

PUBLIC PERCEPTIONS OF NEW ZEALAND'S ENVIRONMENT: 2010

Kenneth F. D. Hughey | Geoffrey N. Kerr | Ross Cullen

2010

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**Lincoln
University**
Te Whare Wānaka o Aoraki

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Obtaining further copies

Further copies of this document may be obtained from:

LEAP

Faculty of Environment, Society & Design

6th Floor, Forbes Building

P.O. Box 84

Lincoln University

Lincoln 7647

New Zealand

Phone: +64 (3) 325-3627

Facsimile: +64 (3) 325-3627

Email: michelle.collings@lincoln.ac.nz

Email: leap@lincoln.ac.nz

SUMMARY

The sixth biennial survey of people's perceptions of the state of the New Zealand environment was undertaken in March-April 2010. The survey is based on the Pressure-State-Response model of state of the environment reporting and is the only long-running survey of this type in the World. New Zealanders' perceptions of all the main resource areas, and more specifically the freshwater environment (including repeats of some questions asked about this resource in 2004 and 2008), were tested. For our postal survey we sampled 2000 people aged 18 and over randomly selected from the New Zealand electoral roll. An effective response of 35% was achieved. (A companion electronic survey was also undertaken for the first time and raw data from this is also reported.) Statistical analyses of the responses were undertaken to determine the roles of several socio-demographic variables.

Amongst a very large set of PSR findings some that are notable include:

- New Zealanders continued to consider the state and management of the New Zealand environment to be good, and better than in other developed countries;
- Air and coastal waters and beaches were rated to be in the best state of the 11 components of the environment studied. Rivers and lakes, marine fisheries and wetlands continued to be perceived to be in the worst state, but were still rated highly;
- Management of most components of the environment studied has improved significantly over the course of the five surveys. Groundwater, rivers and lakes, and marine

fisheries were judged to be the least well managed of the 13 resource areas;

- Management of farm effluent and runoff continued to be perceived to be the least well managed of the environmental problems investigated; and
- Water pollution and water related issues were rated as the most important environmental issue facing New Zealand. On a global basis, climate change/global warming was seen as the most important issue for around a third of respondents.

Overall findings regarding the freshwater case study were similar between the 2004 and 2008 surveys and this survey. The general state of freshwater is good but there are issues at regional and local levels with streams and sometimes with lakes. Ethnicity was an important determinant of freshwater perceptions, with New Zealand European and Maori respondents almost always more concerned than people of other ethnicities—the consistent pattern is startling. In terms of freshwater generally it is clear respondents want high quality water and value freshwater for its intrinsic, environmental and recreation values; while they consider development important they rate maintaining instream values more highly. These views are consistent with long term aims around the need for resource conservation in terms of freshwater. Finally, in order to achieve desired outcomes respondents favour integrated approaches which combine economic, regulatory and voluntary instruments, while in a complementary way they are strongly supportive of charging for the commercial use of freshwater.

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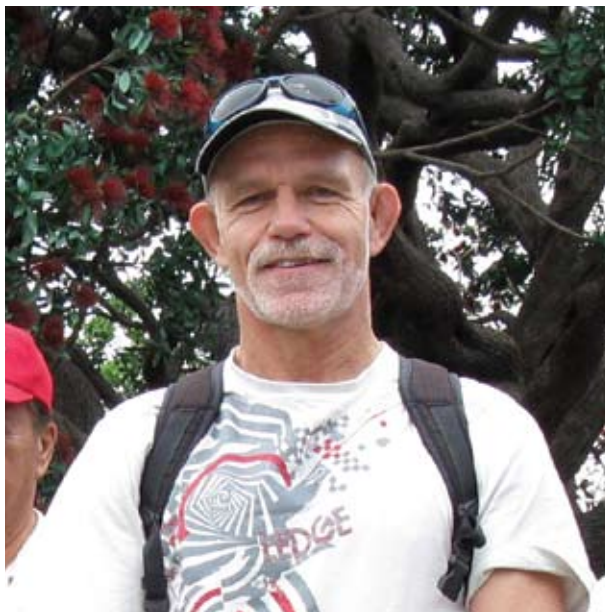
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We also thank Fujun Shen who assisted with data analysis and graph preparation.



*The authors; Ken Hughey (top),
Geoff Kerr (middle), Ross Cullen (bottom).*



SHELLEY MCMURTRIE

Kaikoura Ranges, South Island

INTRODUCTION

1.1 BACKGROUND

The first survey of New Zealanders' perceptions of the State of the Environment was performed in 2000 using a survey questionnaire constructed around a Pressure-State-Response model. Hughey *et al.* (2001) provides background, justification of the survey approach used, and results. The OECD (1996) and Ministry for the Environment (1997) explain the pressure-state-response model, which is used internationally as the basis for environmental reporting. The model is used primarily in reporting biophysical monitoring data – our translation of the model into the perceptions arena means we have needed to take a broad 'socially constructed' interpretation of each of the key components of the model, i.e., 'pressure', 'state' and 'response'. For example, we consider state to include, for some resources, both condition and amount, either individually or in combination.

The 2000 postal survey (Hughey *et al.* 2001) was designed to be undertaken biennially and subsequent surveys were undertaken in 2002, 2004, 2006 and 2008 (Hughey *et al.* 2002a, 2004, 2006, 2008). Some findings from the 2006 survey were included in the 2007 OECD *Environmental Performance Reviews – New Zealand* report (OECD 2007).

This publication reports the results of the sixth biennial postal environmental survey undertaken in 2010 and includes a comparison with previous survey findings. The addition in 2010 of a partner electronic survey using the same questions as the postal survey is an important development that sends a signal about future management of the survey – details of the implications of this approach are provided in Chapter 2.

1.2 RESEARCH OBJECTIVES

The main aims of the research are to measure, analyse and monitor changes in New Zealanders' perceptions, attitudes and preferences towards a range of environmental issues, ultimately contributing to improved state of the environment reporting. Specific objectives are to:

- Implement a questionnaire, operated biennially, to measure and monitor New Zealanders' environmental attitudes, perceptions, and preferences;
- Provide independent commentary on environmental issues of public concern as a contribution to public debate and a means of alerting government and others to these issues;
- Provide opportunities for organisations and other researchers to derive one-off research data for individual areas of interest, including teaching purposes; and
- To report biennially, via a published report and other research publications, on findings from the research.

Waterfall into Lake Waikaremoana, North Island.





02

SHELLEY MCMURTRIE

Black beech forest on Kirwans Track, West Coast, South Island

SURVEY METHOD

A postal questionnaire based on the Pressure-State-Response (PSR) model and previous surveys in this series were used to gather information on New Zealanders' perceptions of the environment and environmental management. In 2010 an electronic survey was introduced to complement the postal survey. The postal and electronic surveys were selected as the best methods of gathering PSR information. The large number of questions deemed a telephone survey unsuitable and interviews would have been too expensive and cumbersome for adequately sampling the New Zealand population.

2.1 THE 2010 QUESTIONNAIRE

The postal survey items were presented in a 22 page (four more than in 2008) A5 booklet with questions on facing pages (see Appendix 1). The electronic survey contained the same questions on 14 screen pages. A letter of introduction stated the purpose of the questionnaire, introduced the questionnaire topics and invited voluntary participation. There were 227 questions, asked in sets, requiring respondents to either circle a number or tick a box to indicate their response.

The PSR framework guided the development of survey questions. Two sets of questions assessed perceptions of the state of the environment (**state** questions) and two sets of questions assessed perceptions of the quality of resource management (**response** questions). For all of these measures a 'don't know' option was provided. Perceived **pressures** were assessed by another set of questions.

Further questions supplemented the PSR framework. Respondents were asked what was the most important environmental issue facing New Zealand and also the world today and why these issues were chosen.

Participation in fifteen activities was measured to explore relationships between environmental behaviour and responses to the PSR framework. Twelve questions sought demographic information. The dynamics of relationships between demographic information and concern for the environment have been well documented (e.g., Jones and Dunlap, 1992) and these are explored biennially using survey responses. A question on ethnic origin was introduced in 2002. It revealed substantial differences between ethnic groups in responses to some questions. The question on ethnic origin was retained in following surveys, with an Asian ethnic origin category being included from the 2006 survey. A question on respondent's place of residence was added to the 2006 survey, organised by regional council boundaries. A further question determined whether respondents lived in an urban area (town or city of 1,000 people or more) or rural area (countryside or a town of less than 1,000 people). In 2008, an additional question on respondent's occupation was included in the survey.

Knowledge, standard of living, and 'clean green'

The questionnaire began by asking for a self-assessment of respondents' knowledge of the environment, and their assessment of the overall standard of living in New Zealand with the invitation: 'We would like your opinion on the following issues.' The questions were: 'Your knowledge of environmental issues is ...', 'The overall standard of living in New Zealand is ...', 'The overall state of the natural environment in New Zealand is ...'. Measurements were taken on five-point scales anchored by 'very good' and 'very bad'. The fourth question asked for an assessment of how 'clean and green' New Zealand is. In 2002 respondents were asked if they agreed with a statement: 'New Zealand's environment is regarded as "clean and green"', which was changed slightly in 2004 to read 'New Zealand's environment is "clean and green"'. Measurement was on a five-point scale anchored by 'strongly agree' and 'strongly disagree'.

The state of the environment

To measure the state of the environment two sets of questions were asked about (i) the quality or condition, and (ii) the availability or amount of various resources. In the 2000-2004 surveys a third question set asked whether the environment had changed over the last five years. This question was omitted from the 2006 questionnaire as analysis of the previous survey data showed that results remained consistent over the years and by 2006 sufficient perceptions data were available from previous surveys. This change was retained for the 2008 and 2010 surveys.

The first question set was preceded by the instruction: 'Please indicate what you think the condition of each of the following is.' Followed by: 'The condition of New Zealand's ...'. The eleven aspects were then presented with a five-point measurement scale anchored by 'very good' and 'very bad'.

The second set of questions regarding the state of the environment measured perceptions of the amount or availability of ten natural resources. These were measured by asking: 'Now we would like your opinion on some of our natural resources.' The set of ten natural resources was preceded by: 'New Zealand's ...'. Five-point scales provided for measurement were anchored by 'very high' and 'very low'.

Adequacy of environmental management

Information on the adequacy of environmental management was sought by asking two sets of questions, the first regarding the management of six specific resources and the second designed to measure perceptions about current management of aspects of New Zealand's environment.

The first set of questions asked ‘What do you think of the management of the following items?’, followed by: ‘Management of New Zealand’s...’. Six specific ‘management of resource’ issues (e.g., sewage disposal) were then presented, measured along a five-point scale anchored by ‘very good’ and ‘very bad’.

The next set of questions on the current management of aspects of New Zealand’s environment presented thirteen items preceded by: ‘What do you think of the management of each of the following?’ followed by ‘Currently New Zealand’s...’. These items were each presented with a five-point scale anchored by ‘very well managed’ and ‘extremely poorly managed’.

Pressures on the environment

Perceived causes of damage to parts of the New Zealand environment were measured by presenting a table containing ten resources with fifteen potential causes of damage. Respondents were instructed to select up to three causes of degradation for each environmental component. This approach was designed to ease the cognitive burden that would have been placed on respondents if they were required to select the single most important item from the fifteen presented. Respondents were invited to respond with: ‘Please tell us what you think are the main causes of damage to parts of the New Zealand environment by ticking up to three causes on each row across the page.’

Participation in environmental activities

Measurements were taken of respondent participation in fifteen activities related to the environment. In 2000 respondents were asked: ‘Please indicate if in the last twelve months you have...’ followed by thirteen environmental activities. Measurements were taken using either ‘Yes’, ‘No’ or ‘don’t know’ options. The question was modified slightly in the 2002 survey by adding ‘Regularly’ as an option in addition to the ‘Yes’ response. This has been retained through subsequent surveys, with the addition of two activities in 2006 [‘Reduced, or limited your use of freshwater’, and ‘Made a financial donation to a non government environmental organisation (e.g., Forest and Bird)’].

Holidays and climate

In 2010 one page of 12 questions focused on holidays and climate in New Zealand. This question was included because one of the researchers (KH) was part of a Foundation for Research Science and Technology project team researching tourism and adaptation to climate change. While summary data are presented in Appendix 3 of this report, further analysis will be reported separately.

Freshwater Resource Questions

In 2010 questions were asked about the quality and management of freshwater resources, namely rivers and streams, aquifers (groundwater) and lakes. Some of the same questions had been asked in the 2004 and 2008 surveys. Other questions in 2010 explored a range of issues around: the most important values and desired futures for freshwater; perceived effectiveness of different water management approaches and their political acceptability; and the acceptability of paying for commercial use of water:

- The first questions concerned the quality of water in the river/stream and lake (a) closest to where the respondent lived, (b) in the respondent’s region and (c) in New Zealand.
- The next questions asked respondents about the extent to which they agreed or disagreed with 14 statements about the state of freshwater, who should be involved in its management and other related issues.
- The following two questions concerned respondent knowledge about organisation responsibility of freshwater management functions, and about perceived contributions of these to environmentally sustainable water management outcomes.
- Organisation water management function performance was then examined using a 5-point Likert scale anchored by ‘extremely poor’ and ‘extremely good’, and with a ‘don’t know’ option.
- A related question was then asked, using the same scale, about how well the respondent’s regional council was managing water.
- These management questions were followed by an open-ended question concerning suggestions for changes to water management in New Zealand.
- Measurements were taken of respondent participation in 10 activities related to freshwater management. Respondents could choose from three responses: (i) Yes, in the last 12 months, (ii) Yes, undertaken at some time, and (iii) No, never undertaken. A ‘none of the above’ option was also provided.
- A question delivered in three parts explored how respondents prioritised different values of rivers and streams, lakes, and aquifers/underground water. The values explored were recreation, scenic/visual, nature, commercial use, customary Maori, and community household and other use. Respondents were asked to respond on a 5-point Likert scale anchored by ‘totally irrelevant – not a consideration’ to ‘critical – the most important thing to consider’.

- Seven sets of questions then explored the effectiveness of different combinations of approaches to managing freshwater resources. These approaches were regulation, economic instruments, voluntary/advocacy. Effectiveness was considered in terms of how well the approaches achieved (a) environmental protection, (b) economic growth, and (c) benefits to society. Respondents could choose from a 5-point Likert scale anchored by 'extremely effective' and 'very ineffective' supplemented with a 'don't know' option.
- The final three freshwater-related questions presented sets of statements for respondents to evaluate. The first set of 11 statements examined the extent to which respondents agreed or disagreed with statements about policy approaches for freshwater management and the likely outcomes these might achieve. These questions were followed by further questions asking about the political acceptability of these approaches for managing freshwater, singularly or in combination. Finally, respondents were asked to evaluate nine statements about future states of freshwater in New Zealand. All responses were on 5-point Likert scales, with an additional 'don't know' option.

Environmental issues

As in previous years, the survey ended by asking 'What do you think is the most important environmental issue facing New Zealand today?' The 2006 survey added the question 'What do you think is the most important environmental issue facing the world today?' In addition, for both these questions respondents were asked 'Why did you choose this issue?' This set of questions was retained in the 2008 and 2010 surveys. An open space was provided at the end of the survey for respondents to add anything further that they wished to say.

Demographic information and representativeness

Information was sought regarding gender, number of household members, age, country of birth, ethnicity, residential region, rural or urban residence, education, current situation (e.g., student, retired or in paid employment), the industry the person worked in or had last worked in, occupation and personal income. Where possible these were measured using categories closely corresponding to data categories reported in the New Zealand Census. Key demographic information for the 2010 survey(s) is provided in Appendix 2. In the 2000, 2002 and 2004 surveys, numbering of each survey allowed identification of respondents' residential

locations, which were subsequently categorised into three regions: Northern, representing north of the Bombay Hills; Central being the rest of the North Island; and Southern being the South Island. In the 2006 survey a specific question enabled respondents to identify which regional council area they lived in, with subsequent tabulation allowing Northern, Central, and Southern 'mega' regions to be identified. This change was retained for the 2008 and 2010 surveys.

To determine representativeness of the postal survey sample it was compared with currently available official statistics (Statistics NZ 2006, Census of NZ 2006). The following key points can be drawn about the postal survey sample:

- Females are over-represented;
- Those aged under 50 are under-represented;
- Those earning less than \$20,000 per annum, are under-represented;
- Those with no educational qualifications are under-represented;
- NZ European respondents are slightly over-represented, while Pacific Islanders are highly under-represented.

Despite the difference of these distributions from the 2006 Census distributions and from related data, the large sample and relatively high response rate are judged to be an adequate basis for making comment on New Zealanders' views about the environment.

There are differences between the postal and electronic surveys. We will examine the extent and implications of these differences before deciding on whether to run just a postal or just an electronic survey, or both, for our next survey iteration. Here, we simply report the unweighted summary data from the electronic survey in Appendix 3.

2.2 PRE-TESTING

Pre-testing followed a cognitive interview process described in Dillman (1998). Several individuals were interviewed about each of the questions in the 2000 survey and were also asked about new draft questions in subsequent surveys. MfE staff worked closely on design of the freshwater-related questions. Subsequently, some minor adjustments were made to the questionnaire. The survey instrument has been scrutinised and approved by the Lincoln University Human Ethics Committee.

2.3 METHODS OF ANALYSIS

Descriptive data from the postal survey are provided in Section 3, along with a comparison of 2010 survey results with those from previous surveys. Relationships between selected PSR framework components and demographics are also presented in Section 3. Chi-square tests (χ^2) were used to test for intertemporal changes in responses. Data aggregation was necessary in some areas because there were too few valid responses to enable robust tests to be applied. Due to the very large number of relationships tested, in general only summarised results for significant relationships ($p < 0.05$ or greater) are reported.

2.4 DISTRIBUTION

Two thousand postal survey questionnaires were distributed to randomly selected individuals drawn from the most recently available New Zealand electoral roll. Booster sampling targeted six low population regions, namely Gisborne (100 additional surveys), Hawkes Bay (50), Taranaki (50), Nelson (100), West Coast (100), and Southland (50). The purpose of the booster survey was to improve statistical validity of inter-regional comparisons – the lower than expected response rate to the 2010 survey has however marginalised the value of some of these boosters. Here we focus mainly on national level responses, with primary emphasis on inter-temporal comparisons. Consequently, booster samples have not been used here, but will be used (with care given the response rate issue) in future analyses of regional differences in environmental perceptions.

The questionnaire and the letter of introduction were posted with a freepost return envelope. The questionnaires were posted on 12th March 2010. In addition, a follow-up postcard was sent on 26th March 2010 and a second questionnaire was posted to non-respondents 3rd May 2010.

The electronic survey was implemented under contract by ShapeNZ (based at the NZ Business Council for Sustainable Development, Auckland). They maintain a database of around 7000 volunteers who are on email – the ShapeNZ database was open for electronic survey responses over the same time period as the postal survey was operating. All responses were recorded automatically by ShapeNZ. For both surveys anonymity was assured.

2.5 RESPONSE

After accounting for known undeliverable surveys, effective postal survey response rates have been:

2000	48%	<i>N</i> = 894
2002	45%	<i>N</i> = 836
2004	43%	<i>N</i> = 820
2006	46%	<i>N</i> = 880
2008	40%	<i>N</i> = 752
2010	35%	<i>N</i> = 610

All postal surveys had maximum margins of error of 3% at the 95% confidence level. There were 2477 responses to the electronic survey, for which the response rate is unknown.

The lower response rate in 2010 relative to earlier postal surveys is concerning – some of the components of the freshwater case study were complex and might have led to a significant decrease in the response rate. For example, the individual components of the question regarding effectiveness of different policy approaches received only around 450 (out of a potential 610) responses – see Appendix 3. It was possible to track cessation points for those undertaking the electronic survey – the majority of cessations occurred during the freshwater section.

2.6 MAJOR CHANGES IN THE 2010 SURVEY

In summary the following changes and additions have been made from the 2008 survey:

- Whereas the major case study in 2008 addressed conservation, in 2010 it concerned freshwater.
- Questions about conservation and resource-based recreation have not been included in this survey.
- Booster samples were included in the postal survey to increase total *N* in low population regions, thus allowing further regional analysis should such be desired – these boosters of course are excluded from the analysis presented here because they would heavily bias the overall sample toward rural and smaller city respondents.
- A stand alone electronic survey was trialled in 2010.



SHELLEY MCMURTRIE

Pivot irrigator, Canterbury

03

PRESSURE-STATE-RESPONSE ANALYSIS BY QUESTION

3.1 KNOWLEDGE OF THE ENVIRONMENT, STANDARD OF LIVING, STATE OF THE ENVIRONMENT AND 'CLEAN AND GREEN'

The 2010 Survey

This section reports findings grouped by question type, which provides the clearest depiction of the relative evaluations of different environments. Chapter 4 presents an overview of all results for each environment. Appendix 3 reports data for each of the items addressed in this chapter, and also includes corresponding data for the e-survey.

Most people considered their environmental knowledge to be 'adequate' (56.2%) or 'good' (27.6%, Figure 3.1). The vast majority considered the standard of living in New Zealand to be 'good' or 'adequate' (80.2%, Figure 3.2). The state of the New Zealand environment is considered to be 'adequate' to 'good' (78.2%, Figure 3.3). Although most people agreed with the statement that New Zealand's environment is 'clean and green' (52.1%), there was also a high number who neither agreed nor disagreed (25.8%), and 20.6% who disagreed (Figure 3.4).

Trends 2000–2010

In each survey most respondents reported they had 'adequate' or 'good' knowledge of environmental issues. Very few respondents reported 'bad' or 'very bad' knowledge. There was a slight increase in percentage of respondents who considered their knowledge to be 'very good' in the 2010 survey. Changes over the six surveys were statistically significant ($P < 0.05$).

As Figure 3.2 shows, over the period 2000 to 2004 the overall standard of living in New Zealand was viewed increasingly positively. The 2006 and 2008 surveys had slight reductions in the good and very good categories and an increase in the 'adequate' response. This change was reversed slightly in 2010. The overall change over the six surveys has high statistical significance ($p < 0.001$), but is of small magnitude.

There has been no statistically significant trend in people's perceptions of the state of the New Zealand environment in the three years this question has been asked.

Figure 3.4 shows that in 2002, two thirds of respondents either 'agreed' or 'strongly agreed' that New Zealand's environment is 'clean and green'. However, in 2004 this decreased to just over 50% of respondents and that level was maintained in 2006. There was a further slight decline in 2008 and 2010. It seems that more people are unconvinced of New Zealand's 'clean and green' status and the difference in responses between the five surveys is statistically significant ($p < 0.001$). Note that the wording of the question changed between 2002 and 2004, with the original statement being 'New Zealand's environment is regarded as "clean and green"' (emphasis added). In 2004 this changed to 'New Zealand's

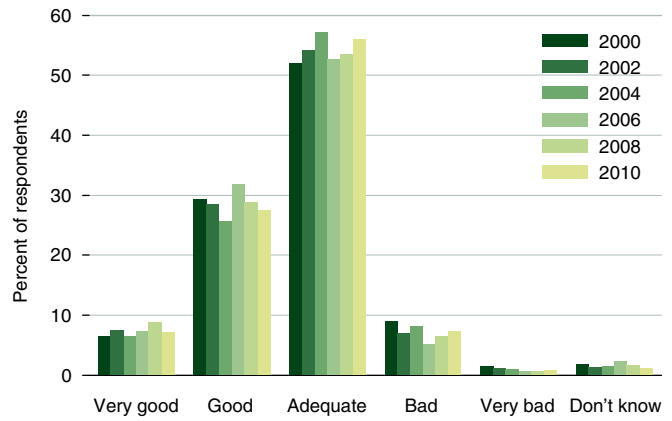


Figure 3.1. Knowledge of environmental issues.

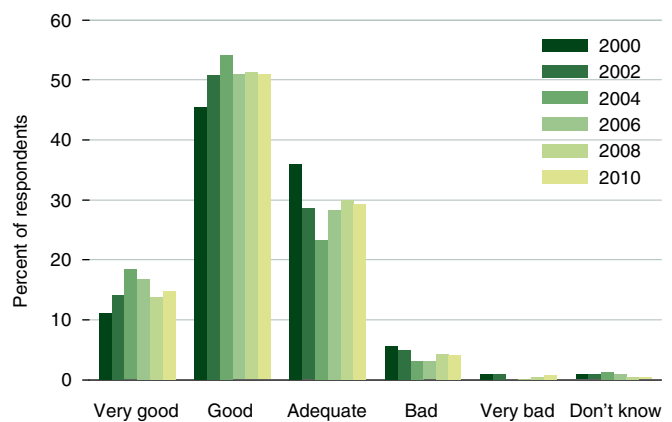


Figure 3.2. Standard of living in New Zealand.

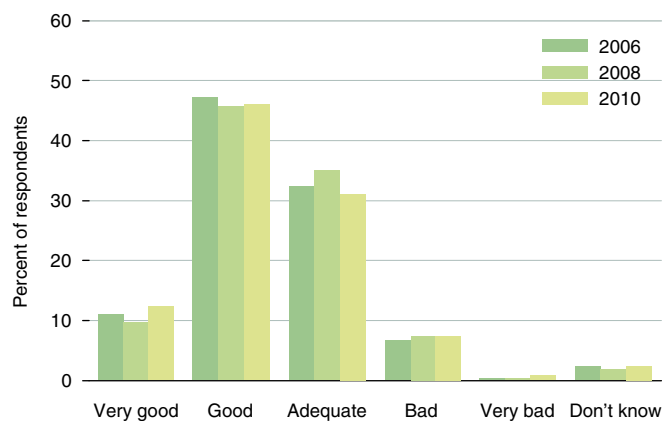


Figure 3.3. State of New Zealand's natural environment.

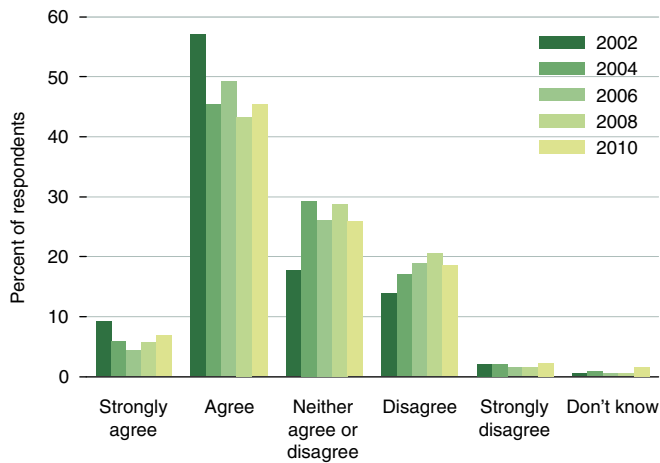


Figure 3.4. New Zealand's environment is 'clean and green'.

Table 3.1. Significant changes (cells with asterisks) in 'state' and 'response' ratings between the 2000 and 2010 surveys (note however that for rivers and lakes, and for groundwater, data are only for 2004–2010). (↓) = deterioration; (↑) improvement; NA = not asked in all six surveys. Cells with only asterisks indicate significant changes between years, but with no consistent trend.

	State	Availability	Management
Natural environment in towns and cities		NA	*(↑)
Air	*** (↓)	NA	*** (↑)
Native land & freshwater plants & animals			*** (↑)
Native bush and forests	** (↑)		*** (↑)
Soils	(↓)	NA	** (↑)
Coastal waters & beaches	*** (↑)	NA	*** (↑)
Marine fisheries	(↑)	**	*** (↑)
Marine reserves	NA	*** (↑)	*** (↑)
Rivers and lakes		*	*** (↑)
Groundwater			
National Parks	NA		*** (↑)
Wetlands			*** (↑)
NZ's natural environment compared to other developed countries		NA	*** (↑)

The number of asterisks indicates the strength of significance: * Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$.

environment is “clean and green”, with the same five-point scale. Care should therefore be taken in comparing results. In 2002 people may have been reporting their perceptions of other people's views, whereas the 2004 and later wording was designed to encourage survey respondents to report their own views.

3.2 CHANGES IN RATINGS FOR STATE AND MANAGEMENT OF THE ENVIRONMENT

Table 3.1 presents a summary of significant changes between 2000 and 2010 in ratings of the state of the environment and its management. Freshwater was split into 'water in rivers and lakes' and 'groundwater' from the 2004 survey, and the category 'other natural environments' was excluded from the 2004 and subsequent surveys. Consequently, ratings about these items are compared over only four surveys.

In the 2008 survey (Hughey *et al.* 2008:11) there were significant differences in responses between surveys in 21 cases, with 16 items exhibiting clear trends over the five surveys, and they were:

<i>Condition of air quality</i>	<i>Worse</i>
<i>Management of air quality</i>	<i>Better</i>
<i>Management of native land and freshwater plants and animals</i>	<i>Better</i>
<i>Condition of native forests and bush</i>	<i>Better</i>
<i>Management of native forests and bush</i>	<i>Better</i>
<i>Management of soils</i>	<i>Better</i>
<i>State of coastal waters and beaches</i>	<i>Better</i>
<i>Management of coastal waters and beaches</i>	<i>Better</i>
<i>Management of marine fisheries</i>	<i>Better</i>
<i>Management of marine reserves</i>	<i>Better</i>
<i>Amount of freshwater in rivers and lakes</i>	<i>Worse</i>
<i>Management of rivers and lakes</i>	<i>Better</i>
<i>Availability of groundwater for human use</i>	<i>Worse</i>
<i>Management of national parks</i>	<i>Better</i>
<i>Management of wetlands</i>	<i>Better</i>
<i>Management of NZ's natural environment compared to other developed countries</i>	<i>Better</i>

Addition of the sixth (2010) survey dataset has led to a few changes in trends, mostly in a positive direction (Table 3.1). Continuing to be most notable is the perceived overall improvement of management of all resources (apart from groundwater) over the 2000–2010 period. In contrast, there are few significant changes to evaluations of 'state' or 'availability' over time, which is continuing to suggest that there may be a lag between improved management and improved outcomes.

3.3 THE STATE OF THE ENVIRONMENT

3.3.1 Quality of the New Zealand environment

The 2010 Survey

The quality of the New Zealand environment was measured on five-point Likert scales ranging from 'very good' to 'very bad'. Figure 3.5 shows that respondents generally rated the state of the New Zealand environment to be 'good' or 'adequate'. However, New Zealand's natural environment was rated to be 'good' or 'very good' when compared with other developed nations. In 2010 four specific resources (air, native bush and forests, soils, and coastal waters and beaches) scored very positively. Rivers and lakes were considered to be in the worst condition, with 23.2% of respondents rating them as 'bad' or 'very bad'. Wetlands, marine fisheries and groundwater received the largest number of 'don't know' responses (each with more than 10%).

Trends 2000–2010

Figure 3.6 shows mean Likert scores for 11 environmental aspects, including nine that have been included in all six surveys. Most aspects showed an improvement in perceived quality from 2000 to 2002, then a decline or a relatively static position from 2002 to 2010. The exceptions are air quality, which shows a declining trend from 2000-2006 and then improvement ($p < 0.001$), and native bush and forests, and coastal waters and beaches, which both show a significant improvement ($p < 0.001$) over the period of the six surveys.

The state of New Zealand's environment compared to other developed countries received the best rating each year despite a small decline since 2002, with a mean value between 'good' and 'very good'. All other environmental aspects were rated as 'adequate' or 'good', with native bush and air quality receiving slightly higher ratings, and marine fisheries and wetlands receiving lower ratings. Rivers and lakes, measured as a combined resource from 2004 to 2010, received the lowest ratings.

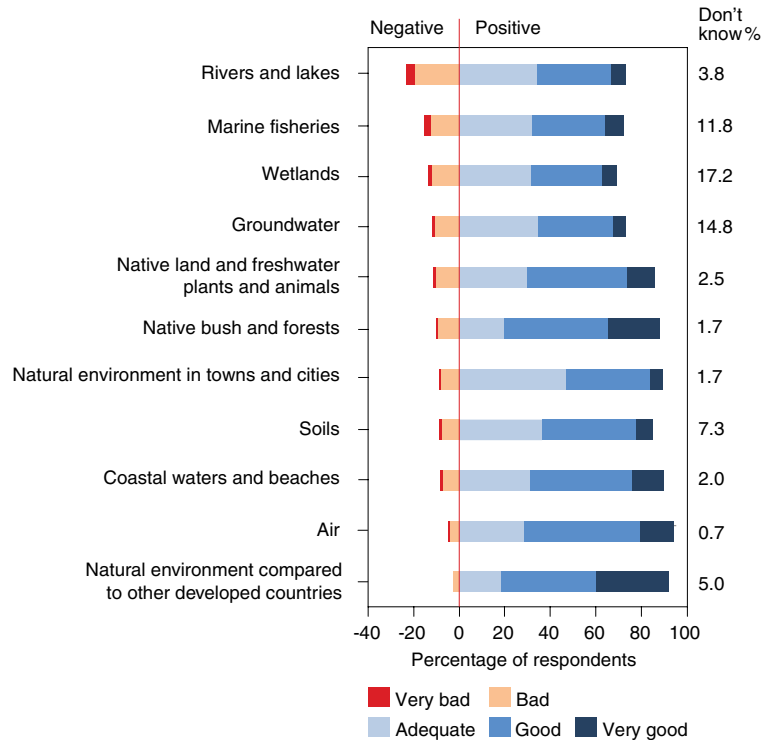


Figure 3.5. Perceived state of the environment.

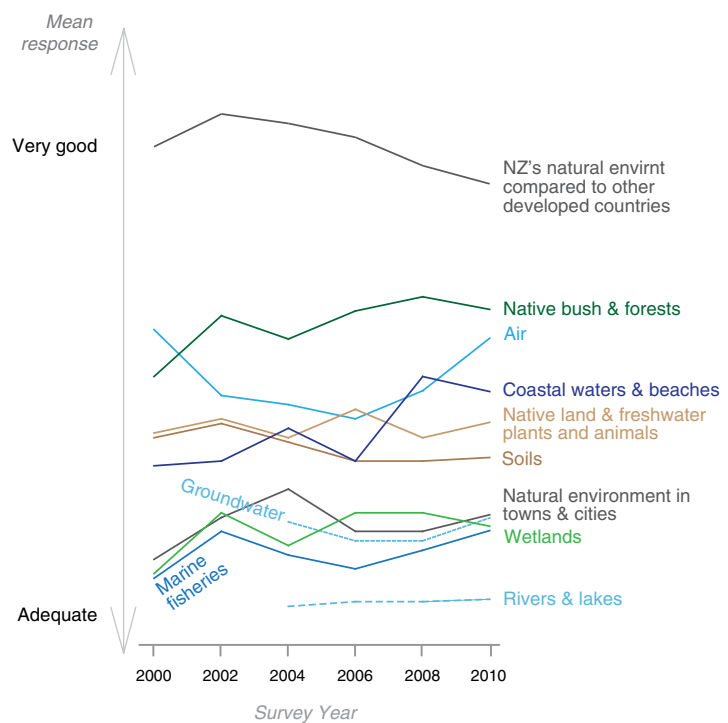


Figure 3.6. Trends in perceived state of the environment.

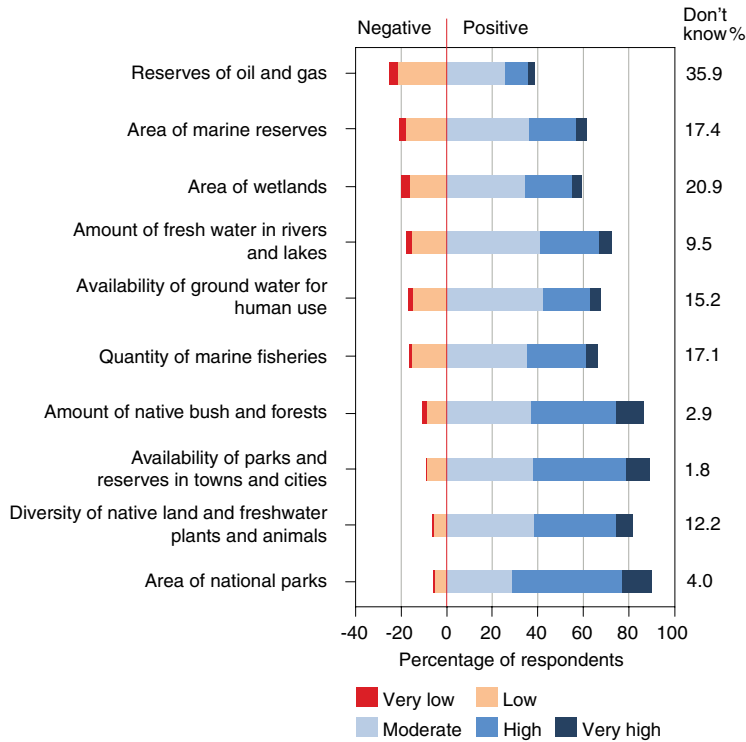


Figure 3.7. Perceived availability of natural resources.

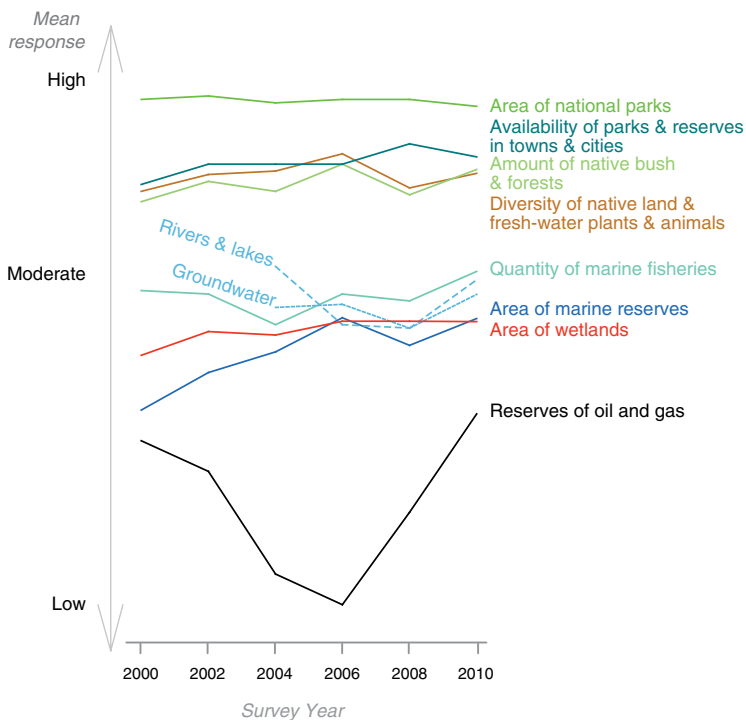


Figure 3.8. Trends in perceived availability of natural resources.

3.3.2 Resource availability

The 2010 Survey

Respondents' assessments of New Zealand resource availability are shown in Figure 3.7. The lowest availability rating was for reserves of oil and gas, with around a quarter of respondents rating availability as 'very low' or 'low'. Area of marine reserves, area of wetlands, quantity of marine fisheries, and availability of groundwater for human use were considered to have 'moderate' to 'low availability'. The area of national parks had the highest rating, with 60.9% of respondents rating it 'high' or 'very high'. The availability of parks and reserves in towns and cities, the diversity of native land and freshwater plants and animals, the amount of native bush and forests, and the amount of freshwater in rivers and lakes were also rated 'high' or 'moderate'. Several resources received a high number of 'don't know' responses, especially reserves of oil and gas (35.9%) and area of wetlands (20.9%).

Trends 2000–2010

Figure 3.8 shows mean Likert scores for the eight natural resources that were included in all six surveys, and the two additional resources included only from 2004 to 2010. Perceptions on the reserves of oil and gas changed appreciably between 2006 and 2010, with an overall improvement occurring ($p < 0.001$). Ratings of the area of marine reserves retains a significant improving trend ($p < 0.001$) despite a slight decline in 2008.

The remaining natural resource ratings changed little over the six surveys and all retained their relative positions, despite some demonstrating considerable variation over this time, e.g., marine fisheries. It is interesting to note the change in spread from 2000, with 2008 and 2010 results showing groupings of native bush, animals, and parks and reserves at the higher availability end of the scale, marine reserves, fisheries, rivers and lakes, groundwater and wetlands converging to a moderate level, and with reserves of oil and gas standing out as having the lowest availability (despite its 2010 increase).

3.4 MANAGEMENT OF THE ENVIRONMENT

3.4.1 Management of environmental activities

The 2010 Survey

Survey respondents were asked to evaluate the management of six items on a five-point Likert scale that ranged from 'very good' to 'very bad' (Figure 3.9). A high percentage of respondents thought that the management of farm effluent and runoff (54.7%) was 'bad' or 'very bad'. Pest and weed control had high frequencies of 'good' or 'very good' management ratings (28.1%), and 'bad' or 'very bad' ratings (27.5%). The management of solid waste and sewage disposal were mainly seen as adequate. Hazardous chemicals use and disposal had the largest 'don't know' response (19.6%).

Trends 2000–2010

In 2008, for the first time over the survey period the mean rating of quality of management activities rose above adequate for two activities, namely pest and weed control, and sewage disposal – these ratings were retained in 2010. However, Figure 3.10 also shows continued improvement in people's rating of the management of solid waste disposal and (for 2002–2010) industrial impact on the environment. The exception is the management of farm effluent and runoff, for which the rating was much worse in 2002 than in 2000, but showed a slight improvement in 2004 and again in 2006, before once again declining in 2008 and still further in 2010.

There are significant differences in ratings of all management activities over the six surveys (Table 3.2).

Table 3.2. Trends in perceptions of management activities.

Management activity	Probability	Trend
Pest and weed control	$p < 0.001$	consistent improvement 2000–2004; slight decline 2006; major improvement 2008; minor decline 2010
Solid waste disposal	$p < 0.001$	consistent improvement 2000–2004; steady 2006; improvement 2008 and 2010
Sewage disposal	$p < 0.001$	consistent improvement
Farm effluent and runoff	$p < 0.01$	declined 2000–2002; slight improvement 2002–2006; decline 2008 and 2010
Hazardous chemicals use and disposal	$p < 0.001$	consistent improvement 2000–2004; decline 2006; improvement 2008; minor decline 2010
Industrial impact on the environment	$p < 0.01$	improved between 2002 and 2004; increase 2006–2010

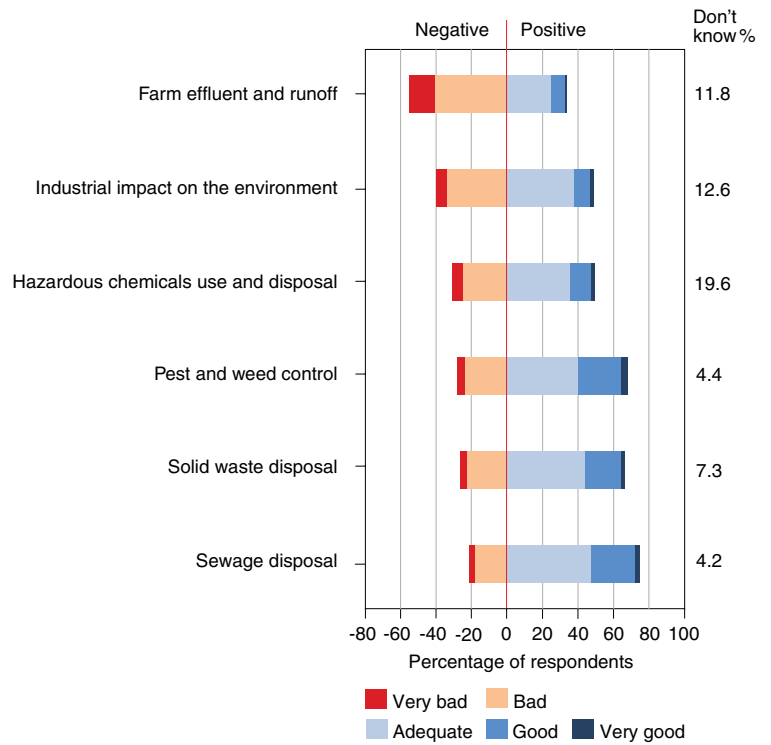


Figure 3.9. Perceived quality of management activities.

