The proposed national bottom lines for ecosystem health in rivers that were tested in Southland do not impose costs. Water quality will be maintained above bottom lines for periphyton (slime) and nitrate toxicity under all scenarios tested (including scenarios that expand dairying).

    b. The status quo requires councils to maintain or improve overall water quality for their regions. Maintained or improved water quality would be achieved under all scenarios tested. Dairy growth can be achieved while maintaining or improving water quality.

    c. The proposed national bottom line for human health in rivers (5 per cent or greater risk of infection during secondary contact recreation) is breached at seven per cent of the monitoring sites tested for E. coli. In Southland mitigation measures only on dairy farms will not be sufficient to ensure the *E. coli* national bottom line is met. However, fencing of waterways on surrounding sheep and beef farms as well as on dairy farms, would address *E. coli*. The majority of costs for this mitigation would be met by sheep and beef farms, as most dairy farms already have fencing in place.

77. In **Canterbury**, the Hinds and Selwyn-Waihora zones were studied. The proposed human health national bottom line is currently met in both zones. However, a number of water bodies in Hinds currently fall below the nitrate toxicity national bottom line for ecosystem health.

78. The Hinds zone contains the most significant breaches of the nitrate toxicity bottom line in the country and has four out of six of the monitored sites in New Zealand that currently breach the proposed threshold. Meeting national bottom lines in Hinds will require a 45 percent reduction in nitrate leaching after the expansion of irrigation in the zone and dilution through the release of water from alpine rivers into the catchment. The additional cost of the proposed national bottom line in the Hinds zone is estimated to ultimately be $22 million per annum or 7 percent of the zone's projected agricultural net income. This is based on a policy of nutrient trading. Less efficient policies would increase the

cost. On farm mitigation is insufficient to meet the restrictions imposed by the proposed bottom line threshold; these restrictions would likely drive land use change with some of the anticipated dairy conversion not proceeding.

79. In Selwyn-Waihora current plan proposals are consistent with meeting nitrate toxicity national bottom lines.

80. The impacts of national bottom lines in the **Upper Waikato** catchment will be minimal. In the Upper Waikato the proposed bottom lines for ecosystem health are already being met. The national bottom line for *E. coli* (human health) is currently met in all but one monitored site in the Upper Waikato. The current objective in the National Policy Statement to maintain or improve overall water quality will have greater impacts than the proposed national bottom lines. It is estimated that maintaining or improving overall water quality in the catchment could cost up to $71 million per annum in reduced operating surplus, depending on ground water lags.

81. The current objectives in the Waikato River Vision and Strategy (including swimability and mahinga kai) will also likely be more stringent than national bottom lines for the region. The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 states at section 12(1)(a) that the Vision and Strategy prevails over any inconsistent provision in a national policy statement.

Exceptions to national bottom lines

82. We propose to consult on a mechanism to provide for exceptions to national bottom lines on the following grounds:

    a. where a water body is contaminated from natural processes, such as where a native bird colony leads to *E. coli* levels that breach national bottom lines

    b. where historical activities have created impacts and the reversal of those impacts is not reasonably practicable, either physically or ecologically, even in the long term

    c. where the effects of significant existing infrastructure means bottom lines will unlikely be met.

83. Many communities will choose to set long adjustment timeframes to meet their freshwater objectives. Exceptions will not be needed for water quality issues where a community wants to achieve bottom line objectives but sets long adjustment timeframes and faces uncertainty regarding the path towards achieving those objectives. Exceptions will only be needed in limited situations where there is no intention to ever meet bottom lines.

84. For exceptions on the grounds of natural state or irreversible historical impacts (a. and b. above) decision-making criteria are specified in the proposed amendments to the National Policy Statement. Decisions on whether to allow an exception under natural or historical grounds will be initiated through the council plan development process, using either Schedule 1 of the RMA or the new collaborative process agreed by Cabinet [CAB Min (13) 18/8 refers].

85. The normal checks and balances of the planning system will apply to exceptions under natural or historical grounds including, submissions, hearings, council decisions, and possible Environment Court appeals or appeals to the

High Court on points of law. The Minister for the Environment may also call in a plan change and refer it to the board of inquiry or the Environment Court where the plan change is determined to be a matter of national significance.

86. We also propose exceptions for fresh water affected by significant existing infrastructure by specifically identifying situations in an appendix of the National Policy Statement. Such exceptions will likely apply in catchments modified by hydroelectricity generation or drinking water dams, for example where flows are significantly reduced or stopped. Decision-making for these exceptions should be transparent and at a national level reflecting the significance of the situations and the judgements and trade-offs involved.

87. Officials would work with councils to identify potential exceptions for fresh water affected by significant existing infrastructure. The process to populate the appendix of these exceptions would be combined with the review of the National Policy Statement proposed for 2016.

88. We propose to consult on the concept of an appendix with specific exceptions to be added using the following criteria:

    a. the need for an exception must arise because of limited efficient or effective management options as a result of significant existing infrastructure;

    b. the significant existing infrastructure affecting the water body must enable economic benefits that have a significant impact on national or regional GDP; and

    c. the economic benefits can only be realised if the objectives for the water body are set below bottom lines (i.e. setting a long term objective at or above bottom lines will not provide the same or similar economic benefit).

