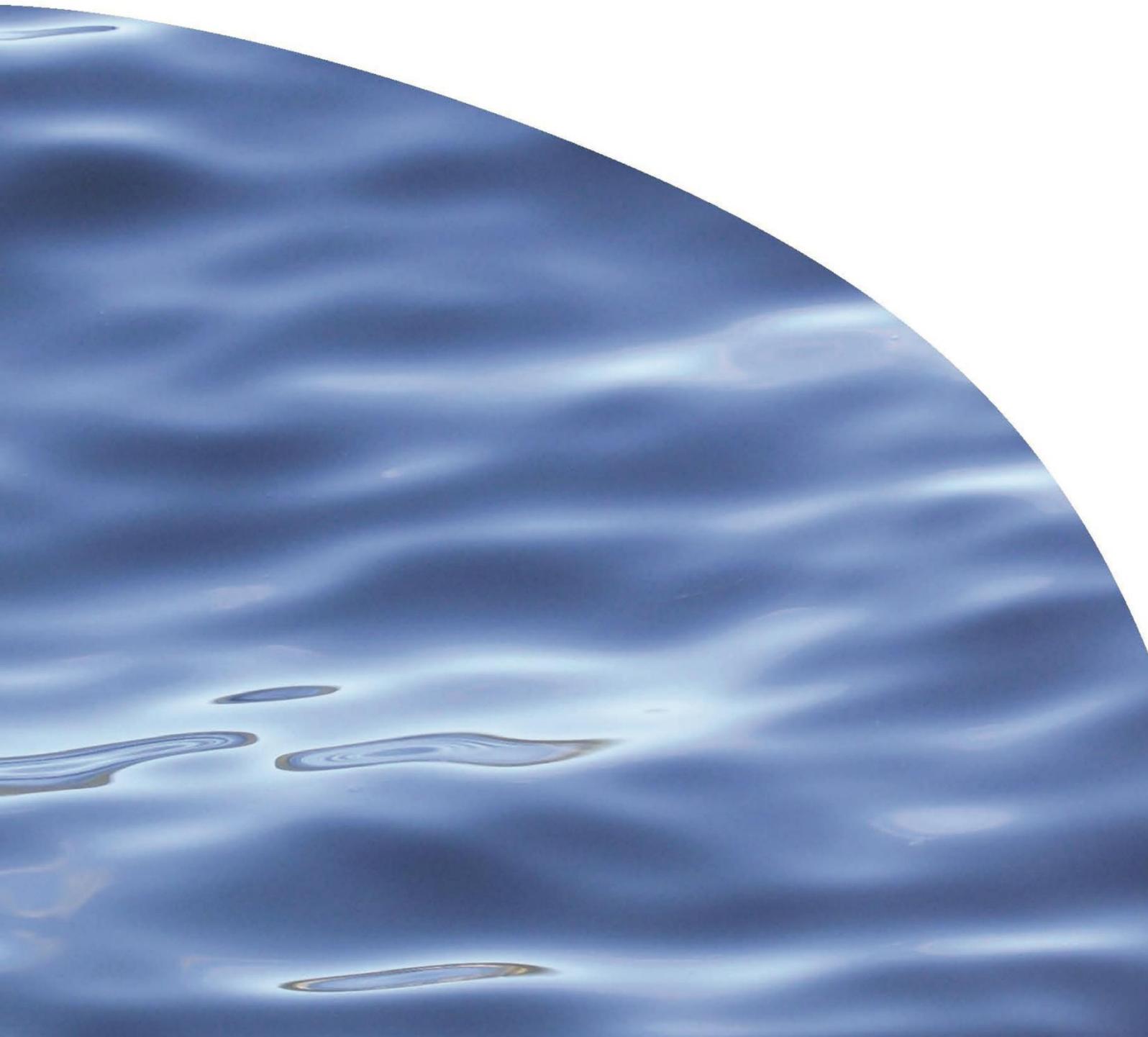




REPORT NO. 3199

# **WATER MANAGEMENT GROUPS: PRELIMINARY GUIDANCE**





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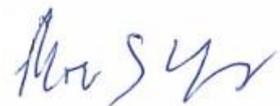
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# 1. INTRODUCTION

