Freshwater Objectives and Limits and Implementing the National Policy Statement for Freshwater Management 2011

Peter Winder, January 2012

1. Introduction

The National Policy Statement for Freshwater Management 2011 (NPS) requires regional councils to undertake a wide range of actions meet national objectives for freshwater management. Regional councils must review their regional plans to determine the extent to which they must be changed to give effect to the NPS. If a regional council determines that its current regional plans do not give effect to the NPS they must make changes to ensure that they do.

Regional councils are collaborating in an effort to make implementing the NPS as cost effective as possible. The implementation programme comprises collective work on climate change, water allocation mechanisms, work on best practice for non-statutory approaches to improving water quality, legal advice, and work on freshwater objectives and limit setting. There are a number of approaches that regional councils could take to establishing freshwater objectives and setting limits. This paper focuses on some of the possible approaches and the issues associated with them. It is intended that this paper prompt debate within the sector and encourage resolution of the issues and to the extent possible common approaches. This paper should be read in conjunction with the legal advice from Dr Royden Somerville and in particular his advice regarding the obligation to give effect to a national policy statement and the interplay between that requirement and the powers and obligations of a regional council under the Resource Management Act.

It is clear from Dr Somerville's opinion that regional councils have considerable discretion in implementing the NPS. The NPS does contain some quite directive policies – but they are direct councils with respect the process and the requirement to have in place policies and rules that give effect to the NPS. The objectives of the NPS are very broad and are open to broad and quite different interpretations. Indeed, Dr Somerville's opinion identifies that a number of different approaches to establishing water quality limits are legitimate and could give effect to the NPS.

Given the broad nature of the NPS it is important that regional councils carefully consider the best way to give effect to the NPS in their community. The best approach may well vary from region to region. The best approach in each region will need to reflect the current and expected resource management issues in the region, the current state of any regional policy statement and regional plans made under the RMA, and the nature of the community and economy of the region.

2. Giving effect to the NPS

Dr Somerville's legal advice is unequivocal on the obligation of councils to give effect to the NPS. His advice is that councils are obliged to give effect to the NPS. However, his advice is equally clear that councils have considerable discretion in the way in which they give effect to the NPS. In particular, his advice identifies a range of mechanisms that could be used to set water quality limits.

Each regional council starts the process of implementing the NPS from a different position. Current regional policy statements and plans deal with freshwater management in different ways and to differing degrees. This reflects the significance of water issues within each region and the particular approach to resource management that each council has taken over time. The discretion provided for in the NPS and the range of starting positions mean that it is quite possible for councils to implement the NPS in quite differing ways.

The NPS clearly anticipates that councils will need to undertake a range of both statutory and non-statutory initiatives in order to effectively manage freshwater. The obligation to give effect to a national policy statement is considerable. Sections 55(2) and 2(A) of the RMA clearly require a local authority to change an existing or proposed regional policy statement or regional plan (or any variation to them) as directed to do so by a national policy statement without using the Schedule 1 process. Section 55(2B) further requires local authorities to change an existing or proposed regional policy statement or regional plan (or any variation to them) as may be required to give effect to a national policy statement using the Schedule 1 process.

The obligation to give effect to a national policy statement extends considerably beyond changing statutory documents. Section 55(3) requires a local authority to "take any other action that is specified in the national policy statement". This is very significant with respect to Policy A2 of the NPS, which requires councils to undertake (implement) a range of methods to improve water quality within timeframes specified by the council if water bodies do not meet freshwater objectives.

It is possible that current regional plans give effect to the NPS. Councils are only required to make or change plans only to the extent necessary to give effect to the NPS. If in the opinion of the council their existing regional plans contain provisions that already give effect to the NPS then no further change is required. It is more likely that existing plans partially give effect to the NPS. Many of the regional plans that were reviewed when preparing this advice had objectives and policies that were very similar to the objectives of the NPS. Many current regional plans have objectives relating to safeguarding the life-supporting capacity of water bodies. Current plans have a variety of ways of establishing limits on the taking of water from water bodies. Current plans also have mechanisms designed to improve water quality or limit the discharge of contaminants within catchments. It is possible that these provisions already give effect to the NPS.

In implementing the NPS councils will need to formally consider the extent to which their current regional policy statements and regional plans already give effect to the objectives and policies of the NPS. If a council is satisfied that its current regional policy statement and regional plan provisions are adequate then it should pass a formal resolution to that effect. If a council determines that it needs to make changes to its policy documents it either needs to complete the process of making changes by 31 December 2014 or, where it is satisfied that it is impracticable for it to do so, adopt a timetable for completing changes in stages. Councils need to make these decisions within 18 months of the Gazetting of the NPS. So by 12 November 2012 each regional council will need to formally consider the extent to which they need to change regional plans, whether it is possible to do so by 31 December 2014, and if it is not, the timetable for plan changes. Councils are required to implement the policies of the

NPS as "promptly as is reasonable in the circumstances, and so it is fully completed by no later than 31 December 2030". Councils that adopt a programme of staged implementation must report each year on the extent to which the programme has been implemented.