89. Other relevant considerations may include:

    a. whether the analysis and evidence provided on economic benefits is rigorous and exhaustive

    b. the extent of any environmental, social or cultural effects anticipated as a result of the exception

    c. the degree of consensus among stakeholders, the community and iwi over the need for an exception

    d. any other consideration that is deemed relevant in the situation.

90. Feedback on the Freshwater Reform document was varied with regard to exceptions. There was some opposition to any exceptions, calls for exceptions for natural conditions, and arguments for allowing exceptions in catchments modified by hydro-generation.

91. The second report of the Land and Water Forum acknowledged the need for exceptions to national bottom lines in certain circumstances.

Implementation

92. Further work will be undertaken to provide councils and practitioners with guidance materials and tools to assist them in effectively implementing the amended National Policy Statement.

93. The amended National Policy Statement and associated implementation guidance are only part of the broader reform package. A number of additional non-regulatory tools are proposed or in development to support the amended National Policy Statement. The Ministry for the Environment and Ministry for Primary Industries intend to partner with councils to help build planning capability as well as the scientific, economic, and collaborative expertise that underpin good planning.

94. Engagement between central and local government early in the planning process will be encouraged. These discussions will identify any expertise or funding required for planning and will be an opportunity to discuss the timeframes involved in meeting objectives.

95. In April 2013 [CAB Min (13)10/15] Cabinet agreed in principle to a public release in September or October 2013 of detailed timeframes and deliverables for implementing water reforms. We propose to defer the release of this detailed information to align timing with final promulgation of the amended National Policy Statement. This information we propose to release at that time will set out for the public and stakeholders the detail of timing and deliverables for the implementation of freshwater reforms. It will also lay out the timeframe for addressing remaining freshwater policy issues.

96. A range of intervention options are available to Ministers in the unlikely event that a situation arises where a council does not carry out duties under the National Policy Statement and RMA in a satisfactory manner:

    a. ministerial consultation and submissions on plan changes (1, clause 3 and 6 of the RMA)

    b. ministerial power to investigate the performance by a local authority of any of its duties under the RMA (section 24A of the RMA)

    c. ministerial power to direct a review of a regional plan (section 25B of the RMA)

    d. for matters of national significance under Part 6AA of the RMA, ministerial power to appoint project coordinators or commissioners to assist the council or a hearing panel (section 149ZA of the RMA).

97. The proposed reforms of the RMA include a ministerial power to direct councils to redo part of a plan if it does not meet the requirements of the RMA.

Consultation

98. The following departments and agencies have been consulted on this paper and their views are reflected: 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 and Ministry of Justice. The Department of Prime Minister and Cabinet was informed.

99. Early policy proposals were driven by the Land and Water Forum and more recently the NOF Reference Group has been used to test policy proposals from a stakeholder perspective.

100. At the time of lodging this paper, we were awaiting a formal response from the Freshwater Iwi Leaders Group. We will update Cabinet orally on the views of the Freshwater Iwi Leaders Group.

Financial implications

101. The proposals in this paper have financial implications for the Ministry for the Environment and Ministry for Primary Industries. Current resourcing will enable the provision of limited guidance and targeted modelling and science to support council implementation of the National Policy Statement. There is an opportunity to put a science and evidence base in place, build capacity across councils and the science sector, and populate the NOF more fully. However, to do so would require significant additional resourcing. We are investigating opportunities and may seek funds through the 2014 Budget process.

102. There will be financial implications for regional councils and other stakeholders associated with consultation and planning. However, regional planning is a regular process and it is expected that the proposals in this paper will reduce costs for the scientific analysis and litigation that often accompany planning.

103. There will be costs to councils for the development of accounting infrastructure and methods. These costs have been estimated at up to $22.1 million nationwide. These costs will be spread between regions during the two year grace period for developing accounting systems. There are also likely to be on-going costs for maintaining freshwater accounting systems, estimated at between $0.6m and $0.8m per annum in each region. Costs to regional councils are likely to be passed on to ratepayers and water consent holders.

104. The impacts of national bottom lines in the National Policy Statement (for example on the productivity of the primary sector) are discussed in the commentary on national bottom lines above.

Human rights

105. The proposals contained in this Cabinet paper are consistent with the New Zealand Bill of Rights Act 1990 and the Human Rights Act 1993.

Legislative implications

106. This paper has legislative implications as it proposes to consult on amendments to the National Policy Statement, which is a deemed regulation for the purposes of the Regulations (Disallowance) Act 1989. We propose to report back to Cabinet in February 2014 for final decisions.

107. Section 17(3) of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 requires consideration of the Vision and Strategy for the Waikato River when carrying out functions under the RMA, including consulting on a proposed National Policy Statement. The Vision and Strategy applies to the catchments of the Waikato and Waipaa rivers, whereas the National Policy Statement applies throughout New Zealand. The Vision and Strategy includes

policies and strategies that aim to improve freshwater quality to a greater extent than the National Policy Statement. For example, the Vision and Strategy includes an objective to provide for swimming and food gathering for the entire length of the Waikato River. This reflects the importance of the Waikato River to the five iwi in the region.