## 1.1. The purpose of this report

Diffuse effects on water bodies are difficult for regional councils to manage and equally difficult for individual land users to address. Water management groups (WMGs), if properly structured and supported, have significant potential to help both councils and land users manage diffuse effects. This report offers preliminary guidance to WMGs, regional councils and other interested parties on how WMGs can be structured and what regional council plans should contain to improve the likelihood that groups will achieve the freshwater outcomes desired by their communities.

## 1.2. The problem of diffuse pollution

In New Zealand, freshwater ecosystems have deteriorated in recent decades, driven by urban and rural land use intensification (Parliamentary Commissioner for the Environment 2013, 2015a, 2015b). A major difficulty in freshwater management worldwide is that many pollutant inputs and other effects on water bodies are diffuse—a myriad of small sporadic inputs that cannot all be monitored and managed reliably by government authorities (Gilbert 2015; OECD 2017). Nitrogen leaching is the most well-known example of diffuse pollution in New Zealand; phosphorus, sediment and *E. coli* are others.

These stressors also interact, causing multiple-stressor impacts (Matthaei et al. 2010; Wagenhoff et al. 2012; Lange et al. 2014), and there are time lags between changes in land use practices and the resulting effects in water bodies. This leads to a ‘tragedy of the commons’ in which individuals cannot see the results of their actions and therefore consider that their actions will make little difference to the overall outcome.

New Zealand’s National Policy Statement for Freshwater Management, issued in 2011 and amended in 2014 and 2017, requires regional councils to set objectives for water quality and ecosystem health for every water body in the country and to implement plans to achieve these objectives. Formulating policies to address diffuse pollution has been one of the more challenging issues facing regional councils.

One approach to managing these diffuse effects is to allocate limits for individual pollutants to individual properties. This is usually based on models that may not accurately reflect physical processes and cumulative effects, leaving environmental outcomes in doubt and land users questioning the models (Duncan 2014). Another approach is to require land users to adopt specific ‘good management practices’. This provides some certainty of actions and costs but delivers uncertain environmental outcomes and, without other controls, may allow further intensification. Hence, both approaches have limitations and may not deliver what the community expects.

Collective management offers a way to focus more on achievement of desired outcomes, especially where multiple stressors are involved. By assigning environmental responsibilities to a water management group (WMG) rather than an individual land owner, land users have more flexibility to identify place-specific mitigations. Members are accountable to each other as well as to the wider community, creating peer pressure to improve performance<sup>1</sup>. This report provides preliminary guidance on how to implement such an approach.

It is important to note that this report is *not* about collaborative freshwater *planning*, that is, diverse interests working together to agree on standards and rules for freshwater management. Rather, it is about plan *implementation* through collective management and responsibility, i.e. land users working together to achieve freshwater outcomes already agreed in a plan. These are two very different processes with quite different challenges. Much has been said and written about collaborative planning, but very little about collective responsibility as a strategy for plan implementation even though the idea has been around for some time (Sinner & Nelson 1994).

### 1.3. Advantages of collective management

Responses to address diffuse effects that affect freshwater ecosystems can be coordinated more effectively at the sub-catchment scale, where landholders can see the results of collective efforts. Regional councils are better able to monitor collective performance than outcomes for individual properties, so landholders (through WMGs) will be more accountable for improving water quality outcomes.

Compliance costs for landholders will also be reduced, as WMGs identify and implement new cost-effective mitigations. WMG members won't need individual consents and will not be required to adopt specific practices; instead they will be empowered to trial new mitigation practices and land uses targeted at specific problems, expected outcomes and values. Group members can collaborate on projects such as riparian planting and reconstructed wetlands, which may not have been viable at the individual property scale.

### 1.4. Water management groups in New Zealand

There are several examples of groups in New Zealand working collectively to manage freshwater outcomes. Some have existed for several years, while others are just forming or have recently extended their purpose to include environmental objectives.

