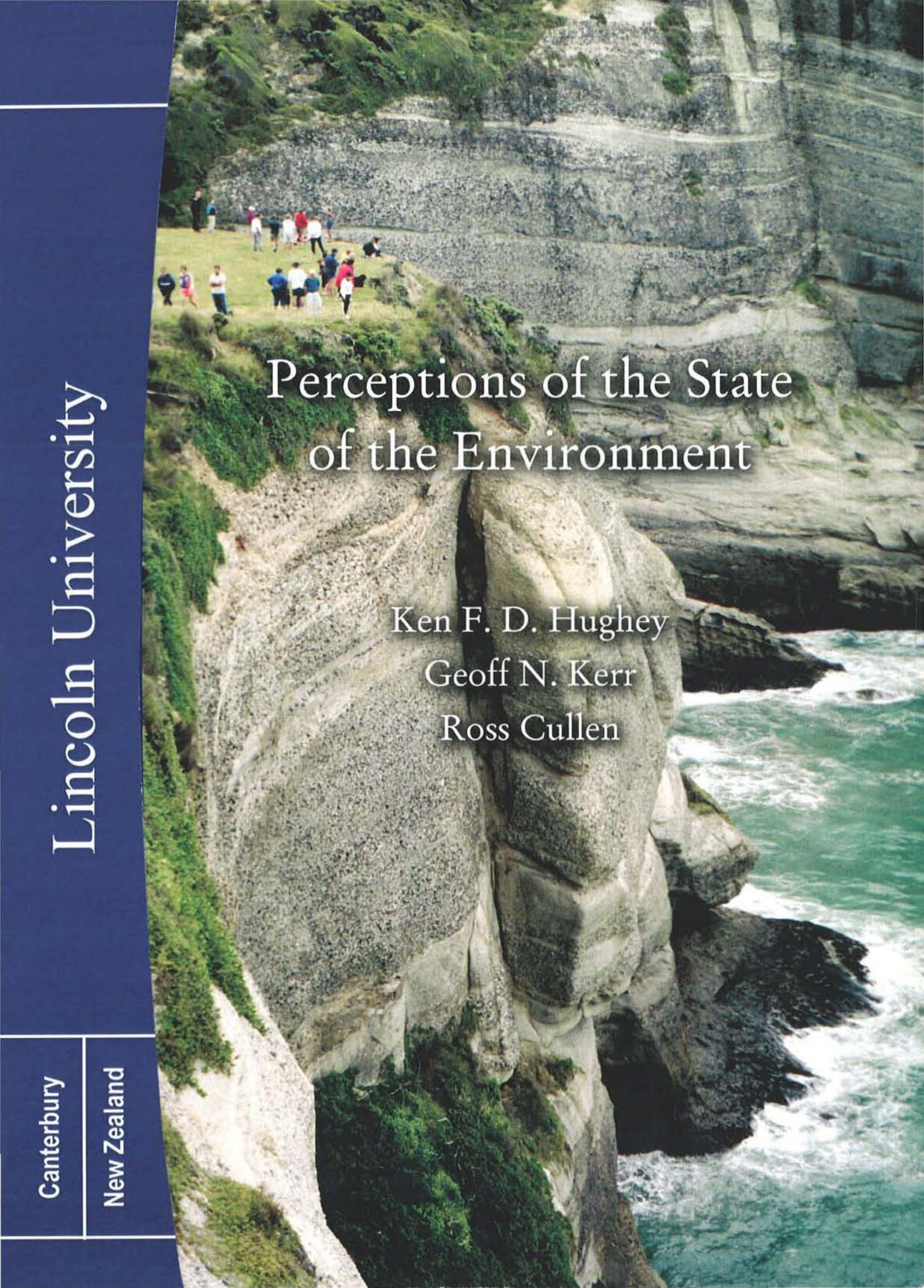

Perceptions of the State of the Environment

Ken F. D. Hughey
Geoff N. Kerr
Ross Cullen

Lincoln University
Canterbury
New Zealand

Perceptions of the State of the Environment:

The 2002 survey of public attitudes, preferences and perceptions of the New Zealand environment

Ken F. D. Hughey
Geoff N. Kerr
Ross Cullen

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Agribusiness and Economics Research Unit
PO Box 84
Lincoln University
Canterbury
New Zealand
Ph (64) 3 325 2811
Fax (64) 3 325 3847
http://www.lincoln.ac.nz/AERU

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SUMMARY

The second biennial survey of people's perceptions of the state of the New Zealand environment was undertaken in February 2002. The survey is based on the Pressure–State–Response model of state of the environment reporting. It tests perceptions of all the main resource areas and in 2002 looked more specifically also at coastal management issues. Two thousand people, aged 18 and over, were randomly selected from the New Zealand electoral roll. An effective response rate of 45% was achieved. Data has been analysed descriptively and subject to statistical analyses in terms of comparing the 2002 survey response with that from 2000 and in terms of analyzing responses by several demographic variables. Key findings include:

- New Zealanders consider the state and management of the environment to be good and better than other developed countries;
- Farming is seen to be an increasing pressure for a number of resources, including fresh water;
- New Zealanders would like to see more spent on the environment, especially on fresh water related activities;
- While the Government has dismissed implementing licences for marine recreational fishers the survey indicated that such a regime would generate a large income stream which would likely benefit marine recreational fisheries' management;
- Ethnicity is a key variable, e.g., for responses to water-related questions. Maori responses were often highly negative. Maori judge that water quality is lower, and management of water is worse than do New Zealand Europeans and 'other ethnicity' respondents, perhaps because Maori have particular affinities with water and their recent experiences with pollution are unsatisfactory.

There are policy implications from many of the report's key findings. Generally speaking farming comes out negatively in this survey. The public give a very low rating to management of farm effluent and runoff and farming is perceived as an increasing threat to many resources. Policy makers should consider whether new policies are needed to combat these problems. The recent effort by Statistics New Zealand to monitor progress towards a sustainable New Zealand does not include any perceptions information. Future development of the Environmental Perceptions survey might be able to more explicitly consider people's perceptions of sustainability and therefore contribute to such progress monitoring.

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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 in 2000 was reported by Hughey et al. (2001) using a survey based on the Pressure–State–Response model (See Hughey et al. (2001) for background and justification for the survey). 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. In this book we report the results of the second biennial survey undertaken in 2002 including a comparison with the 2000 survey findings. We also comment on the potential for this sort of reporting to be included in monitoring progress towards a sustainable New Zealand (see Statistics New Zealand 2002).

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 key issues of public concern as a medium for providing policy advice to government and others;
- Provide space for individual 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 questionnaire.

2. SURVEY METHOD

A postal questionnaire based on the Pressure–State–Response model (PSR) model and the survey administered in 2000 was used to gather information on New Zealander's 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 questionnaire

Questionnaire items were presented in an A5-size booklet with questions on facing pages. The booklet had thirteen pages of questions. A letter of introduction stating the purpose of the questionnaire, introducing the topics in the questionnaire and inviting voluntary participation was included. 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 135 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 response by management. For all of these measures a 'don't know' option was provided for respondents who did not feel they were sufficiently informed to respond. Perceived pressures were assessed by one set of questions.

Further questions supplemented the PSR framework. These included measurement of the main perceived causes of damage to the environment. One question set examined preferred allocation of government expenditure on environmental management and government services.

Participation in thirteen activities was measured to explore relationships between environmental behaviour and responses to the PSR framework. Perceptions of marine resource management were measured for a separate project, though initial analysis of these perceptions is provided in this report. Eight 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 developed biennially. We introduced questions on ethnic origin to further our analysis here.

Knowledge, standard of living and 'clean green'

The questionnaire began by assessing knowledge of the environment and New Zealand's standard of living with the invitation: *We would like your opinion on the following issues.* The questions were: *Your knowledge of the environment is...* , *The overall standard of living in New Zealand is...* and *New Zealand's environment is regarded as 'clean and green' ...* . Measurements were taken on five-point scales anchored by *very good* and *very bad.*

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 state of each of the following is.* Followed by: *The quality or condition of New Zealand's...* . The eleven aspects were then presented with a five-point scale provided for measurement of each which was anchored by *very good* and *very bad.*

The second set of questions regarding the state of the environment measured perceptions of the amount or availability of nine natural resources. These were measured by asking: *We would like your opinion on the availability or amount of some of our natural resources.* The set of nine natural resources was then preceded by: *In New Zealand the ...* . Five-point scales provided for measurement 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. These were taken with the invitation: *Now that you have told us what you think about the state of New Zealand's environment, we would like you to tell us how you think the environment has changed over the last 5 years.* The set of aspects was preceded by: *Compared to five years ago...*, followed by thirteen aspects of the New Zealand environment. 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 five aspects of management with: *Now we would like you to tell us what you think of the following items*: followed by *Management of New Zealand's ...* followed by the five aspects. 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 same resources considered in the other 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: *Currently in New Zealand how well or poorly managed is...* These items were presented with a five-point scale provided for measurement of each anchored by *very well managed* and *extremely poorly managed.*

A further set of management questions was design to establish whether 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: *Compared to five years ago, management of New Zealand's....* These items were presented with a five-point scale provided for measurement anchored by *much better* and *much worse.*

Preferences for management

Preferences for who should manage resources were measured with the invitation: *There are many ways to manage resources. Please indicate your preferences by ticking one box for each line.* Fourteen resource areas were presented with five possible management arrangements for respondents to select from.

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 ten 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: *Tell us what you think are the main causes of damage to parts of the New Zealand environment by ticking up to three items on each line.*

Allocation of government funds

Design of the 2002 survey differed from the 2000 survey in the way respondents were asked to consider expenditure preferences. The 2000 survey mixed the major areas of government expenditure with some specific conservation and environment expenditure items. While these results were

interesting, it was decided to improve the question in 2002 by separating the general areas of government expenditure from specific areas in environment and conservation. Despite these changes an effort is made to compare findings between surveys, although these comparisons need to be made with care.

A table in the 2002 survey presented current government spending on six items (rounded to the nearest $0.5 billion): defence, education, crime prevention, health, superannuation and income support, and conservation and the environment. Respondents were invited to write beside each item the spending they would prefer with the instruction: *The government can reallocate expenditure within a fixed budget. Please indicate* ***your preferences*** *for allocating expenditure on the following items by writing numbers in the empty column (remembering that total expenditure does not change).*

To identify preferences for allocation of government spending on conservation and the environment within the existing budget, respondents were asked whether they considered more or less should be spent on eleven items. The question began by stating: *Now we would like to know how you would* ***reallocate the government's expenditure on Conservation and the Environment.*** *Total spending on Conservation and the Environment would not change. Please tick one box for each spending category to show how you would change the allocation of government spending if* ***total spending is the same as now.*** Measurement was then taken on five- point scales anchored by *we should spend far more* and *we should spend far less.*

Participation in environmental activities

Measurements were taken of whether respondents had participated in twelve activities related to the environment. In 2000 respondents were asked: *Please indicate if in the last twelve months you have...* followed by twelve environmental activities. Measurements were taken using either *yes, no* or *don't know* options. The question was modified slightly in 2002 by adding *Regularly* as an option to the *Yes* response. A few respondents ticked both options so we removed the *Yes* responses in these circumstances to avoid double counting of their responses.

Marine resource questions

Measures were taken of respondents' views of a range of coastal and marine issues. The first question concerned *quality of beaches and water* in the coastal and marine environments. *Change in beach and water quality* was also examined. Peoples perceptions about the *area of coastal waters used for marine farming* and about *access to the NZ coast* were also measured. Questions about recreational fishing included whether they were a *marine recreational fisher* and, if they were, how their *catch rates had changed over the last five years* and then, if catch rates had changed, they were asked to identify *the main cause* of that change. A question measured *willingness to purchase an annual licence for sea fishing.* Licence fees tested were on a 'semi-log' scale: $10, $15, $20, $25, $30, $40, $50, $70 and $100, with each respondent randomly allocated one of these prices. Perceived *fish abundance and effort to catch fish* was examined. Finally, respondents were asked *who should manage* the New Zealand coastline. Ten alternatives were given, although respondents could tick any number of boxes.

Demographic information

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 (or had last worked) in, and personal income. Where possible these were measured using categories corresponding, as closely as possible, to data extracted from the 2001 New Zealand Census information. Demographic information is provided in Appendix 1, along with comparisons between the 2000 and 2002 data sets. In addition, numbering of each survey allowed identification of respondents' residential locations, which were subsequently categorised into three regions (southern, central and northern), and into two categories (either within the five major urban centres, or elsewhere).

Gender is the only demographic variable tested which is representative of the population at large. The following key points about the survey sample can be drawn:

- New Zealand Europeans and 'others' are over-represented in terms of ethnicity;
- 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 more likely to respond; and
- Those with a tertiary qualification were over-represented.

However, apart from the income and age variables, distributions of the others were a reasonable match with the census and enabled valid comparisons of the demographics with key questions in the survey to be undertaken.

2.2. Pre-testing

Pre-testing followed a cognitive interview process as described in Dillman (1998) Eight individuals were interviewed about each of the questions in the 2000 survey and, following drafting, were also asked about new questions in the 2002 survey. As well, a small number of individuals completed the 2002 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. The survey instrument was 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 2002 survey results with those from 2000. Some relationships between parts of the PSR framework and demographic information were explored and are also presented in Section 3. Chi-square tests were used to test for changes in responses. Data conglomeration was necessary in some areas because there were too few valid responses in some cells 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 New Zealand electoral roll. The questionnaire and the letter of introduction were posted with a freepost return envelope. The questionnaires were posted on 9 March 2002. In addition, a follow-up postcard was sent on 28 March 2002 and a second questionnaire posting to non-respondents was made on 18 April 2002.

2.5 Response

The survey received an effective response rate of 45% (N= 836) (2000 survey response rate of 48%; N = 894). Both surveys had maximum margins of error of 3% at the 95% confidence level.

3. PRESSURE–STATE–RESPONSE ANALYSIS BY QUESTION

3.1. Knowledge of the environment, standard of living and 'clean and green'

The first part of the survey measured knowledge of the environment and the perceived overall standard of living in New Zealand (Table 1 and Figure 1). In general most respondents reported *adequate* to *good* knowledge of environmental issues. Very few respondents reported *bad* to *very bad* knowledge. There was a significant difference between surveys in terms of perception of standard of living with more people in 2002 considering it to be good or very good.

Table 1. Knowledge of environmental issues and standard of living.

Respondents perceptions of ...	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
their own knowledge of environmental issues									
2000	878	6.5	29.4	52.1	8.9	1.4	1.8	2.69	.78
2002	810	7.5	28.6	54.4	7.0	1.1	1.2	2.65	.77
the overall standard of living in New Zealand; **									
2000	863	11.1	45.5	36.0	5.6	0.9	0.8	2.39	.80
2002	766	14.1	50.8	28.6	4.8	0.9	0.8	2.27	.80

Key: * P<0.1; ** P<0.05; *** P<0.01

Respondents were asked, in the second part of question one, the extent to which they agreed or otherwise with the statement that New Zealand's environment is regarded as 'clean and green'. Two thirds of respondents either agreed or strongly agreed with the statement (Table 2).

Table 2. New Zealand's 'clean and green' image.

Respondents perceptions of ...	N	Strongly agree (1)	Agree	Neither agree or disagree (3)	Disagree (4)	Strongly disagree (5)	Don't know	Mean (1-5)	Std. Dev.
New Zealand's environment is regarded as "clean and green"		%							
2000	Question not asked in 2000								
2002	816	9.2	57.0	17.6	13.7	2.0	0.5	2.42	.91

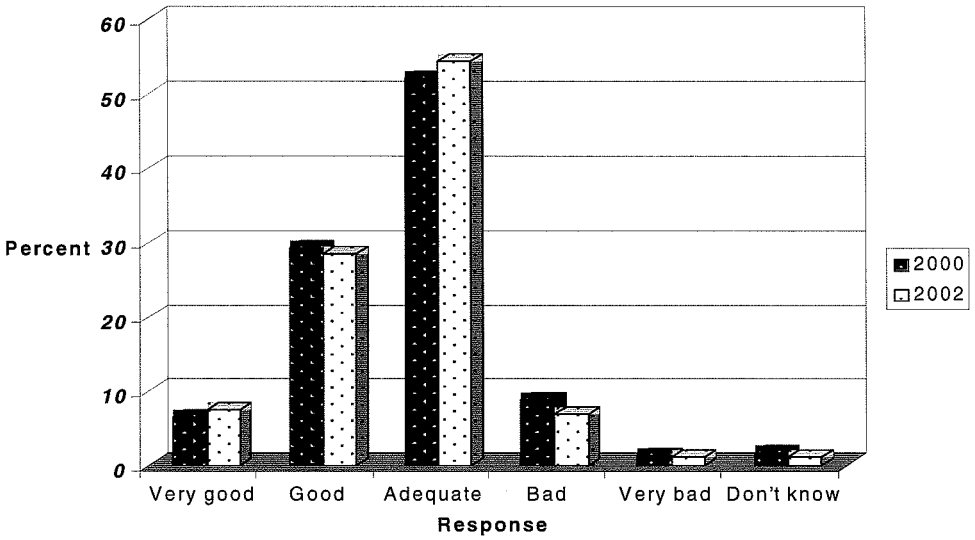


Figure 1. Perceived knowledge of environmental issues: 2000 and 2002 compared.

3.2. Changes in perceptions for state of, and management of, the environment

Several questions explored aspects of the state (condition or quality) of the environment and also management of the environment. A summary of significant changes between 2000 and 2002 for five of these questions is presented in Table 3. The most notable finding was that for all measures of 'air' there was a significant deterioration in perceptions between surveys. Where other significant differences occurred these were normally associated with perceptions of improved conditions.

3.3. The state of the environment

a) Quality or condition of the environment in New Zealand

Question 2 measured perceived quality of aspects of the New Zealand environment. Table 4 shows that perceptions of the state of the New Zealand environment were generally *good* to *adequate*. In 2000, of the environmental aspects presented, air was considered to be in the best condition and marine fisheries were considered to be the worst, although the mean values for both are still within the *good* to *adequate* range. For 2002 native bush and forests was considered best and marine fisheries the worst. Marine fisheries and wetlands received the largest number of 'don't know' responses (each with more than 10%) in both years. While aspects of the environment were generally judged as *good* to *adequate*, the state of the New Zealand environment compared to other developed countries received a higher rating of *good* to *very good*. The quality of air was perceived to be significantly worse in 2002 than in 2000, whereas significant improvements were recorded for the natural environment in towns and cities, native bush and forests, marine fisheries, and wetlands.

Table 3. Significant changes in peoples' perceptions between the 2000 and 2002 surveys, and the directions of those changes.

'E'	State or condition of 'E'	Availability (Quantity) of 'E'	State or condition of 'E' compared to 5 years ago	Current management of 'E'	Management of 'E' compared to 5 years ago
Natural environment in towns and cities	* Better				
Other natural environments					
Air	** Worse	NA	*** Worse	** Worse	** Worse
Native land & freshwater plants & animals					
Native bush and forests	* Better			*** Better	
Soils					
Coastal waters & beaches					
Marine fisheries	** Better	** Similar centre of mass, but fewer polar responses			
Fresh waters			* Better		
National Parks	NA		** Better		
Wetlands	* Better	* Better			
NZ's natural environment compared to other developed countries					

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-square test

NA: not asked in either survey

Table 4. Perceived state of New Zealand's environment.

