



Public Perceptions of
New Zealand's Environment:
2004

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**Lincoln
University**
Te Whare Wānaka o Aoraki

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SUMMARY

The third biennial survey of people's perceptions of the state of the New Zealand environment was undertaken in February - March 2004. The survey was based on the Pressure-State-Response (PSR) model of state of the environment reporting. It tested New Zealanders' perceptions of all the main resource areas and in 2004 also looked more specifically at freshwater and freshwater fishery issues.

Two thousand people, aged 18 and over, were randomly selected from the New Zealand electoral roll. An effective response rate of 43% was achieved. Data have been analysed descriptively and the 2004 survey responses were compared with responses from the 2000 and 2002 surveys. Statistical analyses of the responses were completed to determine the roles of several demographic variables. Among a very large set of findings some that stand out include:

- New Zealanders considered the state and management of the environment to be good and better than in other developed countries;
- Native forest and bush was rated to be in the best state of the 11 components of the environment studied. Rivers and lakes, wetlands and marine fisheries were perceived to be in the worst state, but were still rated highly;
- Rivers and lakes, marine fisheries, and air quality were judged to be the least well managed of the 11 components of the environment studied;
- Management of farm effluent and runoff was perceived to be the least well managed of the environmental problems investigated;
- Pollution (air, water, and solid waste disposal) was rated as the most important environmental issue facing New Zealand. There was a 96% increase, compared to 2002, in the percentage of respondents who judged that water pollution was the most important issue;
- There was very strong support (52.8%) for a \$20 per year increase in rates to fund lowland stream enhancement;
- There was very strong opposition to statements that more water could be extracted from large rivers for irrigation (56.9% opposed) and from lowland streams (72.2% opposed);
- Regional variation was a key factor in responses, especially regarding perceptions of freshwater quality and management.

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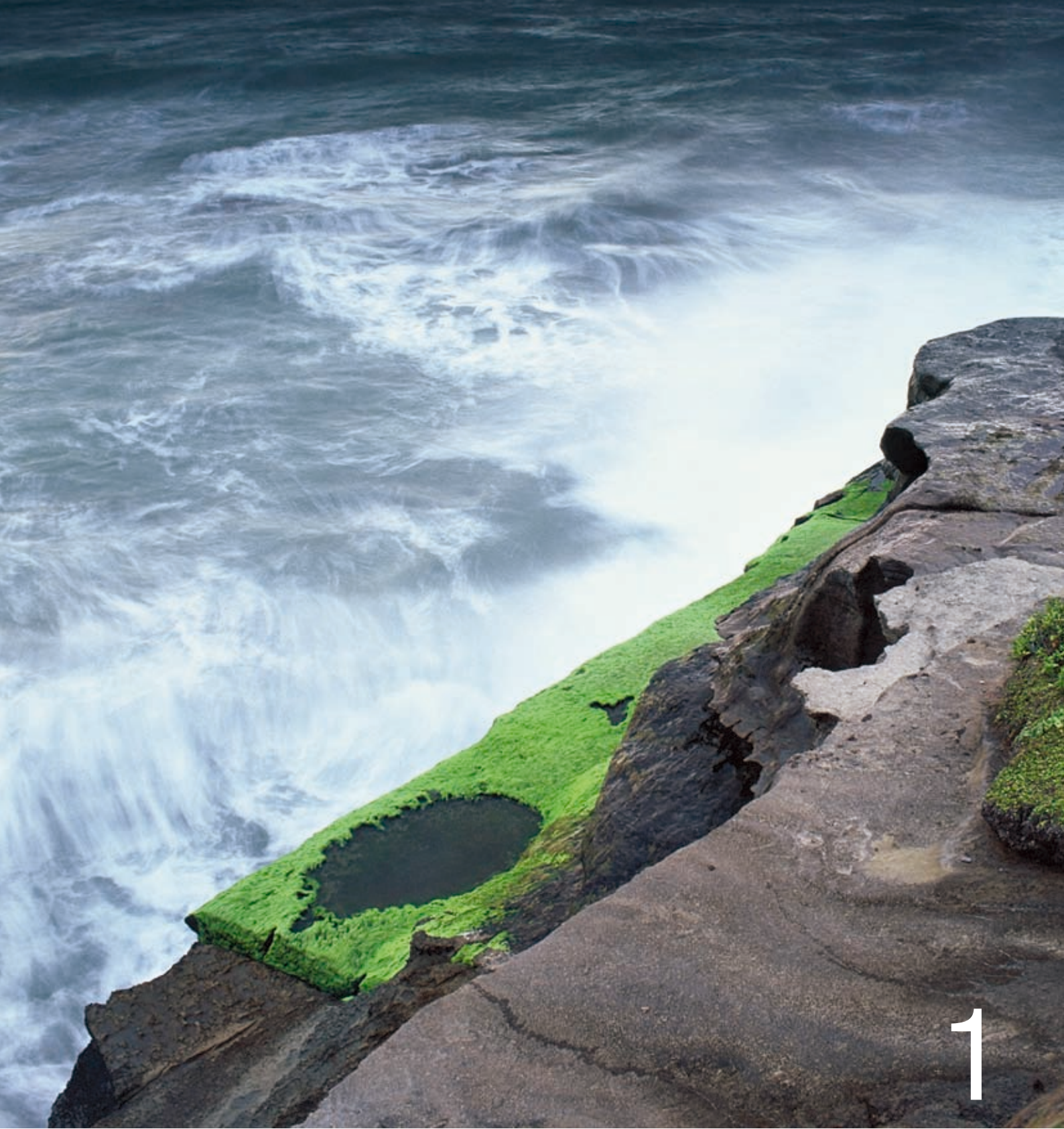
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The authors; Kenneth Hughey (left), Geoffrey Kerr (middle), Ross Cullen (right).



Perpendicular Point, Paparoa (S. McMurtrie)

1

INTRODUCTION

1.1 BACKGROUND

The first State of the Environment Reporting (SER) exercise based on a survey of New Zealanders' perceptions of the environment was performed in 2000 and reported by Hughey *et al.*, (2001). The survey questionnaire is constructed upon a Pressure-State-Response model. Hughey *et al.*, (2001) provides background and justification for the survey approach used. OECD (1996) and MfE (1997) explain this model, which is used internationally as the basis for environmental reporting. The Hughey *et al.*, (2001) survey was designed to be undertaken biennially and a second survey was undertaken and reported on in 2002 (Hughey *et al.*, 2002). This publication reports the results of the third biennial survey undertaken in 2004 and includes a comparison with the 2000 and 2002 survey findings.

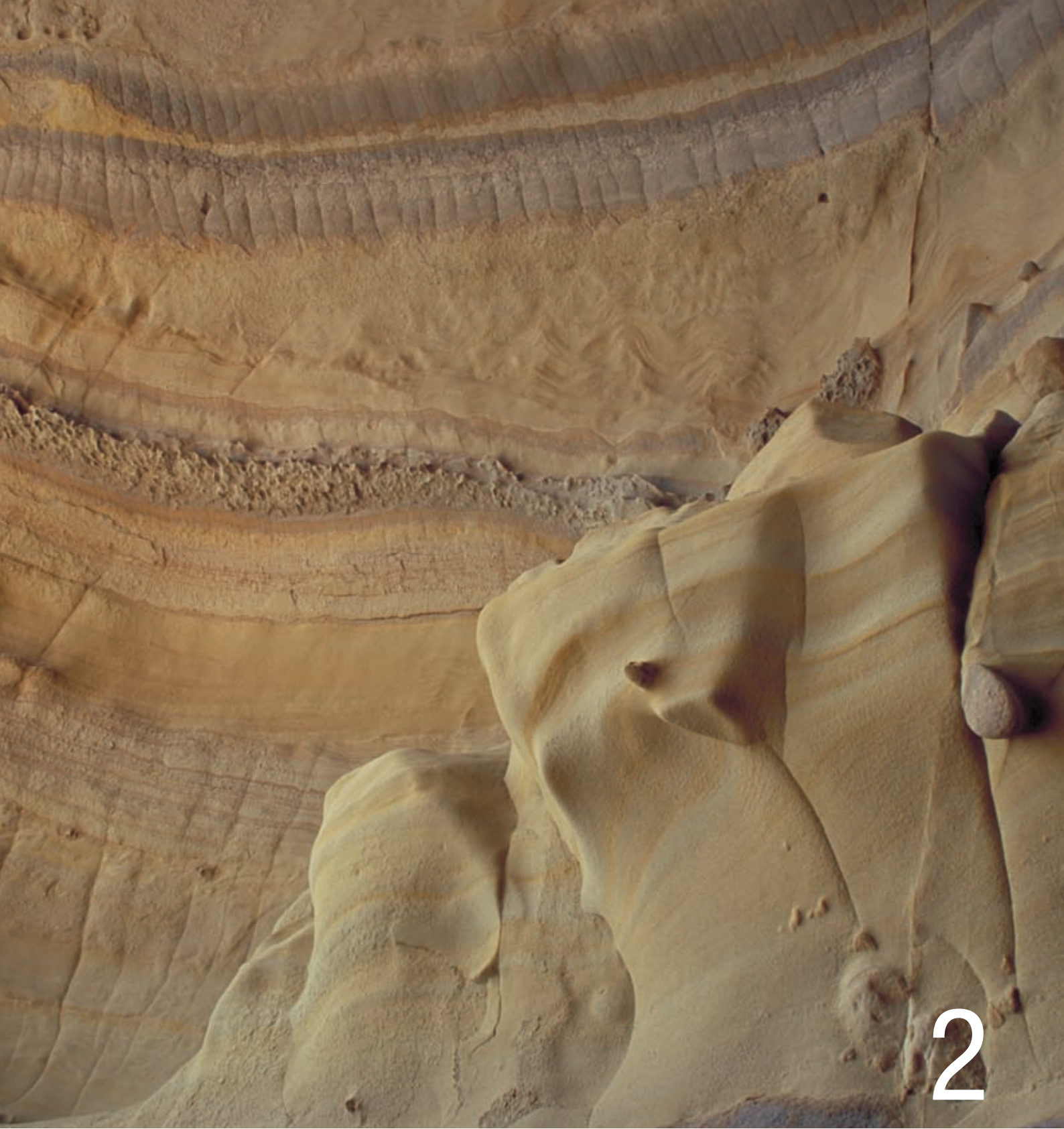
1.2 RESEARCH OBJECTIVES

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 (see the separate list of survey-related publications at the end of the References).

Below: sunset at Tahakopa Bay, Catlins (photo S. McMurtrie).





Hole-in-the-rock, Cooks Cove, Tolaga Bay (S. McMurtrie)

SURVEY METHOD

A postal questionnaire based on the Pressure-State-Response (PSR) model and the survey administered in 2000 was used to gather information on New Zealanders' perceptions of the environment and environmental management. The postal questionnaire was selected as the best method of gathering this information. The large number of questions deemed it unsuitable for a telephone survey and interviews would have been an expensive and cumbersome method for sampling the New Zealand population.

2.1 THE 2004 QUESTIONNAIRE

Questionnaire items were presented in an A5-size booklet with questions on facing pages. The booklet had fourteen pages of questions. A letter of introduction was included stating the purpose of the questionnaire, introducing the topics in the questionnaire and inviting voluntary participation. Questions were asked in sets with a response scale provided for each question. Respondents were instructed to either circle a number or tick a box to indicate their response. The questionnaire contained a total of 143 questions.

The PSR framework guided the development of survey questions. Three sets of questions assessed perceptions of the state of the environment and three sets of questions assessed perceptions of the quality of resource management (response). For all of these measures a 'don't know' option was provided for respondents who did not feel they were sufficiently informed to provide an assessment. Perceived pressures were assessed by one set of questions.

Further questions supplemented the PSR framework. Respondents were asked, as they were in 2002, 'what is the most important environmental issue facing New Zealand today?'. One question asked respondents if they were aware of the Ministry for the Environment's (MfE) 2004 Climate Change advertising programme and a follow-up question asked respondents what they were doing to reduce climate change.

Participation in thirteen activities was measured to explore relationships between environmental behaviour and responses to the PSR framework. Perceptions of freshwater (lakes, rivers and streams, aquifers) and freshwater fishery issues were measured for a separate project, and initial analysis of these perceptions is provided in this publication. Nine 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 being explored biennially. A question on ethnicity was introduced in 2002 and

analysis of responses by ethnicity revealed there were substantial differences in responses to some questions. The question on ethnicity was retained in the 2004 survey.

Knowledge, standard of living and 'clean green'

The questionnaire began by asking for 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...', and 'The overall standard of living in New Zealand is...'. Measurements were taken on five-point scales anchored by 'very good' and 'very bad'. The third 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 taken on a five-point scale anchored by 'strongly agree' and 'strongly disagree'.

The state of the environment

To measure the state of the environment three sets of questions were asked on

- (i) the quality or condition;
- (ii) the availability or amount; and
- (iii) change of state over the previous five years.

The first set was preceded by the instruction: 'Please indicate what you think the condition of each of the following is'. A five-point response scale was anchored by 'very good' and 'very bad'.

The second set of questions measured perceptions of the availability of ten natural resources. Five-point scales provided for measurement were anchored by 'very high' and 'very low'.

The third measurement was of perceptions of change in the state of the environment over the last five years. A five-point measurement scale was anchored by 'much better' and 'much worse'.

Adequacy of environmental management

Judgement of the adequacy of management was sought by introducing six aspects of management with: 'What do you think of the management of the following items?'. A five-point scale was provided for measurement of management adequacy for each aspect, anchored by 'very good' and 'very bad'. These questions concerned particular aspects of environmental management, e.g., pest and weed control, and industrial impact on the environment, whereas the following set dealt with the same resources considered in the earlier questions about

the state of the environment.

A set of questions designed to measure current management of aspects of the environment was then presented. Thirteen items were preceded by: 'What do you think of the management of each of the following?'. These items were presented with a five-point scale anchored by 'very well managed' and 'extremely poorly managed'.

A further set of questions was designed to establish whether environmental management had improved or had become worse over the previous five years. The question presented the same set of items as the previous set with the instruction: 'What do you think of the management of the following compared to 5 years ago?'. These items were presented with a five-point scale anchored by 'much better' and 'much worse'. The 2004 survey accidentally omitted the category 'marine reserves' from this question.

Pressures on the environment

The PSR framework includes pressures on the environment. Perceived causes of adverse environmental effects were measured by presenting a table containing eleven aspects of damage to the New Zealand environment with fifteen potential causes. Respondents were instructed to select up to three causes. 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 the invitation: 'Please tell us what you think are the main causes of damage to parts of the New Zealand environment by ticking up to 3 causes on each row across the page'.

Participation in environmental activities

Measurements were taken of whether respondents had participated in thirteen 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 2002 and 2004 by adding 'regularly' as an option to the 'yes' response. A few respondents ticked both options so the 'yes' responses were removed in these circumstances to avoid double counting.

Freshwater resource questions

Measures were taken of respondents' views of a range of freshwater and freshwater fishery issues. The first questions concerned support for a regional council proposal to increase rates to

pay for lowland stream enhancement and reasons for the views expressed. Respondents were also asked to rank performance of their local regional council's management of freshwater, Department of Conservation's management of whitebait, and local Fish and Game Council's management of freshwater sports fish. People were asked whether they agreed or disagreed with statements concerning water take from large rivers, small lowland streams, and aquifers. They were also asked about lowland stream management, water quality, condition, and whether water quality had been damaged by dairy farming. Public access to New Zealand's rivers and streams and lakes was examined and compared with 5 years ago. People were asked about quality of water in rivers and streams, aquifers, and lakes in New Zealand and in their region currently and compared to 5 years ago. They were also asked about the state of the banks and edges of lakes, rivers and streams in their region and in New Zealand.

Freshwater fishery resource questions

The first question asked respondents about trout catch rates, condition and size in their region over the last five years and the main cause of change in catch rates. They were asked if they were a freshwater angler and whether they had a freshwater fishing licence. Eleven freshwater species were presented and fishers asked to tick the box of each species they fished for in rivers and lakes. Respondents were then asked which of these species they spent the most time fishing for and which species was most important to them.

Demographic information and representativeness

Information was sought regarding gender, age, country of birth, ethnicity, education, current situation, e.g., student, retired or in paid employment, the industry the person worked in (or had last worked in), and personal income. Where possible these were measured using categories corresponding as closely as possible to the 2001 New Zealand Census. Demographic information for the 2004 survey is provided in Appendix 1. In addition, 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.

Gender was the only demographic variable tested which was representative of the population at large. A similar outcome occurred in the 2002 survey. The following key points can be drawn about the survey sample:

- New Zealand Europeans and 'others' are over-represented compared to the distribution of

- ethnicities of adults in the 2001 Census;
- those aged over 40 were more likely to respond;
- those with an income of over \$30,000 and those recording a financial loss were over-represented;
- those in employment were over-represented; and
- those with a tertiary qualification were over-represented.

Despite the difference of these distributions from the 2001 Census distributions, the large nationwide sample is judged to be an adequate basis for making comment on New Zealanders' views about the environment.

Other questions

As in previous years, the survey ended by asking 'What do you think is the most important environmental issue facing New Zealand today?'. In 2004 an additional question was also asked for the MfE, relating to awareness of their 2004 Climate Change advertising programme and what, if anything, people were doing to reduce climate change. Results from this question have been included in this report.

2.2 PRE-TESTING

Pre-testing followed a cognitive interview process as described in Dillman (1998). Several individuals were interviewed about each of the questions in the 2000 survey and, following drafting, were also asked about new questions in the 2002 and 2004 surveys. In addition, a small number of individuals completed the 2004 questionnaire and subsequently provided comments about the questionnaire and the questionnaire topics. MfE staff also appraised the questionnaire. Subsequently, some minor adjustments were made to the questionnaire including several additional questions to those posed in 2000 and 2002. The survey instrument has been scrutinised and approved by the Lincoln University Human Ethics Committee.

2.3 METHODS OF ANALYSIS

Descriptive data are provided in Section 3, along with a comparison of 2004 survey results with those from 2002 and 2000. Some relationships between parts of the PSR framework and demographic information were explored and are also presented in Section 3. Chi-square tests (χ^2) were used to test for changes in responses. Data conglomeration was necessary in some areas because there were too few valid responses in some categories to enable appropriate testing to be undertaken. Due to the

large number of relationships tested, in general only summarised results for significant relationships ($P < 0.1$) are reported.

2.4 DISTRIBUTION

Two thousand questionnaires were distributed to randomly selected individuals drawn from the most recently available New Zealand electoral roll. The questionnaire and the letter of introduction were posted with a freepost return envelope. The questionnaires were posted on 20 February 2004. In addition, a follow-up postcard was sent on 12 March 2004 and a second questionnaire posting to non-respondents was made on 26 March 2004.

2.5 RESPONSE

The survey received an effective response rate of 43% (N = 820). The 2000 survey response rate was 48% (N = 894) and the 2002 survey response rate was 45% (N = 836). All surveys had maximum margins of error of 3% at the 95% confidence level.

2.6 MAJOR CHANGES IN THE 2004 SURVEY

The freshwater aspect was split into 'rivers and lakes' and 'groundwater' for the 2004 survey, and the aspect 'other natural environments' was excluded from the 2004 survey. Therefore these categories were unable to be compared over the three surveys.



3

Clyde Dam, Central Otago (G. Kerr)

PRESSURE-STATE-RESPONSE ANALYSIS BY QUESTION

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

The 2004 Survey

Most people considered their environmental knowledge to be 'adequate' (57%) or 'good' (27%, Figure 3.1). Most people considered the overall standard of living in New Zealand to be 'good' or 'very good' (73%, Figure 3.2).

Respondents were asked the extent to which they agreed or otherwise with the statement that New Zealand's environment is 'clean and green'. Although most people agreed with the statement (45%), there was also a high number who neither agreed nor disagreed (29%), and 17% who disagreed (Figure 3.3).

Trends 2000 - 2004

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 decrease in percentage of respondents who considered their knowledge to be 'good', with more claiming 'adequate' knowledge in later surveys. Changes over the three surveys were not statistically significant.

As Figure 3.2 shows, over the period 2000 to 2004 the overall standard of living in New Zealand has been viewed increasingly more positively. The total number of 'very good' or 'good' responses increased from 57% in 2000 to 73% in 2004; a change with extremely high statistical significance ($\chi^2 = 50.3, P < 0.01$).

Figure 3.3 shows that in 2002, two thirds of respondents either 'agreed' or 'strongly agreed' that New Zealand's environment was 'clean and green'. However, in 2004 this decreased to just over 50% of respondents. More people were unsure of New Zealand's 'clean and green' status, shown by the increasing number of respondents who neither agreed nor disagreed with the statement. The difference in responses between the two years was statistically significant ($\chi^2 = 11.97, P < 0.05$). Note that the wording of the question changed between 2002 and 2004, with the original statement being

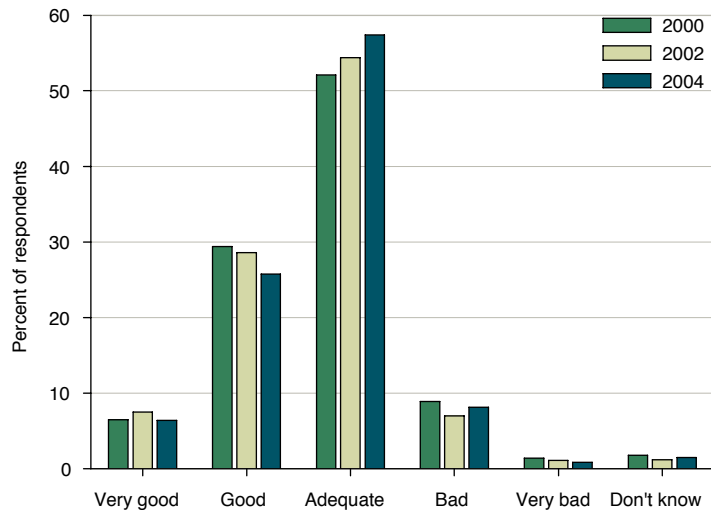


Figure 3.1. Comparison of respondents' knowledge of environmental issues. Full data provided in Appendix 2.

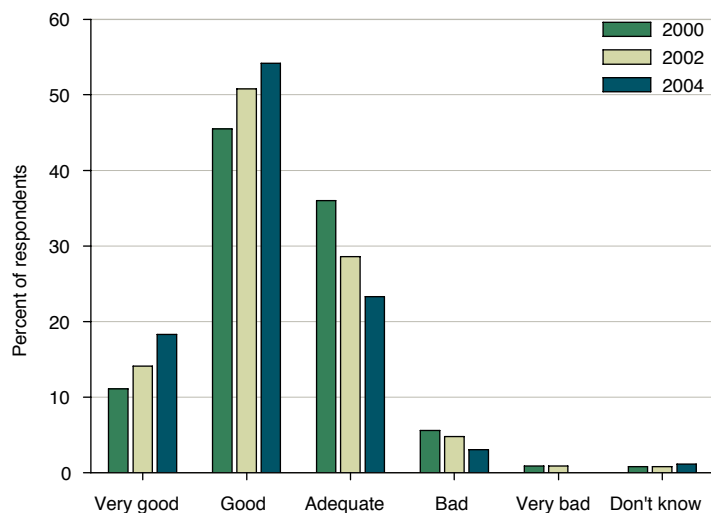


Figure 3.2. Comparison of respondents' ratings of standard of living in New Zealand.

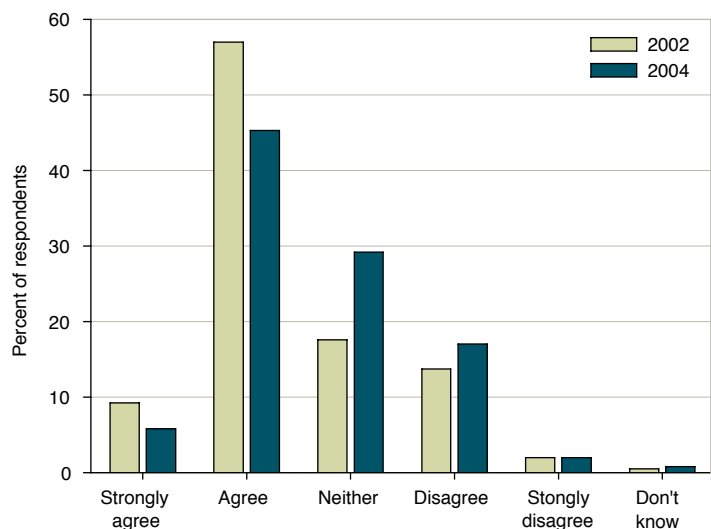


Figure 3.3. Comparison of respondents' opinions that New Zealand's environment is 'clean and green'.

Table 3.1. Significant changes (cells with asterisks) in ratings between the 2000, 2002, and 2004 surveys. (↓) indicates deterioration, (↑) indicates an improvement. Other cells with asterisks indicate significant changes between years, but with no consistent trend. NA; not asked in all three surveys.

	State	Availability	State compared to 5 years ago	Current management	Management compared to 5 years ago
Natural environment in towns & cities	** (↑)	NA			
Air	** (↓)	NA	*** (↓)	***	**
Native land & freshwater plants & animals			*		***
Native bush and forests			*** (↑)	*** (↑)	***
Soils		NA			
Coastal waters & beaches		NA	**		**
Marine fisheries	***	***			
Marine reserves	NA	**			NA
National Parks	NA		**		*
Wetlands					
NZ's natural environment compared to other developed countries					

The number of asterisks indicates the strength of significance: * Significant at 90% confidence level ($P < 0.1$), ** Significant at 95% confidence level ($P < 0.05$), *** Significant at 99% confidence level ($P < 0.01$).

'New Zealand's environment is regarded as "clean and green"'. In 2004 this changed to 'New Zealand's 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 revision was designed to encourage survey respondents to report their own views.

3.2 CHANGES IN RATINGS FOR STATE OF, AND MANAGEMENT OF, THE ENVIRONMENT

Table 3.1 presents a summary of significant changes between 2000 and 2004 in ratings of the state of the environment and its management. Freshwater was split into 'water in rivers and lakes' and 'groundwater' for the 2004 survey, and 'other natural environments' was excluded from the 2004 survey. Consequently, ratings about these items cannot be compared over the three surveys.

Although statistical testing showed a significant

difference in responses between years in 17 cases, only five items exhibited clear trends over the three years, and they were:

Current condition of the natural environment in towns and cities	↑
Current condition of air quality	↓
Condition of air quality compared to five years previously	↓
Condition of native forests and bush compared to five years previously	↑
Management of native forests and bush	↑

3.3 THE STATE OF THE ENVIRONMENT

3.3.1 Quality of the New Zealand environment

The 2004 Survey

The quality of the New Zealand environment was measured on five-point Likert scales ranging from 'very good' to 'very bad'. Figure 3.4 shows that respondents generally rated the state of the New Zealand environment as 'good' or 'adequate'. However, New Zealand's natural environment was rated as 'good' or 'very good' when compared with other developed nations. In 2004 native bush and forest was considered to be in the best condition of all the items tested, followed by air. Rivers and lakes were considered to be in the worst condition, with 23.6% of respondents rating them as 'bad' or 'very bad'. Wetlands, marine fisheries, groundwater, and soils received the largest number of 'don't know' responses (each with more than 10%).

Trends 2000 - 2004

Figure 3.5 shows mean Likert scores for the nine environmental aspects that were included in all three surveys. Most aspects showed an improvement in perceived quality from 2000 to 2002, then a decline from 2002 to 2004. The exceptions were air quality, which showed a slight but significant declining trend over all three surveys ($P < 0.05$), and natural environment in towns and cities, which showed a significant improvement ($P < 0.05$) over the three surveys.

The state of New Zealand's environment compared to other developed countries received the best rating in each survey, 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.

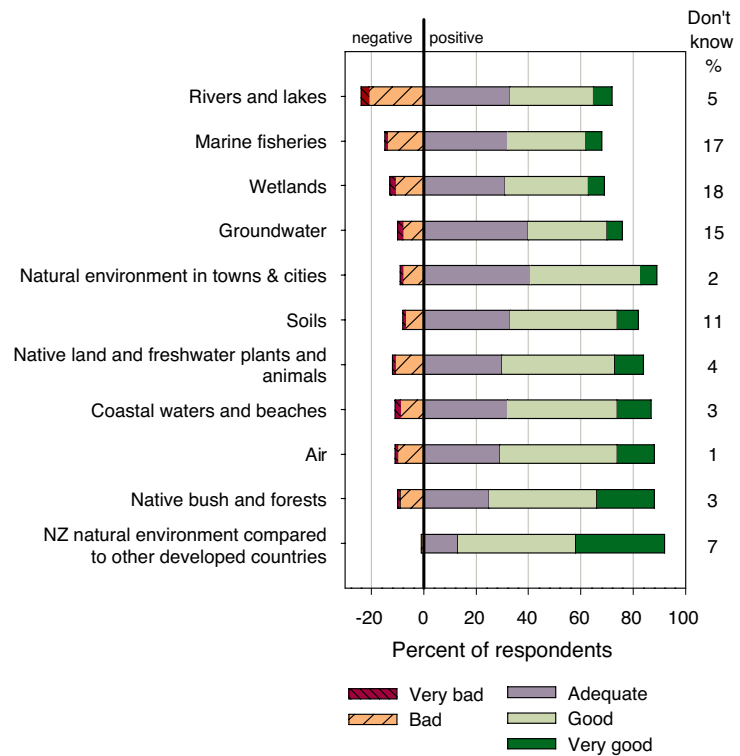


Figure 3.4. Respondents' opinions of the state of the environment. Full data provided in Appendix 2, Table 3.

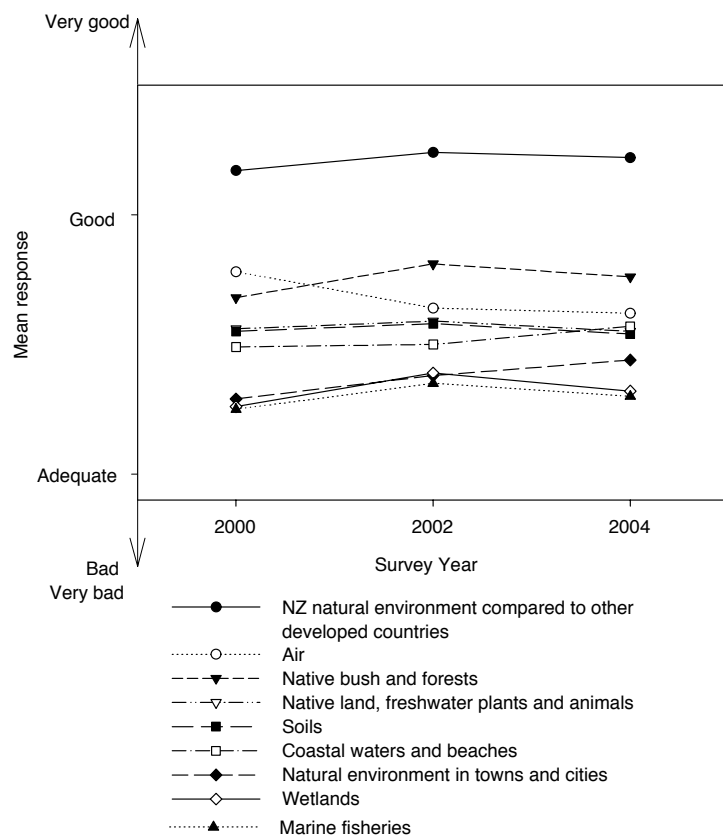


Figure 3.5. Change in respondents' opinions of the current state of the environment.

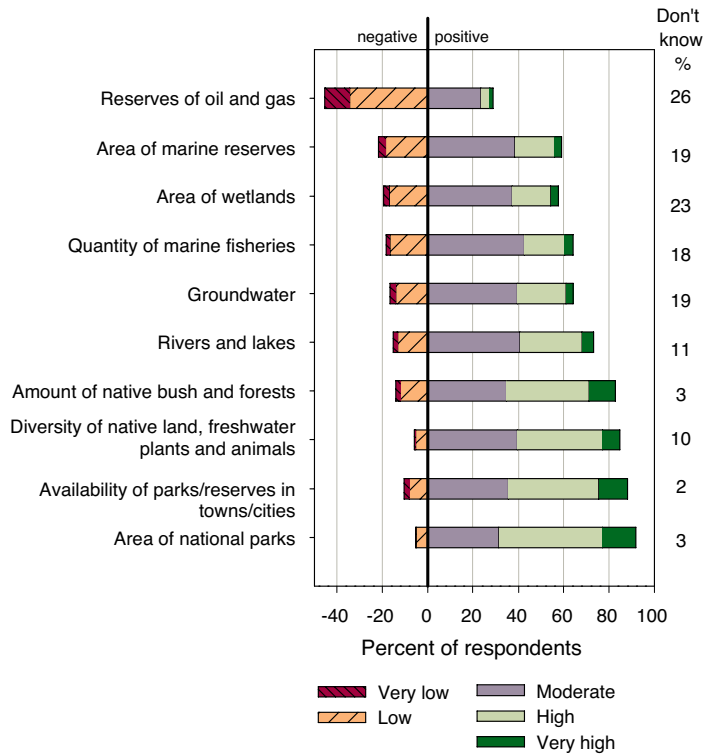


Figure 3.6. Respondents' opinions of the availability of natural resources. Full data provided in Appendix 2, Table 4.

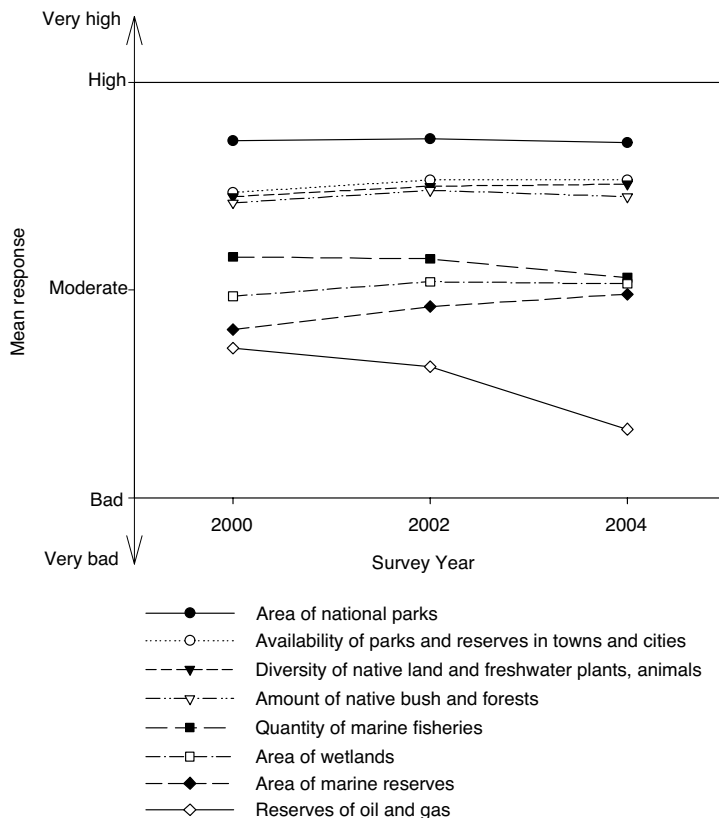


Figure 3.7. Change in respondents' opinions of the availability of natural resources.

3.3.2 Resource availability

The 2004 Survey

Respondents' assessments of New Zealand resource availability are shown in Figure 3.6. The lowest availability rating was for reserves of oil and gas, with approximately 45% 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 61% of respondents rating it 'high' or 'very high'. The availability of parks and reserves in towns and cities, the diversity of native land and fresh water plants and animals, the amount of native bush and forests, and the amount of fresh water in rivers and lakes were also rated 'high' or 'moderate'. There were several resources which received a high number of 'don't know' responses: reserves of oil and gas (25.8%), area of wetlands (22.8%), area of marine reserves (19.4%), and availability of groundwater (19.3%).

Trends 2000 - 2004

Figure 3.7 shows mean Likert scores for the eight natural resources that were included in the survey in all three years. Only three natural resources showed significant trends that were confirmed by statistical testing. Reserves of oil and gas were increasingly perceived to be 'low' or 'very low', increasing from 28.6% of respondents in 2000 to 45.3% in 2004 ($\chi^2 = 95.3, P < 0.01$). Ratings of the area of marine reserves had a significant improving trend ($P < 0.05$). Respondents perceived the quantity of marine fisheries to be declining ($P < 0.01$), reflected in the drop in mean Likert score between 2002 and 2004.

The remaining natural resource ratings changed little over the three surveys and all retained their relative positions. It is interesting to note the change in spread from 2000, with 2004 results showing groupings of native bush, animals and parks at the higher availability end of the scale, marine reserves, fisheries and wetlands converging to a moderate level, and reserves of oil and gas standing out as the only natural resource rated as having low availability.

3.3.3 Change in the state of the environment

The 2004 Survey

The 2004 measurements of how the state of New Zealand's environment had changed over the last five years are shown in Figure 3.8. Of the thirteen categories, rivers and lakes were mostly rated as 'worse' or 'much worse' (47%), with marine fisheries, air quality, and coastal waters and beaches also receiving a high number of 'worse' responses. 57% of respondents rated the condition of New Zealand's natural environment compared to other developed countries as being 'better' or 'much better' over the past five years. National parks, marine reserves, native bush and forests and natural environment in towns and cities had over 25% of respondents rating their condition as 'better' or 'much better', but most environmental attributes had a high frequency of 'no change' over the previous five years.

It should be noted that several categories had over 25% 'don't know' responses: wetlands, marine reserves, marine fisheries, soils, groundwater, and New Zealand natural environment compared to other developed countries.

Trends 2000 - 2004

Figure 3.9 shows the mean values for the eleven categories that were included in the survey in all three years. Although Figure 3.9 does not show any major changes in respondents' ratings of the state of the environment compared to five years before each survey, there were some small but statistically significant trends. From 2000 to 2004 the condition of native bush and forests showed a gradual improvement ($P < 0.01$), and the condition of the natural environment in towns and cities showed a gradual decline ($P < 0.01$).

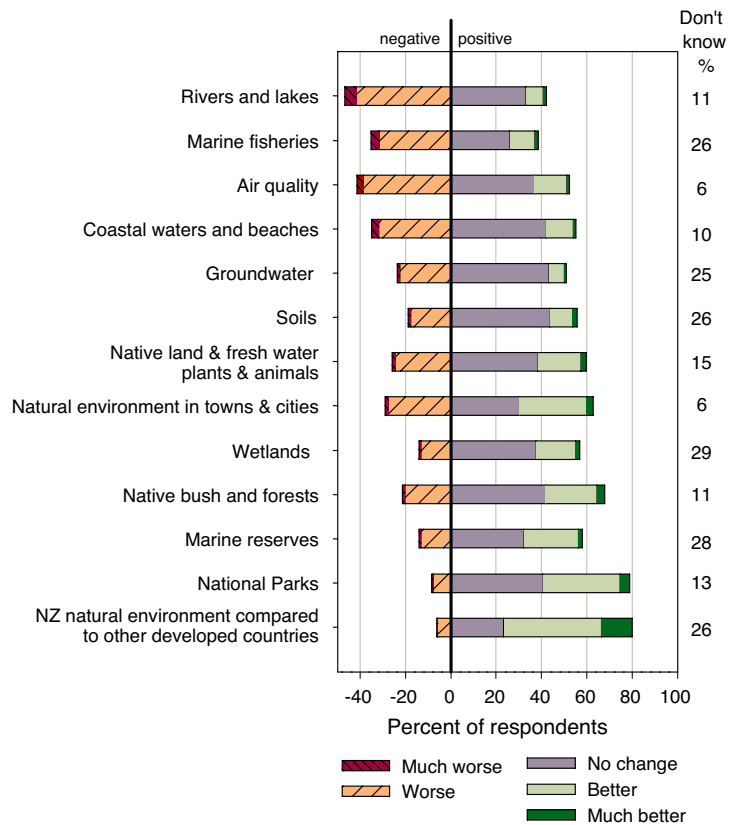


Figure 3.8. Respondents' opinions of the state of the environment compared to five years ago. Full data provided in Appendix 2, Table 5.