Where a council adopts a staged implementation programme to give effect to Policies A1, A2 and/or A3 it must make changes to its plans in accordance with Section 55 of the RMA to include the provisions required by Policy A4. Similarly, where a council adopts a staged implementation programme to give effect to Policies B1, B2, B3, B4, B5, and/or B6 it must make changes to its plans in accordance with Section 55 of the RMA to include the provisions required by Policy B7. These changes do not require a Schedule 1 process and should be made at the same time as a council adopts a staged implementation programme (by 12 November 2012).

Some councils have more than one regional plan that impacts upon water quality, for example a plan dealing with sediment control and a plan dealing with water management and quality. Councils must ensure that the net effect of their plans is to give effect to the NPS. This may require changes to more than one plan. It may require additional cross-referencing between existing plans, or it may prompt the amalgamation of plans.

In making decisions on the implementation of the NPS councils should be aware that decisions could be subject to review through a number of mechanisms. Any decision made by a local authority could be subject to a judicial review. More importantly, any individual could seek an enforcement order against a council requiring a particular action in order to meet the general obligations of the council. The Minister for the Environment also has considerable power under sections 25a and 25b to direct a council to initiate a plan change or variation. Councils will need to consider very carefully the extent to which their current plans, or variations or changes that are in process already give effect to the NPS.

In order to give effect to the NPS councils will also need to ensure that, to the extent that is appropriate, the objectives and policies of the NPS are considered in its decision making. This will be relevant in the development of any change to a regional policy statement or regional plan as well as in broader decision-making under the RMA. Councils will need to consider the extent to which their consenting and other decision making processes need to be amended or changed to ensure that the NPS is given effect to.

It is important to note that councils only need to take action under Policy A2 where water bodies do not meet freshwater objectives. Equally, setting targets and implementing methods to improve water quality under Policy A2 need not involve any changes to regional plans. Indeed, it would be perfectly legitimate for a council to establish targets and a work programme for dealing with water quality issues through its annual plan process or by resolution of the council. Provided the decision gives effect to the NPS the council has complied with its obligations.

The NPS requires councils to have freshwater objectives and limits/levels for all water bodies within its region. This does not mean however that councils must adopt individual and specific objectives and limits/levels for each and every individual water body. It is perfectly legitimate for a council to set broad objectives and limits/levels that apply to types of water body, or to large areas of its region. It is also legitimate to establish catchment specific objectives and limits/levels. A very large proportion of New Zealand's freshwater catchments are short, small and are not under pressure with respect to either water quality or demand for water use. In these catchments it would make sense for councils to adopt a generic approach using a typology or area-wide set of objectives and limits/levels. This would enable councils to focus their efforts on the more complex catchments where there is significant pressure on water quality and demand for water use.

3. Freshwater Objectives

Policies A1 and B1 require regional councils to establish freshwater objectives for all bodies of water. These freshwater objectives are the key to implementing the NPS. The way that the NPS is structured all of the actions and policies that a regional council is required to implement stem from the need to establish and meet over time freshwater objectives and related limits. This approach is designed to define and avoid over allocation of freshwater resources – in terms of both water quality and the allocation and use of water.

In establishing freshwater objectives and related limits a council must consider and give effect to the NPS. However, it must also meet all of its other obligations under the RMA and result in regional plans that are coherent and effective. Dr Somerville's advice explores this point and presents guidance on the balance between the obligations that a council has.

The water quality and quantity objectives of the NPS are fundamentally focused on the health of freshwater ecosystems, but they are also directly linked to the sustainable development of land and to the efficient allocation and use of water. The objective of safeguarding life supporting capacity, ecosystem processes, and indigenous species including their associated ecosystems of freshwater goes to the core of the purpose of the RMA (Section 5) and to some matters of national importance (Section 6).

The construct of the NPS hinges on the expression of regional freshwater objectives. The water quality limits, environmental flows and/or levels and allocation of water that regional councils are required to develop are all designed to "allow a freshwater objective to be met". Freshwater objectives must encompass the elements of the objectives in the NPS. They must also reflect the particular regional resource management issues and values and the specific nature and quality of the resources that are being managed. Freshwater objectives must also sit within a plan that gives effect to the broad responsibilities of each council and the outcomes that they are seeking.

How broad can freshwater objectives be?

It would be possible, and indeed it could be useful, to express freshwater objectives that address matters beyond the core environmental health objectives that are expressed in the NPS. Freshwater objectives will drive limits relating to water quality, the limits and/or levels relating to water quantity and any water allocation process. Freshwater objectives provide the mechanism for a region to express the priority that may be given to particular uses, and also to express the importance of the social, economic, aesthetic, and cultural conditions which affect ecosystems, their people and communities (from the RMA definition of environment). Where a region has particular objectives relating to the contribution that freshwater makes to the well-being of its people and communities it could be appropriate to express them as a "freshwater objective" within the framework of the NPS. Drawing on Section 5 of the RMA it could be entirely appropriate for a regional council to express freshwater objectives that reflect the rate at which freshwater resources can be used, developed or protected.