108. The inconsistency between the National Policy Statement and Vision and Strategy is not problematic. The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 states, at section 12, that the Vision and Strategy prevails over any inconsistent provision in a national policy statement.

Regulatory impact analysis

Regulatory Impact Analysis requirements

109. The regulatory impact analysis requirements apply to the proposed policy. A regulatory impact statement (RIS) is not required at this stage as no regulatory changes are proposed before the completion of another public consultation process. However, a draft RIS has been prepared to help inform the public consultation process and is attached to this paper as Appendix 4. The discussion document (Appendix 1) and section 32 analysis required under the RMA (Appendix 3) provide further analysis.

110. It is intended that the information in the attached consultation RIS will be further informed and tested by public consultation. A final RIS will be prepared incorporating further analysis following the outcome of the public consultation before any final decisions are sought from Cabinet.

Publicity

111. The RMA requires public consultation to be undertaken on the proposed amendments to the National Policy Statement. We propose the use of the alternative consultation process in section 46A(1)(b) of the RMA. This process does not involve a board of inquiry and will be administered by the Ministry for the Environment.

112. There is likely to be a high degree of public interest in these proposals. This is the first time a NOF and numeric states will have been tested publically. The proposed consultation will enable debate to occur once at a national level and will help to reduce debate on a region by region basis during planning.

113. Given the role of the Land and Water Forum and Iwi Leaders Group in shaping the proposals in this paper, we propose to seek their feedback prior to the launch of formal consultation.

114. We will issue a media release in late October 2013 announcing the proposed amendments to the National Policy Statement and the consultation process.

115. We also propose to release the following Consultation Package:

    a. draft *Amendment of the National Policy Statement for Freshwater Management 2011: A discussion document* (Appendix 1)

    b. draft amendments to the National Policy Statement (Appendix 2)

    c. draft section 32 analysis (Appendix 3)

d. draft Regulatory Impact Statement (Appendix 4)

e. this Cabinet paper (subject to any withholds under the Official Information Act 1982).

116. We also propose to release the scientific and economic work underpinning the amendments to the National Policy Statement as well as ongoing work to populate the attributes of the NOF. This information will provide useful technical guidance and background on the proposals. This information will be released in a format and at a time determined by the Minister for the Environment and Minister for Primary Industries.

117. We propose a role for the NOF Reference Group and scientific panels during and after the consultation period. These groups will be able to support the analysis of submissions and will also be asked to participate in discussions at the technical workshops, hui and public meetings.

Recommendations

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

Background

1. note the proposals in this paper are part of a comprehensive package of freshwater reforms including a new collaborative planning model, a National Objectives Framework, and managing to quality and quantity limits
2. note that in December 2012 Cabinet agreed to [CAB Min (12) 44/6 refers] a freshwater reform discussion document in 2013 including the following proposals:
    2.1. a regulated National Objectives Framework to support regional objective setting that reflects the values of iwi/Māori, communities and resource users
    2.2. setting a limited number of national bottom lines
    2.3. managing to water quantity and quality limits, improvements to freshwater accounting, the provision of guidance and the development of good practice toolkits for priority sectors
3. note that in March 2013 the government released *Freshwater reform: 2013 and beyond* which sought feedback on its freshwater reform proposals [CAB Min (13) 5/11 refers]
4. note that on 4 June 2013 Cabinet agreed to amend the Resource Management Act 1991 to empower the establishment of a National Objectives Framework in the National Policy Statement for Freshwater Management 2011 [CAB Min (13) 18/8 refers]

Status quo

5. note that the National Policy Statement for Freshwater Management 2011 currently requires councils to amend plans by 31 December 2030 to:
    5.1. maintain or improve the overall quality of fresh water in a region
    5.2. safeguard life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of freshwater
6. note there is currently minimal national direction on how councils should go about setting objectives and limits in plans, which has led to different approaches from region to region and inefficiencies due to duplication of the science underpinning limits, and unnecessary litigation

Freshwater accounting

7. agree to consult on proposed amendments to the National Policy Statement for Freshwater Management 2011 including:
    7.1. a requirement for councils to account for all water takes and for all sources of relevant contaminants

7.2. a timeframe for complying with this requirement, with a grace period of two years from promulgation, after which councils will be required to have a system in place prior to setting objectives and limits in plans under the amended National Policy Statement for Freshwater Management 2011

7.3. a requirement that where limits have been set, consolidated accounting information will be available annually for water quantity and five yearly for water quality

Progressing a National Objectives Framework and national bottom lines

8. note that a National Objectives Framework would provide national direction and support for identifying values and setting freshwater objectives while allowing regions to choose management approaches and timeframes

9. note that the Land and Water Forum supports the introduction of a National Objectives Framework

10. note that in the absence of national bottom lines in a National Objectives Framework, regional councils (and ultimately the Courts) will set bottom lines, involving duplication of science, litigation and investment uncertainty

11. agree to public consultation on the details of proposed amendments to the National Policy Statement for Freshwater Management 2011, including:

    11.1. a National Objectives Framework with reference tables that provide an array of values and uses for which communities may consider managing water bodies and for each value or use, a set of attributes and associated states that indicate the level to which that value or use is met

    11.2. a process for use of the National Objectives Framework in objective-setting by councils and collaborative groups