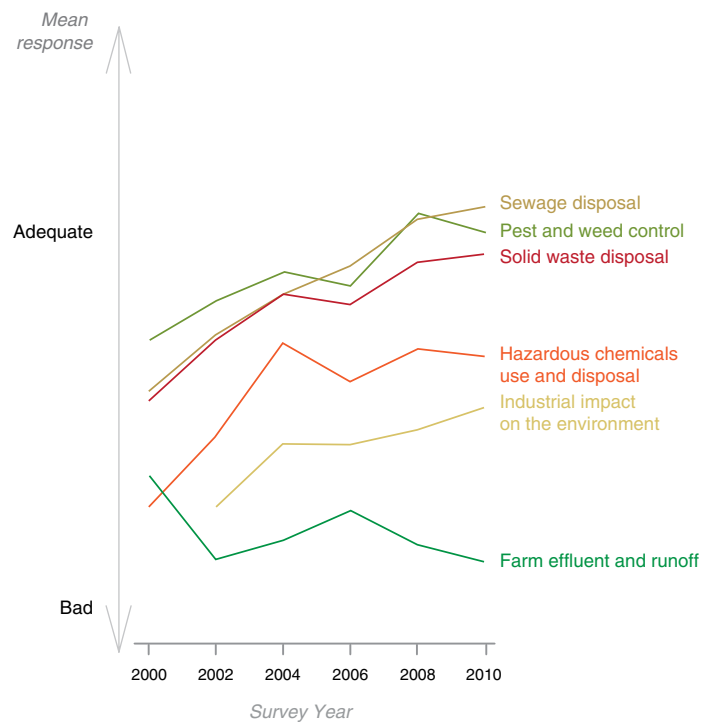


Figure 3.10. Trends in perceived quality of management activities.

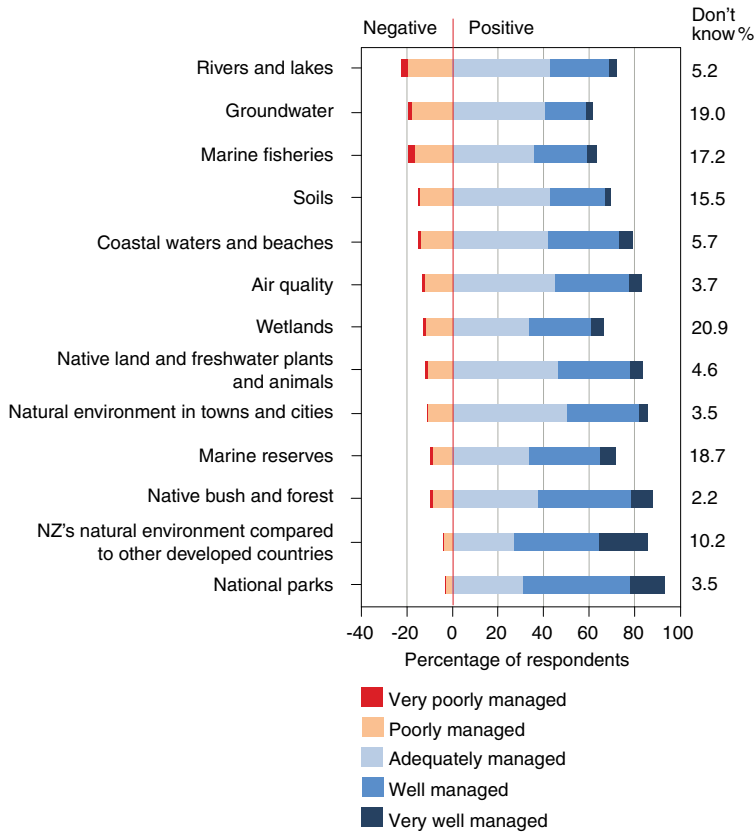


Figure 3.11. Perceived quality of management.

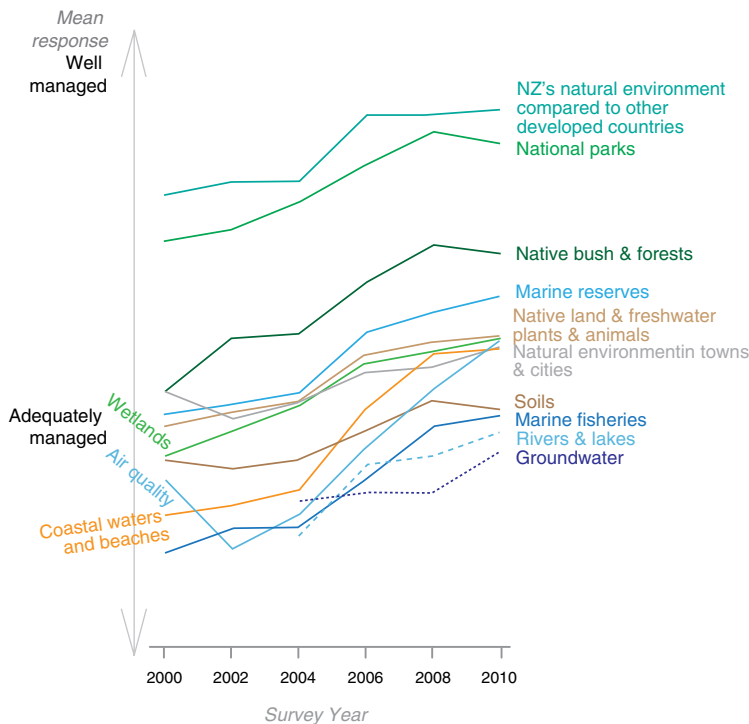


Figure 3.12. Trends in perceived quality of management.

3.4.2. Current management of the environment

The 2010 Survey

The quality of management of thirteen environments or resources was assessed on a scale ranging from 'very well managed' to 'very poorly managed' (Figure 3.11). In general, most environmental features were considered to be 'adequately managed'. However, over 20% of respondents felt that rivers and lakes were either 'poorly managed' or 'very poorly managed'. Over half the respondents rated national parks (62.3%) and New Zealand's natural environment compared to other developed countries (58.5%) as either 'very well managed' or 'well managed'. There were high rates of 'don't know' responses for five resources, namely soils (15.5%) marine fisheries (17.2%), marine reserves (18.7%), groundwater (19.0%) and wetlands (20.9%).

Trends 2000–2010

Mean Likert scores for most resources correspond with resources being 'adequately managed' (Figure 3.12). Exceptions are national parks and New Zealand's natural environment compared to other developed countries, whose management is judged more positively, with the mean scores being nearer to the 'well managed' end of the scale.

The most evident emergent trend over the six surveys, for all resources examined, has been virtually uninterrupted and now significant perceptions of improved management, as shown in Table 3.3 (and see also Table 3.1). The biggest perceived changes for most resources occurred between 2004 and 2006.

3.5 MAIN CAUSES OF DAMAGE TO THE ENVIRONMENT

The 2010 Survey

Respondents were instructed to select what they considered to be the main causes of damage from a list of 15 items for ten components of the environment. They could select up to three causes for each environmental component. The responses for each component are shown in Table 3.4. Colour coding helps to interpret the table, with red highlighted cells signifying the most frequently cited cause of damage to individual environmental components, orange indicating the second most frequently cited main cause, and the third most frequent response in yellow.

For some environmental components, people have very clear ideas about sources of harm. For example, motor

vehicles and transport (88%), as well as industrial activities (71%), were clearly judged to be the main causes of damage to air. Similarly, sewage and stormwater was judged to be the main cause of damage to beaches and coastal waters, with 68% of respondents nominating this cause, while 70% percent of respondents identified commercial fishing as a major problem for marine fisheries.

Reading across the rows of Table 3.4 identifies sources of harm that are important across different areas of the environment. Sewage and stormwater was perceived to be a main cause of damage for five of the environmental components addressed in the question, with pests and weeds considered a main cause of damage to four components. Mining (unlike in 2006 and 2008) did feature amongst the top causes of damage for native bush and forests and for national parks.

Motor vehicles and transport, as a cause of damage to air, received the single highest cause of damage rating. Photo: traffic buildup in central Christchurch.



GEOFF KERR

Table 3.3. Mean Likert scores for management of resources 2000–2010 (including rivers and lakes, and groundwater 2004–2010).

Perception of management of ...	Mean Likert score (1= very well managed; 5= very poorly managed)						
	2000	2002	2004	2006	2008	2010	Change 2010–2000
Natural environment in towns and cities	2.82	2.88	2.85	2.77	2.76	2.72	-0.10
Air quality	3.03	3.19	3.11	2.95	2.81	2.70	-0.32
Native land and freshwater plants and animals	2.90	2.87	2.84	2.73	2.70	2.69	-0.22
Native bush and forests	2.82	2.69	2.68	2.56	2.47	2.50	-0.34
Soils	2.98	3.00	2.98	2.91	2.84	2.85	-0.14
Coastal waters and beaches	3.11	3.09	3.05	2.86	2.73	2.72	-0.38
Marine fisheries	3.20	3.14	3.14	3.03	2.90	2.88	-0.32
Marine reserves	2.87	2.85	2.82	2.68	2.63	2.59	-0.27
Rivers and lakes			3.16	2.99	2.97	2.93	-0.24
Groundwater			3.08	3.06	3.06	3.97	-0.11
National parks	2.46	2.43	2.37	2.20	2.20	2.24	-0.2
Wetlands	2.97	2.91	2.85	2.75	2.72	2.70	-0.25
Natural environment compared to other developed countries	2.35	2.32	2.32	2.16	2.16	2.16	-0.19

Table 3.4. Perceived main cause of damage to the environment. The fill colours (■ ■ ■) indicate in order the three most-frequently-cited causes of damage to the individual environmental component.

	Air	Native land and freshwater plants and animals	Native forests and bush	Soil	Beaches & coastal waters	Marine fisheries	Marine reserves	Fresh waters	National parks	Wetlands
Motor vehicles and transport	88%	3%	3%	2%	5%	1%	2%	2%	10%	3%
Household waste and emissions	28%	11%	3%	17%	20%	5%	8%	15%	6%	8%
Industrial activities	71%	16%	15%	27%	18%	14%	14%	30%	8%	19%
Pests and weeds	3%	52%	58%	14%	6%	6%	9%	21%	55%	37%
Farming	11%	38%	22%	35%	10%	4%	7%	52%	8%	35%
Forestry	1%	13%	35%	11%	1%	1%	1%	7%	18%	8%
Urban development	16%	26%	27%	16%	21%	4%	8%	13%	12%	25%
Mining	2%	17%	26%	15%	3%	1%	2%	8%	22%	7%
Sewage and storm water	5%	22%	3%	20%	68%	39%	36%	40%	6%	26%
Tourism	0%	6%	14%	1%	11%	4%	12%	6%	35%	6%
Commercial fishing	1%	3%	1%	0%	20%	70%	36%	2%	1%	1%
Recreational fishing	0%	1%	1%	0%	6%	20%	25%	4%	1%	1%
Dumping of solid waste	8%	21%	11%	43%	26%	18%	20%	19%	11%	21%
Hazardous chemicals	25%	21%	11%	45%	20%	20%	18%	25%	7%	18%
Other	2%	3%	4%	2%	5%	7%	8%	3%	8%	9%

Note: Percentages in each column do not add to 100% because respondents identified up to three causes for each environmental component.

Trends 2000–2010

Respondents' judgements of the main causes of damage to the 10 environmental components which were included in all six surveys are shown in Figures 3.13 (a–j). Responses are consistent across years for a number of items. Motor vehicles and industrial activities clearly rate as the main causes of damage to air in each year the survey was undertaken. Similarly, sewage and stormwater clearly rates as the main cause of damage to beaches and coastal waters, and commercial fishing as the main cause of damage to marine fisheries, followed by sewage and stormwater.

There were no clear main causes of damage to marine reserves, with responses spread between commercial fishing, sewage and stormwater, recreational fishing, hazardous chemicals, dumping of solid waste, and tourism. Main causes of damage to soils and wetlands were also spread relatively evenly over several categories.

Figures 3.13 (a–j) contain an enormous amount of information. In order to clarify the important changes that have occurred over the six surveys, Table 3.5 identifies the changes between 2000 and 2010 that are statistically significant.

The three most notable results in Table 3.5 are:

- The continuing increase in negative judgements about the environmental impacts of farming. Farming has received highly significant increases in blame for environmental damage to all resources other than native forests and bush, marine fisheries and national parks;
- The dramatic increase, primarily between 2008 and 2010 (i.e. from 6% to 22% of respondents) in attributing mining as a major cause of damage to national parks, but also to native land and freshwater plants and animals, and to native forests and bush;
- Reductions in negative judgements about the environmental impacts of hazardous chemicals, to eight of the 10 resources evaluated; and
- The increasing attribution of 'other' factors as a cause of damage to several resources, albeit at very low response levels, i.e., always <10%.



KEN HUGHES



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Farming continues to increase as the perceived main cause of damage to freshwater. Photo top: Inadequate stream protection in the Mackenzie Basin. Photo above: Much of the irrigation water in mid Canterbury is sourced from the area's surface waterways.

Table 3.5. Significant changes (cells with asterisks) in ratings of main causes of damage between the 2000 and 2010 surveys. ■ Green shaded cells (and negative percent figures) show a reduction in this cause of damage to the relevant resource. ■ Orange shaded cells (and positive percent figures) show a significant increase in this cause of damage to the related resource. Note that the percent figures refer to percentage points of change, e.g., farming has increased as a cause of damage to freshwater by 27 percentage points (from 24.7 in 2000 to 51.9% in 2010, an increase of 110%).

	Air	Native land and freshwater plants and animals	Native forests and bush	Soil	Beaches and coastal waters	Marine fisheries	Marine reserves	National parks	Wetlands	Fresh waters
Motor vehicles and transport	**	NS	***		NS			**	NS	
Household waste and emissions	NS	NS	NS	NS	NS	NS	NS	NS	NS	***
Industrial activities	NS	***	NS	NS	NS	NS	NS	NS	NS	*
Pests and weeds		NS	NS	**	NS	NS	NS	NS	NS	NS
Farming	***	***	NS	***	***		***	NS	*	***
Forestry		NS	***	NS				**	NS	NS
Urban development	NS	NS	NS	NS	NS		NS	NS	NS	NS
Mining		**	***	NS				***	NS	*
Sewage and storm water	NS	NS	NS	NS	*	NS	NS	NS	NS	NS
Tourism		NS	NS		NS	NS	NS	*	NS	NS
Commercial fishing					NS	NS	NS			
Recreational fishing					NS	NS	NS			
Dumping of solid waste	NS	NS	NS	*	NS	NS	NS	NS	NS	*
Hazardous chemicals	*	***	NS	**	*	**	**	NS	*	***
Other					NS	***	**	***	***	

The number of asterisks indicates the strength of significance: * Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$, no asterisk = not significant. Empty cells indicate less than 5% of respondents chose this as one of the main causes of damage to this resource.

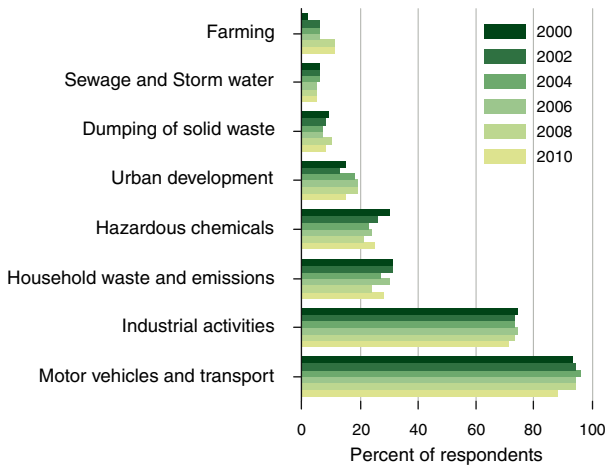


Figure 3.13a. Perceived main causes of damage to air. Categories less than 5% are omitted.

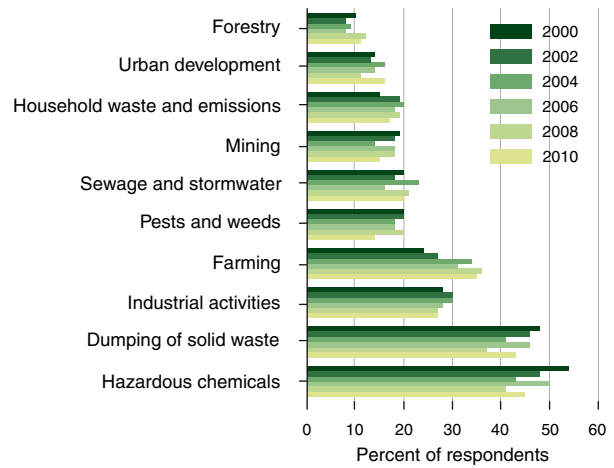


Figure 3.13d. Perceived main causes of damage to soils. Categories less than 5% are omitted.

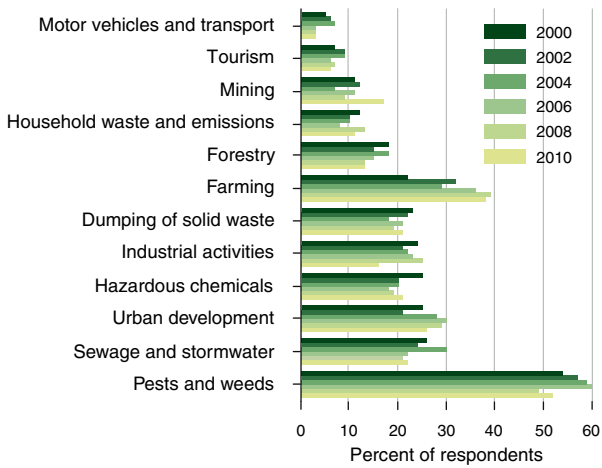


Figure 3.13b. Perceived main causes of damage to native land and freshwater plants and animals. Categories less than 5% are omitted.

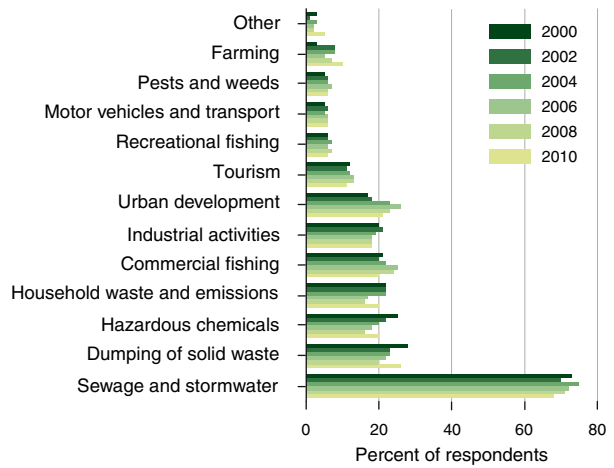


Figure 3.13e. Perceived main causes of damage to beaches and coastal waters. Categories less than 5% are omitted.

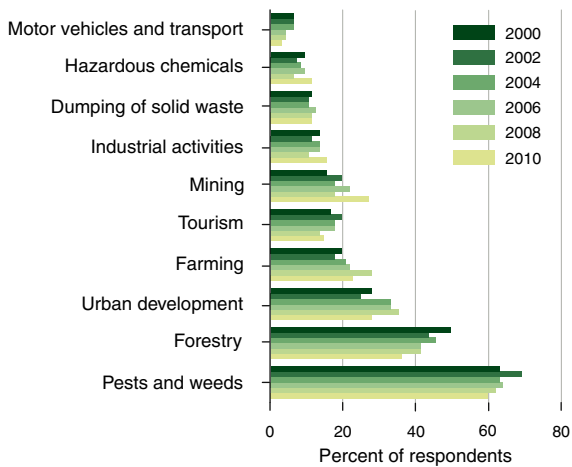


Figure 3.13c. Perceived main causes of damage to native forests and bush. Categories less than 5% are omitted.

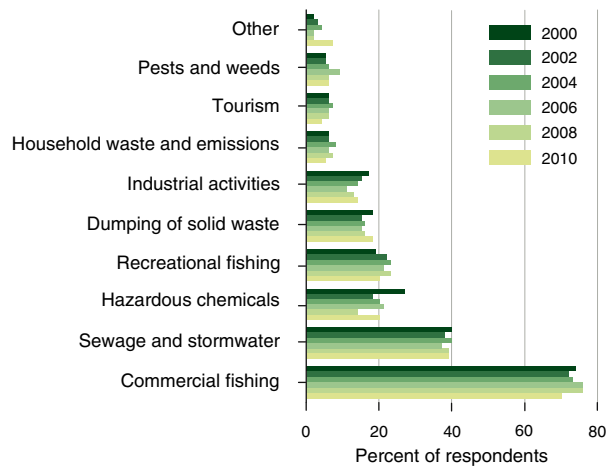


Figure 3.13f. Perceived main causes of damage to marine fisheries. Categories less than 5% are omitted.

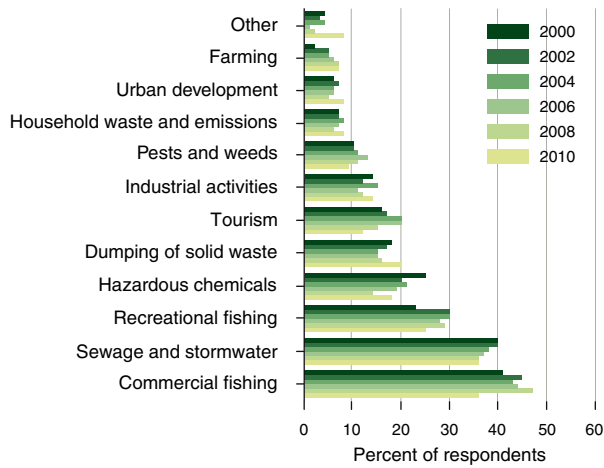


Figure 3.13g. Perceived main causes of damage to marine reserves. Categories less than 5% are omitted.

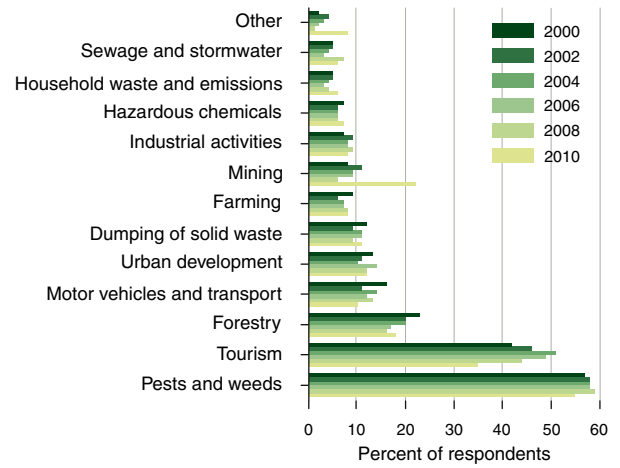


Figure 3.13i. Perceived main causes of damage to national parks. Categories less than 5% are omitted.

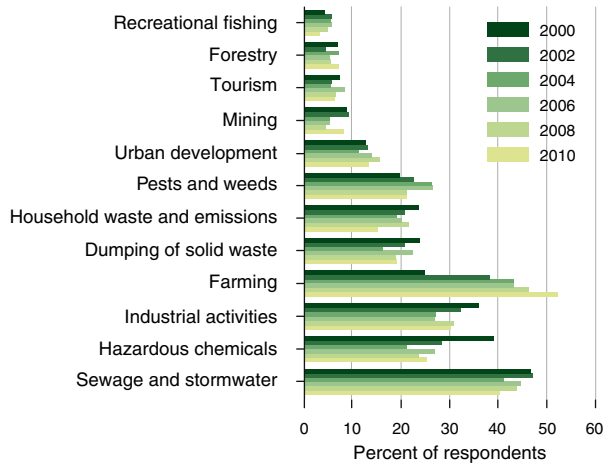


Figure 3.13h. Perceived main causes of damage to freshwaters. Categories less than 5% are omitted.

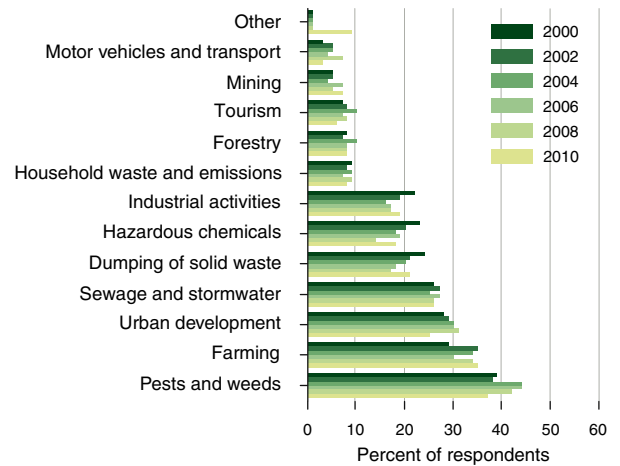


Figure 3.13j. Perceived main causes of damage to wetlands. Categories less than 5% are omitted.

3.5.1 Ethnicity

Differences were explored between ethnic group ratings of main causes of damage to two key resources: air, and freshwaters. There is no significant difference in ratings of causes of damage to air (Figure 3.14).

In contrast to the situation with air, there were three significant differences when ethnicity was evaluated against freshwater (Figure 3.15). NZ Europeans were much more likely than others or Maori to have defined farming as a key cause of damage to freshwaters ($p < 0.01$). Those of other ethnicities were more likely to have identified household waste and emissions ($p < 0.001$) or dumping of solid waste ($p < 0.05$), than were Maori or NZ European respondents.

3.5.2 Regional differences

For spatial analysis the nation was divided into three regions. The Southern Region consisted of the South Island, the Northern Region was defined as the Auckland and Northland Regional Council areas, and the Central Region was the remainder of the North Island.

Southern respondents were far more likely to identify household waste and emissions as a major cause of damage to air ($p < 0.01$) than were either Northern or Central respondents (Figure 3.16).

In contrast to the regional analysis against air there were no significant regional differences with freshwaters (Figure 3.17).

3.6 PARTICIPATION IN ENVIRONMENTAL ACTIVITIES

The 2010 Survey

Participation in a range of environmental activities has been monitored since 2000. However, in 2002 the question was modified and as a result only data and analysis from the 2002, 2004, 2006, 2008 and 2010 surveys are presented here. Figure 3.18 shows levels of participation in 15 environment related activities during the preceding twelve months. Around 80% or more of respondents to the 2010 survey recycled household waste, bought products marketed as environmentally friendly, reduced or limited their use of electricity, or had grown some of their own vegetables. Over half had composted garden and/or household waste, grown some of their own vegetables, reduced or limited their use of freshwater, visited a national park, or obtained information about the environment from any source. Few respondents, however, had been involved in the restoration or replanting of the natural environment, had participated in an environmental organisation, or had taken part in hearings or consent processes about the environment. Two activities added to the survey in 2006 were 'Reduced or limited your use of freshwater' (60.6% participation) and 'Made a financial donation to a non government environmental organisation (e.g., Forest and Bird)' (24.3% participation).

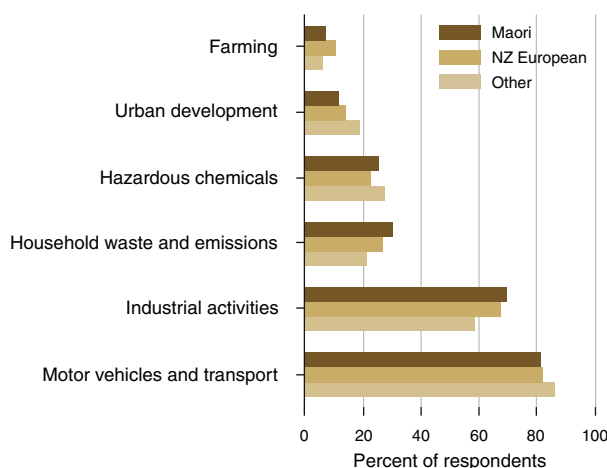


Figure 3.14. Perceived main causes of damage to air, by ethnicity. Categories less than 10% are omitted.

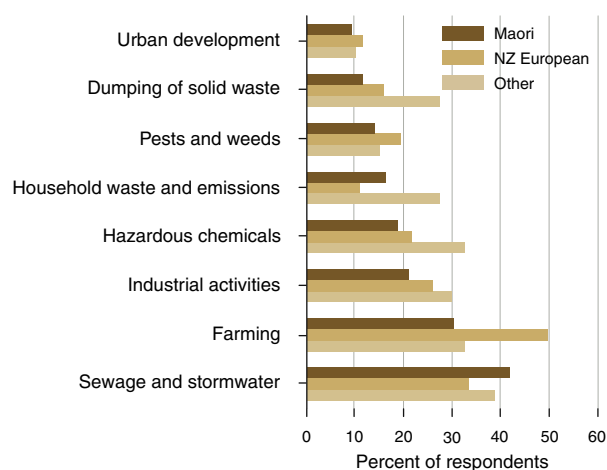


Figure 3.15. Perceived main causes of damage to freshwaters, by ethnicity. Categories less than 10% are omitted.

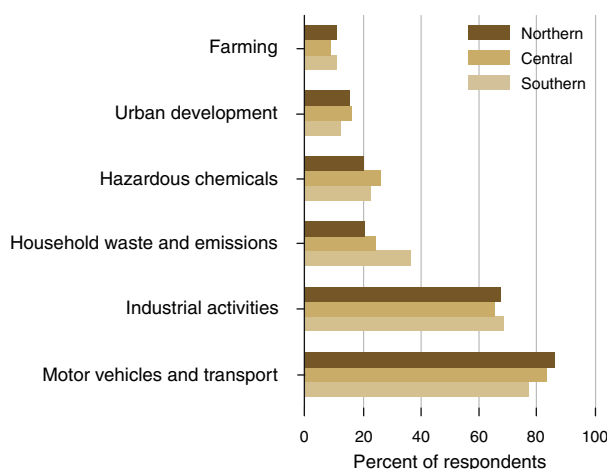


Figure 3.16. Perceived main causes of damage to air, by region. Categories less than 10% are omitted.

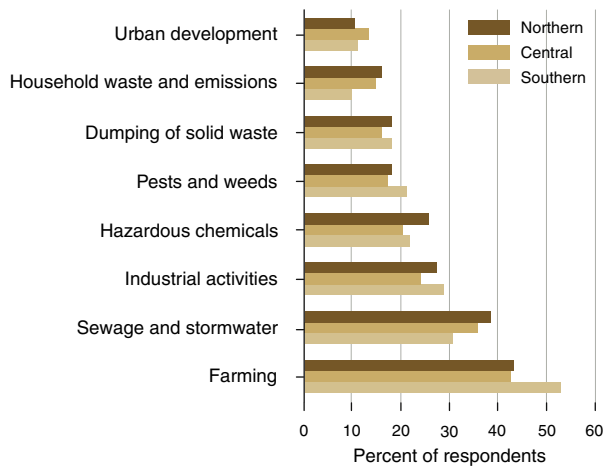


Figure 3.17. Perceived main causes of damage to freshwaters, by region. Categories less than 10% are omitted.

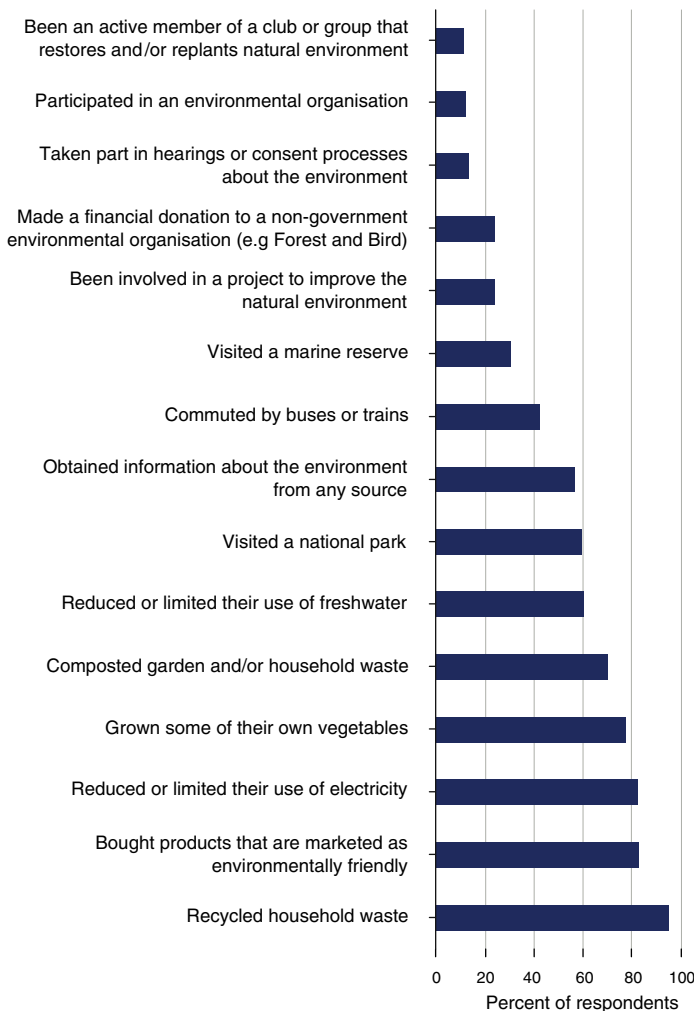


Figure 3.18. Reported participation in environmental activities, 2010.

Rates of participation were evaluated against education and ethnicity. While participation rates do vary by demographics, these variations are mostly insignificant. There were some significant variations, namely:

Education

- Those holding a tertiary qualification were more likely to visit a national park (72%; $p < 0.001$) than were than those leaving high school with a qualification (61%) and those educated only at primary school (37%);
- Those leaving high school with qualifications and those with tertiary qualifications were more likely (c.90% average participation) to buy products that are marketed as environmentally friendly, than those with lesser qualifications (c.75% participation) ($p < 0.01$);
- Those with postgraduate qualifications were more likely to obtain information about the environment (72%), than those leaving high school with a qualification (56%) and those educated only at primary school (35%) ($p < 0.001$);
- Postgraduate qualification holders (20%) were much more likely to have taken part in a hearing or consent process than were those leaving high school with a qualification (10%) and those educated only at primary school (7%) ($p < 0.001$); and
- Similar to the above, those with tertiary qualifications were more likely (28%) to have participated in an environmental organisation than were high school leavers with a qualification (8%) or those leaving school without a qualification ($p < 0.001$).

Ethnicity

- Maori (76%) had higher reported participation rates than other ethnicities (73%) or NZ Europeans (58%) in terms of reducing or limiting their use of freshwater ($p < 0.01$);
- Maori (33%) had higher participation rates in projects to improve the natural environment than either NZ Europeans (26%) or other ethnicities (14%) ($p < 0.05$);
- NZ Europeans (80%) participated more often in growing some of their own vegetables than did Maori (77%) or other ethnicities (62%) ($p < 0.01$); and
- Maori report a higher rate of participation (38%) in making a donation to a non government environmental organisation than do NZ European (25%) or other ethnicities (15%) ($p < 0.05$).

These results indicate that there is an overall high level of participation in many environmental activities, irrespective of most demographic influences. This conclusion is only slightly modified by the finding that participation in environmental organisations and restoration activities is strongest amongst those with high levels of education, a perhaps unsurprising finding.

Trends 2002–2010

Figure 3.19 shows the extent of between-survey changes in reported behaviour. Table 3.6 shows a comparison of participation in activities between the 2000 and 2010 surveys. Significant increases in participation are reported by respondents in limiting their use of electricity, commuting by buses or trains, recycling household waste, obtaining information about the environment from any source and growing some of their own vegetables. The first three of these increases are likely explained by national energy savings and recycling campaigns and response to price signals such as energy and transport costs. Two significant decreases have continued to be recorded – visits to marine reserves and visits to national parks. Why these decreases have occurred is unknown.

3.7 MAJOR ENVIRONMENTAL ISSUES – NEW ZEALAND AND THE WORLD

Respondents were asked, in two open-ended questions, to identify the most important environmental issues facing New Zealand and the World today. Responses to these questions are difficult to code (i.e., there is likely to be some within and between survey variability) and to analyse (e.g., should all freshwater related items be clustered or should some attempt be made to sub categorise where possible?). Furthermore, there is evidence that some respondents are driven by the case study focus of the survey. For example, in 2006 transport was the case study and transport was identified as a significant New Zealand issue – transport was not the case study in 2008 and was not identified as a major environmental issue. Because of these difficulties some care needs to be taken when evaluating within- and between-year responses. Due to the significance of the inter-survey issue we are no longer presenting long term analysis of these results.

Table 3.6. Significant changes in participation in environmentally-related activities between the 2000 and 2008 surveys. ■ Green shaded cells show a significant increase in this activity. ■ Red shaded cells show a significant decrease in this activity.

Activity and significance of change between surveys	Percent participation	Percent participation
Reduced or limited electricity use ***	62%	84%
Commuted by buses or trains ***	18%	38%
Recycled household waste ***	85%	94%
Bought products that are marked as environmentally friendly (NS)	86%	86%
Composted garden and/or household waste (NS)	71%	72%
Grown some of their own vegetables **	71%	79%
Been involved in a project to improve the natural environment (NS)	22%	24%
Been an active member of a club or group that restores and/or replants natural environments (NS)	12%	13%
Obtained information about the environment from any source *	53%	58%
Taken part in hearings or consent processes about the environment (NS)	14%	14%
Participated in an environmental organisation (NS)	13%	13%
Visited a marine reserve *	36%	31%
Visited a national park **	66%	60%

The number of asterisks indicates the strength of significance: * Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$, (NS) = not significant.

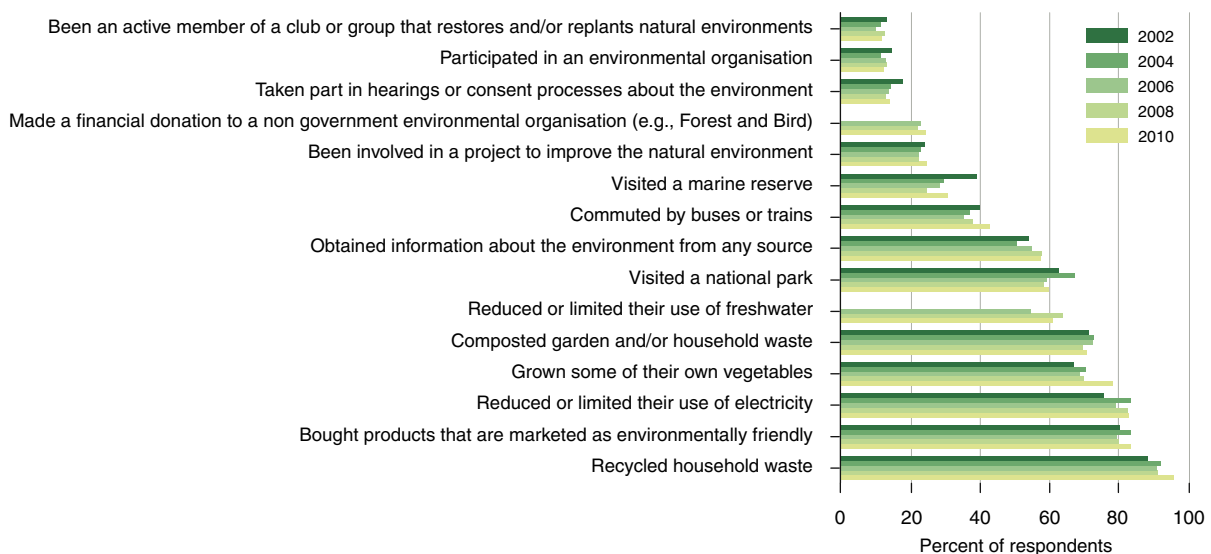


Figure 3.19. Trends in reported participation in environmental activities.

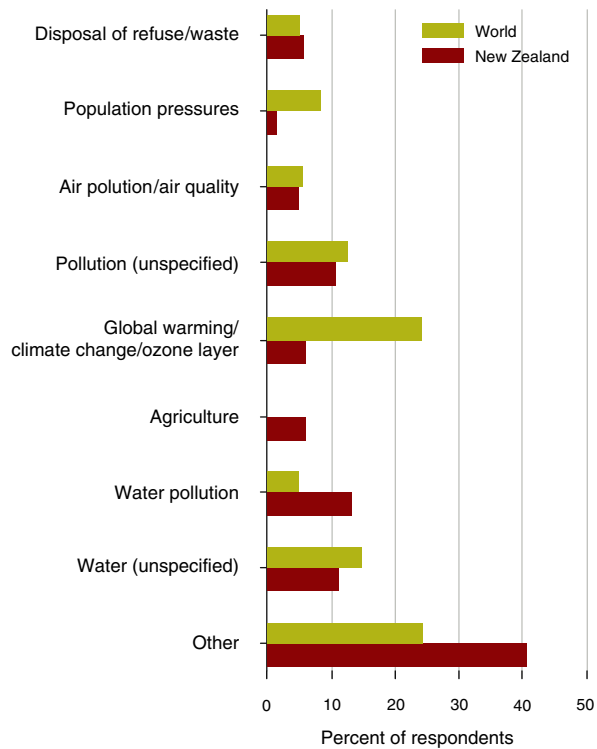


Figure 3.20. Most important issues facing New Zealand and the World (Note – items only included where at least 5% of respondents identified the issue for either New Zealand or the World).

The 2010 Survey

‘Water pollution and/or water (unspecified)’ (24% of respondents) was identified as the most important environmental issue facing New Zealand (Figure 3.20). Respondents identified ‘Global warming/climate change’ (24%) as the single biggest issue facing the world. The size of the ‘other’ categories for both the world and New Zealand are large but with no component bigger than 5%.