Freshwater objectives are also fundamental in establishing whether or not a water body is "over-allocated". Objectives drive limits and the combination of the limit and whether or not an objective is met determines whether or not a water body is over-allocated. This in turn drives the range of other initiatives or rules that will apply once a water body is over allocated. The entire impact of the NPS is therefore dependent upon the way in which regional freshwater objectives are expressed.

To illustrate this issue it is useful to draw on an example. The Canterbury Water Management Strategy is a useful example because it is a clear statement of the multiple

objectives that are at play in managing that region's freshwater resources. The same mix of objectives will be at play in many regions.

The desired outcome of the Canterbury Water Management Strategy is:

> *To enable present and future generations to gain the greatest social, economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework.*

The strategy embodies targets relating to ecosystem health/biodiversity, the natural character of braided rivers, Kaitiakitanga, drinking water, recreational and amenity opportunities, water-use efficiency, irrigated land area, energy security and efficiency, regional and national economies and environmental limits. The targets establish a framework of multiple objectives within a comprehensive strategy. Implementing the strategy will require a mix of both regulatory activity under the RMA and a range of non-regulatory initiatives – including substantial investment.

Arguably the targets in the Canterbury Water Management Strategy reflect "environmental outcomes" within the definition of the environment under the RMA. The combination of the targets goes directly to the way and the rate at which Canterbury's water resources are used, developed or protected.

In implementing the NPS in Canterbury it will be important to consider whether, and if so how, these targets might be expressed as freshwater objectives. The direct translation of the NPS objectives alone into freshwater objectives will drive the establishment of limits, a definition of over-allocation and an approach to the allocation of water that primarily reflects the life supporting capacity of water bodies. This may deliver a rather different outcome than the careful balancing of the multiple objectives of the strategy.

What level of detail - regional, catchment, sub-catchment or water body?

Freshwater objectives could be set at the level of the region. The MfE guidelines also touch on the potential for a region to adopt a range of freshwater objectives that reflect the particular geography of the region and the particular issues that might be at play in a catchment or sub-catchment, or indeed for each individual water body. This approach reflects the scope for rules in a regional plan relate to some or all of a region. Given the very different characteristics of, and pressures on, individual catchments it may be wise for a council to express different freshwater objectives for different catchments or sub-catchments within its region. This approach would reflect the historic approach of some councils to manage water in particular catchments for particular purposes.

If councils express differing freshwater objectives within a catchment the objectives will need to nest effectively. It would be logically inconsistent for an objective within a sub-catchment to provide for a level of water quality that would result in failure to achieve a freshwater objective for parts of the down-stream water body.

In considering region-wide freshwater objectives councils need to consider the impact of failing to achieve that objective. Under Policy A2 once water bodies do not meet freshwater objectives every council is to specify targets and implement methods to assist the improvement of water quality in the water bodies. In considering the geographic extent of objectives and related limits councils will need to consider the practicality of initiatives to improve water quality and the nature and extent of the catchment within which measures would need to apply in order to improve water quality.

Freshwater objectives must be measurable

Policy A2 is triggered by the situation where water bodies do not meet freshwater objectives. Similarly, the scope of actions a council may be required to undertake to deal with over allocation depends upon the related specification of freshwater objectives and limits. For the NPS to work each council will need to establish freshwater objectives that are measurable. Measurement need not be complex but councils will need to know whether or not freshwater objectives are being met and act accordingly. Freshwater objectives could be descriptive, for example that 'freshwater quality will not deteriorate' provided the council has also established how it will measure water quality.

In specifying freshwater objectives councils will need to consider how they relate to limits and rules, and where and how compliance and intended environmental outcomes will be measured. For instance, if water quality objectives are expressed as regional outcomes councils will need to consider how they might aggregate measurement of water quality to demonstrate whether or not freshwater objectives are being met. Catchment level objectives will need to relate to the places at which measurement is possible and meaningful. Measures will also need to deal with the frequency of measurement and any tolerance around measurement. Given the conditional nature of the activities required to implement Policy A2 councils will need to carefully establish both the objectives and how they will determine if the objectives is being met. For instance, will one measure of water quality at one point in time trigger non-compliance, or will it reflect some average measurement, or repeated measurements?

Example Freshwater Objectives

In his 2003 paper "Drafting Issues, Objectives, Policies, and Methods in Regional Policy Statements and District Plans" Gerard Willis differentiates between open and closed objectives. Open objectives he defines as, "setting a general direction that might simply be enhancement of the status quo". He defines a closed objective as, "a finite statement of a desired end state: the water quality in the x Lake is improved to meet a Trophic Index level of 3.2 by 2006". Willis's distinction is helpful and is similar to the distinction that the MfE guidelines on the NPS makes between narrative and numeric objectives.