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<sup>1</sup> A video describing this approach is available at <https://vimeo.com/270210016>

In 2015, Beef and Lamb New Zealand, the Gisborne District Council, Ministry for the Environment and local farmers formed a collaboration to address *E. coli* contamination at Rere Falls and Rockslide, a popular swimming spot on the Wharekopae River near Gisborne. In Hawke's Bay, the Twyford Irrigators Group has pooled its water permits to make better use of members' water allocations, enabling them to reduce total abstractions. Canterbury's Amuri irrigation scheme is taking on responsibility for water quality monitoring, reporting and some compliance roles for its members, and some other irrigation schemes have bulk nutrient allowances that they can allocate flexibly. A group of dairy farmers worked with the New Zealand Landcare Trust (NZLT) and the Marlborough District Council to address water quality concerns in the Rai Valley. In the Tasman District, again with assistance from the NZLT, groups of farmers in the Sherry River and Aorere River catchments are working together to improve freshwater outcomes. Farmer groups are also emerging in Southland and probably in other regions to address water quality issues.

Some provisions for WMGs are being written into RMA plans. For example, for Waikato farmers operating under a Certified Industry Scheme, the Waikato Regional Council's Proposed Plan Change 1 would provide permitted activity status for dairying and other farming activities (except commercial vegetable production) that generate diffuse discharges. Otherwise, starting in 2020 for high priority catchments and high-discharge properties, these activities would require resource consents (Waikato Regional Council 2016). The plan change sets out criteria for a scheme to be approved by the council as a Certified Industry Scheme.

Environment Canterbury's regional plan for South Canterbury coastal streams enables land users to work collectively rather than be required to submit individual farm plans. In Hawke's Bay, farmer representatives have suggested that farmer collectives could manage sediment and other aspects of ecological health of water bodies. Their proposal is being considered by a collaborative stakeholder group making recommendations for new provisions in a regional plan.

In an urban context, the Marlborough District Council worked with stakeholders in the Murphys Creek catchment in Blenheim to agree on stormwater standards for new development (Newton 2017)<sup>2</sup>. The Murphys Creek residents' group could provide the basis for establishing an urban WMG to reduce diffuse pollution from existing residential and commercial properties. There are undoubtedly other urban water groups in New Zealand that could be mobilised to take on a more formal role with councils.

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<sup>2</sup> A video about the Murphys Creek collaborative process is available at <https://vimeo.com/214937013>.

## 2. PRELIMINARY GUIDANCE FOR COUNCILS AND GROUPS

This report provides preliminary guidance for water management groups that have a formal relationship with a regional council, i.e. have responsibilities to help deliver land and water management objectives identified in a regional plan under the Resource Management Act 1991 (RMA). This guidance is based on insights from Ostrom (1990; 2010) and other literature, and also draws from numerous discussions the authors have had with interested parties over the past several years. However, more research is needed in New Zealand to gain better understanding of the features of effective water management groups.

### 2.1. Group formation

#### 2.1.1. Size of groups

There is no single right answer to the appropriate size of a water management group. Depending on the size of individual properties and relationships between neighbours, a group might be anywhere from a few properties to twenty or more properties that all contribute to the health of a local water body at a defined point.

A collective response to freshwater management involves identification of selected points in a catchment where outcomes can be monitored and where land users can see the effects of their land management practices. Depending on topography, the size of properties and the intensity of land use, we suggest defining a water management group for the catchment upstream of each confluence of a fourth-order stream<sup>3</sup> with another fourth- or higher-order stream. We refer to these points where one WMG area flows into the next as 'WMG confluence points' as shown in Figure 1.

Alternatively, it might be more practical to combine several fourth-order catchments into one WMG and have sub-groups for each fourth-order catchment.

A sensitive feature such as a significant lake or wetland could be managed by a separate group, defined by the catchment for that feature, or might be managed as part of a group with a larger area, with the significant feature as an additional monitoring point.