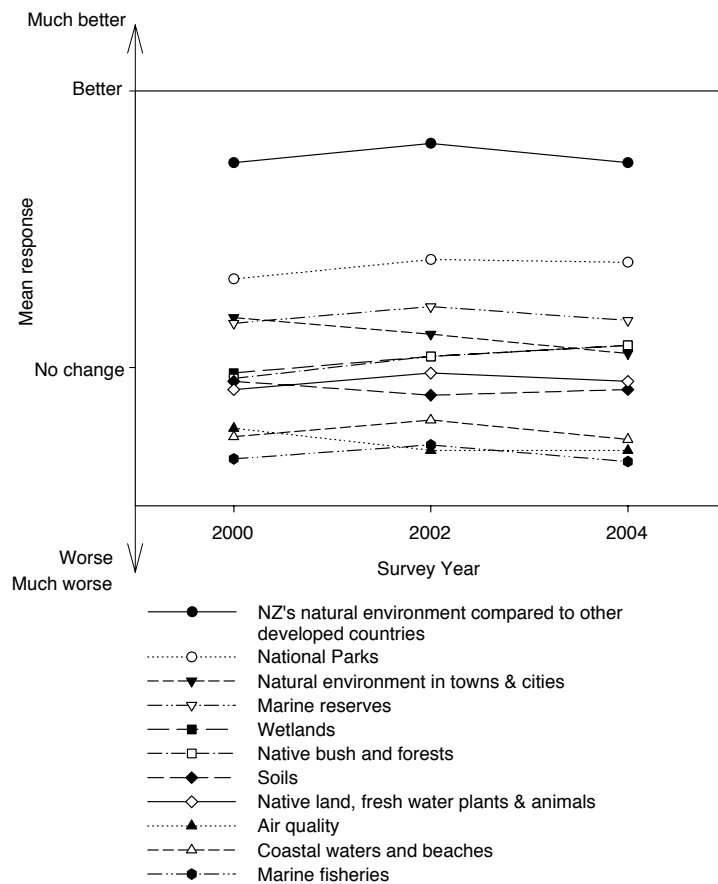


Figure 3.9. Change in respondents' opinions of the state of the environment compared to five years ago.

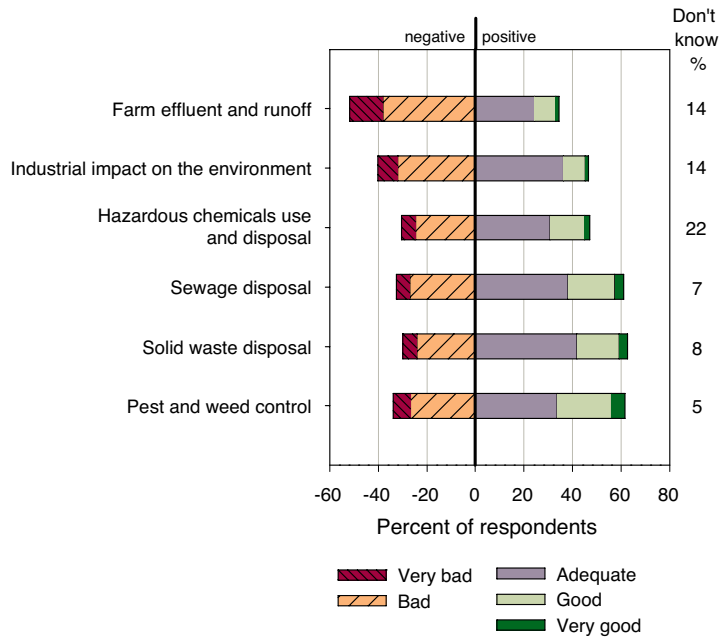


Figure 3.10. Respondents' opinions of the quality of management activities. Full data provided in Appendix 2, Table 6.

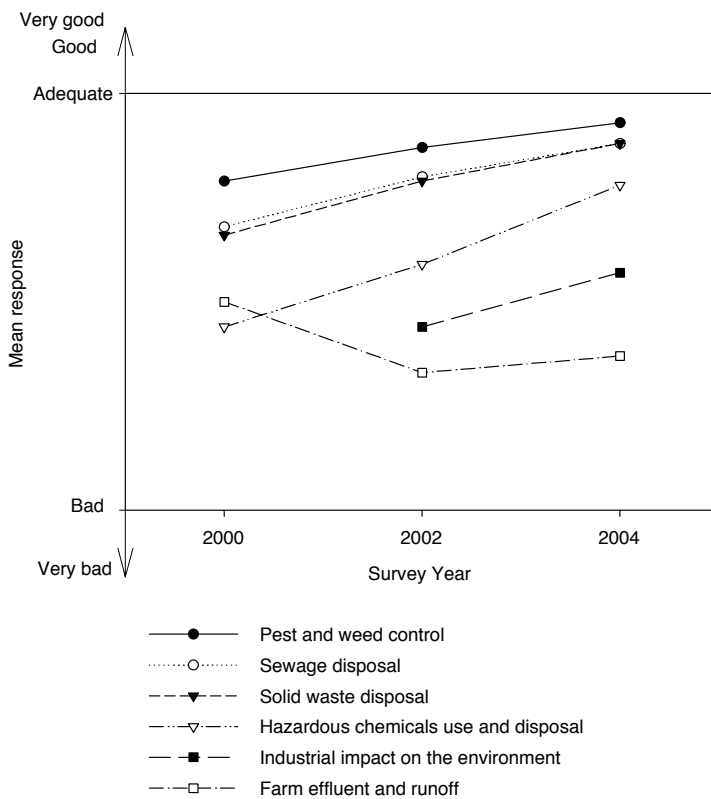


Figure 3.11. Change in respondents' opinions of the quality of management activities.

3.4 MANAGEMENT OF THE ENVIRONMENT

3.4.1 Management of the environment

The 2004 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 3.10). A high percentage of respondents thought that the management of farm effluent and runoff (52%) and industrial impact on the environment (40%) was 'bad' or 'very bad'. Pest and weed control had the highest frequency of 'good' or 'very good' management ratings (28%), but it also had the third highest frequency of 'bad' or 'very bad' ratings (34%). 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 (22.4%), followed by farm effluent and runoff (13.9%) and industrial impact (13.6%).

Trends 2000 - 2004

Over all three surveys the mean rating of quality of management activities is below adequate. However, Figure 3.11 shows an improvement in people's rating of the management of pest and weed control, sewage disposal, solid waste disposal, hazardous chemicals use and disposal, and (for 2002, 2004 only) 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.

Note that the values for sewage disposal and for solid waste disposal are almost identical so they are difficult to distinguish in Figure 3.11.

Statistical testing showed significant differences in ratings of all management activities over the three surveys. Significance levels of differences in ratings are:

Pest and weed control	↑ significant	($P < 0.01$)
Solid waste disposal	↑ significant	($P < 0.01$)
Sewage disposal	↑ significant	($P < 0.01$)
Farm effluent and runoff	↓ 2000 & 2002	($P < 0.01$)
Hazardous chemicals use and disposal	↑ significant	($P < 0.01$)
Industrial impact on the environment	↑ 2002 & 2004	($P < 0.05$)

3.4.2 Current management of the environment

The 2004 Survey

This question addressed quality of management of thirteen environments or resources on a scale ranging from 'very well managed' to 'very poorly managed' (Figure 3.12). In general, most environmental features were considered to be 'adequately managed'. However, over 20% of respondents felt that rivers and lakes, marine fisheries, air quality, groundwater, and coastal waters and beaches were either 'poorly managed' or 'very poorly managed'. Over half the respondents rated national parks (52.5%) and New Zealand's natural environment compared to other developed countries (51.8%) as either 'very well managed' or 'well managed'.

There were over 20% of 'don't know' responses for wetlands, groundwater, marine fisheries, soils and marine reserves.

Trends 2000 - 2004

The mean Likert scores for most resources correspond with resources being adequately managed (Figure 3.13). Exceptions are national parks and New Zealand's natural environment compared to other developed countries, whose management

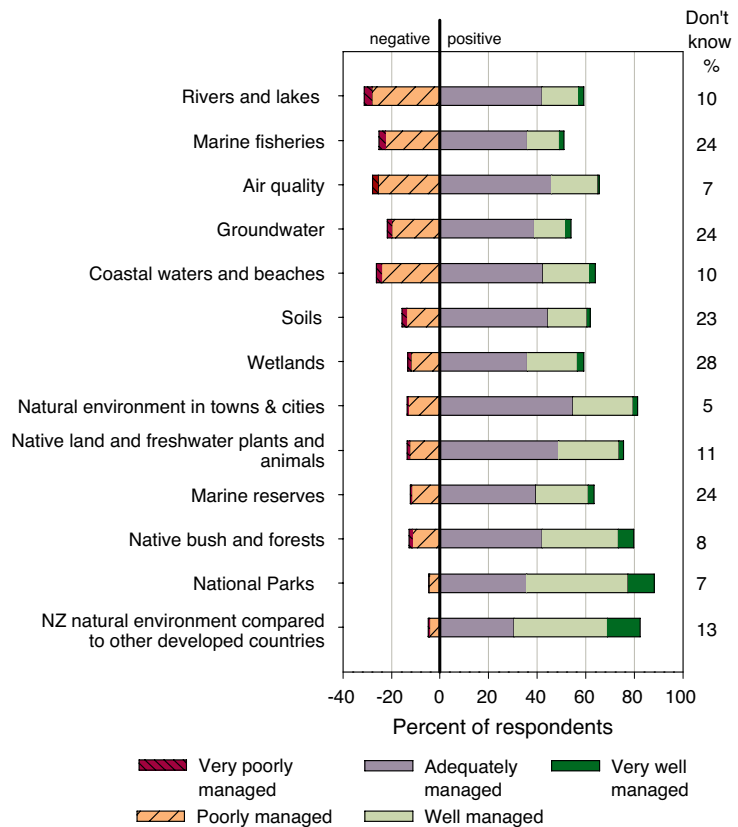


Figure 3.12. Respondents' opinions of current management of the environment. Full data provided in Appendix 2, Table 7.

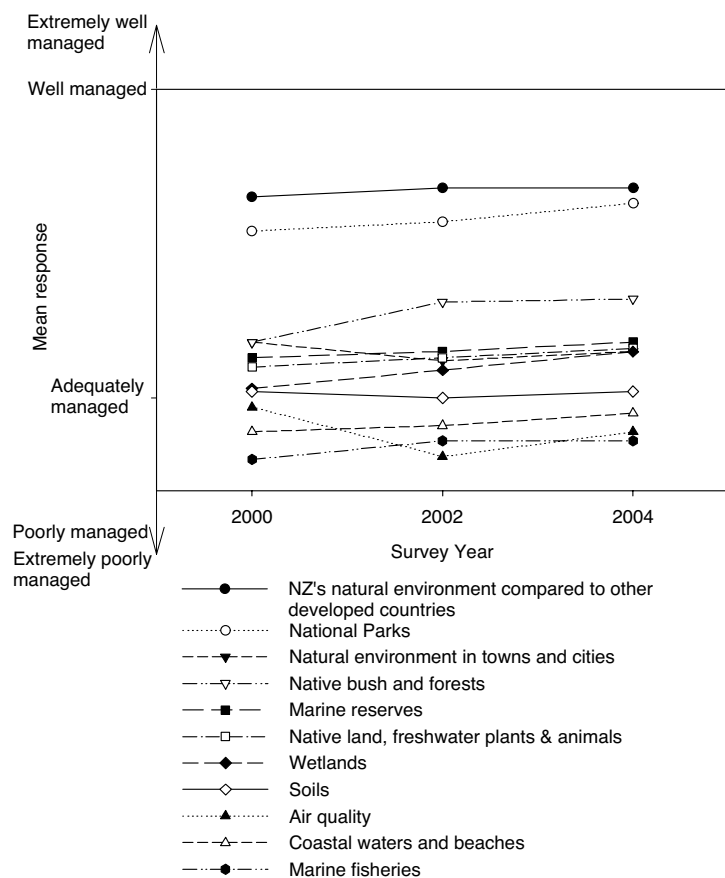


Figure 3.13. Change in respondents' opinions of current management of the environment.

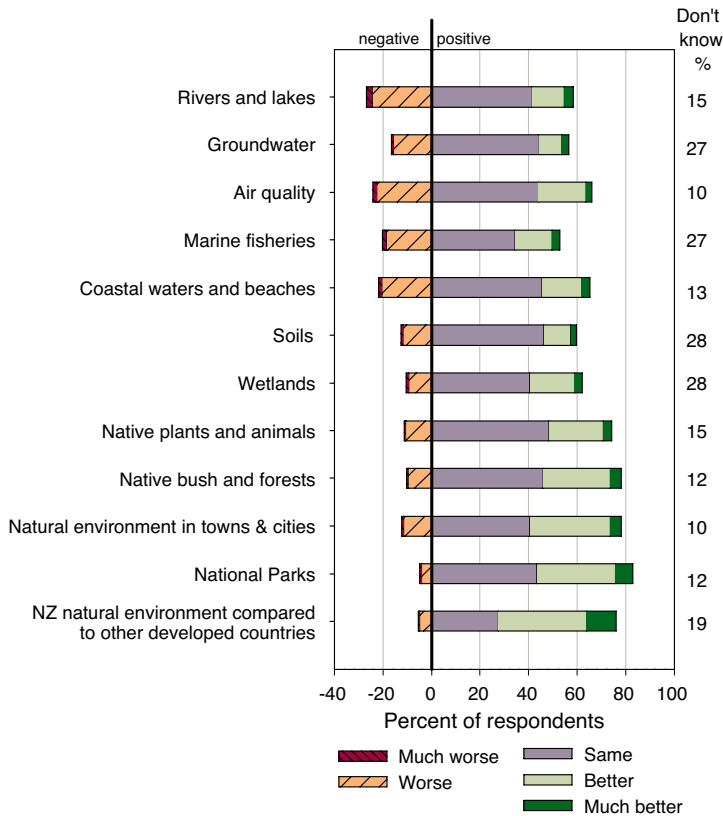


Figure 3.14. Respondents' opinions of the quality of management compared to five years ago. Full data provided in Appendix 2, Table 8.

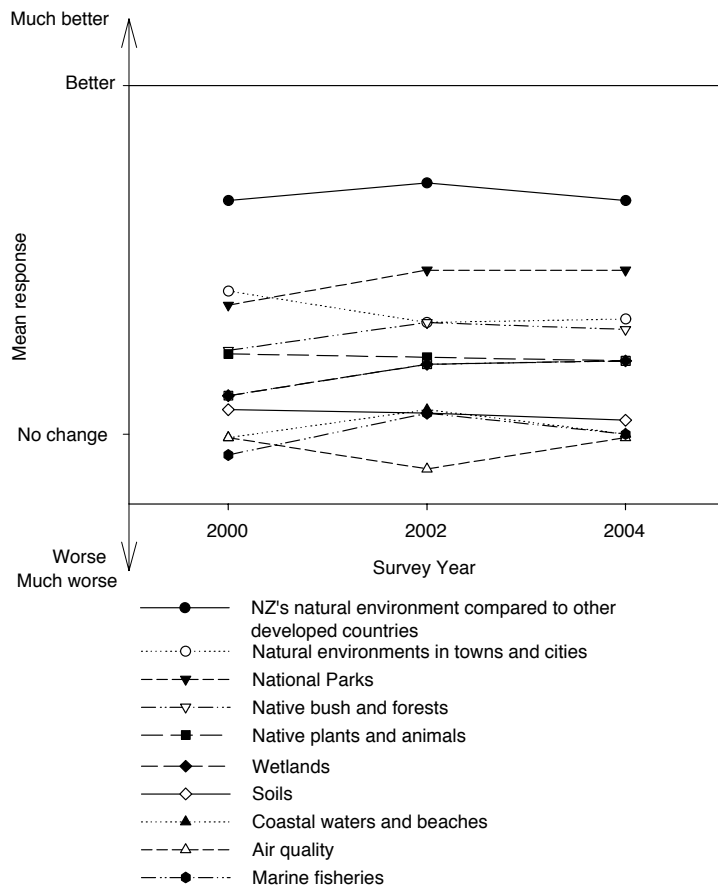


Figure 3.15. Change in respondents' opinions of the quality of management compared to five years ago.

was judged more positively, with the mean scores being nearer to the well managed end of the scale.

From 2000 to 2004 there was a constant improvement in the rating of management of national parks, native bush and forests, wetlands, and coastal waters and beaches, and a slight improvement for native land and freshwater plants and animals and marine fisheries. However, the only statistically significant change was for native bush and forests ($\chi^2 = 34.8, P < 0.01$, see also Table 3.1).

Most changes occurred between 2000 and 2002 with very little change between the 2002 and 2004 survey responses. The management of air quality received an improved rating in 2004 after a dramatic decline in 2002 ($\chi^2 = 26.5, P < 0.05$).

3.4.3 Management of the environment compared to five years ago

The 2004 Survey

Respondents were asked to rate how the management of twelve environmental components had changed compared to five years ago¹. The results, on a scale from 'much better' to 'much worse', are shown in Figure 3.14. Generally, respondents considered that management was either the same or better than five years ago. Exceptions were rivers and lakes, air quality, marine fisheries, and coastal waters and beaches, where over 20% of respondents felt management was 'worse'. Wetlands, soils, marine fisheries, and groundwater received a large number of 'don't know' responses (over 25%).

Trends 2000 - 2004

Mean Likert scores for the 10 categories that were included in all three surveys are compared in Figure 3.15. There are slight improvements in ratings of management for six of the categories from 2000 to 2002 but this trend did not continue in the 2004 survey, with very little change among any of the categories. Management of air quality was rated to be 'worse' in 2002 compared to five years before, but improved again in the 2004 survey.

¹ 'Marine reserves' was accidentally omitted in 2004.

Table 3.2. Perceived main causes of damage to the environment. Red text signifies the most frequently cited cause of damage to individual environmental components; orange text indicates the second most frequently cited main cause; light blue text indicates the third most frequent response.

	Air	Native land & freshwater plants & animals	Native forests & bush	Soil	Beaches and coastal waters	Marine fisheries	Marine reserves	National parks	Wetlands	Rivers	Ground water
Motor vehicles and transport	91%	6%	5%	3%	5%	1%	2%	11%	4%	3%	2%
Household waste and emissions	26%	9%	3%	18%	20%	6%	6%	4%	7%	19%	22%
Industrial activities	70%	19%	12%	26%	17%	12%	11%	7%	12%	27%	24%
Pests and weeds	5%	51%	55%	16%	5%	5%	9%	48%	34%	26%	5%
Farming	6%	25%	18%	30%	7%	4%	4%	6%	27%	43%	30%
Forestry		15%	39%	8%	2%		1%	17%	8%	7%	4%
Urban development	17%	24%	29%	14%	21%	3%	4%	9%	23%	11%	14%
Mining	1%	6%	15%	13%	2%	1%	1%	8%	3%	5%	8%
Sewage and storm water	6%	26%	3%	20%	67%	34%	29%	4%	20%	41%	33%
Tourism	1%	8%	15%		11%	6%	15%	42%	7%	5%	1%
Commercial fishing		2%			20%	62%	32%	1%		2%	
Recreational fishing		1%			6%	20%	23%	1%	1%	5%	1%
Dumping of solid waste	7%	15%	9%	35%	21%	13%	11%	9%	16%	16%	27%
Hazardous chemicals	21%	18%	8%	37%	18%	17%	15%	5%	14%	21%	33%
Other		1%	2%	2%	3%	3%	3%	2%	1%	2%	1%

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

Statistical tests showed that several categories had significant changes over the three surveys: air quality ($P < 0.05$); native land and freshwater plants and animals ($P < 0.01$); native bush and forests ($P < 0.01$), coastal waters and beaches ($P < 0.05$), and national parks ($P < 0.1$).

A major difference in people's ratings of the management of native land and freshwater plants and animals compared to five years ago, which is not reflected by the mean values in Figure 3.15, was an increase in the frequency of 'don't know' responses.

3.5 MAIN CAUSES OF DAMAGE TO THE ENVIRONMENT

The 2004 Survey

Respondents were instructed to select what they considered to be the main causes of damage from a list of 15 items for 11 components of the environment. Respondents could select up to three causes for each environmental component. The three most frequent responses for each component are shown in Table 3.2. Colour coding helps to interpret the table, with red text 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 light blue.

For some environmental components, people have very clear ideas about sources of harm. For example, motor vehicles and transport (91%), as

Table 3.3. Significant changes (cells with asterisks) in ratings of main causes of damage across the 2000, 2002 and 2004 surveys. (↑) indicates the cause is judged to be more important now than it was earlier, (↓) indicates the cause is judged to be less important now than it was earlier. Other cells with asterisks indicate significant changes between years, but with no consistent trend.

	Air	Native land & fresh water plants & animals	Native forests and bush	Soils	Beaches and coastal waters	Marine fisheries	Marine reserves	National Parks	Wetlands
Motor vehicles and transport	** (↑)							*	
Household waste and emissions				** (↑)					
Industrial activities									** (↓)
Pests and weeds			**						* (↑)
Farming	*** (↑)	***		*** (↑)	*** (↑)	** (↑)	*** (↑)		* (↑)
Forestry	*		*						
Urban development		**	***		*** (↑)				
Mining		***	*	** (↓)			* (↓)		
Sewage and storm water		**	***	*	*				
Tourism								***	
Commercial fishing									
Recreational fishing							*** (↑)		
Dumping of solid waste		** (↓)		**	** (↓)				
Hazardous chemicals	*** (↓)	**		*** (↓)	** (↓)	***	**		* (↓)
Other				*** (↑)					

The number of asterisks indicates the strength of significance: * Significant at 90% confidence level ($P < 0.1$), ** Significant at 95% confidence level ($P < 0.05$), *** Significant at 99% confidence level ($P < 0.01$).

well as industrial activities (70%), were clearly judged to be the main causes of damage to air. Similarly, sewage and stormwater were judged to be the main cause of damage to beaches and coastal waters, with 67% of respondents nominating this cause, while 62% percent of respondents identified commercial fishing as a major problem for marine fisheries.

Reading across the rows of Table 3.2 identifies sources of harm that are important across different areas of the environment. Sewage and stormwater were perceived to be a main cause of damage for more than half of the environmental components addressed in the question. Pests and weeds featured as the top cause of damage for four components. Mining, tourism, and household waste and emissions did not feature as the top causes of damage for any environmental component.

Trends 2000 - 2004

Respondents' judgements of the main causes of damage to the nine environmental components which were included in the survey for all three years are shown in Figures 3.16 (a-i). These figures contain an enormous amount of information. In order to clarify the important changes that have occurred over the three surveys, Table 3.3 identifies the changes that were statistically significant.

The most notable result in Table 3.3 is the dramatic increase in negative judgements about the environmental impacts of farming. Farming received increasing blame for environmental damage inflicted to air, soils, beaches and coastal waters, marine fisheries, marine reserves, and wetlands. Other items increasingly rated as harming the environment were:

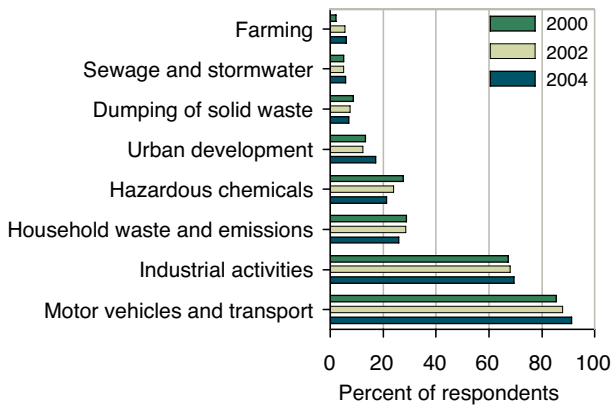


Figure 3.16a. Comparison of perceived main causes of damage to air. Categories less than 5% are omitted.

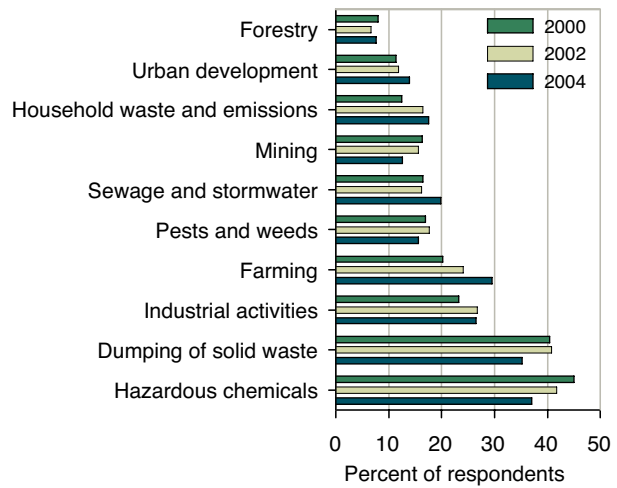


Figure 3.16d. Comparison of perceived main causes of damage to soils. Categories less than 5% are omitted.

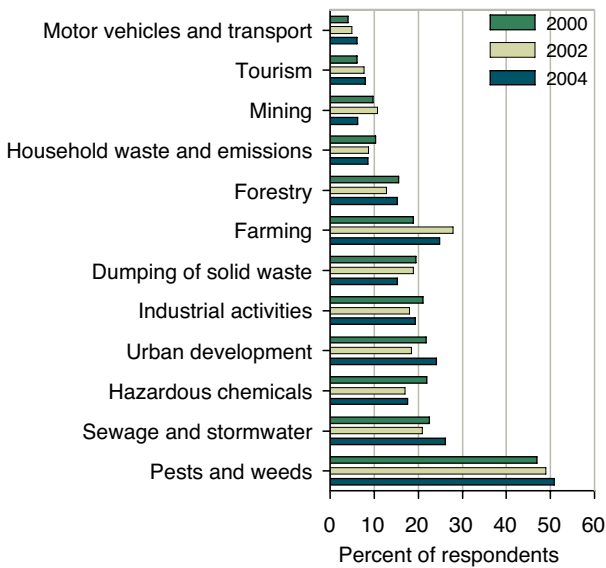


Figure 3.16b. Comparison of perceived main causes of damage to native land and freshwater plants & animals. Categories less than 5% are omitted.

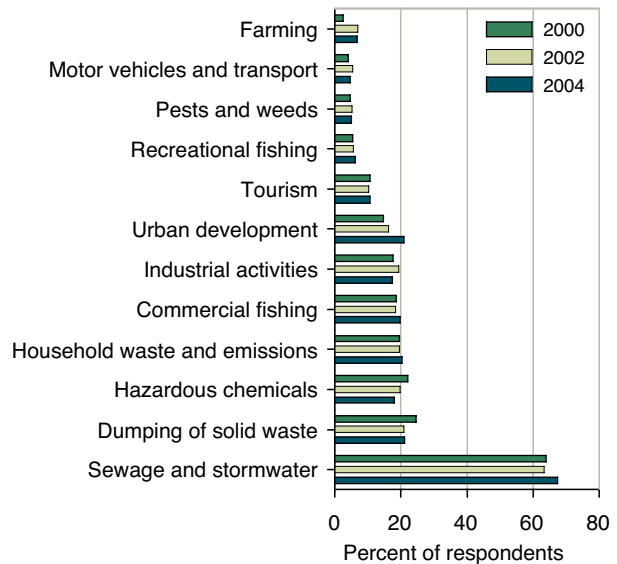


Figure 3.16e. Comparison of perceived main causes of damage to beaches and coastal waters. Categories less than 5% are omitted.

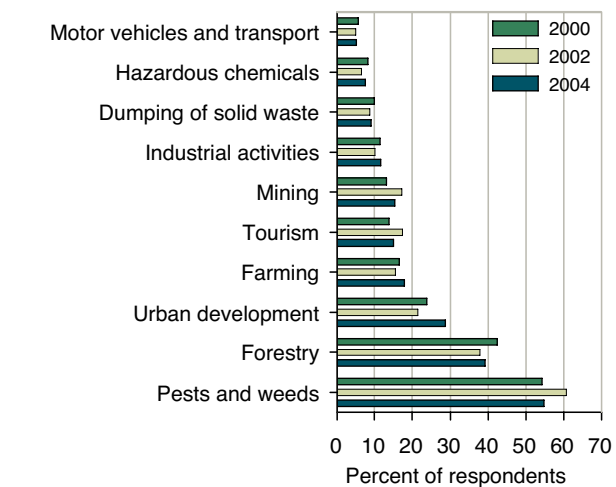


Figure 3.16c. Comparison of perceived main causes of damage to native forests/bush. Categories less than 5% are omitted.

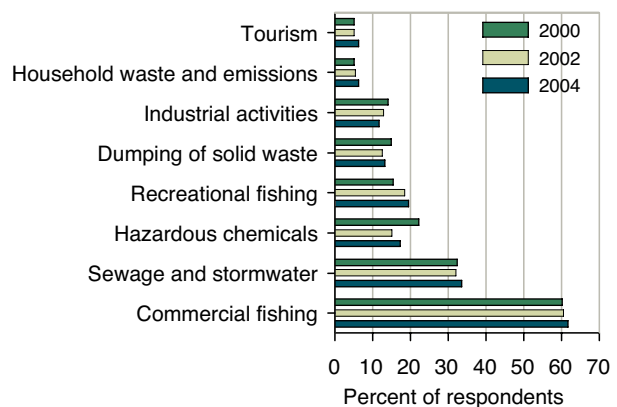


Figure 3.16f. Comparison of perceived main causes of damage to marine fisheries. Categories less than 5% are omitted.

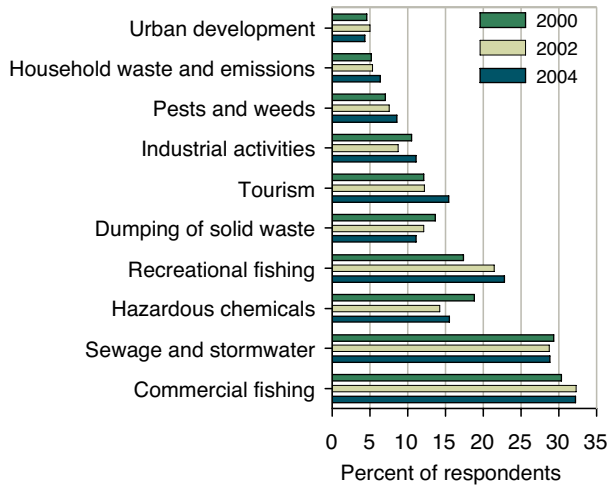


Figure 3.16g. Comparison of perceived main causes of damage to marine reserves. Categories less than 5% are omitted.

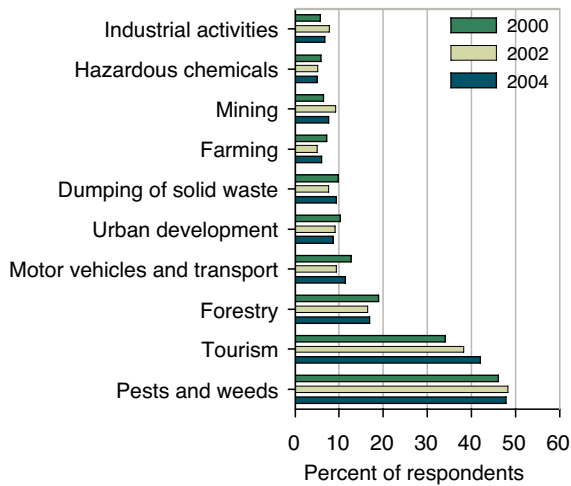


Figure 3.16h. Comparison of perceived main causes of damage to national parks. Categories less than 5% are omitted.

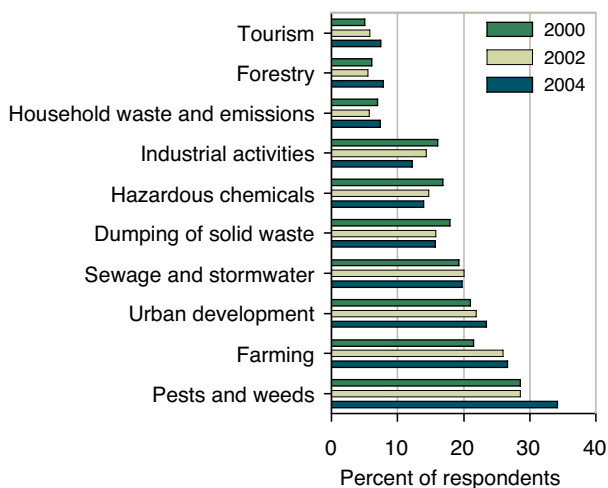


Figure 3.16i. Comparison of perceived main causes of damage to wetlands. Categories less than 5% are omitted.

Item	Increasingly rated as a main cause of damage to:
Motor vehicles and transport	Air
Household wastes and emissions	Soils
Pests and weeds	Wetlands
Urban development	Beaches and coastal waters
Recreational fishing	Marine reserves

Tourism and urban development were both increasingly rated as causes of damage for most of the environmental components over the three surveys, although they seldom ranked in the top three causes.

On the positive side, respondents to more recent surveys were less likely to nominate mining, hazardous chemicals and dumping of solid waste as one of the three most important causes of damage to the environment.

Reading down the columns of Table 3.3 indicates shifts in attributed main causes of damage to particular environmental areas. For example, mining and hazardous chemicals are now less implicated in damage to soils, whereas household waste emissions, farming and other causes have risen in prominence as perceived main causes of damage to soils.

Responses are consistent across years for a number of items. Motor vehicles and industrial activities were clearly rated as the main causes of damage to air in each year the survey was undertaken. Similarly, sewage and stormwater was clearly rated 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.

Freshwater, rivers and lakes, and groundwater have not been included in the preceding analyses because they were not included in all three surveys. In the 2004 survey 'fresh waters' was separated into two items: 'waters in rivers and lakes' and 'groundwater'. Main causes of damage to fresh waters (2000-2002), waters in rivers and lakes (2004), and groundwater (2004) are shown in Figure 3.17.

Sewage and stormwater was considered the main cause of damage to freshwaters in both 2000 and 2002. The next three most common responses changed order between 2000 (hazardous chemicals, industrial activities, farming) and 2002 (farming, industrial activities, hazardous chemicals), mirroring outcomes for soils and beaches and coastal waters.

Farming, as well as sewage and stormwater, were rated to be the main causes of damage to waters in rivers and lakes, while sewage and stormwater, hazardous chemicals, and farming were seen as the main causes of damage to groundwater.

3.5.1 Ethnicity

Statistical tests were undertaken to identify potential differences between ethnic group ratings of main causes of damage to four key resources; water in rivers and lakes, marine reserves, marine fisheries, and beaches and coastal waters. Of these, there was only a significant difference in ratings of causes of damage to water in rivers and lakes ($\chi^2 = 39.79, P < 0.01$). As Figure 3.18 shows, New Zealand Europeans were more likely than Maori or other ethnicities to name farming as a main cause of damage to rivers and lakes ($P < 0.01$). Maori were significantly more likely than New Zealand Europeans and other ethnic groups to nominate household waste and emissions ($P < 0.05$) and dumping of solid waste ($P < 0.01$) as main causes of damage to rivers and lakes.

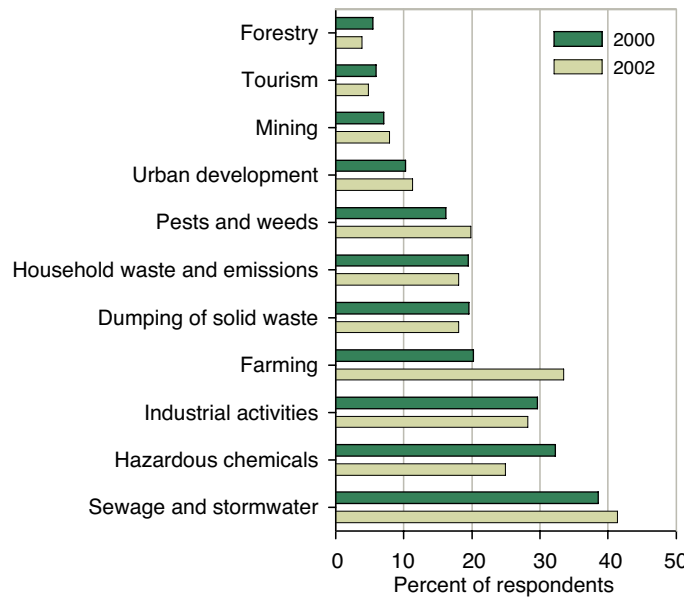


Figure 3.17a. Comparison of perceived main causes of damage to freshwater.

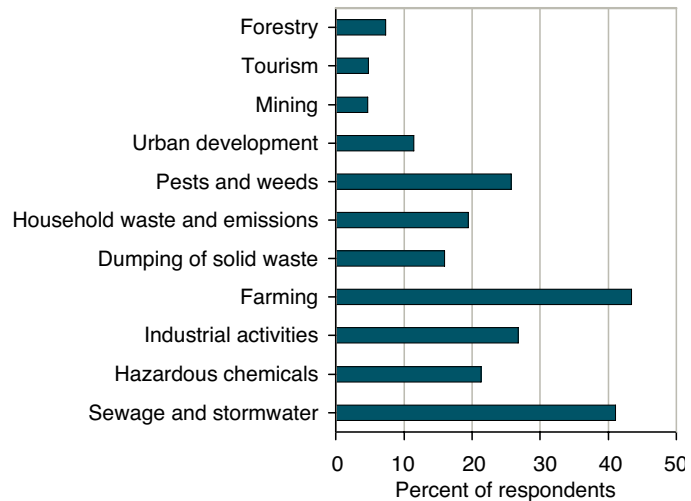


Figure 3.17b. Perceived main causes of damage to waters in rivers and lakes.

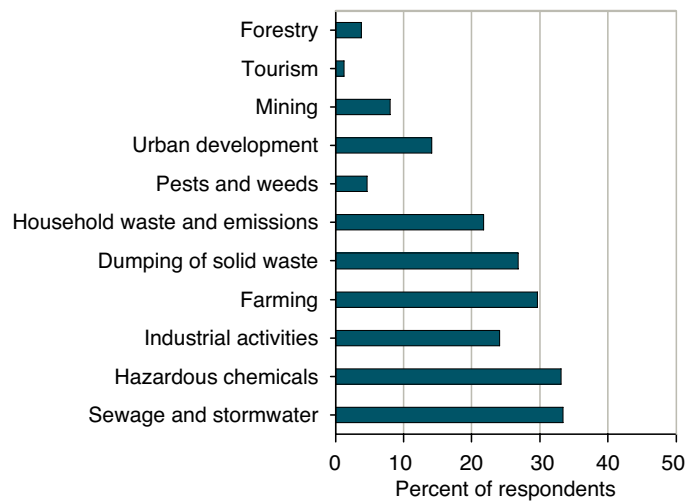


Figure 3.17c. Perceived main causes of damage to groundwater.

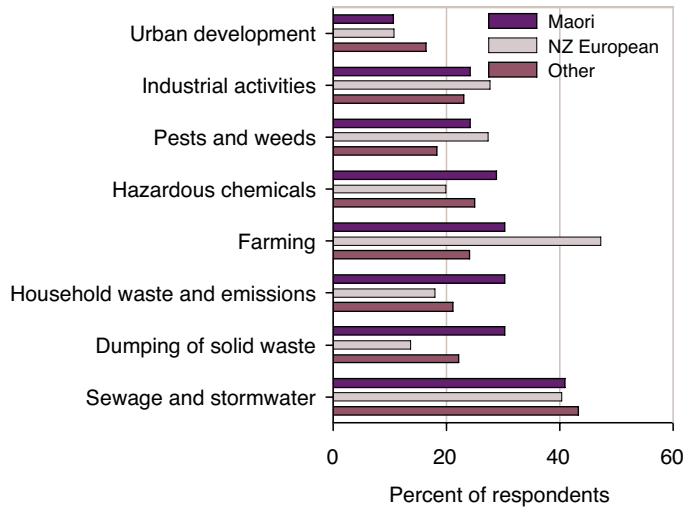


Figure 3.18. Comparison of perceived main causes of damage to water in rivers and lakes by ethnicity. Categories less than 10% are omitted.