Respondents perceived quality of ...	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
natural environment in towns and cities: *									
2000	875	3.7	34.5	47.4	12.1	0.7	1.6	2.71	.75
2002	815	5.9	36.9	44.7	9.6	1.1	1.8	2.62	.79
other natural environments:									
2000	866	11.5	46.9	34.8	3.2	0.8	2.8	2.33	.76
2002	795	14.5	47.0	31.2	3.8	0.8	2.8	2.27	.79
air: **									
2000	866	20.0	47.0	23.6	7.2	1.3	1.0	2.22	.89
2002	795	15.8	43.5	29.6	8.8	1.5	0.8	2.36	.91
native land and freshwater plants and animals:									
2000	870	12.6	42.8	29.9	10.1	1.8	2.8	2.44	.91
2002	808	14.6	40.8	30.2	9.2	1.7	3.5	2.41	.92
native bush and forests: *									
2000	870	20.5	39.8	26.0	10.6	1.6	1.6	2.32	.97
2002	808	23.1	42.9	23.1	7.7	1.0	2.1	2.19	.92
soils:									
2000	862	10.1	40.1	33.4	7.1	1.2	8.1	2.45	.84
2002	797	10.4	40.8	32.0	7.0	0.9	8.9	2.42	.83
coastal waters and beaches:									
2000	873	12.4	37.2	35.2	11.3	1.5	2.4	2.51	.91
2002	817	12.6	37.5	34.8	10.5	2.0	2.7	2.50	.92
marine fisheries: **									
2000	875	6.2	30.2	32.9	15.4	2.7	12.6	2.75	.93
2002	801	6.2	33.5	36.0	10.2	2.5	11.6	2.65	.88
fresh waters:									
2000	875	11.7	35.3	35.1	12.2	1.9	3.8	2.56	.93
2002	803	12.1	34.2	36.5	11.1	2.4	3.7	2.56	.94
wetlands: *									
2000	872	6.0	28.1	34.6	13.0	2.6	15.7	2.74	.91
2002	836	7.3	33.9	31.2	11.8	1.5	14.4	2.61	.89
New Zealand's natural environment compared to other developed countries:									
2000	879	34.6	42.3	14.7	1.6	0.2	6.6	1.83	.77
2002	821	38.7	41.2	12.7	1.3	0.4	5.7	1.76	.76

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-squared test

b) Availability of natural resources

Respondents' assessments of the availability of aspects of the New Zealand environment were measured (Table 5). Respondents rated three items; marine reserves, wetlands and reserves of oil and gas, as having *moderate* to *low* availability. The area of National Parks was considered *high*, as was the diversity of native land and fresh water plants and animals, and the amount of native bush and forests. Marine reserves, wetlands and reserves of oil and gas received the highest number of 'don't know' responses. Only marine fisheries and wetlands displayed significant differences between years, with the former characterised by a distributional change which did not affect its overall score, whereas there was a perception of an increase in the area of wetlands.

Table 5. Perceived availability of natural resources.

Respondents perceptions of ...	N	Very high (1)	High (2)	Moderate (3)	Low (4)	Very low (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
diversity of native land and fresh water plants and animals:									
2000	841	7.6	36.0	40.5	8.0	0.7	7.1	2.55	.79
2002	807	7.7	37.9	38.0	5.6	1.1	9.7	2.50	.79
amount of native bush and forests:									
2000	855	9.4	39.3	34.9	12.6	2.0	1.9	2.58	.90
2002	812	10.7	39.2	34.5	10.3	2.1	3.2	2.52	.90
quantity of marine fisheries: **									
2000	846	3.8	25.2	38.3	16.2	1.5	15.0	2.84	.84
2002	808	3.7	22.0	42.9	12.0	2.4	17.0	2.85	.92
area of marine reserves:									
2000	849	2.5	13.8	37.9	24.5	4.9	16.4	3.19	.88
2002	808	3.7	16.7	36.1	21.8	4.6	17.1	3.08	.93
amount of fresh water:									
2000	851	11.2	41.2	32.4	8.5	1.8	4.9	2.46	.88
2002	813	8.6	40.0	35.4	8.1	2.0	5.9	2.52	.86
area of National Parks:									
2000	858	16.1	44.8	30.3	5.4	0.8	2.7	2.28	.83
2002	812	15.1	47.4	27.5	5.9	0.5	3.6	2.27	.81
area of wetlands: *									
2000	855	2.8	16.8	37.0	18.9	3.0	21.4	3.03	.87
2002	807	3.3	19.2	38.7	14.3	4.3	20.2	2.96	.90
availability of parks and reserves in towns and cities:									
2000	856	12.0	36.2	37.4	10.5	2.0	1.9	2.53	.91
2002	812	12.8	39.0	34.7	9.7	1.7	2.0	2.47	.90
reserves of oil and gas:									
2000	851	1.2	10.0	32.8	24.7	3.9	27.5	3.28	.83
2002	812	1.4	7.3	29.9	28.7	3.8	28.9	3.37	.81

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-square test

c) Change in the state of the environment

Measurements of how the perceived state of New Zealand's environment had changed over the last five years are shown in Table 6. Respondents generally considered that no or little change had occurred over the last five years, for both 2000 and 2002. There was, however, an indication that National Parks were perceived to have improved and also that marine fisheries were considered to have become worse. Respondents also believed that New Zealand's natural environment had improved compared to natural environments in other developed countries. There were large numbers of *don't know* responses for: soil condition, marine fisheries, marine reserves and wetlands. The state of air was perceived to have worsened significantly, while for fresh waters and National Parks there was perceived improvement.

Table 6. The perceived state of the environment compared to five years ago.

Perceived change over the last five years of ...	N	Much better (1)	Better (2)	No change (3)	Worse (4)	Much worse (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
natural environment in towns & cities:									
2000	853	3.9	34.7	32.5	23.9	0.8	4.2	2.82	.88
2002	818	2.2	35.3	30.7	24.8	1.7	5.3	2.88	.89
other natural environments:									
2000	852	2.2	25.6	42.8	20.2	1.3	7.9	2.92	.80
2002	808	1.9	29.6	38.2	20.2	1.2	8.9	2.88	.82
air quality: ***									
2000	851	3.5	10.2	47.1	32.7	2.7	3.8	3.22	.81
2002	809	0.9	11.2	44.5	34.5	3.3	5.6	3.30	.76
native land & fresh water plants & animals:									
2000	853	2.6	17.2	42.2	25.3	2.1	10.6	3.08	.82
2002	807	1.9	22.2	38.7	23.4	2.0	11.9	3.02	.83
native bush and forests:									
2000	849	2.9	21.9	39.6	25.0	3.3	7.3	3.04	.88
2002	807	2.4	26.9	37.2	22.9	2.5	8.2	2.96	.87
soils:									
2000	851	1.5	11.6	50.1	15.0	1.8	20.0	3.05	.70
2002	811	1.4	10.4	46.9	17.8	1.6	22.1	3.10	.71
coastal waters and beaches:									
2000	852	1.9	14.6	39.8	30.9	5.3	7.6	3.25	.86
2002	810	1.6	17.4	38.1	32.0	3.3	7.5	3.19	.84
marine fisheries:									
2000	850	1.6	10.6	28.8	32.1	3.6	23.2	3.33	.85
2002	807	1.6	12.3	28.6	27.1	4.6	25.8	3.28	.89
marine reserves:									
2000	845	2.6	23.7	33.3	14.1	1.3	25.1	2.84	.83
2002	802	2.5	27.2	30.4	12.7	1.6	25.6	2.78	.84
fresh water quality: *									
2000	843	2.3	12.5	42.7	30.1	4.4	8.1	3.24	.83
2002	805	1.7	16.3	44.5	25.8	3.0	8.7	3.13	.81
National Parks: **									
2000	849	3.5	31.9	45.0	9.3	0.6	9.7	2.68	.73
2002	805	4.2	37.9	38.3	8.4	1.2	9.9	2.61	.78
wetlands:									
2000	840	1.4	14.4	38.3	15.7	1.7	28.5	3.02	.77
2002	809	1.4	17.3	38.8	14.6	1.2	26.7	2.96	.76
NZ's natural environment compared to other developed countries:									
2000	857	13.5	45.3	24.4	5.1	0.6	11.1	2.26	.81
2002	817	15.7	43.5	21.7	4.7	0.4	14.2	2.19	.81

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-square test

3.4. Management of the environment

a) Management of aspects of the environment

Survey respondents were asked to evaluate the quality of six environment activities including pest control and pollution control (Table 7). Sewage, solid, and liquid waste disposal were the only categories in which a majority of respondents registered adequate to good opinions. Around half the respondents thought management of farm effluent and runoff (49.7%) and industrial impact on the environment (48.1%) was bad or very bad. For farm effluent and runoff the perception is much worse for 2002 than in 2000. This contrasts with all other categories where there were two data points, in these other situations there were perceptions of significant improvements in management between 2000 and 2002.

Table 7. Perceived quality of management activities.

Respondent perceptions of management of ...	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1-5)	Std. Dev.
		%					N		
pest and weed control **									
2000	852	2.9	18.8	34.5	30.2	7.0	6.6	3.21	.95
2002	812	4.2	17.6	40.6	26.4	6.0	5.2	3.13	.94
solid waste disposal *									
2000	854	1.6	12.8	38.8	32.8	7.4	6.7	3.34	.87
2002	807	2.4	14.3	42.5	27.0	5.8	8.1	3.21	.87
sewage disposal ***									
2000	853	2.0	14.0	39.7	31.4	8.6	4.3	3.32	.90
2002	806	3.0	13.6	46.5	24.6	6.8	5.5	3.20	.88
farm effluent and runoff ***									
2000	849	0.7	9.2	29.8	32.7	9.2	18.4	3.50	.87
2002	811	1.0	6.9	25.4	34.8	14.9	17.0	3.67	.91
hazardous chemicals use and disposal **									
2000	854	1.6	8.1	28.1	29.2	13.5	19.6	3.56	.95
2002	806	1.9	9.4	30.8	28.9	8.4	20.6	3.41	.91
Industrial impact on the environment									
2000	Question not asked in 2000								
2002	811	0.6	7.4	31.9	37.9	10.2	12.0	3.56	.83

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-square test

b) Current management of the environment

Whereas the previous question addressed management activities, the following addressed perceptions of quality of management of particular environments or resources (Table 8). In general, the management of most aspects was considered *adequate* to *well managed*, however, the management of air quality, coastal waters and beaches, and marine fisheries was considered *adequate* to *poor*. There were large numbers of 'don't know' responses for soil condition, marine fisheries, marine reserves and wetlands. Significant differences between surveys occurred for air, fresh waters and National Parks. The former had deteriorated significantly while the latter two had improved between surveys.

Table 8. Perceptions of current management of the environment.

Perceived quality of management of ...	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1-5)	Std. Dev.
		%					N		
natural environment in towns and cities:									
2000	852	2.8	26.4	53.8	12.7	1.2	3.2	2.82	.73
2002	814	2.7	22.1	56.1	14.0	1.1	3.9	2.88	.72
other natural environments:									
2000	851	2.9	26.1	50.4	11.3	1.2	8.1	2.80	.74
2002	806	1.4	24.7	53.6	10.8	0.9	8.7	2.84	.68
air quality: **									
2000	851	2.8	20.1	45.7	22.9	2.9	5.5	3.03	.84
2002	805	1.6	15.2	45.7	26.6	4.6	6.3	3.19	.82
native land and freshwater plants and animals:									
2000	849	3.3	22.5	46.8	17.1	1.6	8.7	2.90	.80
2002	805	2.2	24.6	47.3	14.8	1.4	9.7	2.87	.76
native bush and forests: ***									
2000	850	5.5	29.3	39.6	17.5	3.1	4.9	2.82	.91
2002	807	4.7	34.2	42.1	11.0	1.6	6.3	2.69	.81
soils:									
2000	847	1.5	18.2	44.6	14.5	2.6	18.5	2.98	.78
2002	800	1.4	15.9	43.9	15.0	1.9	22.0	3.00	.75
coastal waters and beaches:									
2000	846	2.5	17.6	44.1	24.8	4.1	6.9	3.11	.85
2002	808	1.9	19.3	43.7	24.6	3.2	7.3	3.09	.83
marine fisheries:									
2000	848	2.2	13.2	33.3	24.5	4.4	22.4	3.20	.89
2002	809	1.2	14.8	37.6	20.4	3.7	22.2	3.14	.83
marine reserves:									
2000	853	2.6	20.3	40.3	10.9	2.2	23.7	2.87	.80
2002	802	2.6	21.7	41.4	11.1	2.0	21.2	2.85	.79
fresh waters:									
2000	846	3.3	20.1	45.3	17.6	3.2	10.5	2.97	.84
2002	807	2.4	20.4	45.5	18.1	3.2	10.4	2.99	.82
National Parks:									
2000	848	9.6	39.5	37.6	5.5	1.4	6.4	2.46	.81
2002	810	8.5	42.1	37.8	3.8	1.2	6.5	2.43	.77
wetlands:									
2000	842	1.9	18.2	35.9	15.4	2.3	26.4	2.97	.83
2002	807	3.0	18.5	38.9	12.6	2.6	24.4	2.91	.84
New Zealand's natural environment compared to other developed countries:									
2000	852	11.6	39.9	33.1	4.3	0.7	12.3	2.35	.80
2002	815	13.6	36.3	32.1	3.2	1.0	13.7	2.32	.82

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-square test

c) Management of the environment compared to five years ago

How respondents perceived quality of management to have changed over the previous five years was also considered (Table 9). Generally respondents considered that management was either *the same* or *better* than five years ago in both surveys. Respondents considered the management of New Zealand's natural environment had improved compared to other developed countries. Respondents were divided on changes in marine fisheries, with those who thought management had got *worse* slightly outnumbering those who thought it had got *better*. In addition, as found for previous management questions, marine fisheries, marine reserves and wetlands received a large number of 'don't know' responses. Management was perceived to be significantly worse for air quality and better for native bush and forests, but there were no other significant inter-survey differences.

Table 9. Quality of management compared to five years ago.

Perceived change in management compared to 5 years ago of ...	N	Much better (1)	Better (2)	The same (3)	Worse (4)	Much worse (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
natural environments in towns and cities:									
2000	847	5.7	38.5	38.0	9.3	1.2	7.3	2.59	.80
2002	812	4.1	36.0	40.4	10.8	1.6	7.1	2.68	.80
other natural environments:									
2000	844	3.6	31.2	45.4	8.5	1.5	9.8	2.70	.76
2002	809	3.2	30.7	46.5	8.9	0.6	10.1	2.70	.72
air quality: **									
2000	843	3.0	16.5	51.1	18.7	2.3	8.4	3.01	.78
2002	806	1.1	16.7	47.6	23.0	2.4	9.2	3.10	.76
native plants and animals:									
2000	843	3.6	29.7	42.9	12.3	1.8	9.7	2.77	.81
2002	798	2.8	26.7	45.4	11.0	1.1	13.0	2.78	.75
native bush and forests:									
2000	843	4.3	30.4	41.9	12.8	2.0	8.7	2.76	.83
2002	803	3.7	34.1	41.1	9.2	1.6	10.2	2.68	.79
soils:									
2000	840	2.3	13.5	51.2	10.7	1.0	21.4	2.93	.68
2002	805	1.5	13.3	47.6	10.8	0.6	26.2	2.94	.66
coastal waters and beaches:									
2000	845	2.8	19.2	45.4	18.7	3.4	10.4	3.01	.84
2002	804	2.6	21.8	45.9	17.3	1.6	10.8	2.93	.79
marine fisheries:									
2000	843	2.6	15.9	35.7	19.0	3.2	23.6	3.06	.87
2002	805	2.6	19.4	35.9	16.4	2.0	23.7	2.94	.84
marine reserves:									
2000	842	2.5	24.0	35.7	10.6	1.8	25.4	2.80	.81
2002	811	3.7	27.6	36.0	8.6	1.4	22.7	2.69	.80
fresh waters:									
2000	837	2.9	17.6	49.5	13.9	3.5	12.8	2.97	.81
2002	805	2.1	19.4	48.3	15.9	1.9	12.4	2.95	.76
National Parks:									
2000	845	5.2	32.7	42.6	7.7	1.2	10.7	2.63	.78
2002	811	6.4	36.4	40.3	5.4	0.9	10.6	2.53	.76
wetlands:									
2000	841	2.3	17.4	40.0	11.1	1.5	27.8	2.89	.77
2002	805	2.6	19.6	40.9	8.6	1.0	27.3	2.80	.74
New Zealand's natural environment compared to other developed countries:									
2000	843	13.2	35.5	29.9	3.9	1.1	16.5	2.33	.84
2002	808	14.1	35.8	28.8	3.3	0.6	17.3	2.28	.82

Key: * $P<0.1$; ** $P<0.05$; *** $P<0.01$—based on chi-square test

3.5. Main causes of damage to the environment

A summary of significant differences between 2000 and 2002 respondents' perceptions of the causes of damage to individual resources is reported in Table 10. Respondents' judgements of the main causes of damage to these resource areas are shown in Figure 2. Respondents were instructed to select what they considered to be the main causes of damage from a list of 15 items for ten aspects of the environment. Respondents could select up to three items. Table 10 and Figure 2 are designed to be complementary. Whereas Figure 2 shows how perceptions of the causes of damage vary for particular resources, Table 10 indicates the extent to which particular causes of damage have changed significantly between the two surveys. For example, in nine out 10 resources there was a significant change in the perceived effect of farming with eight out of nine registering an increased impact from farming. Conversely, while five out of ten resources had a significant change from hazardous chemicals all five of these showed a decreased impact.

'Cause' responses have also been analysed by ethnicity for three key resources, i.e., air, native land and fresh water plants and animals, and freshwater. No significant differences occurred for 'biodiversity' ($P=0.134$) but did so for air ($P<0.05$; see Figure 3) and fresh water ($P<0.05$; see Figure 4). For air the ethnic pattern was very mixed. Over 90% of respondents from all groups considered motor vehicles and transport were the main cause, whereas only 16.7% of Maori compared to 32.1% of NZ European respondents thought household waste and emissions were one of the three main causes. The pattern was also mixed on causes of damage to freshwater. The highest NZ European response was recorded for farming while for Maori and 'others' it was sewage and storm water.