A number of councils use narrative, open objectives as high-level expressions of the general direction that they are seeking to achieve. However, it is quite possible that such narrative objectives are in essence closed. Categorical statements like 'prevent further decline', or 'prevent further loss or degradation', or 'maintain the existing", or "maintain or improve" all have inherent in them a closed base line of the state of the resource at the time the objective is adopted. Using any of these statements as an objective establishes the status quo as the point of reference for all future evaluation or measurement of performance in achieving the objective. This of course begs the question of how water quality will be measured and how a council (or any other stakeholder) will determine if a freshwater objective has been met.

The other potential fishhook with the use of categorical statements in objectives relates to the trigger for implementing Policy A2. If for instance a council established a freshwater objective as "to maintain the diversity and quality of water-based recreational sites, opportunities and experiences" and even one existing site experiences reduced water quality then the freshwater objective has not been achieved and the council must then proceed to implement Policy A2 of the NPS.

Table 1 provides examples of possible freshwater objectives. The table differentiates between open and closed objectives. The example objectives in Table 1 need to be considered in the context of the following discussion of water quality limits and the way in which councils measure the outcomes.

Table 1: Example Freshwater Objectives

Type of Objective	Example Objective
Region wide open objective	• To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water
Region wide open objective	• To enable present and future generations to gain the greatest social, economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework
Region wide open objective with a closed status quo baseline	• To maintain or improve fresh water quality
Region wide largely closed, suite of objectives Objectives of this nature could also be crafted for any area or catchment within a region	• To prevent further loss of naturally occurring wetlands • Stop the decline in freshwater species • Maintain active floodplains, flow variability and sediment movement • Support the dynamics of river mouth and coastal processes • Prevent further decline in the quality of water used as drinking water to supply marae and papakainga • Prevent further loss or degradation of identified wahi taonga • Maintain the existing diversity and quality of water-based recreational sites, opportunities and experiences • Improve the efficiency of use of irrigation water • No reduction in the area of land able to be irrigated • Reduce electricity demand from irrigation • Maintain electricity generating capacity • No decline in the contribution that water makes to the regional economy • Preserve and protect the quality and availability of water for domestic supply
Region wide, catchment, or geographic area, closed objective	• Maintain the health of rivers and streams (or rivers and streams in catchment X, or rivers and streams zone X) at a MCI rating of 80 or higher
Region wide, geographic area, or water body specific closed objective	• Maintain the health of lakes (or lakes in zone x, or Lake X) a Lake Trophic Index rating of 80 or higher
Region wide, catchment, or water body specific closed objective	• Maintain filamentous periphyton cover below 30% cover of riverbeds (or riverbeds in catchment X, or in river X)
Region wide, catchment, or water body specific closed objective	• Maintain the quality of freshwater such that levels of in-river nitrogen are less than X mg/l (or X mg/l in catchment A, or X mg/l in river B, or X mg/l in river C between point R and point T)
Region wide, catchment, or water body specific closed objective	• Maintain the quality of freshwater such that levels of in-river phosphorus are less than X mg/l (or X mg/l in catchment A, or X mg/l in river B, or X mg/l in river C between point R and point T)

Region wide or catchment specific open objective	• Maintain flows / levels in all water bodies consistent with the natural variability of the catchments and sufficient to sustain their life supporting capacity
Area wide or catchment specific closed objective	• Maintain an environmental flow in all water bodies within area X as Y% of MALF

Generally, the more simple the expression of freshwater objectives the easier it will be to craft a plan and related rules. However, as is noted above the simple expression of freshwater objectives solely relating to the life-supporting capacity or health of an ecosystem may not reflect the balance of use, development and protection objectives that a regional community desires.

Is a freshwater objective an objective, a policy or something else?

It is not clear where a freshwater objective fits into the schema of a regional plan. Under section 67 of the Act regional plans are required to state:

(a) the objectives for the region; and
(b) the policies to implement the objectives; and
(c) the rules (if any) to implement the policies.

In developing regional plans councils have adopted a hierarchical approach that moves from the more general objectives to the more specific policies and the very directive and enforceable rules. Policies implement objectives, and rules implement policies. Objectives have tended to be descriptive rather than quantitative and in many cases repeat or closely reflect the matters of national importance from the Act itself.

A freshwater objective is defined in the NPS as describing "the intended environmental outcome(s)". A freshwater objective could therefore be seen as "the environmental results expected from the policies and methods" under Section 67(2)(d). Or indeed, they could be some other new artefact justified for inclusion in a plan under 67(2)(e), "any other information required for the purpose of the regional councils functions, powers and duties...".

In order for policies and rules within a regional plan to be vires they must implement the plan's policies. Similarly, policies must implement objectives. For this reason it would be wisest to couch freshwater objectives as plan objectives under section 67 of the Act. This approach means that freshwater objectives will need to be expressed in a way that is consistent with other objectives in the plan. It also means that a council can conclude that a number of existing objectives are freshwater objectives for the purposes of the NPS. Expressing freshwater objectives as plan objectives councils would then be able to express the limits required by the NPS as policies and to craft rules to regulate activity in order to achieve the policy.