As with earlier surveys, and consistent with 2008, comparing responses for New Zealand and the World indicates that New Zealanders are much more concerned about ‘Global warming/climate change/ozone layer’ at the global level, whereas domestically the concern is about freshwater related issues.



04

SHELLEY MCMURTRIE

Mangere, Auckland

INDIVIDUAL RESOURCES

In Section 3 the PSR model was used as a framework to examine perceptions of the New Zealand environment across all resource areas. In this section each resource area is examined in turn.

Graphs illustrate response distributions for all the years for which data are available. In most cases that is every second year from 2000 to 2010.

Chi-square tests of the significance of differences between distributions were undertaken wherever possible, but only significant differences are reported. Probabilities of significant differences occurring by chance are reported alongside the graph title.

Where available, relevant biophysical PSR trend data are reported for comparative purposes and precede the graphs. The Ministry for the Environment's national Environmental Report Cards are now the primary reference point for comparison. They provide the most up to date, high quality data on state of the New Zealand environment and are grouped into ten domains. Where necessary other published biophysical data and assessments of New Zealand's environmental performance are used, including the OECD (2007) country report for New Zealand. We now use Emerson *et al.* (2010) for the global context—their Environmental Performance Index (EPI) is the mostly widely cited source of comparable international data. We compare EPI New Zealand performance data to other countries (see Table 4.1). These countries and their reasons for being chosen are:

- Iceland – the highest ranked nation in the EPI. A small, high income island nation, as is New Zealand;
- Sweden – 4th highest ranked in the EPI and often cited by the New Zealand government and researchers as of interest for their environmental progress, policy framework and institutional arrangements;

- United Kingdom – 14th ranked in the EPI and a traditional trade, cultural and political partner;
- Canada – 46th in the EPI. A large, natural resource abundant, high income, low population density country.
- United States – 39th ranked in the EPI and large trading partner. Arguably one of the largest influences on climate change, and a source of 'ideas' around environmental concerns and their management;
- Malaysia – 54th ranked in the EPI. A middle income, equatorial country, with considerable forestry and other natural resources;
- Australia – 5th ranked in the EPI and New Zealand's nearest neighbour. A country where there are enormous environmental issues and institutional questions to be considered. Uses some similar policy approaches to New Zealand;
- Chile – 16th ranked in the EPI, an upper middle income, developing country with some geographic and economic similarities to New Zealand.

4.1 NATURAL ENVIRONMENT IN TOWNS AND CITIES

Scientific information on state and trends

Most New Zealanders, in common with people in other 'high income' countries, live in urban environments. There is no national set of urban environmental indicators (although see below regarding the Quality of Life '08 project) and hence it is not possible empirically to determine state of the environment trends for the urban environment. However, there is increasing research and management interest in questions around urban sustainability and quality of life. In terms of policy initiatives

Table 4.1. Summary ranking and individual resource data from the EPI for New Zealand and eight other countries (Data source: Emerson *et al.* 2010, extracted and summarised from Country sheets for 2010 EPI Countries).

Country	EPI country score (/100) (rank from 149 nations)	Air – health impacts (/100)	Water – environmental effects (/100)	Biodiversity (/100)	Fisheries (/100)	Marine protected areas (/100)
New Zealand	73.4 (15th)	97.4	95.0	65.7	86.3	11.3
Sweden	86.0 (4th)	97.4	96.3	61.0	66.5	53.2
Iceland	93.5 (1st)	97.4	96.1	68.9	66.5	13.6
United Kingdom	74.2 (14th)	97.4	77.4	70.5	76.2	15.2
Canada	66.4 (46th)	97.4	90.7	61.9	33.8	17.3
United States	63.5 (61st)	95.7	70.2	65.9	87.6	84.2
Malaysia	65.0 (54th)	93.8	74.0	74.1	52.8	29.6
Australia	65.7 (51st)	97.4	58.0	77.9	96.5	90.7
Chile	73.3 (16th)	74.4	59.2	40.9	93.6	1.2

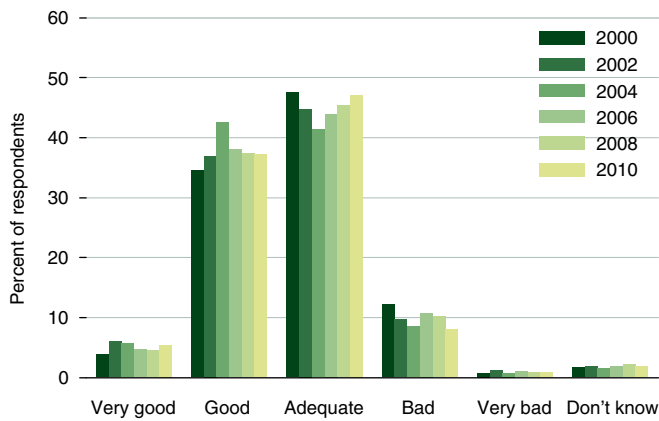


Figure 4.1a. Perceived condition of the natural environment in towns and cities.

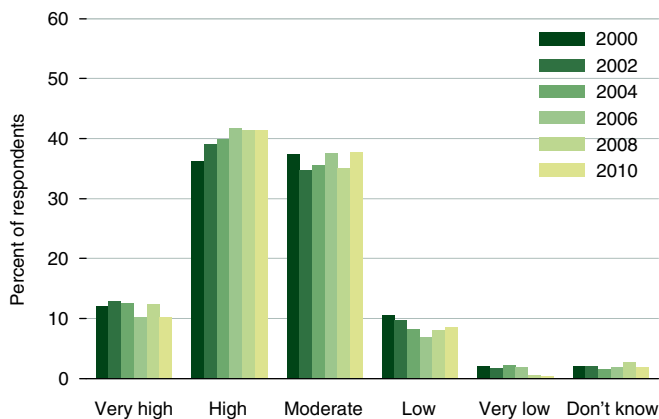


Figure 4.1b. Perceived availability of parks and reserves in towns and cities ($p < 0.05$).

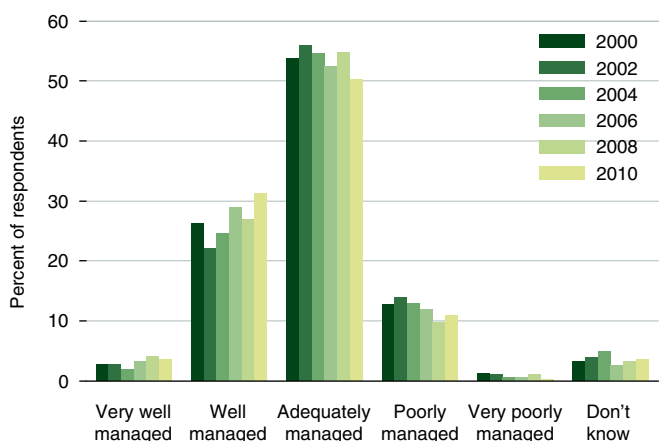


Figure 4.1c. Current management of the natural environment in towns and cities ($p < 0.01$).

the Ministry for the Environment has introduced the New Zealand Urban Design Protocol (MfE 2005). The Protocol aims to make New Zealand's towns and cities more successful by using quality urban design to help them become:

- Competitive places that thrive economically and facilitate creativity and innovation
- Liveable places that provide a choice of housing, work and lifestyle options
- Environmentally responsible places that manage all aspects of the environment sustainably
- Inclusive places that offer opportunities for all citizens
- Distinctive places that have a strong identity and sense of place
- Well-governed places that have a shared vision and sense of direction.

In addition, the Government has established the Auckland Government Policy Office (APO). APO's objective is to transform Auckland into a world class internationally competitive city. This initiative followed earlier activities of the Big Cities Project (<http://www.bigcities.govt.nz/>). That project incorporated perceptions surveys (Gravitas Research and Strategy Ltd 2005) and developed a set of quality of life indicators which included the natural environment. These latter indicators are reported in Quality of Life '08 (<http://www.bigcities.govt.nz/>). The study reports on three biodiversity indicators:

- Initiatives councils have taken to address biodiversity through their Long Term Council Community Plans
- Hectares of privately owned open space covered by QEII Trust registered covenants
- Number of ecological heritage sites.

Unfortunately, none of these indicators provides a holistic measure of the status of the natural environment in towns and cities and therefore they are of limited value for tracking trends over time. Despite this concern, it is arguable that the state of some aspects of particular natural environments in urban areas around New Zealand is improving (e.g., riparian management, sand dune management, and management of weeds and pests in native bush).

Perceptions of state, pressures and management trends

It is clear from all six surveys that most people consider the natural environment in towns and cities to be 'adequate' or 'good' (Figure 4.1a), but very few consider it very good. The availability of parks and reserves is 'moderate' or 'high' and increasing significantly (Figure 4.1b). All 'indicators' in this set scored positively, unlike any other environmental component that was examined. The natural environment in towns and cities is considered to be adequately to well managed (Figure 4.1c).

Commentary

With 86% of New Zealanders living in an urban environment (Census 2006), their knowledge of environmental issues associated with this context should be high—borne out by the low levels of ‘don’t know’ responses. Although not explored in any detail, it does seem surprising that issues such as relatively poor air quality (especially in Auckland and Christchurch) do not appear to have resulted in any downgrading of people’s perceptions—this might be because people perceive the “towns and cities” survey questions to relate more to other aspects of town and city environments, such as parks, reserves, streams and beaches. Having said this, MfE (2007) have highlighted the many water quality issues associated with urban streams and rivers. More research may be helpful in exploring respondent understanding of the natural environment in towns and cities.

4.2 AIR

Scientific information on state and trends

While conflicting views have been expressed about air quality in New Zealand during the last decade there is recent evidence of general improvements in air quality. Analysis of the information available from MfE indicates that in general air quality is good in most New Zealand locations. Regional councils and unitary authorities in New Zealand have identified 42 areas where air quality could breach the national air quality standards and these are known as gazetted airsheds¹. These gazetted airsheds are over only 1.5% of New Zealand’s total land area. However, “about 65% of New Zealanders live in a

gazetted airshed as a result of New Zealand having a highly urbanised population” (MfE 2007: 156).

The MfE (May 2010) air quality report card notes that 2008 was the first year since national standards were introduced in 2004 that standards for carbon monoxide, sulphur dioxide, nitrogen oxide and ozone were not breached at any site. While MfE (2007: 163) reported that “emissions of PM10 particulates have fallen in Auckland and Christchurch in recent years”, 25 airsheds exceeded the national standard for PM10 on two or more days during 2009 (MfE February 2009 PM10 scorecard). Two Otago and one Timaru airsheds exceeded the PM10 standard most often, but 51% of the New Zealand population live in airsheds that exceeded the standard on two or more days during 2009.

New Zealand’s air quality as it affects humans ranks highly compared to most other nations (Emerson *et al.* 2010) and compares well with the other eight nations in Table 4.1, reflecting the fact that over much of the country air quality is very high. However, the Emerson *et al.* (2010) assessment of New Zealand air pollution impacts on ecosystems is much lower. This analysis leads to the conclusion that while ‘rural’ air quality is high there are issues in some major urban areas and thus the state of air quality should be considered as ‘good’. Urban air quality issues include winter PM10 levels, nitrogen oxide levels in Auckland, and sulphur dioxide levels in Christchurch (Woolston site).

¹ “A gazetted airshed is a specific area identified by a council where air quality standards are (or may be) breached. These areas have been made public through the New Zealand Gazette and are known as gazetted airsheds” (See: <http://www.mfe.govt.nz/laws/standards/airsheds/faqs.html> – accessed December 2010).



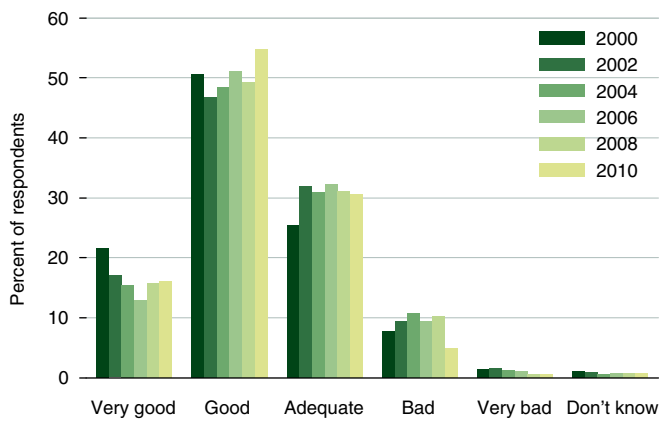


Figure 4.2a. Perceived state of air quality ($p < 0.001$).

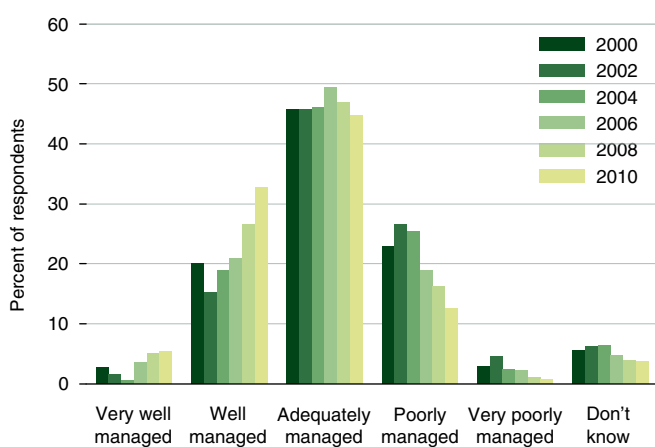


Figure 4.2b. Perceptions about management of air quality ($p < 0.001$).

Overall then, while there are issues there are also many examples of places achieving major pollutant reductions. For example, annual total suspended particulate levels in Auckland (MfE 2007: 159), carbon monoxide in Auckland and Christchurch (p171), and sulphur dioxide in Auckland and Christchurch (p173), have all declined over a variety of time periods.

Perceptions of state, pressures and management trends

From all six surveys it is clear that New Zealanders consider air quality to be good, and a number of respondents believe its condition has improved since 2002 (Figure 4.2a).

The main pressures on air are considered to be 'motor vehicles and transport' and 'industrial activities' (Figure 3.13a).

Most respondents over the six surveys consider the quality of air management to be adequate and improving significantly ($p < 0.001$) (Figure 4.2b).

Commentary

Continued public awareness and debate over transport and related air quality issues may be contributing to changes in responses, especially in the Auckland dominated northern region. Frequent discussion about climate change and vehicle emissions has kept matters of air quality in the media. MfE introduced the National Environmental Standards for Air Quality in 2004 (MfE 2004). The 14 standards include:

- Seven standards banning activities that discharge significant quantities of dioxins and other toxics into the air
- Five standards for ambient (outdoor) air quality
- A design standard for new wood burners installed in urban areas
- A requirement for landfills over 1 million tonnes of refuse to collect greenhouse gas emissions.

Release of these standards created much public debate, especially in Christchurch and Auckland, throughout 2005 and much of 2006. In combination these policy initiatives and associated environmental and health problems may have helped maintain interest in air quality issues.

It is unclear what natural aspects respondents consider when answering questions on the natural environment in towns and cities. Photo: town and country nestled together in Mangere, Auckland.



4.3 NATIVE LAND AND FRESHWATER PLANTS AND ANIMALS

Scientific information on state and trends

While Esty *et al.* (2005: Appendix B: 200) ranked New Zealand very poorly in terms of biodiversity performance—indeed one of the worst of 142 nations evaluated—the evaluation of Emerson *et al.* (2010: Table 4.1) indicates New Zealand is performing reasonably well compared to similar countries (albeit given these have vastly differing biodiversity contexts). Both findings perhaps are predictable. In the first instance, New Zealand has a record of large numbers of extinctions of bird, bat, freshwater fish and other species, and many species remain under threat. However, credit needs to be given for New Zealand's improving conservation efforts (e.g., a huge increase in the area of land subject to pest control by DoC since 2000 (MfE 2007: 395), the large proportion of terrestrial areas protected (33.4% of total land area)), all of which is reflected in the Emerson *et al.* (2010) evaluation.

Even given the above mixed score cards, conservation of New Zealand's native plants and animals remains one of the country's main environmental issues (DoC and MfE 2000). New Zealand's diverse flora and fauna comprises many endangered plants and animals, some of which, e.g., kiwi and kakapo, remain as national symbols and attract high levels of media interest and corporate sponsorship. Hitchmough *et al.* (2007) re-evaluated the risk of extinction for New Zealand's threatened and potentially threatened species of animals and non-vascular plants using the New Zealand Threat Classification System. The number of species listed as threatened increased to 2788 in 2005 from 2372 in 2002.

Another report showed that seven selected native species used as indicators of biodiversity levels have shown a marked (40–98%) reduction in range since human settlement, and six have declined further (6–90%) since the 1970s (MfE 2007: 377-391).

Based on the above, the state of New Zealand's biodiversity can be regarded as bad or very bad. This is perhaps a contentious conclusion given that the New Zealand archipelago is considered a biodiversity 'hotspot' (Given and Mittermeier 1999). Despite this recognition the state of a major component of the indigenous biodiversity is clearly in significant decline.



SHELLEY MCMAURTRIE



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Conservation of our plants and animals remains one of New Zealand's main environmental issues, with our indigenous biodiversity continuing to decline. Yet respondents seem little aware of this, continuing to rank condition and diversity as adequate – good. Photo top: Giant Kokupu is one of twelve native fish with a 'declining' threat classification. Photo above: Visitors to an ancient Totara tree, Banks Peninsula, South Island.

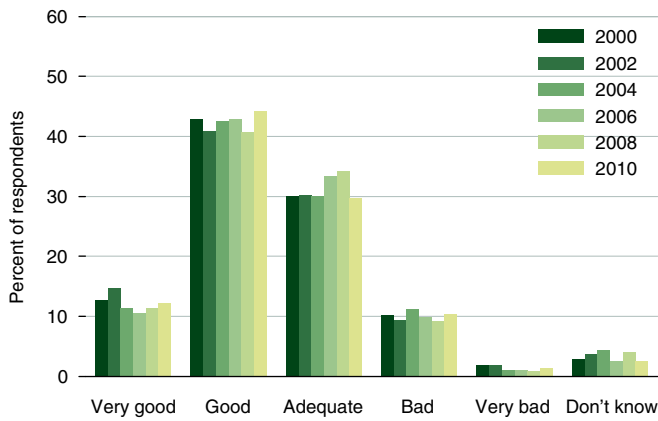


Figure 4.3a. Perceived state of native land and freshwater plants and animals.

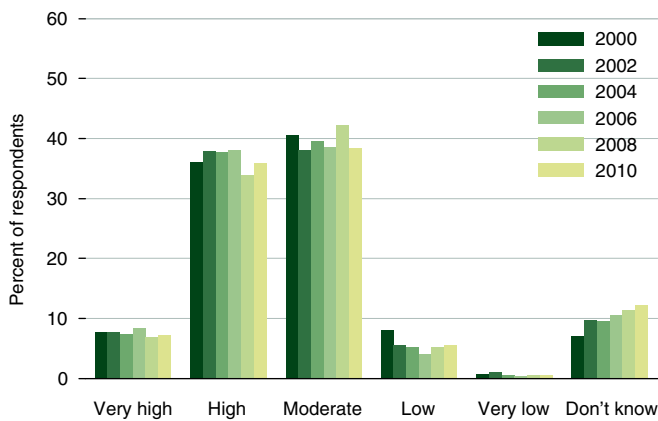


Figure 4.3b. Perceived diversity of native land and freshwater plants and animals.

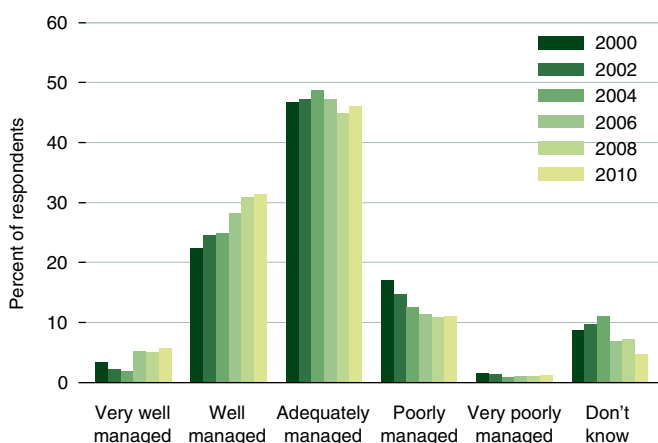


Figure 4.3c. Perceptions about management of native land and freshwater plants and animals ($p < 0.001$).

Perceptions of state, pressures and management trends

Survey respondents have continued to rate the condition (Figure 4.3a) and diversity (Figure 4.3b) of native land and freshwater plants and animals as adequate to good. Key pressures have been identified (Figure 3.13b) as pests and weeds (52–60% of respondents), forestry, urban development and, increasingly, farming (22–38%). And, while native land and freshwater plants and animals are rated as adequately to well managed (Figure 4.3c), the proportion rating this category as well managed increased significantly between 2004 and 2010 ($p < 0.001$).

Commentary

Why respondents continue to rate the condition of New Zealand's native plants and animals as 'adequate' or 'good' remains surprising when clearly it is not the case. There are 2788 threatened and endangered species in New Zealand (Hitchmough *et al.* 2007), key indicator species' ranges continue to decline (MfE 2007) and the conclusions drawn in the comparative global performance reported by Esty *et al.* (2005) attest to the poor biodiversity performance of New Zealand, both in comparison to other environmental resources and in international comparisons. We continue to suggest the need for more research in this area, but it can be hypothesised that the enormous amount of apparently 'good' news about endangered species management projects (e.g., increases in kakapo numbers, high profile investments in growing numbers of fenced sanctuaries) is masking the true gravity of the biodiversity crisis in New Zealand. Equally, respondents who continue to attribute forestry as a major cause of decline (around 40% in 2008) are ignoring the fact that there is relatively little felling of indigenous forests still occurring in New Zealand. This conclusion needs to be tempered by the fact that OECD (2007) reported that 175km² of indigenous habitat disappeared during 1996–2002 and experts comment that the true figure is at least double that (B Clarkson pers comm. 2007). Equally, loss of biodiversity to urban development is likely to be miniscule compared to losses due to farming intensification and other activities, given the enormous differences in scale and location.

4.4 NATIVE BUSH AND FORESTS

Scientific information on state and trends

The ongoing need for sustainable and conservation-based management of native bush and forests is now little debated in New Zealand. The area of legally protected public land increased from 8,138,500 hectares in 2006 to 8,525,000 hectares in 2009, an increase of 386,500 hectares, or 4.7% (MfE April 2010 INFO 492). While there are some ongoing contentious issues, including sustainable logging of indigenous forests and the future of the South Island Landless Natives Act forests in Southland, mostly the emphasis is on protecting what remains, especially from pests and weeds. New Zealand's original forest cover has been reduced from around 85-90% of terrestrial area to about 24% (McWethy *et al.*, 2010; MfE 2007: 216). About 80% of this remaining forest is now managed for conservation purposes by the Department of Conservation (Ministry of Agriculture and Forestry 2001). However, MfE (2007: 401) reported that over the last decade "the clearance of native forests has reduced to low levels as a result of sectoral initiatives and stronger legislation, such as the New Zealand Forest Accord 1991 and amendments to the Forests Act 1949, the latter of which largely stopped the clear-felling of native forest". However, other types of New Zealand native land cover,

such as broadleaved native hardwoods, mānuka and kānuka, matagauri, and tall tussock grassland, continue to be modified. The OECD (2007) note that a net loss occurred of nearly 175 km² of indigenous habitat (including 24 km² of native forest) from 1996–2002. Despite these losses an ongoing increase in conservation covenants on private land has been reported (MfE 2007: 401). The area of legally protected private land increased from 216,200 hectares in 2006 to 238,300 hectares in 2009, an increase of 22,100 hectares or 10.2% (MfE April 2010 INFO 492). The area of QEII National Trust registered covenants (which include a range of habitats) has increased steadily from 71,648 ha in 2005 to reach 93,889 ha in 2010 (QEII National Trust, 2005: 2010).

The state of native forests varies, but is not reported on in the national State of the Environment Report (MfE 2007). It is widely believed that browsing pressure from possums, goats, deer, and other introduced species is substantially modifying many forest environments. It has been suggested that "alien species threaten a third of our protected forests (1.8 million hectares) (such that) when not being smothered or overshadowed by exotic weeds, native plants are being eaten by browsing and grazing animals" (DoC, undated). Some very large pest control programmes, particularly those targeting possums, are attempting to redress some

The overall extent and condition of native bush may be slowly declining. This is not reflected in the public response which view native bush and forests very positively.
 Photo: Tramping through the Nelson Lakes district, Lake Rotoiti, South Island.



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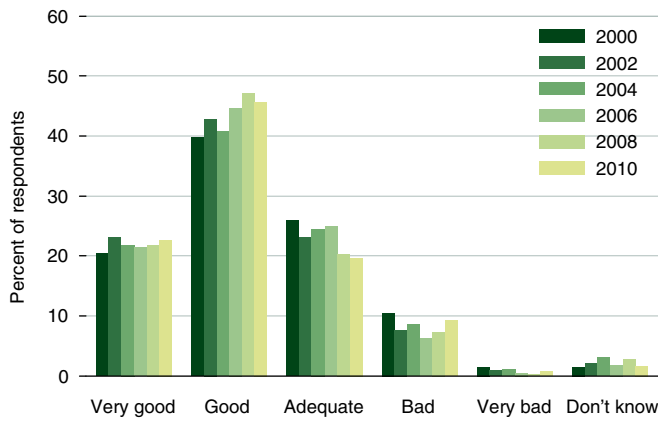


Figure 4.4a. Perceived condition of native bush and forests ($p < 0.01$).

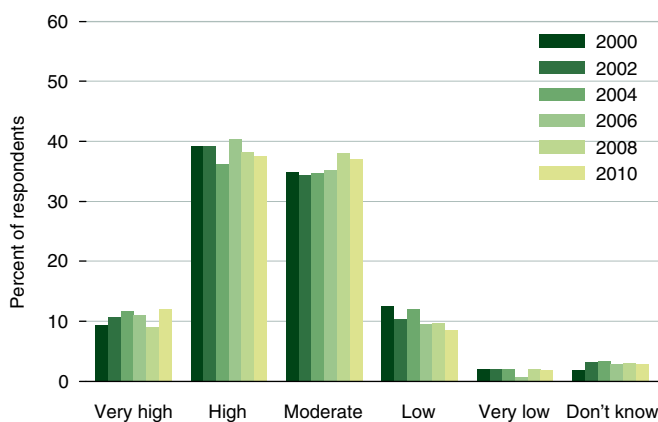


Figure 4.4b. Perceived quantity of native bush and forests.

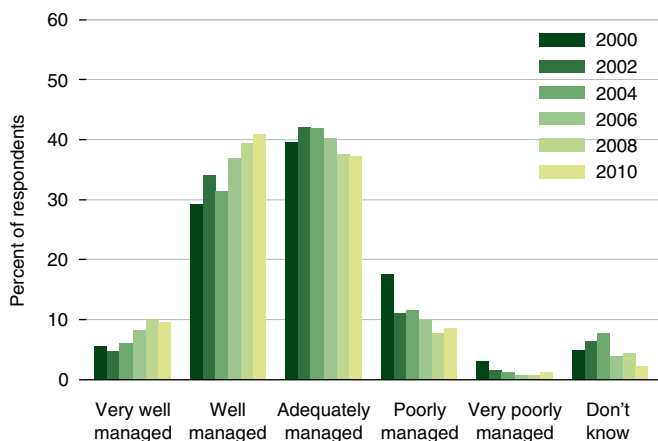


Figure 4.4c. Perceptions about management of native bush and forests ($p < 0.001$).

of this damage (MfE 2007: 395). Currently, there is no comprehensive monitoring programme based on a universal set of indicators against which to report trends; however, work on developing such a programme is being conducted by the Department of Conservation.

The overall state of native bush and forests is likely to be mixed and to range from good to very poor.

Perceptions of state, pressures and management trends

Both the perceived condition (Figure 4.4a) ($p < 0.01$) and perceived quality of management (Figure 4.4c) ($p < 0.001$) have improved considerably over the six surveys. Respondents consider condition of native bush and forests to be adequate to very good, with management being adequate to good and improving. Most respondents report a moderate to high amount of native bush and forests. The main perceived pressures (Figure 3.13c) have been 'pests and weeds' (58–67% of respondents), 'forestry' (35–48%), 'urban development' and 'farming'.

Commentary

It remains difficult to accurately determine trends in condition and amount of native bush and forests in New Zealand. However, it seems likely that the overall extent of native bush and forest is declining slowly, and its overall quality is probably declining as a result of pest and weed damage. These trends do not appear to be reflected in the public response, which views native bush and forests very positively, possibly because of the large number of pest control programmes underway, and restoration programmes such as Project Crimson (2010) which is designed to protect pohutakawa and rata trees. It is also surprising that respondents continue to identify forestry and urban development as the second and third most important causes of damage to native forests and bush. There is little indigenous forestry logging occurring in New Zealand and urban development into forest areas is absolutely minimal, especially compared to the relatively much larger impacts from farming.

4.5 SOILS

Scientific information on state and trends

Seventeen percent of New Zealand's GDP depends on the top 150 mm of the country's soil (MfE 2007: 237, citing Sustainable Land Use Research initiative, no date). Given their importance, it is not surprising that soils are included in Statistics New Zealand (2008) Measuring New Zealand's progress using a Sustainable Development Approach. Soils are critical resources for agriculture, horticulture and forestry, and contribute to several ecosystem services including ground water quality and flood mitigation (<http://www.sluri.org.nz/Objectives/Display/3>) yet they remain a largely unseen resource that receives little or no media attention and/or public interest. It is clear from the Soil Health Environmental Report Card (MfE January 2010: INFO 471) that all is not well with some of our soils. MfE 2010 note that "...just over one third of monitored soil under productive land uses meet all soil health target ranges."

Soil quality is assessed against four indicators: organic reserves, fertility, acidity, and physical status. Repeat sampling of soil quality at about 300 sites in 1995 and 2009 provides useful insights on level and trends in soil quality under a range of land uses (MfE January 2010: INFO 471 citing Hill and Sparling 2009). Only 24% of soils at sites used for drystock farming, 30% of soils at sites under dairying and 35% of sites for all productive land uses meet all soil target ranges. Over half of the sites used for dairying have compacted soil, as do a third of dry stock sites. Intensively farmed sites tend to have above target ranges of organic reserves and fertility. Other dry stock sites tend to be below target fertility levels (MfE January 2010 INFO 471). The trend from resampling in 2009 indicates soil "fertility improvements are likely to be due to decreasing fertility in those soils that had earlier levels above target ranges" (MfE January 2010 INFO 471, p.5).

Soils are likely to be another area where public perceptions differ from research and monitoring findings. Statistics New Zealand (2008: 55) report that between 1997 and 2002 New Zealand lost 5,500 hectares of versatile soils due to coverage by artificial surfaces. Hill country erosion is a further way in which New Zealand loses soil. Landcare Research 2006 (quoted in Statistics New Zealand 2008: 56) report that an estimated 200 million tonnes of soil are lost each year due to erosion.

The state of soils in New Zealand is clearly mixed, as only 35% of all sites monitored meet soil health target ranges.

Perceptions of state, pressures and management trends

Most respondents believe the quality or condition of soils is good to adequate (Figure 4.5a). The main pressures on soils (Figure 3.13d) are 'hazardous chemicals' (41–54% of respondents), 'dumping of solid waste' (37–48%) and 'farming' (24–36%), with the latter increasing significantly since the first survey in 2000. Around half the respondents thought management was adequate (Figure 4.5b), but (consistent with other surveys) slightly less than 20% of respondents expressed a 'don't know' opinion about the quality of soil management.

Commentary

Information about soils is readily available from the MfE website hence it is possible for the public to read about trends in the state of soils in New Zealand. Around 90% of respondents are prepared to express an opinion on soil condition, although around 20% express 'don't know' responses to the other questions. People's perceptions about soils are more favourable than their state warrants. There are several soil health issues associated with particular land management practices, including urban and lifestyle sprawl and land use intensification.

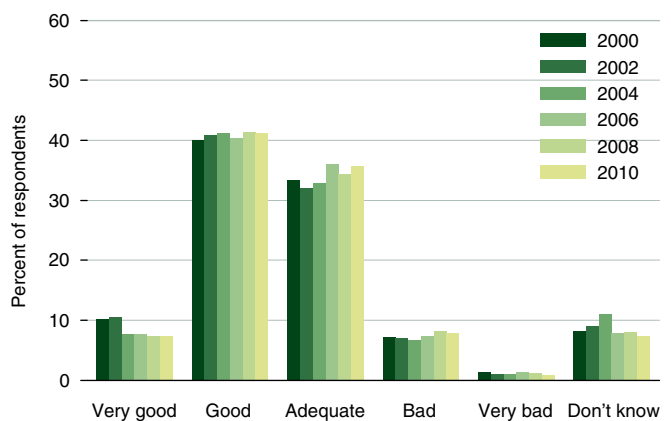


Figure 4.5a. Perceived quality or condition of soils.

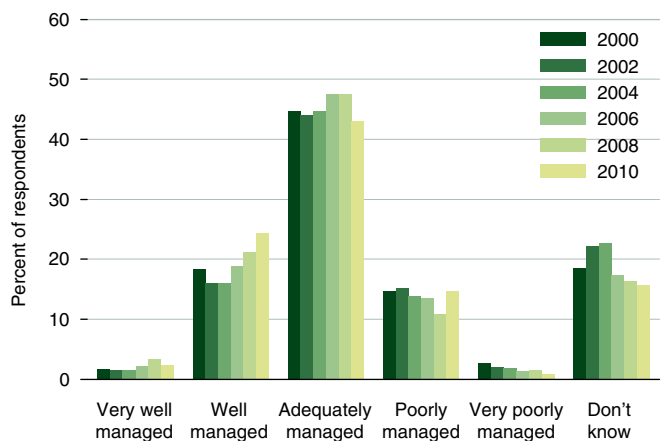


Figure 4.5b. Perceptions about management of soils (p<0.001).

4.6 COASTAL WATERS AND BEACHES

Scientific information on state and trends

New Zealand has the fourth largest Exclusive Economic Zone and the eighth longest coastline of any nation. About 80% of the coast is directly exposed to the sea, with the remainder in sheltered harbours and estuaries (<http://www.teara.govt.nz/en/natural-environment/2>). It is near the latter areas where most of the New Zealand population lives. No overall trends in the state of coastal waters and beaches has been reported, but regional council reports note a range of pressures including continued discharges of concentrated nutrients into estuaries and harbours, ongoing reclamations and extensive development on previously undeveloped coastlines (e.g., see: http://www.nrc.govt.nz/upload/6435/NRC%20SOE%20Report%20Cards_Part3.pdf). MfE (<http://www.mfe.govt.nz/environmental-reporting/freshwater/recreationalsnapshot/coastal.html>) reported that “over the 2009/2010 summer, 77% of the 343 monitored coastal swimming spots had water quality that met the guidelines for contact recreation almost all of the time. ... Two percent of sites breached bacterial guidelines regularly”. The most recent report from MfE (2010) states ... “Recreational water quality at (about 350) monitored coastal sites has been relatively stable at a national-scale, over the last seven years. The number of sites with samples that met the guidelines for contact recreation on at least 95% of sampling occasions has fluctuated between 64 and 80%.”

Despite reclamations, and localised water pollution the overall state of New Zealand’s coastal waters and beaches can be considered to be good or very good.

Perceptions of state, pressures and management trends

The 2010 survey has demonstrated the continuation of a trend toward perceptions of improving condition (Figure 4.6a) of coastal waters and beaches and of their management (Figure 4.6b). These increasingly positive views resulted in big increases between 2004 and 2006 in particular, with some improvement in 2008 and 2010. Overall, respondents now consider the resource to be in an adequate to good condition and coastal waters and beaches to be adequately to well managed. In terms of pressures (Figure 3.13e), ‘sewage and stormwater’ continues to be, by far, the largest perceived contributor (68–75%).

Commentary

Reasons for the continued trend of more positive responses about coastal waters and beach conditions and management remain largely unknown. While MfE (1997: section 7:88) notes that point source discharges have become better managed over the last 20–30 years, and MfE (2010) report no trend in swimming beach water quality, there may be other factors influencing the degree of positive feeling by the public in this area.

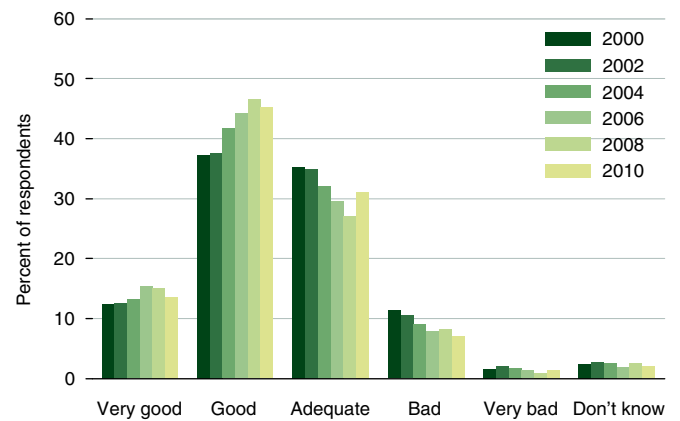


Figure 4.6a. Perceived quality or condition of coastal waters and beaches ($p < 0.01$).

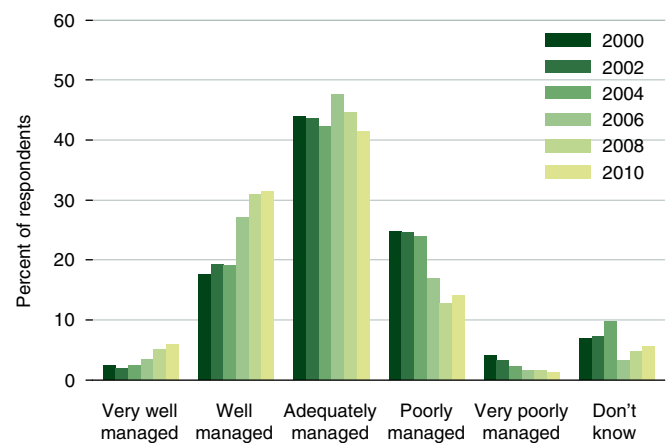


Figure 4.6b. Perceptions about management of coastal waters and beaches ($p < 0.001$).

4.7 MARINE FISHERIES

Scientific information on state and trends

Scientific and public debate continues about the state of New Zealand's fish stocks. The Quota Management System (QMS) is credited with improving profitability and efficiency of fisheries (Batstone and Sharp 1999; Kerr *et al.* 2003), but not all fishery management problems have been solved. In particular, some fish stocks have declined, some species outside the QMS are under pressure, and illegal fishing activities, including poaching, high grading and misreporting of bycatch, and the environmental effects of fishing are all recognised as being important (Ministry of Fisheries 2004).

Ministry of Fisheries (2010) reports that there are currently 130 species commercially fished, of which 97 species groupings are managed within New Zealand's QMS. There are 633 stocks or stock-complexes that are managed via the QMS, of which 280 are considered to be nominal and are not significantly fished. Of the 119 stocks or sub-stocks with known status, 82 (69%) have been determined to be at or above their management targets based on a recent evaluation – up from 79 (67.5%) a year ago (MFish 2010). Fourteen stocks were assessed to be overfished in 2010, and of those nine were considered to be collapsed (MFish 2010: 10).

Quota levels have changed for most fish stocks since they were introduced to the Quota Management System. For example, the initial quota² for Orange Roughy (1983/84) in the Challenger region was 4,950 tonnes per year. By the 1987/88 fishing year this quota had increased to 12,000 tonnes. Within two years, the quota was dropped to 2500 tonnes in response to declining fish stocks, and the fishery was effectively closed in October 2000. A decade later MFish announced the Challenger Plateau Orange Roughy fishery will reopen with a limit of 500 tonnes (<http://www.scoop.co.nz/stories/BU1009/S00757/orange-roughy-recovery-a-major-success-story.htm> – accessed 1 November 2010).

Questions about the sustainable management of New Zealand's marine fisheries remain topical. While some aspects of New Zealand fisheries management are viewed internationally as world-leading (e.g., Hughey *et al.* 2002b, Worm *et al.* 2009), within New Zealand there is much debate about the direction of management. There are initiatives underway to establish integrated fisheries plans, including stakeholder-led fisheries plans and Ministry-led fisheries plans to overcome remaining management issues (Ministry of Fisheries 2008b).

Measures of fisheries habitat sustainability have been defined but do not provide information on sea floor impacts (MfE 2007: 319). A Benthic Impacts Standard is being developed. It will establish criteria that can be used to determine the effect of fishing on the seabed (MFish 2010: 9). However,

² This was termed an Enterprise Allocation (EA) when issued prior to the 1986 introduction of the Quota Management System. In 1986 EAs were changed to Individual Transferable Quotas (ITQs).

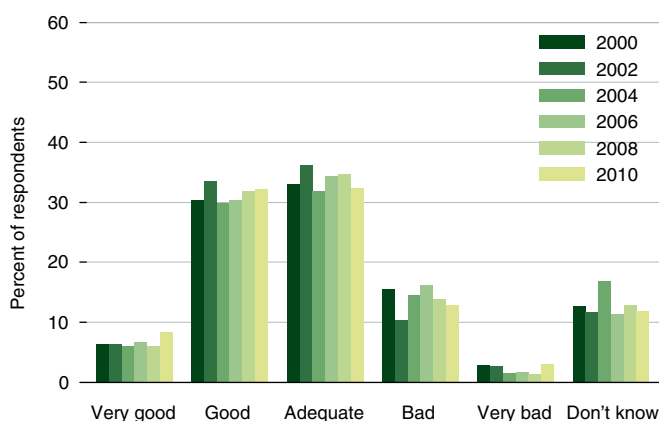


Figure 4.7a. Perceived quality or condition of marine fisheries ($p < 0.01$).

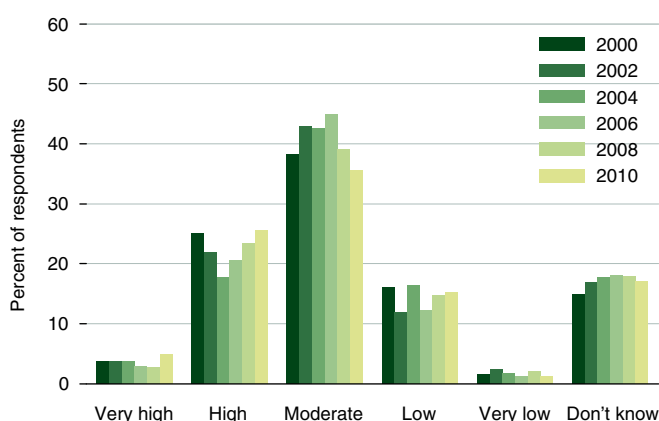


Figure 4.7b. Perceived quantity of marine fisheries ($p < 0.01$).