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<sup>3</sup> Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams, and a second-order stream is formed when two first-order streams join. A fourth-order stream is formed by the confluence of two third-order streams, or of a third-order stream and a fourth-order stream. Depending on the number of watercourses in the landscape, it might work better to use fifth-order confluences as the basis for group boundaries.

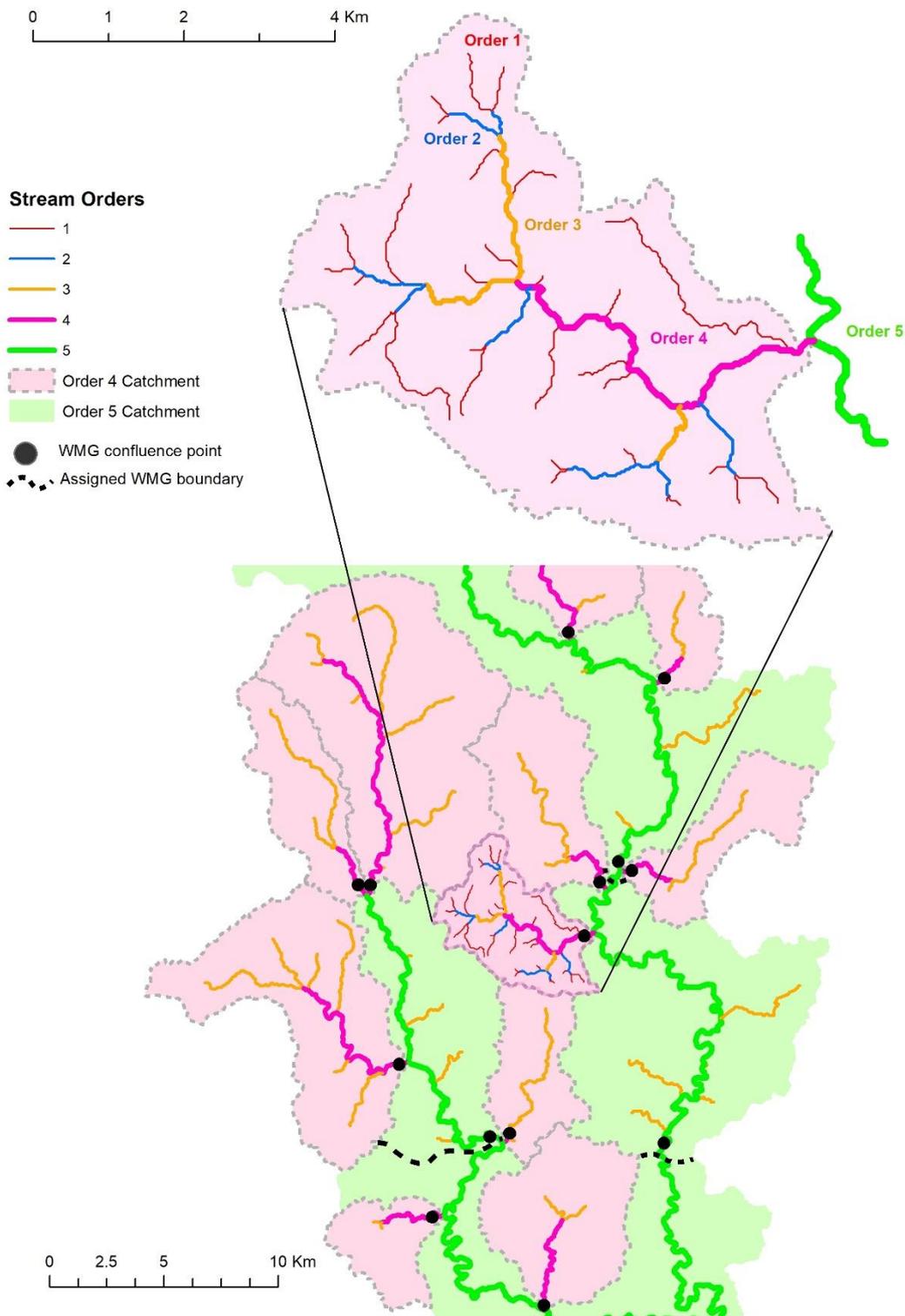


Figure 1. The top image shows a fourth-order catchment, being the area upstream of the confluence of a fourth-order stream and a higher-order stream. The lower image shows this fourth-order catchment amongst others in the wider catchment and the confluence points (black dots) at which WMGs would monitor their performance. The dashed black line is a suggested assignment of a WMG boundary, dividing remaining parts (light green) of the fifth-order catchment that do not have fourth-order streams.

To be most effective, all areas of a river catchment should be included in a water management group or covered by an individual farm plan that is consistent with the catchment group plan. Some properties will belong to two groups if they straddle ridge lines such that the land drains to different streams. Neighbouring groups can decide how to manage these situations.

In addition to these groups at sub-catchment scale, we recommend that there be a group for the entire catchment, comprised of representatives of the smaller groups. The whole-of-catchment group would be a forum where WMGs can discuss alignment and consistency of WMG plans, shared responsibility for downstream objectives, and actions that might require coordination between multiple groups. The whole-of-catchment group could also be an appropriate forum for iwi and other interested parties to engage with WMGs, discussed further in Section 2.4 of this report.

### **2.1.2. Group structure**

Groups may start by working together informally but in order to accept responsibility for delivering freshwater objectives, they should have some formal elements, including the following:

- list of members
- specific objectives for water quality and ecosystem health (see next section)
- defined boundaries and monitoring points shown on a map
- terms of reference or articles of agreement, including decision-making procedures, signed by group members
- contact person or coordinator—a group member or an external person such as a farm advisor or consultant.