Resource: **Main causes of damage:**	Air	Native land & fresh water plants & animals	Native forests and bush	Soils	Beaches and coastal waters	Marine fisheries	Marine reserves	Fresh waters	National Parks	Wetlands
Motor vehicles and transport	x						2.4-1.2% * Decrease		12.8-9.3% ** Decrease	2.4-3.8% * Increase
Household waste and emissions				12.4-16.5% ** Increase						
Industrial activities				23.2-26.7% * Increase						
Pests and weeds		x	54.3-60.8% x *** Increase					16.2-19.9% ** Increase	x	x
Farming	2.2-5.6% **** Increase	18.9-27.9% **** Increase		20.3-24.0% * Increase	2.6-7.1% *** Increase	1.6-3.4% ** Increase	1.2-3.4% *** Increase	20.3-33.5% **** Increase	7.2-5.0% * Decrease	21.5-26.0% ** Increase
Forestry	0.5-1.2% * Increase		42.4-37.9% * Decrease				0.7-0.0% * Decrease			
Urban development		21.8-18.4% * Decrease								
Mining			13.1-17.2% ** Increase						6.5-9.2% ** Increase	
Sewage and storm water			3.9-1.6% *** Decrease		x			x		
Tourism			13.9-17.5% ** Increase						34-38.3% * Increase	
Commercial fishing						x	x			
Recreational fishing						15.4-18.5% * Increase	17.3-21.4% ** Increase			
Dumping of solid waste					24.6-21.0% * Decrease					
Hazardous chemicals	27.6-23.8% * Decrease	21.9-17.0% *** Decrease		x		22.2-15.1% **** Decrease	18.8-14.2% ** Decrease	32.2-24.9% **** Decrease		
Other					2.5-1.3% * Decrease				1.5-3.0% ** Increase	

Table 10. Significant changes to the main causes of damage to resources (Z score; 2 tailed probability) between 2000 and 2002 surveys.

Key: x = Most frequently recorded cause of damage to a resource. Z score; 2 tailed probability * $P<0.1$; ** $P<0.05$; *** $P<0.01$; **** $P<0.001$. Shading in resource columns indicates significant increase in perceived level of impact between surveys. Example: The soil-household waste and emissions cell indicates a significant increase from 12.4% in 2000 to 16.5% in 2002.

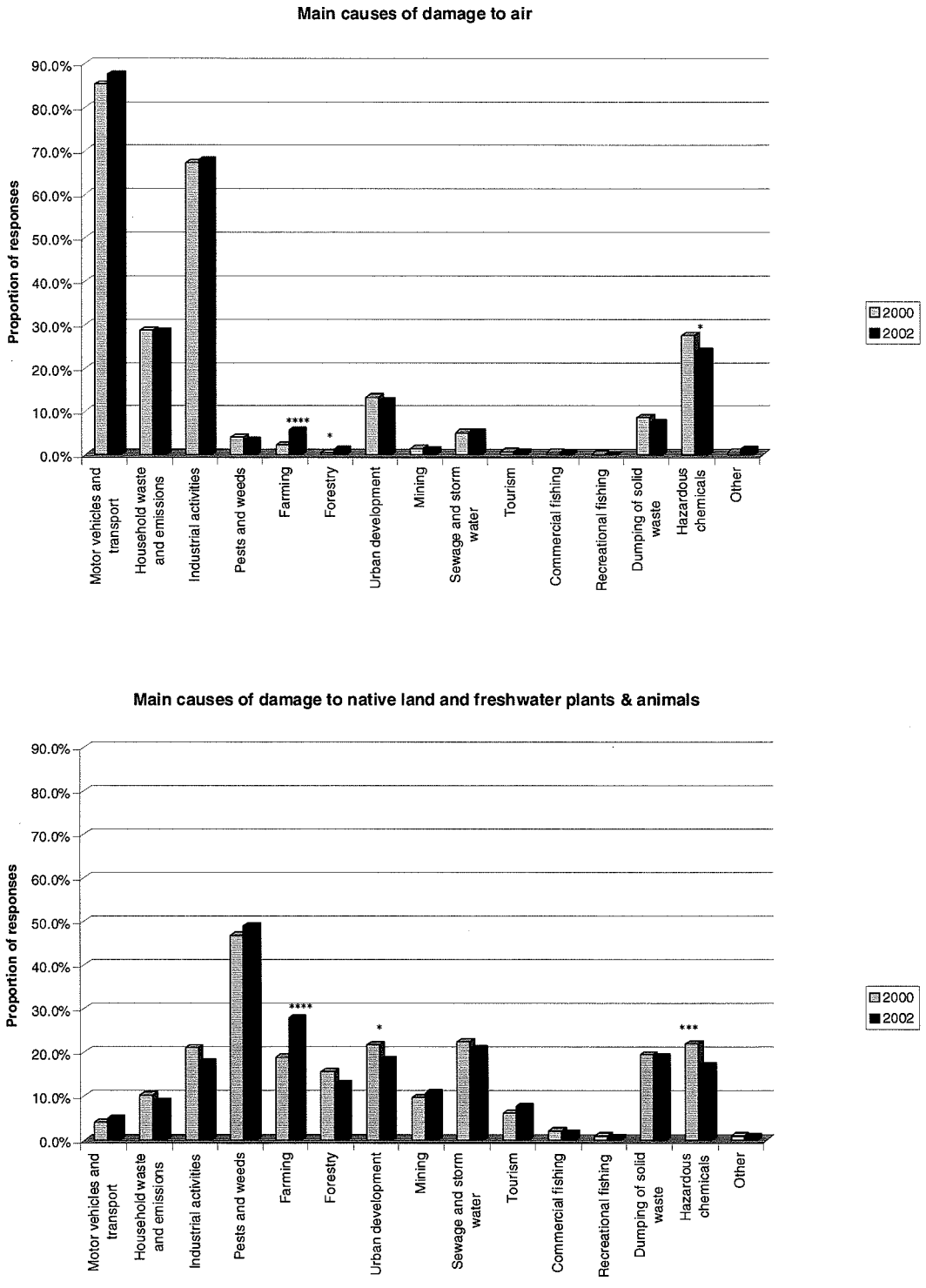
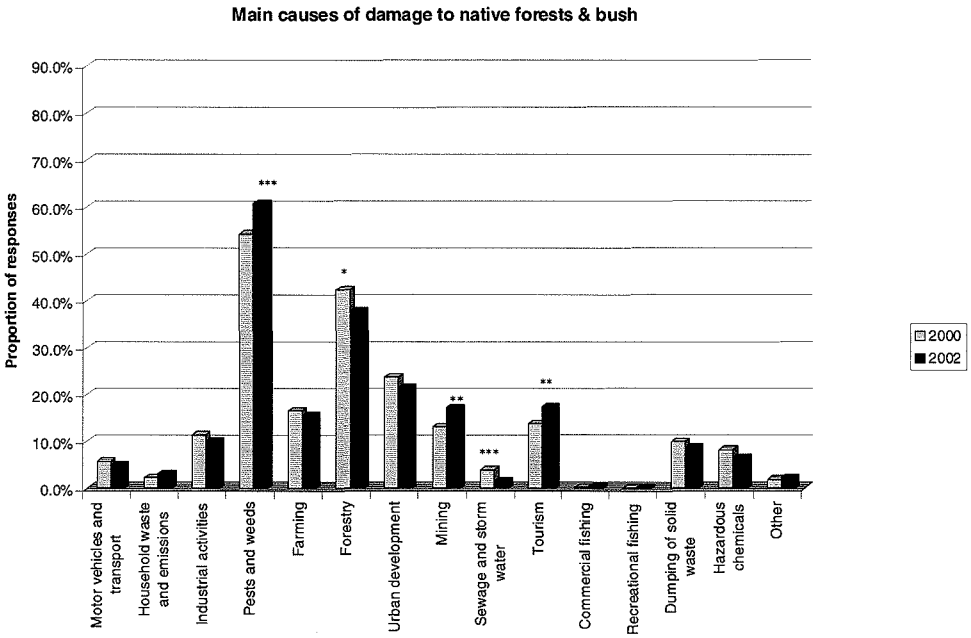


Figure 2. Main causes of damage to 10 natural resources in New Zealand, 2000 compared to 2002.

Key * $P < 0.1$; ** $P < 0.05$; *** $P < 0.01$; **** $P < 0.001$—based on chi-squared test



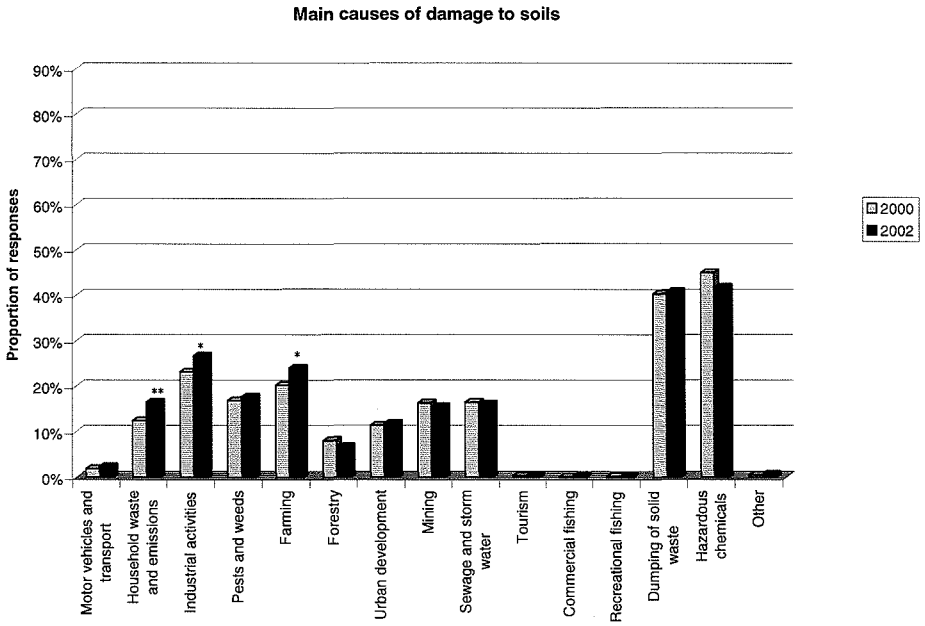
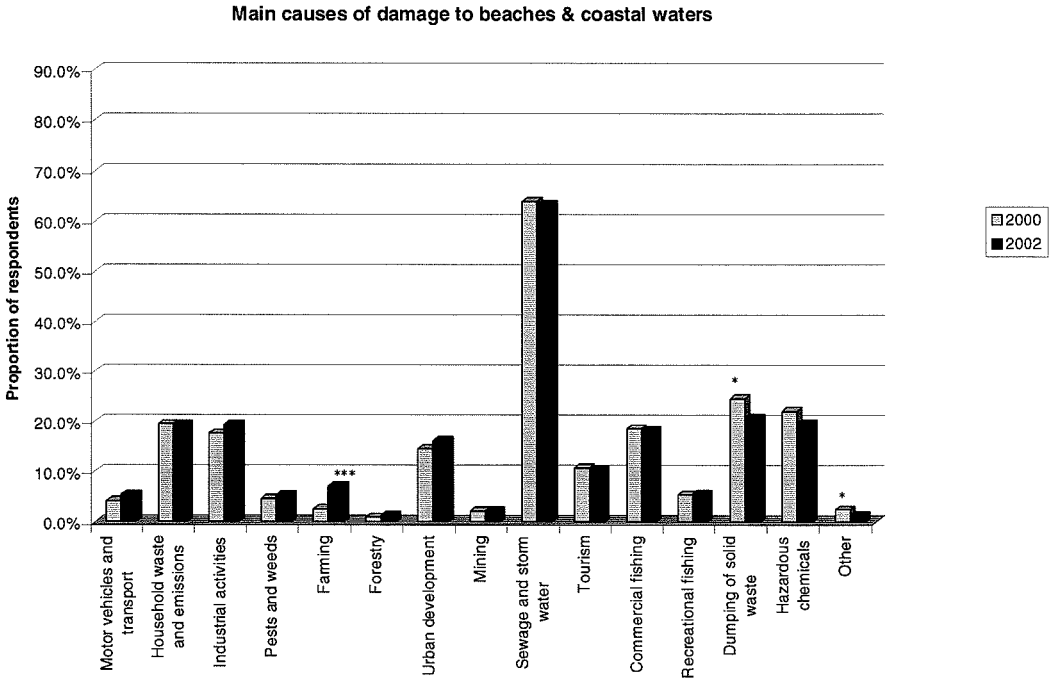


Figure 2 continued.



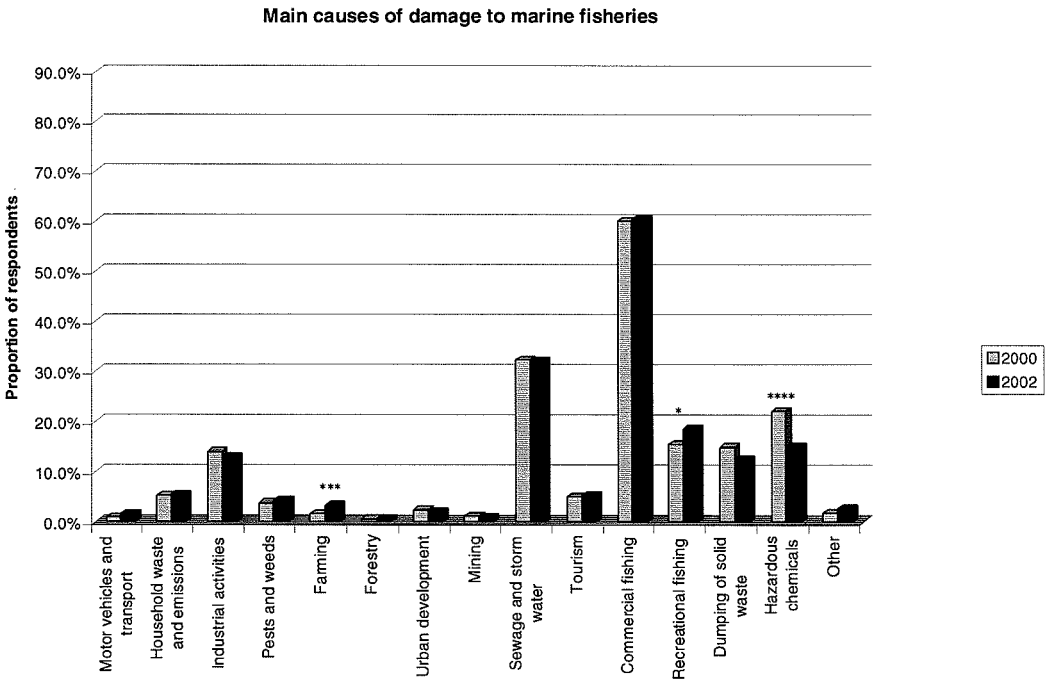
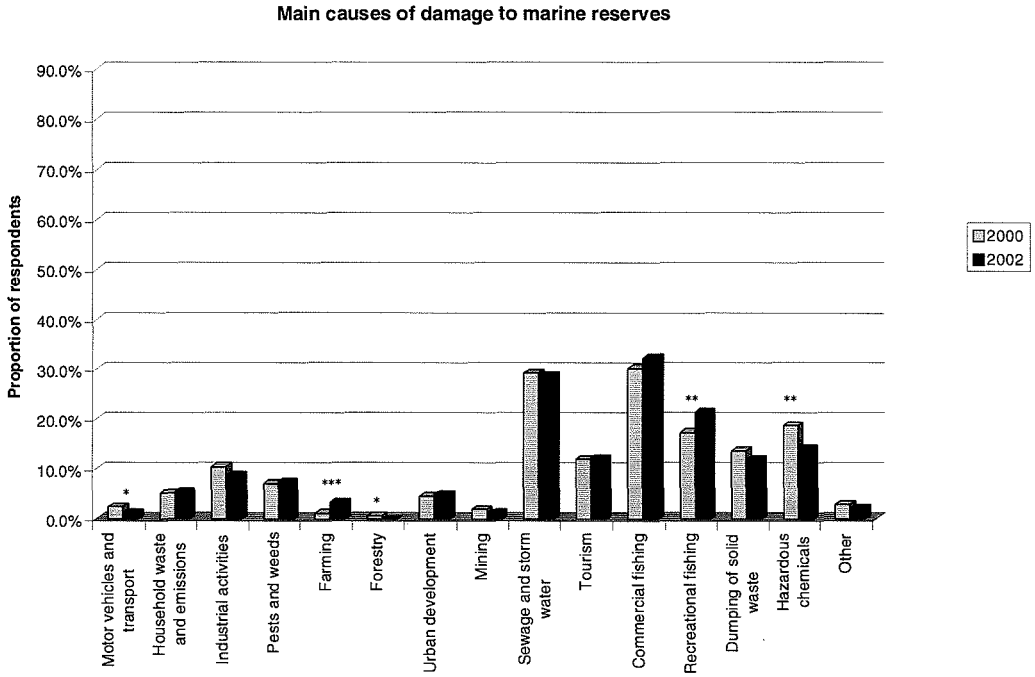


Figure 2 continued.



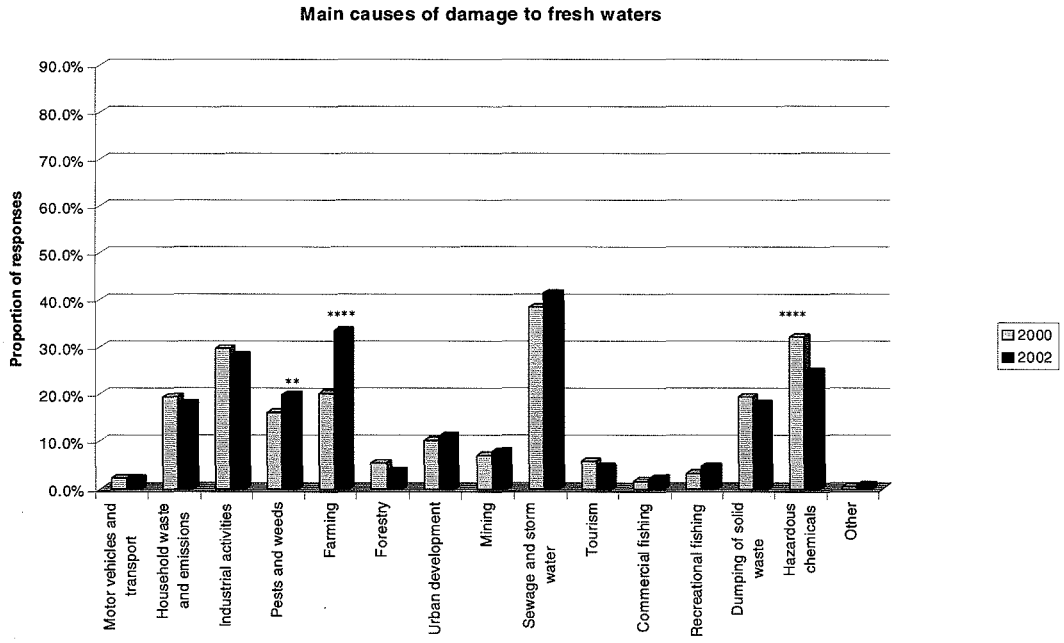
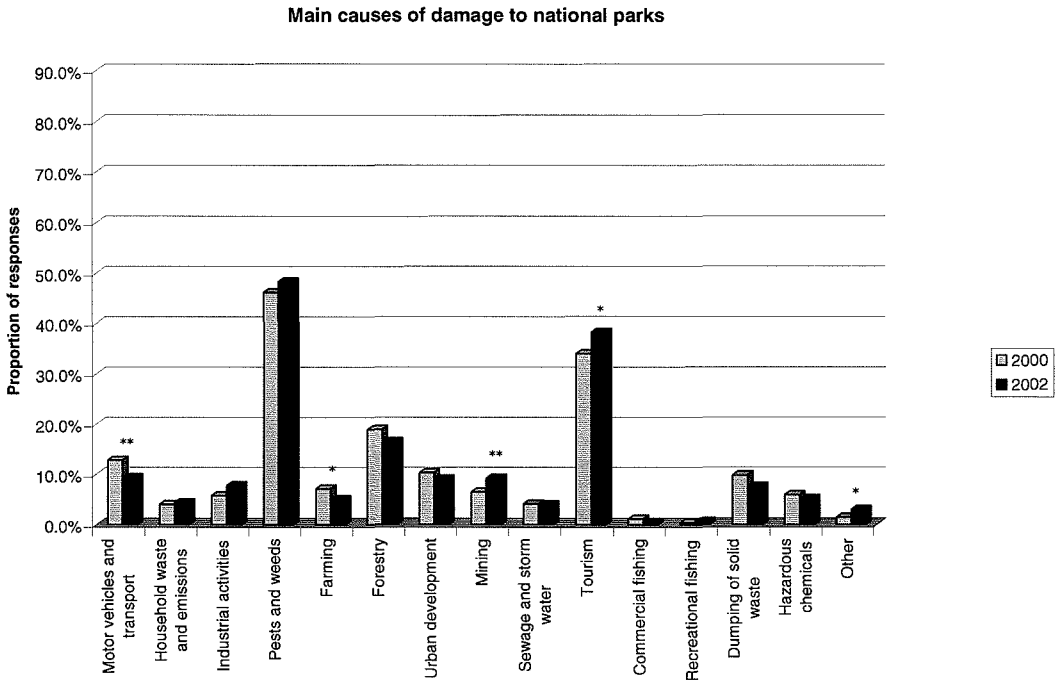


Figure 2 continued.