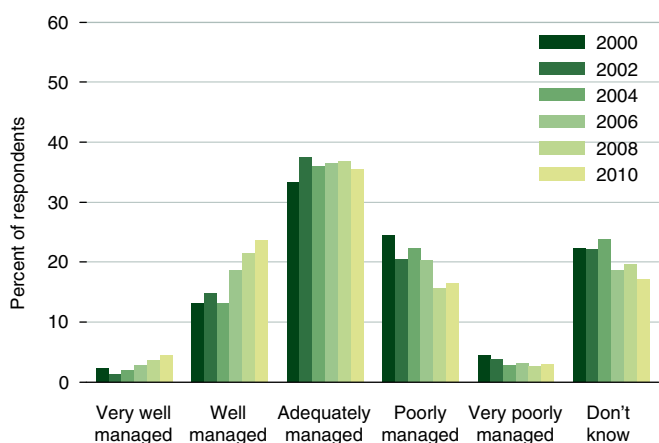


Figure 4.7c. Perceptions about management of marine fisheries ($p < 0.001$).

there is monitoring of fishing-related mortality of protected species. The fishing-related mortality limit for sealions in the Auckland Islands squid trawl fishery was increased in 2008 but the limit was not reached in 2008/09 nor 2009/10. Seabirds, fur seals, Hector's and Maui dolphins can all be impacted by fishing. Marine mammal operating procedures and large stretches of coastline closed for fishing, are in place to help protect seals and dolphins.

The overall state of marine fisheries (including habitat) in New Zealand is therefore mixed.

Perceptions of state, pressures and management trends

Respondents considered the quality or condition of New Zealand fisheries to be adequate to good (Figure 4.7a), with the quantity of fish stocks considered to be moderate (Figure 4.7b) by most respondents who expressed an opinion. Key pressures on marine fisheries (Figure 3.13f) are perceived to be 'commercial fishing' (70–76% of respondents), 'sewage and wastewater' (37–40%) and 'recreational fishing' (19–23%). As with all other resources, there is a perceived improvement in management over time, with the modal response being 'adequate' (Figure 4.7c).

Commentary

In all six surveys large numbers of people expressed 'don't know' responses for many marine fishery-related questions, the proportions ranging from around 15–24% of respondents. The high rates of 'don't know' responses might, in part, reflect the high level of scientific uncertainty about the status of many marine fisheries and may also reflect ongoing claims and counter claims made by fishery and environmental organisations about the status of New Zealand marine fisheries (see, for example, Anderton 2006).

4.8 MARINE RESERVES

Scientific information on state and trends

There are 34 marine reserves in New Zealand, protecting 7% of New Zealand's territorial sea. However 99% of this is in the marine reserves around the distant Auckland and Kermadec Islands. Just 0.3% of New Zealand's total marine environment is protected in marine reserves. As well 18 seamounts are closed for trawling in New Zealand's territorial sea which brings the total marine protected area to just over 3%

The reason why respondents felt the area of marine reserves to be moderate, despite only a tiny fraction of our marine area in reserves, may be because most marine reserves are near to major cities or tourist destinations. Photo: A marine reserve has been proposed near the island reserve of Tiritiri Matangi.



(<http://www.doc.govt.nz/conservation/marine-and-coastal/marine-protected-areas/marine-reserves-a-z/> – accessed 1 November 2010). This fraction is very low when compared to terrestrial reserves which cover 33.4% of New Zealand's land area. A large Benthic Protected Area was proposed in 2007 (http://www.fish.govt.nz/NR/rdonlyres/B058B3F1-1FAC-497C-A76A-86E16D14B5BF/0/FAP_BPACostRecovery.pdf – accessed 1 November 2010). The BPA Accord proposed the closure of about 1.2 million km² (around 30% of New Zealand waters) to bottom trawling and dredging.

The overall state of resources in these 34 reserves has not been quantified, but is likely to be very good compared to surrounding areas (see Willis *et al.* 2003a re snapper abundance). However, internationally there is a lack of empirical research that demonstrates gains in resource quality inside marine reserves (Willis *et al.* 2003b: 101). More recent research indicates that marine reserves are playing a role in fisheries replenishment and habitat restoration (Langlois and Ballantine 2005, Langlois *et al.* 2006). It is also clear that the marine reserves network remains far from representative of the diversity of marine environments present in the New Zealand EEZ (see for example DoC 2008: 40).

Given the above observations it appears likely that, while the existing marine reserves are in good condition, the overall network is not representative.

Perceptions of state, pressures and management trends

Most respondents think there is a moderate quantity of marine reserves in New Zealand (Figure 4.8a). The most frequently identified pressures (Figure 3.13g) are 'commercial fishing' (36–47% of respondents), 'sewage and stormwater' (36–40%) and 'recreational fishing' (23–30%). Marine reserves are considered to be adequately to well managed (Figure 4.8b), with this perception improving significantly over time.

Commentary

Given the tiny fraction of New Zealand's marine area in reserves, it may appear surprising that so few people consider there to be a 'low' or 'very low' quantity of marine reserves in New Zealand (i.e., only about one fifth of all respondents provide this response in 2010). However, most of New Zealand's marine reserves are near major cities or tourism destinations, which may have led to the impression that marine reserves are more common than they really are. Respondents may also be unaware of the magnitude of New Zealand's EEZ (the fourth largest in the world), and perceptions of the marine area may be focused on the coastal zone. There are other differences between marine and terrestrial reserves. Harvest of native terrestrial species is generally forbidden—wherever they occur. However, 33.8% of survey respondents participate in marine recreational fishing, a figure consistent with estimates in Hughey *et al.* (2002a) and may lose recreational fishing opportunities with an increase in marine reserves—an outcome that does not apply to terrestrial reserves.

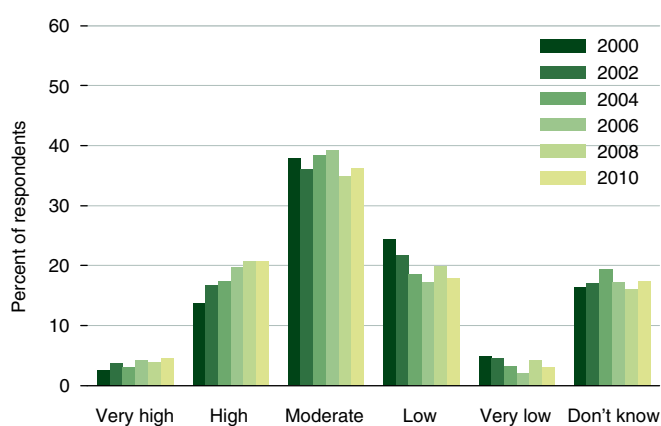


Figure 4.8a. Perceived area of marine reserves ($p < 0.001$).

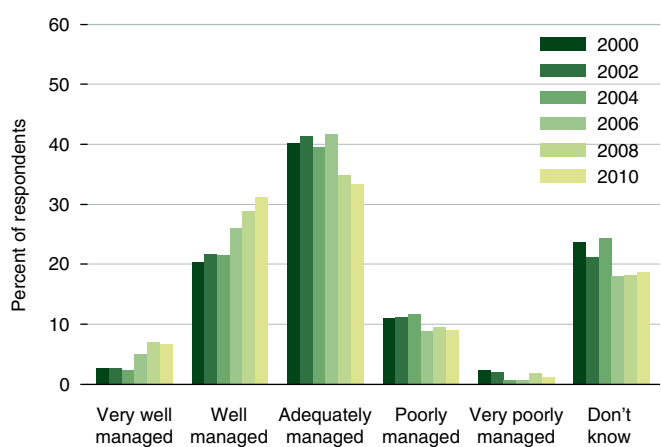


Figure 4.8b. Perceptions about management of marine reserves ($p < 0.001$).

4.9 RIVERS, LAKES AND GROUNDWATER

Scientific information on state and trends

MfE (2007: 304) conclude that: “Water quality in New Zealand is still generally good by international standards, and a large proportion of our water resources remain free of land-use pressures. Nevertheless, water quality continues to decline in areas that are dominated by agricultural and urban land use” (and see also Environment Waikato 2008). Water quantity is reported as being a more significant concern, with MfE (2007: 304) reporting that “while water is generally in good supply in most regions, many large river and aquifer systems are now fully allocated (that is, no further water can be taken from them without causing environmental harm or affecting existing users)”.

The most recent report on river water quality by NIWA (Unwin *et al.* 2010) provides disturbing results which have been summarised by MfE. “The state of water quality and recent trends in New Zealand’s rivers is highly variable around the country. River water quality is significantly deteriorated in lowland areas of Northland, Auckland, Waikato, the east coast of the North Island, Taranaki, Manawatu-Wanganui, Canterbury and Southland. Rivers in urban and rural areas generally have poorer water quality compared to native forest. Rural areas in particular are under increasing pressure as land use intensifies. Results for 2003–2007, indicate that median levels of total nitrogen are 5 times worse in pasture and 9 times worse in urban than in areas of native forest. Also, on average, between 2003 and 2007 the water was half as clear in areas of pasture compared to areas of native forest. Clear water is important for aquatic life and recreation. Based on the river water quality data for 2003–2007, over 50% of sites in Auckland, Waikato, Canterbury and Southland regions had median total nitrogen levels that exceeded the New Zealand guideline value and over 50% of sites in Northland, Auckland, Waikato and Southland had median total phosphorus levels that exceeded the guideline value” (MfE 2010 INFO 522).

Recent research by NIWA on lake water quality (Verburg *et al.* 2010) also provides evidence of declining quality, which has been summarised by MfE. “Trends in nutrient status between 2005 and 2009 were assessed for 68 lakes, and found that 19 (28%) of the lakes had deteriorated and eight lakes (12%) had improved. This pattern varied across lakes with different land covers. Around 40% of lakes with predominantly native catchment cover had deteriorated, compared with 25% of lakes with predominantly pastoral catchment cover. Of the monitored lakes, 112 have nutrient data between 2005 and 2009 available to provide an indication of current state.

Of these: 44% have high to very high levels of nutrients, meaning the water quality is degraded; 33% have low or very low levels of nutrients.” “Extrapolating from the monitored lakes to provide an estimate for the whole of NZ suggests that 32% are likely to be degraded, whilst 43% are likely to have good or excellent water quality.” “Of the 155 lakes that had data on ecological condition (measured by using submerged plants as an indicator) available: 37% have poor ecological condition or had no submerged plants; 33% have high or excellent ecological condition” (<http://www.mfe.govt.nz/publications/ser/lake-water-quality-in-nz-2010/>).

Hughey *et al.* (2007) compared perceptions gathered at national and context-specific levels and found there was a good correspondence with what biophysical scientists were reporting. Generally, water quality is good and there is a large quantity available on a national level, but for lowland streams the status is much more variable and there are major negative impacts, both in quantity and quality.

The state of these resources is clearly mixed and overall might be considered as adequate or good.

Perceptions of state, pressures and management trends

In 2000 and 2002, respondents were asked about condition, quantity and management of freshwater. In 2004 and subsequent surveys, the freshwater category was replaced by two separate categories, ‘rivers and lakes’ (Figures 4.9 a–c) and ‘groundwater’ (Figures 4.9 d–f), because of the different environmental impacts and management issues relating to them. Whereas Hughey *et al.* (2004, 2006) combined these categories for comparison with the earlier data, that practice has been discontinued in this report and only the 2004–2010 data are reported in detail. An exception occurs in terms of pressure, where the term ‘freshwater’ remains in use.

Although most people have opinions on the quality, quantity and management of rivers and lakes, there is a much higher proportion of ‘don’t know’ responses for questions on groundwater, possibly because groundwater is not ‘seen’.

The quality of rivers and lakes and of groundwater (Figures 4.9a and 4.9e) is judged to be ‘adequate’ or ‘good’, and the amount of water available in both (Figures 4.9b and 4.9e) is mostly considered to be either ‘moderate’ or ‘high’.

The main causes of damage to freshwaters (Figure 3.13g), and the range of variations from 2000–2010, are considered to be ‘farming’ (25–52%) and ‘sewage and stormwater’ (40–44%), and ‘industrial activities’ (27–36%). Farming, in particular, has increased hugely in importance over the course of the survey period.

Around 20% of respondents for groundwater and less than 10% for rivers and lakes expressed ‘don’t know’ responses to perceptions of management of each resource (Figures 4.9c and 4.9f respectively).

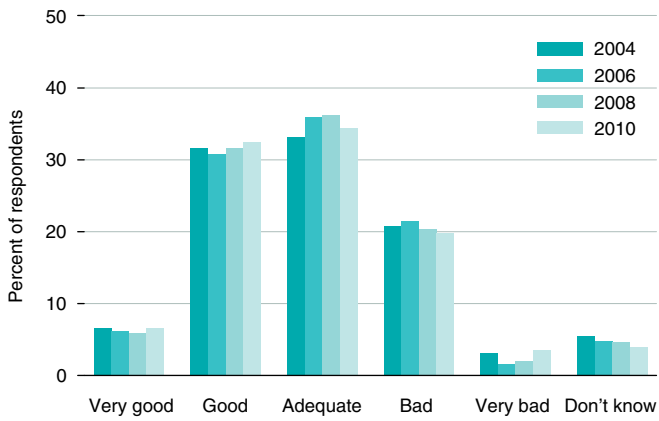


Figure 4.9a. Perceived quality or condition of rivers and lakes.

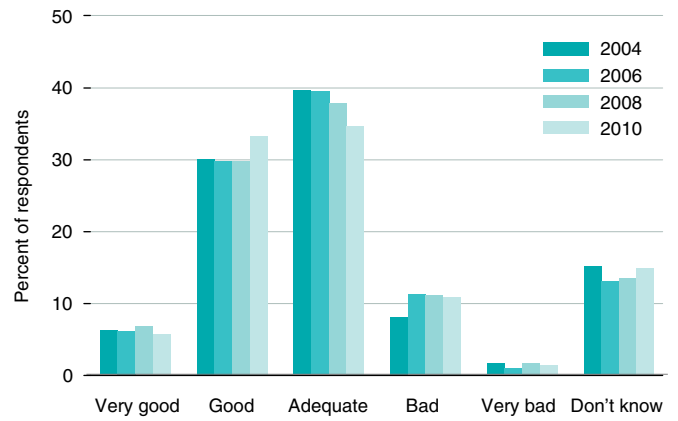


Figure 4.9d. Perceived quality of groundwater.

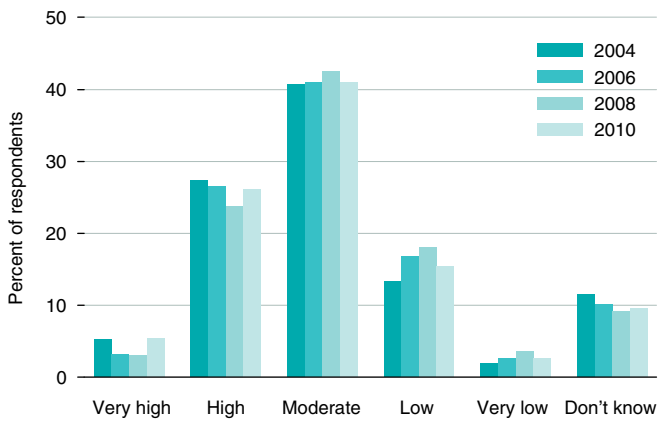


Figure 4.9b. Perceived amount of freshwater in rivers and lakes (p<0.001).

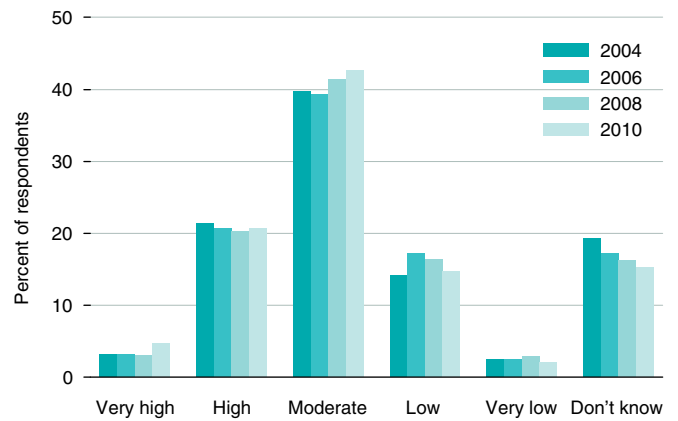


Figure 4.9e. Perceived availability of groundwater for human use (p<0.01).

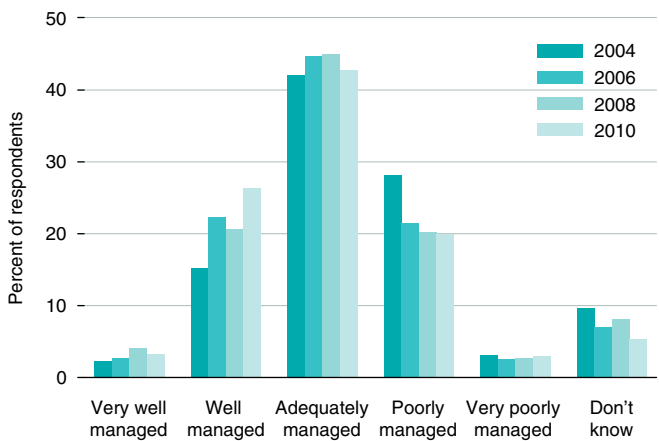


Figure 4.9c. Perceptions about management of rivers and lakes (p<0.001).

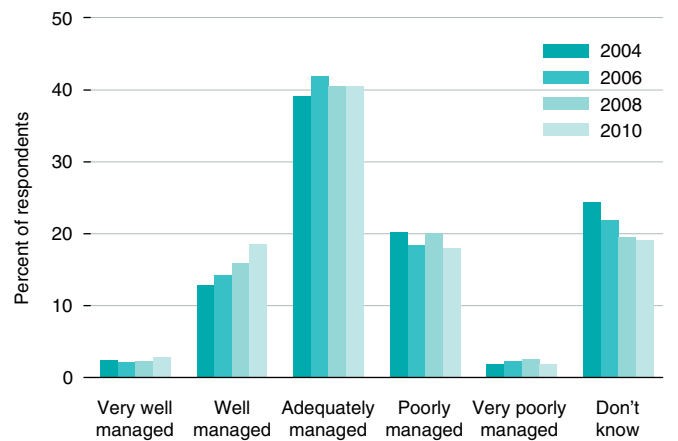


Figure 4.9f. Perceptions about management of groundwater.

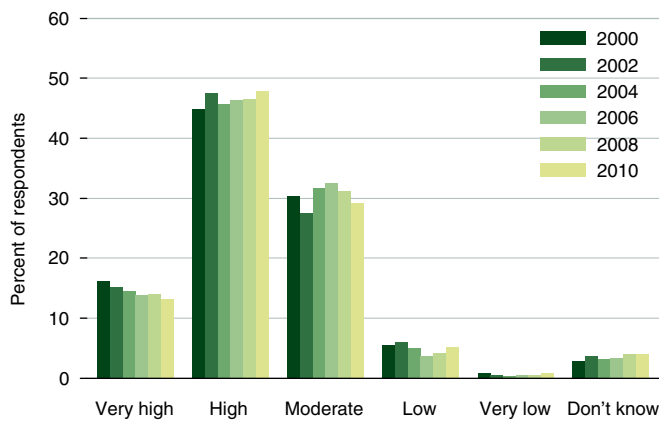


Figure 4.10a. Perceived area of national parks.

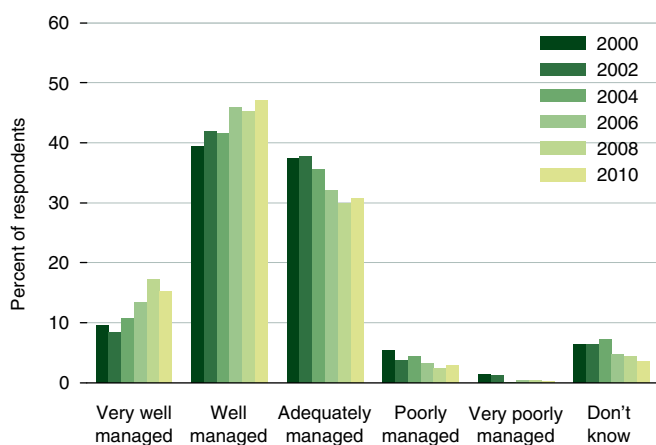


Figure 4.10b. Perceptions about management of national parks ($p < 0.001$).

Commentary

Water quality and quantity issues remain of high public interest. For example, 26% of chapter downloads from the *Environment 2007* report from the MfE website were of the freshwater chapter, with the next closest being biodiversity at 12% (MfE 2008: 3). More recently, the New Zealand Business Council for Sustainable Development (2008) has reported proposals to improve water management in New Zealand to address over allocation and water quality deterioration issues. Concerns about water quality might be a response to ongoing media interest in water quality issues, such as the prominent 'dirty dairying' campaign implemented by Fish and Game New Zealand, and many high profile articles in popular media, including increased prominence of water footprinting and reporting on biophysical monitoring findings.

4.10 NATIONAL PARKS

Scientific information on state and trends

New Zealand has 14 national parks (<http://doc.govt.nz/parks-and-recreation/national-parks/>), with 23% of the land area added relatively recently (Whanganui (1986), Paparoa (1987), Kahurangi (1996), Rakiura (2002)). A disproportionate quantity of national parks (10 out of 14) and other reserves are located in the South Island, mostly in difficult-to-access mountainous areas. New Zealand national parks are dominated by mountain lands and forests. While the state of the mountain lands is likely of high quality, the state of forests is mixed because of the relatively higher level of impacts of weeds and pests (see section 4.4). The overall state of national parks can therefore be considered as good.

Perceptions of state, pressures and management trends

Respondents reported the area of national parks in New Zealand to be moderate to high, but with no detectable trends in response over time (Figure 4.10a). Key pressures (Figure 3.13i) on national parks are 'pests and weeds' (55–59% of respondents) and 'tourism' (35–51% of respondents). Respondents report that national parks are adequately to well managed (Figure 4.10b), with an improving trend detectable over the six surveys ($p < 0.001$).

Commentary

National parks are sometimes considered the 'jewels in the crown' of conservation. They are important to conservation in New Zealand, and have been for many years – Tongariro National Park was established in 1887 (<http://doc.govt.nz/parks-and-recreation/national-parks/tongariro/>). This importance and the level of management input may be reflected in survey responses which evaluate national parks and their management very positively.

4.11 WETLANDS

Scientific information on state and trends

Only an estimated 10% of the pre-human extent of wetlands remain in New Zealand (Charteris *et al.* 2008, MfE 2008). Overall, the percentage remaining is lower in the North Island (4.9%) than in the South Island (16.3%), a fact attributed by Charteris *et al.* (2008) to the detrimental effects of human development in the lowland areas of the North Island. A Sustainable Management Fund project on the co-ordinated monitoring of wetlands, including classification and assessment of wetland quality was undertaken (Clarkson *et al.* 2003), but there are insufficient data to determine the overall state of wetlands. The Department of Conservation developed a wetland typology and has identified key pressures on wetlands (Charteris *et al.* 2008), however no national level picture is yet available from this work.

Despite the challenges outlined above there is a range of now 'older' and very recent national level documentation, complemented by some more recent local level documentation that enables tentative conclusions to be drawn about wetland state. The Parliamentary Commissioner for the Environment (2002: 5) concluded that:

“Although several thousand wetlands remain (including 70 deemed to be of international importance) most are very small, and their natural character and habitat quality have been lost or degraded by drainage, pollution, animal grazing and introduced plants”.

Over half of respondents felt the condition, quality and area of wetlands to be adequate to good. This is in stark contrast to the reality of only 10% of pre-human wetlands remaining.
Photo: Cushion bog, Mackenzie Basin.



KEN HUGHES

Similar conclusions were drawn by the Office of the Controller and Auditor General (2001: 54) who stated that:

“There are no comparisons over time of scientific information on water and biological quality or surveys of the wetland areas. Nevertheless, after questioning key professionals and others involved in the protection and management of wetlands, we concluded that there is strong subjective evidence that suggests a failure to achieve the desired outcome of the Convention³”.

More recently, but also at the national level, Ausseil *et al.* (2010: 15) concluded that:

“Our data indicate that NZ's wetland biodiversity may be severely depleted and what remains may be threatened. Some wetland types and their associated communities may face extinction.”

At the more local level Hughey *et al.* (2009) report a mixed state of one of New Zealand's biggest and most important wetlands, Te Waihora/Lake Ellesmere, with some values in a healthy state and many values greatly reduced over time and continuing to be threatened by habitat destruction including drainage, burning and over grazing, inappropriate water level management, and by pests and weeds.

Based on the above, the overall status of New Zealand's wetlands can be considered to be poor.

³ The Ramsar Convention is the Convention on Wetlands of International Importance adopted in 1971 and signed by New Zealand in 1976.

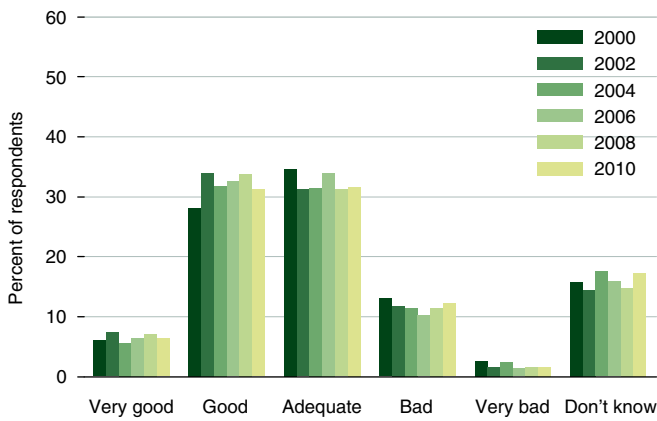


Figure 4.11a. Perceived condition of wetlands.

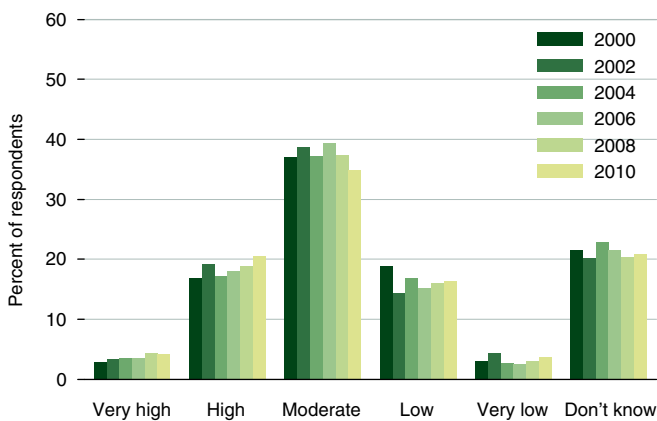


Figure 4.11b. Perceived area of wetlands.

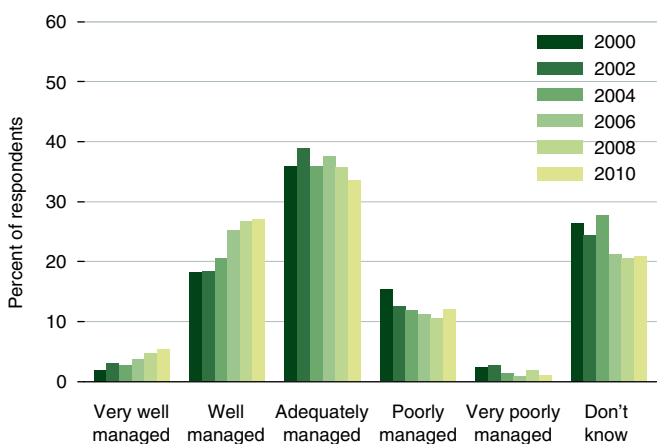


Figure 4.11c. Perceptions about management of wetlands ($p < 0.001$).

Perceptions of state, pressures and management trends

Respondents generally consider the state or condition of wetlands to be adequate to good, with no detectable change over the six surveys (Figure 4.11a). The area of wetlands is considered to be moderate, with almost equal numbers (15–20%) considering it high to very high or low to very low, but in excess of 20% expressing a ‘don’t know’ view (Figure 4.11b). The perceived main causes of damage to wetlands (Figure 3.13j) are ‘pests and weeds’ (34–44% of respondents) and ‘farming’ (29–35% of respondents). Wetlands are considered to be adequately to well managed, with an increasing proportion of respondents expressing very positive views about wetland management (Figure 4.11c).

Commentary

There is a lack of knowledge about trends in the pressures, state and responses to wetland issues in New Zealand—mirrored to some extent by the high frequency of ‘don’t know’ responses to most wetland related questions. Having said this, it is somewhat surprising that around 60–70% of respondents consider the condition or quality, as well as the area, of wetlands to be adequate to good.

4.12 NEW ZEALAND’S NATURAL ENVIRONMENT COMPARED TO OTHER DEVELOPED COUNTRIES

Scientific information on state and trends

There are an increasing number of studies that assess countries’ environmental performance and report relative performance for most countries.

In earlier survey reports (e.g., Hughey *et al.* 2006) we used comparative data from the Environmental Sustainability Index (ESI), which provides a measure of overall progress towards national environmental sustainability. ESI scores are based upon a set of around 20 core “indicators”, each of which combines two to eight variables from a total of around 70 underlying variables. The ESI permits cross-national comparisons of environmental progress in a systematic and quantitative fashion (Esty *et al.* 2005). Overall, New Zealand ranked 14th of 142 nations evaluated in the 2005 ESI—it ranked highly for water quantity, water quality, and for air quality, and badly for biodiversity status. Given the above, the state of the New Zealand environment is broadly comparable to nations in the upper quartile of the ESI.

More recently, an alternative ranking, the Environmental Performance Index, was released on a trial basis in 2006, subsequently confirmed in 2008 and repeated in 2010 (Esty *et al.* 2008, Emerson *et al.* 2010). The EPI has been built around two objectives: 1) reducing environmental stresses on human health; and, 2) protecting ecosystem vitality. The three reports have used different numbers and combinations

of indicators, and different sets of weightings thus making inter-survey comparisons challenging. However, the surveys still give an indication of comparative nation rankings. In 2006 New Zealand ranked 1st of 133 nations evaluated, in 2008 New Zealand ranked 7th of 149 nations considered, and in 2010 it ranked 15th out of 163 countries. In the first two EPI evaluations New Zealand was considered to be performing very strongly in terms of water resources, strongly in terms of sustainable energy, biodiversity and habitat, and moderately in terms of productive natural resources. Table 4.1 (page 28) provides a summary comparison of New Zealand's 2010 performance for some of these scores.

Overall then, evaluated against the ESI and the EPI indices, New Zealand can be considered to be performing well against other developed nations.

A third international comparative study led by the University of Adelaide Environment Institute provides a sobering picture of the environmental impact of the world's economies (Bradshaw *et al.* 2010). The study ranks 171 countries based upon natural forest loss, habitat conversion, marine captures, fertiliser use, water pollution, carbon emissions and species threat. When ranking countries by their proportional environmental impact (ie, with respect to their available resources), New Zealand ranked 18th worst. In particular, biodiversity loss and fertiliser usage rank poorly for New Zealand.

Perceptions of state, pressures and management trends

The vast majority of respondents considered the condition of New Zealand's natural environment to be good or very good when compared to other developed countries, a pattern which has been consistent over all surveys (Figure 4.12a). In terms of management, respondents consider New Zealand to be performing well to adequately, with a trend to higher ratings over time (Figure 4.12b).

Commentary

Survey responses reinforce the view that New Zealanders believe they live in a cleaner and greener environment than is found in many other developed countries. This view concurs with the conclusions from the ESI and the EPI, which rank New Zealand highly for environmental sustainability and performance. However, the Bradshaw *et al.* (2010) study does reveal that the actions of just 4.3 million people have a significant impact on some parts of the New Zealand environment.

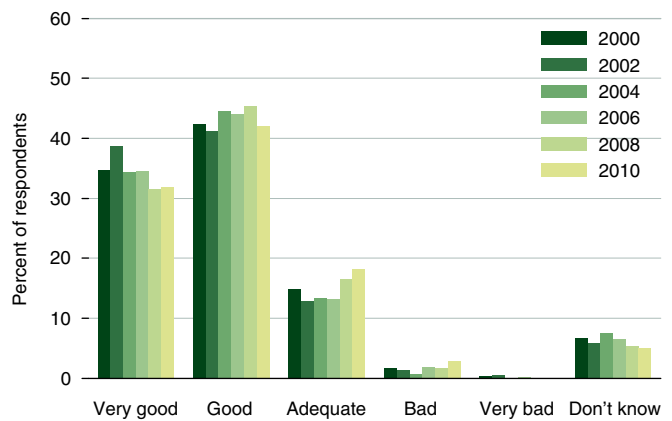


Figure 4.12a. Perceived condition of New Zealand's natural environment compared to other developed countries (p<0.05).

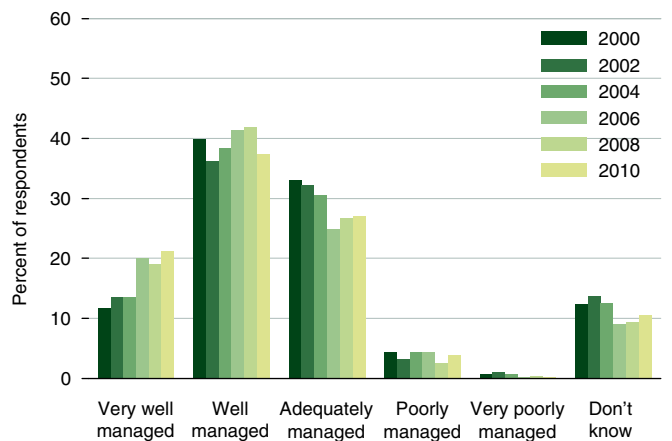


Figure 4.12b. Perceptions about current management of New Zealand's natural environment compared to other developed countries (p<0.001).



SHELLEY MCMURTRIE

Tributary of the Nina River, Lake Sumner Conservation Park, South Island

05

STATE OF THE ENVIRONMENT

In this section the overall trends evident from the detailed results presented in sections three and four are presented.

5.1 OVERALL STATE OF THE ENVIRONMENT

Respondents continue to believe the standard of living in New Zealand is good. Their assessment is that New Zealand is a 'clean and green' land and they also indicate the state of the New Zealand natural environment is good to adequate. New Zealanders believe that they have good knowledge of the environment. While the quality of their knowledge is unknown to us, their concern about the environment is evident. For example, there continue to be eight separate environment-related activities that are engaged in by more than 50% of respondents during the past year (Figure 3.18). Participation in four of these activities (reducing or limiting electricity use, commuting by buses or trains, recycling household waste, and growing some of their own vegetables) is substantially higher than when the survey began in 2000.

5.2 PRESSURES ON THE ENVIRONMENT

The New Zealand economy has grown during the period of the six surveys, with cumulative real GDP growth of 28.1% since 2000. During the same period the New Zealand population has grown by 13.7%. Growth in the economy and population growth can both increase environmental pressures. Each of the six surveys asked respondents about the pressures on the New Zealand environment. Responses indicate a belief that growth in production and consumption, as well as intensification of some activities, farming and urban development in particular, are increasing pressures on the environment.

- Respondents in 2010 (and the 2008 survey) judged freshwater related issues to be the most important environmental issues facing New Zealand (Figure 3.20).

- Some sources of environmental problems are perceived to affect several resources. For example, respondents stated that sewage and storm water cause damage to beaches and coastal waters, freshwaters, marine fisheries and marine reserves (Table 3.4). Similarly, damage of native land and freshwater plants and animals, native forests and bush, national parks and wetlands is frequently attributed to pests and weeds.
- Farming reinforced its prominent position as a perceived source of pressure on the environment, particularly on freshwaters (for the first time in 2010 recorded by over 50% of respondents as one of the three main causes of damage to freshwater). Over time farming has been perceived as increasingly problematic for almost all resources monitored (Table 3.5).
- New Zealand European respondents, as observed previously (Hughey *et al.* 2008), were more likely than others to judge that farming exerts pressure on freshwaters. Other ethnicity respondents were more likely to identify household emissions and the dumping of solid wastes as exerting pressure on freshwaters.
- Forestry and urban development were judged to exert considerable pressure on native forests and bush.
- Commercial fishing was judged to be the main source of pressures on marine fisheries and marine reserves.

Of continuing interest is that tourism was listed as second only to pests and weeds as a major cause of damage to national parks (Table 3.44). Also notable in 2010 was mining, which ranked third (22% of respondents in 2010 compared for 6% in 2008) – this increase is almost certainly due to the controversial proposal in 2010 for considering mining in national parks (e.g., Hembry 2010).

Respondents believe that growth in production, consumption, and intensification of some activities are increasing pressures on the natural environment. Photo: Natural systems and signs of human progress are part of the iconic landscape in the ranges behind Hamner Springs, Clarence River headwaters, South Island.



5.3 STATE OF THE ENVIRONMENT

Respondents rate the state of the New Zealand environment highly compared to the environment in other developed countries (Figure 3.5). The six surveys asked respondents to assess the state of nine components of the environment.

- In the 2000 and 2002 surveys New Zealanders rated the state of marine fisheries as worse than other parts of the environment. However, the 2004-2010 surveys, which disaggregated freshwater into two separate categories, indicated that rivers and lakes are rated worse than marine fisheries (Figure 3.5).
- Three distinct clusters reflect the perceived availability of natural resources in New Zealand. (i) Area of national parks, parks and reserves in towns and cities, diversity of native and freshwater plants and animals, and amount of native bush and forest were tightly grouped at moderate to high availability. (ii) Area of marine reserves, area of wetlands, amount of groundwater, amount of freshwater in rivers and lakes, and quantity of marine fish were rated as having moderate availability. (iii) Oil and gas reserves were perceived to be moderate to low (Figure 3.7).
- The downward trend in perceptions of the amount of oil and gas reserves from 2000 to 2006 was reversed in 2008 and 2010 with a substantial increase. Perceived availability of this resource remains less than moderate, but is at its highest perceived level since the surveys began in 2000.
- Perceptions about availability of all other resources remain relatively static, or there are only marginally sufficient data to detect trends (e.g., for rivers and lakes there are only four surveys) (Figure 3.8).

5.4 MANAGEMENT OF THE ENVIRONMENT

New Zealanders generally judge that the environment is adequately managed, but that environmental management is improving – this trend has emerged strongly over the course of the 2008 and 2010 surveys. However, this statement conceals a wide range of views about management of specific parts of the environment.

- For rivers and lakes, for groundwater, and for marine fisheries around 20% of respondents thought that management was bad or very bad.
- As in 2008, management of New Zealand's natural environment compared to other developed countries and management of national parks, were both rated much more highly than other parts of the environment (Figure 3.11).
- Across the six surveys, air quality, marine fisheries and soils have consistently been rated amongst the worst managed environmental sectors (Figure 3.12), joined more recently by rivers and lakes, and by groundwater.
- Ratings of management of many resources including marine fisheries and wetlands has improved every survey.

The overall continuing improvement in perceptions of management is not always matched by perceptions of state. In 2008 it was noted that a lag between management improvements and state is one possibility and this issue needs to be monitored carefully in future surveys – this monitoring is continuing and has yet to detect the lag being corrected.





06

SHELLEY MCMURTRIE

Walkers on a guided tour to Oashore, Banks Peninsula

SPECIAL TOPICS

6.1 INTRODUCTION

Demand for freshwater in New Zealand continues to increase, especially from agriculture, but also for energy generation, other industries and for domestic water supply. This growth in demand and its effects on quantity and quality of freshwater has increased attention on the amounts of water available and the ability of rivers and streams to meet instream flow needs for fishing, wildlife, boating and other activities. In several regions dairy farming is associated with declining water quality in lowland streams. In 2010 the Land and Water Forum, a group¹ commissioned by the government to report on the ongoing management needs of freshwater, reported in a 'Fresh Start for Freshwater'. Given the Forum's mandate we considered it appropriate to undertake a broad exploration of freshwater and its management as a complement to previous and somewhat similar case studies undertaken in the 2004 and 2008 surveys.

6.2 METHODS

Twelve questions, some in multiple parts, addressed survey participants' perceptions of freshwater issues in New Zealand. Respondents were asked:

- About the quality of water in New Zealand and in their region
- To respond to 14 statements about use of, and involvement in, aspects of freshwater – state, use and management
- To identify which agencies were responsible for various water management functions
- To evaluate how well various policy and planning mechanisms were performing; and separately how well the water management agencies were performing
- About their regional council's performance in water management; and separately about ideas for improved water management
- To identify whether or not they had been involved in a range of water management related activities
- To prioritise various values associated with rivers and streams, lakes, and of aquifers/underground water
- About the effectiveness of three approaches to managing freshwater, i.e., regulation, economic instruments, and voluntary/advocacy; a subsequent question then

¹The forum comprised a range of primary industry groups, environmental and recreational NGOs, iwi and other organisations.

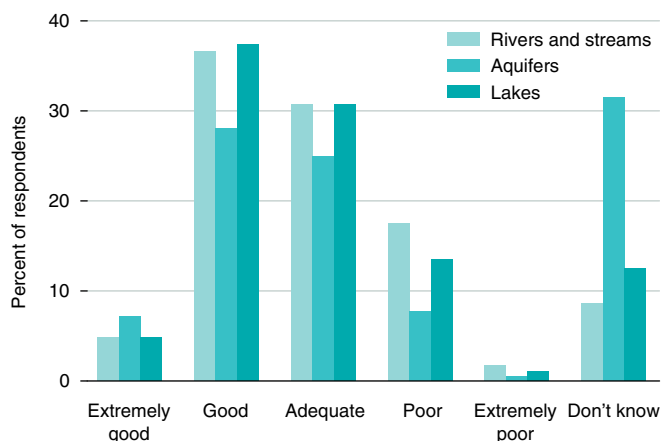


Figure 6.1. The quality of water in New Zealand's rivers and streams, aquifers, and lakes—2010 ($p < 0.001$ excluding 'don't know' responses).

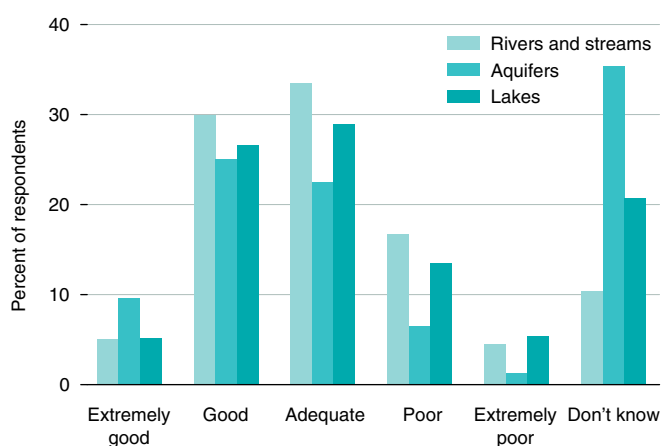


Figure 6.2. The quality of water in my region's rivers and streams, aquifers, and lakes—2010 ($p < 0.001$ excluding 'don't know' responses).