Membership can include people who are not landowners or land users inside the WMG area. For example, a WMG could include a representative from the local marae, possibly as an observer rather than as a full member, because it is the full members who will be accountable for taking action to achieve agreed objectives.

It would be advantageous for groups to have legal status, such as an incorporated society or partnership. It may even be required for groups to have a resource consent or other legal obligations under a regional plan. Legal status would also enable groups to apply for grants and enter into agreements with other entities, e.g. other WMGs. Note that legal status brings with it reporting obligations, e.g. incorporated societies are required to maintain accounting records and file annual reports.

Further work is required to assess the merits of different legal structures and determine which would best suit WMGs. It would be useful if a national body were to develop templates for terms of reference and other documents that individual groups could adapt to their circumstances.

## 2.2. Regional plan provisions for WMGs

### 2.2.1. Freshwater outcomes

Regional plans under the RMA provide critical context and direction for WMGs, specifying issues and objectives that groups are expected to achieve. If the regional plan is not clear about what outcomes are sought for a catchment, and for specific points within a catchment, WMGs will not know what they are expected to achieve.

Ideally, a regional plan would specify one or more outcomes, e.g. water quality or habitat standards, for every WMG confluence point. Monitoring would be done just upstream of the confluence. To be practical and manageable for WMGs, councils could initially specify, say, between two and four outcomes for any given WMG, based on the most important or sensitive values for that point (or downstream).

Specific water quality and ecosystem health objectives for a WMG confluence point could include some of the following, for example:

- periphyton cover (more than 1 mm thick) not to exceed 30% of streambed<sup>4</sup>
- nitrate (NO<sub>3</sub>) concentration not to exceed 0.2 mg/litre for upland sites or 0.45mg/litre for lowland sites
- macroinvertebrate index (MCI) score to be 100 or greater
- whitebait spawning habitat protected along 200 m of bank in specified reach
- water clarity during baseflows to exceed 1 m black disk reading
- *E. coli* count during baseflows not to exceed 260/ml.

For some streams, it might be appropriate to establish standards for temperature, dissolved oxygen and/or pH. Standards for these might involve multi-day averages and hence might require instream data loggers to collect sufficient data, which are more feasible for WMGs than for individual land users.