    11.3. a new objective to safeguard the health of people and communities as affected by their secondary contact with fresh water

    11.4. numeric national bottom lines for ecosystem health and human health for secondary contact that need to be met over time

    11.5. an exceptions regime that allows freshwater objectives to be set below national bottom lines in limited circumstances

12. note that the National Objectives Framework proposed for consultation contains numeric attributes and states where the science is robust and is applicable nationwide

13. note that scientific work will continue so that updated versions of the National Objectives Framework can be introduced in future (a review in 2016 is already agreed in the National Policy Statement and further updates are expected in 2019)

14. agree to consult on national bottom lines for the compulsory values of ecosystem health and human health for secondary contact

Te Mana o te Wai

15. agree to consult on the objective in the National Policy Statement for Freshwater Management 2011 to reflect the concept of Te Mana o te Wai

Flexibility

16. note that councils will group water bodies into management units for the purposes of freshwater accounting and planning and that objectives will apply at the scale of the management unit, rather than individually to each water body

17. note that national bottom lines are not standards to be met immediately; councils will set long term objectives to enable improvement over a period of time that is acceptable to communities

18. agree that where a community has concerns about significant impacts as a result of adjusting to national bottom lines, they may approach central government to seek a transitional arrangement, during which a freshwater objective may temporarily be set below a national bottom line for an agreed period

19. note that the current requirement that "the overall quality of freshwater within a region is maintained or improved" will not be affected by the proposed amendments and councils will continue to have the flexibility to trade-off water quality between waterways across a region

20. agree to consult on a new objective in the National Policy Statement for Freshwater Management 2011 to provide an approach for the monitoring of progress towards freshwater objectives, including:

    20.1. requiring regional councils to identify a range of monitoring sites that are representative of water bodies within a region

    20.2. recognising the importance of long-term trends in monitoring results

Exceptions to national bottom lines

21. agree to consult on criteria for councils to apply in deciding when to allow exceptions to national bottom lines on the following grounds:

    21.1. where a water body is contaminated from natural processes, such as where a native bird colony causes an *E. coli* state that breaches national bottom lines

    21.2. where historical activities have created impacts and the reversal of those impacts is not reasonably practicable, either physically or ecologically, even in the long term

22. agree to consult on the concept of an appendix to the National Policy Statement for Freshwater Management 2011 for exceptions where the effects of significant existing infrastructure mean bottom lines will unlikely be met

23. agree to consult on the following criteria to guide the population of an appendix of specific exceptions:

23.1. the need for an exception must arise because of limited efficient or effective management options for significant existing infrastructure;

23.2. the significant existing infrastructure affecting the water body must enable economic benefits that have a significant impact on national or regional GDP; and

23.3. the economic benefits can only be realised if the objectives for the water body are set below bottom lines (i.e. setting a long term objective at or above bottom lines will not provide the same or similar economic benefit)

24. agree that the initial process to populate the appendix of exceptions be combined with the review of the National Policy Statement for Freshwater Management 2011 proposed for 2016

Financial implications

25. note that the cost to the Crown of implementing these reforms has been budgeted within existing baselines but that further funds may be sought through the Budget process

26. note the economic studies that have been undertaken in Southland, Canterbury and Waikato on the impacts of national bottom lines and that in some catchments costs will be minimal while in others they will be significant

27. note that costs of developing and implementing the amended National Policy Statement for Freshwater Management 2011 are outweighed by the benefits to regional councils and communities, namely through greater scientific and technical certainty, more consistent planning outcomes, less litigation, increased investment certainty, and improved outcomes for freshwater management

Communication and consultation

28. note that the Minister for the Environment intends to follow the alternative consultation process in section 46A(1)(b) of the Resource Management Act 1991

29. agree that feedback on the proposed amendments to the National Policy Statement for Freshwater Management 2011 be sought from the Land and Water Forum and the Iwi Leaders Group prior to the release of the consultation documents

30. agree to release the following documents via a media release and on the Ministry for the Environment and Ministry for Primary Industries websites:

30.1. *Amendment of the National Policy Statement for Freshwater Management 2011: A discussion document* (Appendix 1)

30.2. draft amendments to the National Policy Statement for Freshwater Management 2011 (Appendix 2)

30.3. section 32 analysis (Appendix 3)

30.4. this Cabinet paper (subject to any withholds under the Official Information Act 1982)

30.5. draft Regulatory Impact Statement (Appendix 4)

31. agree to release the scientific and economic work underpinning the amendments to the National Policy Statement for Freshwater Management 2011 as well as ongoing work to populate the attributes of the National Objective Framework

32. agree that the Minister for the Environment and Minister for Primary Industries may approve further changes to the discussion document, draft amendments to the National Policy Statement for Freshwater Management 2011, and section 32 analysis as is necessary prior to release

33. agree that public meetings, hui and technical workshops be held to discuss the proposed amendments to the National Policy Statement

34. agree that the National Objectives Framework Reference Group and scientific panels be invited to support officials with consultation, including participation in technical workshops, hui and public meetings

35. agree to defer the release of a *Blueprint for Implementing Freshwater Reform*, including detailed timings and deliverables to align with promulgation of the amended National Policy Statement for Freshwater Management 2011