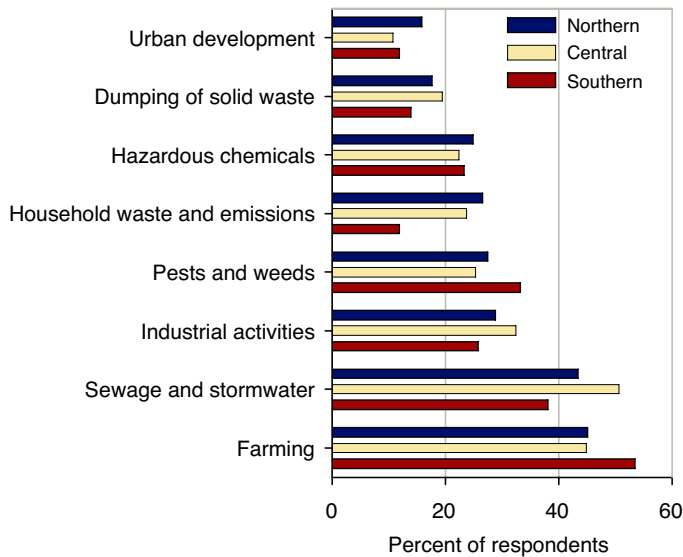


Figure 3.19. Comparison of perceived main causes of damage to rivers and lakes by region. Categories less than 10% are omitted.

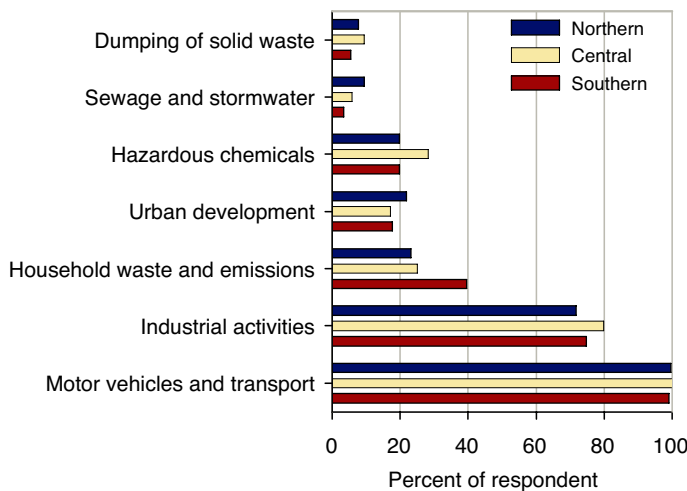


Figure 3.20. Comparison of perceived main causes of damage to air by region. Categories less than 10% are omitted.

3.5.2 Regional differences

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. Statistical tests on four resources (water in rivers and lakes, air, marine fisheries, and coastal beaches and waters) identified significant regional differences in the main causes of damage to water in rivers and lakes ($\chi^2 = 35.51, P < 0.11$) and air ($\chi^2 = 30.05, P < 0.05$), but not for marine fisheries or for coastal beaches and waters.

Figure 3.19 shows that the southern region's response was significantly different to both the northern region ($P < 0.12$) and central region ($P < 0.05$). Northern and central respondents were more likely than southern region respondents to identify sewage and stormwater as a main cause of damage, and were almost twice as likely as the southern region respondents to identify household waste and emissions. Farming was nominated as a main cause of damage to rivers and lakes in all regions, but more frequently in the southern region (53%).

Ratings of main causes of damage to air also showed significant differences between regions, with the southern region again having significantly different responses to northern ($P < 0.05$) and central ($P < 0.05$) regions. More southern region respondents consider household waste and emissions a main cause of damage to air (Figure 3.20). Motor vehicles and transport were most frequently identified as a main cause of air damage in each region.

3.6 PARTICIPATION IN ENVIRONMENTAL ACTIVITIES

The 2004 Survey

Figure 3.21 shows levels of participation in 13 environmental activities in the preceding twelve months. Over 80% of 2004 respondents recycled household waste, bought products marketed as environmentally friendly, or had reduced or limited their use of electricity. More than 70% had composted garden and/or household waste or had grown their own vegetables. 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.

There were some significant differences between activities performed by each age group. Fewer than 60% of respondents aged under 30 years composted garden and/or household waste, whereas nearly 80% of those aged over 40 years did so. Similarly, older respondents were much more likely to have grown their own vegetables. On the other hand, commuting by train or bus was most common amongst those aged under 30 years, although the 60-69 year group was also prominent in this activity.

Trends 2000 - 2004

Figure 3.22 shows the extent of between-survey changes in behaviour. The two biggest changes since 2000 were for electricity use and use of public transport. In the 2000 survey 58.5% of respondents reported they had reduced or limited their use of electricity. This increased dramatically in 2002 (75.3%), and again in 2004 (82%). The other major change occurred in the area of commuting; whereas 17.5% reported in 2000 that they had regularly commuted by bus or train, the proportion had increased to 39.7% in 2002, although it dropped a little in 2004 (37%). There was also a steady increase in the number of people who recycled household waste, bought products marked as 'environmentally friendly', and composted garden and/or household waste. There was an overall decline in visits to marine reserves.

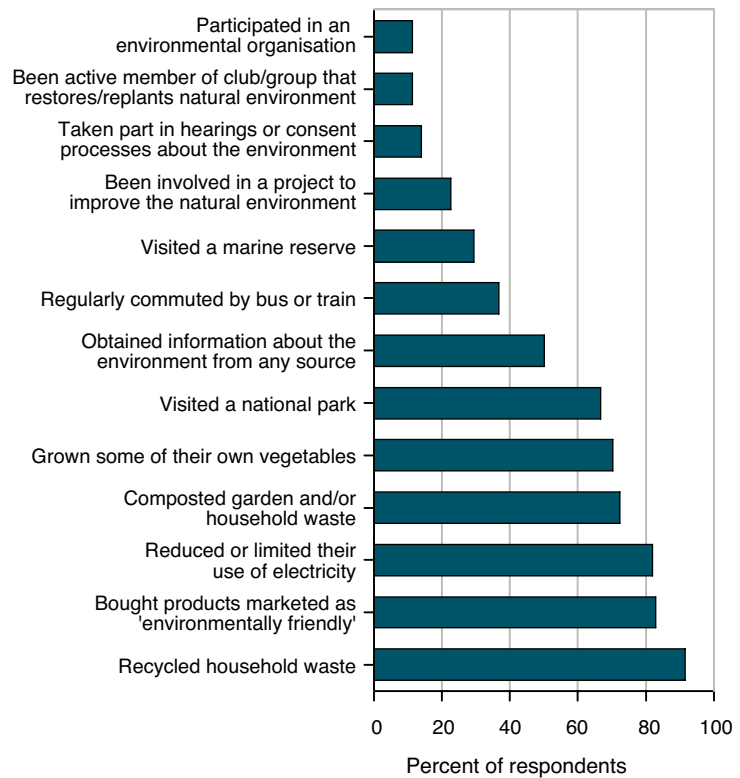


Figure 3.21. Reported participation in environmental activities.

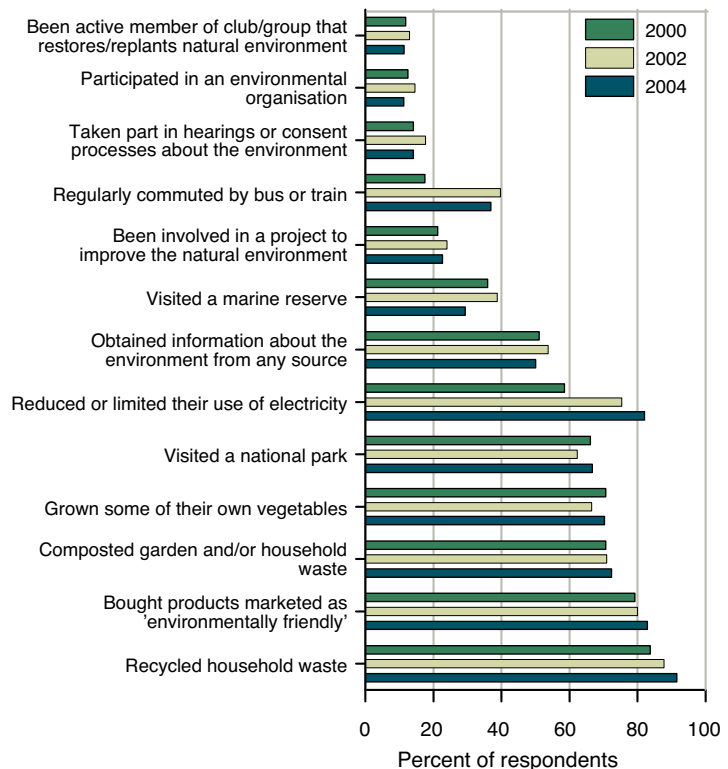


Figure 3.22. Comparison of reported participation in environmental activities. Full data provided in Appendix 2, Table 9.

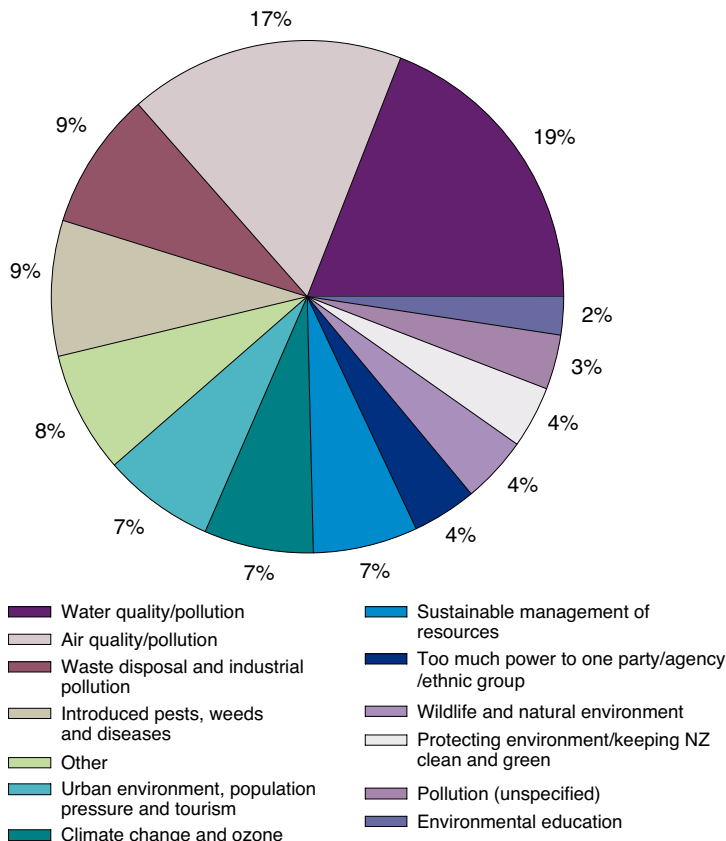


Figure 3.23. Respondents' views of the most important environmental issues facing New Zealand. Full data provided in Appendix 2, Table 10.

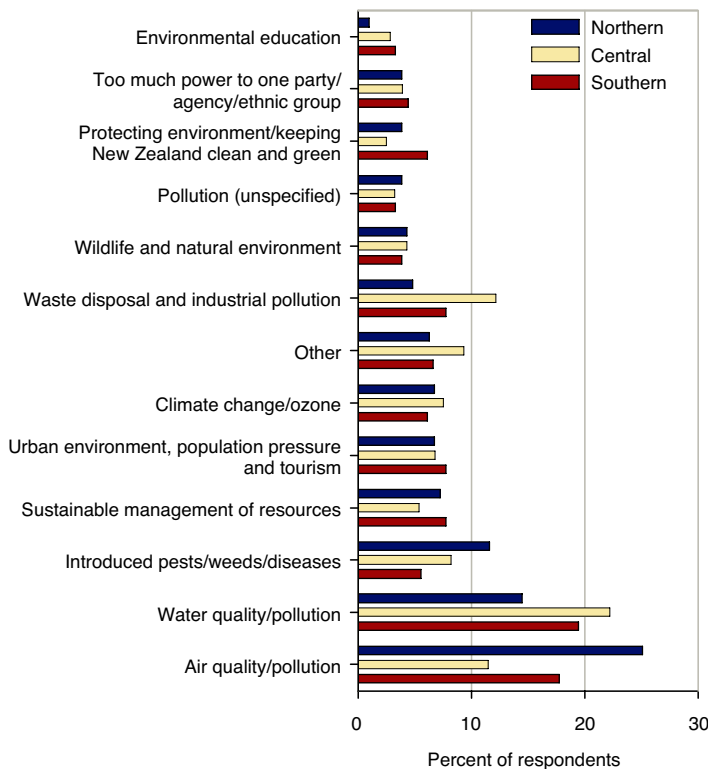


Figure 3.24. Comparison of respondents' views of the most important environmental issue by region. Statistical testing of responses to this question was limited because of the small number of responses for some categories.

There have been statistically significant changes between surveys in participation in the following activities:

Recycled household waste	↑ significant	($P < 0.01$)
Reduced or limited use of electricity	↑ significant	($P < 0.01$)
Visited a marine reserve	decline in 2004	($P < 0.01$)
Regularly commuted by bus or train	↑ from 2000	($P < 0.01$)
Took part in hearings or consent processes about the environment	more frequent in 2002	($P < 0.12$)

3.7 MAJOR ENVIRONMENTAL ISSUES

The 2004 Survey

Respondents were asked to identify the most important environmental issue facing New Zealand today. Responses were grouped into the same thirteen categories used in 2002.

Water quality and/or water pollution (19%) and air quality and/or air pollution (17%) were identified as the most important environmental issues facing New Zealand in 2004 (Figure 3.23).

Responses differed significantly between regions (Figure 3.24), with the northern region being more likely than the other regions to name air quality/pollution as the main issue ($P < 0.01$). Central region respondents were significantly more likely than respondents from other regions to name waste disposal and industrial pollution as the most important issue ($P < 0.01$). Introduced pests, weeds and diseases constituted a more important issue for the northern region compared to the central and southern regions ($P < 0.1$). The southern region was significantly more likely than the other regions to identify sustainable management of resources as the main environmental issue ($P < 0.01$). There was no significant difference between different ethnic groups' perceptions of the most important environmental problem.

Trends 2000 - 2004

Figure 3.25 compares the most important environmental issues facing New Zealand as rated by respondents in the 2002 and 2004 surveys. Generally, pollution issues were most frequently rated as important. However, certain management issues increased in importance in the 2004 survey.

The major change between surveys was the increased response for 'water quality/pollution' as the most important environmental issue, increasing significantly ($P < 0.01$) from 10% in 2002 to 19% in 2004. There were also notable increases in 2004 for 'urban environment, population pressure and tourism' ($P < 0.1$), 'sustainable management of resources' ($P < 0.1$), and 'too much power to one party/agency/ethnic group' ($P < 0.01$).

Introduced pests, weeds and diseases dropped in importance in 2004 ($P < 0.01$). There were also significant decreases between 2002 and 2004 for wildlife and natural environment ($P < 0.15$) and pollution (unspecified) ($P < 0.05$).

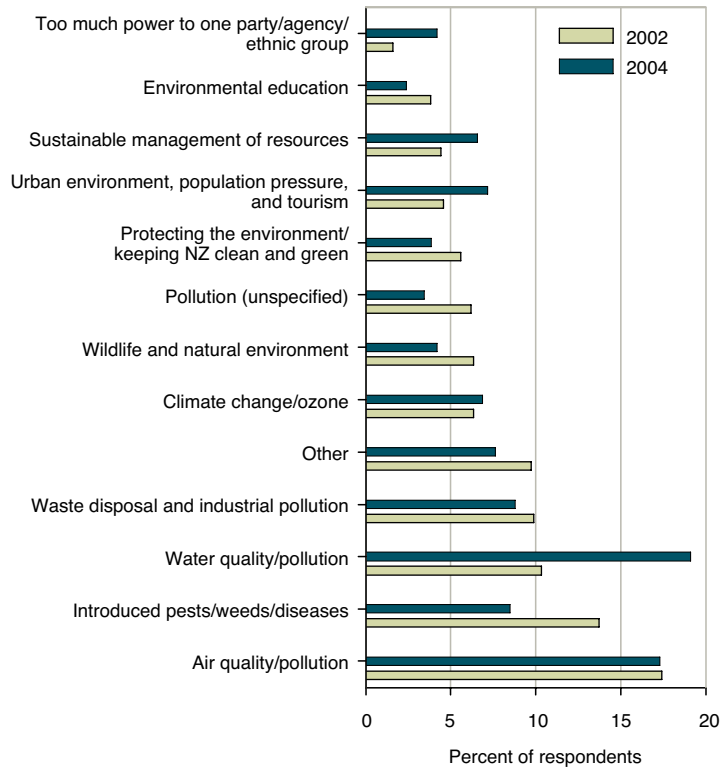


Figure 3.25. Comparison of perceived most important environmental issue facing New Zealand today.



4

McLean Falls, Catlins (S. McMurtrie)

INDIVIDUAL RESOURCES

In Section 3 the Pressure-State-Response (PSR) model was used as a framework to examine perceptions of the New Zealand environment across all resource media. In this section each resource area is examined in turn, and where appropriate regional and ethnicity-based analyses of the data presented. The following individual resource areas are addressed:

- natural environment in towns and cities;
- air;
- native land and freshwater plants and animals;
- native bush and forests;
- soils;
- coastal waters and beaches;
- marine fisheries;
- freshwaters; (incorporating rivers and lakes; and groundwater)
- national parks;
- wetlands; and
- New Zealand's natural environment compared to other developed countries.

Each set of graphs represents an analysis of the data presented in Section 3, and included in Tables 3-8 of Appendix 2. Thus, each graph contains three important elements:

- 2000 survey data;
- 2002 survey data; and
- 2004 survey data.

Chi-square analysis of the significance of the difference between the distributions was undertaken wherever possible but only significant differences are reported. These significance levels indicate a change in the distribution of responses between the three surveys:

- significant at 90% confidence level ($P < 0.1$);
- significant at 95% confidence level ($P < 0.05$); and
- significant at 99% confidence level ($P < 0.01$).

Note that significance levels, where appropriate, are given alongside the graph title.

A comparative analysis of each resource area precedes presentation of the graphs. This analysis, where available, incorporates relevant biophysical PSR trend data for comparative purposes.

4.1 NATURAL ENVIRONMENT IN TOWNS AND CITIES

Scientific information on state and trends

Most of New Zealand's population, in common with other 'developed' countries, lives in urban environments. There is no national set of urban environmental indicators and hence it was not possible empirically to determine state of the environment trends for the urban environment. Nevertheless, there is an increasing amount of research and management interest in questions around urban sustainability (see for example Eason 2003) with a major focus on the greater Auckland conurbation. In terms of policy initiatives the Ministry for the Environment (MfE) has sought feedback on the Draft New Zealand Urban Design Protocol (MfE,

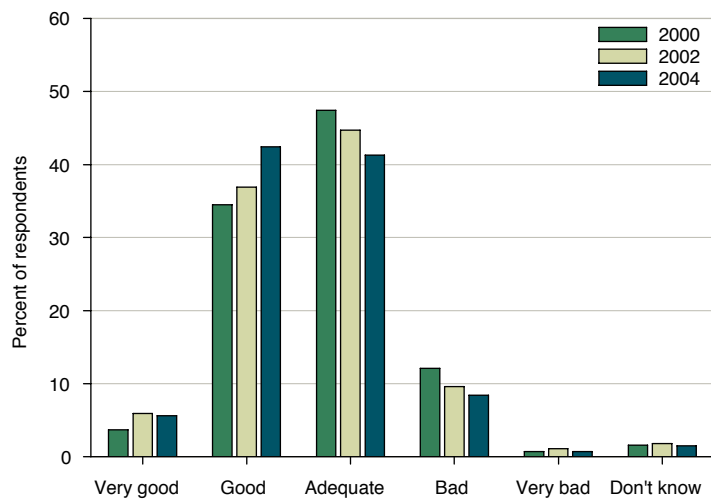


Figure 4.1a. Comparison of perceived condition of the natural environment in towns and cities ($P < 0.05$).

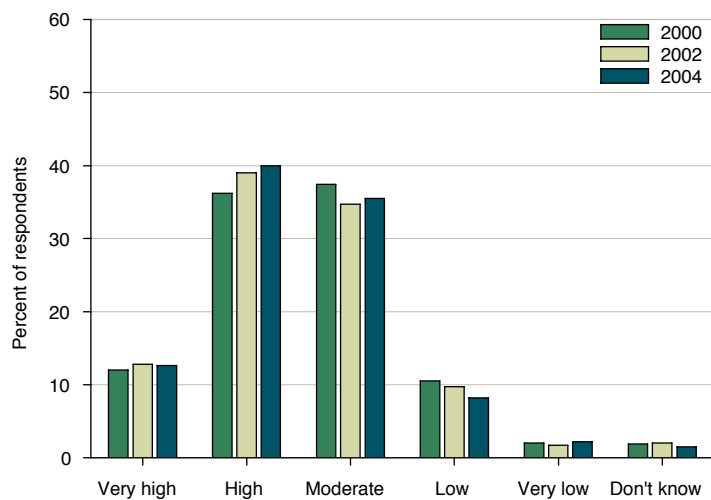


Figure 4.1b. Comparison of perceived availability of parks and reserves in towns and cities.

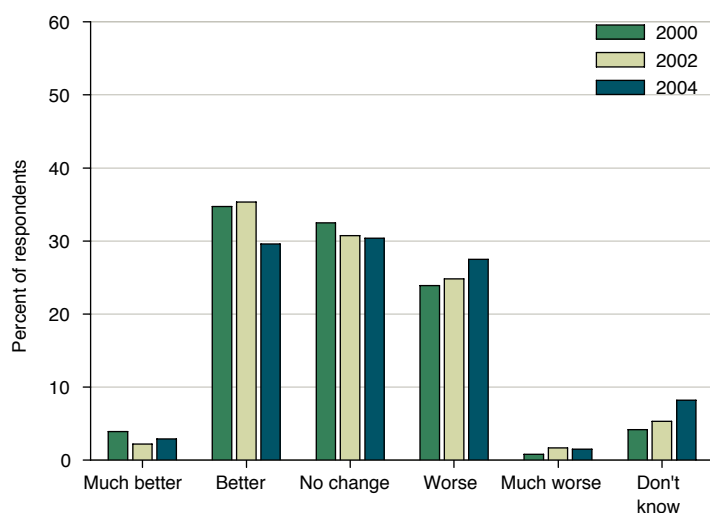


Figure 4.1c. Comparison of perceived condition of the natural environment in towns and cities compared to five years ago.

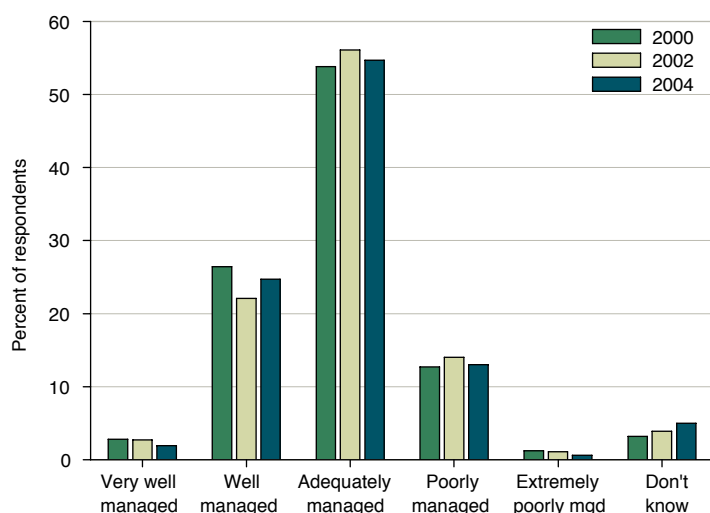


Figure 4.1d. Comparison of perceived current management of the natural environment in towns and cities.

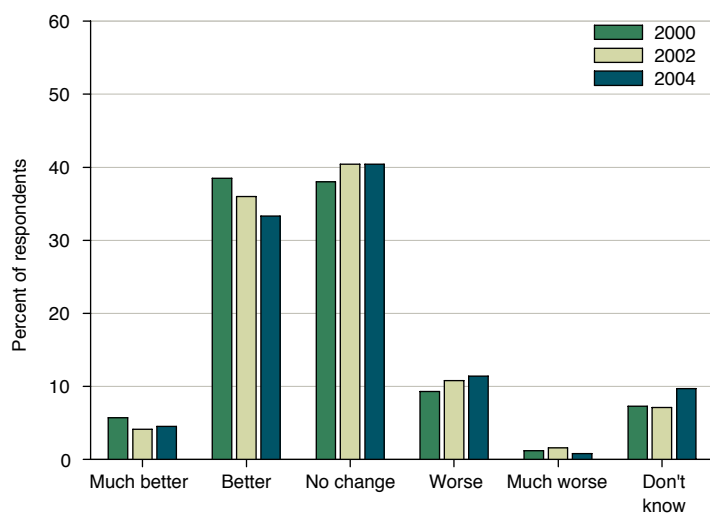


Figure 4.1e. Comparison of perceived management of the natural environment in towns and cities compared to five years ago.

2004, August):

“The draft Protocol has been prepared by the Ministry in conjunction with an Urban Design Advisory Group as part of the Government’s Sustainable Development Programme of Action. Its purpose is to accelerate quality urban design to create places that work and people use and value”.

Given the level of concern and increased research and management interest in urban sustainability questions it might tentatively be concluded that the state of the urban environment is at best only adequate or poor.

Perceptions of state and trends

From all three surveys it was clear that most people considered the natural environment in towns and cities to be ‘adequate’ or ‘good’ and that the availability of parks and reserves was ‘moderate’ or ‘high’. The only significant difference between surveys was for the perceived condition of the natural environment in towns and cities, which had improved significantly over the three surveys (Figure 4.1a). Interestingly, this situation was not reflected in the 2004 data (Figure 4.1c), where the number of people who considered the environment in towns and cities to be ‘worse’ compared to five years ago was about the same as the number who considered it had improved.

All other ‘indicators’ in this set scored positively, unlike any other environmental component that was examined.

Commentary

Given that most New Zealanders live in an urban environment, their knowledge of environmental issues associated with this setting should be high - this is 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 poor air quality do not appear to have resulted in any downgrading of people’s perceptions. This might be because people perceive this question to relate more to other aspects of town and city environments, such as parks, reserves, streams and beach frontages.

4.2 AIR

Scientific information on state and trends

Superficially conflicting views have often been expressed about air quality in New Zealand. On the one hand there is increasing concern amongst scientists about the health effects of air pollution in New Zealand, e.g., Fisher *et al.*, (2002) regarding increased mortality from vehicle emissions in the greater Auckland region, and Hales *et al.*, (2000) who link increases in air-borne particulates to increased mortality and to an increase in respiratory hospital admissions in Christchurch. On the other hand, MfE (1997: Section 6:24) report that

“As with suspended particulate matter, smoke levels around the country have also shown some improvements over the last 10 to 20 years. In Christchurch and Dunedin, for example, wintertime levels of smoke have decreased - significantly in the case of Christchurch - especially over the last decade”.

Further analysis of the information available from MfE (1997) indicates that in general air quality in New Zealand is ‘good’. Statistics New Zealand (2002: pg 31) conclude that

“Trends in air quality over the past 20 years indicate that air quality in New Zealand is getting better in some respects but getting worse in others”.

On the other hand New Zealand’s air quality is ranked first out of 142 nations (World Economic Forum’s Global Leaders for Tomorrow Environment Task Force, 2002).

This analysis leads to the conclusion that while ‘rural’ air quality is high there are significant problems in several major urban areas, and thus the state of air quality should at best be considered as ‘adequate’.

Perceptions of state and trends

From all three surveys it is clear that New Zealanders considered air quality to be ‘good’, but an increasing and significant number of respondents believed its condition had declined in the last 5 years (see Figure 4.2b). Air was the only resource examined for which there were significant differences for all of the parameters that can be compared statistically between surveys. Most respondents over all three

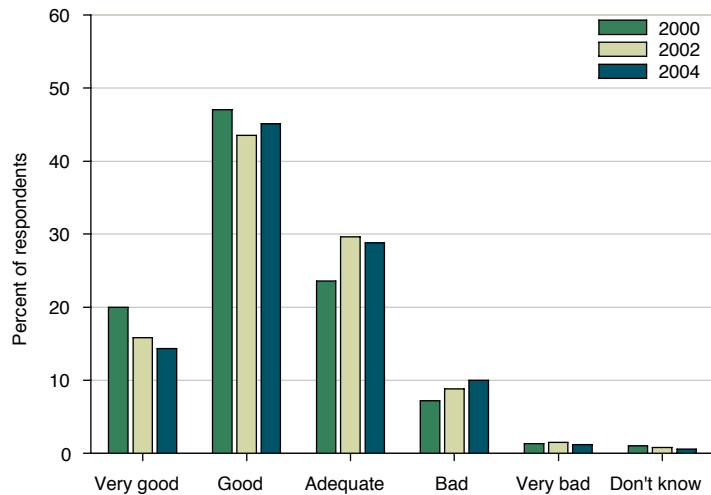


Figure 4.2a. Comparison of perceived state of air quality (P < 0.05).

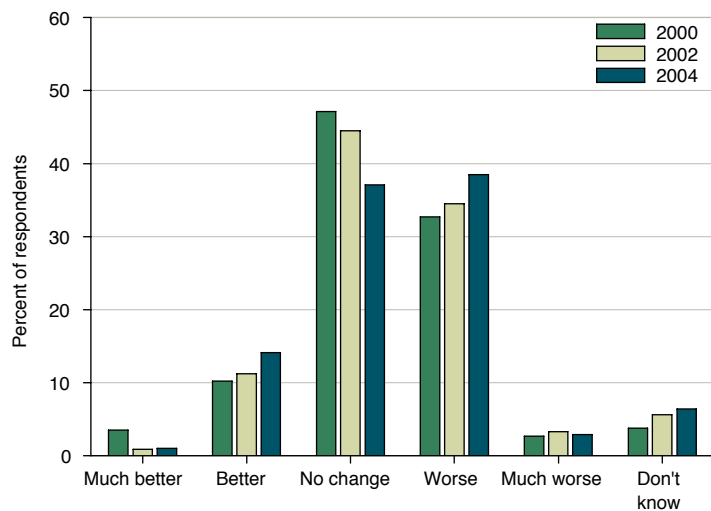


Figure 4.2b. Comparison of perceived air quality compared to five years ago (P < 0.01).

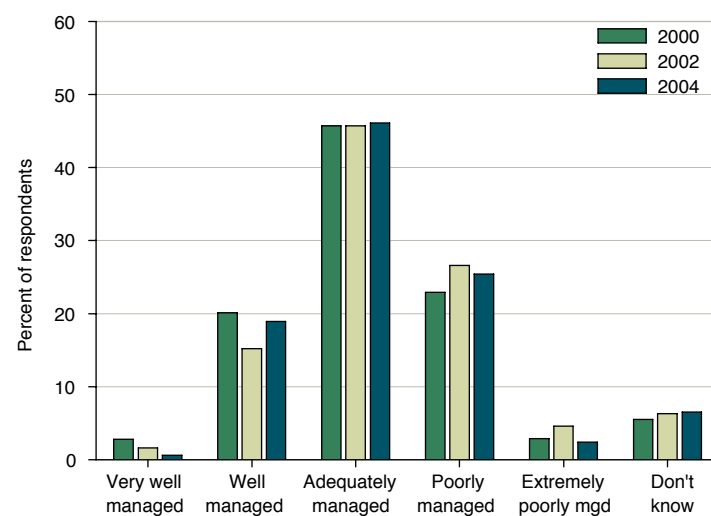


Figure 4.2c. Comparison of perceived current management of air quality (P < 0.01).

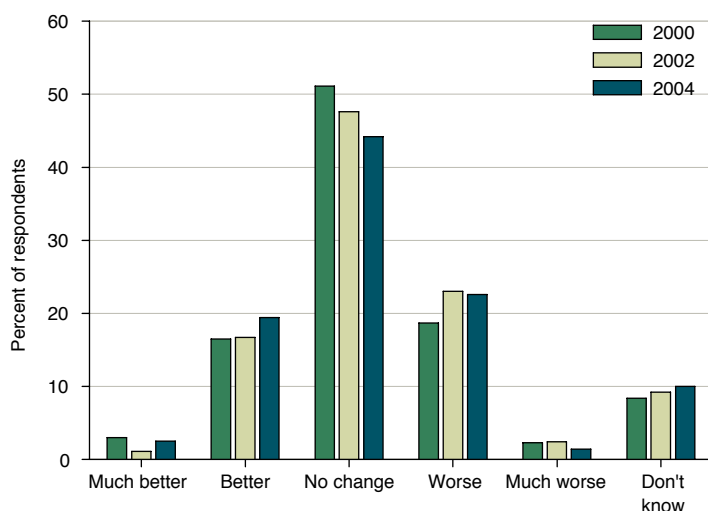


Figure 4.2d. Comparison of perceived quality of air management compared to five years ago ($P < 0.05$).



surveys considered air management, both at the time of the survey and five years previously, to be adequate and either staying the same or improving.

Analysis of the 2004 survey based on regional responses indicated that in all regions air quality was considered 'adequate' or 'good', with the central region judging air quality most favourably, and the southern region judging it least favourably. Whereas about 40% of respondents from the central and southern regions thought air quality was worse than five years previously, nearly 60% of those in the northern region considered air quality to be worse than five years ago. Management of air quality was judged relatively uniformly across the country, with respondents from the central region being a little more positive than others. Around 40% of northern respondents thought air management had deteriorated over the previous five year period (compared with about 20% of other respondents), with more southern region respondents than others (30%) considering air quality management had improved over the preceding five years.

Commentary

Why respondents perceive a decline in air quality over the last five years is unclear. However, the reason(s) might support the conclusion of MfE's Chief Executive, Barry Carbon (2002). When opening the conference of the Clean Air Society of Australia and NZ he said

"And overall, I wonder how prepared we are to deal with the growth of community concern over heightened sensitivity, or multiple chemical sensitivity to concentrations a hundred fold less than any of our standards?"

Of course, heightened public awareness and debate over transport and related air quality issues may be contributing to these responses, especially in the Auckland-dominated northern region. Frequent discussion about climate change has kept matters of air quality in the media. Discussion about climate change and greenhouse

Respondents from all three survey years believed air quality was 'good', although an increasing number considered the condition had declined over the past five years. Left: early morning smog over Christchurch.

gases increased prior to the 2004 survey as the Government launched a national publicity campaign related to its climate change awareness programme (see Section 6.3 for an analysis of peoples' awareness of this programme). The Ministry for the Environment's 'clean air programme' (MfE, n.d.) aims to promote the sustainable management of air in New Zealand by developing the best national policies and tools to maintain and, where necessary, improve air quality. While this programme may be leading to improvements it may also have driven enhanced awareness and thus concern about air quality issues.

4.3 NATIVE LAND AND FRESHWATER PLANTS AND ANIMALS

Scientific information on state and trends

Conservation of New Zealand's native plants and animals remains one of the country's main environmental issues (DoC and MfE, 2000). New Zealand has a diverse flora and fauna with many endangered plants and animals, some of which are national symbols and attract high levels of media interest (e.g., kakapo and kiwi). According to Biodiversity Information Online (BIO, 2000a);

"About 800 of New Zealand's known animal, plant and fungi species and 200 subspecies are considered threatened. It is likely that many still unknown species are also threatened."

According to the Department of Conservation (DoC, 2004a);

"An increase in active conservation management and changes in attitude to the natural environment over the past two decades appear to be slowing the rate of decline."

Based on the above, the state of New Zealand's biodiversity should be regarded as bad or very bad. This is consistent with the opinion that the New Zealand archipelago is considered a biodiversity 'hotspot' (Given and Mittermeier, 1999).

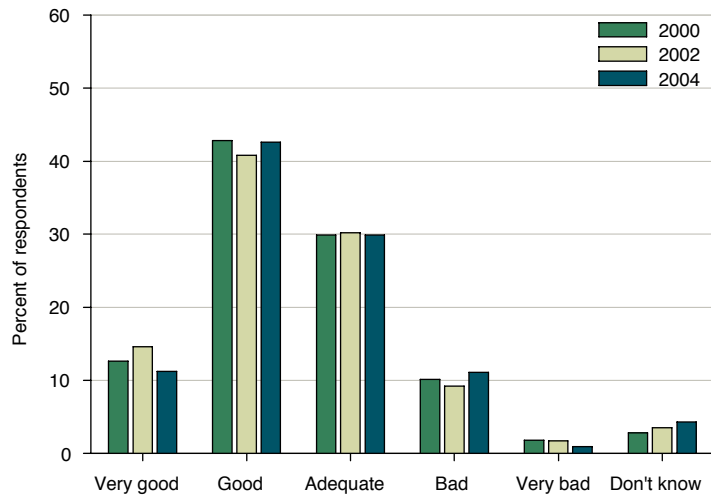


Figure 4.3a. Comparison of perceived state of native land and freshwater plants and animals.

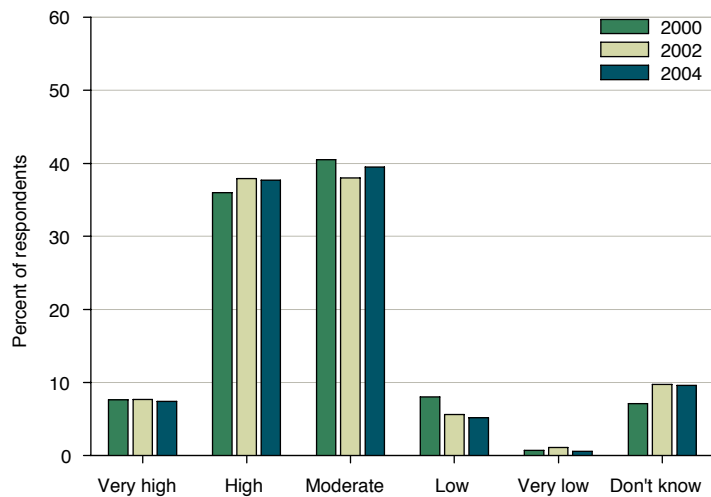


Figure 4.3b. Comparison of perceived diversity of native land and freshwater plants and animals.

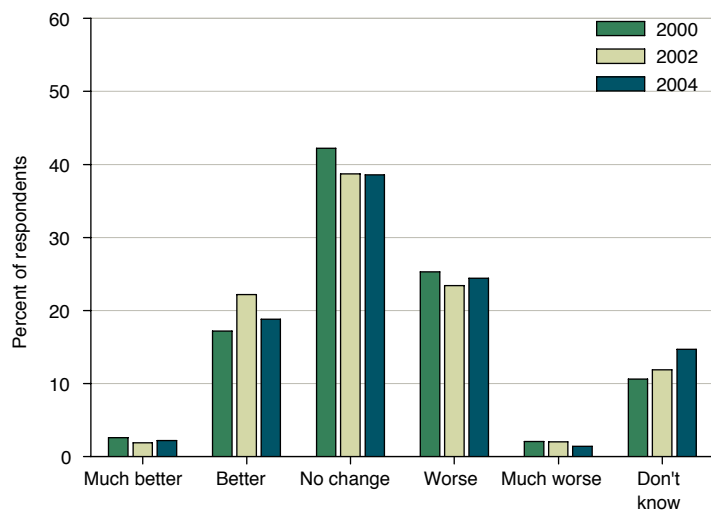


Figure 4.3c. Comparison of perceived state of native land and freshwater plants and animals compared to five years ago ($P < 0.1$).