Do existing objectives constitute freshwater objectives?

Where a council is considering the extent to which existing plan provisions give effect to the NPS it will need to identify the provisions that constitute "freshwater objectives". This can be done through a decision of council rather than by making a change to the plan. It would be wise to record such a decision as a practise note to guide interpretation of the plan in the future.

Lastly, where freshwater objectives provide for the management of water for any of the purposes provided for in Schedule 3 of the Act then any consequential rules will have to reflect the standards specified in Schedule 3 as required by section 69. Interestingly, any plan

that adopts this approach would not be able to specify water quality limits that are different from those specified in Schedule 3.

4. Water Quality Limits

Before considering the nature of limits it is important to note the nature of water resources. The flow of water through a water body is dynamic and highly variable. The quality of the water that can be measured at any one point in time in any particular part of a catchment will reflect a range of factors, including the nature, characteristics and chemical composition of the substrate over which it has flowed, the nature and chemical composition of any sediment that is suspended in the water or has been deposited in the channel, the nature and intensity of recent rainfall, the nature of ground water that may flow into the water body and all of the historic factors that have impacted on its quality, the nature of the channel and surrounding vegetation, the nature of land use and land cover in the catchment and the nature of any discharges in to the water body. What is measured today is quite likely different from what was measured yesterday and what will be measured next week. What is measured will vary seasonally and the same volume of discharge will create different outcomes in low flow conditions than it will in high flow conditions.

It is also worth noting that most of the discussion relating to freshwater quality has focused on rural areas and the impact on intensive agriculture on water quality. The NPS applies equally to all water bodies. The appropriate limits and approach to water bodies in urban areas may need particular attention.

Is a water quality limit an objective, a policy, or a rule?

Regional plans must contain objectives, policies and rules. Clearly, Section 68(7) of the RMA anticipates that rules in a regional plan may relate to maximum or minimum levels or flows or rates of use of water or minimum standards of water quality. Despite this there is logic to establishing freshwater objectives as objectives in a regional plan and water quality limits as either policies, or as closed objectives (a finite statement of desired end state).

Rules categorise activities into being permitted, controlled, restricted discretionary, discretionary, non-complying, or prohibited, and establish conditions relating to undertaking activities within each category. Rules directly control the nature and scope of activities in order to avoid, remedy, or mitigate their effects and to implement policies. Water quality is the product of all of the activities that may take place within a catchment, as well as the nature and characteristics of the catchment itself. Establishing limits as a closed objective or a policy provides the mechanism to direct the nature of the rules that apply to the activities that impact on water quality.

The NPS clearly anticipates that for some catchments actual water quality will be worse than provided for in the water quality limit set by the regional council. Establishing limits as a closed objective or a policy provides the mechanism for councils to identify not only the limits, but also the tolerance around the limit and the timeframe for achieving it.

Establishing limits as a policy within an RPS could also be a very helpful mechanism to provide quite directive policies under Policy C2 to ensure that District Plans appropriately regulate land use in order to achieve integrated management objectives.

Setting and expressing limits

The MfE guidelines state that *"Limits are to be set to ensure freshwater objectives established for the relevant water body are met, rather than to give effect to more generic RMA or sustainable management objectives"*. Dr Somerville's advice is rather at odds with this statement. Indeed, it is clear that a regional council can only act under the specific and total obligations, functions and powers provided to it under the legislation. All of the actions, policies and plans implemented by a regional council under the RMA must give effect to the purpose of the Act, and must reflect the matters of national importance and other matters. The Act provides no mechanism to isolate any individual instrument from the general approach of the Act to sustainable management.

The MfE guidelines state that a limit is a specific quantifiable amount and clearly anticipate that water quality limits will be expressed in terms of each (or any) of the factors that impact on achieving a freshwater objective. This approach would see a regional council establishing limits associated with the physiochemical composition of the water and directly measuring the characteristics of the water to gauge compliance with the limit. Adopting this approach provides for a link between the activities in a catchment and water quality. MfE clearly anticipates a direct connection between the limit for a particular contaminant and rules or other methods that limit the scope and nature of activities that generate it.

The MfE guidelines also acknowledge that limits may be set for particular parts of a catchment or river system. For instance, the limit may be set at a particular confluence, or a particular place on the river and relate to rules governing activities in the catchment upstream of that point. The MfE guidelines clearly anticipate that some limits will be set with a great deal of rigour and investigation, whereas other might be set with a more generic approach and that effort to set limits should be prioritised.

What must a water quality limit achieve?

Along with freshwater objectives water quality limits determine whether or not a council must implement Policy A2 of the NPS. They also drive the establishment of conditions on discharge permits required under Policy A3. A water body will fail to meet freshwater objectives where its water quality is worse than the limit that has been set for that water body. This will in turn trigger the need to implement Policy A2. Implementing Policy A2 will require considerable effort and expense and may require significant changes in land use practise within a catchment. Changes which would have a major impact on land owners should not be undertaken lightly. There needs to be a clear reason to intervene before a council should impose new management regimes, or new requirements that would require investment or significantly changed practice by land owners.