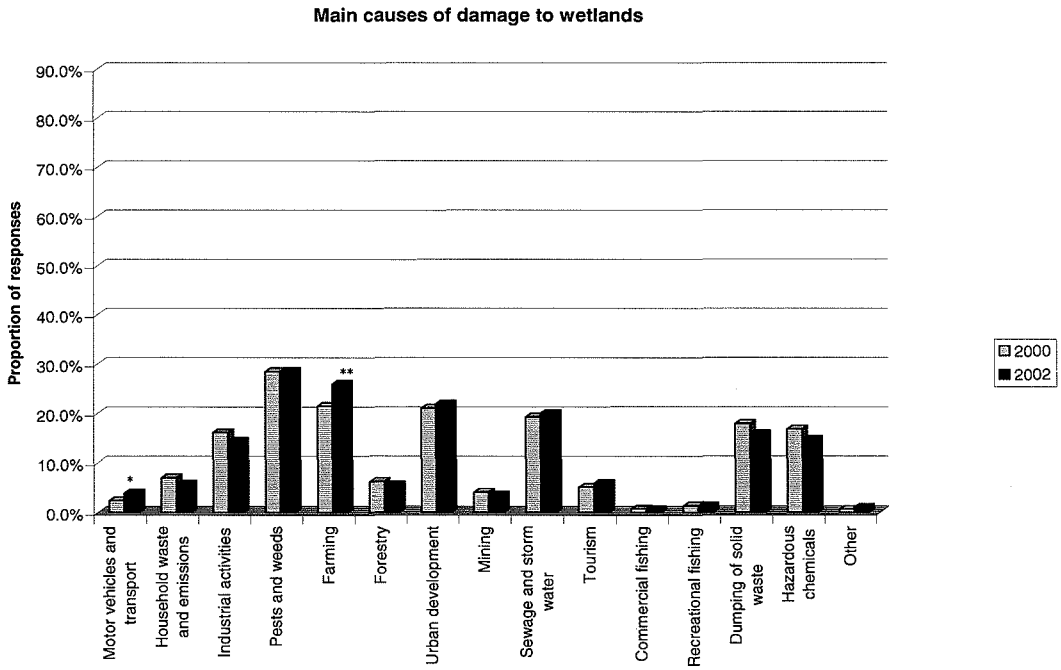


Figure 2 continued.

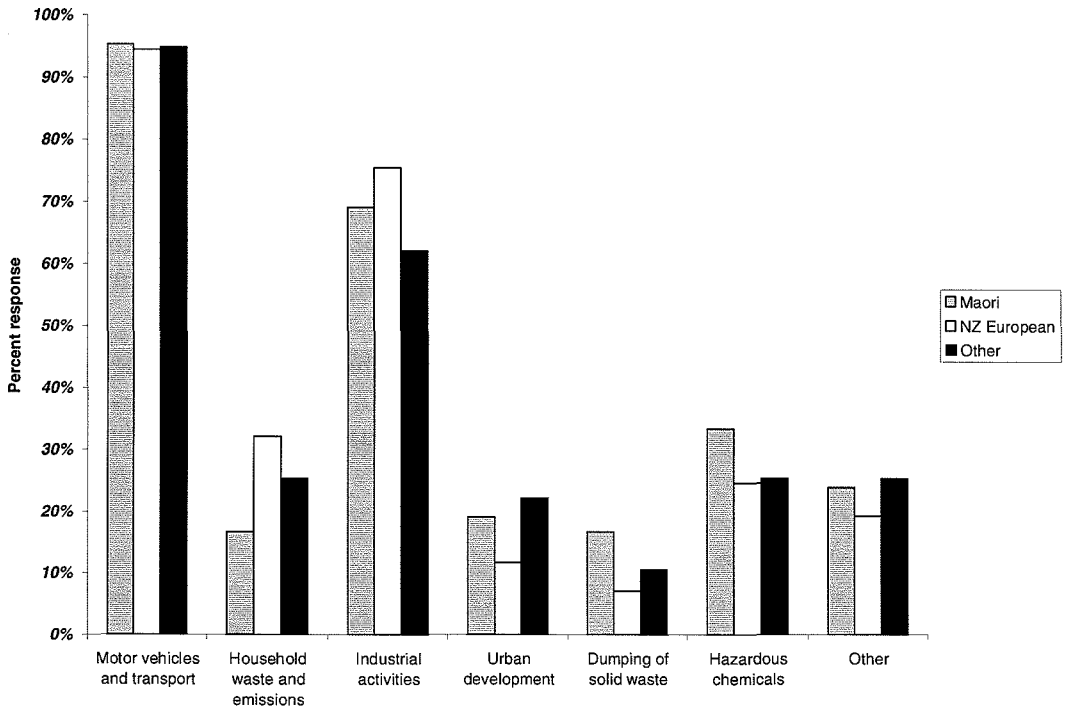


Figure 3. Main causes of damage to air by *ethnicity*.

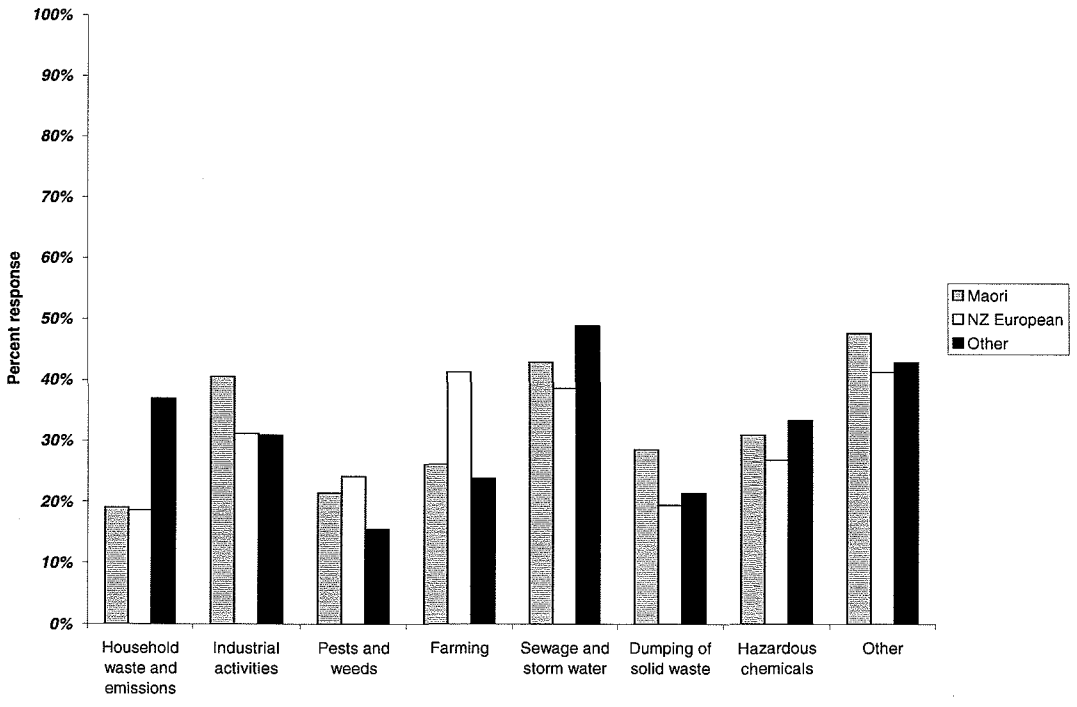


Figure 4. Main causes of damage to fresh water by *ethnicity*.

3.6. Participation in environmental activities

Respondents reported their participation in twelve environment-related activities in the preceding twelve months.

Table 11 shows levels of participation in environmental activities. From the table it can be seen that more than seventy percent of 2002 respondents recycled household waste, composted domestic waste, or grew their own vegetables. More than seventy percent had also bought environmentally friendly products or had been involved in a project to improve the environment. Almost sixty percent had reduced or limited their use of electricity. Few respondents, however, had been involved in the restoration or replanting of the natural environment. Also few had participated in an environmental organisation or took part in hearings or consent processes related to the environment. More than a third of respondents had visited a marine reserve or National Park and just under one third had regularly commuted by bus or/and train.

Figure 5 shows clearly the extent of between-survey changes in behaviour. The two biggest variations occur in terms of electricity use and use of public transport. In both circumstances there was a huge increase in those claiming to have reduced or limited their use of electricity and those who regularly commuted by bus or train.

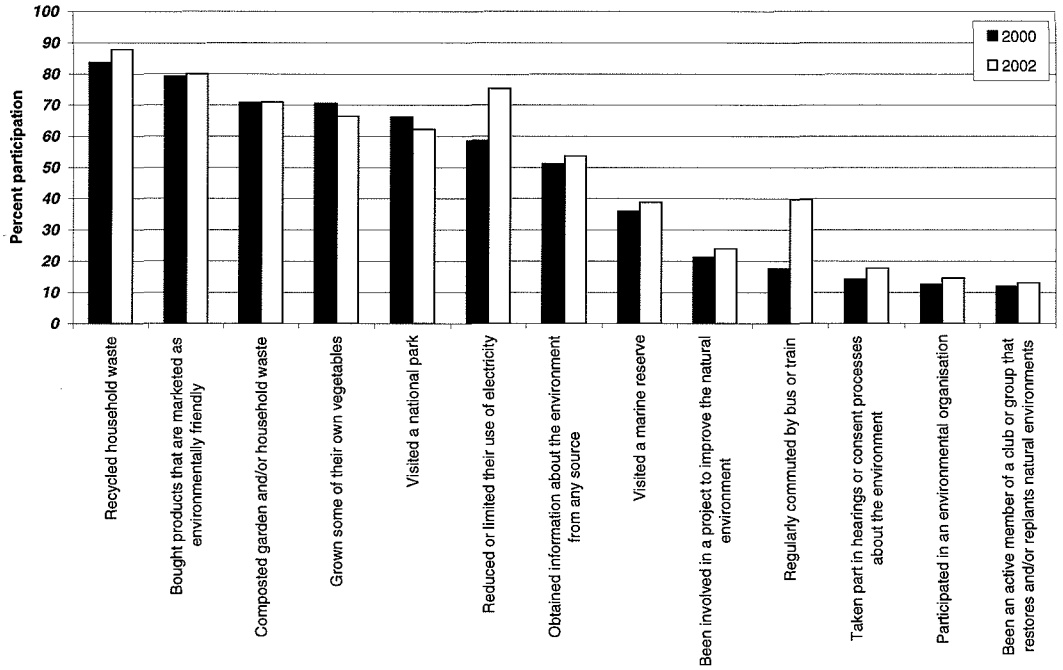


Figure 5. Participation in environmental activities, 2000 and 2002

Table 11. Participation in environmental activities (percent).

In the last 12 months the respondent had ...	Year	N	Yes %	Regularly %	Total Yes %	No %	Don't know %
reduced or limited their use of electricity	2000	863	58.5	NA	58.5	35.7	5.8
	2002	803	60.3	15.1	75.3	22.2	2.5
visited a marine reserve	2000	859	36.0	NA	36.0	63.0	1.0
	2002	801	36.0	2.9	38.8	59.8	1.4
visited a national park	2000	861	66.1	NA	66.1	33.4	0.5
	2002	801	55.6	6.7	62.3	36.8	0.9
bought products that are marketed as 'environmentally friendly'	2000	865	79.2	NA	79.2	12.9	7.9
	2002	805	64.8	15.2	80.0	11.7	8.3
recycled household waste	2000	866	83.7	NA	83.7	15.2	1.0
	2002	800	63.3	24.5	87.8	11.8	0.5
composted garden and/or household waste	2000	864	70.7	NA	70.7	28.8	0.5
	2002	804	50.2	20.6	70.9	28.5	0.6
been involved in a project to improve the natural environment	2000	859	21.3	NA	21.3	76.5	2.2
	2002	797	20.3	3.6	24.0	74.7	1.4
grown some of their own vegetables	2000	867	70.6	NA	70.6	29.2	0.2
	2002	812	54.9	11.6	66.5	33.0	0.5
obtained information about the environment from any source	2000	863	51.1	NA	51.1	46.1	2.8
	2002	805	46.0	7.7	53.7	44.2	2.1
taken part in hearings or consent processes about the environment	2000	864	14.1	NA	14.1	84.7	0.8
	2002	810	15.1	2.6	17.7	81.1	1.2
participated in an environmental organisation	2000	862	12.5	NA	12.5	86.7	0.8
	2002	802	12.3	2.2	14.6	84.0	1.4
regularly commuted by bus or train	2000	863	17.5	NA	17.5	81.9	0.6
	2002	806	34.9	4.8	39.7	59.4	0.9
been an active member of a club or group that restores and/or replants natural environments	2000	864	11.9	NA	11.9	87.2	0.9
	2002	807	11.9	1.1	13.0	86.0	1.0

NA: Not asked in 2000

3.7. Major environmental issues

Respondents were asked to identify the most important environmental issue facing New Zealand today (Table 12). Pollution of a variety of sorts is the main issue identified in the survey.

Table 12. Most important environmental issues facing New Zealand.

Environmental Issue	% of valid responses
Air quality/pollution	17.3
Waste disposal and industrial pollution	11.8
Introduced pests, weeds and diseases	10.9
Water quality/pollution	10.8
Urban environment, population pressure and tourism	6.5
Climate change and ozone layer	6.3
Sustainable management of resources	6.3
Pollution (unspecified)	6.2
Wildlife and natural environment	5.9
Protecting environment/keeping New Zealand clean, green	5.6
Environmental education	3.8
Other	8.6
Total:	100.0

4. INDIVIDUAL RESOURCES

The sections, which follow, examine the following individual resource areas:
- 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;
- Fresh waters;
- National Parks;
- Wetlands;
- New Zealand's natural environment compared to other developed countries;

in terms of overall findings associated with the PSR model used as the basis of this report.

Each set of graphs represents an analysis of the tabular data presented in section 3. Thus, each graph contains three important elements:
- 2000 survey data;
- 2002 survey data; and
- Comparison of the distributions of responses between the two surveys.

Chi-square analysis of the significance of the difference between the distributions has been undertaken in all circumstances but only significant differences are reported. These significance levels indicate a change in the distribution of responses between the two surveys—explanations of these changes are given in the preceding explanatory text. Note that significance levels, where appropriate, are given alongside the graph title.

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

4.1. Natural environment in towns and cities

New Zealand, in common with other 'developed' countries, has most of its population dwelling in urban environments. Although there is no national set of urban environmental indicators, it is clear that New Zealanders consider the urban setting is important for social and aesthetic reasons. This is clearly manifested in Christchurch, where people take great pride in the urban environment and have labelled Christchurch the 'Garden City'. From both surveys (Figure 6) it is clear that most people think the natural environment in towns and cities is *adequate* to *good* and that the availability of parks and reserves is *moderate* to *high*. All other 'indicators' in this set also scored positively, unlike any other resource or environment examined. The only significant difference between surveys was for the state or condition, which has improved significantly between the 2000 and 2002 surveys.

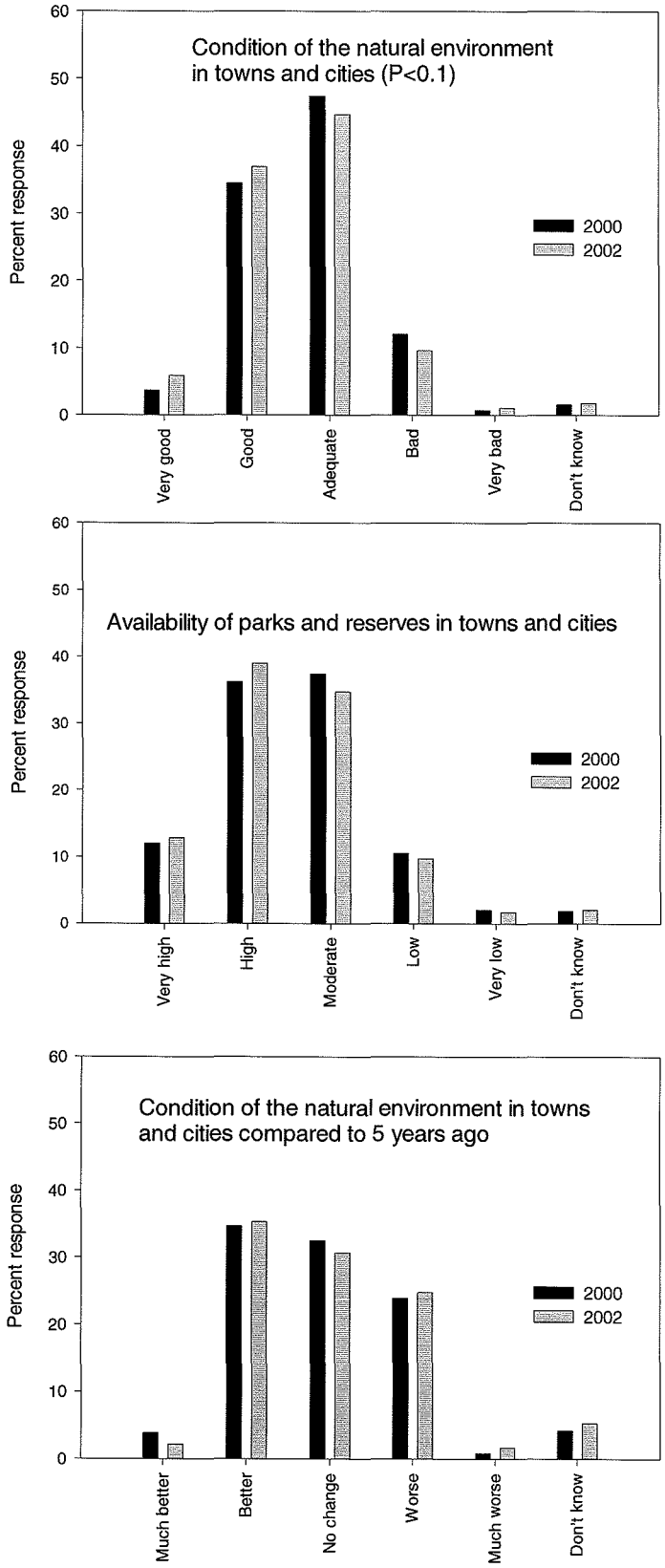


Figure 6. Perceptions (% response by category) of the status and management of the natural environment in towns and cities in New Zealand.