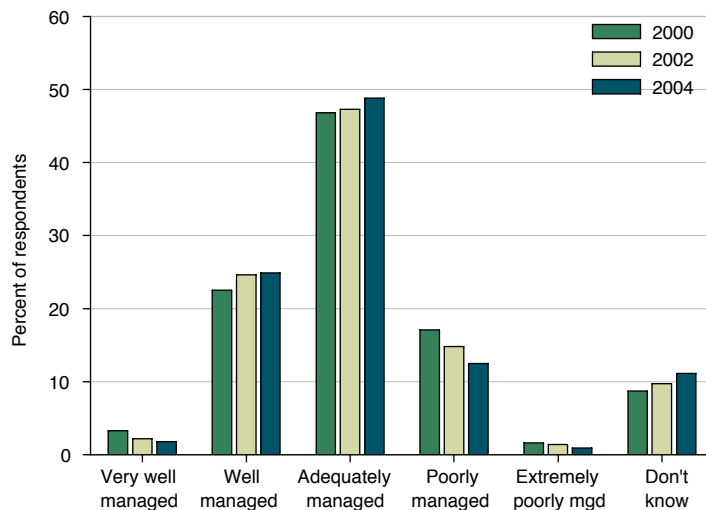


Figure 4.3d. Comparison of perceived current management of native land and freshwater plants and animals.

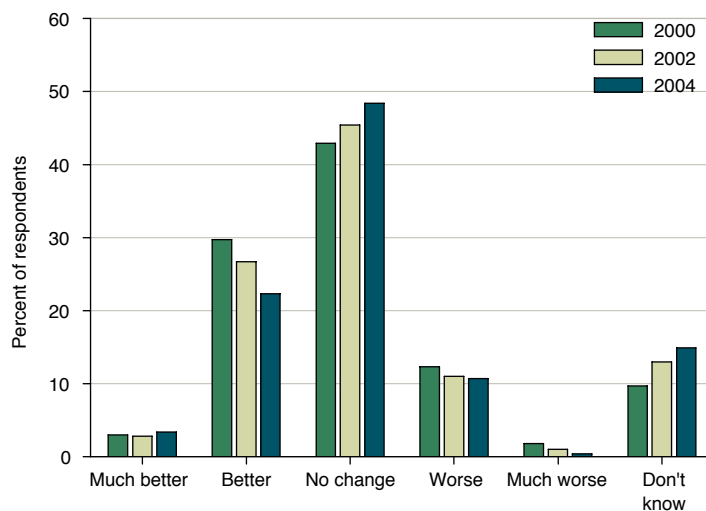


Figure 4.3e. Comparison of perceived quality of native land and freshwater plant and animal management compared to five years ago ($P < 0.01$).



Perceptions of state and trends

The survey revealed that New Zealanders considered there was a 'moderate' or 'high' diversity of native plants and animals, and that the condition of native land and freshwater plants and animals was 'adequate' or 'good'. Most respondents believed that native land and freshwater plants and animals were 'adequately managed' or 'well managed'. Responses about the state of the resource and its management were uniform across the three surveys.

Whereas there had been little change in opinions about the state of this part of the environment when measured in the different surveys, a somewhat different view emerged when people were asked how the state of native plants and animals had changed over the last five years (Figure 4.3c). The number of people judging things had got worse was consistently greater than the number judging it had got better. This negative view about changes over the previous five years also contrasts with perceptions about management. The vast majority of people thought this aspect of the environment was 'adequately managed' or 'well managed', and that management was the 'same' as, or 'better' than five years ago. This is difficult to reconcile with the view that the condition of native land and freshwater plants and animals is worse than it was five years ago.

Commentary

It continues to surprise that the condition of New Zealand's native plants and animals is considered 'adequate' or 'good'. This is not the case, as indicated by the contents of the National Biodiversity Strategy, which notes that many ecological processes have been damaged and that there are over 1000 threatened species in New Zealand (DoC and MfE, 2000). This view is supported by the World Economic Forum's Global Leaders for Tomorrow Environment Task Force (2002) finding that New Zealand's biodiversity performance is the worst of 142 nations ranked.

Respondents perceived the condition of New Zealand's native plants and animals was 'adequate' or 'good'. This is clearly not the case however, with approximately 1000 animal, plant, and fungi considered threatened, and with the country's biodiversity performance ranked worst of 142 developed nations. Left: the threatened plant, *Stilbocarpa lyallii*, Ulva Island (photo K. Hughey).

4.4 NATIVE BUSH AND FORESTS

Scientific information on state and trends

Management of native bush and forests continues to be debated in New Zealand. Examples of contentious issues include sustainable logging of indigenous forests and the future of the South Island Landless Natives Act forests in Southland. New Zealand's original forest cover has been reduced from around 85% to about 23% (MfE, 1997: Section 9:59). Most (19.1%) of this remaining 23% is now managed for conservation purposes by DoC (Ministry of Agriculture and Forestry, 2001). The state of these forests varies but this is not reported on in the national State of the Environment Report (MfE, 1997). 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” (BIO, 2000b).

Some very large pest control programmes, particularly those targeting possums, are attempting to redress some of this damage.

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

Perceptions of state and trends

The vast majority of respondents considered that the condition and quantity of native bush and forests was 'adequate' or better, whereas 20% of respondents believed the condition of native bush and forests was 'very good'. Perceptions about the quantity of native bush and forests were slightly less positive, with most people viewing quantity as 'moderate' or 'high' and with only about 10% believing quantity to be 'very high'. There has been very little change in perceptions about condition and quantity of native bush and forest over the three surveys.

The position on change in forest and bush condition was mixed. Only about 40% believed there had been no change, with about equal numbers believing that

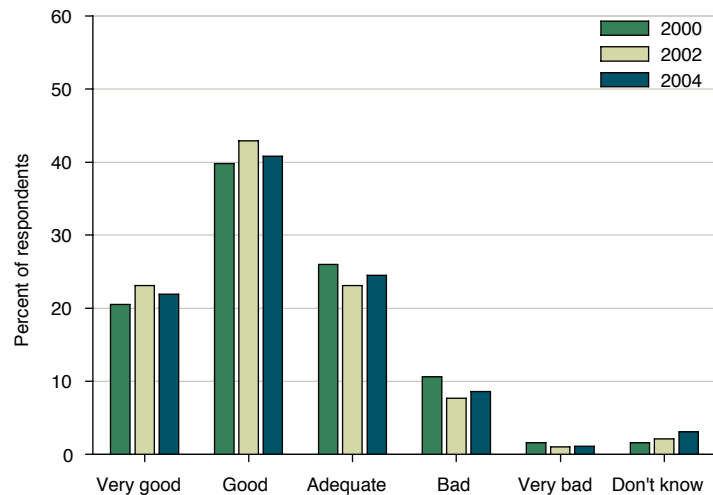


Figure 4.4a. Comparison of perceived condition of native bush and forests.

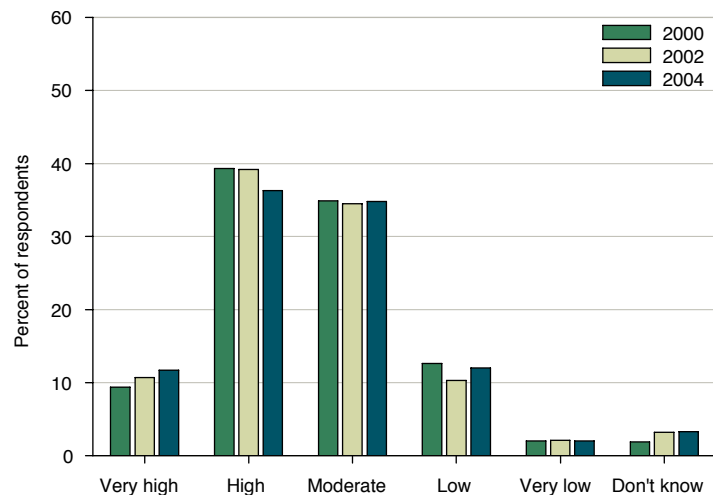


Figure 4.4b. Comparison of perceived quantity of native bush and forests.

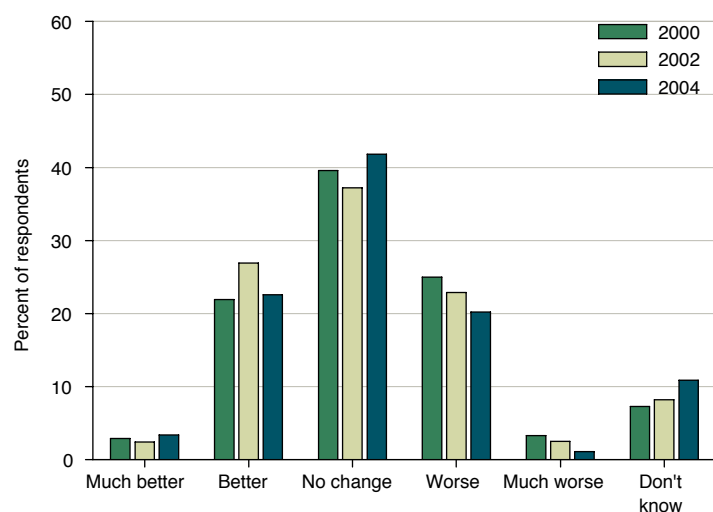


Figure 4.4c. Comparison of perceived condition of native bush and forests compared to five years ago ($P < 0.01$).

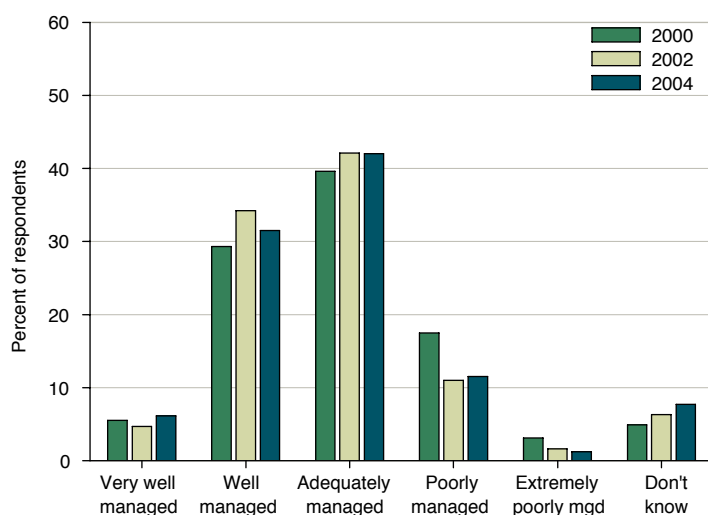


Figure 4.4d. Comparison of perceived current management of native bush and forests ($P < 0.01$).

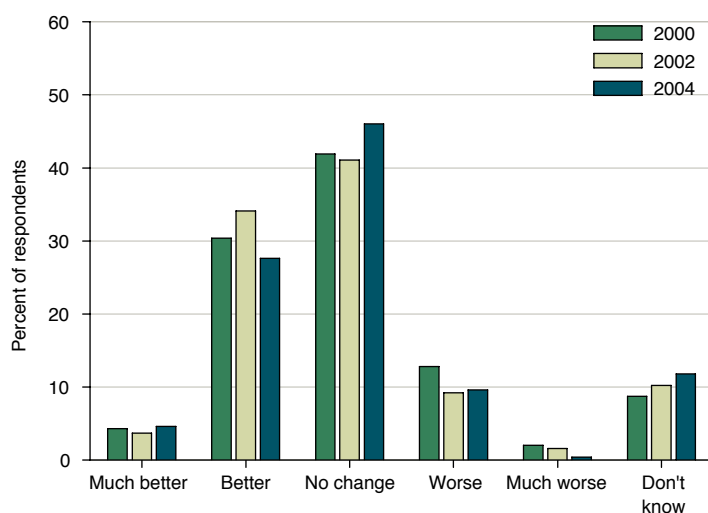


Figure 4.4e. Comparison of perceived quality of native bush and forests management compared to five years ago ($P < 0.01$).

the condition of forests and bush had improved or had deteriorated in the last five years (Figure 4.4c). Native bush and forests were considered by about 70% of respondents to be 'adequately managed' or 'well managed'. About the same percentage believed that forest management was the same as, or better than, five years ago.

Perceptions about conditions of native bush and forests compared to five years ago and perceptions about current management changed significantly over the three surveys, but with no steady positive or negative trend.

Commentary

Despite a lack of overall scientific trend data it seems likely that while the extent of native bush and forests is in fact increasing, its overall quality is probably declining as a result of pest and weed damage. This problem does not appear to be reflected in the public response which viewed native bush and forests very positively.

Most respondents believed the condition and quantity of native bush and forests in New Zealand was 'adequate' or better. This does not reflect the current mixed state of our native bush/forests, ranging from 'good' to 'very poor'. Below: students in Ulva Island forest, Stewart Island (photo K. Hughey).



4.5 SOILS

Scientific information on state and trends

Soils are crucial resources for agriculture, horticulture and forestry, yet are often the unseen resource that receives little or no media attention and/or public interest. It is clear from the State of the Environment Report (MfE, 1997) and from soil experts (Tonkin, pers. comm.) that all is not well with our soils. For example, there are accelerated rates of soil erosion in areas such as the East Coast of the North Island. Soils are often over-exploited and productivity is sustained through topdressing as basic structural components begin to break down in many areas. MfE (1997: Section 8:90) concludes that:

“The issues of more immediate concern to land users and local authorities are the serious problems caused by soil and water degradation. Although significant degradation of both soil and water is confined to only a few regions ... moderate impacts occur in all regions and at least one form of significant impact occurs in several regions.”

However, in some other respects the results are reassuring. For example, analysis of data from the 500 soils project funded by the Ministry for the Environment's Sustainable Management Fund (and others) shows that:

“Overall, New Zealand soils are in reasonable shape. But about 20% of the soils surveyed caused us some concern, chiefly because of an excess of fertilisers, rather than a deficit. Also, more than a third of soils used for pastures and cropping were compacted more than is advisable.” (Sparling 2003: pg 2).

Soils are likely to be another area where public perception is distant from research and monitoring findings. Given these findings and the importance of soils it is somewhat surprising that soils are not even mentioned in Statistics New Zealand (2002) efforts to monitor progress 'towards a sustainable New Zealand'.

The state of soils in New Zealand is clearly mixed, but overall they 'are in reasonable shape'.

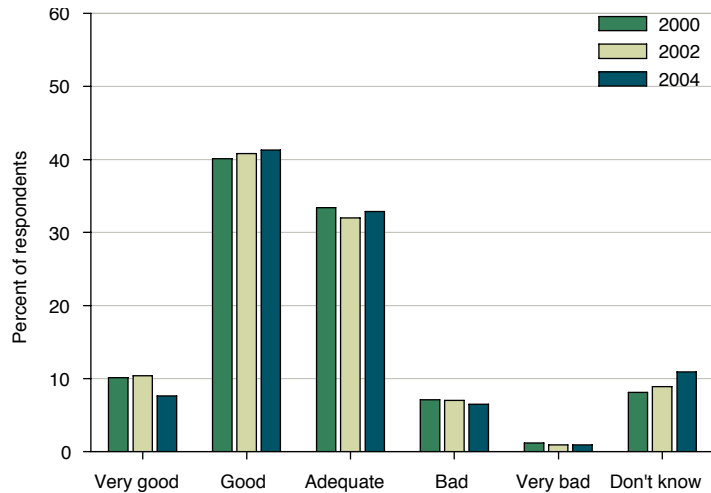


Figure 4.5a. Comparison of perceived quality or condition of soils.

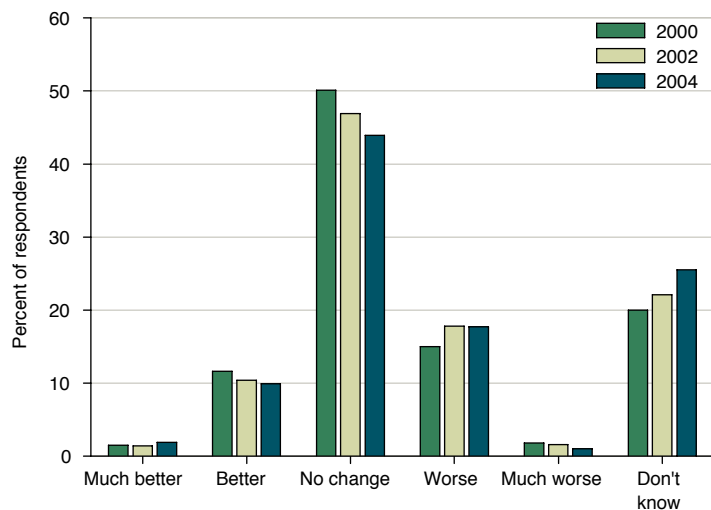


Figure 4.5b. Comparison of perceived quality or condition of soils compared to five years ago.



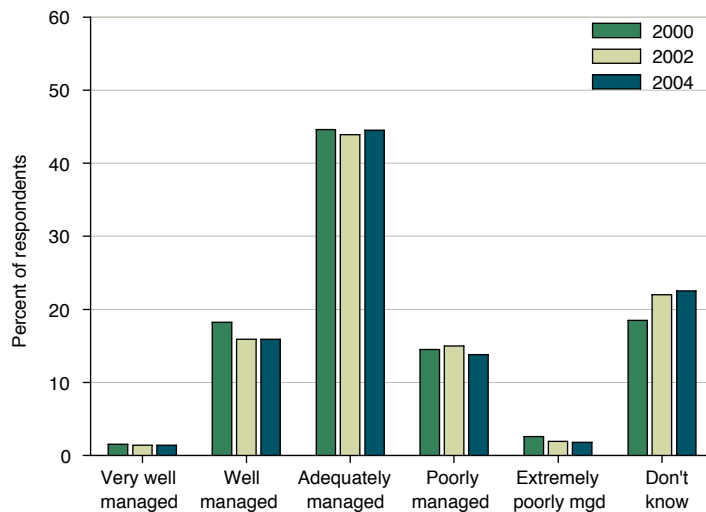


Figure 4.5c. Comparison of perceived current management of soils.

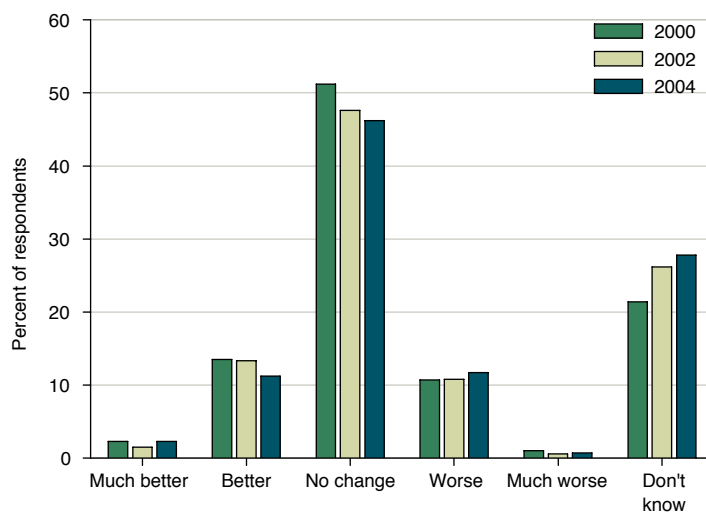


Figure 4.5d. Comparison of perceived quality of soil management compared to five years ago.

Perceptions of state and trends

The modal response is that soils were in 'good' condition, with about 80% of respondents believing the condition of soils to be 'adequate' or better. Most people reported that the condition of soils had not changed, or that they did not know (Figure 4.5b). Slightly more people reported that soils had changed for the worse than the number who thought that soil condition had improved. Management was deemed to be 'adequate' but unchanged over the past five years. There were no significant differences between the three surveys for any of the data presented here, although an increasing (but not significant) number of people were responding 'don't know'.

Commentary

Without easily understood information it is probably difficult for respondents to judge trends in the state of soils in New Zealand. Despite this problem, around 90% of respondents were prepared to express an opinion on soil condition, although around 20% express 'don't know' responses to the other questions. People's perceptions do not match the science findings, which indicate problems with soil condition and management in some areas.

New Zealand's soils are currently of variable condition, with moderate impacts occurring in all regions, but with some areas showing significant degradation. Respondents' perceptions of soils being in 'adequate' or better condition are inconsistent with these findings. Below: natural erosion patterns, Hope River Valley (photo K. Hughey).



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 (MfE 1997). 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 MfE (1997) reports a loss of mangroves during the 20th century, continued discharges of concentrated nutrients into estuaries and harbours, and reclamations. Statistics New Zealand (2002: pg 34) reported that 94% or more of between 33 and 141 monitored beaches were safe for recreational contact over the period 1998/99 to 2001/02.

Despite reclamations, loss of some mangroves and localised water pollution, the overall state of New Zealand's coastal waters and beaches should be considered to be 'good' or 'very good'.

Perceptions of state and trends

Most New Zealanders believed the quality or condition of the coastal environment was 'good' or 'very good', with most of the rest thinking it was 'adequate'. Over 30% of respondents considered there has been a decline in condition over the last five years (Figure 4.6b). Management was generally considered to be 'adequate', although over 20% of respondents believed that coastal waters and beaches were 'poorly managed'. Most people who expressed an opinion believed that management quality was unchanged over the past five years, with about the same numbers opting for management getting better as for management getting worse.

There were two significant differences in responses over the three surveys; condition of coastal waters and beaches compared to five years ago and management compared to five years ago. Neither showed a consistent trend over the three surveys, except for a small increase in the number of 'don't know' responses.

Regional analysis showed almost 50% of northern region respondents considered the condition of coastal waters and

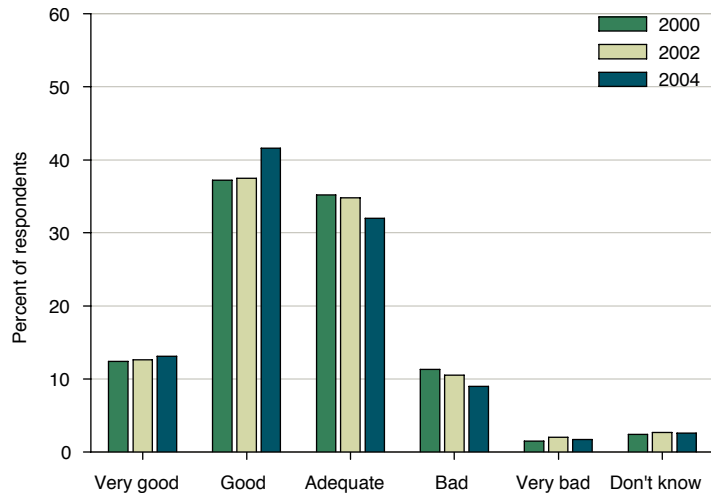


Figure 4.6a. Comparison of perceived quality or condition of coastal waters and beaches.

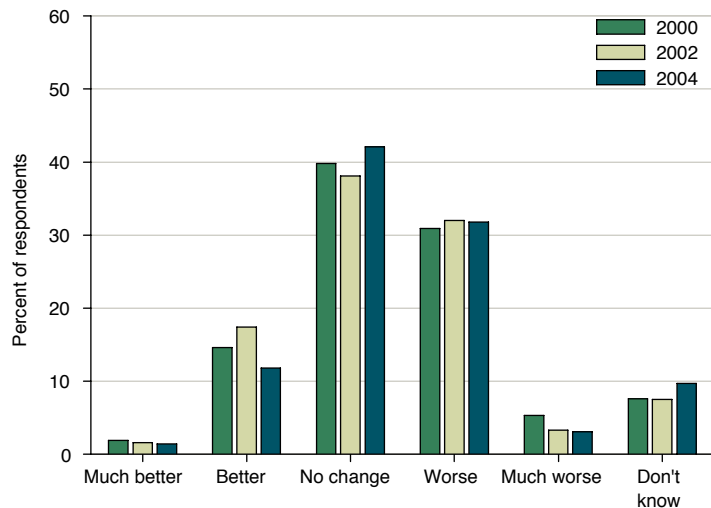


Figure 4.6b. Comparison of perceived condition of coastal waters and beaches compared to five years ago ($P < 0.05$).

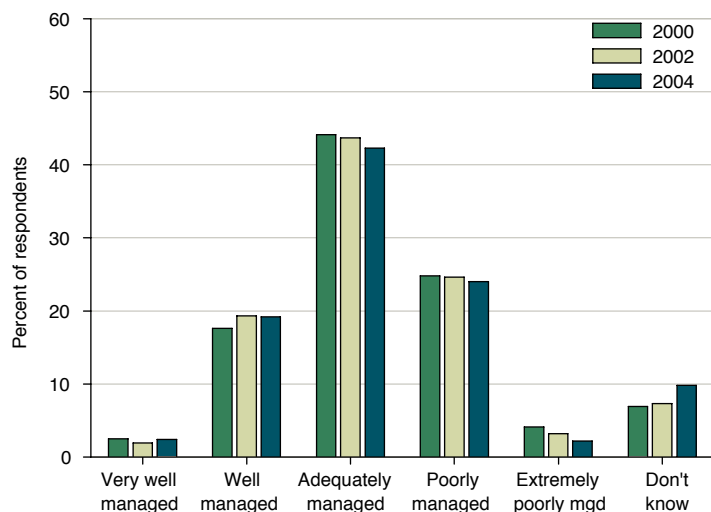


Figure 4.6c. Comparison of perceived current management of coastal waters and beaches.

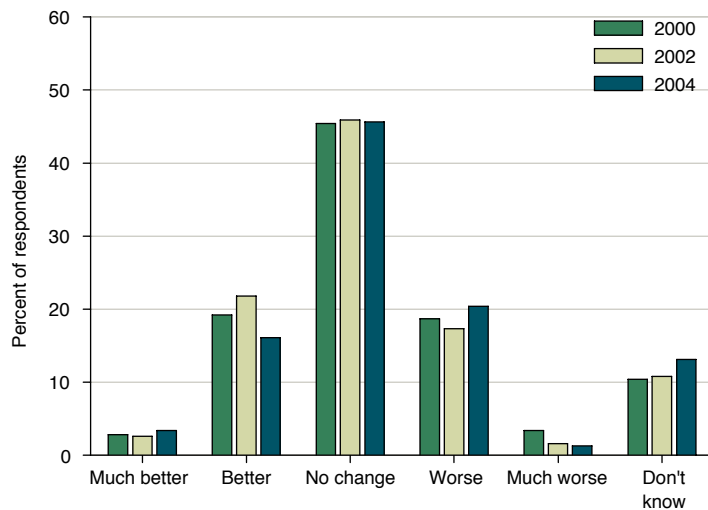


Figure 4.6d. Comparison of perceived management of coastal waters and beaches compared to five years ago ($P < 0.05$).

Most respondents believe the quality of the coastal environment is 'good' or 'very good', although almost half of the northern region respondents consider their condition has worsened over the past five years. Below: Pancake Rocks, Punakaiki (photo S. McMurtrie).

beaches had worsened over the past five years, and about a third thought management over the same period was worse. Both of these responses were more pessimistic than in other parts of the country.

Commentary

There are no real surprises in these responses. Perhaps of concern to policy makers, given the existence of a clear coastal management framework, which has been in place since 1991, and the ongoing development of an Oceans Policy, is the perceived decline in environmental quality over the last five years. While MfE (1997: Section 7:88) notes that point source discharges have become better managed over the last 20-30 years there may be other factors influencing public concern in this area. Probably the most noteworthy finding is the level of concern expressed by northern respondents, possibly reflecting the higher coastal resource development pressures in this region.



4.7 MARINE FISHERIES

Scientific information on state and trends

There is ongoing scientific and public debate 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). However, the QMS has not solved all fishery management problems. In particular, some fish stocks have declined, some species outside the QMS are under pressure, and illegal fishing activities, including high grading and misreporting of bycatch, and the environmental effects of fishing are all recognised as being important (Ministry of Fisheries, 2004).

Measures of sustainability are available for only 76 of 272 fish stocks in the Quota Management System (Statistics New Zealand, 2002: pg 35). Fourteen of 40 stocks for which there is information are below target stock levels. There have been some well publicised errors in quota setting. For example, the initial quota 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. Since the early 1990s, in response to declining fish stocks, the quota steadily declined until a quota of 1 tonne was set in the 2000/01 fishing year. 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 (Hughey *et al.*, 2002), within the country there is much debate about the direction of management. There are initiatives underway to establish integrated fisheries plans to overcome remaining management issues.

The overall state of marine fisheries in New Zealand is therefore very mixed, from 'very good' to 'very bad', and therefore can at best only be regarded as adequate.

Perceptions of state and trends

Most New Zealanders believed the quality of marine fisheries was 'adequate' to 'good'. Although most believed that the quantity of marine fisheries was 'moderate', more people perceived quantity to be 'high' rather than 'low'. About one quarter of respondents did not offer an opinion on

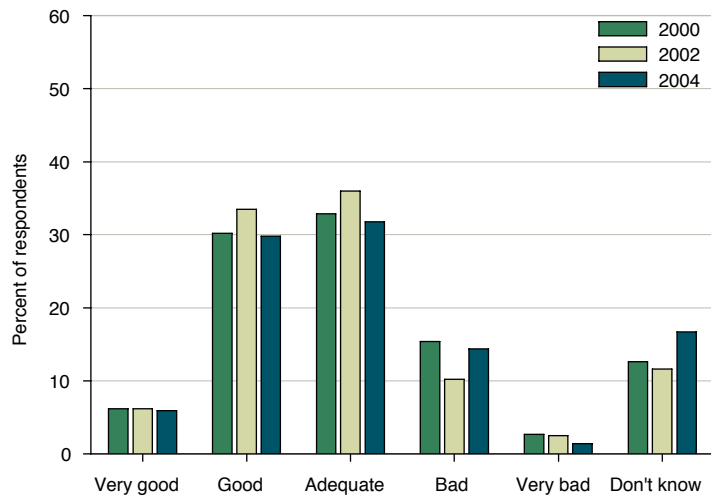


Figure 4.7a. Comparison of quality or condition of marine fisheries (P < 0.01).

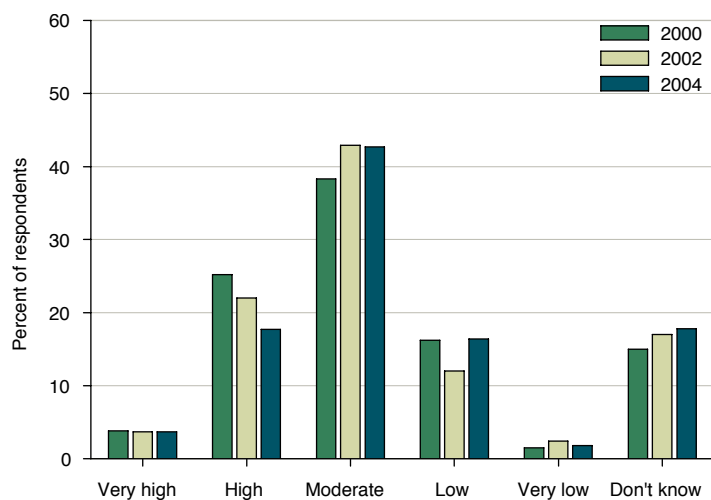


Figure 4.7b. Comparison of quantity of marine fisheries (P < 0.01).

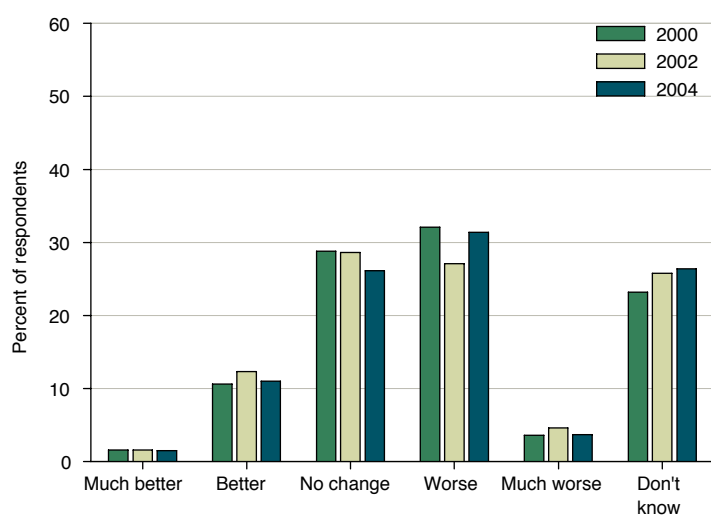


Figure 4.7c. Comparison of perceived condition of marine fisheries compared to five years ago.

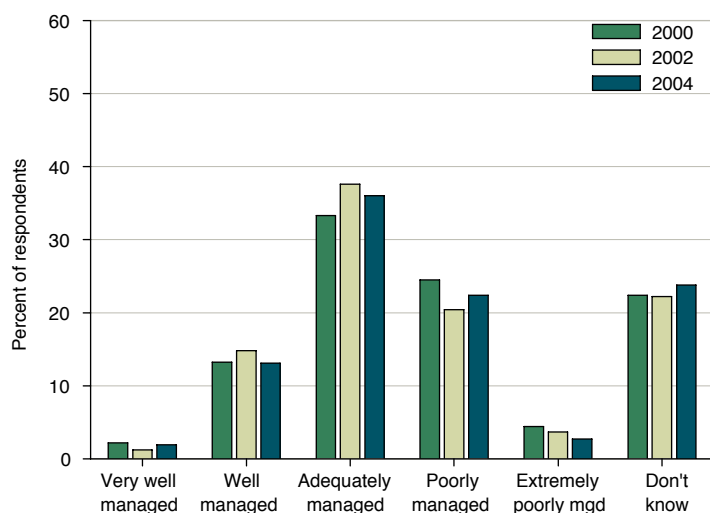


Figure 4.7d. Comparison of perceived current management of marine fisheries.

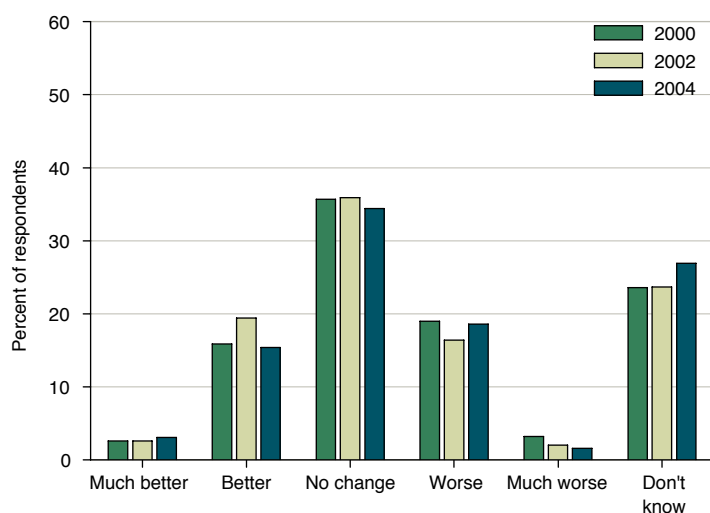


Figure 4.7e. Comparison of perceived quality of marine fisheries management compared to five years ago.



the condition of marine fisheries relative to five years previously. Of those who did, most believed there was either no change or that fisheries condition had worsened (Figure 4.7c).

About one third of respondents thought that marine fisheries were 'adequately managed', and about one quarter believed they were 'poorly managed'. Of people offering an opinion, the modal response was that quality of marine fisheries management had not changed over the previous five years. The number of respondents who thought that fisheries management had improved was about the same as the number who thought it had worsened.

All three surveys to date rated marine fisheries as the worst environmental sector for all of the pressure, state and response criteria considered. This finding was tempered by recognition that, although marine fisheries rated the worst, they and their management were generally rated in the 'adequate' range.

There were significant differences between the three surveys for both condition of fish stock and quantity of fish stock. An increasing number of respondents gave 'don't know' responses, and there was an overall decline in the percentage who provided positive ratings.

Commentary

It is notable that in all three surveys large numbers of people expressed 'don't know' responses for many marine fishery-related questions, the proportions ranging from around 12-27% of respondents. These proportions generally increased through time. The high 'don't know' responses might, in part, reflect the high level of scientific uncertainty about the status of many marine fisheries and the claims and counter claims made by fisheries and environmental organisations about the status of New Zealand marine fisheries. Increase in intensity of that debate could be associated with the increasing frequency of 'don't know' responses.

The overall state of New Zealand's fisheries can be regarded as 'adequate' at best, with the condition (and in some cases, knowledge) of different species varying widely. While some aspects of New Zealand fisheries management are viewed internationally as world-leading, within the country there is much debate about the direction of management. Left: commercial fishing boats in Lyttelton Harbour (photo K. Hughey).

4.8 MARINE RESERVES

Scientific information on state and trends

There are 19 marine reserves in New Zealand, representing less than 0.1% of New Zealand's Exclusive Economic Zone (EEZ). This fraction is very low when compared to terrestrial reserves, which cover about 30% of New Zealand's land area (DoC, 2004b).

The overall state of resources in these 19 reserves has not been quantified but is likely very high compared to surrounding areas (see Willis *et al.*, 2003a regarding snapper abundance). However, there is a lack of empirical research internationally that demonstrates these gains (see Willis *et al.*, 2003b: pg 101). On the other hand it is also clear that the marine reserves network is far from representative of the diversity of marine environments present in the New Zealand EEZ.

Given the above observations it appears likely that while the existing marine reserves are in 'good' condition, the overall network is insufficient to meet basic conservation requirements.

Perceptions of state and trends

Most people thought there was a 'moderate' or 'low' quantity of marine reserves in New Zealand, although there had been a significant shift in perceptions from 'low' towards 'high' quantity over the three surveys. While most people considered the condition of marine reserves compared to five years ago had improved or had not changed, around 25% of people expressed a 'don't know' view (Figure 4.8b). Most people thought marine reserves were 'adequately' or 'well' managed. The question on management of marine reserves compared to five years ago was accidentally omitted from the 2004 survey.

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 quarter of all respondents provided this response in 2004). However, most of New Zealand's marine reserves are near major cities or tourism destinations, which may have led

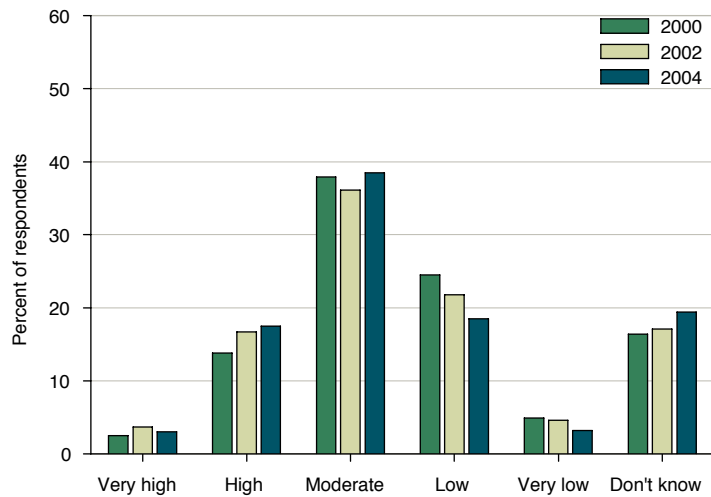


Figure 4.8a. Comparison of perceived quantity of marine reserves ($P < 0.05$).

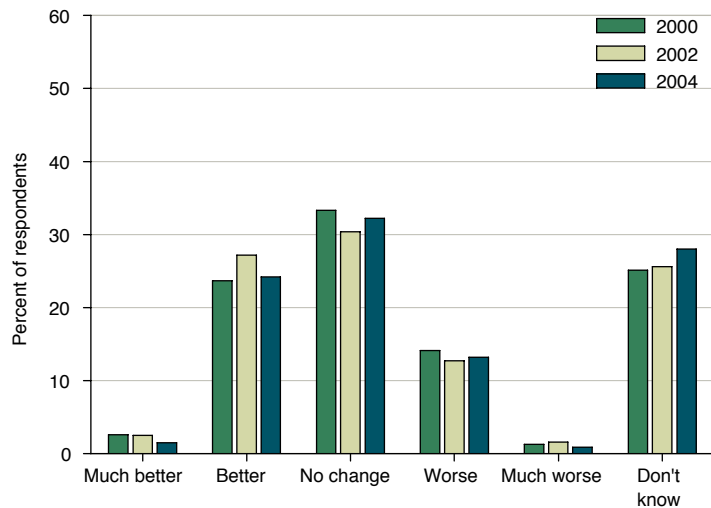


Figure 4.8b. Comparison of perceived condition of marine reserves compared to five years ago.