It is important to note that the standards listed above are just examples, not recommendations. The actual standards chosen for a given WMG confluence point will depend on the values and circumstances of that catchment. Parameters chosen should be linked as closely as possible to the outcomes sought, while still being practical to monitor. For example, native fish will be an important value for some streams, but it is difficult for land users to monitor the outcome, e.g. fish abundance, without specialised equipment and training. Instead, a WMG might focus on water temperature, MCI or other indices (e.g. the Cox-Rutherford Index<sup>5</sup>) and parameters that are likely to be limiting native fish in that stream, with fish monitoring done periodically by council staff or the Department of Conservation (DOC).

<sup>4</sup> In a defined river segment or section at a specified monitoring interval linked to a flow statistic.

<sup>5</sup> The Cox-Rutherford Index is the average of the daily mean and maximum temperatures over the five hottest days of a continuous temperature record.

Regional plans are unlikely to have detailed outcome standards for every WMG confluence point. Councils will need to work with WMGs (preferably through a catchment-wide group that includes a representative from each WMG; see Section 2.1.1 above) to identify appropriate objectives for each WMG confluence point and sensitive feature, and confirm that together these will enable achievement of the objectives specified in the regional plan for the entire catchment.

For example, suppose that an estuary at the bottom of the catchment is compromised by excessive nutrients and sediment. The council could estimate the total load that is sustainable, i.e. consistent with the desired state of the estuary, and then apportion that load to different WMGs. Or the council could specify water quality or other outcomes at each WMG confluence point that would ensure that the outcomes in the estuary are achieved. If information for these estimates is lacking, it could specify a percentage reduction in loads or interim water quality standards for each WMG and then monitor and adjust these at periodic intervals, e.g. five yearly, based on an adaptive management plan. Other approaches may also be possible. Ultimately, the WMGs and the regional council need to demonstrate to the wider community that they are taking steps that will achieve the outcomes specified in the regional plan.

### **2.2.2. Responsibilities of WMGs**

In addition to specifying the outcomes expected of WMGs, a regional plan that relies on WMGs as a mechanism to achieve objectives needs to have policies and methods to make this work. For example, a regional plan could say that every property exceeding a certain size and with specified land uses must have an approved farm environment plan or be part of a WMG with an approved group environment plan.

The regional plan should specify criteria or conditions for a group to be recognised and what its group environment plan must contain (see next section). Waikato's Proposed Plan Change 1 has criteria for Certified Industry Schemes and, in Hawke's Bay, the collaborative planning group for the Tūtaekurī, Ahuriri, Ngaruroro and Karamu (TANK) catchments is considering proposed requirements for what it calls 'catchment collectives'.

A regional plan should specify that a WMG's environment plan must be approved by the regional council in order for this plan to relieve group members of any requirements that non-WMG members are subject to, e.g. requirements to submit an individual farm environment plan for approval. Councils should consider making this a transparent process so that tangata whenua and interested groups such as Fish & Game New Zealand can comment on plans submitted by WMGs. This need not be through a formal resource consent process, although that is one option.

## **2.3. Content of WMG environment plans**

There are several key elements for effective WMG environment plans.

### **2.3.1. Goals**

A WMG environment plan needs to clearly state the goals of the group. These would include the freshwater values in the WMG area and downstream values that are affected by land use of the group. It is also helpful to have an objective for each value, e.g. at point X, flow and water quality will be suitable for swimming during base flow. The plan then also needs to state the specific targets the group is aiming to achieve, based on the objectives in the regional plan; see Section 2.2.1 of this report.

### **2.3.2. Land use**

The plan should specify the land uses and land use practices being used in the WMG area, and where they are being used. The plan should also state what flexibility members have to change land use practices without triggering a formal review of the plan by the regional council.

### **2.3.3. Mitigation actions**

The plan needs to specify what actions will be taken by the group to maintain and/or improve the health of waterbodies within the group's area. These should be specific enough to ensure that they have the desired effect without being overly prescriptive and thereby discouraging possible innovation. A WMG that has a good relationship with tangata whenua and other parties such as DOC or Fish & Game can check proposed changes with these parties and find out whether they have any objections or can offer constructive suggestions.