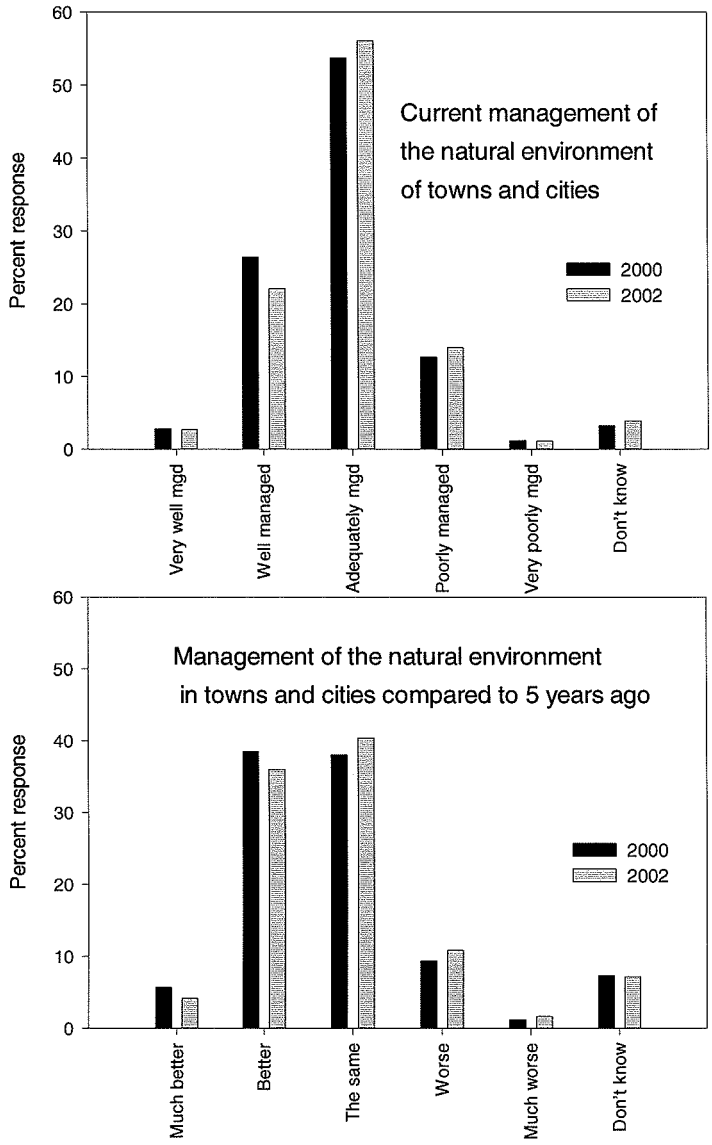


Figure 6 continued.

4.2. Air

Air quality is an important issue in the Auckland region and in Christchurch, and there has been recent media interest also in Nelson's worsening air quality. Frequent discussion about the ozone layer and climate change generally keeps matters of air quality in the media. Discussion about climate change and greenhouse gases increased in the year or so prior to the 2002 survey as New Zealand debated becoming a signatory to the Kyoto Protocol and then went about developing a Preferred Policy Package for climate change response (Department of Prime Minister and Cabinet, 2002).

From both surveys it is clear that New Zealanders believe air quality is good, but the majority of respondents believed its condition has declined in the last 5 years (see Figure 7). The perceived deterioration in air quality is matched by a demand for more expenditure on air quality. Air is the only resource examined for which there were significant differences for all of the parameters that could be compared statistically between surveys. In each case there was a perceived worsening in state, change over time, and in terms of management response.

Superficially conflicting views are often 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 linked 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) reported 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 available information from MfE (1997) indicates that in general air quality in New Zealand is good. Statistics New Zealand (2002: 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".

Why respondents perceive a decline in air quality over the last five years is therefore unknown. However, the reason(s) might support the conclusion of Ministry of the Environment'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?"

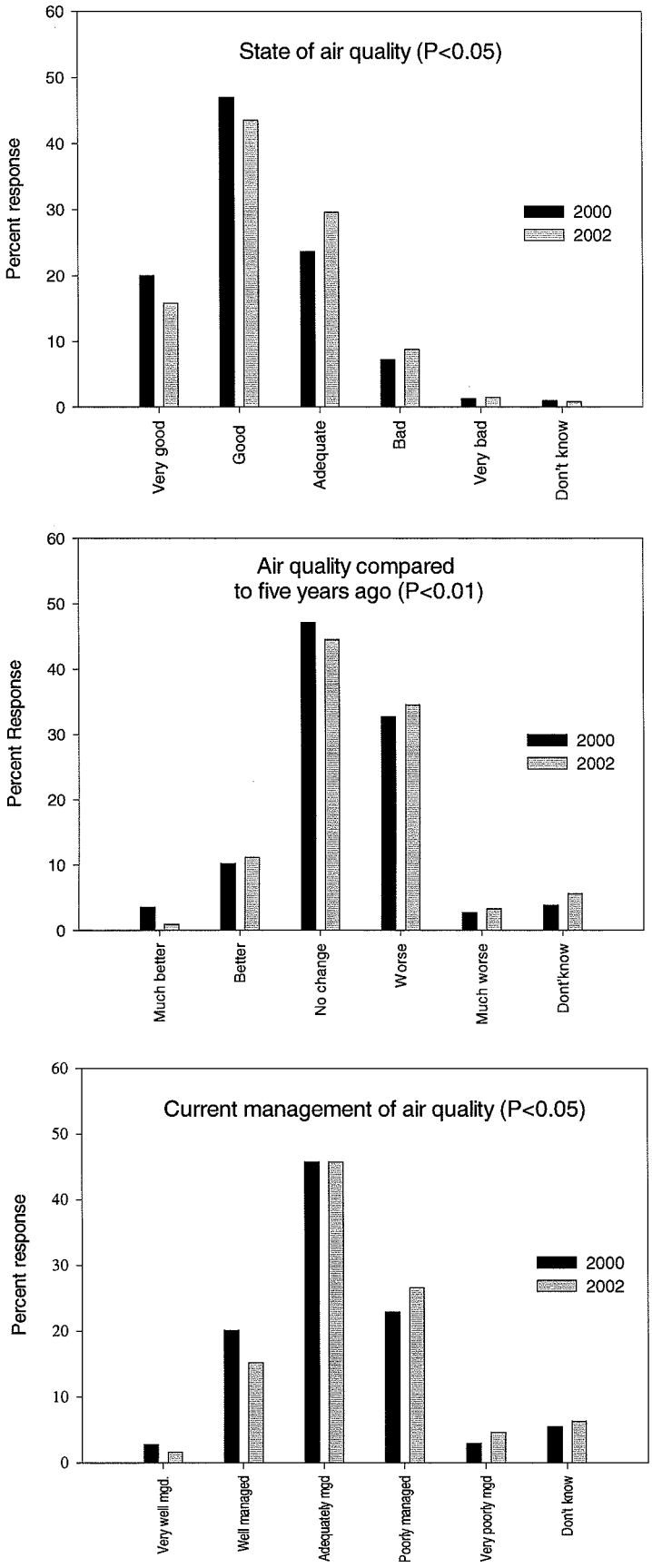


Figure 7. Perceptions (% response by category) of the status and management of air in New Zealand.

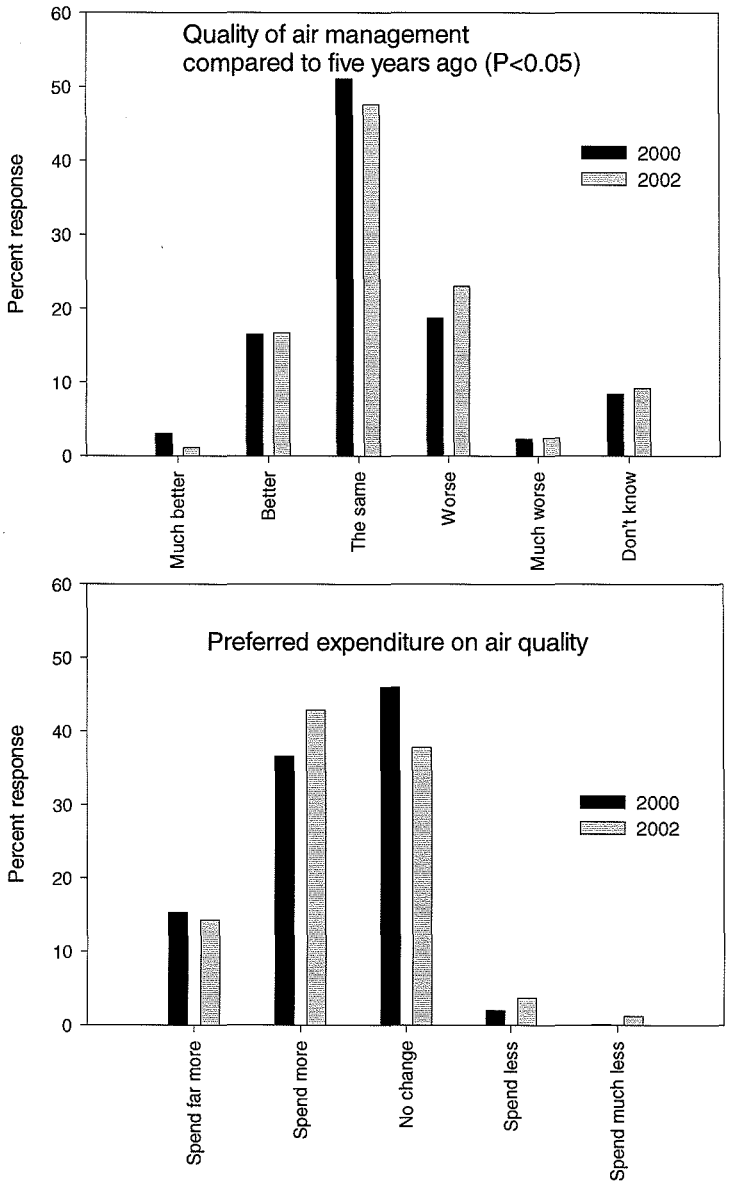


Figure 7 continued.

4.3. Native land and freshwater plants and animals

Conservation of New Zealand's native plants and animals is 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, e.g., kakapo and kiwi, are national symbols and attract high levels of media interest. It is clear from the survey that New Zealanders believe the quality or condition of native land and freshwater plants and animals to be *adequate* to *good*, although there is a perceived decline in this position over the last five years (see Figure 8). There were no significant differences in perceptions between the two surveys for any of the questions concerning native land and freshwater plants and animals.

It is surprising that the condition of New Zealand's native plants and animals is considered *adequate* to *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 (2002) finding that New Zealand's biodiversity performance is ranked worst of 142 nations.

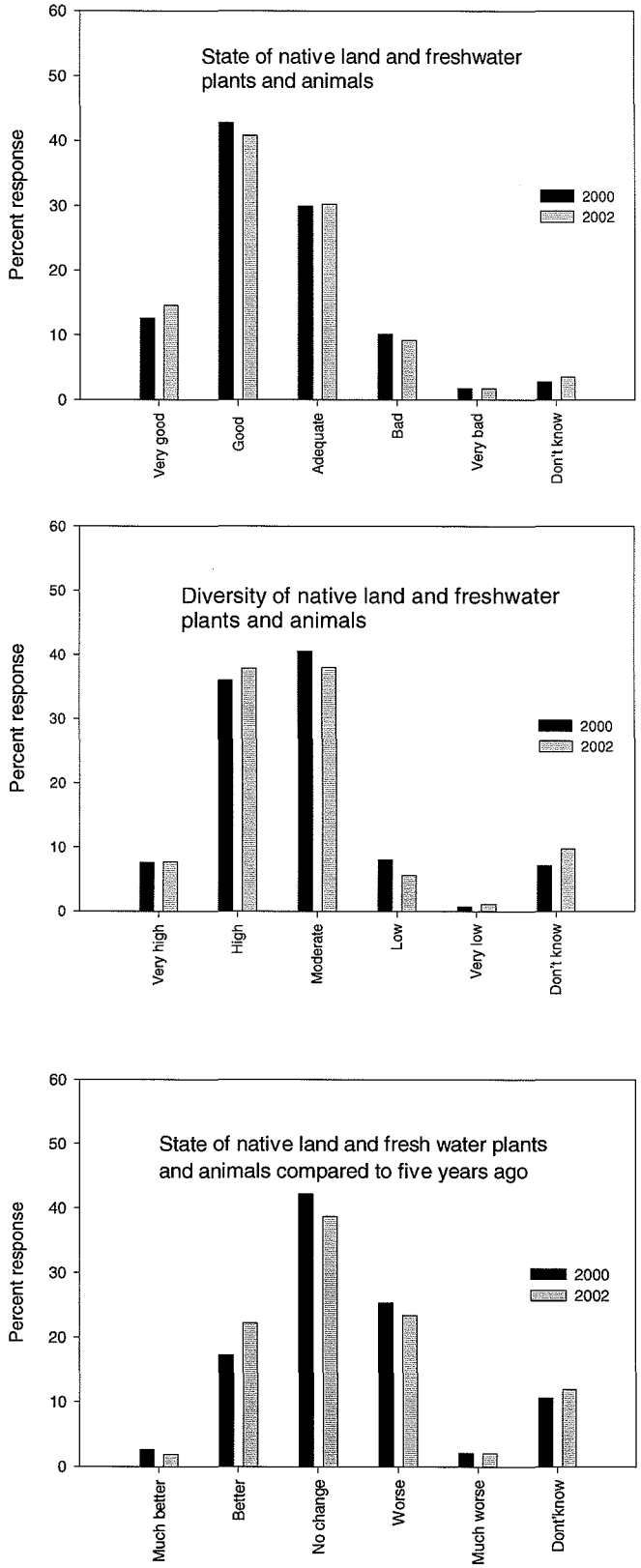


Figure 8. Perceptions (% response by category) of the status and management of native land and freshwater plants and animals.

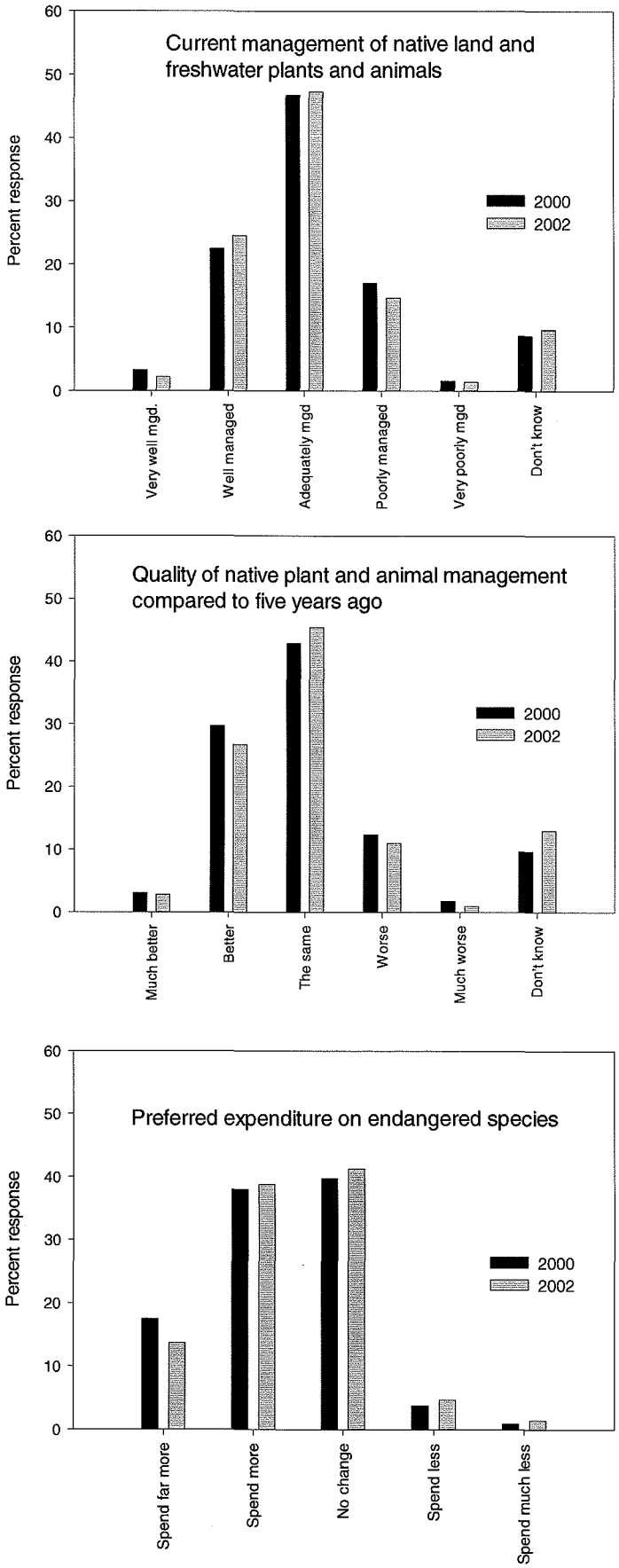


Figure 8 continued.

4.4. Native bush and forests

Management of native bush and forests is an ongoing issue in New Zealand, e.g., sustainable logging of indigenous forests and the future of the South Island Landless Natives Act forests in Southland. From the surveys it is clear that most New Zealanders believe the quality, condition and quantity of native bush and forests are *adequate* to *very good*, and that the condition has hardly changed in the last five years (see Figure 9). Native bush and forests are considered to be a*dequately* to *well managed* and this has improved over the past five years. While most people wanted *no change* in expenditure, about 35% thought *more* should be spent on native bush and forests.

Two perceptions, conditions of native bush and forests and current management, changed significantly between the 2000 and 2002 surveys, with both exhibiting higher positive ratings.

Given the positive findings above it seems somewhat surprising that many respondents considered expenditure should remain the same or increase—why this should be the case is unknown, but it may be related to the long history of the forest conservation movement in New Zealand.