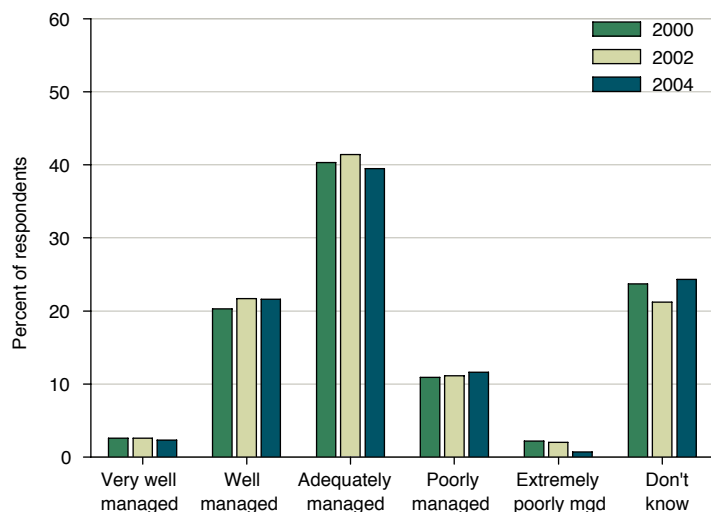


Figure 4.8c. Comparison of perceived current management of marine reserves.

to the impression that marine reserves are more common than they really are. Respondents may 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, about a third of New Zealanders engage in marine recreational fishing (Hughey *et al.*, 2002) and may lose recreational fishing opportunities with an increase in marine reserves. It is notable that marine recreational fishers frequently express strong opposition to marine reserve proposals (Hughey, 2000).

4.9 FRESHWATER, RIVERS AND LAKES AND GROUNDWATER

Scientific information on state and trends

MfE (1997: Section 7: 88) concludes that:

“Water quality is generally high around the coast, in deep lakes, and in the headwaters of most rivers, and in many cases this is maintained into lowland areas. However, water quality deteriorates in streams, rivers and lakes which drain agricultural catchments, with agricultural run-off causing elevated nutrient and sediment loads.”



Left: New Zealand's marine reserves represent a tiny fraction of our EEZ (< 0.1%). North-west circuit of Stewart Island, where there are currently no marine reserves (photo K. Hughey). Above: most respondents considered freshwater to be of 'adequate' or better quality, although there was a perception of worsening quality. Indeed, water quality is generally high in headwater areas, but deteriorates in many lowland areas draining agricultural catchments. Thunder Falls, West Coast (photo S. McMurtrie).

In similar vein, Statistics New Zealand (2002: pg 36) notes:

“As a general rule ‘lowland’ rivers, whose catchments are dominated by agricultural land use, ‘pull down’ general compliance with nutrient criteria...”

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

Perceptions of state and trends

In 2000 and 2002, respondents were asked about condition, quantity and management of freshwater (Figures 4.9 a-e). In 2004, the freshwater category was replaced by two separate categories, ‘rivers and lakes’ and ‘groundwater’, because of the different environmental impacts and management issues related to them (Figures 4.9 f-j).

Although most people had opinions on the quality, quantity and management of freshwater (2000 and 2002) and rivers and lakes (2004), there was a much higher proportion of ‘don’t know’ responses for questions on groundwater (2004), possibly because groundwater is not ‘seen’.

The quality of freshwater was judged to be ‘adequate’ or ‘good’, and the amount of freshwater was mostly considered to be either ‘moderate’ or ‘high’ (total of about 75%) in the 2000 and 2002 surveys. The 2004 survey obtained somewhat more pessimistic responses. Whereas in the 2000 and 2002 surveys about 45% of respondents rated freshwater quality as better than ‘adequate’, this figure fell to about 35% in 2004. An even more emphatic shift occurred for water availability, with about 50% providing ratings of better than ‘moderate’ in the two early surveys, but less than 30% doing so in 2004.

The condition and management of rivers and lakes and groundwater are mostly considered to be the same or worse than they were five years previously, similar to responses for freshwater in earlier surveys.

Nearly half of respondents in 2000 and 2002 considered that freshwater management was ‘adequate’, with about equal numbers holding more optimistic or more pessimistic views. Perceived quality of management was lower in 2004 (noting the different questions), with only about 40% of respondents believing that groundwater and rivers and lakes were adequately managed and with more people evaluating management as ‘poor’ or ‘very poor’ than evaluating these resources as ‘well managed’ or ‘very well managed’.

In 2004, significantly more Maori thought the amount of freshwater in rivers and lakes was ‘bad’ than did people in the ‘others’ (i.e. non-Maori and non-NZ European) ethnicity group, about half of whom thought the amount was ‘good’. A similar pattern emerged for the availability of groundwater

for human use. In terms of change over the previous five years, more than half the Maori and NZ European respondents thought the condition of rivers and lakes was worse, but only around 40% of ‘others’ thought that. Other questions showed similar patterns. Maori consistently expressed the lowest levels of satisfaction with water availability, quality, and management and ‘others’ expressed the highest levels of satisfaction on these items.

Commentary

There is clearly a perception that the quality of freshwaters, particularly rivers and lakes, is worsening, although this conclusion needs to be tempered by the fact that the vast majority still view quality or condition as being adequate or better. This perception of change might be a response to heightened media activity in water quality issues, such as the prominent ‘dirty dairying’ campaign implemented by Fish and Game New Zealand. The significantly more negative views from Maori perhaps reflect the importance of freshwaters to this ethnic group. Development of a Cultural Health Index for streams and waterways (Tipa and Teirney, 2003) may reflect the importance of this resource and the low ratings given by Maori.

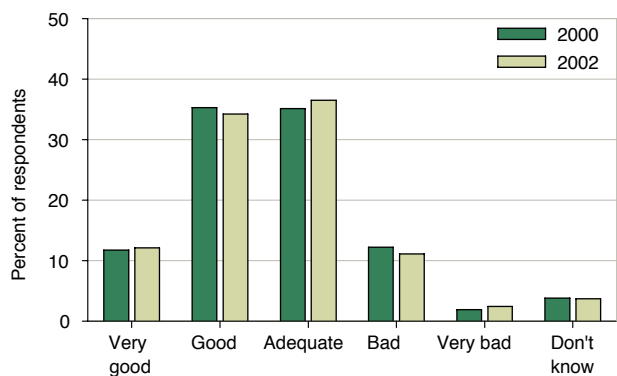


Figure 4.9a. Comparison of perceived quality or condition of freshwater.

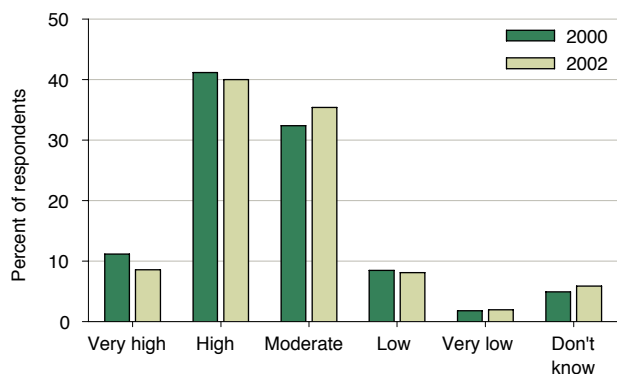


Figure 4.9b. Comparison of perceived amount of freshwater.

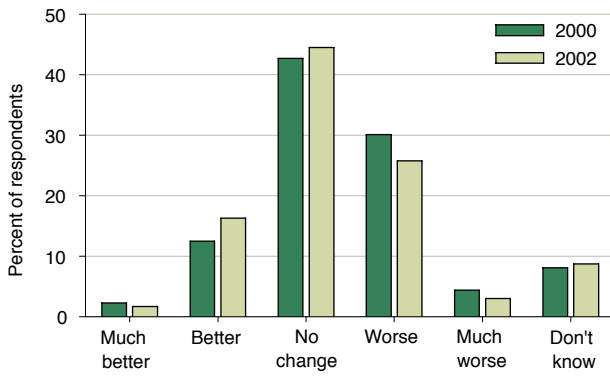


Figure 4.9c. Comparison of perceived condition of freshwater compared to five years ago.

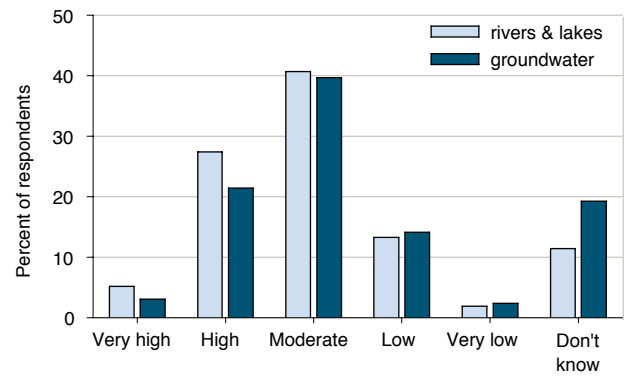


Figure 4.9g. Perceived amount of freshwater in rivers & lakes and availability of groundwater for human use.

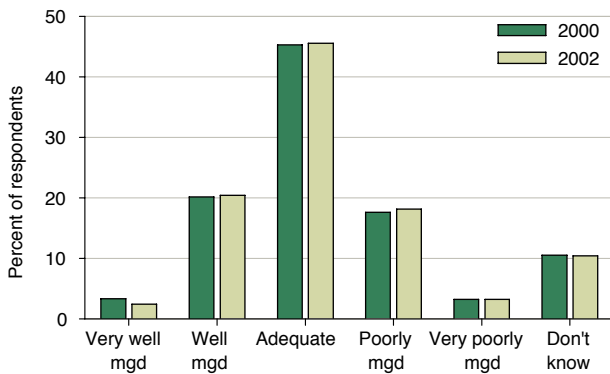


Figure 4.9d. Comparison of perceived current management of freshwater.

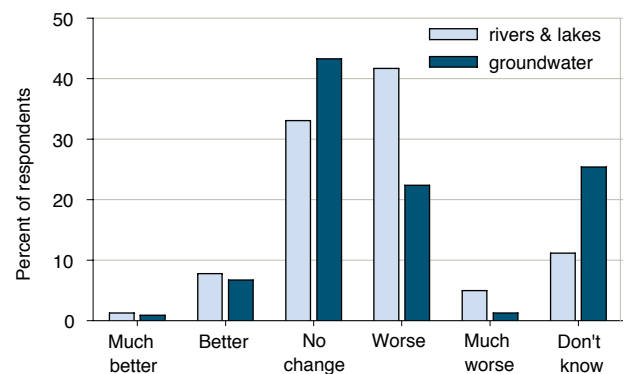


Figure 4.9h. Perceived qualities of freshwater in rivers & lakes and groundwater compared to five years ago.

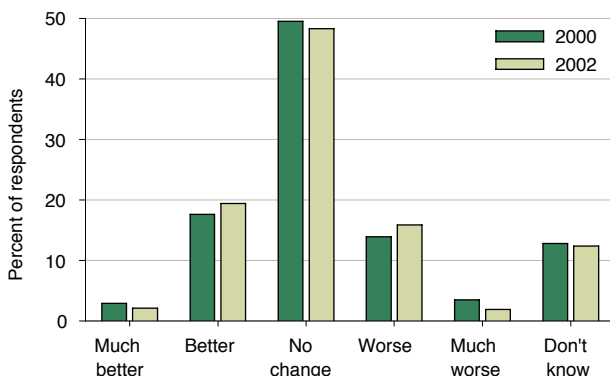


Figure 4.9e. Comparison of perceived current management of rivers & lakes and groundwater compared to five years ago.

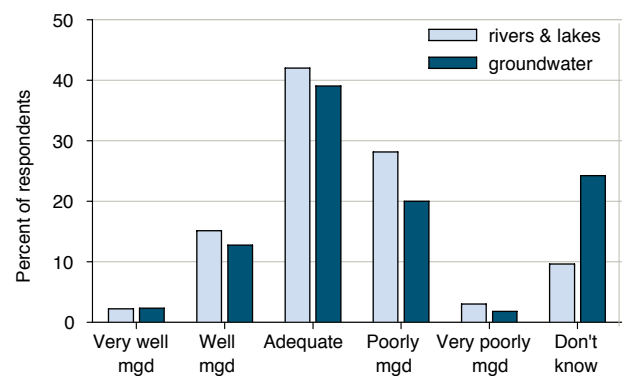


Figure 4.9i. Perceived current management of rivers & lakes and groundwater.

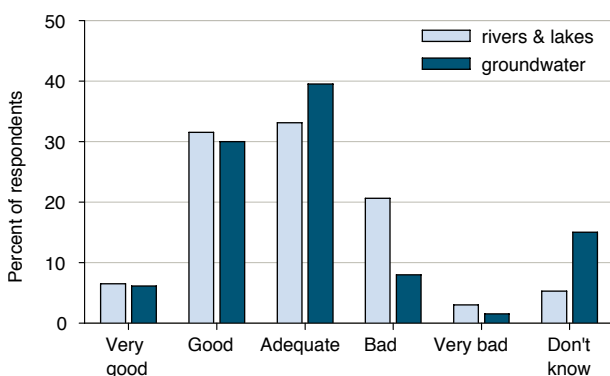


Figure 4.9f. Perceived quality or condition of rivers & lakes and groundwater.

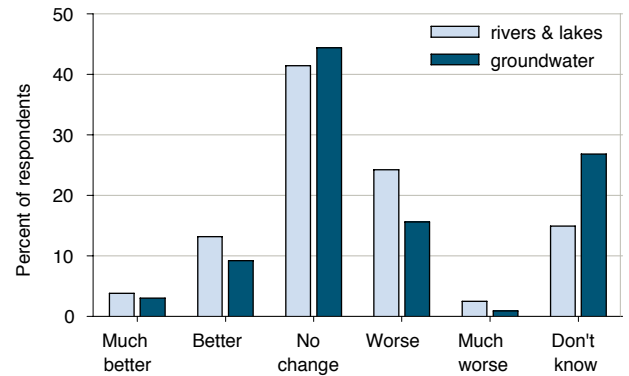


Figure 4.9j. Perceived management of rivers & lakes and groundwater compared to five years ago.

4.10 NATIONAL PARKS

Scientific information on state and trends

New Zealand has 14 national parks and more than five million hectares - a third of New Zealand - protected in parks and other reserve areas. While these areas embody a remarkable variety of landscapes and vegetation (DoC, 2004c), an incomplete range of environments and ecosystems is represented within the country's protected area network (Statistics New Zealand, 2002). Moreover, a disproportionate quantity of national parks and other reserves are located in the South Island, mostly in difficult-to-access mountainous areas.

National parks in New Zealand are dominated by mountain lands and forests. While the quality of the mountain lands is very high, the state of forests is likely to be mixed because of the impacts of weeds and pests (see Section 4.4). The overall state of national parks can therefore be considered as 'good'.

Perceptions of state and trends

About 60% of respondents considered the area of National Parks to be 'good' or 'very good'. Most people thought the condition of National Parks over the last five years had either not changed or it had improved. There was a significant difference between the three surveys with more respondents in 2002 and 2004 considering there was an improvement in condition. There was also a significant difference in evaluations of the quality of national park management compared to five years previously, with an overall perceived improvement. Over 80% of people thought management was either 'adequate' or 'good', with around 75% reporting it was the 'same' or 'better' than five years previously.

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. This importance and the level of management input is possibly reflected in survey responses which evaluate national parks very positively.

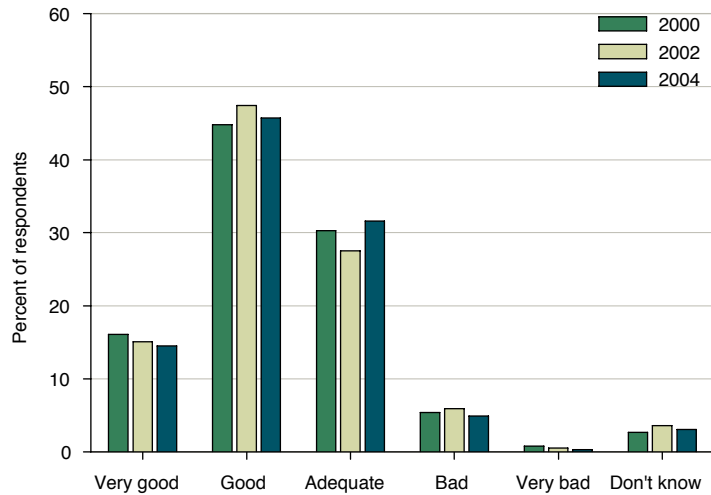


Figure 4.10a. Comparison of perceived area of national parks.

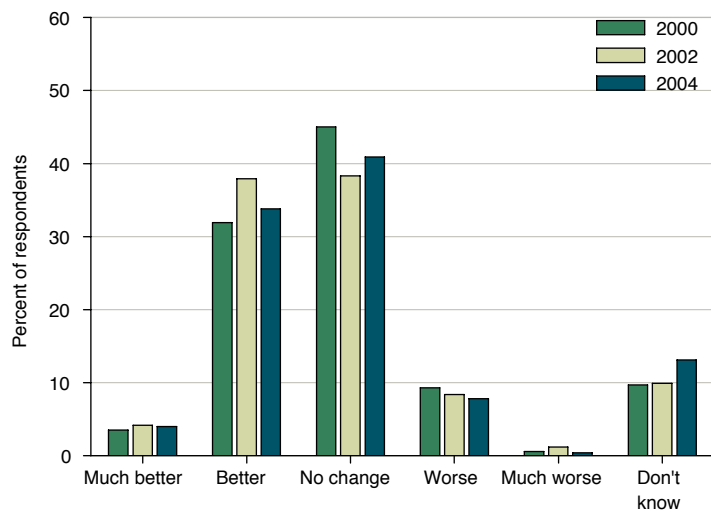


Figure 4.10b. Comparison of perceived condition of national parks compared to five years ago ($P < 0.05$).

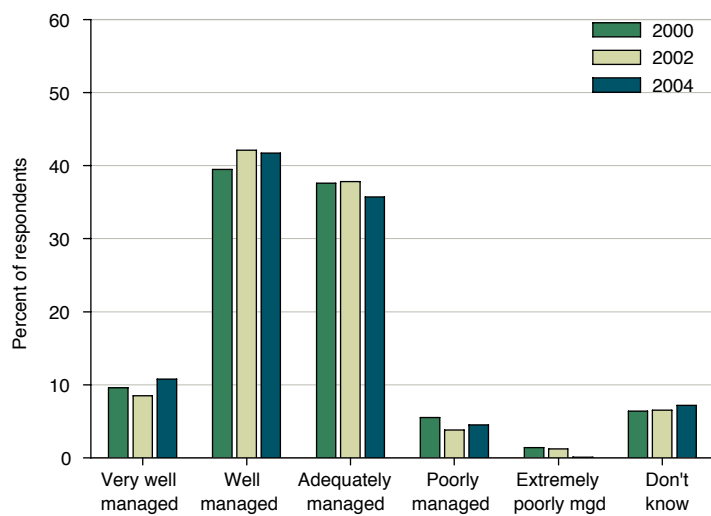


Figure 4.10c. Comparison of perceived current management of national parks.

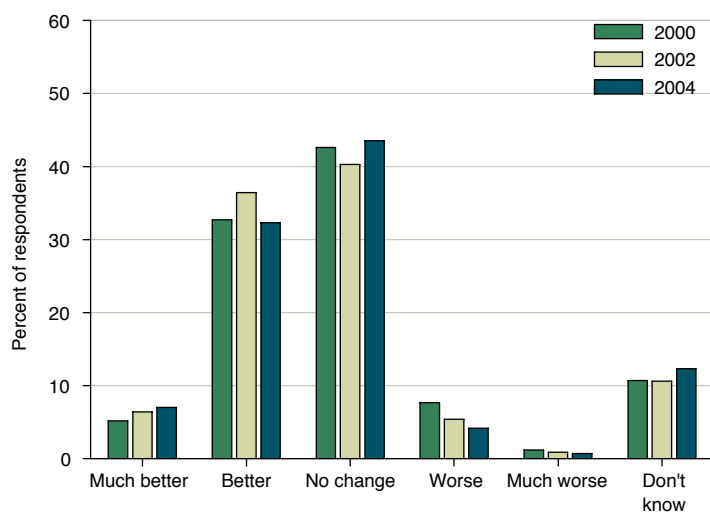


Figure 4.10d. Comparison of perceived management of national parks compared to five years ago ($P < 0.1$).

A third of New Zealand is protected in parks and other reserve areas, (considered to be a 'good' or 'very good' amount by respondents), although an incomplete range of environments and ecosystems are represented. The overall state of our national parks is considered to be good. Below: camping at the base of Mount Irene, with Coronation Peak in the distance, Fiordland National Park (photo R. Dale).



4.11 WETLANDS

Scientific information on state and trends

The area of wetlands is hugely reduced over former times with only an estimated 10% of the pre-human extent of wetlands remaining in New Zealand (MfE, 1997). Classification sheets for assessment of wetland quality have been developed (Clarkson *et al.*, 2003), but there are insufficient results to determine the state of wetlands (Jonet Ward, Lincoln University, pers. comm. 2004). Nevertheless, there is a range of documentation that enables tentative conclusions about wetland state to be drawn. The Parliamentary Commissioner for the Environment (2002: pg 5) concludes 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”.

Similar conclusions are drawn by the Office of the Controller and Auditor General (2001: pg 54), who state 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 Convention¹”.

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

Perceptions of state and trends

New Zealanders generally believed the condition of wetlands was 'adequate' or 'good' (Figure 4.11a). Respondents were about equally divided as to whether wetland area was 'low' or 'very low' or 'high' or 'very high'. The modal response in all years, at about 40% of responses, was that there was a 'moderate' area of

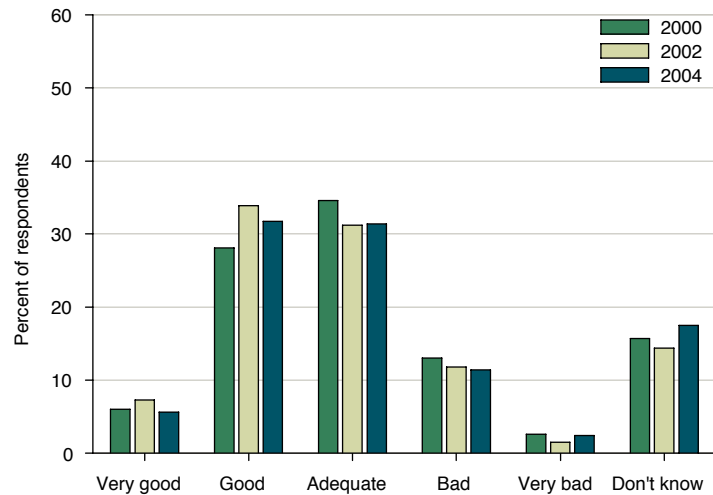


Figure 4.11a. Comparison of perceived condition (quality) of wetlands.

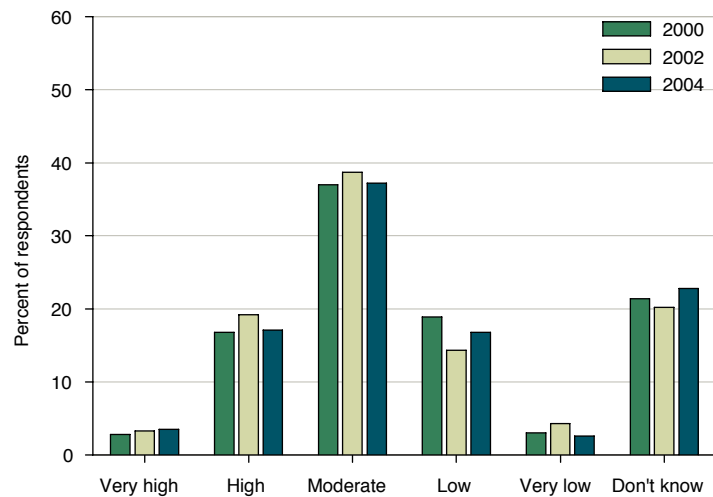


Figure 4.11b. Comparison of perceived area of wetlands.

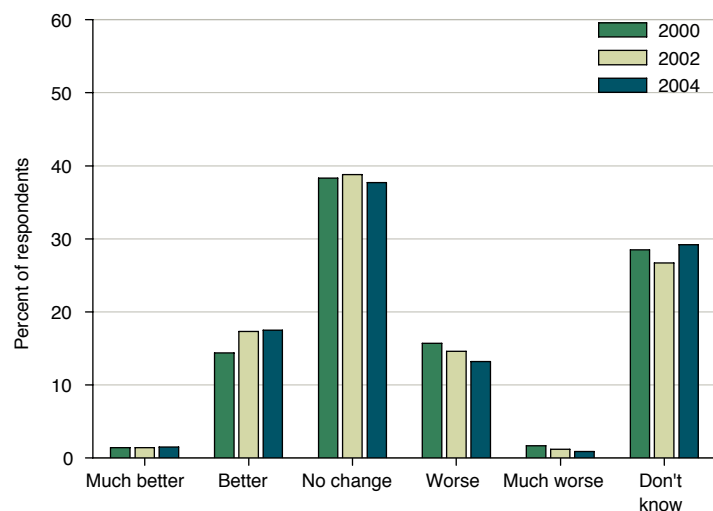


Figure 4.11c. Comparison of perceived condition of wetlands compared to five years ago.

¹ The Ramsar Convention refers to the Convention on Wetlands of International Importance adopted in 1971 and signed by New Zealand in 1976.

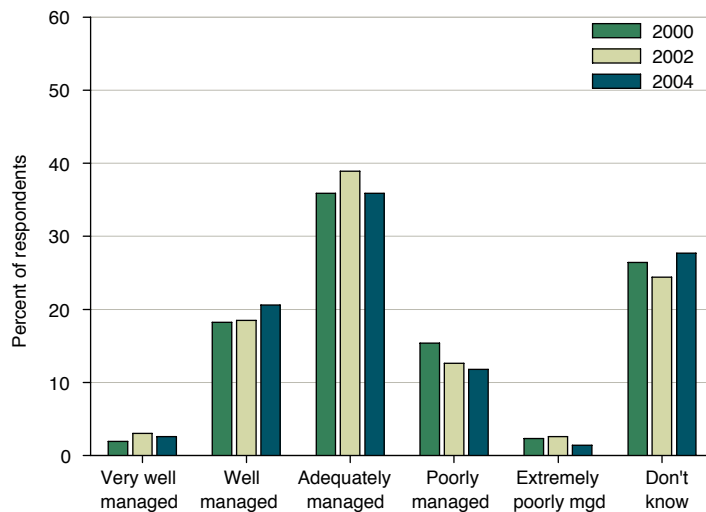


Figure 4.11d. Comparison of perceived current management of wetlands.

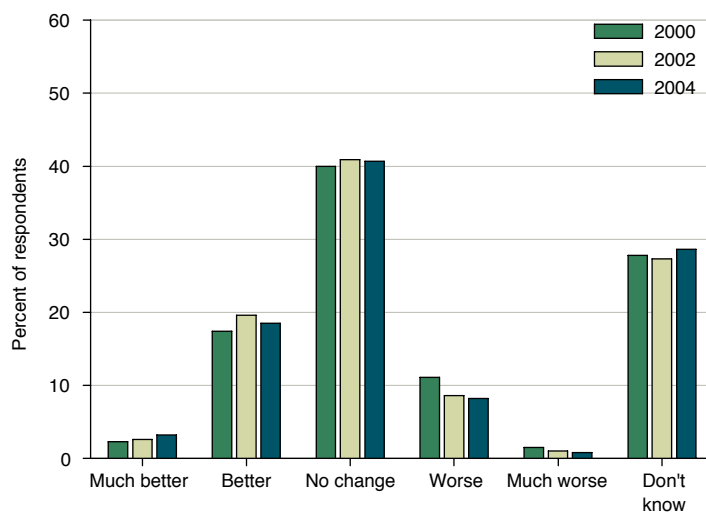


Figure 4.11e. Comparison of perceived management of wetlands compared to five years ago.

wetlands (note, however that there was a large 'don't know' response to some of the wetland questions). There was an equal division between those who thought wetland conditions had got better and those who thought they had worsened, although the modal response was no change. About one quarter of respondents did not evaluate current management, and even more failed to evaluate changes in management compared to five years previously. Of those who provided an evaluation, the weight of opinion was that wetlands were either 'adequately' or 'well' managed and that their condition was the same as before, or improving.

Commentary

There is probably a lack of knowledge about the pressures, state and responses to wetland issues in New Zealand - this is mirrored to some extent by the high frequency of 'don't know' responses when asked about the condition of wetlands compared to five years previously. Having said this, it is somewhat surprising that around 70% of respondents considered the condition or quality of wetlands to be 'adequate' to 'good'.

Respondents considered wetlands were either adequately or well managed, and their condition had improved or was the same as in previous years. However, current knowledge indicates New Zealand's wetlands are being degraded by drainage, pollution, animal grazing, and introduced pests. Below: kahikatea swamp forest, Mitchells Wetland, Lake Brunner (photo S. McMurtrie).



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

Scientific information on state and trends

It is not always easy to determine relative performance on an international basis. The Environmental Sustainability Index (ESI) is a joint initiative of the World Economic Forum's Global Leaders for Tomorrow Environment Task Force, the Yale Center for Environmental Law and Policy, and the Columbia University Center for International Earth Science Information Network (CIESIN). The ESI provides a measure of overall progress towards environmental sustainability, developed for 142 countries (World Economic Forum's Global Leaders for Tomorrow Environment Task Force *et al.*, 2002). ESI scores are based upon a set of 20 core "indicators," each of which combines two to eight variables for a total of 68 underlying variables. The ESI permits cross-national comparisons of environmental progress in a systematic and quantitative fashion. Overall, New Zealand ranks 19th of 142 nations evaluated in the ESI - it ranks best for air quality and worst for biodiversity loss. New Zealand ranks ahead of the Netherlands (34th) and the United States of America (45th), but ranks behind Finland (1st), Canada (4th) and Australia (16th).

Given the above it would be appropriate to conclude that the state of the New Zealand environment is comparable, and better in some areas (e.g., marine fisheries) and worse in others (e.g., biodiversity), to nations in the upper quartile of the ESI.

Perceptions of state and trends

Most people thought that compared to other developed countries, the natural environment in New Zealand was 'good' or 'very good', with about 80% of people giving one of these two responses (Figure 4.12a). Furthermore, over 60% thought the condition of the New Zealand environment had become 'better' or 'much better' compared to the environments of other developed countries. Hardly any respondents thought management of New Zealand's environment was 'worse' than other developed countries, reinforced by an impression that management of New Zealand's environment was improving

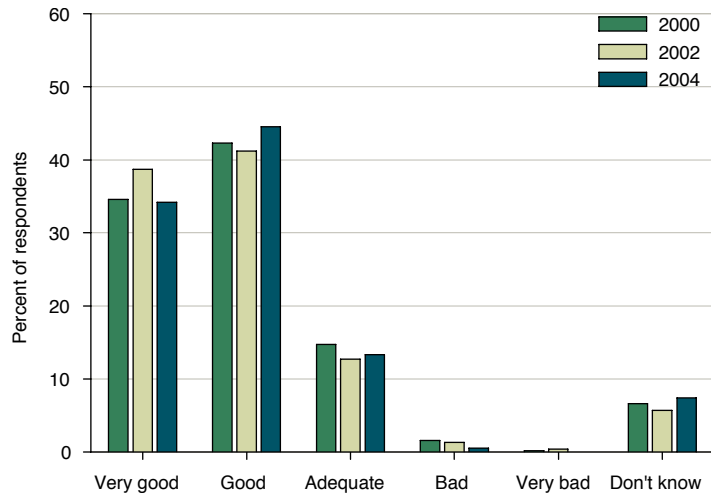


Figure 4.12a. Comparison of perceived condition of New Zealand's natural environment compared to other developed countries.

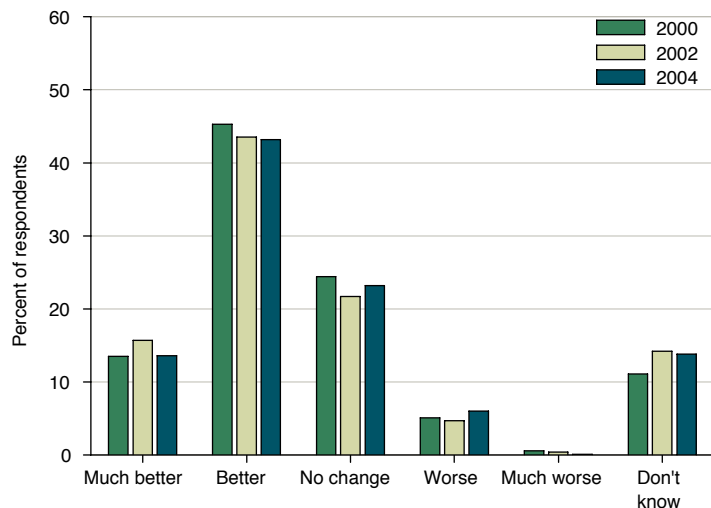


Figure 4.12b. Comparison of perceived condition of New Zealand's natural environment compared to other developed countries, compared to five years ago.

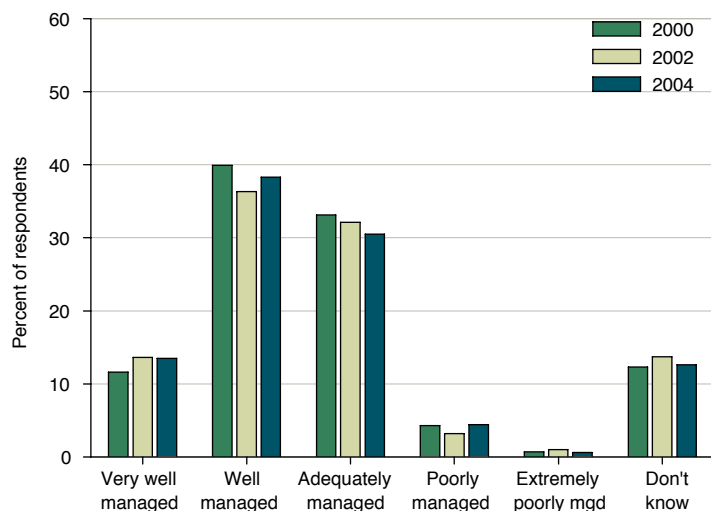


Figure 4.12c. Comparison of perceived current management of New Zealand's natural environment compared to other developed countries.

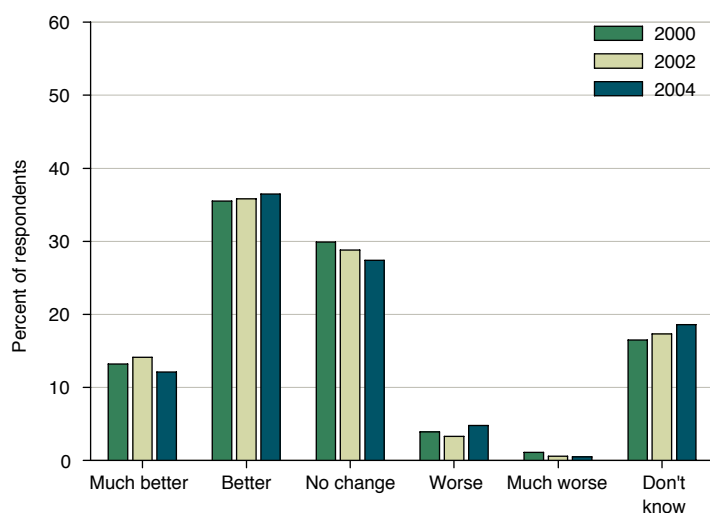


Figure 4.12d. Comparison of perceived management of New Zealand's natural environment compared to other developed countries, compared to five years ago.

The majority of respondents ranked the natural environment in New Zealand as 'good' or 'better' compared to other developed countries. This is relatively consistent with New Zealand's current ranking of 19th overall out of 142 nations evaluated in the international Environmental Sustainability Index; including the best rank for air quality, but worst for biodiversity loss. Below: setting camp by a tarn near Mount Irene, Fiordland National Park (photo R. Dale).



compared to other developed countries. There was no significant difference in responses for any of these questions over the three surveys.

Commentary

Massey University (2001) found that 42% of people do not believe New Zealand is clean and green. However, that does not mean that New Zealanders evaluate the quality of their environment negatively when compared with other countries. Survey responses reinforce the view that New Zealanders believe they live in a cleaner and greener environment than is found in other developed countries. This view concurs with the conclusions from the World Economic Forum (2002) report, which ranks New Zealand highly for environmental sustainability.



Opencast coalmine, Southland (G. Kerr)

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 ASSESSMENT OF THE STATE OF THE ENVIRONMENT

Respondents believe the quality of life in New Zealand is good. Their assessment was that New Zealand is a clean and green land although their responses were a little less positive than the 2002 responses to a similar question. New Zealanders judged that they have good knowledge of the environment. That may be a reasonable claim, as more than 50% of respondents participated in seven different environmental activities during the past year (Figure 3.21).

5.2 PRESSURES ON THE ENVIRONMENT

The New Zealand economy has grown strongly during the past five years with cumulative GDP growth of 20.3%. During the same five year period the New Zealand population has grown steadily and now exceeds 4 million people. Growth in the economy can increase pressures on the environment. Each of the 2000, 2002 and 2004 surveys asked respondents about the pressures on the New Zealand environment. Their responses indicated a

belief that growth in production and consumption as well as intensification of some activities including farming, forestry and fishing is increasing pressure on components of the environment.

- Respondents in 2004 judged that emissions from various sources exert the greatest pressures on the New Zealand environment. Water and air quality are the most important environmental issues facing New Zealand. Other forms of pollution (including waste disposal and industrial pollution), climate change and ozone layer were also stated to be important environmental issues (Figure 3.23). These emissions come from a variety of sources and respondents stated that sewage and stormwater cause damage to beaches and coastal waters, ground water, rivers, marine fisheries, marine reserves, native land and freshwater plants and animals, wetlands and soils (Table 3.2).
- Farming was increasingly identified as exerting pressure on the environment, particularly on rivers, groundwater, and wetlands (Table 3.3).
- New Zealand European respondents were more likely to judge that farming exerts pressure on rivers and lakes. Maori respondents were more likely to identify household and solid wastes as exerting pressure on rivers and lakes.
- Pests and weeds were thought to exert the most pressure on native forests and bush, native land and freshwater plants and animals, national



Farming was increasingly identified as exerting pressure on the environment, particularly on rivers, groundwater, and wetlands. Above: spray irrigation, Canterbury (photo R. Cullen).



parcs, and wetlands. Forestry and urban development were judged to be exerting pressure on native forests and bush. Farming was judged to be damaging native land and freshwater plants and animals. Commercial fishing was judged to be the main source of pressure on marine fisheries and marine reserves (Table 3.2).

- The surveys have not sought direct comment from respondents on the cause of pressure on New Zealand's stocks of oil and gas.

5.3 STATE OF THE ENVIRONMENT

Respondents rated the state of the New Zealand environment highly compared to the environment in other developed countries (Figure 3.4).

The three surveys asked respondents to assess the state of nine components of the environment.

- New Zealanders have consistently rated the state of marine fisheries as worse than other parts of the environment, but the 2004 survey, which disaggregated freshwater into two separate categories, indicated that rivers and lakes are rated slightly worse than marine fisheries (Figure 3.4).
- Four distinct clusters reflected the perceived availability of natural resources in New Zealand. Area of national parks was judged to be plentiful. 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. Area of marine reserves, area of wetlands, and quantity of marine fish were rated as having moderate availability. Oil and gas reserves were perceived to be increasingly less available over the surveys (Figure 3.7).
- Rivers and lakes, marine fisheries, air quality, coastal waters and beaches, and natural environment in towns and cities were perceived to be worse or to have not improved over the past five years. Thirty five percent of all respondents judged that marine fisheries were in a worse state than five years ago (Figures 3.8 and 3.9).
- Regional analysis revealed that 60% of northern respondents judged air quality as worse than it was five years ago and 50% of northern respondents judged that coastal waters and beaches were worse than they were five years ago.