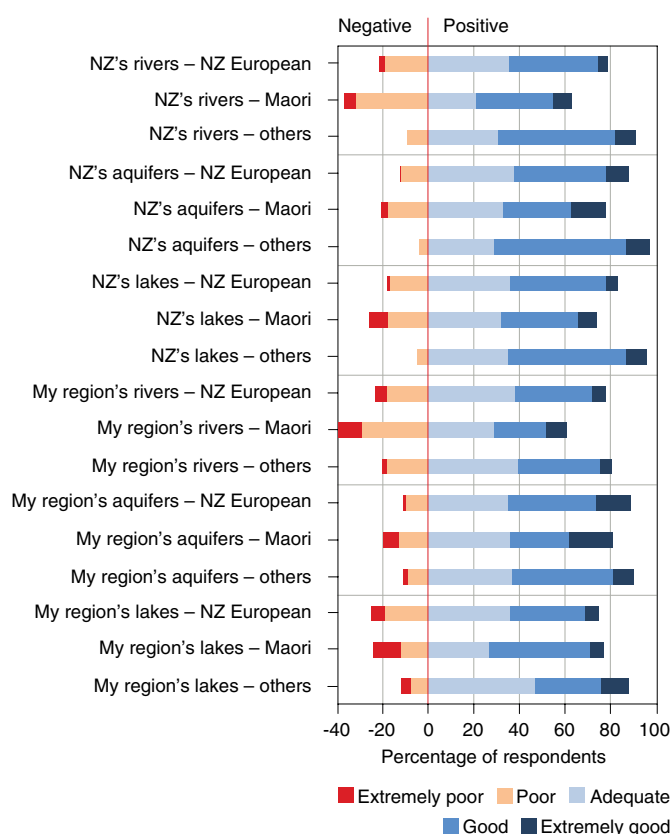


Figure 6.3. Analysis of ethnic variability in perceptions of water quality in New Zealand. Note that the statistical analyses were undertaken by combining 'extremely good' and 'good' and 'poor' and 'extremely poor', and that 'don't know' responses have been removed.

explored some specific aspects of these approaches; and a further question about the political acceptability of the same approaches for managing freshwater

- Finally, to identify desired futures for freshwater by responding to nine different statements.

Both within year and, where comparable data exist from earlier surveys, between survey (2004, 2008 and 2010) evaluations are presented. Where appropriate, responses are cross tabulated with key demographic factors. Appendix 3 reports data for this topic area.

6.3 RESULTS

6.3.1 Water quality

The 2010 survey

The quality of water in New Zealand's rivers and streams, aquifers, and lakes (Figure 6.1) was mainly seen as acceptable to good although there was a significant difference in spread of responses. The main differences were:

- The quality of water in both rivers and streams (Mean Likert score=2.72; scale – 1= extremely good to 5= extremely poor), and in lakes (Mean=2.64) was considered worse than aquifer (Mean=2.51) water quality
- There was a very high proportion of 'don't knows' regarding aquifers.

Ratings for regional perceptions of water quality (Figure 6.2) followed a similar pattern to those at the national level with rivers and streams receiving the most negative (albeit still very positive) rating. While aquifers also had the highest 'don't know' response (35.3%), there was also a relatively high 'don't know' response for lakes (20.7%). Those who had an opinion considered the quality of water in their region as good to adequate.

As per our 2008 study (Hughey *et al.* 2008: 58) we evaluated the quality of water in rivers and streams, and in lakes, against ethnicity (Figure 6.3). The key findings, some even more pronounced than in 2008, are:

- A significant difference in responses by ethnicity was found for all national-level evaluations ($p < 0.01$ for rivers and streams; $p = 0.05$ for aquifers; $p < 0.05$ for lakes), but none when evaluated on a regional basis
- Maori are more negative about all resources on a national level
- People of other ethnicities are always the most positive.

We also assessed whether there were any significant differences between regional councils for rivers and streams (Figure 6.4a), aquifers (Figure 6.4b), and lakes (Figure 6.4c). Sample size limitations restricted comparisons to only the largest regional councils. Low numbers of responses for particular categories required data aggregation for statistical analysis; 'extremely good', 'good' and 'acceptable' were combined, and 'poor' and 'extremely poor' were combined to assess statistical significance of inter-regional differences. Key statistically driven observations (in Chi square analyses with 'don't know' responses removed) were that:

- For all six of the larger regions considered the quality of water in rivers and streams, in aquifers and in lakes, is considered to be very good to adequate
- There was no significant difference for rivers and streams, or for aquifers ($p > 0.05$). Although, for aquifers note the very high 'don't know' response rates for all regions except Canterbury
- There was a significant difference for lakes ($p < 0.05$), although, as above, note the high 'don't know' response rates from Auckland and Wellington. Even allowing for this observation it is clear that respondents from the

Waikato and Bay of Plenty regions, likely informed by water quality issues associated with Lakes Rotorua and Taupo, are much less positive than those from other regions.

Ratings for freshwater quality closest to where respondents live are shown in Figure 6.5. The pattern of responses is similar to the national and regional level evaluations with a significant difference existing between the three water types. Aquifers (Mean Likert score=2.43) were rated more highly than lakes (Mean=2.87) or rivers and streams (Mean=2.96).

Water quality trends 2004, 2008, and 2010: New Zealand

Figure 6.6 shows a comparison of water quality in New Zealand's rivers and streams between the 2004, 2008 and 2010 surveys. For those people who expressed an opinion there was a general view that quality is good–adequate, with no significant differences between surveys.

A similar evaluation has been undertaken for aquifers (groundwater) (Figure 6.7) and of those who have expressed an opinion there is no significant difference between surveys, with most respondents considering quality to be good–adequate. 'Don't know' responses to this question have been high for all three surveys.

New Zealanders judge the quality of water in lakes to be good, although there was a regional difference for some areas. Photo: Lake Sumner, Canterbury.



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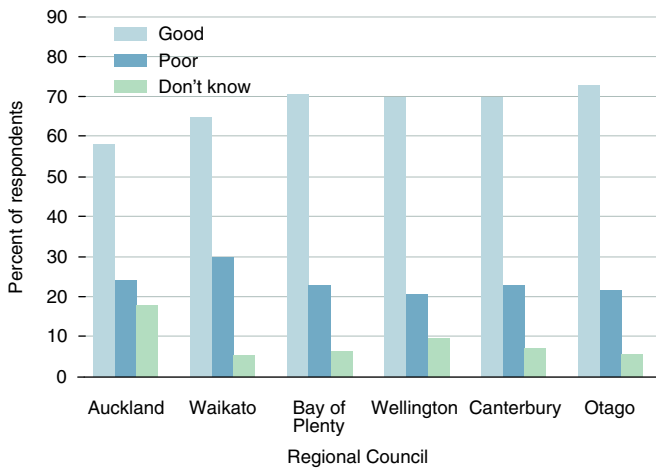


Figure 6.4a. The quality of water in my region's rivers and streams ($p > 0.05$ excluding 'don't know' responses).

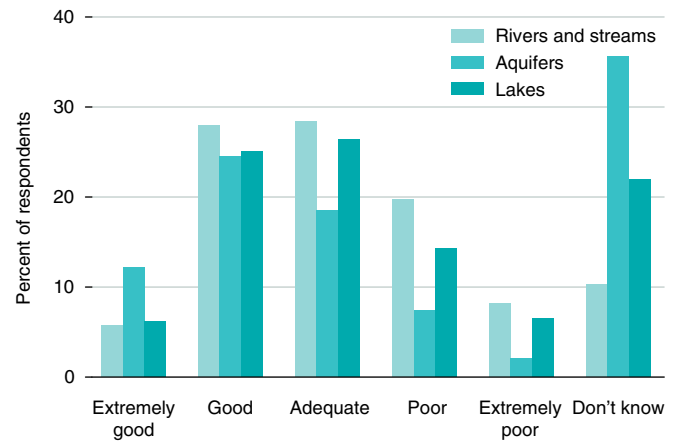


Figure 6.5. The quality of water in rivers and streams, aquifers, and lakes closest to where respondents lived—2010 ($p < 0.001$ excluding 'don't know' responses).

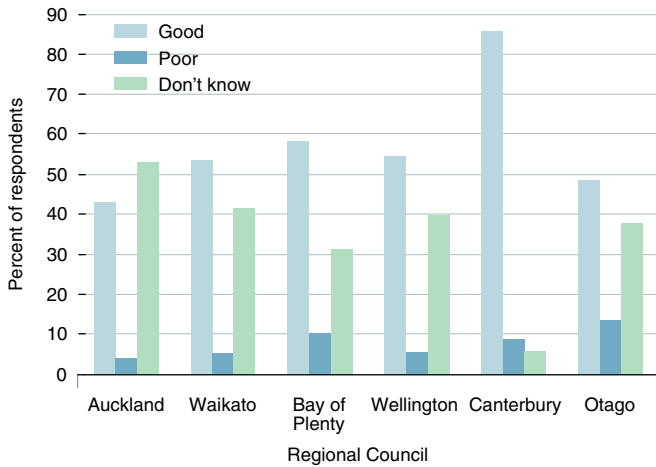


Figure 6.4b. The quality of water in my region's aquifers ($p > 0.05$ excluding 'don't know' responses).

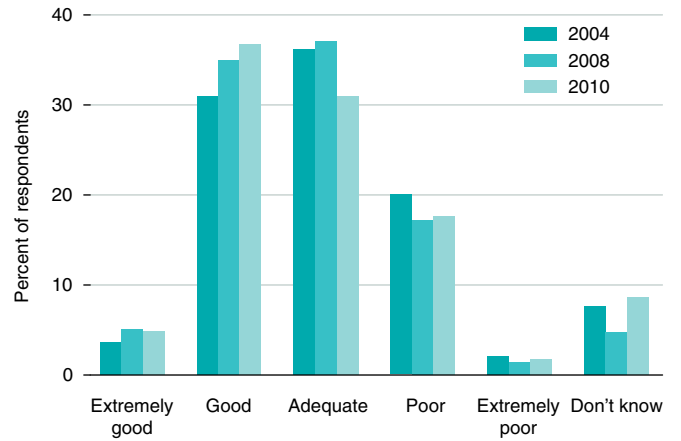


Figure 6.6. The quality of water in New Zealand's rivers and streams: 2004, 2008 and 2010 (NS, excluding 'don't know' responses).

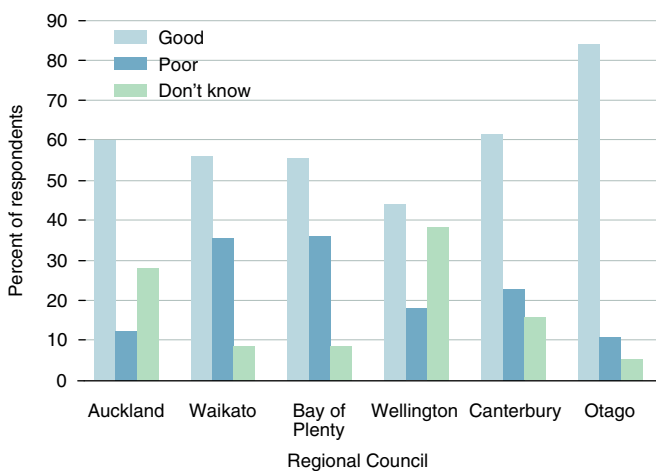


Figure 6.4c. The quality of water in my region's lakes ($p < 0.01$ excluding 'don't know' responses).

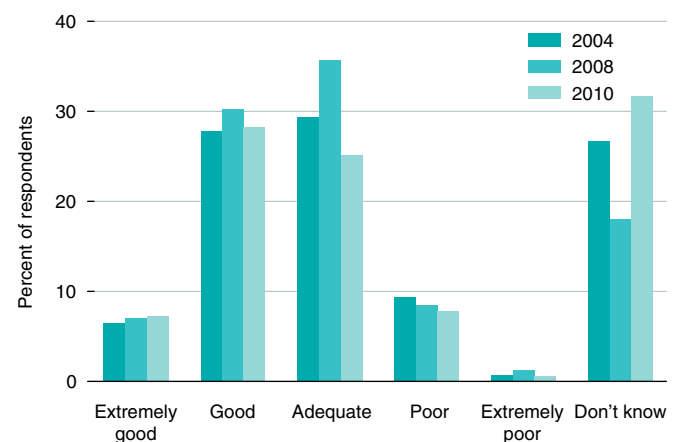


Figure 6.7. The quality of water in New Zealand's aquifers: 2004, 2008 and 2010 (NS, excluding 'don't know' responses).

A different pattern emerged for New Zealand's lakes when responses from 2004, 2008 and 2010 are compared (Figure 6.8). Where people expressed an opinion the general view was that quality is good–adequate, with a highly significant improvement recorded between surveys. Notably this finding flies in the face of Verburgl *et al.* (2010: iv) who reported that since 2005 of 65 lakes monitored for trends, 28% had deteriorated and 12% improved.

Water quality trends 2004, 2008–2010: Regional

Respondents were asked about water quality in their region in the 2004, 2008 and 2010 case studies. Figures 6.9–6.11, respectively, show these comparisons for rivers and streams, groundwater, and lakes. The key finding was that overall there was an improved perception of quality of all three freshwater types over the three surveys. This change is amply demonstrated by the change in mean Likert scores shown below:

Year	2004	2008	2010
Rivers and streams	3.30	2.94	2.84
Aquifers	3.59	3.21	2.46
Lakes	3.54	3.25	2.84

6.3.2 Water management

The survey explored, through a variety of questions, multiple aspects of water resource management. The following:

- addresses knowledge about agency responsibilities
- examines agency performance

- looks at the contributions of policy or planning mechanisms to achieving sustainable water management outcomes
- examines three approaches in terms of their contribution to achieving environmental, economic or social outcomes
- looks at the political acceptability of the three approaches to managing freshwater
- studies the possible outcomes that might be achieved by using the three management approaches in particular circumstances
- examines what respondents themselves are doing to influence freshwater management outcomes.

Agency responsibilities:

Respondents were asked about which agencies were responsible for various aspects of freshwater management (Figure 6.12a–j: note that respondents could choose more than one agency). Clearly the majority of respondents to those aspects in a, c, d, f, h, i and j correctly identified the appropriate agency. However, for:

- b (water conservation orders) less than 30% correctly identified Ministry for the Environment
- e (water resource consents) and allowing for unitary councils in a few areas only around a half correctly identified regional councils
- g (contact recreation guidelines) only around 20% identified MfE as the responsible agency.

While an increasing number of respondents between the 2004 and 2010 surveys found that water quality in lakes was good, the scientific data shows a different trend, with continuing deterioration in lake quality since 2005. Photo: Lake Forsyth on the Banks Peninsula has significant ongoing water quality problems.



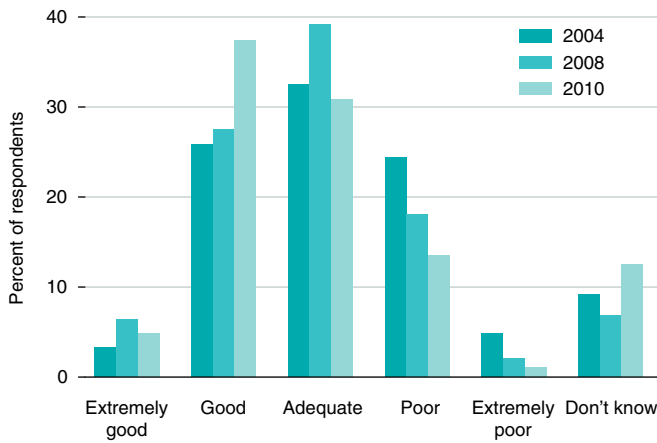


Figure 6.8. The quality of water in New Zealand's lakes: 2004, 2008 and 2010 ($p < 0.001$ excluding 'don't know' responses).

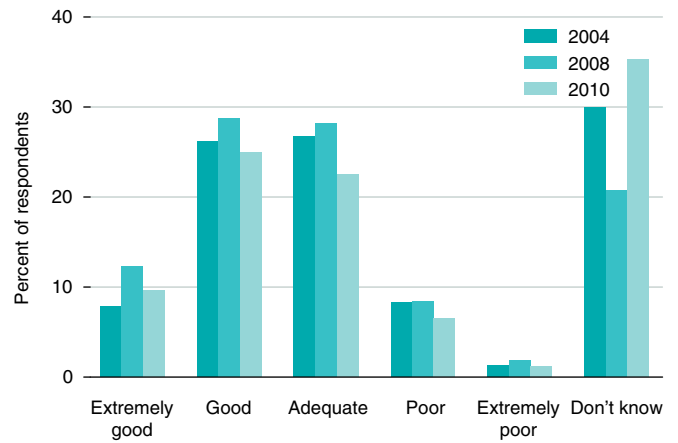


Figure 6.10. The quality of water in my region's aquifers: 2004, 2008 and 2010 (NS, excluding 'don't know' responses).

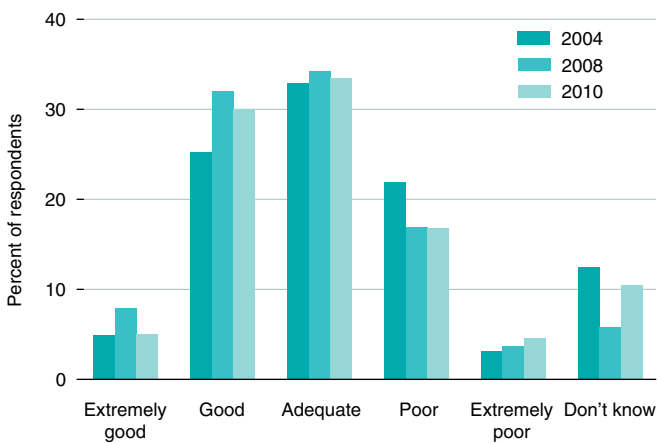


Figure 6.9. The quality of water in my region's rivers and streams: 2004, 2008 and 2010 ($p = 0.01$ excluding 'don't know' responses).

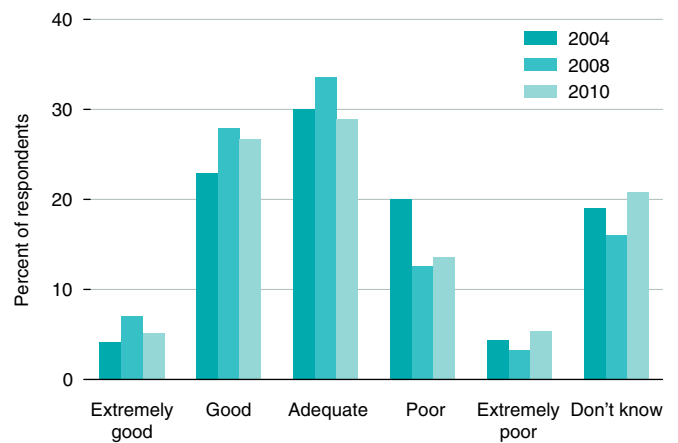


Figure 6.11. The quality of water in my region's lakes: 2004, 2008 and 2010 ($p < 0.001$ excluding 'don't know' responses).



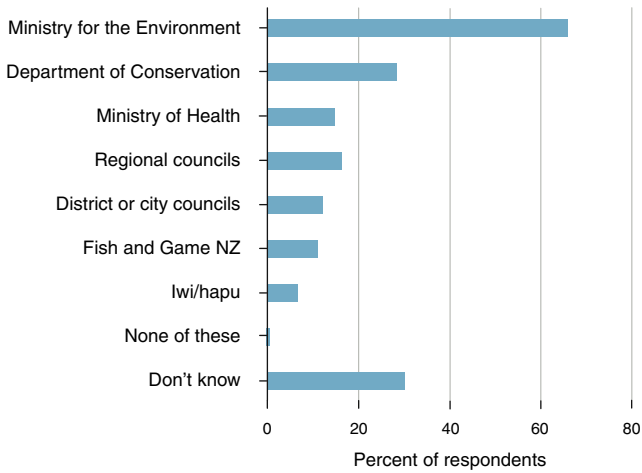


Figure 6.12a. Agency responsibility for National Policy Statements.

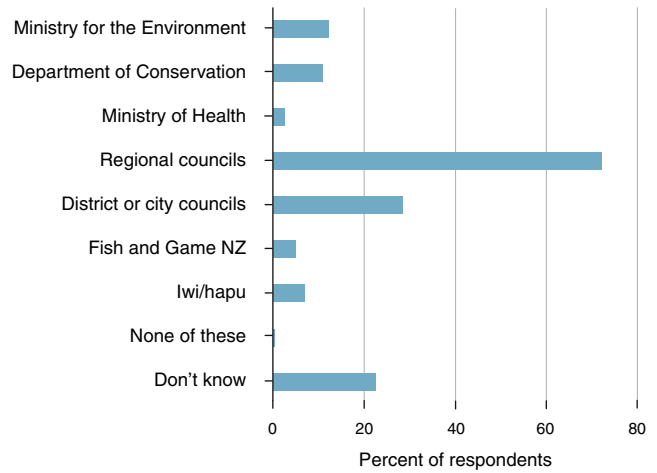


Figure 6.12d. Agency responsibility for Regional plans.

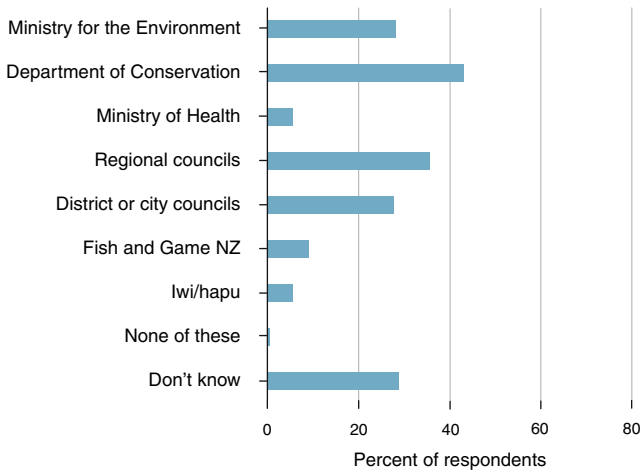


Figure 6.12b. Agency responsibility for Water conservation orders.

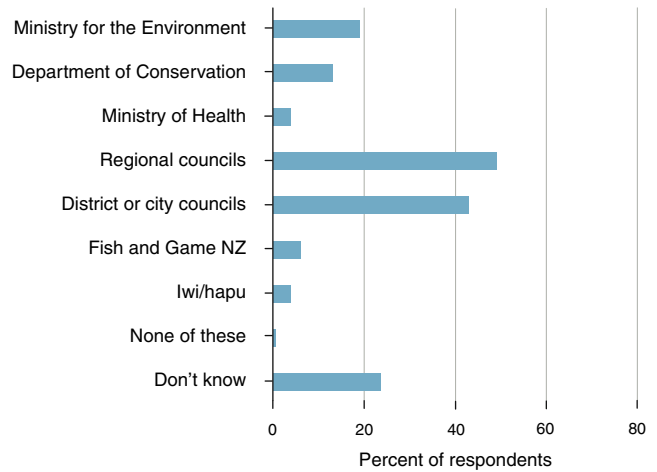


Figure 6.12e. Agency responsibility for Water resource consents.

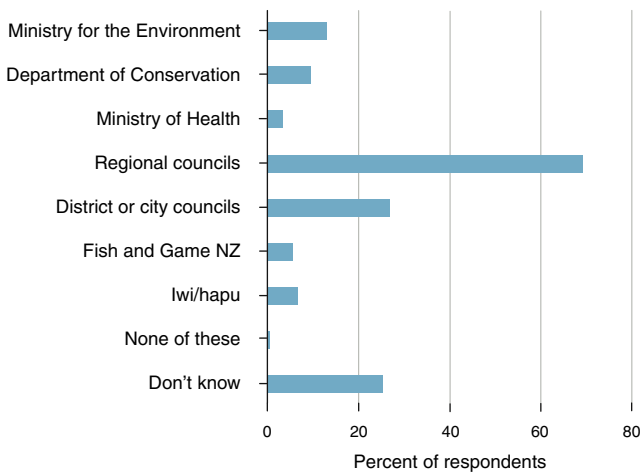


Figure 6.12c. Agency responsibility for Regional Policy Statements.

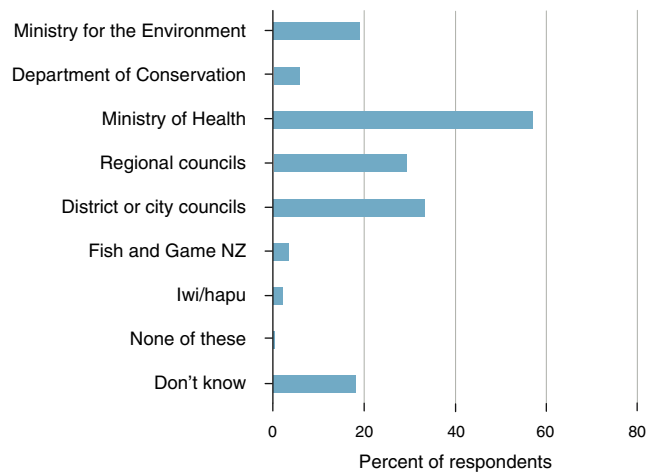


Figure 6.12f. Agency responsibility for Drinking water standards.

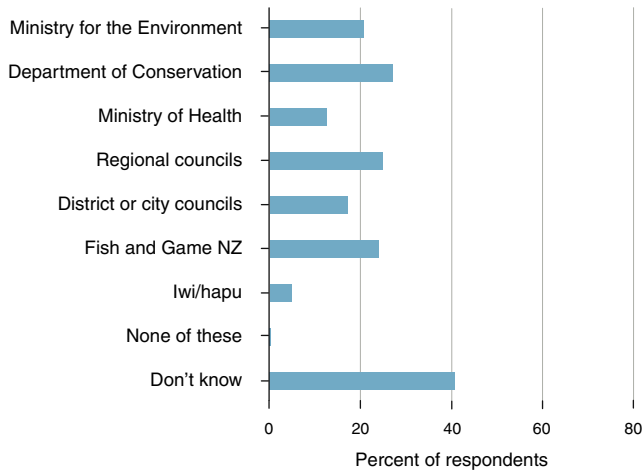


Figure 6.12g. Agency responsibility for Contact Recreation Guidelines.

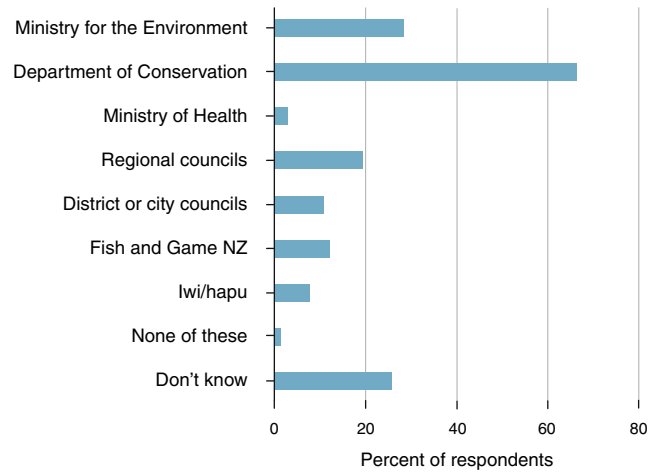


Figure 6.12i. Agency responsibility for Conservation Management Strategies.

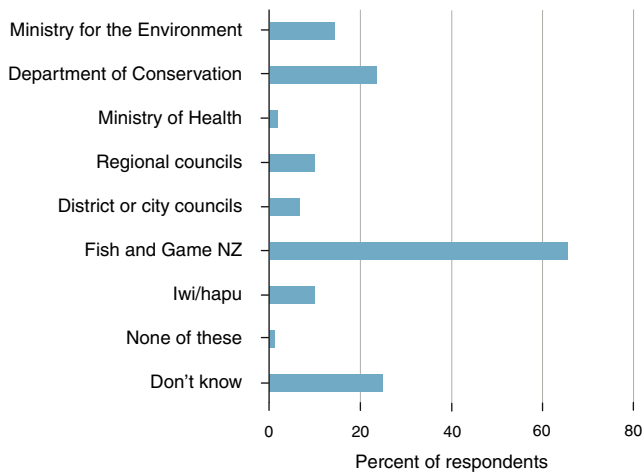


Figure 6.12h. Agency responsibility for sports fish management plans.

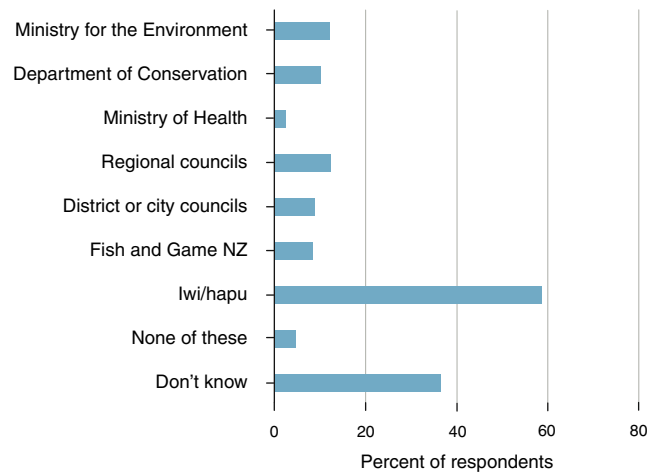


Figure 6.12j. Agency responsibility for Iwi/hapu management plans.

Agency performance:

Respondents were asked to rate the performance of their regional council's management of freshwater. Regional council performance was generally rated as 'adequate-good' for all three resources, although there was a relatively high frequency of 'don't know' responses for aquifers and lakes (Figure 6.13).

We assessed response according to council of residence for six of the largest regional councils, in terms of regional council management of rivers and streams (Figure 6.14a), aquifers (Figure 6.14b) and lakes (Figure 6.14c). Key findings were:

- There was a highly significant difference ($p < 0.001$) in terms of management of rivers and streams with almost equal numbers of Canterbury respondents considering them to be well managed as considering them poorly managed. In all other councils there was a very high rating for management
- There was no significant difference in the quality of management between council areas for aquifers, although apart from Canterbury there was a very high 'don't know' response
- While management of lakes was generally viewed positively there was a significant difference between councils ($p < 0.05$). Most notably, Canterbury and Wellington respondents were least positive although there was a very high 'don't know' response for the former.

Perhaps not surprisingly, and mirroring a similar finding from 2008 for a stand-alone evaluation of MfE performance, there was a very high 'don't know' response about organisational performance in relation to their management functions (Figure 6.15). However, those prepared to express an opinion rated performance as 'good-adequate' for all organisations.

Mean Likert scores ranked for the agencies from worst (5=extremely poor) to best (1= extremely good) show:

District and City councils	2.87
Regional councils	2.86
Ministry for the Environment	2.80
Ministry of Health	2.56
Department of Conservation	2.45
Fish and Game New Zealand	2.42

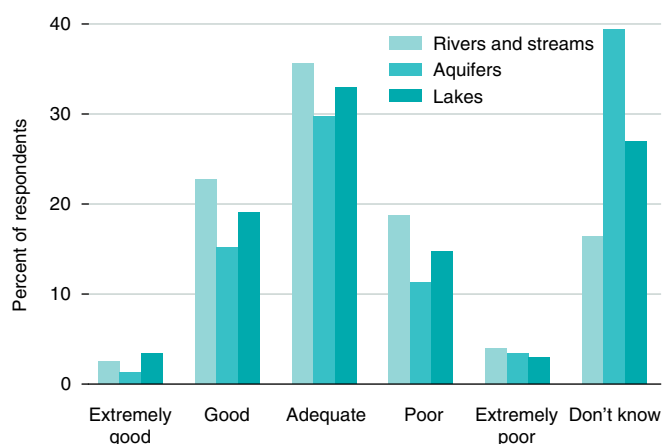


Figure 6.13. Performance rating of regional council river and stream, aquifer and lake management—2010 ($p = 0.30$ excluding 'don't know' responses).



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Respondents prepared to comment on the performance of regional councils in relation to their management function felt they were good-adequate. Photo: Effective environmental policy outcome through riparian planting has been achieved for a tributary of Te Waihora/Lake Ellesmere.

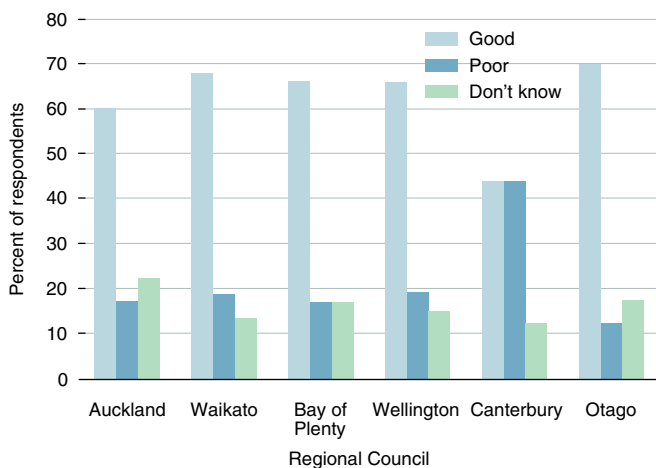


Figure 6.14a. Respondents' regional council management of rivers and streams ($p < 0.001$ excluding 'don't know' responses).

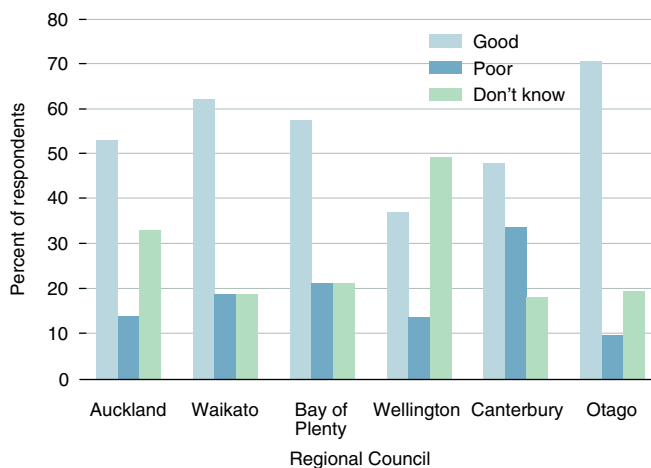


Figure 6.14c. Respondents' regional council management of lakes ($p < 0.05$ excluding 'don't know' responses).



Figure 6.14b. Respondents' regional council management of aquifers ($p > 0.05$ excluding 'don't know' responses).

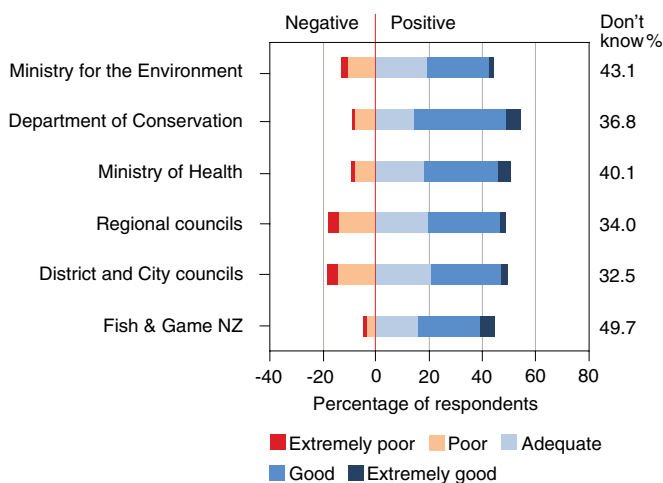


Figure 6.15. Rating of organisations in performing their water management functions—2010 ($p < 0.001$ excluding 'don't know' responses).

Contributions of policy or planning mechanisms:

A variety of policy or planning mechanisms is used in freshwater management. Respondents were asked the following question: "Now we would like your opinion on how well each of the policy or planning mechanisms is helping to achieve environmentally sustainable water management outcomes". Apart from 'drinking water standards' (38.8%) there was a very high 'don't know' response ranging from 49.0% for resource consents for water to 70.1% for 'iwi/hapu management plans' (Figure 6.16). Interpretation of Figure 6.16 is further assisted by looking at the mean Likert scores for each mechanism ranked from worst (1=extremely poor) to best (5= extremely good):

<i>Iwi/hapu management plans</i>	3.11
<i>National policy statements</i>	3.44
<i>Resource consents for water</i>	3.54
<i>Regional policy statements</i>	3.60
<i>Regional plans</i>	3.62
<i>Contact recreation guidelines for freshwater</i>	3.66
<i>Sports fish management plans</i>	3.73
<i>Conservation management strategies</i>	3.74
<i>Water conservation orders</i>	3.74
<i>Drinking water standards</i>	3.91

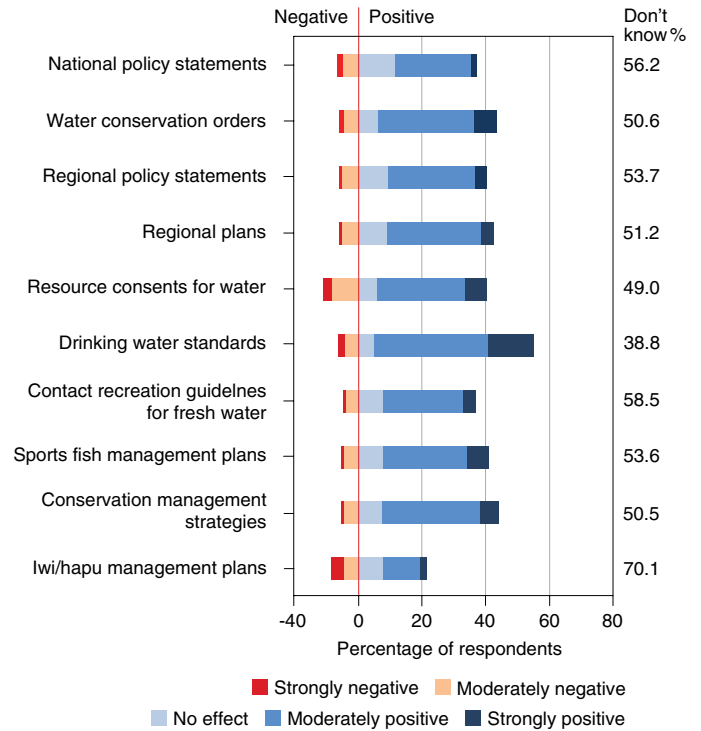


Figure 6.16. Perceptions of policy or planning mechanisms in terms of helping to achieve environmentally sustainable water management outcomes.

The majority of respondents were unable to comment on how well they thought policy is helping to achieve environmentally sustainable water management outcomes.

Photo: Multiple use water resource management is evident here with a hydro energy canal, salmon farm and recreational angling in the Pukaki canal, Mackenzie Basin.



KEN HUGHLEY

While all mechanisms had a positive score 'drinking water standards' was clearly highest and 'iwi/hapu management plans' were lowest.

Evaluation of approaches for managing freshwater:

The above mechanisms are all regulatory, but there are other approaches that can also be considered for managing freshwater. We gave respondents the following information about the three main approaches, i.e., regulation, economic instruments, and voluntary/advocacy:

Regulations, Rules and Standards could be developed and implemented around:

- environmental flows, e.g., providing enough water for fish and birds to live,
- protection of drinking water, and
- contact recreation standards.

Economic instruments could include:

- tradable water use permits, or
- pollution fees, or
- subsidies for reducing pollution, or
- charges for commercial water users.

Voluntary and/or advocacy approaches could involve:

- groups of water users taking responsibility for actions such as voluntary reductions in water use in times of low flow, or sharing available water between commercial and recreation users in such times),
- water conservation education,
- individual or collective riverbank planting, and
- voluntary codes of practice for commercial users.

These approaches were evaluated according to their contribution to: 'achieving environmental protection', 'achieving economic growth', and 'achieving benefits to society'. Respondents were asked to evaluate these contributions on a 1-5 Likert scale with 1 being 'extremely effective' and 5 being 'very ineffective'. Table 6.1 indicates a strong expectation that combining all three approaches would achieve these goals; least expected to be effective was 'Voluntary Action and Advocacy' which was the only option to achieve a negative effectiveness ranking. While there is no significant difference between rankings of regulations and economic instruments alone for achieving economic growth, in all other comparisons economic instruments alone is perceived to be less effective than regulations, which, in turn, are perceived to be more effective than voluntary measures ($p < 0.001$, paired t-tests).

Table 6.1. Comparative evaluation of respondent rankings (Likert scores: 1= extremely effective to 5= very ineffective) of effectiveness of different approaches to managing freshwater.

	Effectiveness in achieving environmental protection	Effectiveness in achieving economic growth	Effectiveness in achieving benefits to society
All three approaches combined	1.86	2.02	1.92
A combination of Regulations and Economic instruments	2.21	2.42	2.33
A combination of Regulations and Voluntary action & advocacy	2.33	2.52	2.38
A combination of Economic instruments and Voluntary action & advocacy	2.45	2.57	2.48
Regulations alone	2.66	2.76	2.76
Economic instruments alone	2.34	2.82	2.57
Voluntary action & advocacy alone	3.06	3.23	3.00

There is a strongly held view that approaches incorporating regulation and economic instruments are likely to be very effective in managing freshwater (see also Figure 6.17).

Political acceptability of three approaches for managing freshwater:

Respondents were asked to evaluate political acceptability of the three approaches for managing freshwater. As indicated in Figure 6.18, stand alone approaches were evaluated to have low political acceptance; the highest level of perceived political acceptance being for a combination of all three approaches. A comparative evaluation of mean respondent rankings (Likert scores: 1= totally unacceptable to 5= very acceptable) of the political acceptability of different approaches to managing freshwater, from least to most acceptable shows:

<i>Economic instruments by themselves</i>	2.79
<i>Voluntary action & advocacy by themselves</i>	2.84
<i>Regulation by itself</i>	2.90
<i>A combination of Regulation and Economic instruments</i>	3.53
<i>A combination of Economic instruments and Voluntary action & advocacy</i>	3.58
<i>A combination of Regulation and Voluntary action & advocacy</i>	3.63
<i>A combination of all three approaches</i>	4.12

All combinations of two of the three approaches were perceived as being of similar political acceptability, but less acceptable than the three approaches combined.

Respondents felt that incorporating regulation and economic instruments with voluntary action and advocacy would be the most effective approach in managing fresh water. Photo: A waterway in Auckland surrounded by industrial and rural land use still retains a protected riparian zone.