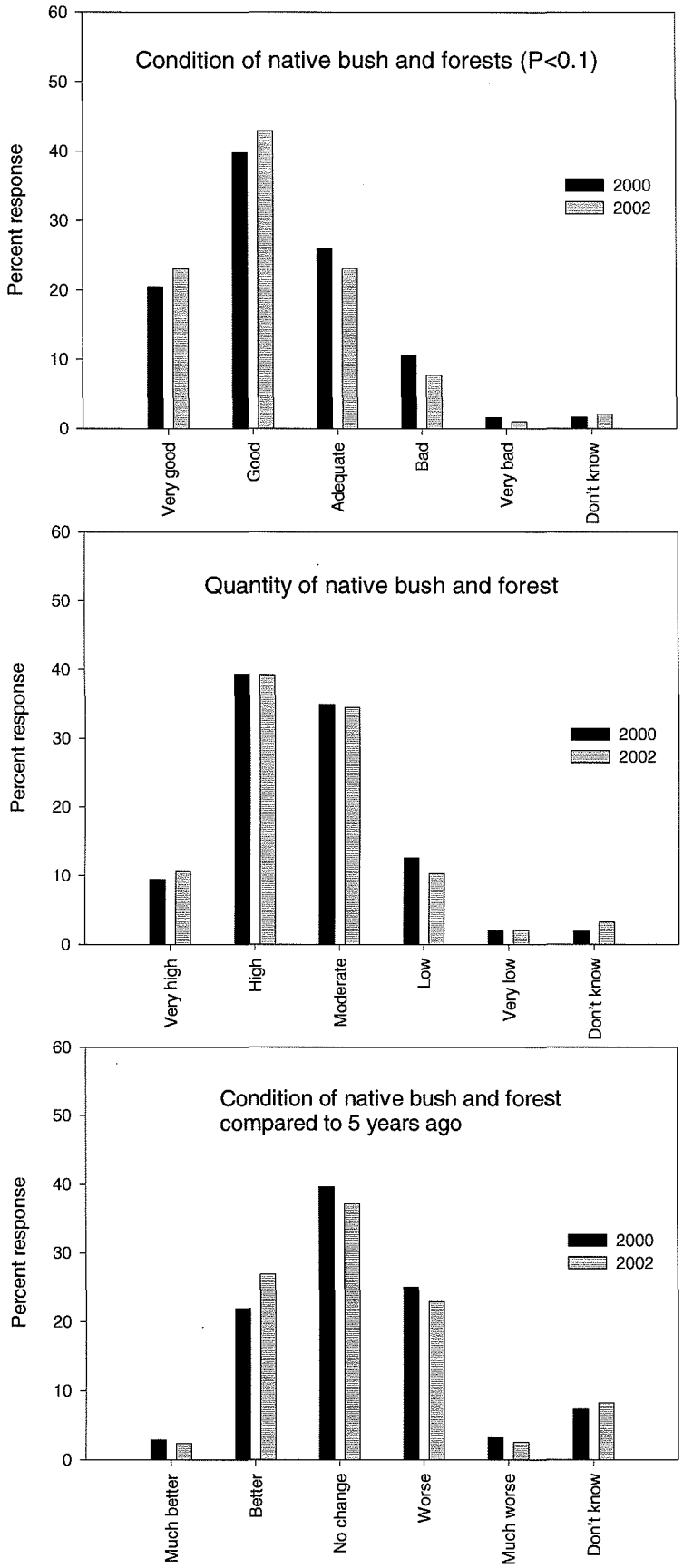


Figure 9. Perceptions (% response by category) of the status and management of native bush and forests.

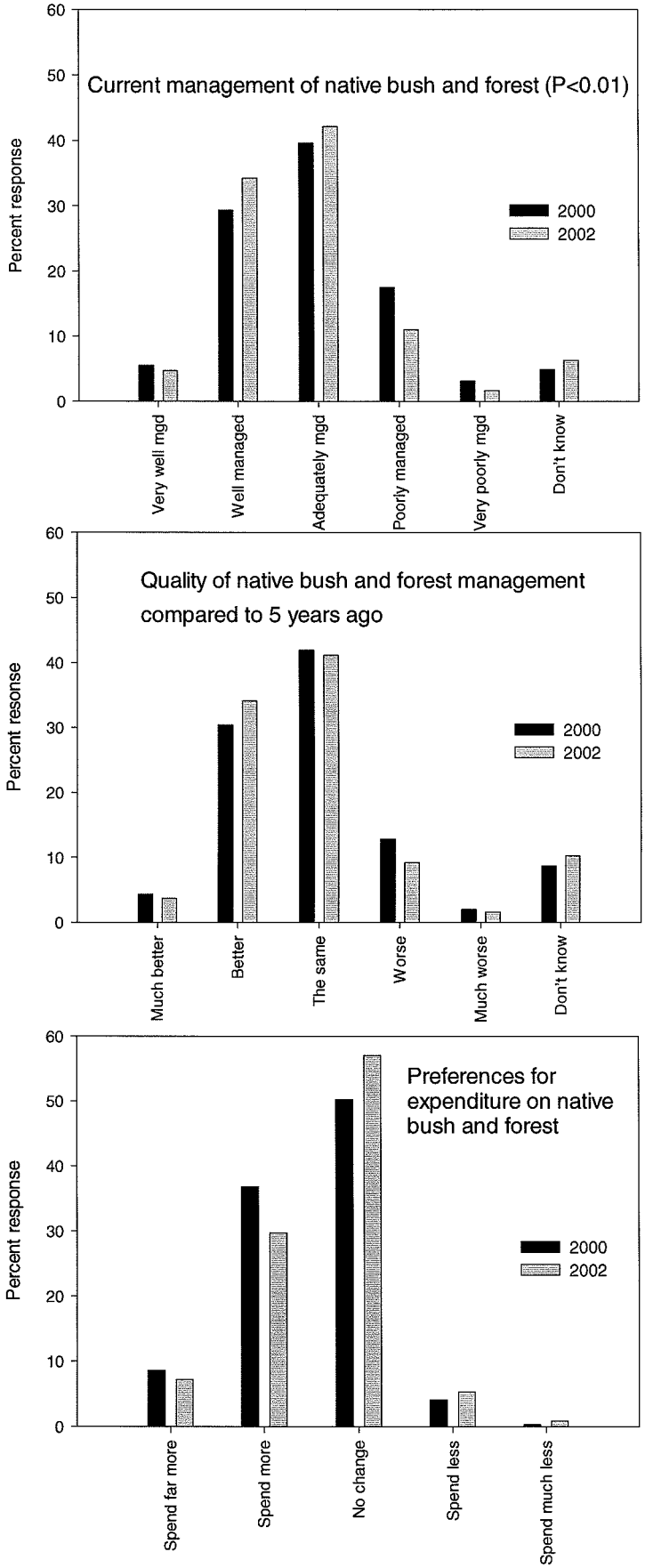


Figure 9 continued.

4.5. Soils

Soils are crucial resources for agriculture, horticulture and forestry. From the survey it is clear most New Zealanders believe the quality or condition of soils to be *good*, with little change having occurred over the last five years (see Figure 10). For both surveys management is deemed to be *good* but *unchanged* over the past few years. There is only slight support for extra funding to go into management of our soils. There are no significant differences between the 2000 and 2002 surveys for any of the data presented here.

Soils are often the unseen resource that receives little or no media attention and/or public interest. It is clear from MfE (1997) and from soil experts (e.g., Dr Phil Tonkin, Senior Lecturer, Lincoln University, pers. comm. 2001) 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 were reassuring, e.g., data from the 500 soils project funded by the Sustainable Management Fund of MfE (G. Sparling, cited in Stevenson 2002: D10). Soils are yet 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'.

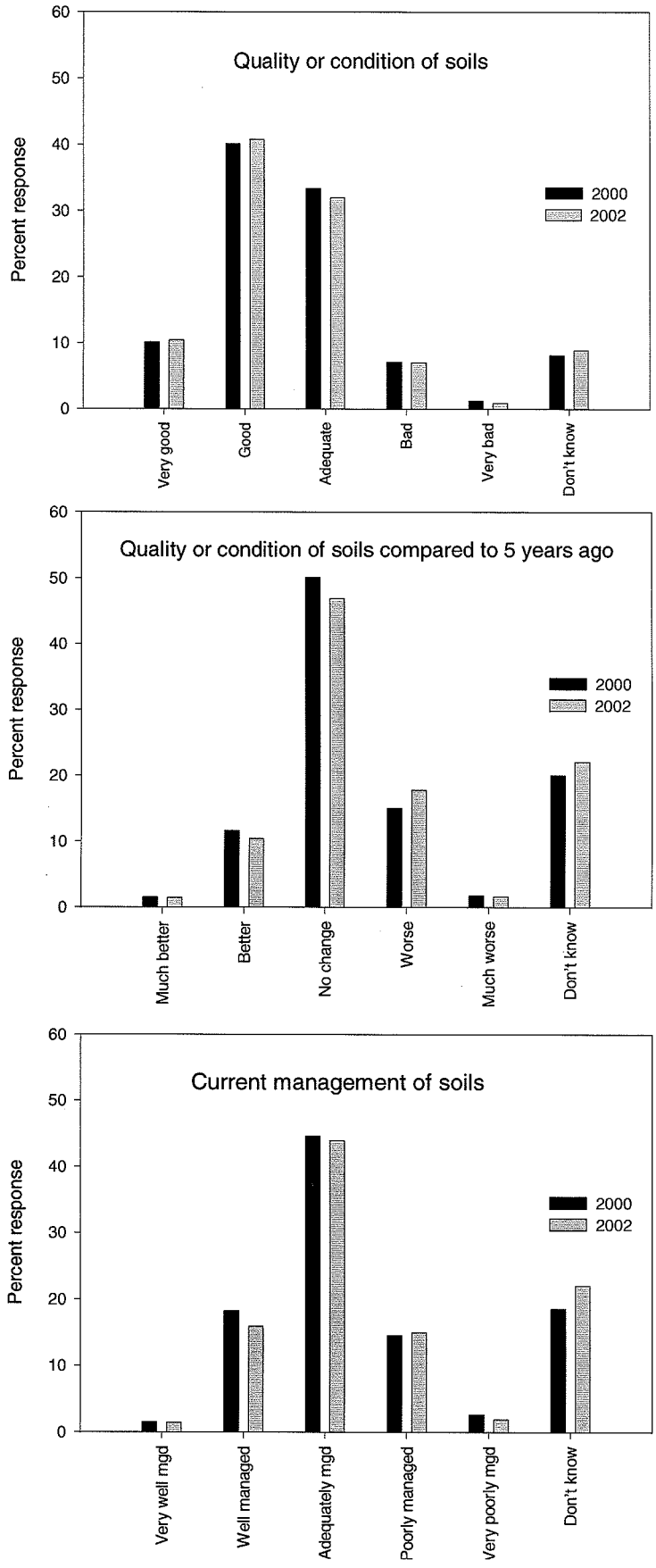


Figure 10. Perceptions (% response by category) of the status and management of soils.

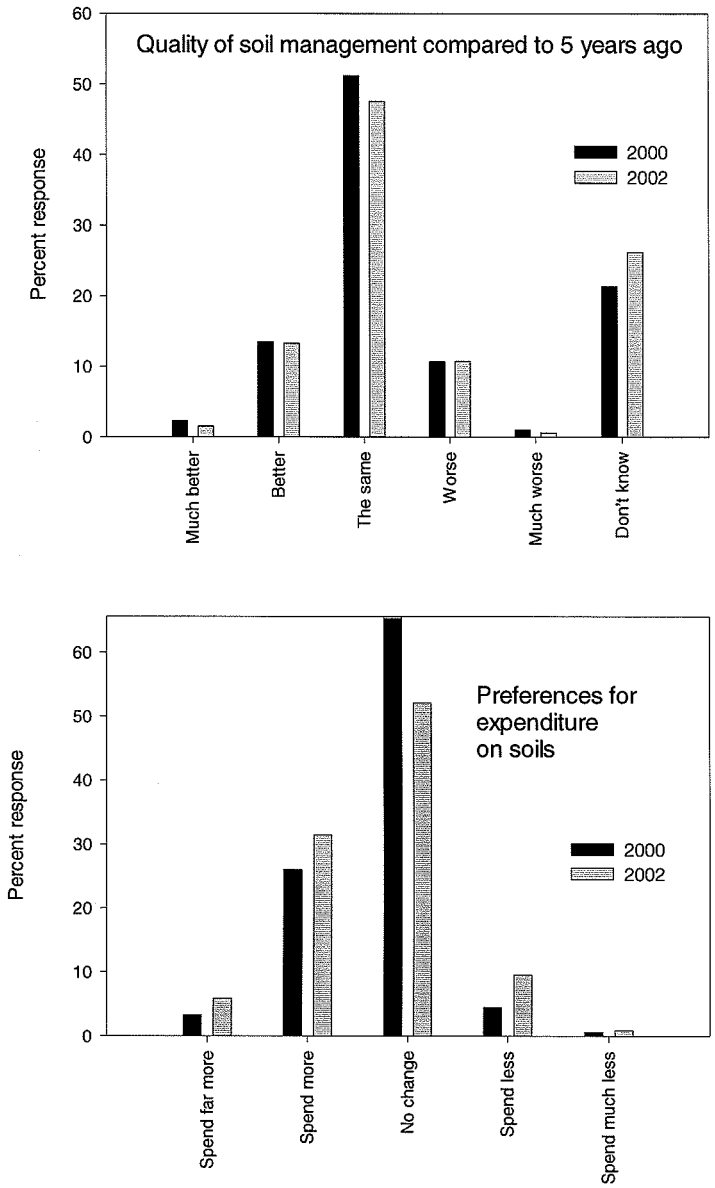


Figure 10 continued.

4.6. Coastal waters and beaches

Most New Zealanders believe the quality or condition of the coastal environment is good, although a substantial proportion of respondents believe there has been a decline in condition over the last five years (see Figure 11). Management is generally considered to be *good* and its quality *unchanged* over the past few years. There is a substantial number of people who would support extra funding for coastal management. There are no significant differences between the 2000 and 2002 surveys for any of the data presented here.

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. Statistics New Zealand (2002: 34) reports that while the proportion of monitored marine beaches that are safe for swimming has remained above 94% since 1998/99, there was a drop from 100% in the summer of 2000/01 to 98% in the 2001/02 summer.

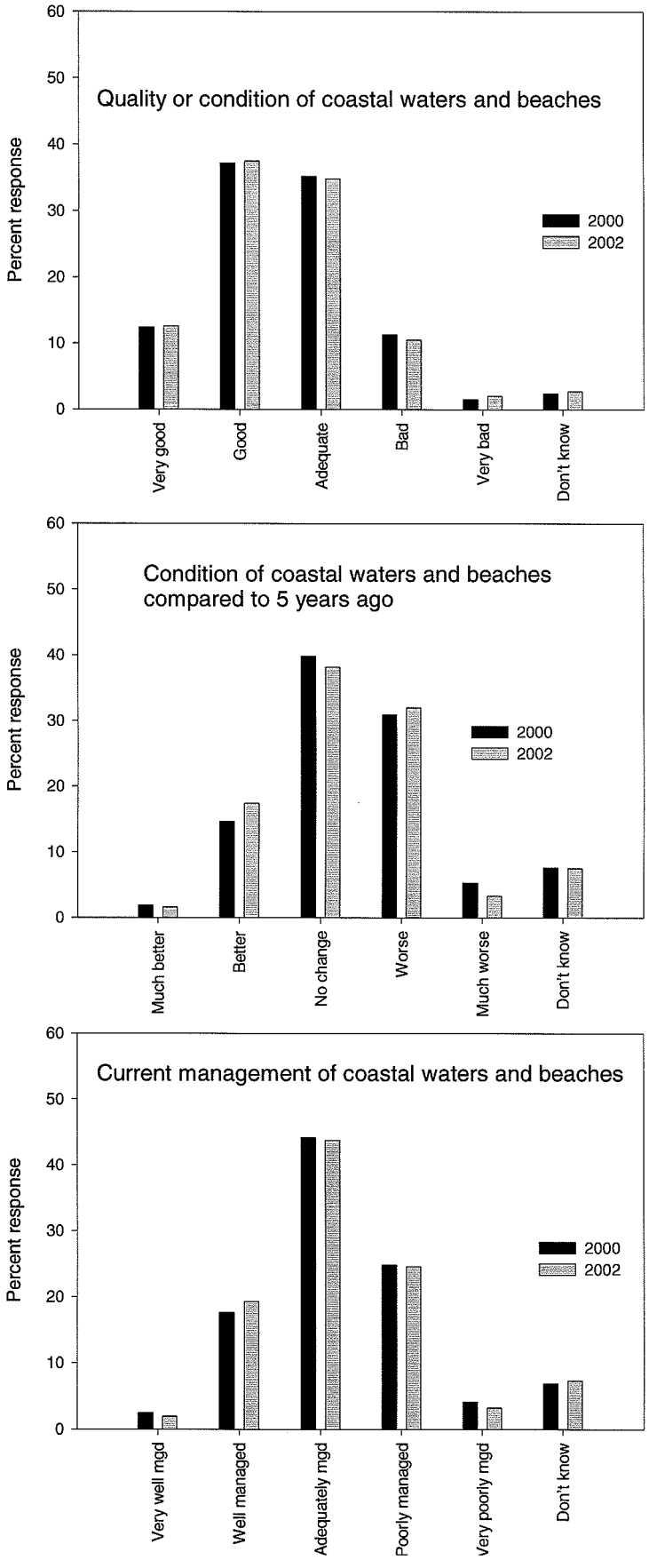


Figure 11. Perceptions (% response by category) of the status and management of coastal waters and beaches.

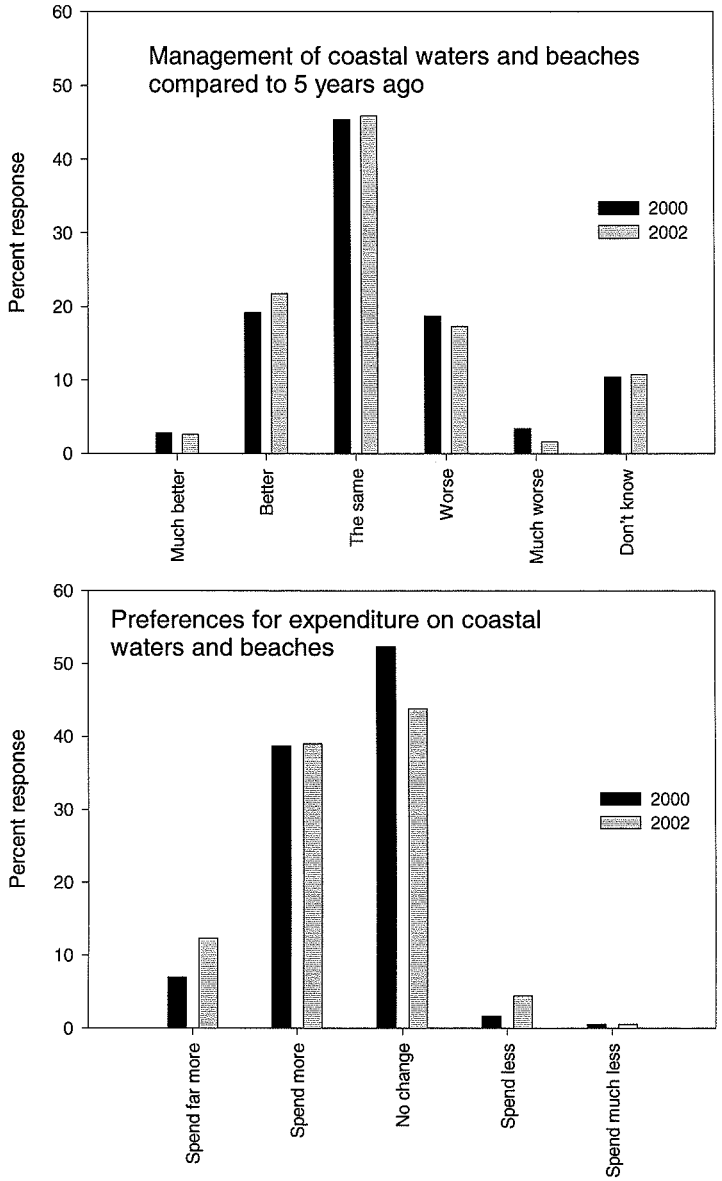


Figure 11 continued.