Final decisions

36. invite the Minister for the Environment and the Minister for Primary Industries to report back to Cabinet for final decisions on amendments to the National Policy Statement for Freshwater Management 2011

_____

Hon Amy Adams
Minister for the Environment
_____/_____/_____

_____

Hon Nathan Guy
Minister for Primary Industries
_____/_____/_____

Appendix 1: Draft Amendment of the National Policy Statement for Freshwater Management 2011: A discussion document

Appendix 2: Draft amendments to the National Policy Statement

Appendix 3: Draft section 32 analysis

Appendix 4: Draft Regulatory Impact Statement

AVAILABLE ON WEBSITE

Appendix 5: Additional drafting of the National Policy Statement proposed for consultation

Appendix 6: Overviews of the impacts of national bottom lines in Southland and Canterbury

Appendix 7: Overview of freshwater bodies currently below national bottom lines

Appendix 5: Additional drafting of the National Policy Statement proposed for consultation

Iwi Advisors have made the following recommendations for the amended National Policy Statement. The changes proposed to the National Policy Statement are underlined below.

1. Inclusion of Te Mana o te Wai in Objective A1

Objective A1

To safeguard:

a. Te Mana o te Wai;

b. the life-supporting capacity, ecosystem processes and indigenous species, including their associated ecosystems, of fresh water; and

c. the health of people and communities as affected by their contact with fresh water;

in sustainably managing the use and development of land, and of discharges of contaminants.

2. Definition of Te Mana o te Wai

"Te Mana o te Wai" represents the innate relationship between te hauora o te wai (the health and mauri of water) and te hauora o te taiao (the health and mauri of the environment), and their ability to support each other, whilst sustaining te hauora o te tangata (the health and mauri of the people).

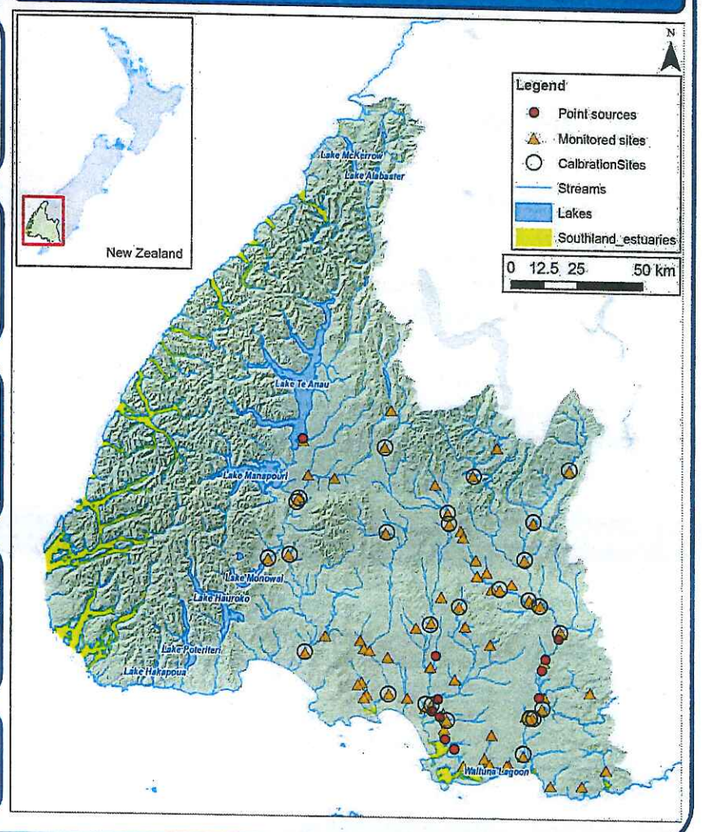
Appendix 6

Overview of the potential economic and environmental impacts of proposed bottom lines for ecosystem heath and human health in Southland

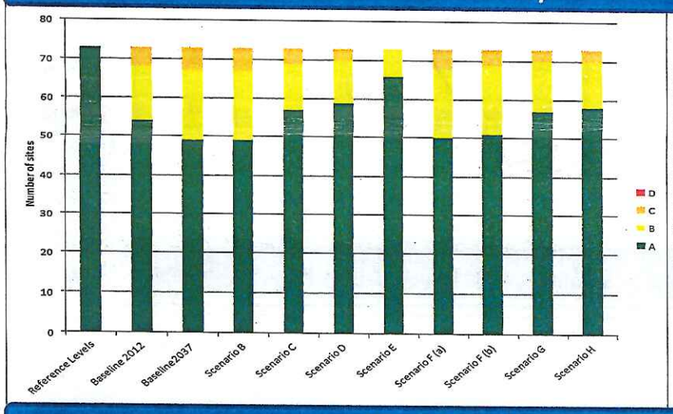
Why Southland?