Water quality limits must be expressed in a way that provides certainty that there is an issue. A one-off exceedance of a water quality limit should not be sufficient to trigger a wholesale change in the management regime within a catchment. However, it may be if that exceedance comes as part of a longer-term trend of worsening water quality that shows no sign of improving. Water quality that is constantly poorer than the established limit and worsening would clearly indicate that a major change is required.

Water quality limits need to have meaning over a long period of time. They must be able to be measured repeatedly and continue to have meaning as the land use within a catchment changes. Focusing water quality measurements on the current drivers of water quality in a catchment could result in meaningless measures quite quickly. The major initial driver of water quality in a catchment that is being converted from forestry to pastoral farming will be sediment. Once pastoral farming is established the major water quality issue will probably become nitrogen. If at some point in the future the catchment is urbanised sediment will

again become the major issue, followed by the release of a wide range of heavy metals and other contaminants associated with urban stormwater and wastewater overflows. One of New Zealand's economic strengths has been the ability to rapidly change rural land use in response to market conditions. It would be a major issue if water quality limits unnecessarily impede land use change. Water quality limits will need to be carefully established to avoid this problem.

Water quality limits must be able understandable. A wide range of stakeholders have a keen interest in water quality and the way in which it is measured. Limits must have meaning for those stakeholders. Equally, the way that water quality is measured must be transparent. Water quality measures that are a "black box" will probably fail to provide sufficient reassurance to stakeholders that they are not subject to interference or gerrymandering.

Alternative Approaches Legitimate

Dr Somerville was asked to explore the legal vires of three alternative approaches to setting water quality limits. Ultimately any limit will need to be justified and defensible following the analysis required by Section 32 and consideration through the Schedule 1 process. Limits must also be related to the freshwater objectives that a council establishes. From a legal vires perspective Dr Somerville concluded that three alternative approaches to establishing water quality limits were defensible. These three approaches are a physiochemical approach, an ecosystem health approach and a catchment input approach and are discussed below.

Physiochemical Approach

A physiochemical approach directly measures the properties of the water at a specific point according to specific protocol. This approach requires consideration of the particular qualities of the water body reflecting its site and the nature of the land that drains towards it. Adopting this approach is likely to result in markedly different limits in different catchments reflecting the chemical composition of the soil and substrate in the catchment.

The prime advantages of this approach are that it is specific, measurable, repeatable and completely transparent – samples either show that the concentration of contaminants is within the allowable limit, or they show that they are not.

One of the attractions of a physiochemical approach is the potential link between the measurement of contaminants in the water, activities in the catchment, and rules that govern the release of that contaminant in the catchment. The challenge with this approach is that the amount of the contaminant in a water body is not a simple direct function of the nitrogen currently being released in the catchment. It will reflect a wide range of historic activities and the natural condition of the substrate and soil.

One of the major challenges with a physiochemical approach is establishing a meaningful measurement regime. The concentration of contaminants measured at any one point along a river or stream will vary continuously with the flow of water. The NPS is really trying to deal with the long-term health of water bodies. It is doubtful that a single point in time measure will reflect the actual health of a water body. To adopt a physiochemical approach Councils will need to adopt a measurement regime that is representative of the health of the water body. This will probably involve sampling from more than one location and sampling at different times of the year. The sampling regime will also need to indicate tolerances to account for any particular circumstances that would impact upon measurements.

Comprehensive and regular testing of a large number of water bodies with full chemical and bacteriological screening could be expensive. However, the costs would depend considerably on the number of tests necessary to monitor compliance with objectives and limits.

Ecosystem Health

An ecosystem health approach to setting water quality limits would adopt an index, like the Macroinvertebrate Community Index (MCI), to directly measure the health of a freshwater ecosystem. A council using an MCI or similar index as a water quality limit would establish the numeric value of the index that it determines is the limit for the water quality of that water body. This could be done for individual water bodies, or for types of water bodies, or for geographic areas within a region. It would for instance be possible to establish an MCI limit for the headwaters of catchments, and differing values for the lower reaches of catchments. This sort of approach would be suited to dealing with the very large number of relatively short water bodies that are common in much of New Zealand. Establishing an index based limit that applies to all water bodies within a particular area would be simple and cost effective approach to rapid implementation of the NPS.

Ecosystem health indices, and the MCI in particular, are well understood and directly measure one of the key outcomes sought by the NPS. It is relatively cheap to implement and lends itself to a more generic approach to dealing with catchments or a zoning approach to large areas with many streams. Another major advantage of this approach is that it directly measures the cumulative effect of what is happening in the catchment. Analysis of the physiochemical properties of the water is subject to continuous change as the characteristics of the flow fluctuate over the very short term. The MCI measures the sum total of what has happened to date. Simple sampling regimes and time series data will provide profound insights.

The major limitation of the MCI approach is that there is no direct link between what is being measured and individual contaminants or activities that cause it. However, due to the nature of lags within ecosystems there is often no or limited direct link between what might be applied to a piece of land today and what will be measured in the water tomorrow.