### **2.3.4. Monitoring and reporting strategy**

Monitoring and reporting are essential for WMGs to be effective. A WMG's environment plan therefore needs to include a monitoring programme, specifying what will be monitored, with what methods and at what frequency. The plan should also state how this information will be reported to the council, tangata whenua and other interested parties.

Monitoring and reporting should include progress on mitigation actions as well as freshwater outcomes. It is recommended that WMGs obtain external review of their monitoring programmes and annual reports, and that the evaluations are documented.

### **2.3.5. Review**

A group environment plan should have a defined duration and provide for review and replacement of the plan with an updated version. The plan should specify the review dates and could require an early review if targets are not being met.

The review should include, among other things, whether the actions are achieving the plan's environmental standards and whether those standards are sufficient to protect the values identified in the regional plan. The monitoring strategy should also be reviewed and updated.

### **2.3.6. Consequences for non-achievement**

Consequences for non-achievement of actions and targets should also be stated in the group's plan. These could include, for example, early review of the group's environment plan, which could result in the council requiring stronger action to improve outcomes, and enforcement action if there is willful failure to comply with the group's environment plan.

## **2.4. Involvement of tangata whenua and other parties**

Tangata whenua and other interested parties such as the Department of Conservation, Fish & Game New Zealand, and the Royal Forest and Bird Protection Society of New Zealand can play important roles in helping make WMGs successful. These roles can include:

- identifying values at risk (e.g. specific species, uses such as swimming or kayaking, or cultural values such as mahinga kai) in specific locations and suggesting appropriate outcomes and standards for WMG confluence points
- suggesting interventions that would improve outcomes (ranging from riparian planting and protection or restoration of wetlands to possible changes in land use)
- providing labour or funding to assist with interventions such as tree planting, fencing or restoring a wetland
- helping with monitoring at WMG confluence points and sensitive features
- reviewing group and catchment plans and providing constructive feedback to ensure that, taken collectively, there is a good chance that the objectives stated in the regional plan will be achieved
- ensuring that there is a robust monitoring programme to evaluate the effectiveness of interventions and adjust group environment plans accordingly. This could include providing peer review of the monitoring strategy and annual reports.

If tangata whenua and other interested parties are involved in selecting measures to achieve the desired objectives, and in monitoring the effectiveness of these

measures, this will help to create a sense of shared ownership in the task and a sense of community between land users, iwi and others.

These parties should be members of the catchment-wide groups that coordinate the action plans of smaller WMGs. The smaller WMG are encouraged to invite participation from members of the local marae and others who may be particularly interested in the health of freshwater ecosystems within their area of responsibility.

## 2.5. Urban groups

Water management groups could also be effective in urban areas, though some modifications to group structure and function would be required. For example, in urban areas, stormwater is still largely seen as a council's responsibility, rather than something property owners should be helping to manage. There is also lower awareness in urban areas about the implications of land use on local waterbodies. For these reasons, urban WMGs should be informally organised and have non-binding goals—at least until members have a greater understanding and acceptance of the implications of their land use practices.

The most appropriate authority to oversee urban WMGs is likely to be district and city councils, rather than regional councils. While runoff from rural properties discharges directly to waterbodies and therefore is under the authority of regional councils, runoff from urban properties predominantly makes its way into the stormwater network, with only a small amount running off directly to local waterways. As district councils manage the stormwater network and are legally required to meet stormwater discharge consent conditions, it makes sense that district and city councils work with urban WMGs to achieve stormwater management outcomes.

Whereas rural group boundaries will reflect the local stream network, urban groups will be based on the stormwater network. Urban WMGs would likely have more members than rural groups, given the high density of urban properties. Groups of 30-50 properties could be established based on their stormwater runoff to shared stormwater discharge points. Monitoring would take place just downstream of the discharge point to provide feedback to a neighbourhood WMG about progress towards its goals.