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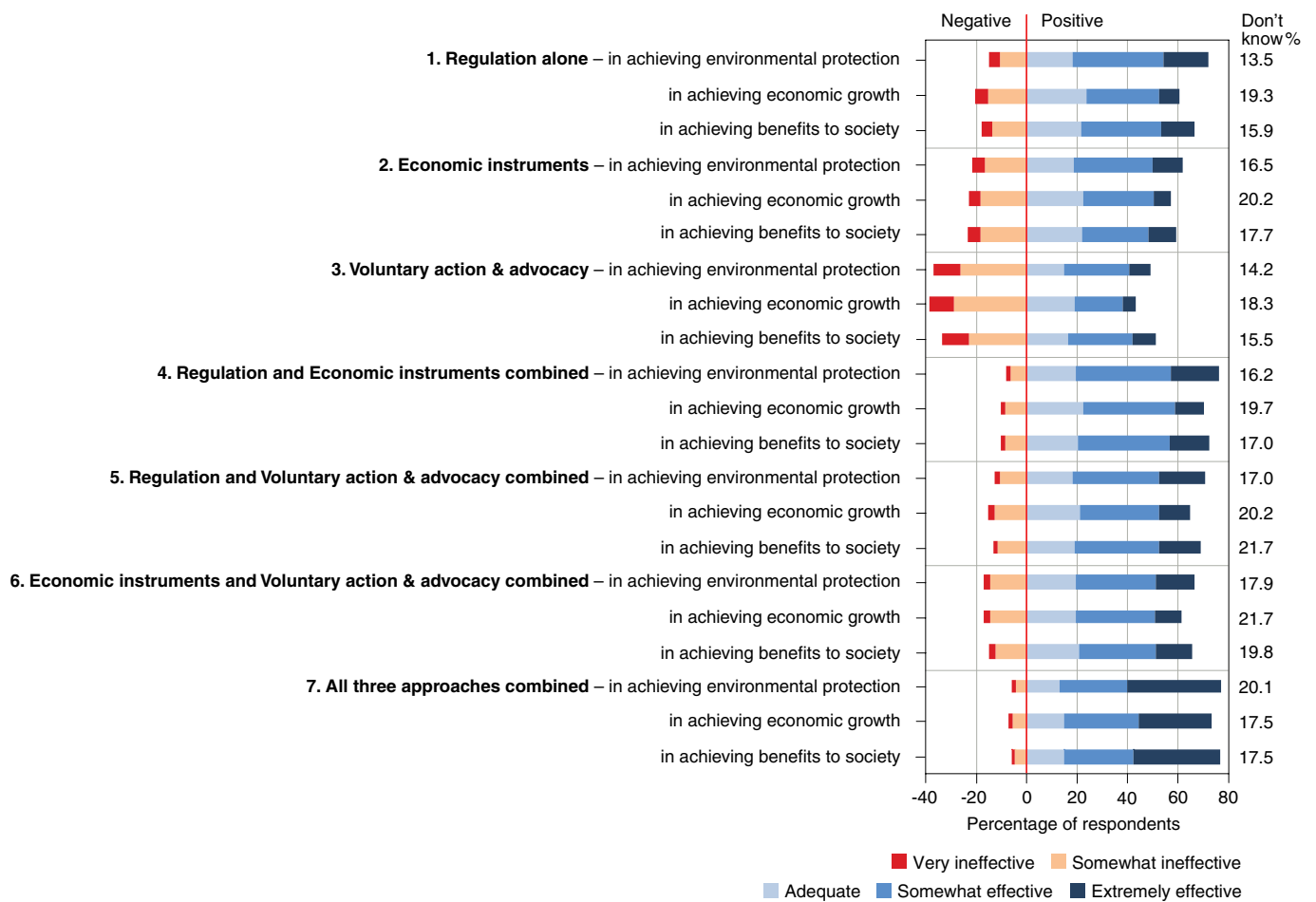


Figure 6.17. Comparative evaluation of three approaches for managing freshwater resources.

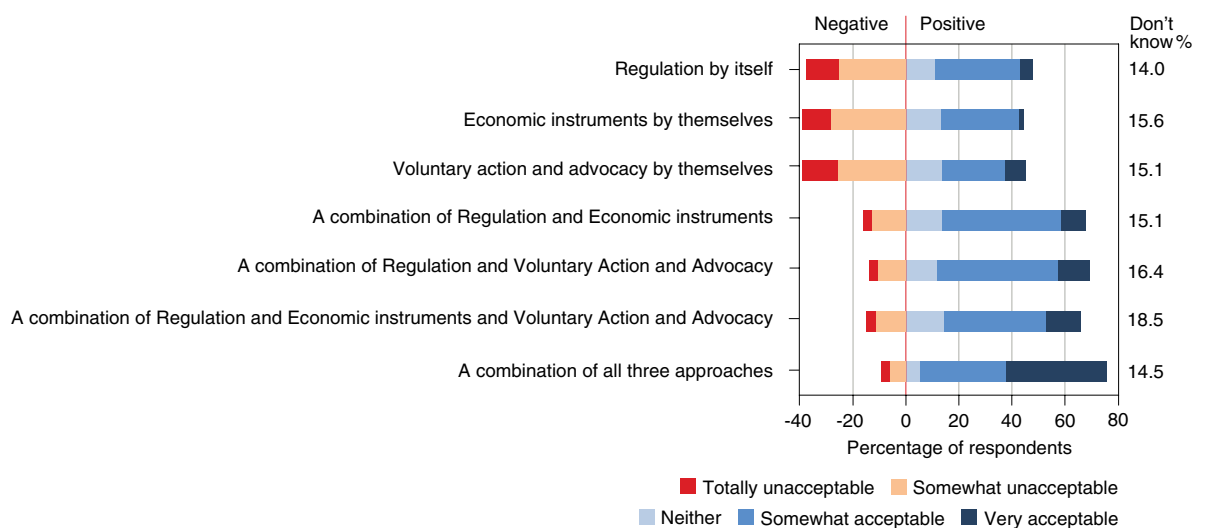


Figure 6.18. Political acceptability of different approaches to the management of freshwater resources.

Outcomes from using different management approaches:

Eleven directional statements containing different ideas about the sorts of outcomes that may or may not be achievable with different approaches or combinations of management approaches, were given to respondents to evaluate on a scale of 1-5 (with 1= 'strongly agree' and 5= 'strongly disagree') supported by a 'don't know' option. The relative distribution of responses to these statements is shown in Figure 6.19. Strongest support occurred for statements a, c, d, and j. These responses indicate a belief that voluntary mechanisms don't work, regulations and pricing do, and combinations work well. Statements b and k reinforce the perceived importance of the role that economic instruments can play in managing water, but the high level of agreement with statement i underlines the perceived importance of coupling economic approaches with other approaches.

Five significant relationships were found when each of the above statements was cross tabulated against ethnicity (note that in this analysis 'strongly agree' and 'agree', and 'disagree' and 'strongly disagree' were combined):

- Maori were more likely ($p < 0.05$) to disagree with the statement that 'regulations prevent opportunities for increasing economic growth' than either NZ Europeans or other ethnicities
- NZ Europeans and other ethnicity respondents were more likely to agree with the statement that 'on their own voluntary/advocacy approaches by commercial water

users do not protect the environment', than were Maori ($p < 0.05$)

- NZ Europeans and other ethnicities were more strongly ($p < 0.05$) supportive of the statement 'more emphasis should be placed on economic instruments supported by regulation and voluntary/advocacy approaches' than were Maori
- NZ Europeans and other ethnicities were more strongly ($p < 0.01$) supportive of the statement 'people use water more efficiently when there is a cost associated with using it' approaches' than were Maori
- Maori were more likely ($p = 0.01$) to disagree with the statement 'assigning a dollar value to water through using economic instruments is beneficial to managing water in the long-term' than were NZ European or other ethnicity respondents.

Individual water related actions:

Respondents were asked about a variety of activities they had undertaken with respect to freshwater – they were asked to tick one of 'in the last 12 months', 'ever' or 'never'. Figure 6.20 shows a comparative ranking of activities from least to most participated in, also comparing participation in the last 12 months to ever. Very few respondents had made submissions on any water related matter while clearly most respondents participate in freshwater-based recreational activities.

Respondents felt that voluntary mechanisms don't work as well as a management approach while regulations and pricing do. Photo: Off-river storage of high flows in the Waiau catchment, Canterbury, is an effective voluntary approach to developing irrigation while minimising environmental damage.



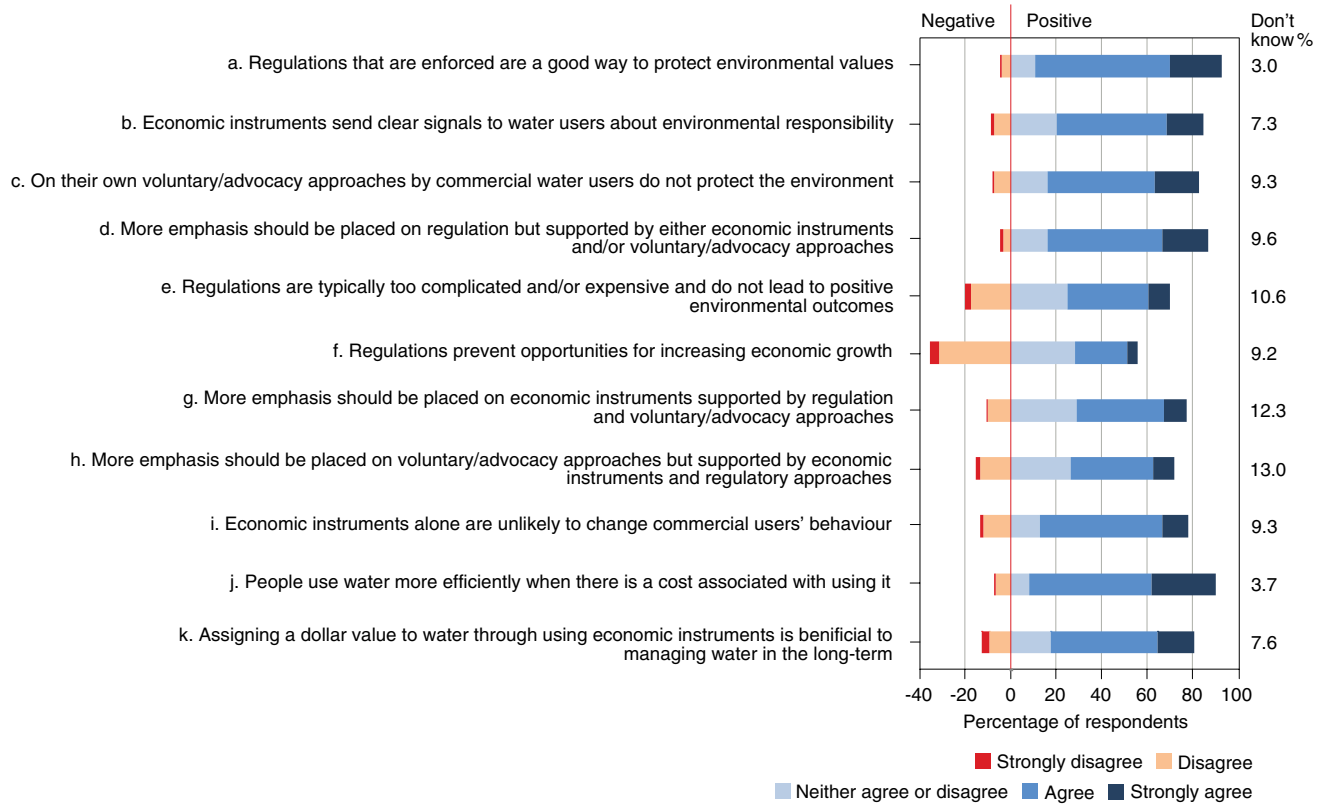


Figure 6.19. Respondents' agreement or disagreement to 11 statements regarding management approaches and their likely outcomes.

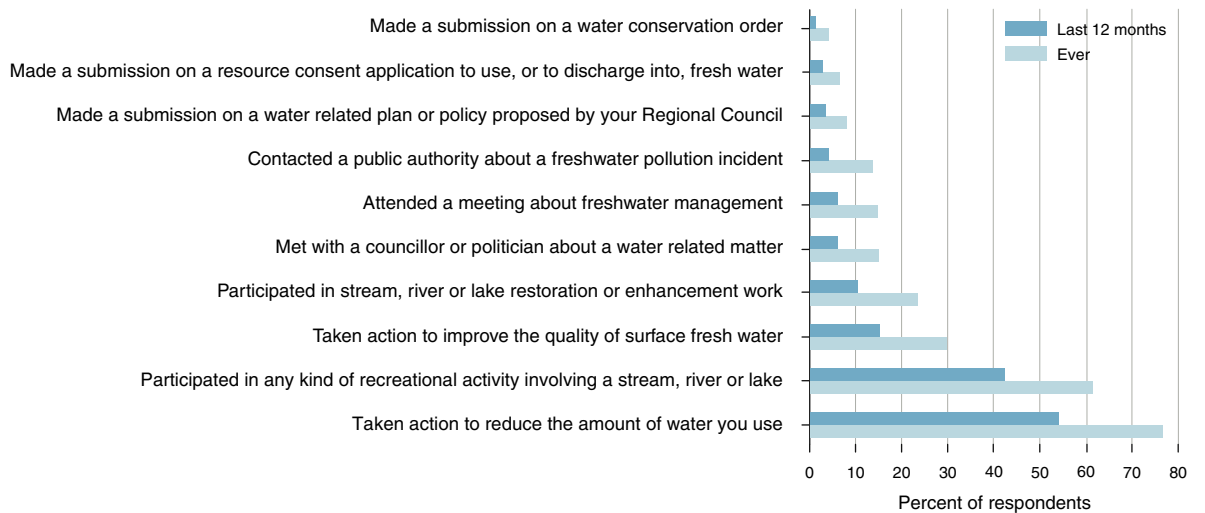


Figure 6.20. Participation in activities associated with freshwater.

6.3.3 Water values and futures

Respondents were asked to indicate the importance of values associated with rivers and streams, with lakes, and with aquifers/underground water. Responses were recorded on a 5-point Likert scale ranging between 'Totally irrelevant – not a consideration' (1) to 'Critical – the most important thing to consider' (5). Results, ranked from the most to least important considerations for the three water 'types', are shown in Table 6.2, while Figure 6.21 shows the distribution of responses.

For all three types of water body, nature, scenic, recreational and community values outrank commercial interests which, in turn, outrank Customary Maori values ($p < 0.001$ in all cases; paired t-test).

Respondents were given nine statements regarding the future for freshwaters in New Zealand to which they could respond on a 5-point Likert scale, anchored by 'strongly agree' (1) and 'strongly disagree' (5), alongside a 'don't know' option. Figure 6.22 shows the distribution of responses to the different statements. Respondents clearly support futures with largely unpolluted waters that are swimmable – they will not accept the loss of native species and clearly do not believe the main emphasis of freshwater management should be economic. Equally, respondents disagree strongly with the proposition that 'we should accept some reduction in environmental values of some freshwater resources in order to enhance economic benefits from their use'.

Two significant relationships were found when each of the above statements was analysed against ethnicity (note that in this analysis 'strongly agree' and 'agree', and 'disagree' and 'strongly disagree' were combined):

- Far more Maori (73%) disagreed with the statement 'loss of some native species from some water bodies is acceptable' than did NZ Europeans (58%) or people of other ethnicities (55%) ($p < 0.05$);



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Community values consistently outranked commercial interests for values associated with waterways and lakes. Photo: With wise management these two values can sometimes coexist, as shown on the west coast (South Island) with trout angling and farming.

Table 6.2. Comparative importance of different values of freshwater in New Zealand (NA= not asked).

	Rivers and Streams	Lakes	Aquifers/ underground water
Nature (e.g., native bird and fish habitat)	4.27	4.26	3.49
Scenic/visual (eg., beauty)	3.87	3.94	NA
Community household and other use (eg., garden irrigation or drinking water)	3.84	3.57	3.76
Recreation (eg., fishing, boating, swimming)	3.62	3.67	NA
Commercial use (eg., farm irrigation, hydro power)	3.39	3.27	3.30
Customary Maori (eg., role as kaitiaki)	2.55	2.54	2.45

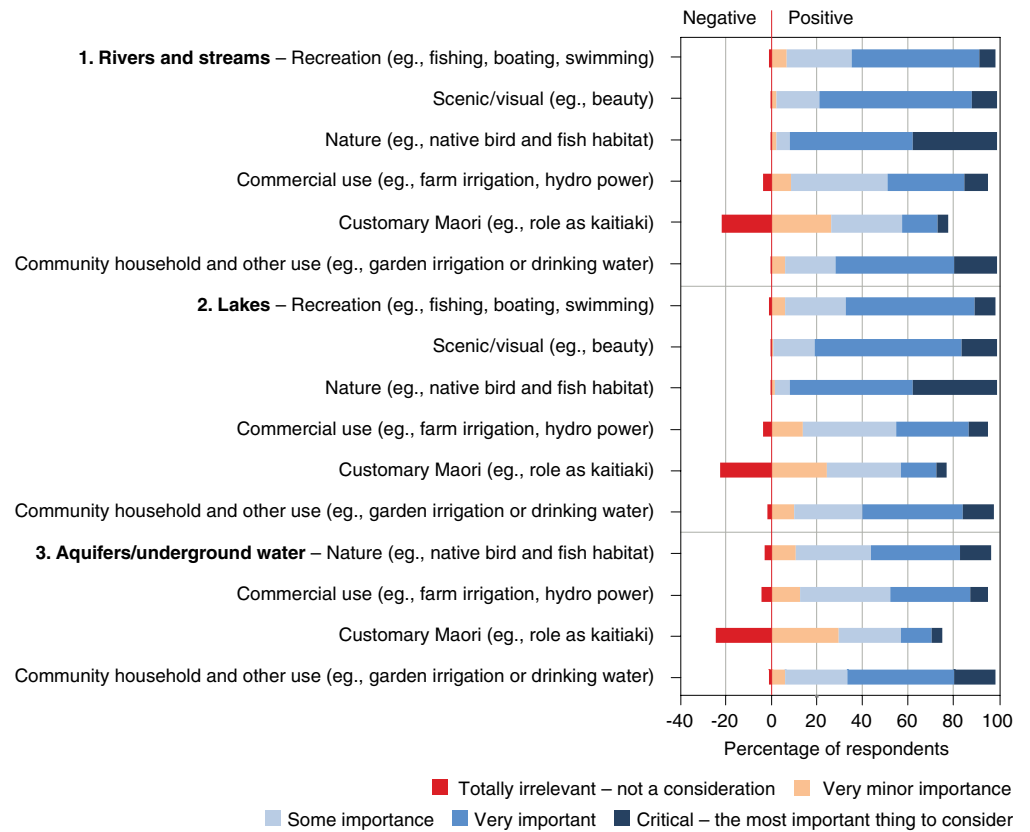


Figure 6.21. Relative importance of different values of three freshwater resources.

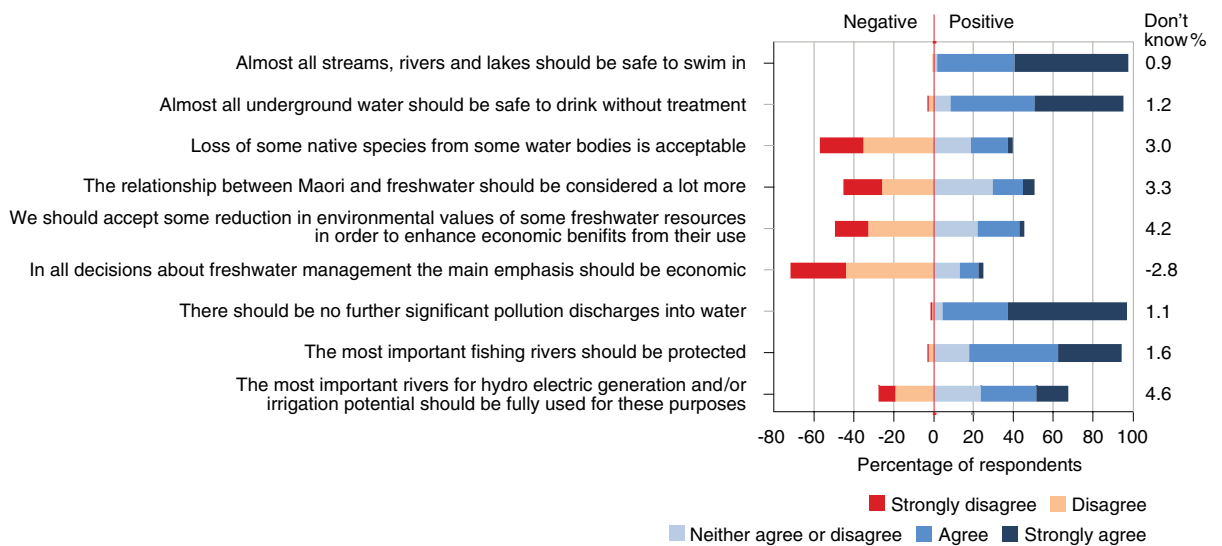


Figure 6.22. Perceptions of desired futures for freshwater.

- Maori were much more likely (70% agreement; $p < 0.001$) than NZ Europeans (17% agreement) or people of other ethnicities (18% agreement) to support the statement 'the relationship between Maori and freshwater should be considered a lot more'.

The same statements were also evaluated against industry type with those employed in the resource sector compared to all other sectors combined – no significant differences occurred.

A related question explored respondents' views on 14 aspects regarding the state, use and ongoing management direction of freshwater (Figure 6.23).

The 14 statements were each evaluated against ethnicity with seven significant relationships found (note that in this analysis 'strongly agree' and 'agree', and 'disagree' and 'strongly disagree' were combined):

- People of other ethnicities were less likely ($p < 0.05$) to disagree with the statement 'more water should be taken from rivers for irrigation' than were NZ Europeans or Maori
- Maori and NZ Europeans were more likely ($p = 0.01$) than people of other ethnicities to disagree with the statement 'more rivers should be used for hydro electric power generation'

- People of other ethnicities were less likely ($p < 0.05$) to disagree with the statement 'small lowland streams in my region have high quality water' than were NZ Europeans or Maori

- Maori and NZ Europeans were much more likely to disagree (64% and 67% respectively; $p < 0.001$) with the statement 'more water should be taken from lowland streams for irrigation' than were people of other ethnicities (34%)

- Maori and NZ Europeans were more likely ($p = 0.05$) to disagree with the statement 'lowland streams in my region are in good condition' than were other ethnicity respondents

- Maori were much more likely ($p < 0.001$) to agree that 'iwi/hapu should have more say in freshwater management' than all other respondents

- Other ethnicity respondents were less opposed to the statement that 'business water users should have more say in freshwater management, whereas over half the other respondents disagreed ($p < 0.05$).

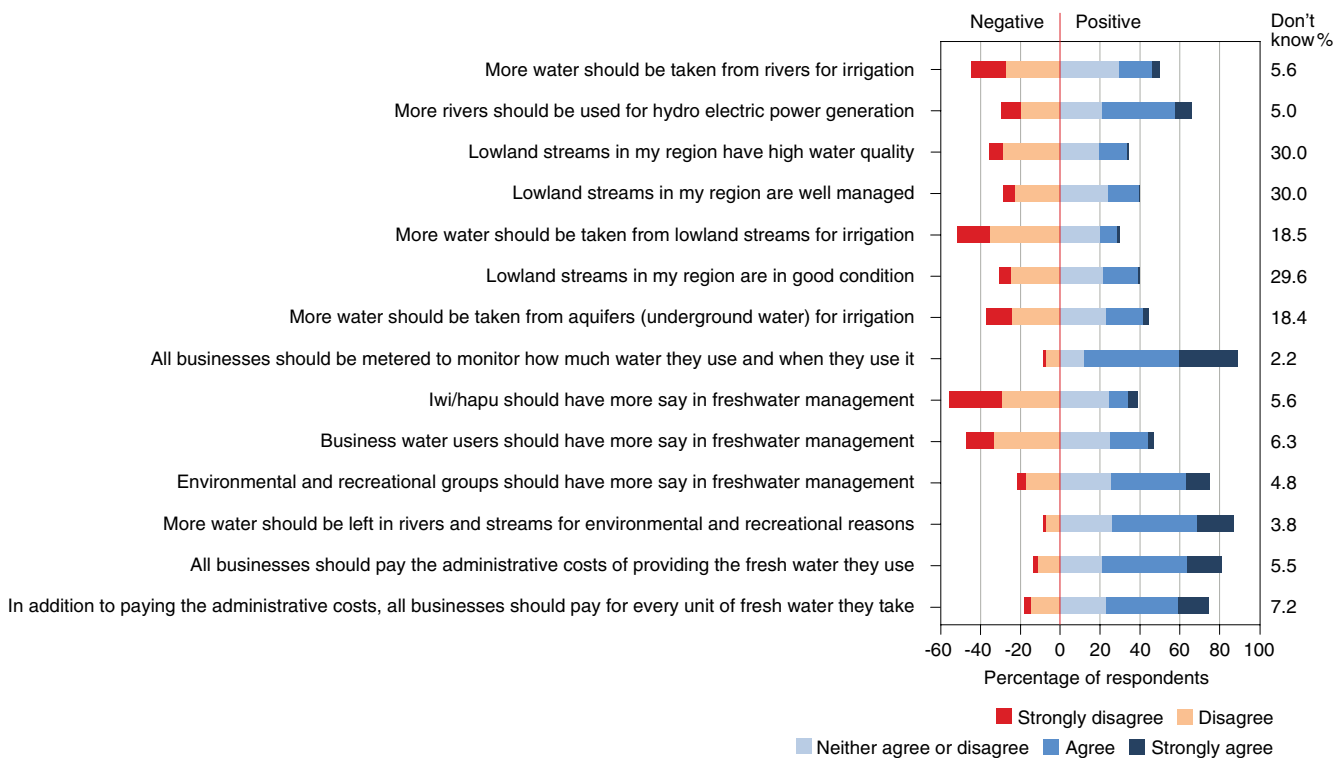


Figure 6.23. Perceptions of aspects of the state, future use and management of freshwater.

A further analysis of the 14 questions was undertaken against educational qualifications. In the survey there were six education groups but due to sample size limitations these have been combined into three, i.e., primary school and high school without qualifications; high school and trade/technical qualification; and university qualification. Responses were also clumped into agree, neither agree nor disagree, and disagree. Only one significant difference was identified:

- Those with a high school and trade/technical qualification were more likely to disagree (25% disagree; $p < 0.05$) with the statement 'In addition to paying the administrative costs, all businesses should pay for every unit of freshwater they take' than the other categories (primary school and high school without qualifications – 17%; university qualification – 14%).

Finally, the same 14 statements were analysed against industry type. The eight categories were reclassified into two to assess whether there was any difference between those in the resource versus other sectors. Responses were combined into agree, neither agree nor disagree, and disagree. No significant differences occurred.

6.4 DISCUSSION

The 2010 freshwater case study is insightful and provides complementary evidence to support interim conclusions from 2008 (and also to a limited extent from 2004).

In terms of the state of freshwater respondents consistently rate water quality highly, especially at the national level, and they think it is improving. This perception of improvement is interesting because it is not matched by the biophysical science findings (e.g., Verburg *et al.* 2010). When evaluated against responses categorised by ethnic groupings it is notable that Maori always give the most negative responses and people of other ethnicities are always the most positive.

Responses to management (Response in the PSR model) related questions were interesting. Generally most people could identify accurately which agency was responsible for which planning or policy mechanism. However, respondents then

found it much more challenging to rate agency performance and there were high rates of 'don't know' responses (between 30–50% in all cases). Those that did respond generally judged agency performance positively. The don't know 'issue' was even greater when respondents were then asked to evaluate the outcome achievements of policy or planning mechanisms (between 35–70%). While those that responded were generally positive it seems clear that some organisations could communicate outcomes more clearly to wider audiences if such an outcome is important to these organisations.

Another important aspect of management is the choice of policy approach. Respondents clearly favoured a combination of regulatory, economic and voluntary and/or advocacy approaches and rated this very highly. Least supported were stand-alone, e.g., regulatory approaches. Respondents consider voluntary approaches to be least effective and policy combinations that include regulation and market based measures to be the most effective. This finding flies somewhat in the face of many recent initiatives that rely almost solely on voluntary agreements (e.g., the just signed Manawatu River Accord). A complementary evaluation of how these approaches might be applied was tested using directional statements – most supported amongst these were strategies that incorporated economic approaches. Perhaps not surprisingly the combination of all three approaches was also considered most politically acceptable. Finally, it is clear that respondents support commercial user pays regimes and limited analysis against some key demographics showed no significant difference between farmers and other occupational classes. Respondents all want commercial water use to be monitored, they all want administrative costs charged to commercial users, and in addition they are all strongly supportive of commercial users being charged for the water they use.

Aspirations for the future, including considerations of key values, was the last area evaluated. It is clear that New Zealanders have a very high desire for a future of largely non-polluted freshwaters, fit for swimming and with abundant aquatic life. They want the most important rivers protected and they do not want to trade off environmental protection for economic growth.



07

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View of the Paparoas, from Kirwans Hill, West Coast, South Island.

DISCUSSION AND CONCLUSIONS

The biennial survey of people's perceptions of the state of the New Zealand environment is the only research the authors are aware of that systematically studies perceptions of the state of the environment using public surveys, while applying the Pressure–State–Response (PSR) model¹. In this section the main findings and implications from the 2010 PSR survey are identified and key trends over all six surveys examined.

7.1 THE 2010 SURVEY

7.1.1 Pressure–State–Response

The survey aimed to determine how New Zealanders perceived pressures, states and responses to various aspects of the New Zealand environment. The survey findings reinforce results based on biophysical measures that show New Zealand is in the top quartile of countries in terms of sustainability (see Emerson *et al.* 2010). This position is consistent with the overarching findings that on average New Zealanders considered the state of their natural environment to be adequate or good, New Zealand to be 'clean and green',

¹ A project undertaken, initially biennially but now triennially, in the Environment Waikato region assesses environmental awareness, attitudes and actions but does not apply the PSR model (Environment Waikato & Gravitas Research and Strategy Ltd 2006). The Waikato project has completed three biennial surveys and undertook its first triennial survey in late 2006.

and that they had a good knowledge of the environment. The pressure on the New Zealand environment is much lower than in many other countries, but it is likely to be increasing steadily with population and economic growth.

The environment overall, and the urban environment in particular, are thought of very highly. Nevertheless, people's perceptions of other resources are of good or very good states despite the fact that for some items, such as 'biodiversity', the state is in fact very poor (see for example Hughey *et al.* 2006b). Reasons for dissonance between science and perceptions are not always clear—this is one area where more research might be useful.

New Zealanders judge that the environment is adequately managed, and generally improving. From the environmental issues management questions (Figures 3.9 and 3.10) respondents continue to give the poorest ratings to management of farm effluent and runoff, and industrial impact on the environment. Questions about management of resources reveal that respondents rate lowest the management of rivers and lakes, groundwater, marine fisheries and soils. Groundwater, soils, and the natural environment in towns and cities receive the lowest ratings for the change in management over all surveys. Despite some low ratings, management is perceived to be improving over time. If such an improvement is indeed the case then there should be an improving trend in perceived state of all these resources at some time, but such an improvement has not yet been observed.

Respondents rated the environment overall, and the urban environment in particular, very highly. Yet there are significant issues with some of our resources (such as biodiversity) which were not perceived by the respondents. Pest control and a breeding and reintroduction programme have saved the Campbell Island Teal (only found on our subantarctic Campbell Island) from extinction. Yet countless other plants, animals and invertebrates face an uncertain future in New Zealand.



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New Zealanders judge that the environment is adequately managed, yet we are likely to have increasing pressures with economic and population growth. Photo top: Wilding pine tree spread is a growing issue in many inland areas of the South Island (such as here in the Mackenzie Basin) and in parts of the North – they are not under control. Photo above: An apparently pristine environment – Tasman River west to Mt Cook – the aerial view masks on-the-ground predation of rare birds by introduced mammals.

There are some environment enhancing activities that are widely adopted. For example, recycling household waste, buying products marketed as environmentally friendly, and reducing or limiting use of electricity were all claimed to be undertaken by over 80% of year 2010 respondents. Few respondents, however, are involved in the restoration or replanting of the natural environment, participate in an environmental organisation, or take part in environmental hearings or consent processes.

The single most important environmental issue for New Zealand in 2010 is again freshwater quality and related issues (24% of respondents).

As with the previous surveys, high numbers of respondents state they lack knowledge about some resources (soils, wetlands, marine reserves, oil and gas reserves, groundwater), and their unwillingness to give uninformed responses should add credibility to the results presented. Having said this, it is clear from the water resources case study that in some areas respondents are increasingly willing to express an opinion.

7.1.2 Freshwater

A case study was undertaken focusing on freshwater, repeating a number of questions asked in 2004 and 2008 but extending research into more detailed aspects of policy options for freshwater management.

Overall findings from questions about national, regional and local aspects of water quality and management were similar between the three surveys, although there is a trend that expresses itself in improving perceptions of lake water quality. The general state of freshwater is good but there is some regional variation—overall, respondents rate quality highly and there is no significant difference between regions, except for lakes where over 30% of Waikato and Bay of Plenty respondents think conditions are poor. Ethnicity was an important determinant of freshwater perceptions, with New Zealand European and Maori respondents almost always more concerned than people of other ethnicities. At the national level the consistent ethnic pattern is startling (see for example Figure 6.3) and was also observed in the 2008 survey (see Hughey *et al.* 2008: 58).

Desirable futures for freshwater in New Zealand were explored by respondents addressing a range of directional statements. A clear conclusion was drawn. Respondents want water futures where freshwater resources are largely unpolluted, they can swim in the rivers and lakes, and native biodiversity is protected. While they support irrigation and hydro generation this should not occur at the expense of these values. Such findings are probably not surprising and are consistent with high levels of support for natural and scenic values of water as compared to the much lower weightings given to commercial use values.

A range of policy and planning mechanisms were evaluated, as were specific measures that might be used in water management. Respondents, perhaps not surprisingly, were supportive of integrated approaches using a mix of economic, regulatory and voluntary approaches—notably they had least faith in the latter. Also supported amongst this mix was recognition that combinations of regulation and pricing (including support for charging for the commercial use of water) are expected to work well.

7.2 IMPLICATIONS FOR POLICY MAKERS

Some of the survey findings should prompt policy makers into action. Differences between perceptions and fact can be indicative of potential problems. First, the 'facts' may not be correct, e.g., species monitoring being carried out at a fine local scale may not be detecting a trend more apparent or of concern at a much wider scale. Residents and resource users are an enormous monitoring resource that can be aware of problems unknown to management agencies and policy makers, simply because they are the eyes over an entire nation. Second, if perceptions are incorrect the public may demand that scarce environmental management funds and expertise are used to manage less serious problems. Where this occurs, resources may be diverted from the major environmental issues to the detriment of overall environmental quality. Some examples of potential issues along these lines are:

- Most respondents considered the condition of New Zealand's native plants and animals to be 'adequate' or 'good' although the National Biodiversity Strategy (DoC and MfE 2002), the Environment New Zealand 2007 report (MfE 2007) and the global Environmental Sustainability Index (Emerson *et al.* 2010) indicate otherwise. This dissonance could ultimately hinder acceptance of additional programmes in this area.
- The perception that the condition of New Zealand's native bush and forests is 'good' to 'adequate' may not accurately reflect the widescale impact of pests and weeds.
- The perceived impact of farming on the environment has always been negative, but was worse in this survey than in previous surveys; a trend which would be interesting to track in relation to new policies and programmes designed to address this issue. Audited positive results arising from the 'Dairying and Clean Streams Accord' (see Hill 2004, for example) may change these perceptions when they are more widely known, although Deans and Hackwell (2008) present a pessimistic view of the outcomes from this type of initiative.



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Respondents were clear that they want freshwater resources largely unpolluted, native biodiversity protected, and recreational activities possible. They support irrigation and hydrogeneration but not at the expense of these values. Photo top: Novice kayakers learning the art on the popular and important North Branch Hurunui River, Canterbury – proposed water storage threatens this activity. Photo above: Waitaki hydro generation brings power to all New Zealanders but respondents want new development to protect environmental and recreational values.

The freshwater case study results have implications for policy makers. Freshwater clearly remains a major environmental issue in New Zealand, a finding that continues to be reinforced by results from this survey. Improved awareness and heightened concerns about freshwater, which transcend demographic groups, should be leading to implementation of significant new policy. It is also clear that freshwater is important to people, and it needs to be retained in its 'natural state'—trade offs for economic growth that come at a cost to nature are not supported. More research on the nature of tradeoffs that might be possible would appear a logical next step.

We consider there are major challenges here. First, while there is much discussion and several proposals surrounding policy changes at the national level, such as the Proposed National Policy Statement for Freshwater Management, and

in the regions (e.g., the now operative Canterbury Water Management Strategy), the national level initiatives have yet to be confirmed. There are lag times between discussions, proposals, and confirmation of policies and plans. Second, assuming these proposed policies are confirmed, there will be further lags in developing and implementing new proposals and giving effect to these at regional levels. Finally, assuming all these necessary changes occur, there will be variable lag times between policy, plan and consent implementation and detectable changes in the environment—these time lags are likely to be in the order of years, if not decades in some cases.

In such circumstances there is a need for realism and education—councils and researchers need to be realistic about raising public expectations. How these expectations and perceptions change over time will be monitored with interest in these surveys, and in other fora.

The perception that our native bush and forest is 'good-adequate' does not reflect the wide scale impact of pests and weeds. Photo: Increasingly our endangered animals and plants can only survive on protected offshore islands, such as Tiritiri Matangi, Auckland.



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08

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Beech forest in Lake Sumner Conservation Park, South Island.

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SHELLEY MCMURTRIE

Lake Rotoiti, Nelson Lakes area, South Island.

09

APPENDICES

9.1 APPENDIX 1: SURVEY

PERCEPTIONS OF THE STATE OF NEW ZEALAND'S ENVIRONMENT

2010 SURVEY

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For each question please indicate your answer by **ticking the appropriate box(es)** or **writing in the spaces provided**.

1 We would like **your opinion** on the following.

	Very good	Good	Adequate	Bad	Very bad	Don't know
Your knowledge of environmental issues is						
The overall standard of living in New Zealand is						
The overall state of the natural environment in New Zealand is						
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know
New Zealand's environment is "clean and green"						

2 Please indicate what you think **the condition** of each of the following is.

<i>The condition of New Zealand's ...</i>	Very good	Good	Adequate	Bad	Very bad	Don't know
Natural environment in towns and cities is						
Air is						
Native land and freshwater plants and animals is						
Native bush and forests is						
Soils is						
Coastal waters and beaches is						
Marine fisheries is						
Rivers and lakes is						
Groundwater is						
Wetlands is						
Natural environment compared to other developed countries is						

3 Now we would like your opinion on some of our **natural resources**.

<i>New Zealand's ...</i>	Very high	High	Moderate	Low	Very low	Don't know
Diversity of native land and freshwater plants and animals is						
Amount of native bush and forests is						
Quantity of marine fisheries is						
Area of marine reserves is						
Amount of fresh water in rivers and lakes is						
Availability of groundwater for human use is						
Area of national parks is						
Area of wetlands is						
Availability of parks and reserves in towns and cities is						
Reserves of oil and gas are						

4 What do you think of the **management** of the following items?

<i>Management of New Zealand's ...</i>	Very good	Good	Adequate	Bad	Very bad	Don't know
Pest and weed control is						
Solid waste disposal is						
Sewage disposal is						
Farm effluent and runoff is						
Hazardous chemicals use and disposal is						
Industrial impact on the environment is						

7 Please tick one box in each row to indicate whether in the last 12 months you have done any of the following.

<i>In the last 12 months you have...</i>	Yes	Regularly	No	Don't know
Reduced, or limited your use of electricity				
Reduced, or limited your use of fresh water				
Visited a marine reserve				
Visited a national park				
Bought products that are marketed as environmentally friendly				
Recycled household waste				
Composted garden and/or household waste				
Been involved in a project to improve the natural environment				
Grown some of your own vegetables				
Obtained information about the environment from any source				
Taken part in hearings or consent processes about the environment				
Participated in an environmental organisation				
Commuted by buses or trains				
Been an active member of a club or group that restores and/or replants natural environments				
Made a financial donation to a non government environmental organisation (e.g., Forest and Bird)				

HOLIDAYS AND CLIMATE

In this section we explore some aspects of holiday making and climate in New Zealand.

8 Do you think New Zealand weather patterns are likely to change in the future?

Yes No Don't know

9 Do you agree or disagree with the following statements?

The following is a list of possible weather and climate-related changes in New Zealand. Please rate how desirable **you** think each change would be for holiday makers in New Zealand by ticking one box in each row (1 = 'Not at all desirable', 7 = 'Very desirable').

<i>How desirable do you think it would be for holiday makers in NZ if there were ...</i>	Not at all desirable → Very desirable						
	1	2	3	4	5	6	7
Higher average temperatures							
More extreme hot days							
More rain in the west, less in the east							
Water supply restrictions in eastern regions							
More heavy rain storms, floods and erosion							
Reduction in biodiversity, especially in alpine areas							
More and stronger westerly winds							
Reduction of snow cover and glaciers							
Sea level rise, coastal erosion and associated flooding							

10 Do you believe climate change will be a significant issue for holiday making in New Zealand?

Yes No Don't know

If yes, what do you think the most important issue will be?

FRESH WATER

We would now like your opinion about some aspects of **lakes, rivers and streams, and aquifers (underground water)**, nationally, regionally, and close to you.

We first want you to consider some questions about water quality and also management of freshwater resources.

11 In the following please give us your **opinion** about **water quality**.

The name of the river/stream closest to where I live is _____

The name of the lake closest to where I live is _____

<i>The freshwater quality closest to where I live is:</i>	Extremely good	Good	Adequate	Poor	Extremely poor	Don't know
Rivers and streams						
Aquifers (underground water)						
Lakes						

<i>The water quality of my region's...</i>	Extremely good	Good	Adequate	Poor	Extremely poor	Don't know
Rivers and streams is						
Aquifers (underground water) is						
Lakes is						

<i>Overall water quality of New Zealand's...</i>	Extremely good	Good	Adequate	Poor	Extremely poor	Don't know
Rivers and streams is						
Aquifers (underground water) is						
Lakes is						

12 Do you agree or disagree with the following statements?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know
More water should be taken from rivers for irrigation.						
More rivers should be used for hydro electric power generation.						
Lowland streams in my region have high water quality.						
Lowland streams in my region are well managed.						
More water should be taken from lowland streams for irrigation.						
Lowland streams in my region are in good condition.						
More water should be taken from aquifers (underground water) for irrigation.						
All businesses should be metered to monitor how much water they use and when they use it.						
Iwi/hapu should have more say in freshwater management.						
Business water users should have more say in freshwater management.						
Environmental and recreational groups should have more say in freshwater management.						
More water should be left in rivers and streams for environmental and recreational reasons.						
All businesses should pay the administrative costs of providing the fresh water they use.						
In addition to paying the administrative costs, all businesses should pay for every unit of fresh water they take .						