The MfE guidelines do not anticipate this approach to setting limits. A number of the major national stakeholders in the debate over freshwater quality would not favour this approach to limit setting. This may mean that there is a level of resistance or objection to this sort of approach. The MCI does provide a numeric and quantifiable measure of the health of the ecosystem. It would be possible to express a limit in terms of the MCI score (maintain or improve, or not fall below a particular value). Dr Somerville's legal advice confirms that this sort of approach to setting water quality limits would be vires.

Catchment Inputs Approach

The third approach to limit setting is hinted at in the MfE guidelines. The guidelines state that when setting limits there will need to be consideration of where the limit applies – including the possibility that the limit applies to nutrient inputs on the land within a catchment. The NPS defines a limit as *"the maximum amount of resource use available, which allows a freshwater objective to be met"*. This clearly makes it possible to set a water quality limit in relation to the amount of a particular activity, or a particular input into an activity (nitrogen) or to the amount of an output produced by an activity within a catchment. Dr Somerville's legal advice confirms that this approach is vires.

A council adopting this approach may express the limit in urban areas as a limit with respect to the amount of impervious surface in the catchment, or the area of land that can be open for earthworks. In a rural catchment this sort of limit may be expressed as the tons of fertilizer that can be used as farm inputs within the catchment, or the total number of stock units, or the maximum intensity of stock per hectare that can be accommodated in the catchment.

In this approach the limit would be best expressed as a policy with related rules that establish the scope for permitted or controlled activities in such a way as to regulate the activities that give rise to discharges that cause water quality issues within a catchment.

It would be possible to combine the MCI approach with limits that apply to activities or inputs within a catchment. Indeed, expressing MCI values as freshwater objectives and limits as a policy and related rules to control activities that produce discharges would make the allocation of the resource with respect to water quality amenable to the same sorts of allocation mechanisms as may be applied to the allocation of water for particular uses. The nitrogen market in the Taupo catchment is only one of the possible approaches to new allocative mechanisms that would be possible by expressing limits in terms of activity or outputs within a catchment.

The major advantage of this approach is that it is direct and relates to the activities that cause the water quality issues.

The major disadvantage of this approach is the ability to cheat the system. To be cost effective this approach would have to rely on self-reporting of activities and a degree of monitoring and compliance activity by the council. The cost of self-reporting would depend upon the complexity of the limit. No matter what self-reporting framework was put in place there would be strong incentives under this approach for land owners to attempt to cheat the system. Monitoring and compliance activity is expensive, but without it this approach would be meaningless.

The second major disadvantage of this approach is that it could be very difficult to put in place through a Schedule 1 process. There will be strong vested interests at play seeking to minimise the impact of controls on the level of activity that can take place on any individual property. It may be easier to set limits through either a physiochemical or ecosystem health approach and then to focus on limits to activities that generate water quality problems through the rules that would ensure that limits are not breached and initiatives that improve water quality to achieve freshwater objectives.

How you might justify a particular limit?

No matter which of the approaches that is adopted to limits each council will need to be able to justify the particular limit adopted in relation to each water body. Whilst a council cannot be challenged on the need to establish limits (it must give effect to the NPS) it could be challenged on the type of limit that it is setting and well as particular limit (numeric value) that it selects.

To justify a particular limit a regional council will need to be able to demonstrate the connection between the limit and the freshwater objective(s). Each council will also need to undertake under its section 32 obligations the appropriateness of the approach. As each council works through the implementation of the NPS it is possible that case law will arise that favours one or, perhaps more importantly, dismisses one of the possible approaches. This could mean that any council pursuing an approach ruled invalid could face substantial costs of reworking their plan. It may well be worthy to contemplate a fairly rigorous joint assessment of the alternative approaches. However, depending upon the approach that is taken to freshwater objectives this could be very difficult.

5. Water Quantity Limits – Environmental Flows

Water quantity limits are probably the most straightforward part of the NPS. There has been considerable work on how to establish environmental flows. It seems that there is general acceptance that for most water bodies using a generic approach to determine a limit as a proportion of mean annual low flow is appropriate. There is also general acceptance that in large and complex river systems an environmental flow needs to be expressed as a flow regime that reflects the seasonal dynamics of the system.

Importantly, under the NPS an environmental flow is "*a type of limit which describes the amount of water in a body of freshwater which is required to meet freshwater objectives*". This means that the way in which freshwater objectives are specified is fundamental to the way in which an environmental flow is set. Setting freshwater objectives solely in terms of life supporting capacity could well result in a different environmental flow than casting a range of objectives.

Environmental flows also need to be set in relation to the water quality limits that apply to a water body. Clearly the nature of the flow regime directly impacts upon the ability of a water body to absorb contaminants without unduly impacting upon its life-supporting capacity or the health of the ecosystem that it supports.