## 3. TOPICS FOR FURTHER RESEARCH

New Zealand has only limited experience with water management groups and the context within which these groups operate varies substantially. Research to analyse and learn from the experience of these groups would help land users, councils and

other parties to formulate group features and regional council plans to enable groups to perform most effectively.

### 3.1. Practical matters

Almost every aspect of the preliminary guidance provided in the previous section would benefit from research on how it is working in practice. Scale—how much area and how many properties a group should comprise, and how to nest small groups within larger groups—is a key area for research. Suggested topics include the following:

#### Group formation and structure

- What are the advantages and disadvantages of small vs large groups?
- How should group boundaries be defined relative to stream catchments?
- What are the options for nested groups and what are the pros and cons of different approaches? How can a whole-of-catchment group align the plans of all WMGs within the catchment?
- What should terms of reference or articles of agreement for a WMG contain?
- What are the advantages and disadvantages of groups having formal legal status, what options have been trialled and how did they perform?
- What roles do tangata whenua and other interested parties have with WMGs? What seems to work best?

#### Standards, plans and monitoring

- How have WMG responsibilities been defined in regional plans and how have these worked? What are the advantages and disadvantages of different options?
- What parameters and standards have WMGs and councils used to define the outcomes that WMGs are supposed to achieve and how useful were these? Which standards are both practical to monitor and meaningful for freshwater outcomes?
- What monitoring strategies and methods have been used by WMGs and councils? What are the advantages and disadvantages of different approaches?
- How do WMGs perform in terms of meeting freshwater outcomes relative to land users working on their own including relative to catchments without WMGs?

#### For urban groups

- How can urban groups be supported and encouraged to form WMGs? What roles should regional councils play relative to district and city councils?
- What is an appropriate group size in an urban context?

- What obligations, if any, should councils impose on urban property owners to control stormwater runoff? Does this vary for residential and commercial properties?

### 3.2. Broader implications

In addition, there are broader questions and implications for how WMGs function. Important topics include the following:

- How do WMGs manage internal dynamics of agreeing on a group plan, monitoring compliance with the plan and enforcing sanctions on members who are not compliant?
- Most collective management groups reported in the academic literature evolved over decades or centuries. What happens when we try to create such groups in a short period of time? How does trust develop between members?
- Who is advantaged and who is disadvantaged by collective management of freshwater outcomes? Does this approach tend to mitigate or exacerbate power differentials within society?
- What can we learn from Mātauranga and Tikanga Māori about managing use of resources by members within a group or community? Do New Zealand's bicultural governance arrangements and multicultural demographics suggest a unique approach to collective management?
- What effects do WMGs have on relationships between rural and urban residents and how does this vary with the amount of involvement of other parties with the WMG?
- What capacity do regional councils and territorial authorities have to support WMGs? How can they best service the information and monitoring needs with limited resources?
- What other common pool resource problems could be managed by collective management approaches? What can we learn from the experience of local pest management groups? Fisheries quota holders? Can we extend learnings from WMGs to help these groups?

## 4. CONCLUSIONS

Diffuse effects from intensified urban and rural land uses on water bodies are difficult for regional councils to manage and equally difficult for individual land users to address. Because outcomes at sub-catchment and catchment scales are the result of

multiple stressors originating from multiple properties, RMA policies and rules aimed at individual properties may not achieve the objectives specified in regional plans.

WMGs offer a way through this problem, and many groups have emerged around New Zealand over the past 15 to 20 years to address local issues. To use this approach more widely under the National Policy Statement for Freshwater Management, however, will require a more deliberate and structured approach, so that the combined actions of all the groups in a given catchment will achieve the community's desired outcomes for that catchment.

This report describes the authors' preliminary guidance to WMGs, regional councils and other interested parties on how WMGs can be established and on what regional council plans could contain to improve the likelihood that groups will achieve the desired freshwater outcomes. These recommendations need to be tested in real-life situations, with research to document, analyse and share the findings in order to increase the effectiveness of this promising new approach to freshwater management.

## 5. ACKNOWLEDGEMENTS

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