1. **Southland was chosen as a study area because:**
   - The region faces issues with water quality and the economy is likely to be impacted by proposed national bottom lines.
   - Regional council was at an early stage of developing regional plan changes which include the expansion of dairying.
2. **Environment Southland (ES) has set a phased plan for implementing the National Policy Statement** with interim limits to be developed by 2015 and plan changes to be developed by 2023. The interim plan change is to maintain existing water quality and achieve a 10% improvement in degraded areas by 2020.
3. **ES monitors 73 rivers and streams** across the region to assess the state of freshwater quality. ES also regularly monitors indicators of water quality in Lake Te Anau, Lake Manapouri and Waituna Lagoon estuary. Lakes are surrounded by conservation sites and are generally elevated resulting in relatively good water quality.
4. **Agricultural sectors are key to Southland's economy**, with high employment, export focus and value added contributions. Agriculture contributed 14% ($490m) to Southland's value added in 2011. There is a notable trend of conversion from livestock farming to dairying in the region.
5. **Economic activities with high water abstraction, discharge and nutrient loadings** are closely aligned to the economic future of the Southland region.

73 State of the Environment River Sites



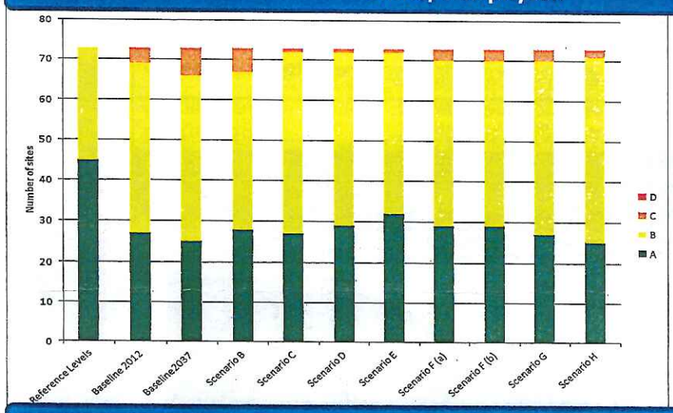
Nitrate Toxicity



Currently 5 sites are in the C band. Increases to 6 sites under 2037 baseline.

Scenarios C, D and E maintain or improve water quality outcomes compared to 2012 baseline.

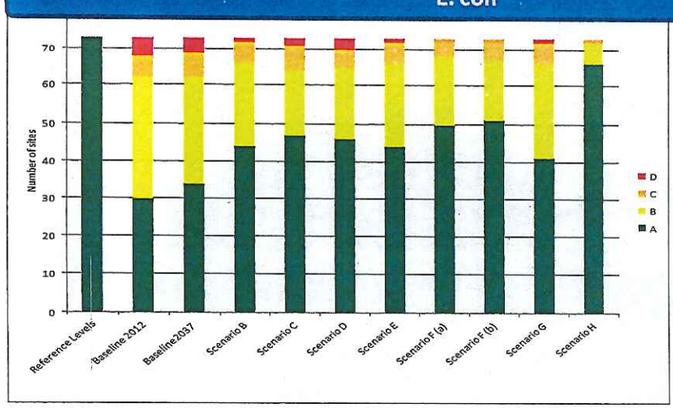
Slime/ Periphyton



Currently 4 sites are in the C band. Increases to 7 sites under 2037 baseline.

Some scenarios maintain or improve water quality outcomes compared to 2012 baseline.

E. coli



Currently 5 sites are in the D band. Reduces to 4 sites under 2037 baseline.

Scenario H results in a large improvement in *E. coli* as mitigation is mandated across all farm types.

Key Findings

Proposed bottom lines for ecosystem health and human health can be achieved in Southland at a low or no cost to agriculture. Headroom for economic growth could be provided whilst maintaining and improving water quality.

1. **Ecosystem health:** Southland rivers currently meet the proposed national bottom line for periphyton (slime) and median nitrate toxicity under all scenarios – proposed national bottom lines for ecosystem health do not impose costs.
2. **Human health:** 7% of monitored sites currently fail the proposed *E. coli* bottom line. Mitigation measures only on dairy farms will not be sufficient to ensure the *E. coli* bottom line is met. However, fencing of waterways on surrounding sheep and beef farms, as well as on dairy farms, would address *E.coli*. The majority of the costs would be met by sheep and beef farms, as most dairy farms already have fencing in place.
3. **Dairy growth and profitability** can be achieved with the least stringent uniform discharge caps (scenario B) and non-uniform caps (scenario F) while maintaining or improving water quality overall. These are the most cost effective scenarios as they deliver mitigation at a low or no cost to agricultural production and a gain in aggregate gross margin.
4. **The most cost effective scenario** tested is the non-uniform caps where all farms adopt stock exclusion, improved nutrient management and improved animal productivity (scenario 17). This results in an overall gain of $180m per year in aggregate farmer gross margin ($130/kg N) while improving water quality and meeting proposed bottom lines for ecosystem health and human health. However, there is a cost to meet the *E. coli* bottom line, which is hidden in the overall benefit of mitigation bundles. The impact on non-market values is unknown but is likely to be positive.
5. **Maintained or improved water quality** is achieved under all scenarios (scenarios B-H), with some allowing for dairy growth. The most stringent uniform discharge caps (scenario E) result in the largest improvements in periphyton and median nitrate toxicity relative to the 2012 baseline, improvements in *E. coli* levels and benefits to non-market values. However, dairying would no longer be viable.
6. **Headroom for economic growth:** Best management practices that drive efficiency gains can incentivise more efficient resource use and production. This could provide headroom to expand and grow sectors that require discharges, while maintaining or improving water quality.