13

We now wish to explore your understanding of **who is responsible** for the following water management functions in New Zealand. **Tick as many boxes as you like** for the organisation(s) you think are responsible for the **preparation and/or implementation** of each of the following policy or planning mechanisms.

Tick 'don't know' rather than guessing, if that is appropriate.

Policy or planning mechanism ...	Organisation								Don't know
	Ministry for the Environment	Department of Conservation	Ministry of Health	Regional councils	District or City councils	Fish and Game NZ	Iwi/hapu	None of these	
National policy statements									
Water conservation orders									
Regional policy statements									
Regional plans									
Water resource consents									
Drinking water standards									
Contact recreation guidelines for fresh water									
Sports fish management plans									
Conservation management strategies									
Iwi/hapu management plans									

14

Now we would like your opinion on how well each of the **policy or planning mechanisms** is helping to achieve environmentally sustainable water management outcomes.

Tick 'don't know' rather than guessing, if that is appropriate.

Contributions to achieving environmentally sustainable water management outcomes from ...	Strongly negative	Moderately negative	No effect	Moderately positive	Strongly positive	Don't know
National policy statements are:						
Water conservation orders are:						
Regional policy statements are:						
Regional plans are:						
Resource consents for water are:						
Drinking water standards are:						
Contact recreation guidelines for fresh water are:						
Sports fish management plans are:						
Conservation management strategies are:						
Iwi/hapu management plans are:						

15a

Now we would like your opinion on how well you think each of these **organisations** is performing in their water management functions.

Tick 'don't know' rather than guessing, if that is appropriate.

Performance of water management functions by ...	Extremely poor	Poor	Neither good nor poor	Good	Extremely good	Don't know
Ministry for the Environment is:						
Department of Conservation is:						
Ministry of Health is:						
Regional councils is:						
District and City councils is:						
Fish and Game NZ is:						

15b Please give us your **opinion** about how well your regional council (e.g., Greater Wellington, Auckland Regional Council, Environment Canterbury) manages water **in your region**.

<i>Generally the way my Regional Council manages...</i>	Extremely good	Good	Acceptable	Poor	Extremely poor	Don't know
Rivers and streams is:						
Aquifers (underground water) is:						
Lakes is:						

16 You may have some suggestions about changing the way New Zealand **manages its fresh water**. Please tell us what changes you would like to see made and briefly explain their benefits.

17 Please tick one box in each row to indicate whether you have done any of the following.

<i>Have you ...</i>	In the last 12 months	Ever	Never
Made a submission on a resource consent application to use, or to discharge into, fresh water			
Contacted a public authority about a freshwater pollution incident			
Made a submission on a water conservation order			
Met with a councillor or politician about a water related matter			
Attended a meeting about freshwater management			
Participated in any kind of recreational activity involving a stream, river or lake			
Made a submission on a water related plan or policy proposed by your Regional Council			
Participated in stream, river or lake restoration or enhancement work			
Taken action to reduce the amount of water you use			
Taken action to improve the quality of surface fresh water			
None of the above			

18

Managers of fresh water consider a range of different and often competing values. The decisions made often reflect the values that are most relevant or important in a given situation. We are interested in the importance **you** place on different types of values associated with fresh water. Our questions first deal with **rivers and streams**, then **lakes**, and finally with **aquifers/ underground water**.

RIVERS AND STREAMS:

Put a tick in each row to indicate the level of importance you place on each type of value.

	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider
Recreation (e.g., fishing, boating, swimming)					
Scenic/visual (e.g., beauty)					
Nature (e.g., native bird and fish habitat)					
Commercial use (e.g., farm irrigation, hydro power)					
Customary Maori (e.g., role as kaitiaki)					
Community household and other use (e.g., garden irrigation or drinking water)					

LAKES:

Put a tick in each row to indicate the level of importance you place on each type of value.

	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider
Recreation (e.g., fishing, boating, swimming)					
Scenic/visual (e.g., beauty)					
Nature (e.g., native bird and fish habitat)					

(LAKES continued >>)

(...LAKES continued)

	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider
Commercial use (e.g., farm irrigation, hydro power)					
Customary Maori (e.g., role as kaitiaki)					
Community household and other use (e.g., garden irrigation or drinking water)					

AQUIFERS/UNDERGROUND WATER:

Put a tick in each row to indicate the level of importance you place on each type of value.

	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider
Nature (e.g., aquatic insects that live underground)					
Commercial use (e.g., farm irrigation, hydro power)					
Customary Maori (e.g., role as kaitiaki)					
Community household and other use (e.g., garden irrigation or drinking water)					

THERE ARE THREE MAIN APPROACHES TO MANAGING FRESHWATER RESOURCES: REGULATION, ECONOMIC INSTRUMENTS, AND VOLUNTARY/ADVOCACY.

Regulations, Rules and Standards could be developed and implemented around:

- environmental flows, e.g., providing enough water for fish and birds to live,
- protection of drinking water, and
- contact recreation standards.

Economic instruments could include:

- tradable water use permits, or
- pollution fees, or
- subsidies for reducing pollution, or
- charges for commercial water users.

Voluntary and/or advocacy approaches could involve:

- groups of water users taking responsibility for actions such as voluntary reductions in water use in times of low flow, or sharing available water between commercial and recreation users in such times,
- water conservation education,
- individual or collective riverbank planting, and
- voluntary codes of practice for commercial users.

19 How effective is each of these approaches to managing fresh water? Please tick one box in each row

<i>Regulation by itself would be >></i>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
in achieving benefits to society						

<i>Economic instruments by themselves would be >></i>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
in achieving benefits to society						

(QUESTION 19 continued >>)

Voluntary action and advocacy by themselves would be >>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
in achieving benefits to society						

A combination of Regulation and Economic instruments would be >>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
in achieving benefits to society						

A combination of Regulation and Voluntary Action and Advocacy would be >>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
In achieving benefits to society						

A combination of Economic instruments and Voluntary Action and Advocacy would be >>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
in achieving benefits to society						

A combination of all three approaches would be >>	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know
in achieving environmental protection						
in achieving economic growth						
in achieving benefits to society						

20 Do you agree or disagree with the following statements? Please tick one box in each row.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know
Regulations that are enforced are a good way to protect environmental values						
Economic instruments send clear signals to water users about environmental responsibility						
On their own voluntary/advocacy approaches by commercial water users do not protect the environment						
More emphasis should be placed on regulation but supported by either economic instruments and/or voluntary/advocacy approaches						
Regulations are typically too complicated and/or expensive and do not lead to positive environmental outcomes						
Regulations prevent opportunities for increasing economic growth						
More emphasis should be placed on economic instruments supported by regulation and voluntary/advocacy approaches						
More emphasis should be placed on voluntary/ advocacy approaches but supported by economic instruments and regulatory approaches						
Economic instruments alone are unlikely to change commercial users' behaviour						
People use water more efficiently when there is a cost associated with using it						
Assigning a dollar value to water through using economic instruments is beneficial to managing water in the long-term						

21

How politically acceptable would each of these approaches be for managing fresh water?

	Totally unacceptable	Somewhat unacceptable	Neither	Somewhat acceptable	Very acceptable	Don't know
Regulation by itself:						
Economic instruments by themselves:						
Voluntary action and advocacy by themselves:						
A combination of Regulation and Economic instruments:						
A combination of Regulation and Voluntary Action and Advocacy:						
A combination of Economic instruments and Voluntary Action and Advocacy:						
A combination of all three approaches:						

22

Please now think ahead – we would like to know what you think our fresh water **should be** like in the future.

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know
Almost all streams, rivers and lakes should be safe to swim in.						
Almost all underground water should be safe to drink without treatment.						
Loss of some native species from some water bodies is acceptable.						
The relationship between Maori and fresh water should be considered a lot more.						
We should accept some reduction in environmental values of some freshwater resources in order to enhance economic benefits from their use.						
In all decisions about freshwater management the main emphasis should be economic.						
There should be no further significant pollution discharges into water.						
The most important fishing rivers should be protected.						
The most important rivers for hydro electric generation and/or irrigation potential should be fully used for these purposes.						

23 Most important environmental issues

a What do you think is the most important environmental issue facing **New Zealand** today?

b Why did you choose this issue?

c What do you think is the most important environmental issue facing the **world** today?

d Why did you choose this issue?

PERSONAL QUESTIONS

24 Now we would like to ask a few questions about you. These questions allow us to check we have a representative sample of people. Remember, your responses are anonymous.

a Are you: Male Female

b Including yourself, how many people live in your household? _____

c What year were you born in?

d What country were you born in? _____

e Are you:

Māori Pacific Islander Other

New Zealand European Asian

f Which **region** do you live in?

North Island

Northland Auckland Waikato

Bay of Plenty Gisborne/Poverty Bay Taranaki

Hawkes Bay Manawatu-Wanganui Wellington

South Island

Nelson Marlborough Canterbury

West Coast Otago Southland

g Do you live in:

The countryside or a town of less than 1,000 people A town of 10,001 to 30,000 people

A town of 1,000 to 10,000 people A large town or city of more than 30,000 people

h What is the **highest level of formal education (or the equivalent outside of New Zealand) you have completed?**

Primary school (standard 6) Trade/technical qualification or similar Bachelor's degree

High school, without qualifications Undergraduate diploma/certificate Postgraduate

High school, with qualifications

9.2 APPENDIX 2: SURVEY DEMOGRAPHICS AND COMPARABLE DATA

The tables that follow present demographic results from the 2010 survey. Comparable data collected from earlier surveys is also shown. In addition, readily available, census results from Statistics New Zealand are included.

Table 1. Gender (%).

Year ...	2000	2002	2004	2006	2008	2010	Census results
Male	44.1	46.8	45.8	46.1	45.1	48.4	48.8
Female	55.9	53.2	54.2	53.9	54.9	51.6	51.2
N	883	822	818	856	730	601	4,027,947

Table 2. Age of respondents (%).

Year ...	2000	2002	2004	2006	2008	2010	Census results
18 to 19	1.4	1.1	1	1.3	1.3	0.9	4.9
20 to 29	15	9.5	9	8.7	7.4	8.3	21.9
30 to 39	18.2	15.9	15.6	15	12.9	12.5	24.6
40 to 49	19.7	22.8	22.5	22.8	18.0	18.0	25.9
50 to 59	18.1	20.8	22.2	19.6	22.7	21.5	20.7
60 to 69	12.8	16.1	16.1	17.5	20.6	18.5	14.0
70 and over	14.8	13.8	13.6	15.2	17.0	20.3	14.8
N	846	807	796	848	688	567	2,346,756

Table 3. Country of birth (%).

Country/region ...	2002	2004	2006	2008	2010
New Zealand	80.0	77.8	77.1	78.3	77.6
Australia	1.7	1.7	1.8	2.9	2.5
Pacific Islands	2.6	0.7	2.5	3.0	2.3
Britain/Ireland	8.7	11.3	9.4	7.4	8.8
Rest of Europe	1.8	1.8	2.6	2.3	1.7
USA and Canada	0.4	1.4	0.9	0.4	1.4
Asia	2.9	3.6	3.4	3.3	4.3
Other	1.7	1.5	2.5	2.1	1.4
N	817	812	849	728	599

Table 4. Ethnicity (%).

Category ...	2002	2004	2006	2008	2010	Census results
Maori	5.8	8.1	5.3	9.0	7.3	12.6
NZ European	81.9	79	77.4	74.9	79.2	71.6
Other	12.3	12.9	17.3	16.1	13.6	9.4
N	810	810	854	722	590	4,501,551

Table 5. Respondent's regional council (%).

Council ...	2006	2008	2010	Census results
Northland	4.3	4.8	5.2	3.8
Auckland	27.1	27.3	27.2	29.5
Waikato	8.4	8.7	9.8	9.7
Bay of Plenty	5.6	8.6	8.2	6.2
Gisborne/Poverty Bay	0.7	0.4	0.5	1.3
Taranaki	3.6	3.0	2.5	2.9
Hawkes Bay	4.2	2.7	4.5	2.9
Manawatu-Wanganui	6.1	4.5	3.5	6.3
Wellington	11.1	10.9	12.7	11.4
Nelson	2.1	3.0	3.3	1.1
Marlborough	1.5	0.8	1.0	1.1
Canterbury	16.5	15.7	12.3	12.9
West Coast	0.7	0.5	1.0	0.9
Otago	5.6	5.9	6.8	5.1
Southland	2.6	3.0	1.5	2.7
N	859	732	600	4,140,300

Table 6. Urban or rural respondents (%).

Area	2006	2008	2010	Census results
Urban	81.4	83.8	84.2	85.8
Rural	18.6	16.2	15.8	14.2
N	854	721	588	3,735,519

Table 7. Education status (%).

Year	2000	2002	2004	2006	2008	2010	Census results*
Primary	4.2	4.3	3.8	3.3	3.0	3.0	33.9
High school without qualifications	18.4	19.8	17.8	18.7	18.7	15.2	33.9
High school with qualifications	21.9	24.4	25.1	21.9	23.9	26.0	25.7
Trade or technical qualification	22.0	19.5	18.5	19.4	16.1	19.0	25.4
Undergraduate diploma	11.9	14.1	12.8	12.2	15.8	11.8	25.4
Bachelors degree	13.7	12.0	14.3	14.9	14.7	15.2	5.7
Postgraduate	7.9	5.9	7.7	9.6	7.8	9.8	2.8
N	876	815	813	852	728	600	2,786,220

Note: For consistency over time the same measures of education were used in the 2010 survey as used in previous surveys. New census measures of education were used in the 2006 census with comparable results shown.

*Aged 15 and over.

Table 8. Employment status (%).

Status	2006	2008	2010
Paid more 30hrs	47.4	47.9	47.0
Paid less 30hrs	13.4	11.4	9.6
Unemployed	0.5	1.5	2.3
Retired	20.8	22.9	28.2
Unpaid Voluntary Work	2.3	3.5	1.3
Student	4.6	5.6	3.0
Homes Duties	5.1	1.0	5.0
Other	6.0	6.2	3.5
N	857	712	602

Table 9. Employment sector (%).

Industry	2002	2004	2006	2008	2010	2001 Census
Resource based	13.3	15.4	17.2	12.3	11.8	8.9
Manufacturing and transport	22.4	20.5	20.8	22.3	23.3	24.4
Accommodation, retail and leisure	17.0	18.3	16.1	14.0	14.6	23.7
Government services and defense	7.9	7.8	6.9	8.6	10.4	3.6
Health services	14.5	14.2	13.6	15.1	14.2	11.1
Education	12.5	11.4	12.5	10.1	13.7	7.7
Communication and financial services	9.9	10.7	11.2	14.2	10.6	20.4
Never been in paid employment	2.5	1.7	1.7	3.5	1.3	NA
N	751	755	825	636	527	1,636,407

Note: Statistics NZ is unable to provide corresponding data from the 2006 census.

Table 10. Income, before tax (%).

Income bracket	2000	2002	2004	2006	2008	2010	Census results
Loss	0	2.0	2.4	1.4	0.9	1.1	0.5
\$0 - \$10,000	17.1	14.4	11.5	9.4	8.5	7.2	18.8
\$10,001 - \$20,000	20.1	18.9	19.5	17.5	13.7	14.6	19.5
\$20,001 - \$30,000	15.4	13.9	16.5	15.0	13.0	15.2	13.8
\$30,001 - \$40,000	13.6	13.3	13.4	14.5	12.6	13.1	12.8
\$40,001 - \$50,000	10.6	11.1	7.4	9.7	10.5	10.5	8.3
\$50,001 - \$70,000	7.5	9.4	10.5	13.3	16.1	14.4	8.9
\$70,001 - \$100,000	4.3	4.1	4.1	6.7	5.9	9.8	4.0
\$100,000 +	3.2	3.7	5.0	5.1	5.9	5.6	3.3
Not stated	8.1	9.2	9.6	7.4	12.9	8.4	10.2
N	894	836	820	880	752	610	3,160,371

9.3 APPENDIX 3: PSR AND SPECIAL TOPIC DATA

Table 1. Knowledge of environmental issues and standard of living (%).

Respondents perceptions of ...	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std. Dev.
their own knowledge of environmental issues									
2000	878	6.5	29.4	52.1	8.9	1.4	1.8	2.69	0.78
2002	810	7.5	28.6	54.4	7.0	1.1	1.2	2.65	0.77
2004	812	6.4	25.7	57.4	8.1	0.9	1.5	2.71	0.74
2006	864	7.3	31.9	52.8	5.1	0.6	2.3	2.59	0.73
2008	739	8.8	28.8	53.7	6.5	0.5	1.6	2.66	0.87
2010	593	7.2	27.6	56.2	7.4	0.7	1.00	2.66	0.75
2010 (e-survey)	2470	11.5	29.3	51.7	5.8	0.8	0.9	2.55	0.80
the overall standard of living in New Zealand									
2000	863	11.1	45.5	36.0	5.6	0.9	0.8	2.39	0.80
2002	766	14.1	50.8	28.6	4.8	0.9	0.8	2.27	0.80
2004	781	18.3	54.2	23.3	3.1	0.0	1.2	2.11	0.73
2006	864	16.8	50.9	28.2	3	0.1	0.9	2.18	0.74
2008	730	13.7	51.2	30.0	4.2	0.4	0.4	2.28	0.80
2010	603	14.7	50.9	29.3	4.1	0.7	0.30	2.25	0.78
2010 (e-survey)	2448	12.4	47.1	32.7	6.2	1.1	0.4	2.36	0.82
the overall state of the natural environment in New Zealand									
2006	861	11	47.3	32.4	6.6	0.3	2.3	2.37	0.78
2008	731	9.6	45.7	35.1	7.4	0.3	1.8	2.70	0.94
2010	581	12.4	46.1	31.1	7.4	0.7	2.40	2.36	0.83
2010 (e-survey)	2440	6.9	41.7	36.5	12.7	1.5	0.7	2.60	0.85

Table 2. New Zealand's 'clean and green' image (%).

	N	Strongly agree (1)	Agree (2)	Neither agree or disagree (3)	Disagree (4)	Strongly disagree (5)	Don't know	Mean (1-5)	Std. Dev.
New Zealand's environment is regarded as "clean and green"									
2000		Question not asked in 2000							
2002	816	9.2	57.0	17.6	13.7	2.0	0.5	2.42	0.91
2004	799	5.8	45.3	29.2	17.0	2.0	0.8	2.64	0.90
2006	863	4.3	49.1	26	18.8	1.4	0.5	2.64	0.88
2008	731	5.6	43.2	28.7	20.5	1.4	0.5	2.70	0.94
2010	583	6.8	45.3	25.8	18.4	2.2	1.50	2.63	0.94
2010 (e-survey)	2455	2.7	39.5	27.7	26.4	3.5	0.3	2.88	0.95

Table 3. Perceived state of New Zealand's environment (%).

Respondents perceived quality of...	N	Very good(1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std.Dev.
natural environment in towns and cities									
2000	875	3.7	34.5	47.4	12.1	0.7	1.6	2.71	0.75
2002	815	5.9	36.9	44.7	9.6	1.1	1.8	2.62	0.79
2004	806	5.6	42.4	41.3	8.4	0.7	1.5	2.56	0.76
2006	868	4.6	38.0	43.9	10.7	0.9	1.8	2.65	0.77
2008	732	4.4	37.3	45.2	10.1	0.8	2.2	2.65	0.76
2010	593	5.4	37.1	47.0	7.9	0.8	1.7	2.61	0.74
2010 (e-survey)	2466	2.4	30.0	47.9	17.1	2.0	0.7	2.86	0.79
air									
2000	866	20.0	47.0	23.6	7.2	1.3	1.0	2.22	0.89
2002	795	15.8	43.5	29.6	8.8	1.5	0.8	2.36	0.91
2004	803	14.3	45.1	28.8	10.0	1.2	0.6	2.38	0.90
2006	859	12.0	47.5	30.0	8.7	1.0	0.7	2.41	0.90
2008	734	14.6	45.8	28.9	9.5	0.5	0.7	2.35	0.87
2010	603	14.9	50.9	28.5	4.5	0.5	0.7	2.24	0.78
2010 (e-survey)	2448	11.1	41.6	35.7	9.6	1.6	0.4	2.49	0.87
native land and freshwater plants and animals									
2000	870	12.6	42.8	29.9	10.1	1.8	2.8	2.44	0.91
2002	808	14.6	40.8	30.2	9.2	1.7	3.5	2.41	0.92
2004	810	11.2	42.6	29.9	11.1	0.9	4.3	2.45	0.88
2006	859	12.0	47.5	30.0	8.7	1.0	0.7	2.39	0.85
2008	734	11.3	40.7	34.1	9.1	0.8	4.0	2.45	0.85
2010	593	12.1	44.2	29.7	10.3	1.2	2.5	2.43	0.88
2010 (e-survey)	2460	9.9	42.2	29.1	15.4	2.3	1.0	2.58	0.95
native bush and forests									
2000	870	20.5	39.8	26.0	10.6	1.6	1.6	2.32	0.97
2002	808	23.1	42.9	23.1	7.7	1.0	2.1	2.19	0.92
2004	807	21.9	40.8	24.5	8.6	1.1	3.1	2.24	0.94
2006	864	21.5	44.8	25.0	6.3	0.6	1.9	2.18	0.87
2008	740	21.9	47.2	20.4	7.4	0.3	2.8	2.15	0.86
2010	603	22.7	45.8	19.7	9.3	0.8	1.7	2.18	0.92
2010 (e-survey)	2466	18.8	43.8	25.1	9.8	1.9	0.6	2.32	0.95
soils									
2000	862	10.1	40.1	33.4	7.1	1.2	8.1	2.45	0.84
2002	797	10.4	40.8	32.0	7.0	0.9	8.9	2.42	0.83
2004	800	7.6	41.3	32.9	6.5	.9	10.9	2.46	0.79
2006	859	7.6	40.4	36.0	7.2	1.2	7.7	2.50	0.80
2008	732	7.2	41.4	34.3	8.1	1.1	7.9	2.50	0.81
2010	599	7.3	41.2	35.6	7.7	0.8	7.3	2.50	0.79
2010 (e-survey)	2461	6.3	37.3	36.9	13.2	2.2	4.2	2.66	0.87
coastal waters and beaches									
2000	873	12.4	37.2	35.2	11.3	1.5	2.4	2.51	0.91
2002	817	12.6	37.5	34.8	10.5	2.0	2.7	2.50	0.92
2004	810	13.1	41.6	32.0	9.0	1.7	2.6	2.43	0.90
2006	859	7.6	40.4	36.0	7.2	1.2	7.7	2.50	0.80
2008	741	15.0	46.4	26.9	8.2	0.9	2.6	2.32	0.87
2010	597	13.6	45.1	31.0	7.0	1.3	2.0	2.36	0.86
2010 (e-survey)	2465	9.2	38.6	32.3	16.4	2.4	1.1	2.64	0.95

Perceived state of New Zealand's environment (%) *continued.*

Respondents perceived quality of...	N	Very good(1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std.Dev.
marine fisheries									
2000	875	6.2	30.2	32.9	15.4	2.7	12.6	2.75	0.93
2002	801	6.2	33.5	36.0	10.2	2.5	11.6	2.65	0.88
2004	808	5.9	29.8	31.8	14.4	1.4	16.7	2.70	0.89
2006	859	6.5	30.3	34.2	16.1	1.6	11.3	2.73	0.90
2008	732	5.9	31.7	34.6	13.8	1.2	12.8	2.69	0.87
2010	600	8.3	32.0	32.2	12.7	3.0	11.8	2.66	0.95
2010 (e-survey)	2462	6.1	29.4	32.0	21.3	5.5	5.7	2.90	1.01
freshwater									
2000	875	11.7	35.3	35.1	12.2	1.9	3.8	2.56	0.93
2002	803	12.1	34.2	36.5	11.1	2.4	3.7	2.56	0.94
2004					Question not asked in 2004				
2006					Question not asked in 2006				
2008					Question not asked in 2008				
2010					Question not asked in 2010				
2010 (e-survey)					Question not asked in 2010				
rivers and lakes									
2000					Question not asked in 2004				
2002					Question not asked in 2006				
2004	810	6.5	31.5	33.1	20.6	3.0	5.3	2.81	0.96
2006	866	6.0	30.7	35.8	21.4	1.4	4.7	2.80	0.91
2008	737	5.7	31.5	36.1	20.2	1.9	4.6	2.80	0.91
2010	600	6.5	32.2	34.3	19.7	3.5	3.8	2.81	0.96
2010 (e-survey)	2464	4.7	26.9	34.1	25.8	6.8	1.7	3.03	1.00
groundwater									
2000					Question not asked in 2004				
2002					Question not asked in 2006				
2004	801	6.1	30.0	39.5	8.0	1.5	15.0	2.63	0.82
2006	861	6.0	29.7	39.4	11.1	0.8	12.9	2.67	0.82
2008	738	6.6	29.7	37.7	11.0	1.6	13.4	2.67	0.86
2010	602	5.5	33.2	34.6	10.8	1.2	14.8	2.64	0.83
2010 (e-survey)	2461	5.1	29.6	39.4	16.1	3.2	6.7	2.81	0.90
wetlands									
2000	872	6.0	28.1	34.6	13.0	2.6	15.7	2.74	0.91
2002	836	7.3	33.9	31.2	11.8	1.5	14.4	2.61	0.89
2004	805	5.6	31.7	31.4	11.4	2.4	17.5	2.68	0.90
2006	865	6.4	32.5	33.9	10.2	1.3	15.8	2.61	0.85
2008	730	7.1	33.8	31.2	11.4	1.6	14.8	2.61	0.89
2010	599	6.3	31.2	31.6	12.2	1.5	17.2	2.65	0.89
2010 (e-survey)	2454	6.0	31.3	33.8	15.6	5.2	8.1	2.81	0.98
New Zealand's natural environment compared to other developed countries									
2000	879	34.6	42.3	14.7	1.6	0.2	6.6	1.83	0.77
2002	821	38.7	41.2	12.7	1.3	0.4	5.7	1.76	0.76
2004	806	34.3	44.5	13.3	0.5	0.0	7.4	1.78	0.70
2006	863	34.5	44.1	13.1	1.7	0.1	6.4	1.81	0.75
2008	736	31.5	45.4	16.4	1.5	0.0	5.2	1.87	0.74
2010	598	31.9	42.1	18.2	2.7	0.0	5.0	1.91	0.80
2010 (e-survey)	2372	27.7	42.9	22.6	3.7	0.3	2.8	2.03	0.83

Table 4. Perceived availability of natural resources (%).

Respondent perceptions of ...	N	Very high (1)	High (2)	Moderate (3)	Low (4)	Very low (5)	Don't know	Mean (1-5)	Std. Dev.
diversity of native land and freshwater plants and animals									
2000	841	7.6	36.0	40.5	8.0	0.7	7.1	2.55	0.79
2002	807	7.7	37.9	38.0	5.6	1.1	9.7	2.50	0.79
2004	794	7.4	37.7	39.5	5.2	0.6	9.6	2.49	0.76
2006	841	8.4	38.0	38.6	4.0	0.4	10.5	2.44	0.74
2008	713	6.9	33.8	42.2	5.2	0.6	11.4	2.54	0.75
2010	588	7.3	35.9	38.4	5.6	0.5	12.2	2.50	0.76
2010 (e-survey)	2452	8.8	37.8	42.4	7.0	0.6	3.3	2.51	0.78
amount of native bush and forests									
2000	855	9.4	39.3	34.9	12.6	2.0	1.9	2.58	0.90
2002	812	10.7	39.2	34.5	10.3	2.1	3.2	2.52	0.90
2004	797	11.7	36.3	34.8	12.0	2.0	3.3	2.55	0.93
2006	853	11.1	40.4	35.3	9.6	0.7	2.8	2.47	0.85
2008	722	9.0	38.2	38.0	9.7	2.1	3.0	2.56	0.87
2010	595	12.1	37.5	37.1	8.6	1.8	2.9	2.49	0.89
2010 (e-survey)	2455	11.2	41.3	34.2	10.3	2.0	0.9	2.50	0.90
quantity of marine fisheries									
2000	846	3.8	25.2	38.3	16.2	1.5	15.0	2.84	0.84
2002	808	3.7	22.0	42.9	12.0	2.4	17.0	2.85	0.92
2004	793	3.7	17.7	42.7	16.4	1.8	17.8	2.94	0.82
2006	849	2.9	20.6	44.9	12.2	1.2	18.1	2.85	0.76
2008	718	2.8	23.4	39.1	14.8	2.0	18.0	2.87	0.83
2010	595	4.9	25.7	35.6	15.3	1.3	17.1	2.79	0.87
2010 (e-survey)	2457	4.7	23.3	42.9	18.6	3.2	7.4	2.92	0.89
area of marine reserves									
2000	849	2.5	13.8	37.9	24.5	4.9	16.4	3.19	0.88
2002	808	3.7	16.7	36.1	21.8	4.6	17.1	3.08	0.93
2004	790	3.0	17.5	38.5	18.5	3.2	19.4	3.02	0.87
2006	850	4.2	19.8	39.4	17.3	2.1	17.2	2.92	0.87
2008	722	3.9	20.8	35.0	19.9	4.3	16.1	3.00	0.94
2010	593	4.6	20.7	36.3	18.0	3.0	17.4	2.93	0.91
2010 (e-survey)	2449	4.9	22.4	39.9	20.0	5.4	7.4	2.99	0.95
amount of freshwater									
2000	851	11.2	41.2	32.4	8.5	1.8	4.9	2.46	0.88
2002	813	8.6	40.0	35.4	8.1	2.0	5.9	2.52	0.86
2004					Question not asked in 2004				
2006					Question not asked in 2006				
2008					Question not asked in 2008				
2010					Question not asked in 2010				
2010 (e-survey)					Question not asked in 2010				
rivers and lakes									
2000					Question not asked in 2000				
2002					Question not asked in 2002				
2004	787	5.2	27.4	40.6	13.5	1.9	11.4	2.77	0.85
2006	850	3.1	26.5	41.0	16.8	2.5	10.1	2.88	0.85
2008	722	2.9	23.8	42.5	18.1	3.6	9.2	2.95	0.86
2010	597	5.4	26.1	41.0	15.4	2.5	9.5	2.87	0.88
2010 (e-survey)	2452	5.5	28.4	40.7	18.0	3.9	3.6	2.86	0.92

Perceived availability of natural resources (%) *continued.*

Respondent perceptions of ...	N	Very high (1)	High (2)	Moderate (3)	Low (4)	Very low (5)	Don't know	Mean (1-5)	Std. Dev.
groundwater									
2000									
				Question not asked in 2000					
2002									
				Question not asked in 2002					
2004	794	3.1%	21.4%	39.7%	14.1%	2.4%	19.2%	2.89	0.84
2006	849	3.2%	20.7%	39.3%	17.2%	2.5%	17.2%	17.2%	0.85
2008	720	3.0%	20.2%	41.4%	16.3%	2.8%	16.2%	2.95	0.84
2010	591	4.7%	20.6%	42.6%	14.7%	2.0%	15.2%	2.87	0.85
2010 (e-survey)	2460	5.0	25.3	42.1	17.4	3.5	6.7	2.88	0.90
area of National Parks									
2000	858	16.1	44.8	30.3	5.4	0.8	2.7	2.28	0.83
2002	812	15.1	47.4	27.5	5.9	0.5	3.6	2.27	0.81
2004	795	14.5	45.7	31.6	4.9	0.3	3.1	2.29	0.79
2006	855	13.8	46.4	32.5	3.6	0.4	3.3	2.28	0.76
2008	722	13.9	46.5	31.2	4.2	0.4	3.9	2.28	0.78
2010	594	13.1	47.8	29.1	5.1	0.8	4.0	2.30	0.80
2010 (e-survey)	2458	14.0	45.4	31.4	6.8	0.9	1.4	2.34	0.84
area of wetlands									
2000	855	2.8	16.8	37.0	18.9	3.0	21.4	3.03	0.87
2002	807	3.3	19.2	38.7	14.3	4.3	20.2	2.96	0.90
2004	794	3.5	17.1	37.2	16.8	2.6	22.8	2.97	0.87
2006	850	3.5	18.0	39.4	15.2	2.4	21.5	2.93	0.85
2008	723	4.3	18.9	37.3	16.0	3.0	20.3	2.93	0.90
2010	589	4.1	20.4	34.8	16.3	3.6	20.9	2.94	0.92
2010 (e-survey)	2453	4.0	22.7	39.9	16.4	6.6	10.4	2.99	0.95
availability of parks and reserves in towns and cities									
2000	856	12.0	36.2	37.4	10.5	2.0	1.9	2.53	0.91
2002	812	12.8	39.0	34.7	9.7	1.7	2.0	2.47	0.90
2004	801	12.6	40.0	35.5	8.2	2.2	1.5	2.47	0.90
2006	856	10.2	41.8	37.6	6.9	1.8	1.8	2.47	0.84
2008	725	12.4	41.5	35.0	8.0	0.4	2.6	2.41	0.83
2010	598	10.2	41.3	37.8	8.5	0.3	1.8	2.47	0.81
2010 (e-survey)	2457	9.2	35.9	38.9	12.2	2.5	1.3	2.63	0.91
reserves of oil and gas									
2000	851	1.2	10.0	32.8	24.7	3.9	27.5	3.28	0.83
2002	812	1.4	7.3	29.9	28.7	3.8	28.9	3.37	0.81
2004	796	1.5	3.8	23.6	34.4	10.9	25.8	3.67	0.86
2006	855	1.1	3.0	21.9	36.3	12.9	24.9	3.76	0.83
2008	722	1.8	7.5	24.4	30.7	8.0	27.6	3.49	0.91
2010	594	3.0	9.8	25.9	21.7	3.7	35.9	3.21	0.93
2010 (e-survey)	2458	2.7	11.0	34.8	25.4	7.0	19.1	3.28	0.92

Table 5. Perceived quality of management activities (%).

Respondent perceptions of management of ...	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std. Dev.
pest and weed control									
2000	852	2.9	18.8	34.5	30.2	7.0	6.6	3.21	0.95
2002	812	4.2	17.6	40.6	26.4	6.0	5.2	3.13	0.94
2004	783	5.7	22.3	33.6	26.8	7.0	4.5	3.07	1.02
2006	859	5.0	18.4	39.6	26.9	5.5	4.7	3.10	0.95
2008	728	4.4	24.0	40.7	23.9	2.2	4.8	2.95	0.88
2010	596	3.9	24.2	40.1	23.3	4.2	4.4	3.00	0.91
2010 (e-survey)	2454	2.6	18.7	41.4	27.6	6.7	3.1	3.18	0.91
solid waste disposal									
2000	854	1.6	12.8	38.8	32.8	7.4	6.7	3.34	0.87
2002	807	2.4	14.3	42.5	27.0	5.8	8.1	3.21	0.87
2004	779	3.5	17.3	41.7	24.0	5.9	7.6	3.12	0.92
2006	857	2.6	15.2	45.0	24.3	4.2	8.8	3.14	0.84
2008	728	2.7	18.7	44.1	24.5	2.2	7.8	3.05	0.83
2010	593	2.0	20.7	43.8	22.4	3.7	7.3	3.05	0.84
2010 (e-survey)	2446	1.5	14.3	42.4	28.7	7.8	5.4	3.29	0.86
sewage disposal									
2000	853	2.0	14.0	39.7	31.4	8.6	4.3	3.32	0.90
2002	806	3.0	13.6	46.5	24.6	6.8	5.5	3.20	0.88
2004	782	3.6	19.3	38.0	26.9	5.6	6.6	3.12	0.94
2006	858	3.0	17.5	47.7	21.8	3.6	6.4	3.06	0.84
2008	728	3.3	22.1	47.0	18.5	3.3	5.8	2.96	0.84
2010	592	2.5	24.2	47.8	17.9	3.4	4.2	2.95	0.83
2010 (e-survey)	2447	2.1	18.3	43.4	25.5	6.2	4.5	3.16	0.88
farm effluent and runoff									
2000	849	0.7	9.2	29.8	32.7	9.2	18.4	3.50	0.87
2002	811	1.0	6.9	25.4	34.8	14.9	17.0	3.67	0.91
2004	783	1.3	8.8	24.3	37.9	13.8	13.9	3.63	0.92
2006	855	0.8	7.1	28.8	38.5	9.2	15.6	3.57	0.83
2008	729	1.4	7.1	26.3	38.3	13.3	13.6	3.64	0.90
2010	593	0.8	7.8	25.0	40.5	14.2	11.8	3.67	0.88
2010 (e-survey)	2453	0.7	5.1	24.3	39.6	24.4	5.9	3.87	0.89
hazardous chemicals use and disposal									
2000	854	1.6	8.1	28.1	29.2	13.5	19.6	3.56	0.95
2002	806	1.9	9.4	30.8	28.9	8.4	20.6	3.41	0.91
2004	785	2.3	14.1	30.7	24.7	5.7	22.4	3.22	0.93
2006	857	0.8	10.9	36.1	25.3	5.5	21.5	3.30	0.83
2008	728	2.1	13.2	32.8	26.0	4.8	21.2	3.23	0.89
2010	597	2.2	12.2	35.3	24.6	6.0	19.6	3.25	0.90
2010 (e-survey)	2450	1.5	9.6	31.6	31.1	13.0	13.1	3.51	0.94
industrial impact on the environment									
2000				Question not asked in 2000					
2002	811	0.6	7.4	31.9	37.9	10.2	12.0	3.56	0.83
2004	781	1.3	9.0	36.1	31.9	8.2	13.6	3.43	0.86
2006	858	0.9	7.1	39.9	31.5	7.3	13.3	3.43	0.80
2008	729	1.1	8.9	38.7	32.6	7.0	11.7	3.40	0.82
2010	596	1.7	9.1	37.8	33.6	5.4	12.6	3.36	0.82
2010 (e-survey)	2450	1.0	7.2	35.0	37.1	12.9	6.8	3.58	0.86

Table 6. Perceptions of current management of the environment (%).

Perceived quality of management of ...	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1-5)	Std. Dev.
natural environment in towns and cities									
2000	852	2.8	26.4	53.8	12.7	1.2	3.2	2.82	0.73
2002	814	2.7	22.1	56.1	14.0	1.1	3.9	2.88	0.72
2004	784	1.9	24.7	54.7	13.0	0.6	5.0	2.85	0.69
2006	856	3.3	29.1	52.5	12.0	0.6	2.6	2.77	0.73
2008	723	4.1	27.0	54.9	9.8	1.0	3.2	2.76	0.73
2010	597	3.7	31.2	50.4	10.9	0.3	3.5	2.72	0.72
2010 (e-survey)	2463	2.6	21.6	55.8	17.4	0.6	2.0	2.92	0.72
air quality									
2000	851	2.8	20.1	45.7	22.9	2.9	5.5	3.03	0.84
2002	805	1.6	15.2	45.7	26.6	4.6	6.3	3.19	0.82
2004	779	0.6	18.9	46.1	25.4	2.4	6.5	3.11	0.77
2006	851	3.6	20.9	49.5	19.0	2.2	4.7	2.95	0.82
2008	719	5.1	26.6	46.9	16.3	1.1	4.0	2.81	0.82
2010	594	5.4	32.7	44.8	12.6	0.8	3.7	2.70	0.80
2010 (e-survey)	2454	3.5	25.1	49.7	18.0	1.3	2.4	2.88	0.79
native land and freshwater plants and animals									
2000	849	3.3	22.5	46.8	17.1	1.6	8.7	2.90	0.80
2002	805	2.2	24.6	47.3	14.8	1.4	9.7	2.87	0.76
2004	775	1.8	24.9	48.8	12.5	0.9	11.1	2.84	0.72
2006	852	5.2	28.3	47.3	11.4	1.1	6.8	2.73	0.79
2008	726	5.0	30.9	45.0	10.9	1.1	7.2	2.70	0.79
2010	591	5.6	31.5	46.2	11.0	1.2	4.6	2.69	0.80
2010 (e-survey)	2450	4.4	28.2	44.5	17.6	1.5	3.8	2.83	0.83
native bush and forests									
2000	850	5.5	29.3	39.6	17.5	3.1	4.9	2.82	0.91
2002	807	4.7	34.2	42.1	11.0	1.6	6.3	2.69	0.81
2004	781	6.1	31.5	42.0	11.5	1.2	7.7	2.68	0.82
2006	856	8.2	37.0	40.4	9.8	0.7	3.9	2.56	0.82
2008	727	10.0	39.5	37.7	7.8	0.7	4.3	2.47	0.82
2010	592	9.6	41.0	37.3	8.6	1.2	2.2	2.50	0.83
2010 (e-survey)	2462	8.3	35.8	39.9	12.7	1.1	2.2	2.62	0.86
soils									
2000	847	1.5	18.2	44.6	14.5	2.6	18.5	2.98	0.78
2002	800	1.4	15.9	43.9	15.0	1.9	22.0	3.00	0.75
2004	773	1.4	15.9	44.5	13.8	1.8	22.5	2.98	0.74
2006	848	2.1	18.8	47.3	13.4	1.2	17.2	2.91	0.74
2008	722	3.2	21.1	47.4	10.8	1.4	16.2	2.84	0.76
2010	594	2.2	24.2	42.8	14.5	0.8	15.5	2.85	0.76
2010 (e-survey)	2457	2.0	20.1	46.7	19.7	2.5	9.0	3.00	0.80
coastal waters and beaches									
2000	846	2.5	17.6	44.1	24.8	4.1	6.9	3.11	0.85
2002	808	1.9	19.3	43.7	24.6	3.2	7.3	3.09	0.83
2004	782	2.4	19.2	42.3	24.0	2.2	9.8	3.05	0.83
2006	853	3.4	27.1	47.7	17.0	1.5	3.3	2.86	0.80
2008	725	5.1	31.0	44.7	12.8	1.5	4.8	2.73	0.82
2010 (e-survey)	592	5.9	31.4	41.6	14.2	1.2	5.7	2.72	0.84
2010 (e-survey)	2459	3.6	24.0	43.5	22.7	3.0	3.2	2.97	0.87

Perceptions of current management of the environment (%) *continued*.