Respondents rated the state of New Zealand's environment highly compared to other developed countries. Left: McLean Falls, Catlins (photo S. McMurtrie).

5.4 MANAGEMENT OF THE ENVIRONMENT

New Zealanders judged that the environment was adequately managed. However, this statement conceals the wide range of views held about specific parts of the environment.

- For rivers and lakes, marine fisheries, air quality, groundwater, coastal waters and beaches more than 25% of respondents thought that management was poor or very poor. Management of New Zealand's natural environment compared to other developed countries, and of national parks were both rated significantly more highly than other parts of the environment (Figure 3.12).
- Across the 2000, 2002 and 2004 surveys, air quality, marine fisheries, coastal waters and beaches and soils have consistently been rated the worst managed environmental sectors (Figure 3.13). Separate questions for rivers and lakes and groundwater have only been included in the 2004 survey and are not covered in Figure 3.13.
- More than 20% of survey respondents judged that management of rivers and lakes, air quality, marine fisheries and coastal waters and beaches were worse or much worse than five years ago (Figure 3.14).



New Zealanders thought the environment was adequately managed, although 20 - 25% thought that management was poor or very poor for many aspects of the environment. Above: tramping down Mount Fyffe, Kaikoura (photo S. McMurtrie).



Native sundew plant (R. Dale)

6

SPECIAL TOPICS

6.1 LAKES, RIVERS, STREAMS AND AQUIFERS (GROUNDWATER)

There is increasing demand for freshwater in New Zealand. Growth in the size of cities increases pressure on their water resources. Agriculture uses very large volumes of water for irrigation in some regions and this 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. The public's views of these and related issues were investigated in a section of the 2004 survey. Ten questions addressed survey participants' perceptions of freshwater issues in New Zealand including management, access, quality and condition of freshwater.

The majority of respondents thought a rate increase was a 'small price to pay for the common good' of lowland stream enhancement, although some respondents were opposed to a rate increase, stating that 'rates are too high already'. Below: stream planting at Papanui Stream, Christchurch, following channel restoration (photo S. McMurtrie). Facing page: wetland planting at Boggy Creek, Lake Ellesmere, Canterbury (photo S. McMurtrie).

6.1.1 Lowland stream enhancement

Participants were presented with the following information: "Local government now has a responsibility to consult with communities over their regional or district visions for the future. Suppose your regional council wants more resources for lowland stream enhancement projects. Please respond to the following proposition."

"If my regional council proposed to increase household rates by \$20 per year for 10 years to pay for lowland stream enhancement work I would be: strongly supportive; supportive; don't care; opposed; strongly opposed; don't know."

Results

771 respondents answered this question, with the majority (53%) supportive of the rate increase (Figure 6.1).

Respondents were then asked to explain the reason for their response. The various responses were grouped into similar response categories. Analysis comparing responses to reasons showed that those who were supportive or strongly supportive of a \$20 rate increase responded:



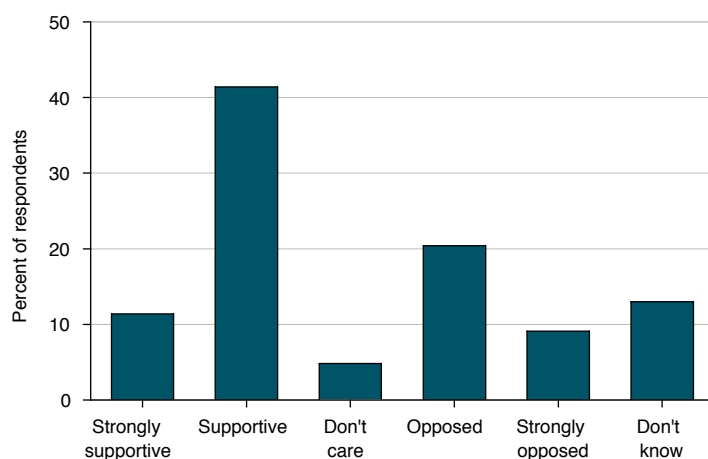


Figure 6.1. Respondents' willingness to support a rate increase for lowland stream enhancement. Full data provided in Appendix 3, Table 1.

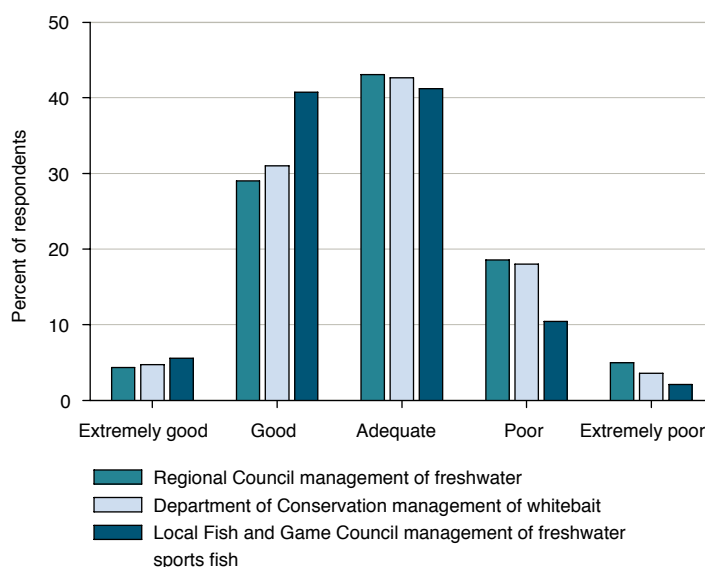


Figure 6.2. Performance rating of agencies' management. Full data provided in Appendix 3, Table 3.



- 'small price to pay for the common good' (43% of 484 responses) followed by
- 'good to pass onto future generations'
- 'to clean up the water' and
- 'better than cleaning it up later'.

Those who were opposed or strongly opposed responded:

- 'rates are too high already' (23% of 484 responses), followed by
- 'industry or farmers should pay for this, not ratepayers'
- 'no proof projects are being done efficiently' and
- 'on a low income'.

There was also a mix of responses categorised as 'other'.¹

6.1.2 Performance of agencies with management responsibilities for lakes, rivers, streams, aquifers and freshwater fisheries

Respondents were asked to rate the performance of: their regional council's management of freshwater; the Department of Conservation's management of whitebait; and their local fish and game council's management of freshwater sports fish. The five-point response scale was anchored with 'extremely good' and 'extremely poor'.

Results

Those with an opinion rated agencies' management performances as mostly 'good' or 'adequate', with their local fish and game council's management performance receiving a higher proportion of 'extremely good'/'good' responses (47%). There was a high proportion of total respondents who did not know enough to comment on the performance of the Department of Conservation (54%) or their local fish and game council (45%), compared to 22% who did not comment on their regional council's performance (Figure 6.2). There was no significant difference between regional responses.

¹ Data provided in Appendix 3, Table 2.

6.1.3 Quality and management of rivers, lowland streams and groundwater

The survey asked respondents whether they agreed or disagreed with seven statements regarding freshwater using the five point scale 'strongly agree', 'agree', 'neither agree or disagree', 'disagree', 'strongly disagree' and also the option of 'don't know'.

Figures 6.3 (a-g) show the total responses for each statement along with any significantly different regional or ethnic responses.

Chi squared analysis (excluding 'don't know' responses) demonstrated that there was a significant difference between regional responses to most statements, with the exception of 'More water should be taken from large rivers' and 'More water should be taken from small lowland streams'².

For most statements there was no significant difference between the views of Maori, New Zealand European and 'other' ethnicities³. There were two exceptions; 'Small lowland streams in my region are in good condition' and 'Water quality in small lowland streams in my region has not been damaged by dairy farming'. In both cases a higher percentage of people who described their ethnicity as 'other' had a more positive view of stream condition and felt that dairy farming had not damaged water quality in streams compared to the views of Maori and NZ Europeans who tended to disagree with the statements (Figures 6.3e and 6.3f).

People predominantly disagreed or strongly disagreed (56.9%) with the statement "More water should be taken from large rivers for irrigation, even if it has a negative impact on freshwater fisheries". 14.7% agreed or strongly agreed and approximately 28% neither agreed/disagreed or did not know (Figure 6.3a).

Most people did not know or neither agreed/disagreed (44.4%) with the statement "Small lowland streams in my region have high quality water" (Figure 6.3b). Of those who expressed an opinion most disagreed or strongly disagreed (37.9%).

Around half of the respondents in each region did not think that streams in their region had high quality water. Central region respondents rated water quality in their small lowland streams most highly (over 30%), whereas respondents in the northern region were significantly less likely to agree with the statement.

Similarly, most people did not know or neither agreed/disagreed (54.4%) with the statement that "Small lowland streams in my region are well managed" (Figure 6.3c). Again, those who expressed

an opinion tended to disagree (29.8%) rather than agree (15.8%). Northern respondents were significantly more likely than other regions to disagree (33%) with the statement and also had the highest percentage of 'don't know' responses.

By far the majority of people (72.2%) disagreed or strongly disagreed with the statement "More water should be taken from small lowland streams for irrigation, even if it has a negative impact on freshwater fisheries" (Figure 6.3d). Around 23% did not know or neither agreed/disagreed and only about 5% expressed agreement.

Most people (44.3%) did not know or neither agreed/disagreed with the statement "Small lowland streams in my region are in good condition" and around 35.8% disagreed (Figure 6.3e). All regions mostly disagreed with the statement. However, the central region response was significantly different from the other regions, with around 37% rating their streams highly.

'Other' ethnicities had the most positive view of stream condition, and also the highest percentage of 'don't know' responses (44%).

The majority of people (44.8%) either did not know or neither agreed/disagreed with the statement that "Water quality in small lowland streams in my region has not been damaged by dairy farming" (Figure 6.3f). Around 39% indicated that dairy farming had damaged water quality in small lowland streams in their region while about 16% indicated that it had not.

The southern region's response differed significantly from both the northern and central regions. Over 50% of the southern region respondents disagreed that dairy farming had not damaged water quality in small lowland streams in their region. The northern region had an overall more positive view as only around 29% considered that dairy farming damaged water quality in their small lowland streams, and over half either did not know or neither agreed/disagreed.

The biggest difference between ethnic responses was that 'other' ethnicities were the only group where more people agreed (20%) than disagreed (9%) with the statement, although many (61%) did not know.

The final statement "More water should be taken from aquifers (underground) in my region" had the most varied range of responses (Figure 6.3g). A high percentage (51.7%) did not give an opinion, but those who did were divided fairly evenly between 'agree' (21%) and 'disagree' (27.2%).

Respondents from the southern region were more likely to have an opinion and mostly disagreed (42%) that more water should be taken from aquifers in their region.

² Data provided in Appendix 3, Table 4.

³ Data provided in Appendix 3, Table 5.

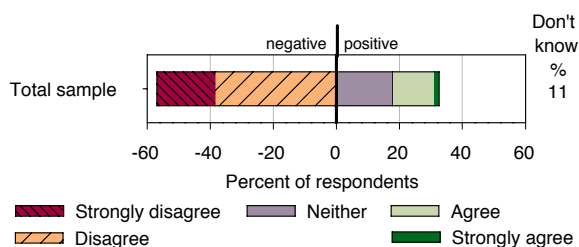


Figure 6.3a. Respondents' opinions on whether more water should be taken from large rivers for irrigation, even if it has a negative impact on freshwater fisheries.

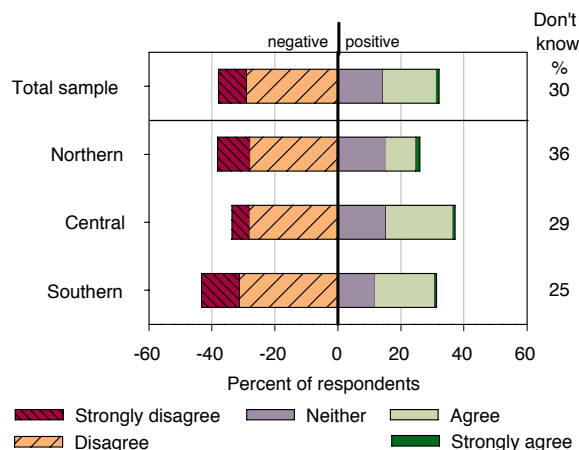


Figure 6.3b. Respondents' opinions on whether small lowland streams in their region have high quality water.

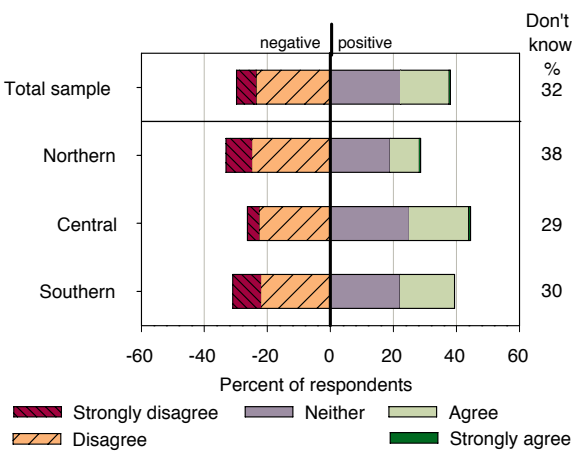


Figure 6.3c. Respondents' opinions on whether small lowland streams in their region are well managed.

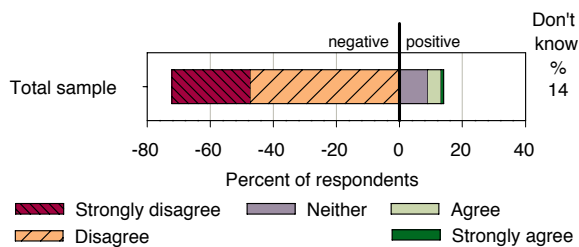


Figure 6.3d. Respondents' opinions on whether more water should be taken from small lowland streams for irrigation, even if it has a negative impact on freshwater fisheries.

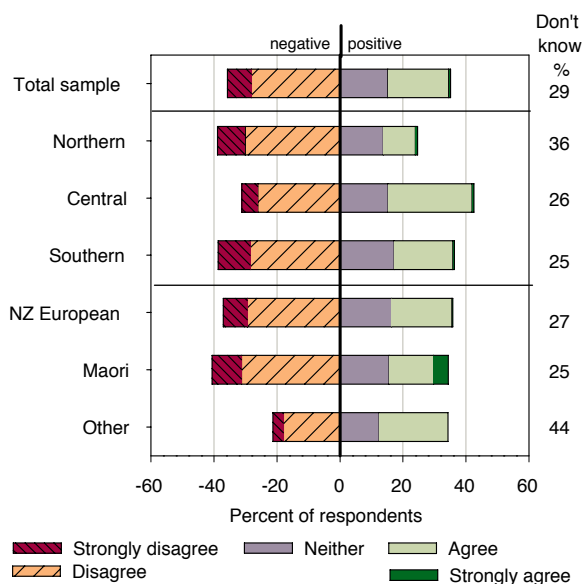


Figure 6.3e. Respondents' opinions on whether small lowland streams in their region are in good condition.

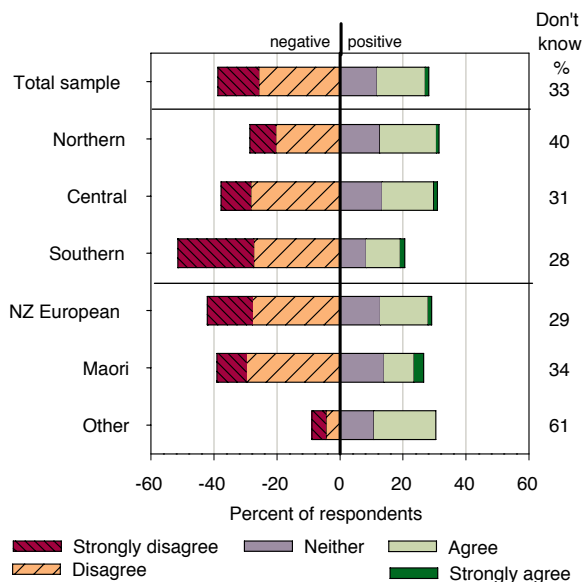


Figure 6.3f. Respondents' opinions on whether water quality in small lowland streams in their region has not been damaged by dairy farming.

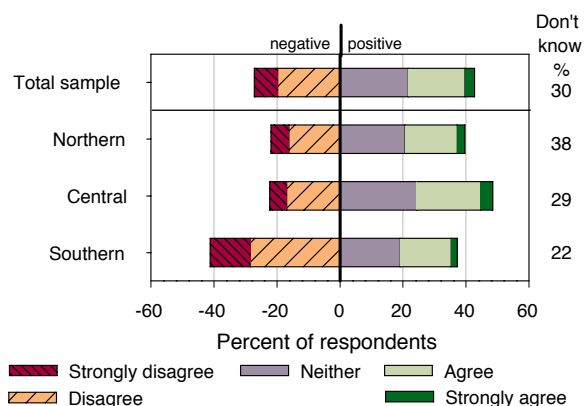


Figure 6.3g. Respondents' opinions on whether more water should be taken from aquifers (underground) in their region.

6.1.4 Freshwater issues: public access, water quality, and condition of banks and edges

Survey participants were asked to rank, using five-point scales, public access and water quality for resources including rivers and streams, aquifers and lakes. Statistical testing found some significant differences in responses for the different resources⁴. The most common difference was that respondents' knowledge about aquifers was significantly less than for rivers and streams and lakes. 'Don't know' responses are excluded from Figures 6.4 (c-f) so that opinions can be compared⁵.

Public access to New Zealand's lakes, rivers and streams was seen as mainly 'good', with lake access being considered slightly better than access to rivers and streams (Figure 6.4a). Access was perceived to be about the same as five years ago, although around 11.5% percent of respondents did not know how access had changed (Figure 6.4b).

The quality of water in New Zealand's rivers and streams, aquifers and lakes was mainly seen as 'acceptable' to 'good' however there was a significant difference in spread of responses for each resource. The main difference was people's perception of water quality in New Zealand's aquifers with over 26% who stated 'don't know' (rivers and streams 7.6%, lakes 9%).

Of those who had an opinion, only around 13% considered New Zealand's aquifer water quality 'poor' or 'extremely poor'. Thirty two percent of respondents considered lake water quality to be 'poor' or 'extremely poor' while 24% of respondents rated rivers and streams 'poor' or 'extremely poor'. These comparisons can be seen in Figure 6.4c.

Again, the ratings for water quality in aquifers in the respondent's region differed significantly from the ratings for other resources, mainly due to the high percentage (30%) of respondents who did not know (rivers and streams 12%, lakes 19%). Those who had an opinion considered the quality of water in their region as 'acceptable' to 'good', with no significant difference between responses for rivers and streams compared with lakes, but aquifer water quality was considered significantly better (Figure 6.4d).

There was a high percentage (33%) of people who did not know about water quality in New Zealand's aquifers compared to five years ago (rivers and streams 17%, lakes 18%). Those who had an opinion considered water quality in New Zealand's rivers and streams, aquifers and lakes to be about the same or worse than five years ago (Figure 6.4e). Change in water quality in New Zealand's lakes

rated worst, followed by rivers and streams, then aquifers.

A high percentage of people did not know about the quality of water regionally compared to five years ago (aquifers 35%, rivers and streams 20% and lakes 24%). Those who did have an opinion perceived all water resources to be about the same or worse (Figure 6.4f). There was no significant difference perceived between change in water quality of regional rivers and streams compared to lakes.

Most people felt that the state of the banks and edges of lakes, rivers and streams in both their region and throughout New Zealand was acceptable. There was a very even spread among those who felt the condition of the banks was 'good' or 'poor' (Figure 6.4g).



Respondents regarded public access to New Zealand's lakes, rivers and streams as 'good'. Above: Waiotapu thermal area, Central North Island (photo G. Kerr).

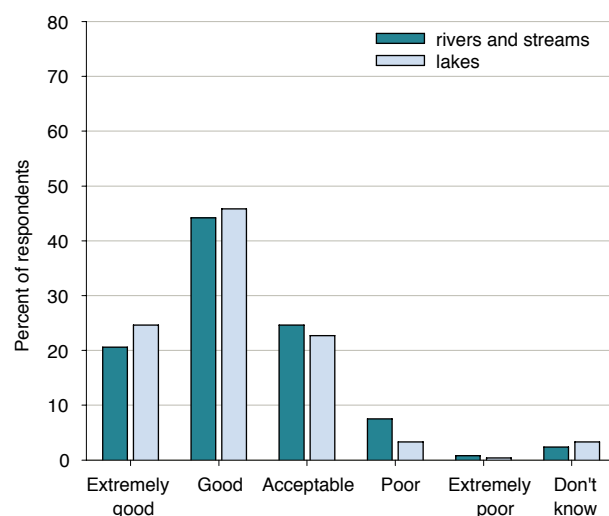


Figure 6.4a. Perceived level of public access to New Zealand's surface waters.

⁴ Data provided in Appendix 3, Table 6.

⁵ Data (including 'don't know' responses) provided in Appendix 3, Table 7.

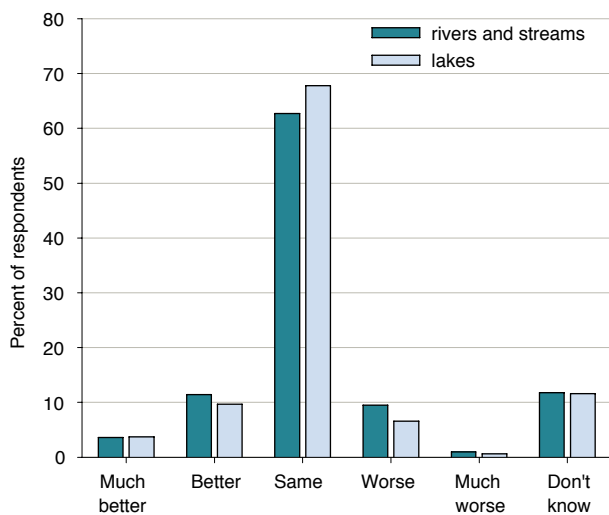


Figure 6.4b. Perceived level of public access to New Zealand's surface waters compared to 5 years ago.

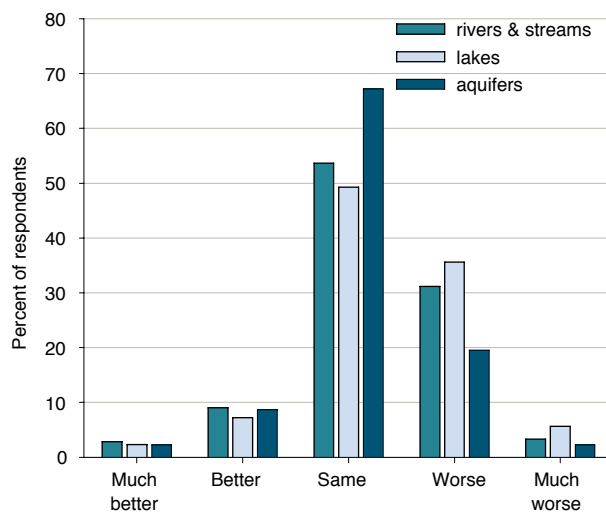


Figure 6.4e. Perceived quality of water in New Zealand's surface waters and aquifers compared to 5 years ago.

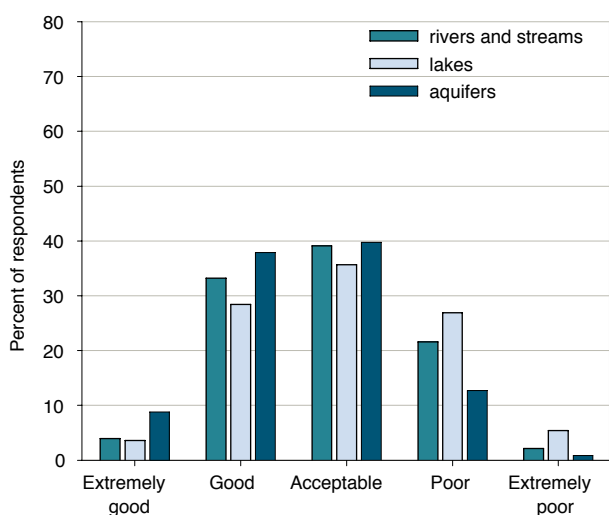


Figure 6.4c. Perceived quality of water in New Zealand's surface waters and aquifers.

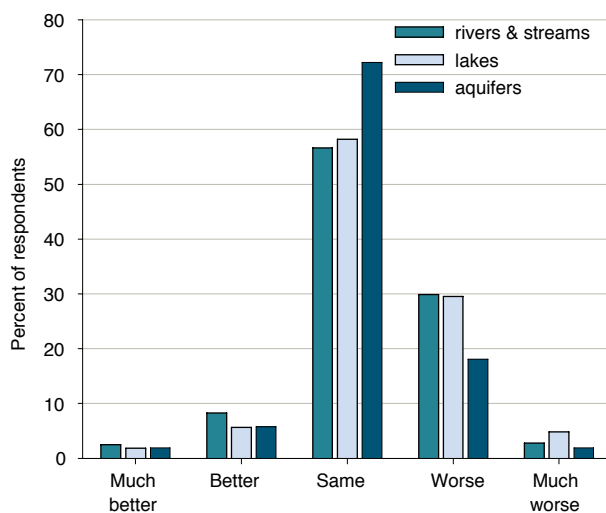


Figure 6.4f. Perceived quality of water in surface waters and aquifers in the respondent's region, compared to 5 years ago.

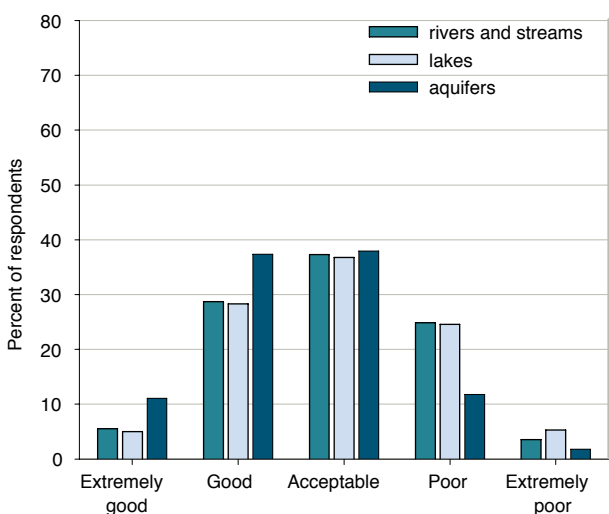


Figure 6.4d. Perceived quality of water in surface waters and aquifers in the respondent's region.

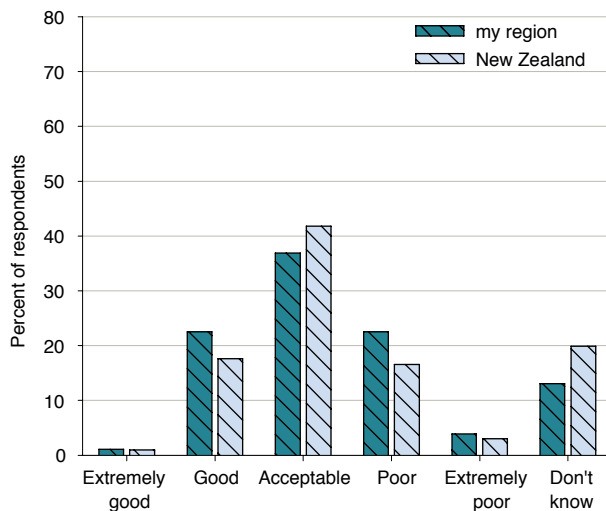


Figure 6.4g. Perceived state of the banks and edges of lakes, rivers and streams in New Zealand and region.

6.1.5 Demographic differences

Regional differences

Chi squared analysis was performed for the seven questions that asked specifically about regions and showed significant differences between regional responses for all questions⁶. This analysis compared the spread of responses but excluded 'don't know' responses. Further analysis was performed to identify where the differences were between the three regions.

Respondents from the northern region were more likely than those from the other regions to consider their current water quality 'poor' and to be 'getting worse' compared to five years ago. Those from the southern region were more likely than respondents from the other regions to consider their current water quality as 'good' to 'adequate'. However, they were the least likely of the regional respondents to say that it was better compared to five years ago.

Ethnic differences

Statistical analysis showed that there were significant differences between ethnic responses over nine out of 18 statements. These were:

- Public access to New Zealand's lakes compared to 5 years ago
- The quality of water in New Zealand's rivers and streams
- The quality of water in New Zealand's lakes
- The quality of water in my region's rivers and streams
- The quality of water in my region's aquifers
- The quality of water in my region's lakes
- The quality of water in New Zealand's rivers and streams compared to 5 years ago
- The quality of water in New Zealand's lakes compared to 5 years ago
- The quality of water in my region's rivers and streams compared to 5 years ago

Respondents in the 'other' ethnicities group were significantly more likely to rate water quality in rivers and streams, aquifers and lakes as 'good' than were Maori and NZ European respondents.

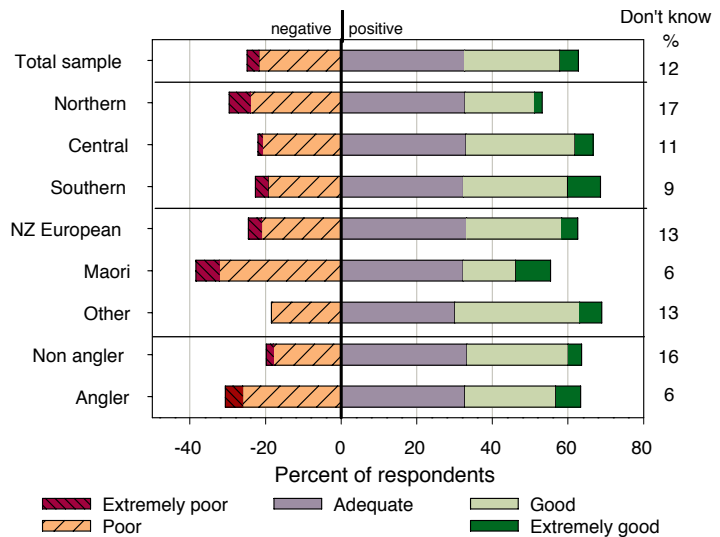


Figure 6.5. Perceived quality of water in rivers and streams in the respondent's region.

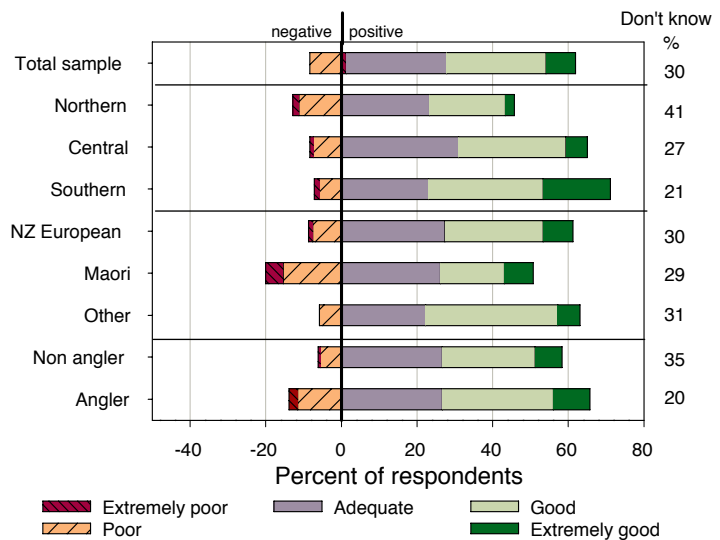


Figure 6.6. Perceived quality of water in aquifers in the respondent's region.

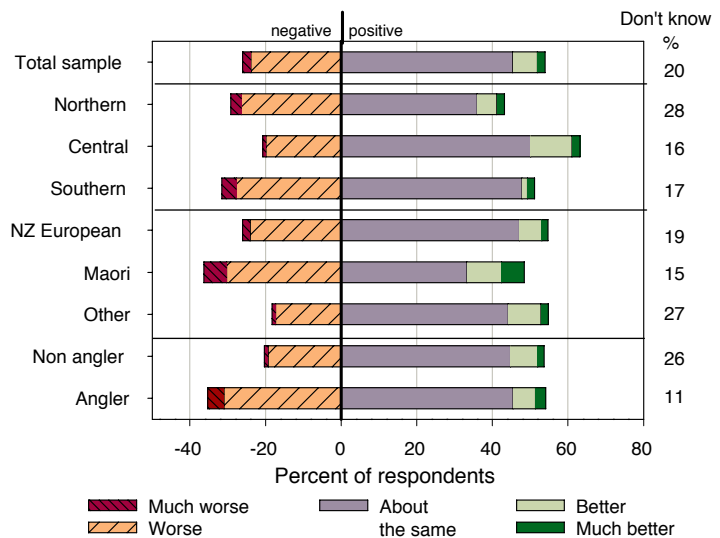


Figure 6.7. Perceived quality of water in rivers and streams in the respondent's region, compared to 5 years ago.

⁶ Data provided in Appendix 3, Table 8.

Angler status differences

Those with some inclination towards fishing ('angler' refers to those who either currently fished, had fished, or were intending to fish) were significantly more likely to rate freshwater quality, access and condition of banks and edges as 'poor' or 'worsening' than those who had never fished and did not intend to ('non angler').

This was true for fifteen of the eighteen statements. The exceptions were:

- The quality of water in New Zealand's rivers and streams
- The quality of water in New Zealand's lakes
- The quality of water in my region's lakes.

Figures 6.5 - 6.7 represent questions where there were significant differences for all three demographic groups.

Northern respondents were more likely to rate the water quality in their rivers and streams as 'adequate' to 'poor' compared with both central and southern regions who rated their rivers and streams 'good' to 'adequate'. Maori were more likely to have a negative view of water quality in regional rivers and streams, as were those classed as 'anglers'. (Figure 6.5).

Figure 6.6 shows a clear difference in responses between regions, most notably the southern region's high water quality rating for their aquifers. The northern region had a less positive view, with the majority (41%) responding 'don't know'. Of all the groups, more Maori judged water quality of aquifers as poor (20%), and more of 'other' ethnicity judged it as 'good' (over 40%).

People from the three regions responded significantly differently to each other in comparing water quality in rivers and streams to five years ago. Most felt water quality was the same as five years ago, but northern and southern regions were more likely to consider it was worse (Figure 6.7). Similarly, Maori were significantly more likely than NZ European or 'other' ethnicities to consider water quality worse than five years ago. 'Anglers' were also more likely to consider water quality in rivers and streams worse than five years ago (35%) and were most likely to have an opinion (only 11% stated 'don't know').

The southern region responses clearly showed that the majority of people (over 50%) felt their lakes had 'good' quality water and only 15% considered it to be 'poor' quality. The northern and central



Anglers were more likely to rate freshwater quality, access, and bank condition as 'poor' or 'worsening' compared to non-anglers. Above: fly fishing in the Akuru River, South Westland (photo R. Millichamp).

regions had no significant difference between their responses, which tended towards 'adequate' to 'poor' lake water quality.

All regions considered aquifer water quality to be mostly the same compared to five years ago. The most significant difference was between the northern and central regions, with the northern region most likely to consider water quality worse or the same.

Central and southern region respondents mostly felt that water quality in their regions' lakes was the same compared to five years ago, however the northern respondents were more inclined to say water quality was worse.

All regions differed significantly in their responses on the state of banks and edges of lakes, rivers and streams. The northern region considered the banks and edges to be in 'adequate' to 'poor' state. In comparison, the southern region considered the state of their banks and edges to be 'good' to 'adequate'. Central respondents mostly considered theirs to be 'adequate' but had a fairly even split in those who considered them 'good' or 'poor'.

6.1.6 Summary

The state of freshwater in New Zealand is generally perceived to be 'adequate' to 'good'. However respondents to this survey perceived pressure on lakes, rivers and streams and aquifers.

The degree of concern varied between regions. Northern region respondents were the least likely to agree that streams in their region were well managed, were in 'good' condition or had high quality water. Southern region respondents were most strongly opposed to more water being taken from aquifers and more than 70% perceived that water in lowland streams in their region had been damaged by dairy farming.

Those of 'other' ethnicity tended to give more positive responses on water quality than Maori or New Zealand European.

Those with an inclination to fish were significantly more likely than those who had never fished and did not intend to, to consider that water quality and condition in rivers and streams, lakes and aquifers was poor or getting worse.

More than 50% of survey respondents said they would support a \$20 per year rate increase for lowland stream enhancement projects.



Most people in the southern region felt their lakes had 'good' quality water, while northern and central respondents tended towards 'adequate' to 'poor' lake water quality. Above: Lake Forsyth/Wairewa, Banks Peninsula, has suffered from toxic algal blooms since the turn of the 20th century (photo J. Walter).

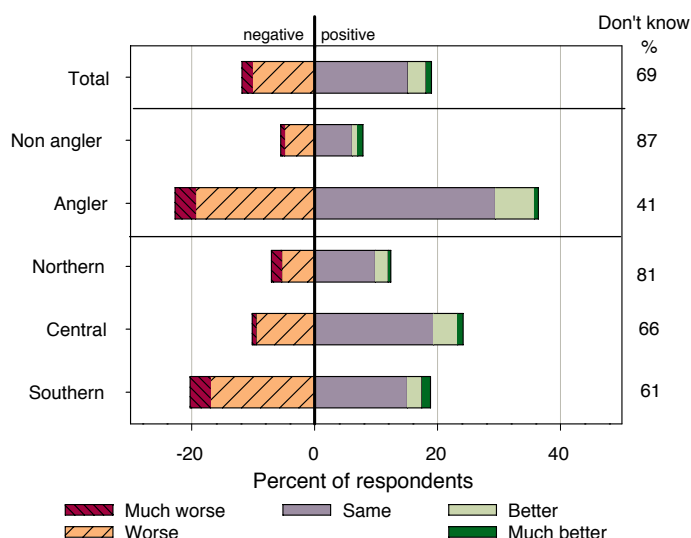


Figure 6.8. Perceived change in trout catch rates in the respondent's region compared to five years ago. Full data provided in Appendix 3, Table 9.

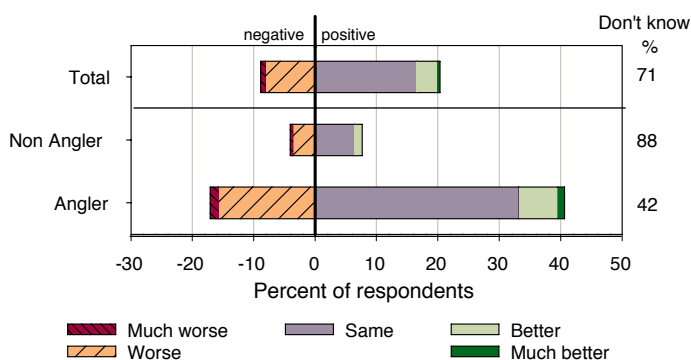


Figure 6.9. Perceived change in trout condition in the respondent's region compared to five years ago. Full data provided in Appendix 3, Table 9.

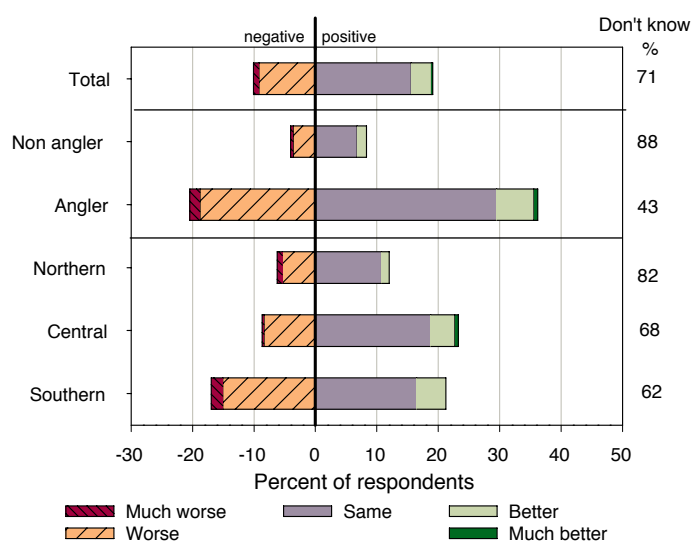


Figure 6.10. Perceived change in trout size in the respondent's region compared to five years ago. Full data provided in Appendix 3, Table 9.