Impact of Bottom Lines on Agriculture in Canterbury

Background & Approach

Current State of Nitrate Toxicity

The Canterbury study evaluates the impacts of meeting proposed bottom lines in two zones; Selwyn-Waihora and Hinds.

The costs of meeting the nitrate toxicity bottom line was modelled through a combination of catchment mitigations under a variety of policies.

1 Current State of Freshwater

Human Health: Rivers and lakes in Canterbury currently meet the proposed national bottom lines for E.coli.

Ecological Health: A number of water bodies in Hinds currently fall below the national bottom lines for nitrate toxicity.

2 Mitigation Bundles

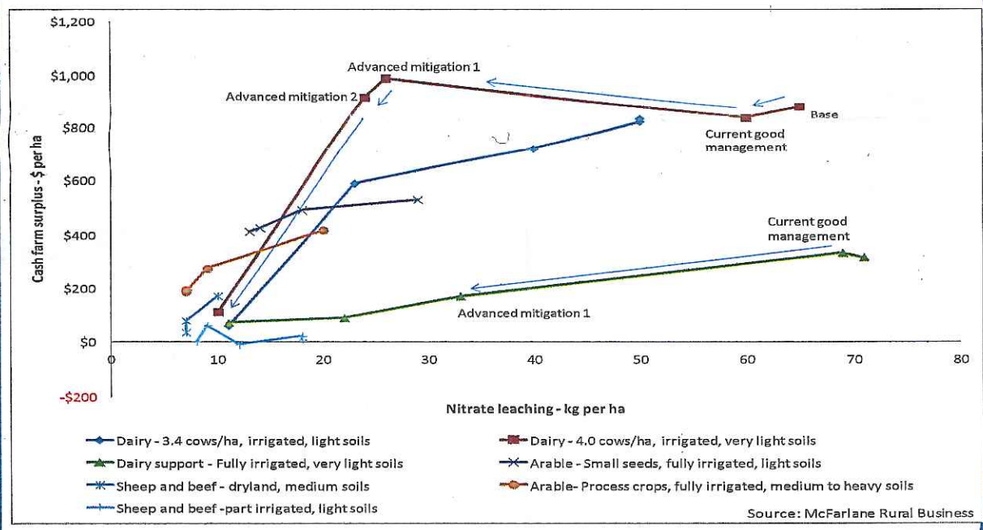
Bundle "name"	Activities
Current Good Management	Nutrient budgeting, effluent management compliance, exclude stock from water ways
Advanced mitigation 1 (management changes)	Variable rate irrigation on existing pivot irrigators, variable rate fertiliser application, soil moisture monitoring, nitrification inhibitors (DCD)
Advanced mitigation 2 (capital investment)	Upgrading boarder dyke and rotorainer irrigators to pivots, winter stock on feed pads with effluent systems
Advanced mitigation 3 (system change)	Reduce stocking rates and fertiliser inputs, wintering in barns with cut and carry feeding.

3 Policy Scenarios

1. Complete uptake of mitigation practices.
2. Allocating nutrient discharge allowances via grandparenting *with trading*.
3. Equal cap without trading (as modelled in Southland).

Impacts

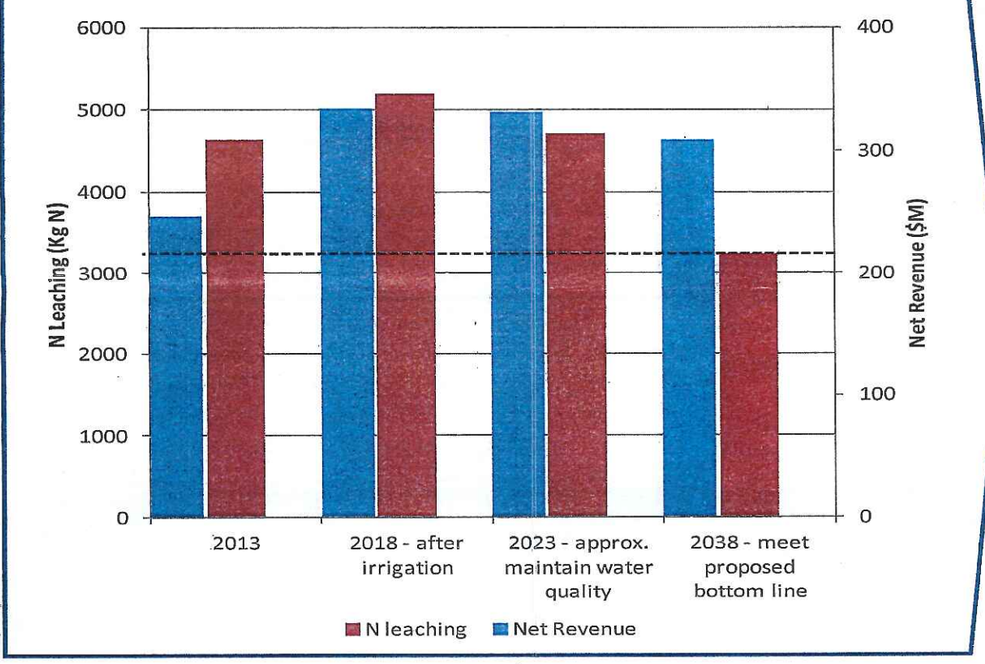
Preliminary Farm-Level Costs of Mitigating Nutrient Discharges



Key Findings

1. **Nutrient Discharge:** agriculture is the dominant source of nutrient discharges in Selwyn-Waihora and Hinds, particularly where irrigation washes nutrients through the soil.
2. **Mitigation potential:** is high via irrigation efficiency, DCD and off-paddock grazing. For instance dairy farming with 4 cows per hectare (in red in the chart) leaches 65 kg N per hectare in the base case but this is reduced to 24 kg per hectare by implementing advanced mitigation 2 at no cost.