Perceived quality of management of ...	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1-5)	Std. Dev.
marine fisheries									
2000	848	2.2	13.2	33.3	24.5	4.4	22.4	3.20	0.89
2002	809	1.2	14.8	37.6	20.4	3.7	22.2	3.14	0.83
2004	780	1.9	13.1	36.0	22.4	2.7	23.8	3.14	0.83
2006	852	2.7	18.7	36.6	20.3	3.1	18.7	3.03	0.87
2008	724	3.6	21.5	36.9	15.7	2.6	19.6	2.90	0.88
2010	594	4.4	23.6	35.5	16.5	2.9	17.2	2.88	0.91
2010 (e-survey)	2462	3.3	20.7	37.7	23.1	5.4	9.8	3.07	0.93
marine reserves									
2000	853	2.6	20.3	40.3	10.9	2.2	23.7	2.87	0.80
2002	802	2.6	21.7	41.4	11.1	2.0	21.2	2.85	0.79
2004	769	2.3	21.6	39.5	11.6	0.7	24.3	2.82	0.75
2006	850	4.9	26.0	41.8	8.8	0.6	17.9	2.68	0.77
2008	724	6.9	28.9	34.9	9.4	1.7	18.2	2.63	0.87
2010	593	6.6	31.2	33.4	8.9	1.2	18.7	2.59	0.84
2010 (e-survey)	2456	5.4	28.6	39.0	13.6	2.5	10.8	2.77	0.88
freshwater									
2000	846	3.3	20.1	45.3	17.6	3.2	10.5	2.97	0.84
2002	807	2.4	20.4	45.5	18.1	3.2	10.4	2.99	0.82
2004				Question not asked in 2004					
2006				Question not asked in 2006					
2008				Question not asked in 2008					
2010				Question not asked in 2010					
2010 (e-survey)				Question not asked in 2010					
rivers and lakes									
2004	779	2.2	15.1	42.0	28.1	3.0	9.6	3.16	0.83
2006	855	2.6	22.2	44.6	21.3	2.5	6.9	2.99	0.83
2008	723	3.7	18.9	41.4	18.5	2.4	7.4	3.0	0.85
2010	591	3.2	26.2	42.6	19.8	2.9	5.2	2.93	0.86
2010 (e-survey)	2455	2.6	19.6	41.3	27.4	5.0	4.1	3.13	0.89
groundwater									
2004	774	2.3	12.7	39.0	20.0	1.8	24.2	3.08	0.80
2006	852	2.0	14.1	41.7	18.3	2.2	21.7	3.06	0.79
2008	722	1.9	14.5	37.3	18.4	2.3	17.9	3.1	0.82
2010	588	2.7	18.4	40.3	17.9	1.7	19.0	2.97	0.82
2010 (e-survey)	2443	2.0	16.3	41.0	24.7	4.8	11.1	3.1	0.86
National Parks									
2000	848	9.6	39.5	37.6	5.5	1.4	6.4	2.46	0.81
2002	810	8.5	42.1	37.8	3.8	1.2	6.5	2.43	0.77
2004	779	10.8	41.7	35.7	4.5	0.1	7.2	2.37	0.76
2006	853	13.4	46.1	32.2	3.2	0.5	4.7	2.20	0.78
2008	728	17.2	45.3	29.9	2.5	0.5	4.5	2.57	1.09
2010	594	15.2	47.1	30.8	3.0	0.3	3.5	2.24	0.76
2010 (e-survey)	2449	15.2	43.9	33.2	5.0	0.7	2.1	2.31	0.82
wetlands									
2000	842	1.9	18.2	35.9	15.4	2.3	26.4	2.97	0.83
2002	807	3.0	18.5	38.9	12.6	2.6	24.4	2.91	0.84
2004	772	2.6	20.6	35.9	11.8	1.4	27.7	2.85	0.80
2006	854	3.7	25.2	37.6	11.2	0.9	21.3	2.75	0.80
2008	722	4.7	26.7	35.7	10.5	1.8	20.5	2.72	0.85
2010	593	5.4	27.2	33.6	12.0	1.0	20.9	2.70	0.85
2010 (e-survey)	2433	5.2	27.4	37.4	15.2	2.4	12.4	2.80	0.89

Perceptions of current management of the environment (%) *continued.*

Perceived quality of management of ...	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1-5)	Std. Dev.
New Zealand's natural environment compared to other developed countries									
2000	852	11.6	39.9	33.1	4.3	0.7	12.3	2.35	0.80
2002	815	13.6	36.3	32.1	3.2	1.0	13.7	2.32	0.82
2004	776	13.5	38.3	30.5	4.4	0.6	12.6	2.32	0.82
2006	846	20.0	41.4	24.9	4.4	0.2	9.1	2.16	0.83
2008	722	19.0	41.8	26.7	2.6	0.4	9.4	2.16	0.80
2010	589	21.1	37.4	27.0	3.9	0.2	10.5	2.16	2.84
2010 (e-survey)	2441	17.8	39.5	30.3	6.7	0.7	4.9	2.29	0.88

Table 7. Respondents' participation in environmental activities (%).

In the last 12 months the respondent had ...	Year	N	No	Yes	Regularly	Don't know
reduced or limited their use of electricity	2002	803	22.2	60.3	15.1	2.5
	2004	798	15.9	63.3	19.7	1.1
	2006	856	19.9	57.0	21.5	1.6
	2008	722	17.4	61.1	21.0	0.4
	2010	603	15.1	58.0	24.9	2.0
	2010 (e-survey)	2307	11.5	53.8	33.4	1.2
reduced or limited their use of freshwater ¹	2006	849	43.8	35.8	18.4	2.0
	2008	722	35.00	39.17	24.4	1.4
	2010	599	37.4	38.9	21.7	2.0
	2010 (e-survey)	2299	35.1	34.2	28.4	2.3
visited a marine reserve	2002	801	59.8	36.0	2.9	1.4
	2004	790	69.9	27.5	1.9	0.8
	2006	851	70.9	26.7	1.6	0.8
	2008	726	74.7	22.8	1.8	0.7
	2010	598	69.2	26.9	3.7	0.2
	2010 (e-survey unwe)	2292	73.6	22.5	2.9	1.0
visited a national park	2002	801	36.8	55.6	6.7	0.9
	2004	797	32.6	61.9	4.9	0.6
	2006	853	41.0	53.6	5.3	0.1
	2008	719	41.79	51.72	6.2	0.3
	2010	598	40.1	53.7	5.9	0.3
	2010 (e-survey)	2294	44.0	48.3	7.0	0.7
bought products that are marketed as environmentally friendly	2002	805	11.7	64.8	15.	8.3
	2004	799	12.1	66.6	16.4	4.9
	2006	850	15.1	63.3	15.6	6.0
	2008	722	15.1	64.7	14.8	5.4
	2010	600	13.0	66.0	16.5	4.5
	2010 (e-survey)	2299	12.6	56.7	24.8	5.9
recycled household waste	2002	800	11.8	63.3	24.5	0.5
	2004	802	8.1	62.8	28.7	0.4
	2006	848	9.3	62.6	27.8	0.2
	2008	725	8.9	65.4	25.3	0.4
	2010	600	4.7	61.7	33.5	0.2
	2010 (e-survey)	2303	4.1	53.0	42.5	0.4
composted garden and/or household waste	2002	804	28.5	50.2	20.6	0.6
	2004	802	27.4	50.4	21.9	0.2
	2006	853	27.4	48.9	23.1	0.6
	2008	720	30.64	48.3	20.8	0.3
	2010	605	29.6	45.3	25.1	0.0
	2010 (e-survey)	2296	25.3	42.4	31.5	0.7

Perceptions of current management of the environment (%) *continued*.

In the last 12 months the respondent had...	Year	N	No	Yes	Regularly	Don't know
been involved in a project to improve the natural environment	2002	797	74.7	20.3	3.6	1.4
	2004	784	75.5	19.4	3.4	1.7
	2006	844	76.9	17.8	4.4	0.9
	2008	718	76.9	19.1	3.1	1.0
	2010	592	75.2	19.9	4.4	0.5
	2010 (e-survey)	2296	71.1	19.3	7.4	2.1
grown some of their own vegetables	2002	812	33.0	54.9	11.6	0.5
	2004	806	29.5	54.7	15.5	0.2
	2006	856	31.5	52.9	15.4	0.1
	2008	718	30.4	54.6	14.9	0.1
	2010	604	22.4	58.4	19.2	0.0
	2010 (e-survey)	2298	21.7	54.6	23.6	0.2
obtained information about the environment from any source	2002	805	44.2	46.0	7.7	2.1
	2004	791	48.4	43.9	6.3	1.4
	2006	845	43.9	46.5	8.0	1.5
	2008	724	41.6	48.3	9.3	0.8
	2010	598	41.1	48.3	8.7	1.8
	2010 (e-survey)	2293	33.1	52.0	13.2	1.7
taken part in hearings or consent processes about the environment	2002	810	81.1	15.1	2.6	1.2
	2004	795	84.8	12.5	1.8	1.0
	2006	853	85.6	12.2	1.4	0.8
	2008	729	87.1	10.9	1.7	0.4
	2010	602	86.0	11.8	2.0	0.2
	2010 (e-survey)	2302	85.5	11.5	2.3	0.7
participated in an environmental organisation	2002	802	84.0	12.3	2.2	1.4
	2004	793	87.3	10.1	1.3	1.4
	2006	852	86.5	10.4	2.3	0.7
	2008	726	86.4	11.3	1.8	0.6
	2008	727	77.0	19.7	2.3	1.0
	2010	599	87.6	9.2	3.2	0.0
	2010 (e-survey)	2297	78.8	16.1	4.5	0.7
commuted by buses or trains	2002	806	59.4	34.9	4.8	0.9
	2004	796	62.7	32.0	4.8	0.5
	2006	851	64.5	29.5	5.6	0.4
	2008	727	62.1	31.40	6.2	0.3
	2010	595	57.5	36.1	6.4	0.0
	2010 (e-survey)	2299	52.5	36.6	10.6	0.3
been an active member of a club or group that restores and/or replants natural environments	2002	807	86.0	11.9	1.1	1.0
	2004	792	87.8	10.4	1.0	0.9
	2006	847	89.7	8.3	1.7	0.4
	2008	725	87.0	10.2	2.3	0.4
	2010	593	88.2	9.9	1.7	0.2
	2010 (e-survey)	2289	86.5	10.1	2.9	0.6
made a financial donation to a non NGO ²	2006	852	76.2	20.0	2.7	1.2
	2010	602	75.1	20.6	3.8	0.5
	2010 (e-survey)	2298	72.3	22.5	4.1	1.0

1 Not asked in 2002 or 2004.

2 Not asked in 2002, 2004 or 2008.

Table 8. Perceived quality of water (%).

Perceived quality of freshwater closest to where I live	N	Extremely good (1)	Good (2)	Adequate (3)	Poor (4)	Extremely poor (5)	Don't know	Mean (1-5)	Std. Dev.
rivers and streams									
2004					Question not asked				
2008					Question not asked				
2010	580	5.0	29.9	33.4	16.7	4.5	10.4	2.96	1.07
2010 (e-survey)	2184	5.7	23.0	27.2	21.8	10.4	11.9	3.09	1.11
aquifers (groundwater)									
2004					Question not asked				
2008					Question not asked				
2010	569	12.1	24.4	18.5	7.4	2.1	35.5	2.43	1.02
2010 (e-survey)	2178	14.4	21.2	19.3	6.8	2.2	36.0	2.39	1.05
lakes									
2004					Question not asked				
2008					Question not asked				
2010	571	6.1	25.0	26.3	14.2	6.5	21.9	2.87	1.07
2010 (e-survey)	2172	5.5	20.6	23.0	15.5	8.4	27.0	3.01	1.12
Perceived quality of water in my region's ...	N	Extremely good (1)	Good (2)	Adequate (3)	Poor (4)	Extremely poor (5)	Don't know	Mean (1-5)	Std. Dev.
rivers and streams									
2004	800	4.9	25.1	32.8	21.8	3.1	12.4	3.30	1.35
2008	718	7.8	31.9	34.1	16.9	3.6	5.7	2.94	1.20
2010	575	5.0	29.9	33.4	16.7	4.5	10.4	2.84	0.97
2010 (e-survey)	2154	4.9	25.3	32.5	19.8	7.2	10.3	2.99	1.02
aquifers (groundwater)									
2004	799	7.8	26.2	26.7	8.3	1.3	29.9	3.59	1.75
2008	715	12.3	28.7	28.1	8.4	1.8	20.7	3.21	1.66
2010	573	9.6	25.0	22.5	6.5	1.2	35.3	2.46	0.93
2010 (e-survey)	2161	12.4	22.7	20.6	7.7	1.7	34.8	2.44	1.01
lakes									
2004	790	4.1	22.9	29.9	19.9	4.3	19.0	3.54	1.48
2008	696	7.0	27.9	33.5	12.5	3.2	15.9	3.25	1.48
2010	571	5.1	26.6	28.9	13.5	5.3	20.7	2.84	1.00
2010 (e-survey)	2154	5.0	22.4	26.2	15.6	5.4	25.5	2.92	1.03
Perceived quality of water in New Zealand's...	N	Extremely good (1)	Good (2)	Adequate (3)	Poor (4)	Extremely poor (5)	Don't know	Mean (1-5)	Std. Dev.
rivers and streams									
2004	799	3.6	30.8	36.0	19.9	2.0	7.6	3.09	1.19
2008	718	5.0	34.8	36.9	17.1	1.4	4.7	2.89	1.09
2010	584	4.6	36.6	30.8	17.5	1.7	8.6	2.72	0.90
2010 (e-survey)	2198	3.1	30.2	33.6	21.6	5.1	6.5	2.95	0.95
aquifers (groundwater)									
2004	793	6.4	27.7	29.3	9.3	.6	26.6	3.50	1.67
2008	714	6.9	30.1	35.6	8.4	1.1	17.9	3.21	1.51
2010	581	7.2	28.1	25.0	7.7	0.5	31.5	2.51	0.86
2010 (e-survey)	2188	7.3	29.1	26.5	9.0	1.4	26.7	2.57	0.90
lakes									
2004	794	3.3	25.8	32.5	24.4	4.9	9.1	3.29	1.25
2008	712	6.3	27.5	39.2	18.1	2.0	6.9	3.03	1.19
2010	578	4.8	37.4	30.8	13.5	1.0	12.5	2.64	0.85
2010 (e-survey)	2177	4.0	29.5	32.9	18.3	3.3	12.0	2.86	0.93

Table 9. Water statements (%).

	N	Strongly agree (1)	Agree (2)	Neither agree or disagree (3)	Disagree (4)	Strongly disagree (5)	Don't know	Mean (1-5)	Std. Dev.
More water should be taken from large rivers for irrigation, even if it has a negative impact on freshwater fisheries.									
2004	789	1.4	13.3	17.9	38.7	18.3	10.5	3.91	1.20
2008	723	2.2	14.7	16.7	39.7	21.7	5.0	3.79	1.15
2010	554	3.6	16.9	29.5	27.3	17.2	5.6	3.40	1.09
2010 (e-survey)	2207	2.3	16.1	28.3	29.7	18.9	4.8	3.49	1.06
More water should be taken from large rivers for hydro electric power generation, even if it has a negative impact on freshwater fisheries.									
2008	720	4.9	21.1	19.3	34.2	15.7	4.9	3.37	1.15
2010	554	8.1	36.5	21.1	19.7	9.6	5.0	2.86	1.15
2010 (e-survey)	2200	7.5	34.5	22.9	20.2	10.4	4.5	2.91	1.15
Small lowland streams in my region have high quality water.									
2004	787	0.8	16.9	14.4	29.2	8.8	30.0	4.18	1.46
2008	720	1.8	19.0	19.7	27.8	7.4	24.3	3.38	1.00
2010	584	1.0	14.0	19.5	28.8	6.7	30.0	4.16	1.45
2010 (e-survey)	2208	1.3	14.4	23.1	25.0	9.8	26.4	3.38	1.00
Small lowland streams in my region are well managed.									
2004	793	0.4	15.4	22.3	23.6	6.3	32.0	4.16	1.48
2008	720	1.8	19.9	22.5	22.6	5.0	28.2	3.94	1.54
2010	584	0.5	15.4	24.1	22.8	6.0	31.2	4.12	1.48
2010 (e-survey)	2203	0.8	14.3	27.8	22.9	8.2	26.0	3.32	0.94
More water should be taken from Small lowland streams for irrigation, even if it has a negative impact on freshwater fisheries.									
2004	790	0.8	4.1	9.1	47.5	24.8	13.8	4.33	1.01
2008	722	1.1	7.1	13.6	46.5	23.3	8.4	4.09	1.04
2010	476	1.4	8.4	20.2	35.1	16.4	18.5	3.70	0.96
2010 (e-survey)	2199	1.2	8.2	22.7	33.7	21.2	12.9	3.75	0.97
Small lowland streams in my region are in good condition.									
2004	792	0.6	19.3	15.2	28.2	7.7	29.0	4.10	1.49
2008	719	1.0	22.4	22.7	22.9	6.8	24.2	3.85	1.50
2010	582	0.7	17.7	21.5	24.6	6.0	29.6	4.06	1.49
2010 (e-survey)	2200	1.1	13.8	26.1	24.5	9.4	25.1	3.36	0.97
More water should be taken from aquifers (underground) in my region.									
2004	794	3.0	18.0	21.8	19.8	7.4	30.0	4.01	1.58
2008	718	2.5	18.4	22.4	22.8	9.7	24.1	3.91	1.50
2010	476	2.9	18.2	23.3	24.4	12.9	18.4	3.32	1.09
2010 (e-survey)	2199	1.9	17.2	25.1	23.8	17.7	14.4	3.45	1.10
All businesses should be metered to monitor how much water they use and when they use it.									
2004					Question not asked				
2008					Question not asked				
2010	570	29.3	48.0	11.8	7.4	1.2	2.2	2.01	0.91
2010 (e-survey)	2204	30.9	47.3	13.2	4.5	1.9	2.2	1.97	0.90
Iwi/hapu should have more say in freshwater management.									
2004					Question not asked				
2008					Question not asked				
2010	552	4.6	9.4	24.6	29.6	26.2	5.6	3.67	1.23
2010 (e-survey)	2208	4.7	12.0	24.2	24.5	29.7	4.9	3.66	1.18
Business water users should have more say in freshwater management.									
2004					Question not asked				
2008					Question not asked				
2010	548	2.6	19.3	24.8	33.2	13.8	6.3	3.39	1.05
2010 (e-survey)	2199	2.1	14.3	30.5	30.7	17.0	5.5	3.49	1.02

Water statements (%) *continued.*

	N	Strongly agree (1)	Agree (2)	Neither agree or disagree (3)	Disagree (4)	Strongly disagree (5)	Don't know	Mean (1-5)	Std. Dev.
Environmental and recreational groups should have more say in freshwater management									
2004					Question not asked				
2008					Question not asked				
2010	564	11.6	37.4	25.6	17.2	4.4	3.8	2.64	1.05
2010 (e-survey)	2210	9.0	39.7	30.4	12.9	5.2	2.9	2.64	1.00
More water should be left in rivers and streams for environmental and recreational reasons.									
2004					Question not asked				
2008					Question not asked				
2010	555	18.2	42.7	25.9	7.0	1.4	4.8	2.27	0.90
2010 (e-survey)	2211	15.7	46.2	27.7	5.6	1.2	3.6	2.28	0.85
All businesses should pay the administrative costs of providing the fresh water they use.									
2004					Question not asked				
2008					Question not asked				
2010	555	17.4	42.2	21.1	11.4	2.4	5.5	2.36	1.00
2010 (e-survey)	2214	19.5	44.9	21.5	7.5	1.8	4.8	2.24	0.93
In addition to paying the administrative costs, all businesses should pay for every unit of fresh water they take.									
2004					Question not asked				
2008					Question not asked				
2010	545	15.5	36.5	22.7	15.0	3.2	7.2	2.50	1.06
2010 (e-survey)	2209	17.8	36.9	25.9	10.3	3.7	5.4	2.42	1.03

Table 10. Opinion on how well each of the policy or planning mechanisms is helping to achieve environmentally sustainable water management outcomes (%).

Contributions to achieving environmentally sustainable water management outcomes from...	N	Strongly negative (1)	Moderately negative (2)	No effect (3)	Moderately positive (4)	Strongly positive (5)	Don't know	Mean (1-5)	Std. Dev.
National policy statements are:									
2008					Question not asked				
2010	573	1.6	5.1	11.5	23.9	1.7	56.2	3.44	0.88
2010 (e-survey)	2030	1.8	7.3	17.1	35.9	4.4	33.5	3.51	0.88
Water conservation orders are:									
2008					Question not asked				
2010	571	1.2	4.7	6.3	30.1	7.0	50.6	3.74	0.90
2010 (e-survey)	2024	1.3	8.0	9.8	41.4	11.5	28.0	3.75	0.92
Regional policy statements are:									
2008					Question not asked				
2010	566	0.7	5.3	9.4	27.2	3.7	53.7	3.60	0.85
2010 (e-survey)	2020	1.2	7.2	15.8	39.2	5.6	31.0	3.59	0.85
Regional plans are:									
2008					Question not asked				
2010	572	0.7	5.4	9.1	29.5	4.0	51.2	3.62	0.84
2010 (e-survey)	2013	1.5	7.9	11.5	43.7	7.0	28.4	3.65	0.88
Resource consents for water are:									
2008					Question not asked				
2010	571	2.5	8.4	6.0	27.5	6.7	49.0	3.54	1.06
2010 (e-survey)	2015	3.5	13.4	9.5	33.8	13.1	26.7	3.54	1.12
Drinking water standards are:									
2008					Question not asked				
2010	572	2.1	4.2	4.9	35.8	14.2	38.8	3.91	0.95
2010 (e-survey)	2025	2.2	7.2	9.7	36.0	22.3	22.6	3.89	1.02

Opinion on how well each of the policy or planning mechanisms is helping to achieve environmentally sustainable water management outcomes (%) *continued*.

Contributions to achieving environmentally sustainable water management outcomes from...	N	Strongly negative (1)	Moderately negative (2)	No effect (3)	Moderately positive (4)	Strongly positive (5)	Don't know	Mean (1-5)	Std. Dev.
Contact recreation guidelines for fresh water are:									
2008					Question not asked				
2010	569	0.9	3.9	7.6	25.3	3.9	58.5	3.66	0.86
2010 (e-survey)	2030	1.1	5.8	13.7	34.1	6.9	38.3	3.65	0.86
Sports fish management plans are:									
2008					Question not asked				
2010	569	0.9	4.6	7.7	26.5	6.7	53.6	3.73	0.90
2010 (e-survey)	2028	1.4	7.1	13.4	33.4	8.4	36.3	3.63	0.92
Conservation management strategies are:									
2008					Question not asked				
2010	570	0.9	4.4	7.4	30.9	6.0	50.5	3.74	0.85
2010 (e-survey)	2025	1.8	7.4	9.8	41.1	9.6	30.3	3.71	0.92
Iwi/hapu management plans are:									
2008					Question not asked				
2010	568	3.9	4.6	7.7	11.6	2.1	70.1	3.11	1.16
2010 (e-survey)	2026	7.5	8.9	14.7	16.3	2.9	49.8	2.96	1.15

Table 11. Organisation performance in their water management functions (%).

Performance of water management functions by...	N	Extremely good (1)	Good (2)	Adequate (3)	Poor (4)	Extremely poor (5)	Don't know	Mean (1-5)	Std. Dev.
Ministry for the Environment is:									
2008					Question not asked				
2010	582	1.7	23.2	19.1	10.5	2.4	43.1	2.82	0.92
2010 (e-survey)	2017	2.0	27.1	29.8	14.5	4.1	22.5	2.89	0.92
Department of Conservation is:									
2008					Question not asked				
2010	579	5.5	34.2	14.5	7.8	1.2	36.8	2.45	0.87
2010 (e-survey)	2013	8.0	37.9	23.2	9.5	2.7	18.6	2.52	0.94
Ministry of Health is:									
2008					Question not asked				
2010	578	4.8	27.7	18.0	7.6	1.7	40.1	2.56	0.92
2010 (e-survey)	2014	5.1	32.2	27.1	12.0	2.5	21.2	2.68	0.92
Regional councils is:									
2008					Question not asked				
2010	580	1.9	26.9	19.5	13.8	4.0	34.0	2.86	0.98
2010 (e-survey)	2016	4.2	31.3	27.3	16.3	4.4	16.4	2.83	0.98
District and City councils is:									
2008					Question not asked				
2010	579	2.6	26.1	20.6	14.0	4.3	32.5	2.87	0.95
2010 (e-survey)	2017	4.2	29.7	29.3	16.0	4.5	16.4	2.84	0.97
Fish and Game New Zealand is:									
2008					Question not asked				
2010	580	5.3	24.5	15.9	3.4	1.2	49.7	2.42	0.86
2010 (e-survey)	2014	7.3	31.4	22.4	5.4	1.9	31.5	2.46	0.89

Table 12. Regional council water management (%).

My regional council's management of ...	N	Extremely good (1)	Good (2)	Adequate (3)	Poor (4)	Extremely poor (5)	Don't know	Mean (1-5)	Std. Dev.
rivers and streams									
2008	704	3.4	28.1	38.4	15.3	2.4	12.4	3.22	1.32
2010	585	2.6	22.7	35.6	18.8	3.9	16.4	2.99	0.90
2010 (e-survey)	2027	2.9	18.7	38.2	20.9	6.5	12.7	3.11	0.93
aquifers (groundwater)									
2008	701	4.6	23.0	33.4	12.3	2.7	24.1	3.58	1.58
2010	580	1.2	15.2	29.7	11.2	3.4	39.3	3.01	0.86
2010 (e-survey)	2020	3.7	16.5	31.3	12.3	4.7	31.6	2.97	0.95
lakes									
2008	695	3.6	24.5	38.4	11.5	1.6	20.4	3.44	1.49
2010	580	3.4	19.1	32.9	14.7	2.9	26.9	2.92	0.90
2010 (e-survey)	2019	2.3	17.9	34.2	17.5	4.8	23.2	3.06	0.91

Table 13. Participation in water resource activities (%).

	Year	N	In the last 12 months	Ever	Never
Made a submission on a resource consent application to use, or to discharge into, fresh water	2010	578	2.8	3.6	93.6
	2010 (e-survey)	2040	2.8	6.1	91.1
Contacted a public authority about a freshwater pollution incident	2010	576	4.0	9.5	86.5
	2010 (e-survey)	2038	5.7	11.8	82.5
Made a submission on a water conservation order	2010	578	1.2	2.9	95.8
	2010 (e-survey)	2030	1.7	3.5	94.8
Met with a councillor or politician about a water related matter	2010	573	6.1	8.9	85.0
	2010 (e-survey)	2033	6.8	11.3	81.9
Attended a meeting about freshwater management	2010	578	5.9	8.7	85.5
	2010 (e-survey)	2024	7.6	11.1	81.4
Participated in any kind of recreational activity involving a stream, river or lake	2010	577	42.3	19.2	38.5
	2010 (e-survey)	2035	37.9	26.6	35.5
Made a submission on a water related plan or policy proposed by your Regional Council	2010	577	3.5	4.5	92.0
	2010 (e-survey)	2029	4.3	7.9	87.8
Participated in stream, river or lake restoration or enhancement work	2010	577	10.2	13.2	76.6
	2010 (e-survey)	2031	10.0	17.3	72.6
Taken action to reduce the amount of water you use	2010	578	54.2	22.5	23.4
	2010 (e-survey)	2033	61.1	21.2	17.6
Taken action to improve the quality of surface fresh water	2010	572	15.2	14.6	71.0
	2010 (e-survey)	2027	17.7	15.7	66.6

Table 14. Importance of different types of values associated with fresh water (%).

Rivers and streams	Year	N	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider	Mean	Std
Recreation (e.g. fishing, boating, swimming)	2010	570	1	6	28	47	19	3.76	0.77
	2010 (e-survey)	1993	1.2	7.0	32.9	51.6	7.3	3.57	0.78
Scenic/visual (e.g., beauty)	2010	561	25	29	27	14	4	2.45	0.65
	2010 (e-survey)	1987	0.4	3.3	26.3	61.1	9.0	3.75	0.67
Nature (e.g., native bird and fish habitat)	2010	571	4	12	40	35	8	3.30	0.68
	2010 (e-survey)	1984	0.3	1.0	8.1	49.2	41.5	4.31	0.68
Commercial use (e.g., farm irrigation, hydro power)	2010	568	3	10	34	39	14	3.49	0.91
	2010 (e-survey)	1993	2.7	14.9	43.9	31.0	7.6	3.26	0.90
Customary Maori (e.g., role as kaitiaki)	2010	581	2	10	30	44	14	3.57	1.13
	2010 (e-survey)	1989	22.7	25.2	31.1	17.0	4.0	2.54	1.13
Community household and other use (e.g., garden irrigation or drinking water)	2010	570	23	24	32	16	4	2.54	0.81
	2010 (e-survey)	1993	0.7	6.5	27.2	48.3	17.4	3.75	0.84
Lakes	Year	N	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider	Mean	Std
Recreation (e.g. fishing, boating, swimming)	2010	581	4	14	41	32	9	3.27	0.77
	2010 (e-survey)	1987	1.7	7.4	34.9	49.2	6.9	3.52	0.80
Scenic/visual (e.g., beauty)	2010	582	1	2	6	54	37	4.26	0.65
	2010 (e-survey)	1984	0.6	2.7	25.5	60.1	11.1	3.79	0.69
Nature (e.g., native bird and fish habitat)	2010	581	1	1	18	65	15	3.94	0.71
	2010 (e-survey)	1984	0.4	1.3	9.5	50.3	38.5	4.25	0.71
Commercial use (e.g., farm irrigation, hydro power)	2010	585	1	6	27	57	9	3.67	0.95
	2010 (e-survey)	1985	4.2	18.3	44.5	26.6	6.3	3.12	0.92
Customary Maori (e.g., role as kaitiaki)	2010	582	0	6	22	53	19	3.84	1.14
	2010 (e-survey)	1983	23.7	24.7	31.6	16.2	3.8	2.52	1.13
Community household and other use (e.g., garden irrigation or drinking water)	2010	572	22	26	32	16	4	2.55	0.92
	2010 (e-survey)	1986	1.9	11.0	32.4	40.3	14.4	3.54	0.93
Aquifers/undergroundwater	Year	N	Totally irrelevant – not a consideration	Very minor importance	Some importance	Very important	Critical – the most important thing to consider	Mean	Std
Nature (e.g., aquatic insects that live underground)	2010	581	4	9	44	34	10	3.39	0.97
	2010 (e-survey)	1986	4.8	9.6	25.1	39.3	21.2	3.63	1.07
Commercial use (e.g., farm irrigation, hydro power)	2010	581	0	2	6	55	37	4.27	0.94
	2010 (e-survey)	1981	6.3	16.8	41.9	28.7	6.4	3.12	0.97
Customary Maori (e.g., role as kaitiaki)	2010	581	0	2	6	55	37	4.27	1.14
	2010 (e-survey)	1980	27.3	25.1	30.0	13.7	3.9	2.42	1.14
Community household and other use (e.g., garden irrigation or drinking water)	2010	581	0	2	6	55	37	4.27	0.86
	2010 (e-survey)	1976	1.0	5.6	29.1	43.4	20.9	3.78	0.87

Table 15. Effectiveness of approaches to managing fresh water?

Regulation by itself would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	494	18.0	35.6	18.4	10.5	4.0	13.5	2.39	1.09
	2010 (e-survey)	1918	14.1	43.4	17.4	14.1	3.7	7.3	2.46	1.05
in achieving economic growth	2010	459	8.1	28.8	23.6	15.1	5.1	19.3	2.76	1.07
	2010 (e-survey)	1915	5.9	31.6	28.4	18.6	4.7	10.8	2.83	1.00
in achieving benefits to society	2010	481	13.1	31.6	21.7	13.3	4.4	15.9	2.57	1.09
	2010 (e-survey)	1916	12.2	37.6	23.9	14.4	4.2	7.8	2.57	1.05
Economic instruments by themselves would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	476	11.9	31.4	18.6	16.5	5.1	16.5	2.66	1.13
	2010 (e-survey)	1908	9.1	33.6	20.8	20.2	7.3	9.0	2.81	1.13
in achieving economic growth	2010	454	6.9	27.9	22.3	18.1	4.6	20.2	2.82	1.06
	2010 (e-survey)	1903	6.6	31.6	26.2	19.2	5.3	11.1	2.83	1.04
in achieving benefits to society	2010	469	10.9	26.3	21.9	17.9	5.3	17.7	2.76	1.13
	2010 (e-survey)	1895	8.1	28.5	25.8	20.6	7.0	10.1	2.89	1.10
Voluntary action and advocacy by themselves would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	489	8.2	26.1	14.7	26.0	10.7	14.2	3.06	1.22
	2010 (e-survey)	1900	6.6	25.5	17.5	29.2	14.3	7.0	3.20	1.20
in achieving economic growth	2010	461	5.1	19.0	19.1	28.7	9.8	18.3	3.23	1.12
	2010 (e-survey)	1895	4.8	20.1	21.6	29.8	13.5	10.3	3.30	1.13
in achieving benefits to society	2010	480	9.3	25.4	16.5	22.9	10.4	15.5	3.00	1.23
	2010 (e-survey)	1884	7.1	23.7	20.9	28.0	12.9	7.5	3.17	1.18
A combination of Regulation and Economic Instruments would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	476	18.8	37.7	19.5	6.2	1.6	16.2	2.21	0.94
	2010 (e-survey)	1886	17.9	45.9	18.2	7.8	1.5	8.7	2.22	0.91
in achieving economic growth	2010	453	11.2	36.5	22.5	8.2	2.0	19.7	2.42	0.93
	2010 (e-survey)	1887	13.1	41.1	24.3	8.6	1.9	11.0	2.38	0.92
in achieving benefits to society	2010	465	15.4	36.5	20.2	8.3	1.9	17.7	2.33	0.97
	2010 (e-survey)	1879	15.1	42.8	22.2	8.6	2.0	9.3	2.33	0.94
A combination of regulation and Voluntary Action and Advocacy would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	470	18.2	34.1	18.2	10.6	1.9	17.0	2.33	1.03
	2010 (e-survey)	1884	14.8	43.3	21.3	9.4	2.2	8.9	2.35	0.95
in achieving economic growth	2010	449	12.4	31.3	21.0	12.4	2.7	20.2	2.52	1.04
	2010 (e-survey)	1885	9.2	38.3	26.1	12.3	2.6	11.5	2.56	0.95
in achieving benefits to society	2010	464	16.5	33.3	19.3	11.3	1.8	17.9	2.38	1.02
	2010 (e-survey)	1873	12.8	41.4	23.6	10.4	2.5	9.3	2.43	0.96
A combination of Economic Instruments and Voluntary Action and Advocacy would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	459	15.0	31.9	18.9	13.5	1.9	18.8	2.45	1.05
	2010 (e-survey)	1900	9.9	40.9	20.8	14.5	4.1	9.8	2.58	1.03
in achieving economic growth	2010	439	10.9	31.2	19.4	14.3	2.5	21.7	2.57	1.04
	2010 (e-survey)	1894	9.2	37.1	24.8	13.7	3.4	11.9	2.60	0.99
in achieving benefits to society	2010	451	14.2	30.6	20.6	12.3	2.5	19.8	2.48	1.05
	2010 (e-survey)	1894	9.7	38.5	23.0	14.8	3.6	10.3	2.60	1.01

Effectiveness of approaches to managing fresh water *continued*.

A combination of all three approaches would be	Year	N	Extremely effective	Somewhat effective	Adequate	Somewhat ineffective	Very ineffective	Don't know	Mean	Std
in achieving environmental protection	2010	463	37.3	26.4	13.2	4.3	1.4	17.5	1.86	0.98
	2010 (e-survey)	1918	38.6	35.0	12.7	3.9	1.4	8.4	1.85	0.92
in achieving economic growth	2010	446	28.7	29.4	14.9	5.6	1.4	20.1	2.02	0.99
	2010 (e-survey)	1915	30.6	35.9	16.8	4.6	1.8	10.4	2.01	0.96
in achieving benefits to society	2010	462	34.1	27.7	14.8	4.6	1.3	17.5	1.92	0.98
	2010 (e-survey)	1903	36.8	34.3	14.2	4.4	1.6	8.7	1.90	0.95

Table 16. Level of agreement with water management statements (%).

	Year	N	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know	Mean	Std
Regulations that are enforced are a good way to protect environmental values	2010	567	22.6	58.9	10.4	4.6	0.5	3.0	1.99	0.76
	2010 (e-survey)	1885	20.7	58.4	13.2	4.7	0.8	2.3	2.04	0.78
Economic instruments send clear signals to water users about environmental responsibility	2010	572	15.4	48.3	19.8	8.0	1.2	7.3	2.26	0.88
	2010 (e-survey)	1884	13.0	51.0	20.8	9.6	1.2	4.5	2.32	0.88
On their own voluntary/advocacy approaches by commercial water users do not protect the environment	2010	569	19.9	46.6	15.6	7.4	1.2	9.3	2.16	0.93
	2010 (e-survey)	1885	19.7	48.2	20.6	5.7	0.8	4.9	2.16	0.85
More emphasis should be placed on regulation but supported by either economic instruments and/or voluntary/advocacy approaches	2010	563	20.1	49.7	15.8	3.9	0.9	9.6	2.07	0.81
	2010 (e-survey)	1880	17.1	51.7	20.3	4.7	1.2	4.9	2.17	0.82
Regulations are typically too complicated and/or expensive and do not lead to positive environmental outcomes	2010	565	9.0	35.4	24.4	17.7	2.8	10.6	2.66	1.01
	2010 (e-survey)	1885	9.7	35.4	29.5	16.5	3.6	5.4	2.67	1.00
Regulations prevent opportunities for increasing economic growth	2010	566	4.4	23.0	27.7	32.0	3.7	9.2	3.08	0.98
	2010 (e-survey)	1877	3.8	21.0	34.3	28.9	5.5	6.6	3.12	0.96
More emphasis should be placed on economic instruments supported by regulation and voluntary/advocacy approaches	2010	562	10.5	38.1	28.1	10.3	0.7	12.3	2.46	0.88
	2010 (e-survey)	1884	8.0	36.6	32.0	13.5	2.4	7.5	2.63	0.93
More emphasis should be placed on voluntary/advocacy approaches but supported by economic instruments and regulatory approaches	2010	561	9.6	35.8	25.8	13.9	1.8	13.0	2.57	0.96
	2010 (e-survey)	1883	7.2	34.0	30.3	16.9	4.6	7.0	2.76	1.00
Economic instruments alone are unlikely to change commercial users' behaviour	2010	568	11.1	53.5	12.3	12.3	1.4	9.3	2.33	0.91
	2010 (e-survey)	1875	12.5	49.9	20.3	9.6	1.9	5.7	2.35	0.91
People use water more efficiently when there is a cost associated with using it	2010	571	27.8	53.6	7.5	7.2	0.2	3.7	1.94	0.83
	2010 (e-survey)	1881	25.7	48.9	13.5	6.8	2.3	2.8	2.08	0.94
Assigning a dollar value to water through using economic instruments is beneficial to managing water in the long-term	2010	568	16.0	46.5	17.3	9.9	2.8	7.6	2.32	0.98
	2010 (e-survey)	1776	14.9	42.6	21.2	11.8	5.0	4.6	2.47	1.06

Table 17. Political acceptability of approaches for managing fresh water (%).

	Year	N	Totally unacceptable	Somewhat unacceptable	Neither	Somewhat acceptable	Very acceptable	Don't know	Mean	Std
Regulation by itself:	2010	557	12.6	25.3	11.1	32.3	4.7	14.0	2.90	1.21
	2010 (e-survey)	1876	9.3	26.1	16.6	34.5	5.1	8.4	3.00	1.14
Economic instruments by themselves:	2010	557	11.0	28.7	13.3	29.8	1.6	15.6	2.79	1.12
	2010 (e-survey)	1873	11.7	28.7	21.6	26.1	2.0	9.9	2.75	1.08
Voluntary action and advocacy by themselves:	2010	556	13.7	25.7	13.5	24.3	7.7	15.1	2.84	1.26
	2010 (e-survey)	1870	15.6	22.6	22.8	24.3	6.2	8.6	2.81	1.20
A combination of Regulation and Economic instruments:	2010	556	3.2	13.1	13.7	45.3	9.5	15.1	3.53	1.01
	2010 (e-survey)	1869	3.0	12.4	16.5	48.4	10.4	9.3	3.56	0.97
A combination of Regulation and Voluntary Action and Advocacy:	2010	556	3.2	10.8	11.9	45.7	12.1	16.4	3.63	1.01
	2010 (e-survey)	1865	2.7	11.4	15.6	49.8	11.3	9.2	3.61	0.96
A combination of Economic instruments and Voluntary Action and Advocacy:	2010	558	3.6	11.5	14.2	39.1	13.3	18.5	3.58	1.06
	2010 (e-survey)	1871	4.1	12.4	16.4	46.7	10.2	10.2	3.52	1.01
A combination of all three approaches:	2010	565	3.4	6.0	5.5	32.4	38.2	14.5	4.12	1.07
	2010 (e-survey)	1876	3.7	5.9	7.5	32.0	41.8	9.1	4.13	1.07

Table 18. Views on futures for fresh water (%).

	Year	N	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know	Mean	Std
Almost all streams, rivers and lakes should be safe to swim in	2010	572	57.3	39.0	1.9	0.9	0.0	0.9	1.46	0.58
	2010 (e-survey)	1869	57.8	33.9	3.7	2.6	1.0	1.0	1.53	0.77
Almost all underground water should be safe to drink without treatment.	2010	570	45.1	42.1	8.4	2.5	0.7	1.2	1.70	0.79
	2010 (e-survey)	1867	47.5	36.6	8.4	4.9	1.2	1.4	1.74	0.90
Loss of some native species from some water bodies is acceptable	2010	570	2.3	18.6	19.1	35.3	21.8	3.0	3.57	1.10
	2010 (e-survey)	1863	1.7	13.9	15.5	35.2	32.5	1.3	3.84	1.09
The relationship between Maori and fresh water should be considered a lot more.	2010	571	6.3	14.7	29.8	25.9	20.0	3.3	3.40	1.16
	2010 (e-survey)	1862	7.0	14.4	27.5	22.9	26.1	2.1	3.48	1.23
We should accept some reduction in environmental values of some freshwater resources in order to enhance economic benefits from their use.	2010	568	2.8	23.9	21.8	32.6	17.4	4.2	3.42	1.11
	2010 (e-survey)	1867	1.9	15.3	23.0	33.1	23.1	3.6	3.63	1.07
In all decisions about freshwater management the main emphasis should be economic.	2010	569	2.5	9.7	12.8	44.8	27.4	2.8	3.88	1.01
	2010 (e-survey)	1866	1.6	7.8	15.6	38.3	34.7	2.0	3.99	0.99
There should be no further significant pollution discharges into water.	2010	571	60.2	32.6	4.4	0.7	1.1	1.1	1.48	0.71
	2010 (e-survey)	1865	57.6	32.1	5.1	1.6	1.8	1.8	1.55	0.82
The most important fishing rivers should be protected.	2010	572	32.3	44.8	17.7	2.8	0.9	1.6	1.93	0.84
	2010 (e-survey)	1861	29.1	45.2	19.0	4.1	1.2	1.4	2.02	0.87
The most important rivers for hydro electric generation and/or irrigation potential should be fully used for these purposes.	2010	571	15.4	28.5	23.3	19.3	8.9	4.6	2.77	1.21
	2010 (e-survey)	1863	13.4	30.9	25.6	19.3	8.4	2.5	2.78	1.17