6.2 FRESHWATER FISHERIES

Recreational fishing is one activity that can be adversely affected by increased use of water for out-of-stream purposes. As well, increased fishing pressure can reduce catch rates, fish condition and size. The following questions in the survey related specifically to trout and other freshwater fisheries and their management by three institutions.

Survey respondents were asked to describe trout catch rates, trout condition and trout size in their region compared to five years ago. Most people (approximately 70%) responded 'don't know'. Of those who did respond, the majority felt that trout catch rates, condition and size were about the same as five years ago or getting worse. When split into anglers ('currently fish, have fished or intend to fish' - 39%) and non-anglers ('never fished and don't want to' - 61%), the majority of anglers were prepared to express an opinion, but most non-anglers stated 'don't know'. However, and perhaps surprisingly, the spread of views in terms of 'better' or 'worse' responses from non anglers and anglers did not differ significantly from the total response (Figures 6.8 - 6.10).

Chi squared tests were performed on regional responses to freshwater fisheries questions⁷. There were only two significant differences and t-tests indicated that these were between trout catch rates and size, in the central and southern regions. The majority of southern respondents felt that trout catch rates (Figure 6.8) were worse compared to five years ago. Southern residents were also more likely to perceive a decrease in trout size (Figure 6.10)

Most people of 'other' ethnicity (56%) perceived trout catch rates as worse compared to five years ago. Most Maori (61%) and NZ European (48%) thought catch rates were about the same⁸. Views on trout size and condition did not appear to vary between ethnic groups.

Significance testing was unable to be performed on regional cause of change in trout catch rate, and ethnic responses due to small numbers within each category.

⁷ Data available in Appendix 3, Table 10 and 10a.

⁸ Data available in Appendix 3, Table 11.

6.2.1 Main cause of change in trout catch rates

Respondents who indicated that trout catch rates in their region had changed, were invited to identify the main cause of change. 143 people responded to this question with most responses falling into one of eight categories that were grouped as shown in Figure 6.11. Of these nine categories, seven categories indicated mainly worse catch rates and two mainly better catch rates. The majority of respondents indicated that pollution was the main cause of change in trout catch rate followed by 'overfished'.

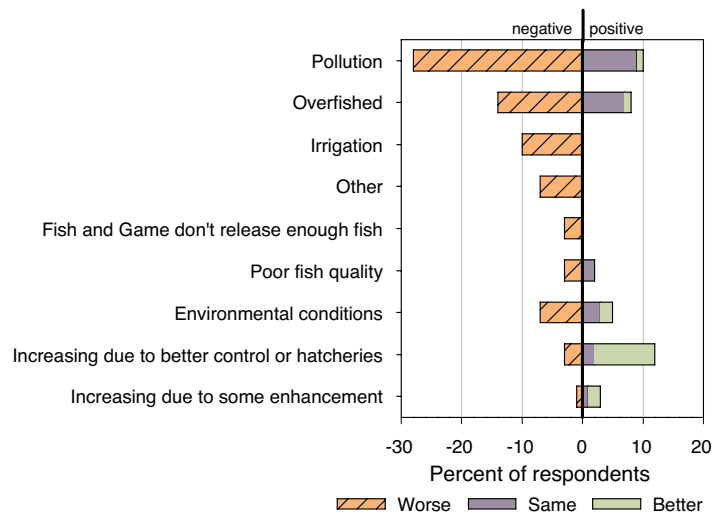


Figure 6.11. Perceived main cause of trout catch rate changes.

6.2.2 Freshwater anglers

Survey participants were asked whether they were a freshwater angler and given a choice of five responses (Figure 6.12). Only 61 people (7.8%) indicated that they currently fish. The majority of respondents (60.9%) indicated that they 'never fished and don't want to'. A small number (5.4%) had 'never fished but intend taking up the sport'. Those people that didn't currently fish but had fished before, were split equally between 'taking it up again in the future' (12.9%) and 'not fishing again' (12.9%).

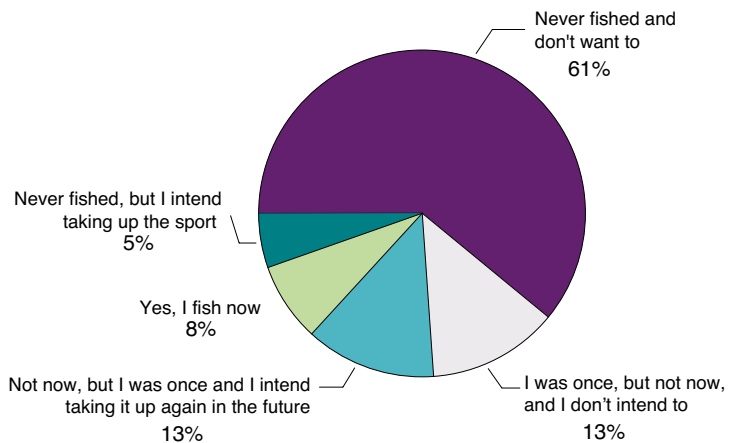


Figure 6.12. Response to the question 'are you a freshwater angler?'

6.2.3 Freshwater fishing licence

Survey participants were asked if they had a current freshwater fishing licence. Of the 790 respondents to this question, 40 people (5.1%) indicated that they did, whereas 61 people (7.8%) had earlier classified themselves as current freshwater anglers. This survey was carried out during the trout fishing season, but note of course that neither recreational whitebaiters or eel fishers are required to possess a licence.

6.2.4 Freshwater fish species

Survey respondents were asked 'If you are a fisher then what freshwater fish species do you fish for?'. Fourteen options were provided with the categories listed in Figure 6.13. Although not stated in the survey, respondents were able to choose as many species as they liked.

Rainbow and brown trout in rivers and lakes were the most commonly fished for species.

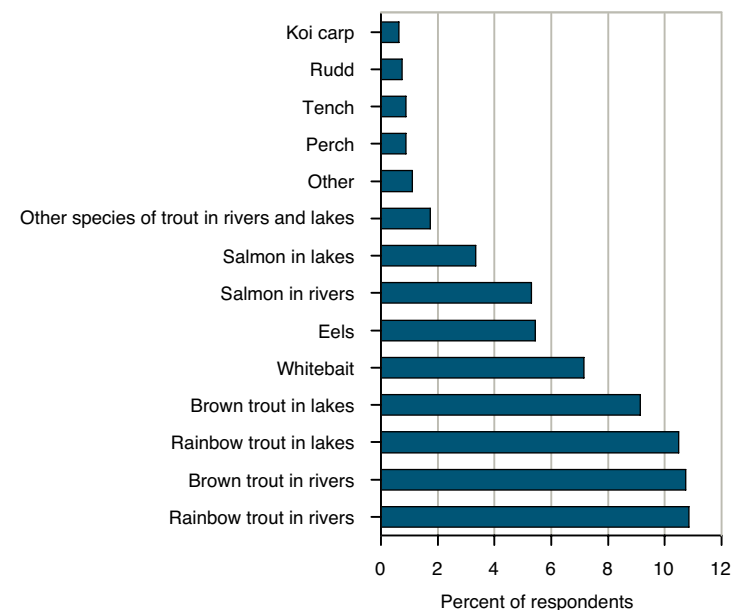


Figure 6.13. Freshwater fish species fished for by the respondents, regardless of fishing licence status.

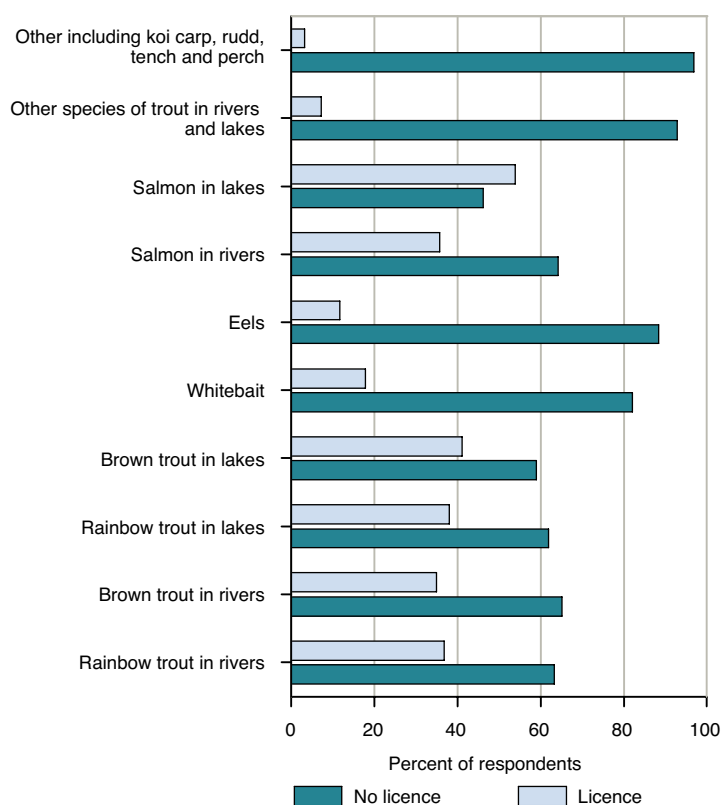


Figure 6.14. Freshwater fish species fished for by the respondents, grouped according to fishing licence status.



Anglers considered whitebaiting the second-most important freshwater fish species, after trout. Left: whitebaiting on the Mokihinui River, West Coast (photo K. Hughey).

Note that although only 61 people indicated that they currently fished, 88 people responded to this question, likely including those who have fished in the past.

A cross tabulation was performed to compare the fish species fished for with current licence status. A substantial number of people appeared to fish for trout and salmon without a licence (Figure 6.14). It is possible that some respondents who did not hold a current licence may have fished for those species in the past, and have therefore distorted the figures. Those who did hold a licence appeared less likely to fish for species that do not require a licence (i.e. whitebait and eels).

Respondents spent the most time fishing for trout (64%), followed by eels (11.9%), whitebait (10.4%) and salmon (9.6%).

Trout was considered the most important species by 58% of the 128 respondents to this question. Whitebait was the next most important (19.5%), followed by salmon (10.2%). Eels were considered most important by only 7% of people who answered this question.

6.2.5 Discussion

Eight percent of respondents reported that they currently fished and a further 31% either used to fish or intend to fish in future. The responses indicate that anglers believed the quality of fisheries was declining in New Zealand. Thirty percent of recreational fishers judged that availability of recreational fish species, fish condition and size were worse than five years ago. More than 50% of respondents in the southern region judged that catch rates were worse than five years ago and over 40% judged that trout size was worse. Pollution was judged to be the main cause of the decline in fish availability, with increased fishing pressure (overfishing) the second main cause.

6.3 THE MINISTRY FOR THE ENVIRONMENT'S CLIMATE CHANGE PROGRAMME

2004 survey respondents were asked "Are you aware of the Ministry for the Environment's Climate Change Programme?". Participants could check one of three boxes; 'yes', 'no', or 'don't know'.

Of 800 participants who responded to this question around 29% were aware of the programme while the majority (61%) were not aware and 10% responded 'don't know'. NZ Europeans and those over 40 years of age were more likely to be aware of the Climate Change Programme (see Figure 6.15).

Survey participants were then asked "Are you doing anything to reduce climate change?". They could respond either 'yes, I am doing the following ...' (and indicate their action), or check the box 'no, I am not doing anything'. 695 participants responded to the question, with the majority (63%) indicating 'no' they were not doing anything and 37% responding 'yes'.

Types of actions that participants (239 who stated an action) indicated they were taking to reduce climate change were grouped into eight main areas (Figure 6.16) plus a category incorporating 'other' responses. The most common action was 'recycling' (28.5%) followed by 'reducing use of the car' (18.8%), then 'planting trees' (13%).

A range of cross tabulations was performed which showed groupings by education, employment and region in those who were taking action to reduce climate change, and no significant differences by gender, ethnicity, and income.

The percentage of those who took action to reduce climate change increased with their level of education, especially those with a tertiary education (trade qualification, undergraduate diploma/certificate, bachelors degree or post graduate qualification) (Figure 6.17).

It is notable that those who indicated they were students in the employment category (see Figure 6.18), contained the lowest percentage of people who were taking action to reduce climate change.

Northern respondents were more likely to do something to reduce climate change than those from the central and southern regions, while those in the southern region were least likely to do something (Figure 6.19).

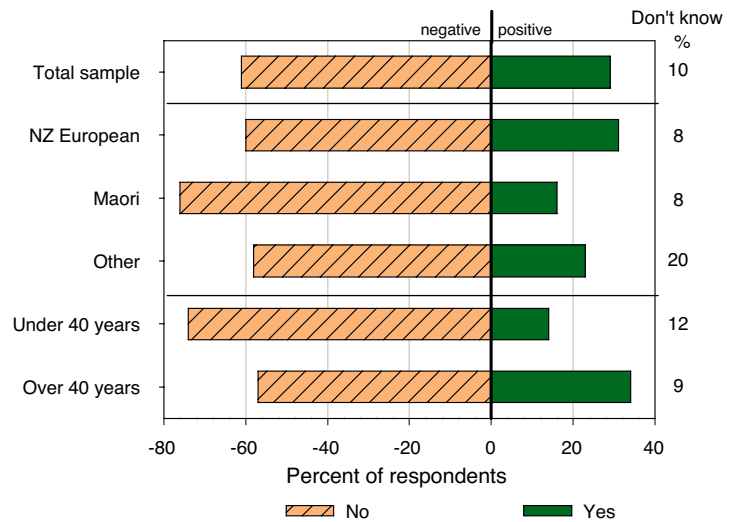


Figure 6.15. Respondents' awareness of Ministry for the Environment's Climate Change Programme.

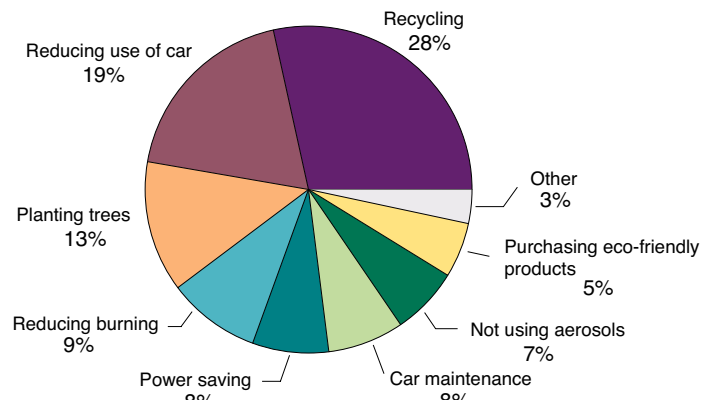


Figure 6.16. Respondents' actions taken to reduce climate change.

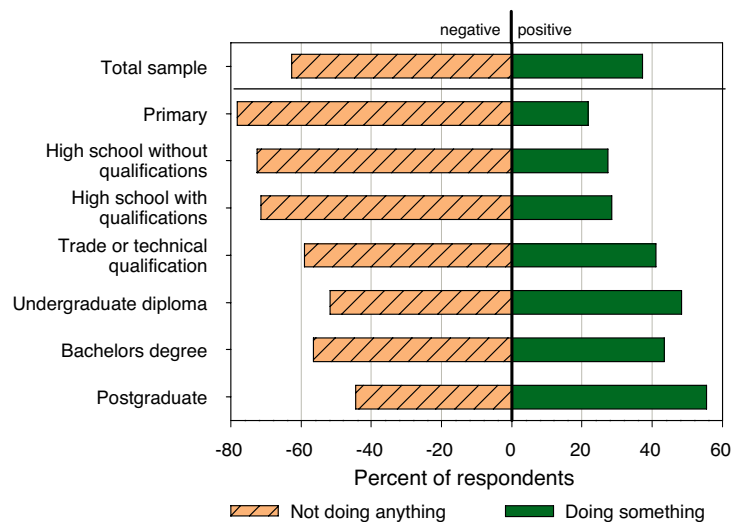


Figure 6.17. Action to reduce climate change by level of education.

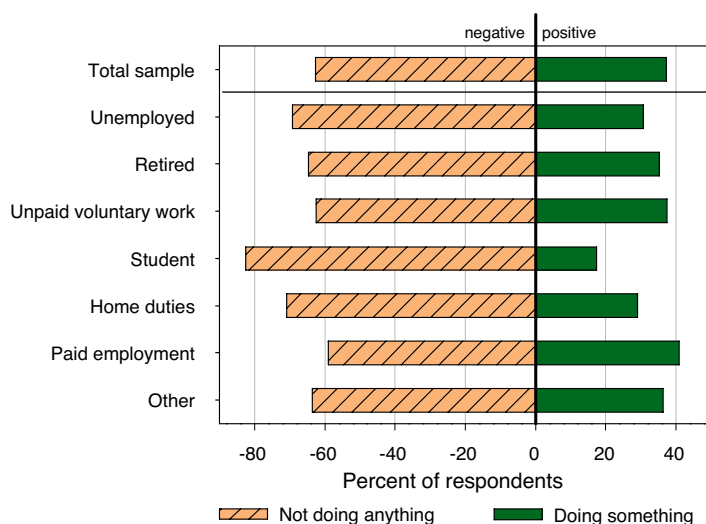


Figure 6.18. Action to reduce climate change by employment.

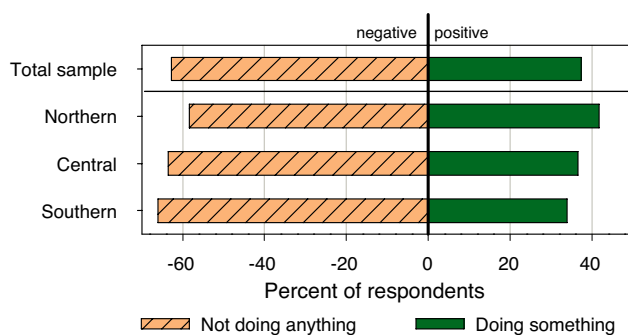


Figure 6.19. Action to reduce climate change by region.

6.3.1 Discussion

Around 60% of respondents were unaware of the MfE climate change programme and were not doing anything to reduce climate change. Demographic analysis indicates a lower awareness among those aged under 40 years, and of Maori ethnicity, which may be of interest for the design of future campaigns. Programmes directed towards students and people without tertiary qualifications may increase overall participation in reducing climate change.



7

Native male upland bully (*Gobiomorphus breviceps*) guarding its eggs (S. McMurtrie)

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 survey, while applying the Pressure-State-Response model. A project undertaken biennially in the Environment Waikato region assesses environmental awareness, attitudes and actions but does not apply the PSR model (Gravitas Research and Strategy Ltd., 2004). Both of these projects have just completed their third biennial survey and therefore, for the first time, have been able to report trends in responses. In this section the main findings and implications from the 2004 survey are identified and key trends over all three surveys examined.

7.1 2004 SURVEY

7.1.1 Pressure-State-Response

The survey sought to determine how New Zealanders perceived pressures, states and responses to various aspects of the New Zealand environment.

The responses reinforce composite indicators of biophysical derived empirical research findings that New Zealand is in the top quartile of countries in terms of sustainability. This position is consistent with the overarching findings that on average New Zealanders considered the state of their environment to be 'adequate' or 'good', New Zealand to be clean and green, and that they had a good knowledge of the environment. The standard of living in New Zealand was increasingly perceived to be 'very good' or 'good'.

While the environment overall, and the urban environment in particular, were thought of very highly, there were negative trends for specific resources, notably rivers and lakes, air quality, the beach and coastal environment, and marine fisheries. Nevertheless, for all of these resources, people's perceptions were of 'good' or 'very good' state despite the fact that for some, like biodiversity, the state is in fact very poor. Why there is this dissonance between science and perceptions for these items is unknown and is one of the areas where more research might be helpful.

New Zealanders judged that the environment was adequately managed. From the environment issues questions (Figure 3.10) respondents gave

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 management of rivers and lakes, air quality, coastal water and beaches, groundwater and marine fisheries lowest. The same five resources received the lowest ratings for the change in management over all three surveys. There appear to be continuing issues for environmental managers, who obviously are struggling to connect their initiatives with understanding or acceptance by the general public.

Over 80% of year 2004 respondents recycled household waste, bought products marketed as environmentally friendly, and had reduced or limited their use of electricity. Few respondents, however, had been involved in restoration or replanting of the natural environment, had participated in an environmental organisation, or taken part in hearings or consent processes related to the environment.

The most important environmental issues in 2004 were identified as water quality/pollution (19%) and air quality/pollution (17%).

As with the 2000 and 2002 survey, high numbers of respondents stated they lacked 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.



Respondents thought highly of the urban environment, but considered a number of specific resources had declined in condition over the last five years. Right: view of Christchurch city from the Port Hills (photo J. Walter)

7.1.2 Freshwater issues

The 2004 survey included a one-off study into various aspects of lakes, rivers and streams, and aquifers (groundwater).

Most of those who gave an opinion felt that freshwater resources were not well managed and were not in good condition. Those with some inclination toward fishing were significantly more likely to consider freshwater quality, access and condition 'poor' or worsening than did those who had never fished and did not intend to. Given the large minority of respondents who profess to fish or want to fish, this should be of continuing concern to policy makers and environmental managers (and to politicians).

Most respondents felt that dairy farming had damaged streams and that more water should not be taken from rivers or streams for irrigation, or from aquifers. This opinion was strongest in the southern region. This is perhaps not surprising as the 'Dirty Dairying' campaign has maintained a consistently high profile over much of the South Island for about the last three years.

Access, quality and management of rivers, lakes and aquifers were mainly rated 'good' or 'adequate', although it was felt that water quality was worse than five years ago. The access results might imply that the politicisation of public access concerns does not appear to be the major issue it is sometimes portrayed as in the media.

Those from the northern region were more likely than central or southern region residents to consider their water quality bad and getting worse. It has not been possible to identify why this is the case and this is another area for future research.

Given concerns about lowland streams and deteriorating water quality it was notable that more than 50% of survey respondents said they would support a \$20 per year rate increase for lowland stream enhancement projects. Hot wire fencing costs in the order of \$1550 per kilometre to erect (Environment Canterbury, 2004). Given approximately 1 million rate payers in New Zealand, the \$20m generated could fund around 12,900km of riparian fencing per year. Hill (2004: pg 87) reported the length of stream banks in dairy farms for the Taranaki (16,000km), Manawatu and Wairarapa (2,800km) and Wellington (583.8km) regions. While the total is unknown for New Zealand, the three-region total remaining to be fenced is known (10,512km). The estimated \$20m generated from a national rate increase would finish this task for these three regions alone in less than one year.

More than half of the respondents supported a \$20 per year rate increase for lowland stream enhancement. The estimated \$20 million generated from this would, for example, pay for fencing of all remaining streams in dairy farms in the Taranaki, Manawatu and Wellington regions in less than one year. Below: Mangawara River, Hoe-o-Tainui, before (1997) and two years after being retired from stock grazing (photos Environment Waikato). Below bottom: A waterway in the Mossburn-Castlerock area before and 10 months after being retired (photos Environment Southland).



7.1.3 Freshwater fisheries

Freshwater fishing is an important recreational activity in New Zealand, and Fish and Game New Zealand, the statutory body charged with the management of trout and salmon, is interested in people's perceptions of the state, trends and issues in these fisheries (B. Johnson, Fish and Game New Zealand, pers. comm.). There are two notable findings from the 2004 study. The first is that 39% of respondents professed an interest in freshwater angling (either now, in the future, or in the past). This is a significant proportion of the adult population. Second, it was interesting to note that trout catch rates were considered about the same as or worse than five years ago, mainly attributed to pollution or overfishing.

Blaming pollution for a drop in trout catch rates is consistent with the reasoning for Fish and Game's 'Dirty Dairying' campaign and perhaps reflects a view that worsening fish stocks and conditions are blamed mostly on agricultural intensification and land use change associated with dairying in many areas. Recreational fishers also judged that availability of recreational fish species was worse now

than it was five years ago. In some districts and for some rivers there is supporting evidence for this view. For example, Ross (2004: pg 101) reported a tiny spawning run for 2004 in the once internationally regarded Selwyn River of North Canterbury. This is just one river and fishery that is clearly impacted by land use developments and by water resource abstraction (see, for example, McDowall 1999), but arguably there are many other examples. Unwin and Jellyman (2002) surveyed pre-selected experienced anglers to determine whether the quality of trout fisheries in lowland New Zealand rivers had changed over time and their findings were largely unequivocal: the quality of angling had generally deteriorated.

7.1.4 Demographic analysis

Responses from the 2004 survey were evaluated against selected demographic variables. These tests generally showed non-significant differences, the key exception being for regional and ethnic responses. Often where differences were significant their magnitude was small.



Farming was increasingly identified as exerting pressure on the environment, particularly on rivers, groundwater, and wetlands. Above: bank and channel damage caused by a cattle crossing area (photo Fish and Game).

Region

Despite the large sample size we were only able to analyse on a statistically reliable basis, the data from three regions: Northern, representing the area covered by the Northland and Auckland regional councils; Central, being the rest of the North Island; and Southern, being the South Island. The key findings were as follows:

- While pollution of water was the single most identified environmental problem, regional analysis indicated some differences; air was a much more important issue for northern region respondents, and water was highest on the agenda for central and southern respondents (Figure 3.24).
- Central respondents were more likely to consider sewage and stormwater the main cause of damage to rivers and streams whereas southern respondents named farming. The rapid rise of dairying as a land use in the South Island and the 'Dirty Dairying' campaign have likely contributed to the latter. Southern respondents were also significantly more likely to consider household waste and emissions a main cause of damage to air (likely due to household heating pollution, which is the major source of emissions in Christchurch and Nelson, for example).
- Regional analysis revealed that 60% of northern respondents judged that air quality was worse than it was five years ago and 50% of northern respondents judged that coastal waters and beaches were worse than they were 5 years ago. While respondents still rated the quality of these resources highly, their downward trend should be of concern to policy makers and perhaps reflects population growth and other development pressures in this region.
- Northern region respondents were the least likely to agree that streams in their region were well managed, were in good condition or had high quality water. Southern region respondents were most strongly opposed to more water being taken from aquifers and more than 70% perceived that water in lowland streams in their region had been damaged by dairy farming.
- Significantly more respondents in the southern region (more than 50%) judged that trout catch rates were worse than five years ago, a finding consistent with the work of Unwin and Jellyman (2002).

Ethnicity

In 2002 we undertook our first analysis of environmental issues using ethnicity of respondents. The findings in 2002, showed much higher levels of concern among Maori about the coastal and marine environment, followed by New Zealand Europeans,

with other ethnicities much less concerned (Hughey *et al.*, 2002). In this survey we undertook similar analyses for freshwater resources and found similar differences for some issues. New Zealand European respondents were more likely to judge that farming exerts pressure on rivers and lakes, while Maori respondents were more likely to identify household and solid wastes as exerting pressure on rivers and lakes. 'Other' ethnicities were significantly more likely to rate water quality in rivers and streams, aquifers and lakes as 'good' than were Maori and NZ European respondents.

7.2 INTER-SURVEY COMPARISONS

There were several notable exceptions to the generally high level of consistency in the responses to the three surveys.

7.2.1 Pressure-State-Response differences over three surveys

- Water quality/pollution increased significantly in importance from 2002 (10%) to 2004 (19%) as a major environmental problem.
- Farming recorded significant increases over the three surveys as a cause of damage for six out of nine resources examined.
- The current condition of the natural environment in towns and cities was increasingly perceived to be better, the current condition of air quality was increasingly perceived to be worse, and the condition of air quality compared to five years ago was perceived to be worse.

7.2.2 Behaviours

There were two notable behavioural shifts between the surveys. A vastly increased proportion of respondents in 2004 (82%) and 2002 (75.3%) compared to 2000 (58.5%) reported they had reduced or limited their use of electricity. There was a 'power crisis' in 2001 and this may have resulted in this modified behaviour. Since then there has been a heightened level of media interest in energy matters and this may well have contributed to greater public responsiveness being reported in the 2004 survey. The other change occurred in the area of commuting: whereas 17.5% reported in 2000 that they had regularly commuted by bus or train, the proportion had increased to 39.7% in 2002, although it dropped a little to 37% in 2004. The numbers of respondents recycling household waste, buying products marketed as environmentally friendly, and composting have also steadily increased over the three surveys.

7.3 IMPLICATIONS FOR POLICY MAKERS

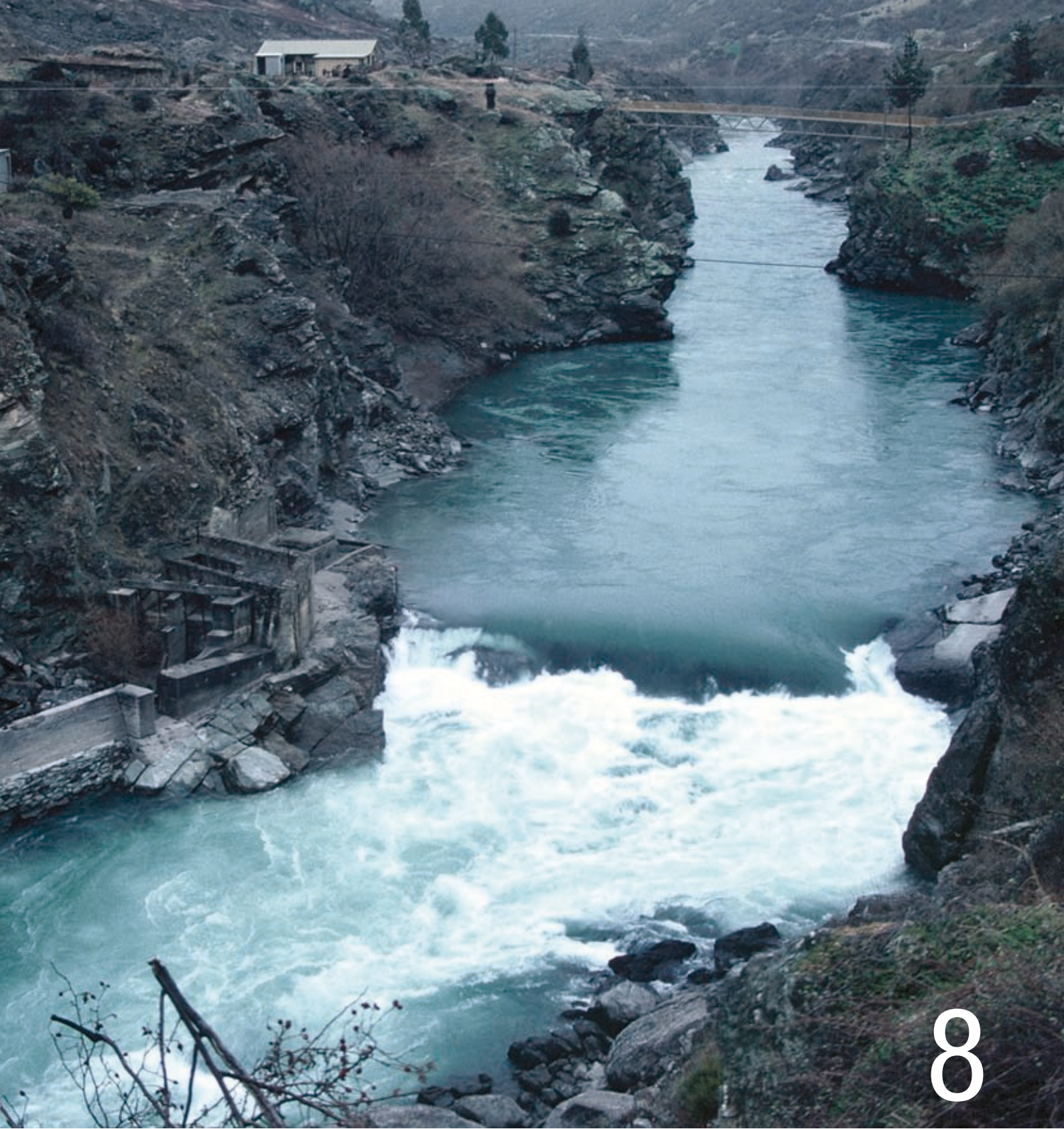
Some of the findings from this survey should prompt policy makers into action. Differences between perceptions and fact can be indicative of potential problems. First, the 'facts' may not be correct. Residents and resource users are a prodigious monitoring resource that can be aware of problems unknown to management agencies and policy makers, simply because they are the eyes and ears over all of New Zealand. 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:

- Although most rate air quality as adequate or good, the majority increasingly felt it was getting worse compared to five years ago. Northern respondents in particular felt that management of air quality was worsening. Communication on policies, programmes and performance regarding air quality may therefore be of increasing importance.
- Most respondents considered the condition of New Zealand's native plants and animals to be 'adequate' or 'good' although the National Biodiversity Strategy and World Economic Forum (2002) indicate otherwise and this dissonance could hinder acceptance of 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 impact of pests and weeds, on which there is little representative scientific data.
- Policies regarding coastal waters and beaches may need to address particular concerns in the northern region.
- The impact of farming on the environment remained negatively perceived in this survey, a trend which would be interesting to track in relation to new policies and programmes designed to address this issue. Results, where positive, from the 'Dairying and Clean Streams Accord' (for example Hill, 2004) need to be made widely known and need to be reputable.

The majority of respondents ranked the condition of New Zealand's native plants and animals as 'adequate' or 'good', but our biodiversity performance is actually ranked worst of 142 developed countries. This large discrepancy between perception and reality could hinder future biodiversity-related programmes. Top right: The shortjawed kokopu is our most threatened fish (photo S. McMurtrie). Middle right: all of the giant wetas, bar this alpine scree weta, are listed as threatened (photo R. Dale). Right: The blue duck (pictured here on a nest) is a threatened species (photo R. Dale).





Sargoods Weir, Kawarau River, Central Otago (G. Kerr)

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BIENNIAL SURVEY OF THE ENVIRONMENT PUBLICATION LIST

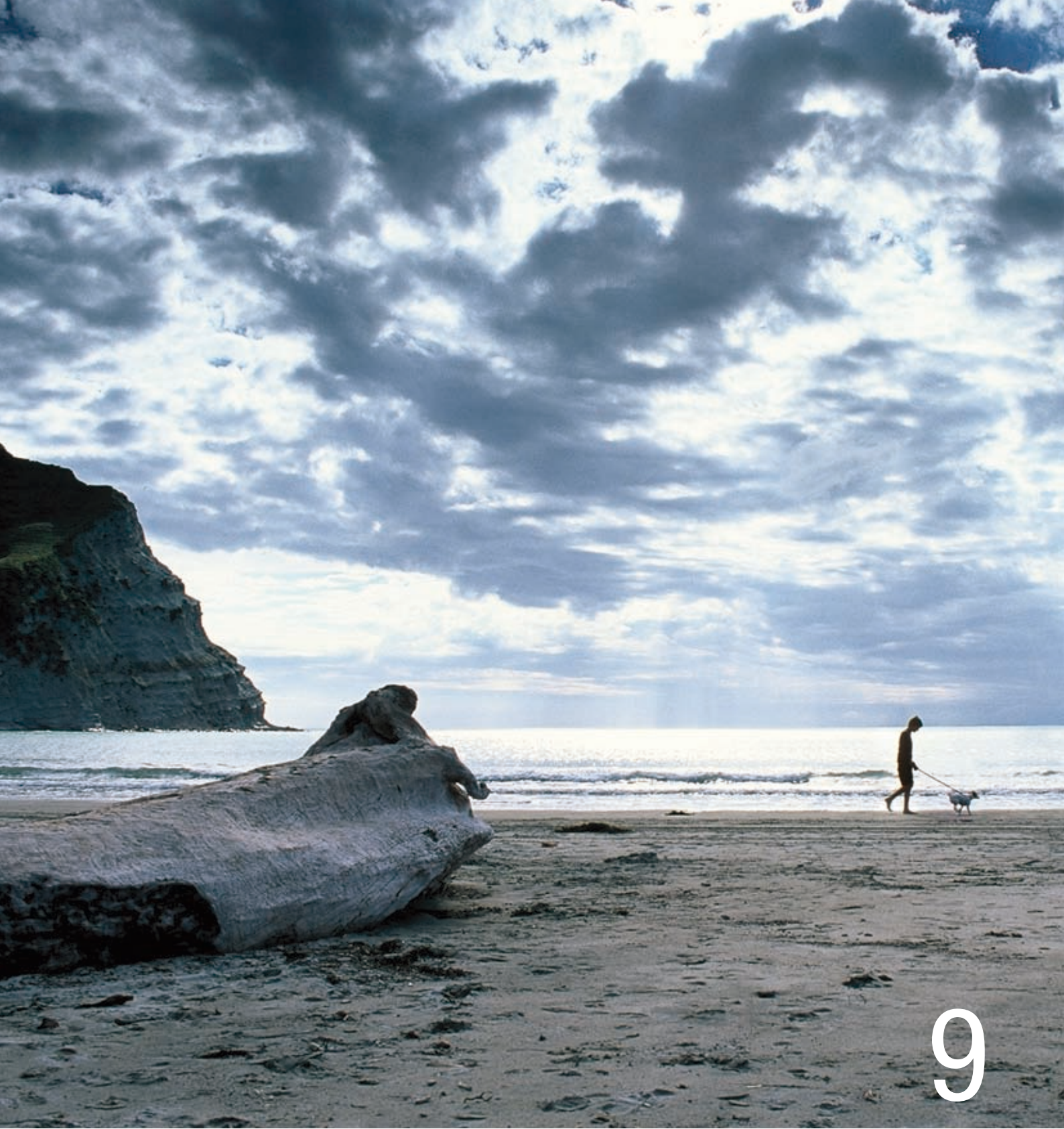
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Mahia Beach, Mahia peninsula (S. McMurtrie)

9

APPENDICES

APPENDIX 1. SURVEY REPRESENTATIVENESS

The following analysis compares 2004 survey demographic data with comparable data from the 2001 census of New Zealand. Note that in some situations the populations are different, with census data including information on 15-17 year olds who were not sampled in the environmental perceptions survey. In these situations a best practical approach has been applied. Significance of differences between survey responses in different years was identified through chi square tests. The statistic reported is the significance level of differences. It may be interpreted as the probability of the observed difference occurring by chance.

- * Significant at 90% confidence level (P<0.1)
- ** Significant at 95% confidence level (P<0.05)
- *** Significant at 99% confidence level (P<0.01).

Gender

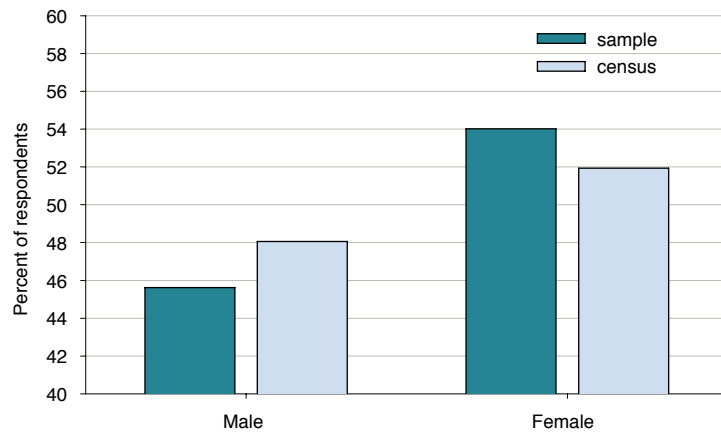


Figure a. Distributions of 2004 survey respondents according to gender and the 2001 census of all New Zealanders aged 15 or over.