Zone Costs to Agriculture of Meeting Nitrate Toxicity Bottom Lines in Hinds



Key Findings

1. **In Selwyn-Waihora, the nitrate toxicity bottom line does not impose costs** as the bottom line is consistent with the zone committee's 'solutions package'.
2. **Meeting nitrate toxicity bottom lines in Hinds** would require a 45% reduction of nutrient leaching after the expansion of irrigation in the zone and dilution through the release of water from alpine rivers into the catchment.
3. **In Hinds, the cost of maintaining water quality, after irrigation,** is estimated to be $4M per annum or 1% of the zone's agricultural net income.
4. **In Hinds, the costs of meeting proposed bottom lines** is estimated to be an additional $22M per annum or 7% of the zone's agricultural net income. This is based on nutrient trading, less efficient policies would increase the cost.

Impacts of proposed national bottom lines

The national bottom lines for ecosystem health and human health are those recommended by expert science panels and the NOF Reference Group. The following table shows how many rivers and lakes will fail these recommended national bottom lines.

Attribute	Water body type	Sites failing C bottom line	Testing undertaken
Ecosystem health			
Nitrate toxicity	Rivers	<1%	Comparison with monitoring data and modelled data nationally. Economic analysis in Southland, Canterbury and under testing in Waikato.
	Lakes	Less than for rivers	Under testing in Waikato, but not tested nationally. Exceedance only possible in the few most polluted lakes, as this bottom line is 8-9 times less constraining than the total nitrogen bottom line for lakes.
Ammonia toxicity	Rivers	0%	Comparison with national monitoring data. Not tested in economic study as high ammonia levels in rivers, now rare, are mainly associated with point source pollution.
	Lakes	Less than for rivers	Under testing in Waikato. Not specifically tested nationally against monitoring data, but lakes always likely to be less than for rivers (see rivers impact).
Periphyton (slime)	Rivers	<1% in Wellington & Southland, 10% in Horizons	Monitoring data analysed for Horizons, Wellington, and Southland. Modelled for Horizons, Southland, and Wellington. Economic analysis in Southland and parts of Canterbury. Comparison with levels in current regional plans.
Dissolved oxygen	Rivers (point sources only)	Negligible (for point sources)	Not possible to fully test because existing monitoring based on spot sampling; requires continuous monitoring data due to daily fluctuation. However, not expecting any significant impact on existing discharges (mainly urban sewage) after reasonable mixing, because already dealt with under existing RMA provisions (eg. s.107).
Chlorophyll a (lake algae)	Lakes	24[1]	Comparison with national monitoring data. Economic analysis in Waikato. Data for lakes is the number of **monitored** lakes. Only around 110 lakes are monitored (which is only 3% of the 3800 lakes in New Zealand) but we expect these to include all significant lakes failing the bottom line, because the large or most at risk lakes tend to be monitored. Lakes falling below the bottom line include a number of Northland and Whanganui dune lakes, the Waikato peat lakes, and Lakes Rotorua, Okaro and Hayes.
Total nitrogen	Lakes	26[1]	Comparison with national monitoring data. Economic analysis in Waikato.
Total phosphorus	Lakes	18[1]	Comparison with national monitoring data. Economic analysis in Waikato.
Human health			
E. coli	Rivers	2.3%	Comparison with national monitoring data, national modelling. Economic analysis in Southland and Waikato.
	Lakes	Less than for rivers	The monitoring data used to assess the primary contact recreation attribute suggests that health risk in lakes is typically lower than in rivers. The lake E. coli levels are therefore expected to reflect or be better than the E. coli levels of rivers upstream of the lake. The low levels of secondary contact risk in rivers suggests that very few lakes will fall in the D band for this attribute.
Cyanobacteria	Rivers	6 out of 68 monitored sites	Comparison with national monitoring data from Waikato, Bay of Plenty, Manawatu-Whanganui, Wellington and Canterbury. These reflect rivers and lakes that are highly valued for recreation and there are known issues from Cyanobacteria in the region.
	Lakes	6 of 16 monitored sites	Only 12 lakes (out of approximately 3800) are monitored. These lakes are monitored because of their known risk of cyanobacteria blooms. However there may be other lakes currently unmonitored which have occasional blooms.

[1] Data for lakes is the number of **monitored** lakes. Only around 110 lakes are monitored (which is only 3% of the 3800 lakes in New Zealand). These lakes tend to be monitored because they are large, at risk or under pressure.