4.7. Marine fisheries

Most New Zealanders believe the quality, condition and quantity of marine fisheries are *adequate* to *good*, but that the condition has declined markedly in the last 5 years (see Figure 12). Both surveys show that marine fisheries are rated as the worst environmental sector for all of the pressure, state and response criteria considered. It is not surprising that there is a call for extra expenditure on marine fisheries. This finding is tempered by recognition that, although marine fisheries rate the worst, they and their management are generally rated in the *adequate* to *good* range. While most people wanted no change in expenditure, over 20% thought more should be spent on marine fisheries. There were significant differences between the 2000 and 2002 survey for both condition and quantity of fish stock questions. On both questions larger proportions of 2002 respondents were positive or neutral in their responses.

Questions about the sustainable management of marine fisheries remain topical in New Zealand. While internationally New Zealand is viewed as leading the world in terms of many aspects of fisheries management (see Hughey et al., 2002), within the country there is much debate about the direction of management. There are new initiatives to establish the framework for integrated fisheries plans. Notable from both surveys are the large numbers of people who expressed 'don't knows' for many marine fishery-related questions, the proportions ranging from 15–23% of respondents. As noted by Statistics New Zealand (2002: 35), the sustainability of only 76 of 272 fish stocks in the New Zealand Quota Management System can be determined, leaving most stocks with an unknown status. The high 'don't know' response might, in part, reflect this high level of scientific uncertainty as well. These figures should concern policy makers who rely on public input for informed decision making.

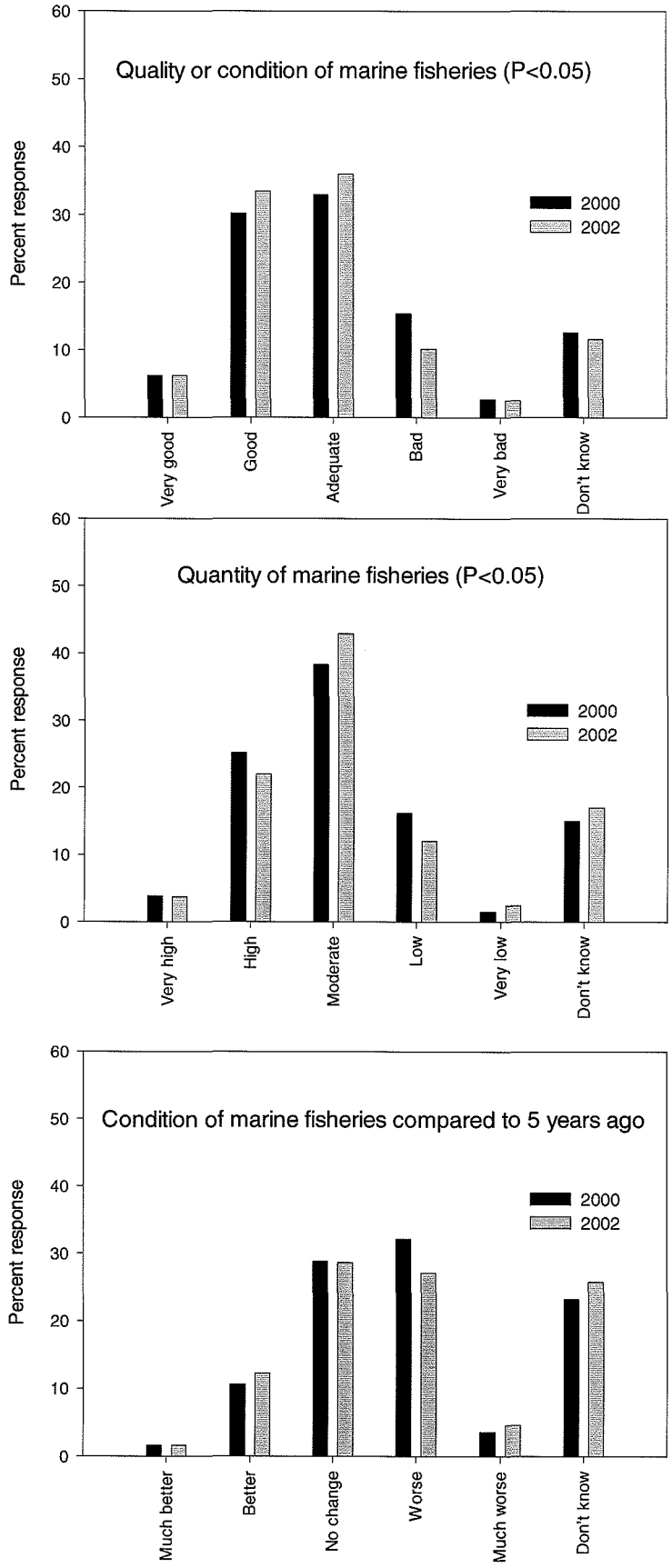


Figure 12. Perceptions (% response by category) of the status and management of marine fisheries.

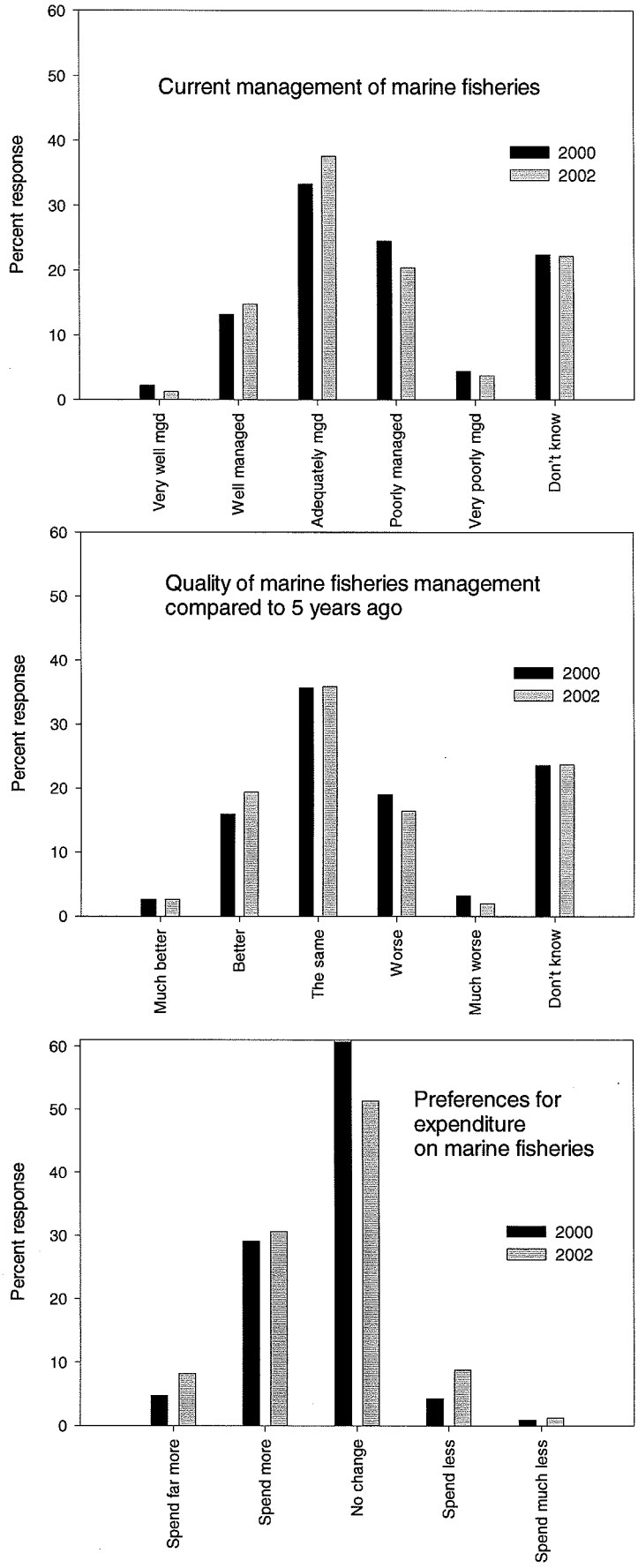


Figure 12 continued.

4.8. Marine reserves

Most people think there is a moderate to low number of marine reserves in New Zealand. This view is supported by the facts that while New Zealand has the World's fourth largest Exclusive Economic Zone, less than 0.1 per cent of this marine environment is currently reserved, compared to about 30 per cent of its land area (www.doc.govt.nz, 2002). While most people think the condition of these reserves compared to five years ago has improved, around 30% of people expressed a 'don't know' view (see Figure 13). Most people think marine reserves are *adequately* to *well managed*, and better managed than five years ago. Although about 50% thought there should be no change in expenditure, about 30% thought there should be an increase.

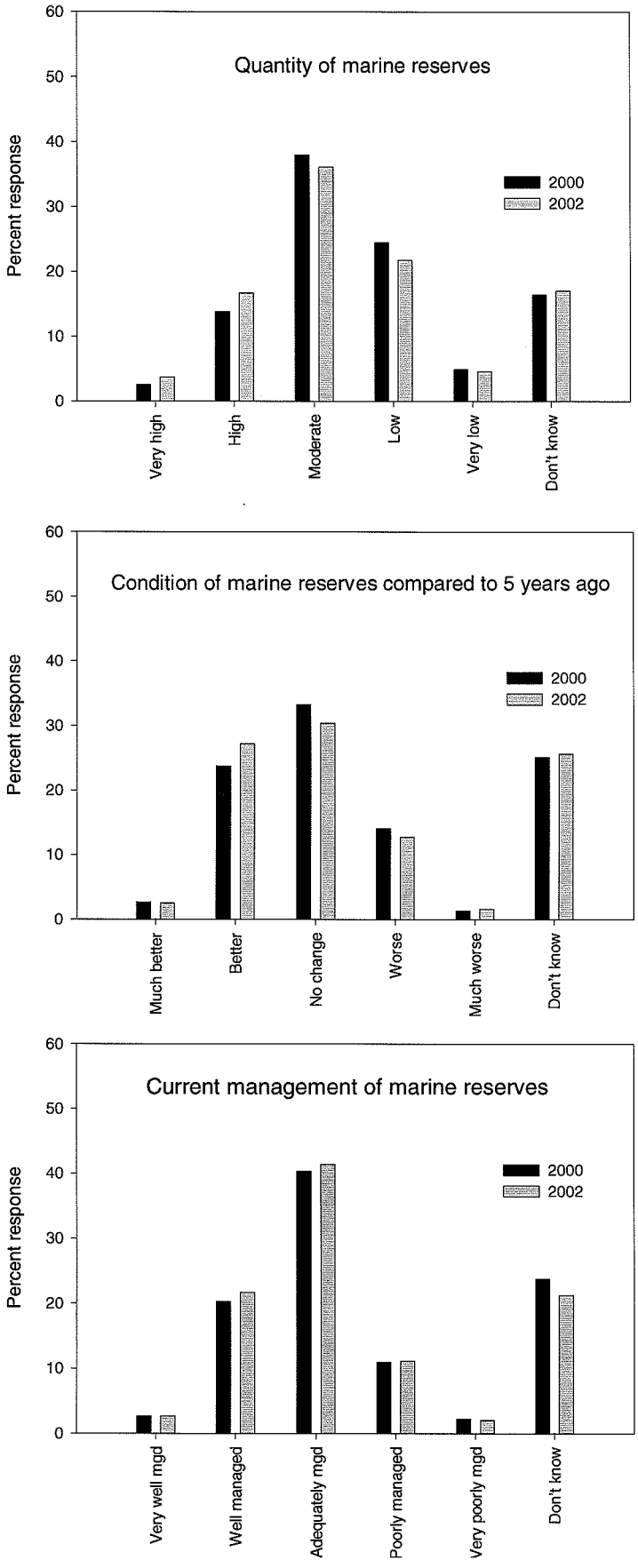


Figure 13. Perceptions (% response by category) of the status and management of marine reserves.

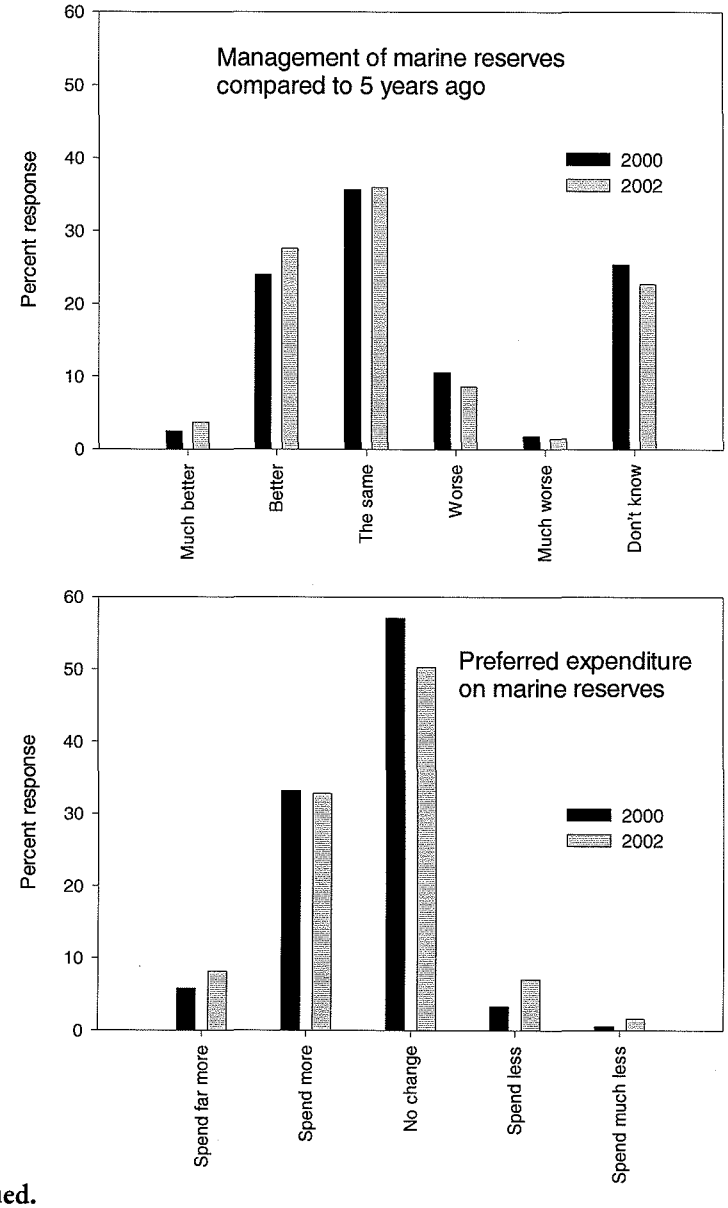


Figure 13 continued.

4.9. Fresh waters

Most of those surveyed believe the quality and abundance of fresh water is *adequate* to *good*. However, there seems to have been a worsening of water quality over the last five years (see Figure 14), although there was a significant change in this measure between the two surveys with an increasing number of respondents in 2002 thinking it was *better*. Management is considered *adequate* and to be largely unchanged over the past few years. There is strong support for extra funding to go into management of our fresh waters.

MfE (1997: section 7: 88) concluded 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."

With regard to this conclusion the survey findings are equivocal, with most people thinking water quality or condition to be adequate or good. However, as noted by Statistics New Zealand (2002: 36):

> "As a general rule 'lowland' rivers, whose catchments are dominated by agricultural land use, 'pull down' general criteria with nutrient criteria ...".

In 2000 it was noted that more analysis would be required to determine if there was a rural–urban difference of perception here. This analysis was undertaken for this survey and no significant differences in perceptions were detected.

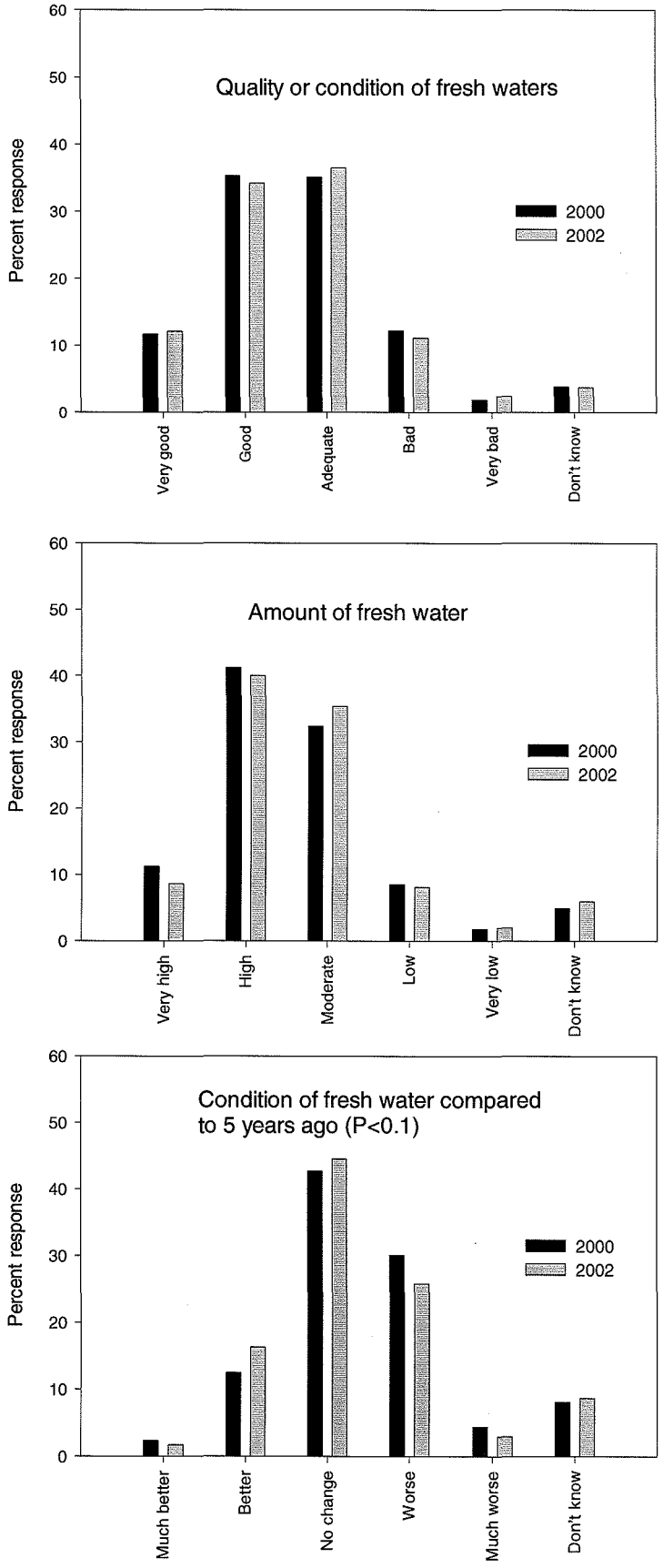


Figure 14. Perceptions (% response by category) of the status and management of fresh waters.