Considerable work has been done on setting environmental flows. The discussion document that proposed a National Environmental Standard on Ecological Flows and Water Levels set out approaches that enjoyed a high level of support from regional councils. The NES discussion document set out proposed interim limits for groundwater, wetlands, and rivers and streams. It also identified a range of techniques that could be used to develop more sophisticated environmental flow regimes for water bodies.

In the introduction to this paper it is argued that for a large number of catchments a generic or vanilla approach should be adequate to provide an effective freshwater management regime. This approach is consistent with the way in which the NES discussion document proposed interim (generic) limits for different types of water body. Those interim limits are set out in Table 2 below. In terms of the NPS the minimum flow set out in the Table 2 is equivalent to the environmental flow that is required by Policy B1. The allocation limit presented below is the amount of water that could be allocated for use whilst still maintaining the minimum (environmental) flow.

Table 2: Summary of Interim Limits from the Proposed NES on Ecological Flows and Water Levels Discussion Document

Type of Water Body	Minimum Flow / Level	Allocation Limit
Shallow, coastal aquifers	Not identified	An allocation limit of 15% of annual recharge
All other aquifers	Not identified	An allocation limit of 35% of annual recharge
All wetlands	No change beyond the variation that has already been consented	No change beyond the variation that has already been consented
Lakes	Not identified	Not identified
Rivers and streams with mean flows less than or equal to 5 m^3/s	90% of MALF	30% of MALF
Rivers and streams with mean flows greater than 5 m^3/s	80% of MALF	50% of MALF

The Interim Limits set out in Table 2 are simple and are readily calculated off a mean annual low flow. However, for most of New Zealand's complex water systems this approach will be too simplistic. The most complex systems include lakes, rivers and groundwater systems that are linked and have significant interactions. In these systems it will be vital to establish flow and level regimes that provide for the operation of the system. For many of these systems the flow regime will need to include adequate peak flows and flushing as well as preserving minimum flows. Maintaining the natural variability in the ecosystem will be an important part of safeguarding ecosystem processes.

Appendix 4 of the NES discussion document developed a risk-based approach to developing the assessment of specific environmental flows and allocation limits for individual water bodies. The recommended approach provides a range of tools for establishing ecological flows and limits to abstraction. The combination of tools used for any individual water body needs to reflect the degree of hydrological alteration that is to be considered and the level of risk that may be tolerated. The major difference between this approach and developing the environmental flows and levels required by the NPS is that the discussion document focused on "the flows and water levels required in a waterbody to provide for the ecological integrity of the flora and fauna present within the waterbodies and their margins". The work (undertaken by Beca in 2008) makes it clear that it "offers no guidance on how to set environmental flows (defined as "the flows and water levels required in a waterbody to provide for a given set of values which are established through a regional plan or other statutory process")". Implementing the NPS requires councils to explicitly consider the values established through their freshwater objectives. Therefore in using the proposed approach from the NES discussion document councils will need to relate the freshwater objectives that they have established to the degree of hydrological alteration and risk that may be contemplated. Clearly, there are a range of tools that can be used to determine environmental flows. No one tool will be sufficient.

Where a council establishes a specific flow regime it will need to reflect the level of spatial detail that the council uses to establish freshwater objectives and water quality limits. Ideally, the points at which water quality limits are measured will reflect key points of measurement for the flow regime. Equally, the rules that apply to the management of contaminants within a catchment must link to the area that is managed in order to provide for the flow regime that is intended.

6. Over Allocation, Rules and Transition

Dr Somerville's legal advice touches on the issues associated with implementing rules that have the effect of phasing out existing lawful activities. There are clearly a number of considerations in terms of fairness, the legitimate expectations of landowners and the timing of any transition. Ultimately transition will depend upon the approach to objectives, setting limits and the extent to which a resource is over-allocated.

The work on water allocation that Gerard Willis is undertaking will address transition issues. It is proposed that that work be used to consider transition issues relating to water quality limits. This will be especially relevant if a council were to choose to implement limits on the activities in a catchment rather than on the water itself.

7. Conclusion

Councils have considerable discretion in the way in which they give effect to the NPS. All councils will need to establish freshwater objectives, water quality limits and environmental flows/levels for all water bodies within their region. There are a number of different approaches to establishing these measures and it is possible that existing regional plans contain provisions that are have the same practical effect as those required by the NPS. The scope of work that a council will need to do to implement the NPS will depend considerably upon whether or not the freshwater objectives that they establish within the region are being met and whether or not water bodies are over allocated. If the objectives are being met and resources are not over allocated implementation is quite straightforward. Where resources are over allocated implementation will require considerably more effort.

In implementing the NPS it will be possible for a council to adopt a generic or vanilla approach to establish objectives, limits and levels for considerable areas of their region where water resources are not under pressure, or where the nature of the catchment ecosystems makes an area-wide approach appropriate.

Overall, the key to effective implementation of the NPS is the way in which councils express freshwater objectives. Freshwater objectives can be expressed as open or closed objectives, and they may also be either simple reflections of the objectives of the NPS, or quite rich mixes of objectives reflecting the very broad definition of the environment within the RMA.