Ethnicity

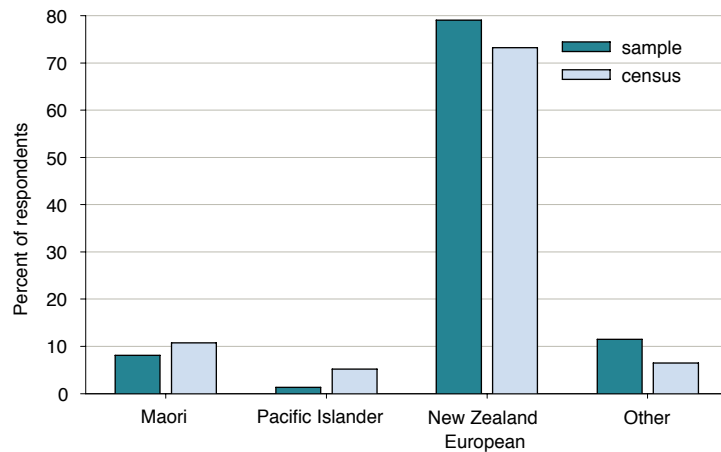


Figure b. Distributions of 2004 survey respondents according to ethnicity and the 2001 census of all New Zealanders aged 15 or over (P<0.01).

Age

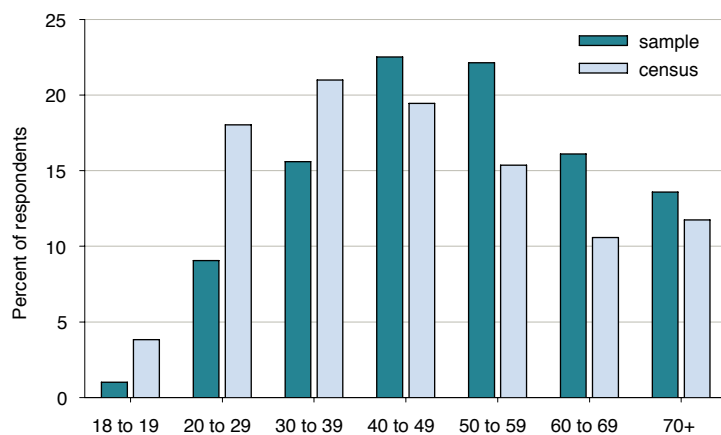


Figure c. Distributions of 2004 survey respondents according to age and the 2001 census of all New Zealanders aged 15 or over (P<0.01).

Income

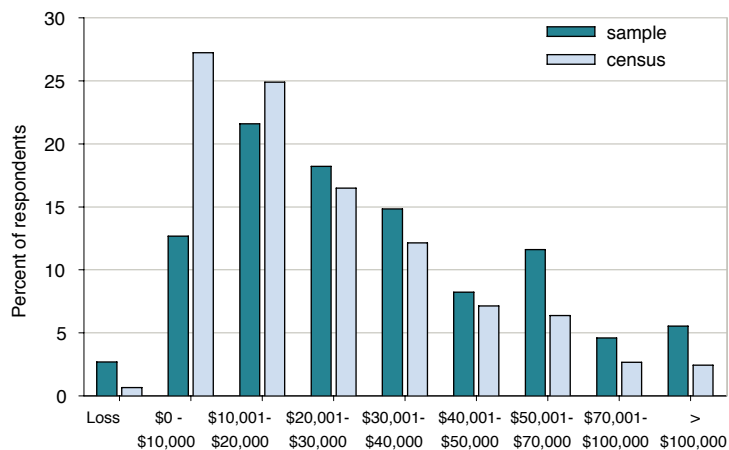


Figure d. Distributions of 2004 survey respondents according to income and the 2001 census of all New Zealanders aged 15 or over ($P < 0.01$).

Employment

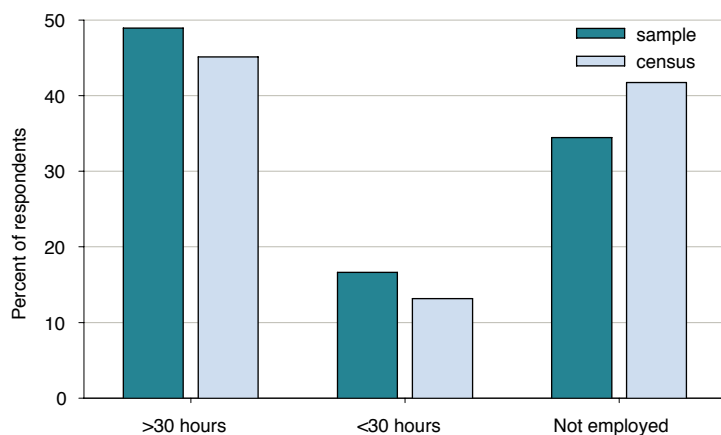


Figure e. Distributions of 2004 survey respondents according to employment and the 2001 census of all New Zealanders aged 15 or over ($P < 0.01$).

Education

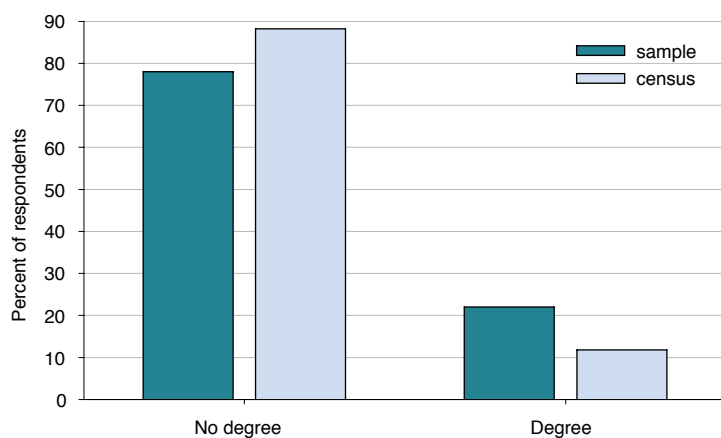


Figure f. Distributions of 2004 survey respondents according to education and the 2001 census of all New Zealanders aged 15 or over ($P < 0.01$).

APPENDIX 2. FULL DATA

Significance of differences between survey responses was identified through chi square tests. The statistic reported is the significance level of differences. It may be interpreted as the probability of the observed difference occurring by chance:

- * Significant at 90% confidence level ($P < 0.1$)
- ** Significant at 95% confidence level ($P < 0.05$)
- *** Significant at 99% confidence level ($P < 0.01$).

Table 1. Respondents' knowledge of environmental issues and standard of living.

Respondents perceptions of ...	Percentage response						N	Mean (1-5)	Std. Dev.
	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know			
their own knowledge of environmental issues									
2000	6.5	29.4	52.1	8.9	1.4	1.8	878	2.69	0.78
2002	7.5	28.6	54.4	7.0	1.1	1.2	810	2.65	0.77
2004	6.4	25.7	57.4	8.1	0.9	1.5	812	2.71	0.74
the overall standard of living in New Zealand***									
2000	11.1	45.5	36.0	5.6	0.9	0.8	863	2.39	0.80
2002	14.1	50.8	28.6	4.8	0.9	0.8	766	2.27	0.80
2004	18.3	54.2	23.3	3.1		1.2	781	2.11	0.73

* $P < 0.1$; ** $P < 0.05$; *** $P < 0.01$

Table 2. Respondents' perception of New Zealand's 'clean and green' image.

	Percentage response						N	Mean (1-5)	Std. Dev.
	Strongly agree (1)	Agree (2)	Neither agree or disagree (3)	Disagree (4)	Strongly disagree (5)	Don't know			
New Zealand's environment is regarded as "clean and green" **									
2002	0.5	9.2	57.0	17.6	13.7	2.0	816	2.42	0.91
2004	0.8	5.8	45.3	29.2	17.0	2.0	799	2.64	0.90

* $P < 0.1$; ** $P < 0.05$; *** $P < 0.01$

Table 3. Perceived state of New Zealand's environment.

Respondents perceived quality of ...	Percentage response						N	Mean (1-5)	Std. Dev.
	Very good	Good	Adequate	Bad	Very bad	Don't			
natural environment in towns and cities**									
2000	3.7	34.5	47.4	12.1	0.7	1.6	875	2.71	0.75
2002	5.9	36.9	44.7	9.6	1.1	1.8	815	2.62	0.79
2004	5.6	42.4	41.3	8.4	0.7	1.5	806	2.56	0.76
other natural environments									
2000	11.1	45.5	36.0	5.6	0.9	0.8	863	2.39	0.80
2002	14.1	50.8	28.6	4.8	0.9	0.8	766	2.27	0.80
2004	18.3	54.2	23.3	3.1		1.2	781	2.11	0.73
air**									
2000	20.0	47.0	23.6	7.2	1.3	1.0	866	2.22	0.89
2002	15.8	43.5	29.6	8.8	1.5	0.8	795	2.36	0.91
2004	14.3	45.1	28.8	10.0	1.2	0.6	803	2.38	0.90
native land and freshwater plants and animals									
2000	12.6	42.8	29.9	10.1	1.8	2.8	870	2.44	0.91
2002	14.6	40.8	30.2	9.2	1.7	3.5	808	2.41	0.92
2004	11.2	42.6	29.9	11.1	0.9	4.3	810	2.45	0.88
native bush and forests									
2000	20.5	39.8	26.0	10.6	1.6	1.6	870	2.32	0.97
2002	23.1	42.9	23.1	7.7	1.0	2.1	808	2.19	0.92
2004	21.9	40.8	24.5	8.6	1.1	3.1	807	2.24	0.94
soils									
2000	10.1	40.1	33.4	7.1	1.2	8.1	862	2.45	0.84
2002	10.4	40.8	32.0	7.0	0.9	8.9	797	2.42	0.83
2004	7.6	41.3	32.9	6.5	.9	10.9	800	2.46	0.79
coastal waters and beaches									
2000	12.4	37.2	35.2	11.3	1.5	2.4	873	2.51	0.91
2002	12.6	37.5	34.8	10.5	2.0	2.7	817	2.50	0.92
2004	13.1	41.6	32.0	9.0	1.7	2.6	810	2.43	0.90
marine fisheries***									
2000	6.2	30.2	32.9	15.4	2.7	12.6	875	2.75	0.93
2002	6.2	33.5	36.0	10.2	2.5	11.6	801	2.65	0.88
2004	5.9	29.8	31.8	14.4	1.4	16.7	808	2.70	0.89
freshwater									
2000	11.7	35.3	35.1	12.2	1.9	3.8	875	2.56	0.93
2002	12.1	34.2	36.5	11.1	2.4	3.7	803	2.56	0.94
rivers and lakes									
2004	6.5	31.5	33.1	20.6	3.0	5.3	810	2.81	0.96
groundwater									
2004	6.1	30.0	39.5	8.0	1.5	15.0	801	2.63	0.82
wetlands									
2000	6.0	28.1	34.6	13.0	2.6	15.7	872	2.74	0.91
2002	7.3	33.9	31.2	11.8	1.5	14.4	836	2.61	0.89
2004	5.6	31.7	31.4	11.4	2.4	17.5	805	2.68	0.90
New Zealand's natural environment compared to other developed countries									
2000	34.6	42.3	14.7	1.6	0.2	6.6	879	1.83	0.77
2002	38.7	41.2	12.7	1.3	0.4	5.7	821	1.76	0.76
2004	34.2	44.5	13.3	0.5		7.4	806	1.78	0.70

*P<0.1; **P<0.05; ***P<0.01

Table 4. Perceived availability of natural resources.

Respondents perceptions of ...	Percentage response						N	Mean (1-5)	Std. Dev.
	Very high (1)	High (2)	Moderate (3)	Low (4)	Very low (5)	Don't know			
diversity of native land and freshwater plants and animals									
2000	7.6	36.0	40.5	8.0	0.7	7.1	841	2.55	0.79
2002	7.7	37.9	38.0	5.6	1.1	9.7	807	2.50	0.79
2004	7.4	37.7	39.5	5.2	.6	9.6	794	2.49	0.76
amount of native bush and forests									
2000	9.4	39.3	34.9	12.6	2.0	1.9	855	2.58	0.90
2002	10.7	39.2	34.5	10.3	2.1	3.2	812	2.52	0.90
2004	11.7	36.3	34.8	12.0	2.0	3.3	797	2.55	0.93
quantity of marine fisheries ***									
2000	3.8	25.2	38.3	16.2	1.5	15.0	846	2.84	0.84
2002	3.7	22.0	42.9	12.0	2.4	17.0	808	2.85	0.92
2004	3.7	17.7	42.7	16.4	1.8	17.8	793	2.94	0.82
area of marine reserves**									
2000	2.5	13.8	37.9	24.5	4.9	16.4	849	3.19	0.88
2002	3.7	16.7	36.1	21.8	4.6	17.1	808	3.08	0.93
2004	3.0	17.5	38.5	18.5	3.2	19.4	790	3.02	0.87
amount of freshwater									
2000	11.2	41.2	32.4	8.5	1.8	4.9	851	2.46	0.88
2002	8.6	40.0	35.4	8.1	2.0	5.9	813	2.52	0.86
rivers and lakes									
2004	5.2	27.4	40.7	13.3	1.9	11.4	787	2.77	0.85
groundwater									
2004	3.1	21.4	39.7	14.1	2.4	19.3	794	2.89	0.84
area of National Parks									
2000	16.1	44.8	30.3	5.4	0.8	2.7	858	2.28	0.83
2002	15.1	47.4	27.5	5.9	0.5	3.6	812	2.27	0.81
2004	14.5	45.7	31.6	4.9	0.3	3.1	795	2.29	0.79
area of wetlands									
2000	2.8	16.8	37.0	18.9	3.0	21.4	855	3.03	0.87
2002	3.3	19.2	38.7	14.3	4.3	20.2	807	2.96	0.90
2004	3.5	17.1	37.2	16.8	2.6	22.8	794	2.97	0.87
availability of parks and reserves in towns and cities									
2000	12.0	36.2	37.4	10.5	2.0	1.9	856	2.53	0.91
2002	12.8	39.0	34.7	9.7	1.7	2.0	812	2.47	0.90
2004	12.6	40.0	35.5	8.2	2.2	1.5	801	2.47	0.90
reserves of oil and gas***									
2000	1.2	10.0	32.8	24.7	3.9	27.5	851	3.28	0.83
2002	1.4	7.3	29.9	28.7	3.8	28.9	812	3.37	0.81
2004	1.5	3.8	23.6	34.4	10.9	25.8	796	3.67	0.86

*P<0.1; **P<0.05; ***P<0.01

Table 5. Perceived state of the environment compared to five years ago.

Perceived change over the last five years of ...	Percentage response						N	Mean (1-5)	Std. Dev
	Much better (1)	Better (2)	No change (3)	Worse (4)	Much worse (5)	Don't know			
natural environment in towns & cities									
2000	3.9	34.7	32.5	23.9	0.8	4.2	853	2.82	0.88
2002	2.2	35.3	30.7	24.8	1.7	5.3	818	2.88	0.89
2004	2.9	29.6	30.4	27.5	1.5	5.8	794	2.95	0.90
other natural environments									
2000	2.2	25.6	42.8	20.2	1.3	7.9	852	2.92	0.80
2002	1.9	29.6	38.2	20.2	1.2	8.9	808	2.88	0.82
air quality ***									
2000	3.5	10.2	47.1	32.7	2.7	3.8	851	3.22	0.81
2002	0.9	11.2	44.5	34.5	3.3	5.6	809	3.30	0.76
2004	1.0	14.1	37.1	38.5	2.9	6.4	797	3.30	0.80
native land & freshwater plants & animals*									
2000	2.6	17.2	42.2	25.3	2.1	10.6	853	3.08	0.82
2002	1.9	22.2	38.7	23.4	2.0	11.9	807	3.02	0.83
2004	2.2	18.8	38.6	24.4	1.4	14.7	788	3.05	0.82
native bush and forests***									
2000	2.9	21.9	39.6	25.0	3.3	7.3	849	3.04	0.88
2002	2.4	26.9	37.2	22.9	2.5	8.2	807	2.96	0.87
2004	3.4	22.6	41.8	20.2	1.1	10.9	797	2.92	0.82
soils									
2000	1.5	11.6	50.1	15.0	1.8	20.0	851	3.05	0.70
2002	1.4	10.4	46.9	17.8	1.6	22.1	811	3.10	0.71
2004	1.9	9.9	43.9	17.7	1.0	25.5	795	3.08	0.72
coastal waters and beaches**									
2000	1.9	14.6	39.8	30.9	5.3	7.6	852	3.25	0.86
2002	1.6	17.4	38.1	32.0	3.3	7.5	810	3.19	0.84
2004	1.4	11.8	42.1	31.8	3.1	9.7	795	3.26	0.79
marine fisheries									
2000	1.6	10.6	28.8	32.1	3.6	23.2	850	3.33	0.85
2002	1.6	12.3	28.6	27.1	4.6	25.8	807	3.28	0.89
2004	1.5	11.0	26.1	31.4	3.7	26.4	794	3.34	0.86
marine reserves									
2000	2.6	23.7	33.3	14.1	1.3	25.1	845	2.84	0.83
2002	2.5	27.2	30.4	12.7	1.6	25.6	802	2.78	0.84
2004	1.5	24.2	32.2	13.2	0.9	28.0	786	2.83	0.79
freshwater quality									
2000	2.3	12.5	42.7	30.1	4.4	8.1	843	3.24	0.83
2002	1.7	16.3	44.5	25.8	3.0	8.7	805	3.13	0.81
rivers and lakes									
2004	1.3	7.8	33.1	41.7	5.0	11.2	797	3.47	0.79
groundwater									
2004	.9	6.7	43.3	22.4	1.3	25.4	790	3.22	0.68
National Parks **									
2000	3.5	31.9	45.0	9.3	0.6	9.7	849	2.68	0.73
2002	4.2	37.9	38.3	8.4	1.2	9.9	805	2.61	0.78
2004	4.0	33.8	40.9	7.8	0.4	13.1	793	2.62	0.73
wetlands									
2000	1.4	14.4	38.3	15.7	1.7	28.5	840	3.02	0.77
2002	1.4	17.3	38.8	14.6	1.2	26.7	809	2.96	0.76
2004	1.5	17.5	37.7	13.2	0.9	29.2	795	2.92	0.75
NZ's natural environment compared to other developed countries									
2000	13.5	45.3	24.4	5.1	0.6	11.1	857	2.26	0.81
2002	15.7	43.5	21.7	4.7	0.4	14.2	817	2.19	0.81
2004	13.6	43.2	23.2	6.0	0.1	26.4	796	2.26	0.81

*P<0.1; **P<0.05; ***P<0.01

Table 6. Perceived quality of management activities.

Respondents perceptions of the management of ...	Percentage response						N	Mean (1-5)	Std. Dev.
	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know			
pest and weed control ***									
2000	2.9	18.8	34.5	30.2	7.0	6.6	852	3.21	0.95
2002	4.2	17.6	40.6	26.4	6.0	5.2	812	3.13	0.94
2004	5.7	22.3	33.6	26.8	7.0	4.5	783	3.07	1.02
solid waste disposal ***									
2000	1.6	12.8	38.8	32.8	7.4	6.7	854	3.34	0.87
2002	2.4	14.3	42.5	27.0	5.8	8.1	807	3.21	0.87
2004	3.5	17.3	41.7	24.0	5.9	7.6	779	3.12	0.92
sewage disposal ***									
2000	2.0	14.0	39.7	31.4	8.6	4.3	853	3.32	0.90
2002	3.0	13.6	46.5	24.6	6.8	5.5	806	3.20	0.88
2004	3.6	19.3	38.0	26.9	5.6	6.6	782	3.12	0.94
farm effluent and runoff ***									
2000	0.7	9.2	29.8	32.7	9.2	18.4	849	3.50	0.87
2002	1.0	6.9	25.4	34.8	14.9	17.0	811	3.67	0.91
2004	1.3	8.8	24.3	37.9	13.8	13.9	783	3.63	0.92
hazardous chemicals use and disposal ***									
2000	1.6	8.1	28.1	29.2	13.5	19.6	854	3.56	0.95
2002	1.9	9.4	30.8	28.9	8.4	20.6	806	3.41	0.91
2004	2.3	14.1	30.7	24.7	5.7	22.4	785	3.22	0.93
industrial impact on the environment**									
2002	0.6	7.4	31.9	37.9	10.2	12.0	811	3.56	0.83
2004	1.3	9.0	36.1	31.9	8.2	13.6	781	3.43	0.86

*P<0.1; **P<0.05; ***P<0.01

Table 7. Respondents' perceptions of current management of the environment.

Perceived quality of management of ...	Percentage response						N	Mean (1-5)	Std. Dev.
	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know			
natural environment in towns and cities									
2000	2.8	26.4	53.8	12.7	1.2	3.2	852	2.82	0.73
2002	2.7	22.1	56.1	14.0	1.1	3.9	814	2.88	0.72
2004	1.9	24.7	54.7	13.0	0.6	5.0	784	2.85	0.69
other natural environments									
2000	2.9	26.1	50.4	11.3	1.2	8.1	851	2.80	0.74
2002	1.4	24.7	53.6	10.8	0.9	8.7	806	2.84	0.68
air quality ***									
2000	2.8	20.1	45.7	22.9	2.9	5.5	851	3.03	0.84
2002	1.6	15.2	45.7	26.6	4.6	6.3	805	3.19	0.82
2004	0.6	18.9	46.1	25.4	2.4	6.5	779	3.11	0.77
native land and freshwater plants and animals									
2000	3.3	22.5	46.8	17.1	1.6	8.7	849	2.90	0.80
2002	2.2	24.6	47.3	14.8	1.4	9.7	805	2.87	0.76
2004	1.8	24.9	48.8	12.5	0.9	11.1	775	2.84	0.72
native bush and forests ***									
2000	5.5	29.3	39.6	17.5	3.1	4.9	850	2.82	0.91
2002	4.7	34.2	42.1	11.0	1.6	6.3	807	2.69	0.81
2004	6.1	31.5	42.0	11.5	1.2	7.7	781	2.68	0.82
soils									
2000	1.5	18.2	44.6	14.5	2.6	18.5	847	2.98	0.78
2002	1.4	15.9	43.9	15.0	1.9	22.0	800	3.00	0.75
2004	1.4	15.9	44.5	13.8	1.8	22.5	773	2.98	0.74
coastal waters and beaches									
2000	2.5	17.6	44.1	24.8	4.1	6.9	846	3.11	0.85
2002	1.9	19.3	43.7	24.6	3.2	7.3	808	3.09	0.83
2004	2.4	19.2	42.3	24.0	2.2	9.8	782	3.05	0.83
marine fisheries									
2000	2.2	13.2	33.3	24.5	4.4	22.4	848	3.20	0.89
2002	1.2	14.8	37.6	20.4	3.7	22.2	809	3.14	0.83
2004	1.9	13.1	36.0	22.4	2.7	23.8	780	3.14	0.83
marine reserves									
2000	2.6	20.3	40.3	10.9	2.2	23.7	853	2.87	0.80
2002	2.6	21.7	41.4	11.1	2.0	21.2	802	2.85	0.79
2004	2.3	21.6	39.5	11.6	0.7	24.3	769	2.82	0.75
freshwater									
2000	3.3	20.1	45.3	17.6	3.2	10.5	846	2.97	0.84
2002	2.4	20.4	45.5	18.1	3.2	10.4	807	2.99	0.82
rivers and lakes									
2004	2.2	15.1	42.0	28.1	3.0	9.6	779	3.16	0.83
groundwater									
2004	2.3	12.7	39.0	20.0	1.8	24.2	774	3.08	0.80
National Parks									
2000	9.6	39.5	37.6	5.5	1.4	6.4	848	2.46	0.81
2002	8.5	42.1	37.8	3.8	1.2	6.5	810	2.43	0.77
2004	10.8	41.7	35.7	4.5	0.1	7.2	779	2.37	0.76
wetlands									
2000	1.9	18.2	35.9	15.4	2.3	26.4	842	2.97	0.83
2002	3.0	18.5	38.9	12.6	2.6	24.4	807	2.91	0.84
2004	2.6	20.6	35.9	11.8	1.4	27.7	772	2.85	0.80
New Zealand's natural environment compared to other developed countries									
2000	11.6	39.9	33.1	4.3	0.7	12.3	852	2.35	0.80
2002	13.6	36.3	32.1	3.2	1.0	13.7	815	2.32	0.82
2004	13.5	38.3	30.5	4.4	0.6	12.6	776	2.32	0.82

*P<0.1; **P<0.05; ***P<0.01

Table 8. Respondents' perception of the quality of management compared to five years ago.

Perceived change in management compared to 5 years ago of ...	Percentage response						N	Mean (1-5)	Std. Dev
	Much better (1)	Better (2)	Same (3)	Worse (4)	Much worse (5)	Don't know			
natural environments in towns and cities									
2000	5.7	38.5	38.0	9.3	1.2	7.3	847	2.59	0.80
2002	4.1	36.0	40.4	10.8	1.6	7.1	812	2.68	0.80
2004	4.5	33.3	40.4	11.4	0.8	9.7	775	2.67	0.79
other natural environments									
2000	3.6	31.2	45.4	8.5	1.5	9.8	844	2.70	0.76
2002	3.2	30.7	46.5	8.9	0.6	10.1	809	2.70	0.72
air quality **									
2000	3.0	16.5	51.1	18.7	2.3	8.4	843	3.01	0.78
2002	1.1	16.7	47.6	23.0	2.4	9.2	806	3.10	0.76
2004	2.5	19.4	44.2	22.6	1.4	10.0	770	3.01	0.80
native plants and animals ***									
2000	3.6	29.7	42.9	12.3	1.8	9.7	843	2.77	0.81
2002	2.8	26.7	45.4	11.0	1.1	13.0	798	2.78	0.75
2004	3.4	22.3	48.4	10.7	0.4	14.9	767	2.79	0.72
native bush and forests***									
2000	4.3	30.4	41.9	12.8	2.0	8.7	843	2.76	0.83
2002	3.7	34.1	41.1	9.2	1.6	10.2	803	2.68	0.79
2004	4.6	27.6	46.0	9.6	0.4	11.8	769	2.70	0.75
soils									
2000	2.3	13.5	51.2	10.7	1.0	21.4	840	2.93	0.68
2002	1.5	13.3	47.6	10.8	0.6	26.2	805	2.94	0.66
2004	2.3	11.2	46.2	11.7	0.7	27.8	766	2.96	0.70
coastal waters and beaches**									
2000	2.8	19.2	45.4	18.7	3.4	10.4	845	3.01	0.84
2002	2.6	21.8	45.9	17.3	1.6	10.8	804	2.93	0.79
2004	3.4	16.1	45.6	20.4	1.3	13.1	769	3.00	0.80
marine fisheries									
2000	2.6	15.9	35.7	19.0	3.2	23.6	843	3.06	0.87
2002	2.6	19.4	35.9	16.4	2.0	23.7	805	2.94	0.84
2004	3.1	15.4	34.4	18.6	1.6	26.9	767	3.00	0.85
marine reserves									
2000	2.5	24.0	35.7	10.6	1.8	25.4	842	2.80	0.81
2002	3.7	27.6	36.0	8.6	1.4	22.7	811	2.69	0.80
freshwater									
2000	2.9	17.6	49.5	13.9	3.5	12.8	837	2.97	0.81
2002	2.1	19.4	48.3	15.9	1.9	12.4	805	2.95	0.76
rivers and lakes									
2004	3.8	13.2	41.4	24.2	2.5	14.9	765	3.10	0.85
groundwater									
2004	3.0	9.2	44.4	15.6	0.9	26.8	761	3.03	0.74
National Parks *									
2000	5.2	32.7	42.6	7.7	1.2	10.7	845	2.63	0.78
2002	6.4	36.4	40.3	5.4	0.9	10.6	811	2.53	0.76
2004	7.0	32.3	43.5	4.2	0.7	12.3	767	2.53	0.74
wetlands									
2000	2.3	17.4	40.0	11.1	1.5	27.8	841	2.89	0.77
2002	2.6	19.6	40.9	8.6	1.0	27.3	805	2.80	0.74
2004	3.2	18.5	40.5	9.3	1.1	27.9	772	2.79	0.74
New Zealand's natural environment compared to other developed countries									
2000	13.2	35.5	29.9	3.9	1.1	16.5	843	2.33	0.84
2002	14.1	35.8	28.8	3.3	0.6	17.3	808	2.28	0.82
2004	12.1	36.5	27.4	4.8	0.5	18.6	767	2.33	0.82

*P<0.1; **P<0.05; ***P<0.01

Table 9. Respdnts' participation in environmental activities.

In the last 12 months the respondent had ...	Year	Percentage response				N
reduced or limited their use of electricity	2000	58.5	NA	35.7	5.8	863
	2002	60.3	15.1	22.2	2.5	803
	2004	63.2	19.7	15.9	1.1	797
visited a marine reserve	2000	36.0	NA	63.0	1.0	859
	2002	36.0	2.9	59.8	1.4	801
	2004	27.5	1.9	69.8	0.8	789
visited a national park	2000	66.1	NA	33.4	0.5	861
	2002	55.6	6.7	36.8	0.9	801
	2004	61.8	4.9	32.7	0.6	796
bought products that are marketed as 'environmentally friendly'	2000	79.2	NA	12.9	7.9	865
	2002	64.8	15.2	11.7	8.3	805
	2004	66.5	16.4	12.2	4.9	798
recycled household waste	2000	83.7	NA	15.2	1.0	866
	2002	63.3	24.5	11.8	0.5	800
	2004	62.8	28.7	8.1	0.4	801
composted garden and/or household waste	2000	70.7	NA	28.8	0.5	864
	2002	50.2	20.6	28.5	0.6	804
	2004	50.4	22.0	27.3	0.2	801
been involved in a project to improve the natural environment	2000	21.3	NA	76.5	2.2	859
	2002	20.3	3.6	74.7	1.4	797
	2004	19.3	3.4	75.6	1.7	783
grown some of their own vegetables	2000	70.6	NA	29.2	0.2	867
	2002	54.9	11.6	33.0	0.5	812
	2004	54.8	15.5	29.4	0.2	805
obtained information about the environment from any source	2000	51.1	NA	46.1	2.8	863
	2002	46.0	7.7	44.2	2.1	805
	2004	43.8	6.3	48.5	1.4	790
taken part in hearings or consent processes about the environment	2000	14.1	NA	84.7	0.8	864
	2002	15.1	2.6	81.1	1.2	810
	2004	12.3	1.8	84.9	1.0	794
participated in an environmental organisation	2000	12.5	NA	86.7	0.8	862
	2002	12.3	2.2	84.0	1.4	802
	2004	10	1.3	87.4	1.4	792
regularly commuted by bus or train	2000	17.5	NA	81.9	0.6	863
	2002	34.9	4.8	59.4	0.9	806
	2004	32.1	4.8	62.6	0.5	795
been an active member of a club or group that restores and/or replants natural environments	2000	11.9	NA	87.2	0.9	864
	2002	11.9	1.1	86.0	1.0	807
	2004	10.4	1.0	87.7	0.9	791

NA; Not asked in 2000.

Table 10 Respondents' opinions of the most important environmental issue facing New Zealand today.

	Percentage response	
	2002 (N=678)	2004 (N=670)
Air quality/pollution	17.40	17.30
Introduced pests, weeds, and diseases	10.47	5.37
Pesticides/poisons	1.92	0.45
Genetic engineering	1.33	2.69
Water quality/pollution	6.93	13.58
Sewerage and water supply	3.39	5.52
Waste disposal and industrial pollution		
Disposal of refuse/waste	5.46	6.40
Industrial pollution/waste	4.42	2.39
Pollution (unspecified)	6.19	3.43
Other	5.46	5.07
Insufficient environmental controls/resources	0.74	0.30
Environmental controls too restrictive	1.77	1.64
Transport	1.77	0.60
Climate change and ozone	6.34	6.87
Wildlife / biosecurity	4.42	2.99
Natural bush and waterways	1.92	1.19
Protecting environment/keeping New Zealand clean, green	5.60	3.88
Urban sprawl/urban environment	2.36	3.28
Population pressure and tourism	2.21	3.88
Sustainable management of resources	2.51	4.48
Over fishing/fish stocks	1.92	2.09
Environmental education	3.83	2.39
Too much power to one party/agency/ethnic group	1.62	4.18

APPENDIX 3

Significance of differences between survey responses was identified through chi square tests. The statistic reported is the significance level of differences. It may be interpreted as the probability of the observed difference occurring by chance.

* Significant at 90% confidence level ($P < 0.1$)

** Significant at 95% confidence level ($P < 0.05$)

*** Significant at 99% confidence level ($P < 0.01$).

Table 1. Willingness to pay increased household rates for lowland stream enhancement work.

	Percentage response						N
	Strongly supportive	Supportive	Don't Care	Opposed	Strongly opposed	Don't know	
If my regional council proposed to increase household rates by \$20 per year for 10 years to pay for lowland stream enhancement work I would be...	11.4	41.4	4.8	20.4	9.1	13	771

Table 2. Willingness to pay increased household rates for lowland stream enhancement work.

Reason for level of support	Percentage response					N
	Strongly supportive	Supportive	Don't care	Opposed	Strongly opposed	
Other	7.1	57.1	4.8	21.4	9.5	42
To clean up the water	25.0	75.0				16
Better than cleaning it up later	18.2	81.8				11
Industry or farmers should pay for this, not ratepayers	3.6	7.1	3.6	46.4	39.3	28
Rates are too high already	0.9	0.9		71.2	27.0	111
No proof the projects are being done efficiently	3.3	16.7	6.7	43.3	30.0	30
On a low income		7.1		85.7	7.1	14
Good to pass onto future generations	21.6	75.7		2.7		37
Small price to pay for the greater good	25.6	72.8	1.0	0.5		195

Table 3. Management agency performance.

Agency	Percentage response						N
	Extremely good	Good	Adequate	Poor	Extremely poor	Don't know	
Regional Council's management of freshwater	3.4	22.6	33.5	14.4	3.9	22.2	797
Department of Conservation's management of whitebait	2.1	14.1	19.4	8.2	1.6	54.4	792
Local Fish and Game Council's management of freshwater sports fish	3.1	22.4	22.6	5.7	1.1	45	786

Table 4. Significant differences in regional responses to freshwater issues.

	Northern vs Central	Northern vs Southern	Central vs Southern	Overall
More water should be taken from large rivers for irrigation even if it has a negative impact on freshwater fisheries	NA	NA	NA	No
Small lowland streams in my region have high quality water	***	*	No	***
Small lowland streams in my region are well managed	***	No	No	**
More water should be taken from streams for irrigation even if it has a negative impact on freshwater fisheries	NA	NA	NA	No
Small lowland streams in my region are in good condition	***	No	*	***
Water quality in small lowland streams in my region has not been damaged by dairy farming	No	***	***	***
More water should be taken from aquifers	No	**	***	***

* = $P < 0.1$; ** = $P < 0.05$; *** = $P < 0.01$; NA = not applicable; No = no significant difference.

Table 5. Significant differences in ethnic responses to freshwater issues.

	Maori vs NZ European	Maorivs Other	NZ European vs Other	Overall
Streams in good condition	No	No	**	*
Water quality not damaged by dairy farming	No	**	***	***

* = P<0.1; ** = P<0.05; *** = P<0.01; NA = not applicable; No = no significant difference.

Table 6. Significant differences in responses for freshwater resources.

	Rivers and streams vs lakes	Rivers and streams vs aquifers	Aquifers vs lakes	Overall
Public access to NZ's...	***	NA	NA	***
Compared to 5 years ago public access to NZ's...	NA	NA	NA	No
Quality of water in NZ's...	***	***	***	***
Quality of water in region's...	No	***	***	***
Compared to 5 years ago quality of water in NZ's...	**	***	***	***
Compared to 5 years ago quality of water in my region's...	No	***	***	***

* = P<0.1; ** = P<0.05; *** = P<0.01; NA = not applicable; No = no significant difference.

Table 7. Freshwater access and quality currently and compared to five years ago.

Respondents perceptions of ...	Percentage response						N
	Extremely good	Good	Acceptable	Poor	Extremely poor	Don't know	
Public access to New Zealand's...							
rivers and streams	20.6	44.2	24.6	7.5	0.8	2.4	798
lakes	24.6	45.8	22.7	3.3	0.4	3.3	797
Quality of water in New Zealand's ...							
rivers and streams	3.6	30.7	36.1	19.9	2.0	7.6	798
aquifers	6.4	27.8	29.2	9.3	0.6	26.6	792
lakes	3.3	25.9	32.4	24.5	4.9	9.1	793
Quality of water in my region's ...							
rivers and streams	4.9	25.2	32.7	21.8	3.1	12.4	799
aquifers	7.8	26.2	26.6	8.3	1.3	29.9	798
lakes	4.1	22.9	29.8	19.9	4.3	19.0	789
The state of the banks and edges of lakes rivers and streams in...							
my region	1.1	22.5	36.9	22.5	3.9	13.1	800
New Zealand	1.0	17.6	41.8	16.6	3.0	19.9	794

Respondents perceptions of ...	Percentage response						N
	Much better	Better	About the same	Worse	Much worse	Don't know	
Public access to New Zealand's ... compared to 5 years ago							
rivers and streams	3.6	11.4	62.7	9.5	1.0	11.8	804
lakes	3.7	9.7	67.8	6.6	0.6	11.6	793
Quality of water in New Zealand's ... compared to 5 years ago							
rivers and streams	2.4	7.5	44.6	25.9	2.8	16.9	799
aquifers	1.5	5.8	44.8	13.1	1.5	33.3	796
lakes	1.9	5.9	40.4	29.2	4.6	17.9	797
Quality of water in my region's ... compared to 5 years ago							
rivers and streams	2.0	6.6	45.4	23.9	2.2	19.8	802
aquifers	1.3	3.8	47.1	11.8	1.3	34.9	797
lakes	1.4	4.3	44.1	22.4	3.6	24.2	796

Table 8. Significant differences in regional responses to water quality.

	Northern vs Central	Northern vs Southern	Central vs Southern	Overall
The quality of water in my regions...				
Rivers and streams	***	***	No	***
Aquifers	**	***	**	***
Lakes	No	***	***	***
Compared to 5 years ago the quality of water in my region's...				
Rivers and streams	***	*	***	***
Aquifers	***	No	**	***
Lakes	**	***	No	***
The state of the banks and edge of lakes, rivers and streams in my region...				
	***	***	*	***

* = P<0.1; ** = P<0.05; *** = P<0.01; No = no significant difference.

Table 9. Trout angling over the last five years.

Compared to 5 years ago...	Percentage response						N
	Much better	Better	About the same	Worse	Much worse	Don't know	
Trout catch rates in my region are...							
Total	0.9	2.9	15.2	10.2	1.6	69.2	795
Non angler	0.9	0.9	6.2	4.9	0.6	86.6	470
Angler	0.7	6.4	29.4	19.4	3.3	40.8	299
Trout condition in my region is...							
Total	0.4	3.4	16.6	8.1	0.8	70.8	791
Non angler	0.0	1.3	6.4	3.6	0.4	88.2	468
Angler	1.0	6.4	33.2	5.8	1.3	42.3	298
Trout size in my region is...							
Total	0.3	3.3	15.6	9.2	0.9	70.8	794
Non angler	0.0	1.5	6.8	3.6	0.4	87.7	470
Angler	0.7	6.0	29.5	18.8	1.7	43.3	298

Table 10. Catch rate and trout size rates by region.

	Percentage response			N
	Better	About the same	Worse	
Trout catch rates				
Northern region	13	51	36	47
Central region	14	57	30	115
Southern region	10	39	52	83
Trout size				
Northern region	7	59	34	44
Central region	14	59	27	107
Southern region	12	43	44	81

Table 10a. Significant differences in regional response to freshwater fisheries.

	Northern vs Central	Northern vs Southern	Central vs Southern	Overall
Catch rates	No	No	***	**
Size	No	No	**	*

* = P<0.1; ** = P<0.05; *** = P<0.01; No = no significant difference.

Table 11. Fishing status and trout catch rates by ethnicity.

	Percentage response			N
	Will not fish	Fish currently	Intend to fish	
Fishing status				
Maori	52	15	34	62
NZ European	75	8	17	606
Other	80	3	17	102

	Percentage response			N
	Better	About the same	Worse	
Trout catch rates				
Maori	19	61	19	31
NZ European	11	48	41	192
Other	13	31	56	16