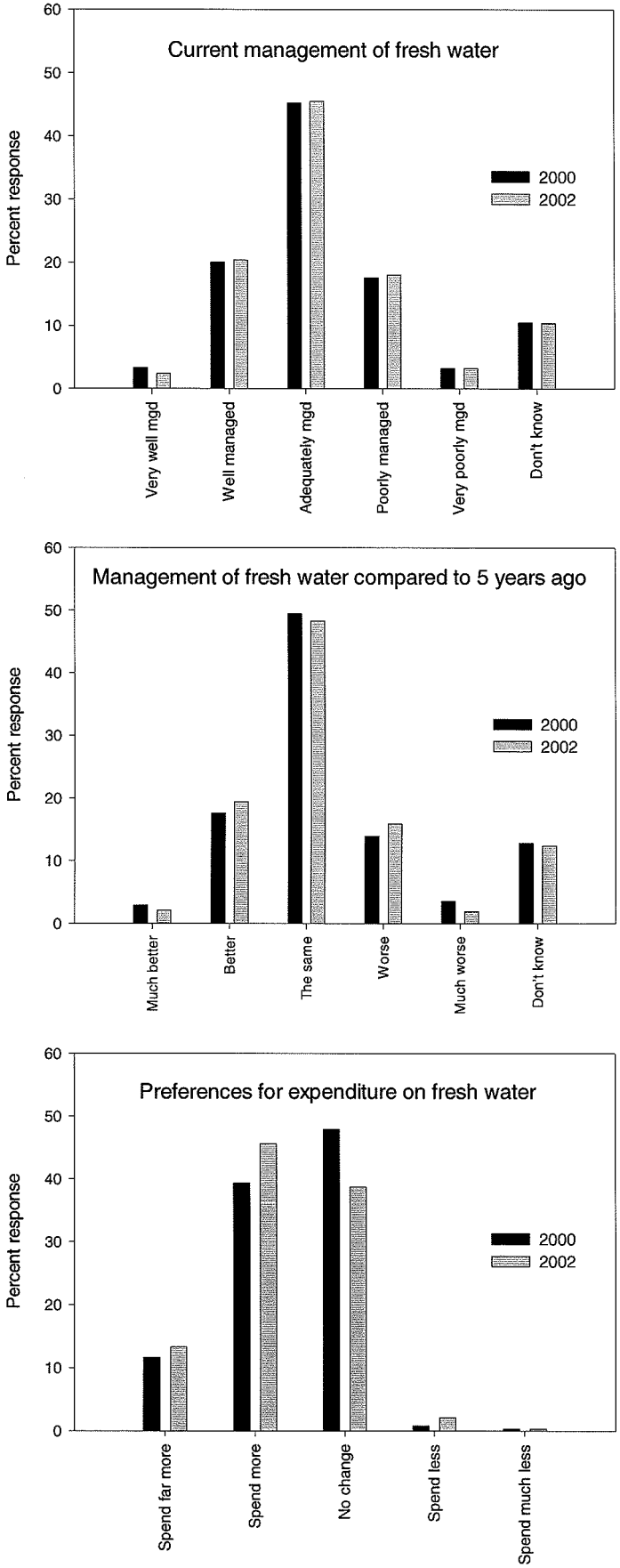


Figure 14 continued.

4.10. National Parks

Almost half of those responding consider the area of National Parks to be high (see Figure 15), a view supported by Department of Conservation data. 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 an incredible variety of landscape and vegetation (www.doc.govt.nz), an incomplete range of environments and ecosystems are represented within the country's protected area network (Statistics New Zealand, 2002). Moreover, the largest proportion of National Parks and other reserves are in the South Island and then mostly in difficult-to-access mountainous areas.

Most people think the condition of National Parks over the last five years has either *not changed* or it has *improved*. There was a significant difference between the 2000 and 2002 survey with more respondents in 2002 considering there was an improvement in condition. No other significant differences between the two surveys were found for any question. Over 80% of people think management is either *adequate* or *good*, with around 75% thinking it is the *same* or *better* than 5 years ago. Almost 60% want expenditure on National Parks to remain the *same* with less than 40% supporting increased expenditure.

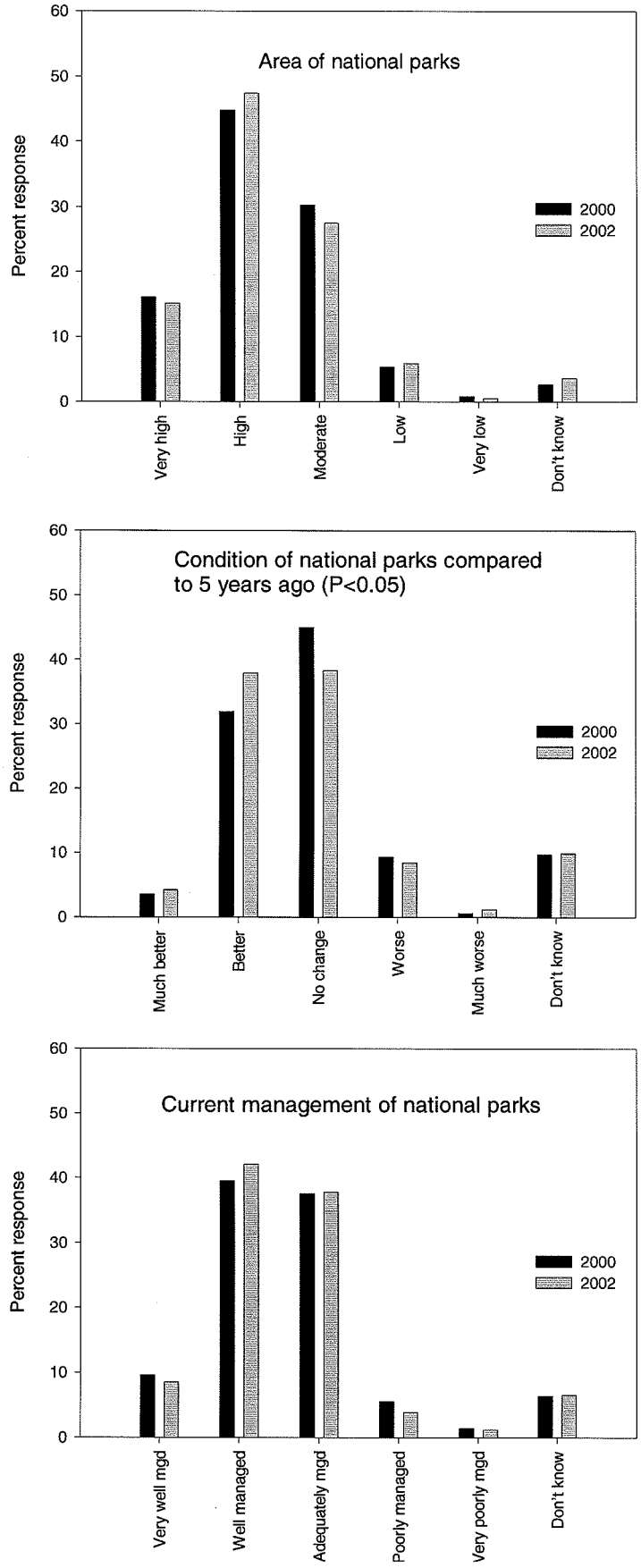


Figure 15. People's perception (% response by category) of the status and management of National Parks.

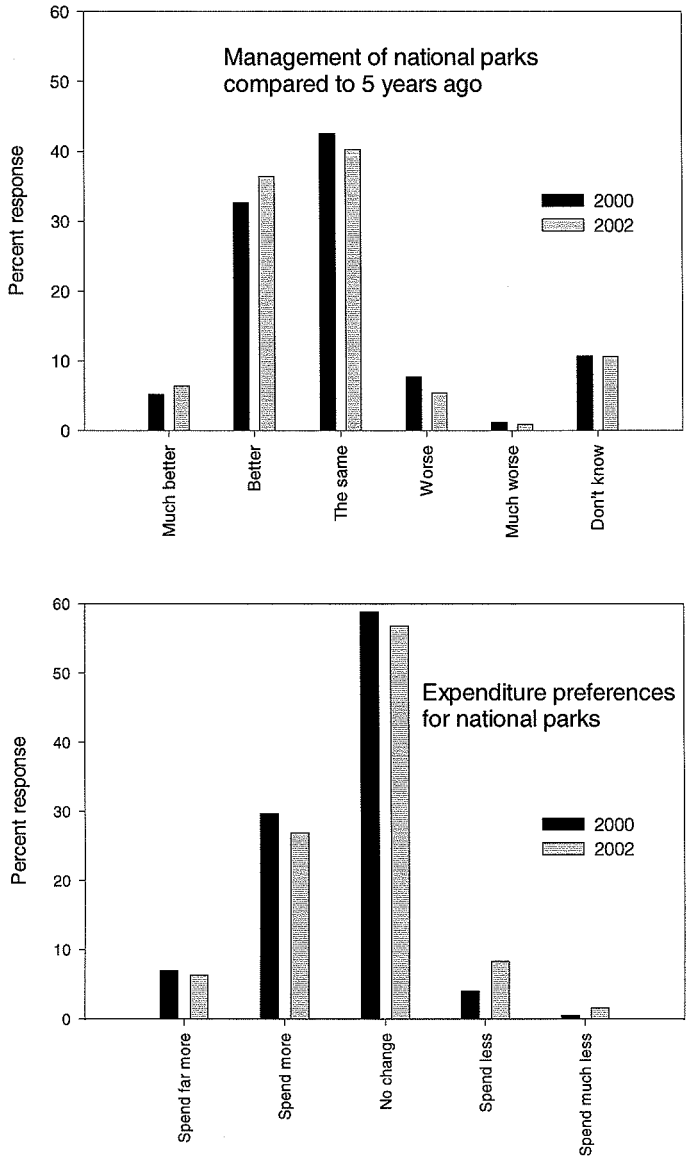


Figure 15 continued.

4.11. Wetlands

New Zealanders generally believe the condition of wetlands is *adequate* to *good* (see Figure 16). Significantly more people in 2002 than in 2000 thought the condition of wetlands was *high*. While some think the extent of wetlands is *low* and some *high*, the greatest proportion think New Zealand has a *moderate* area of wetlands (note however that there is a large 'don't know' response to some of the wetland questions) although there was a significant difference between surveys with fewer in 2002 considering the area of wetlands to be *low*. From the responses there seems to be no perceived change in wetland status over the last five years. Management is deemed to be *adequate* and largely unchanged over the past few years. There is some support for extra funding to go into management of wetlands but most people think there should be no change in expenditure.

It is somewhat surprising that most people think there is a moderate area of wetlands in New Zealand when in fact 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).

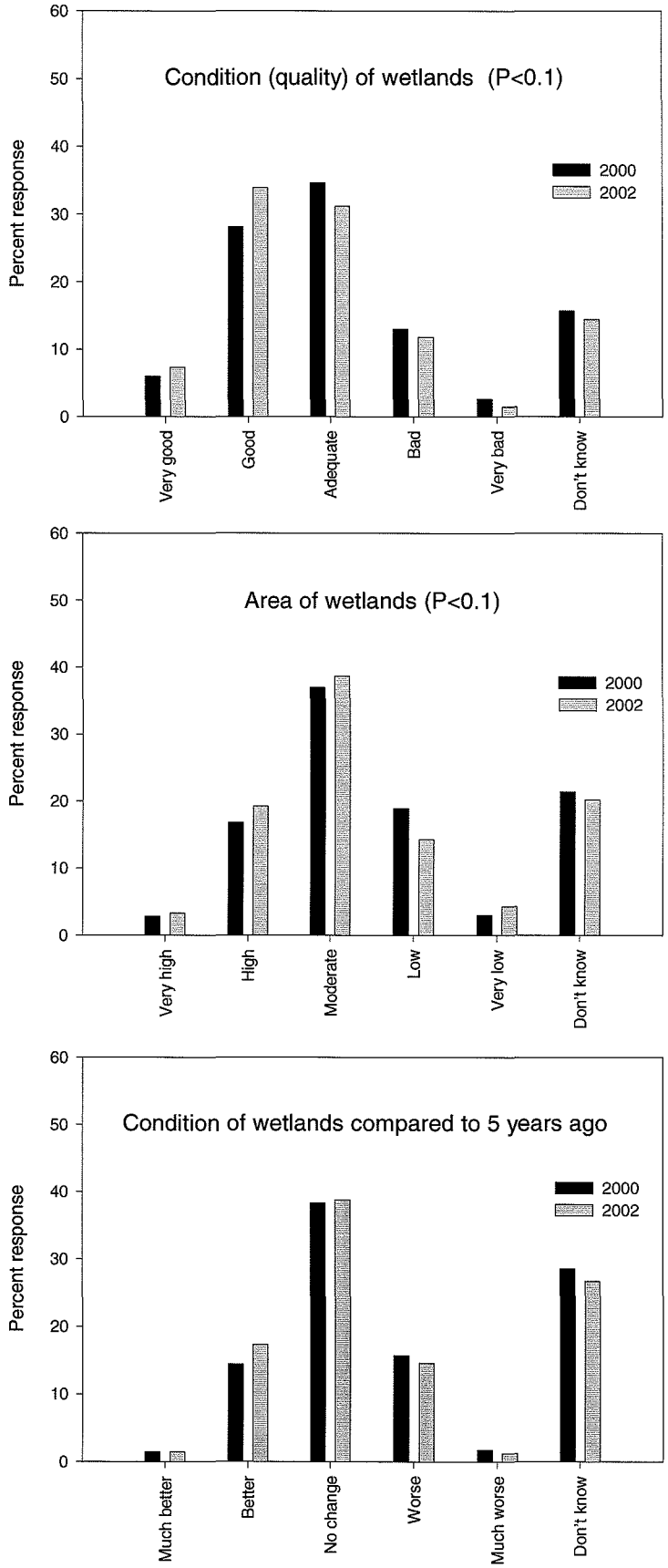


Figure 16. Perceptions (% response by category) of the status and management of wetlands.

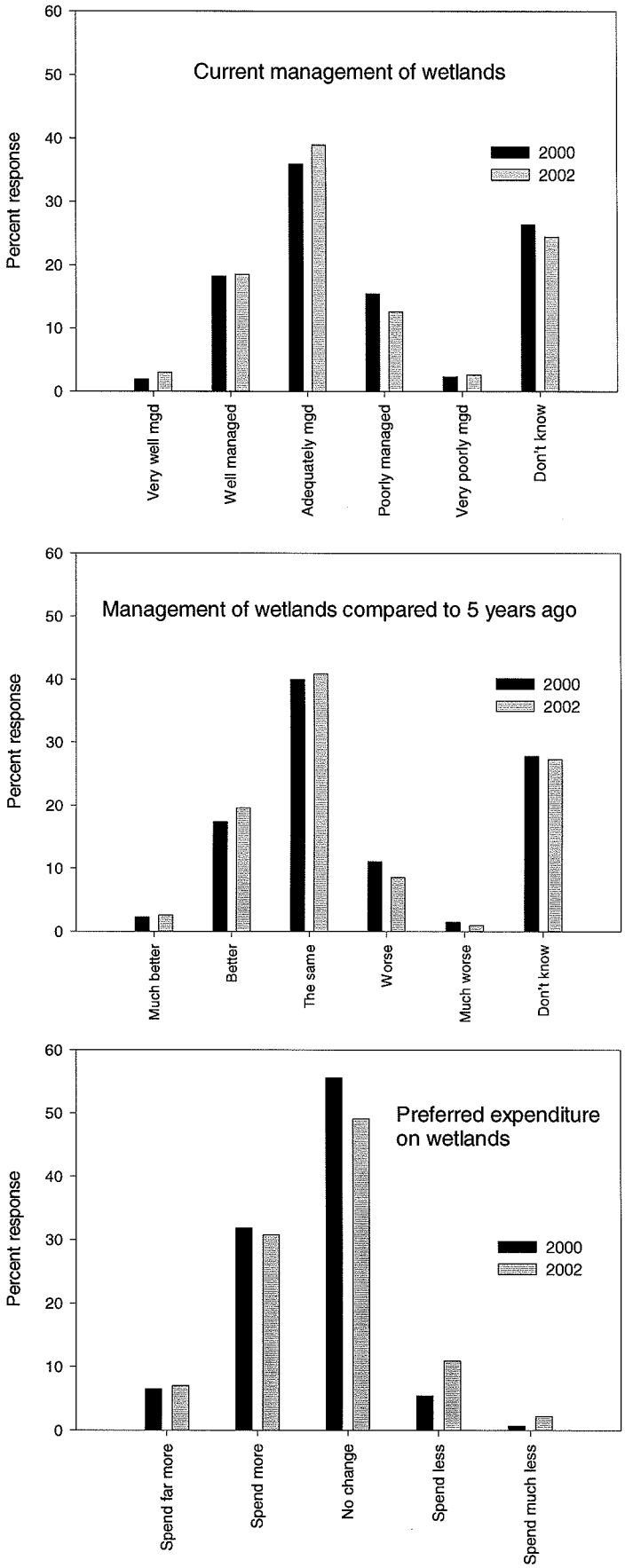


Figure 16 continued.

4.12. New Zealand's natural environment compared to other developed countries

Most people think the natural environment in New Zealand compared to that of other developed countries is *good* to *very good* (Figure 17). Furthermore, over 60% think the condition of the NZ environment has become *better* or *much better* compared to that of other developed countries. It follows that respondents thought management is *better* compared to these other countries, and that management was the *same* or *better* than in other developed countries compared to five years ago. There were no significant differences in responses for any of these questions between the 2000 and 2002 surveys.

Massey University (2001) found that 42% of people do not believe New Zealand is clean and green. Findings from the 2002 Environmental Perceptions survey are not surprising and reinforce the view that New Zealanders believe they live in a cleaner and greener environment than is found in other developed countries. This view is supportive ofconcurs with the conclusions from the World Economic Forum (2002) report, which ranked New Zealand highly in terms of relative environmental sustainability.

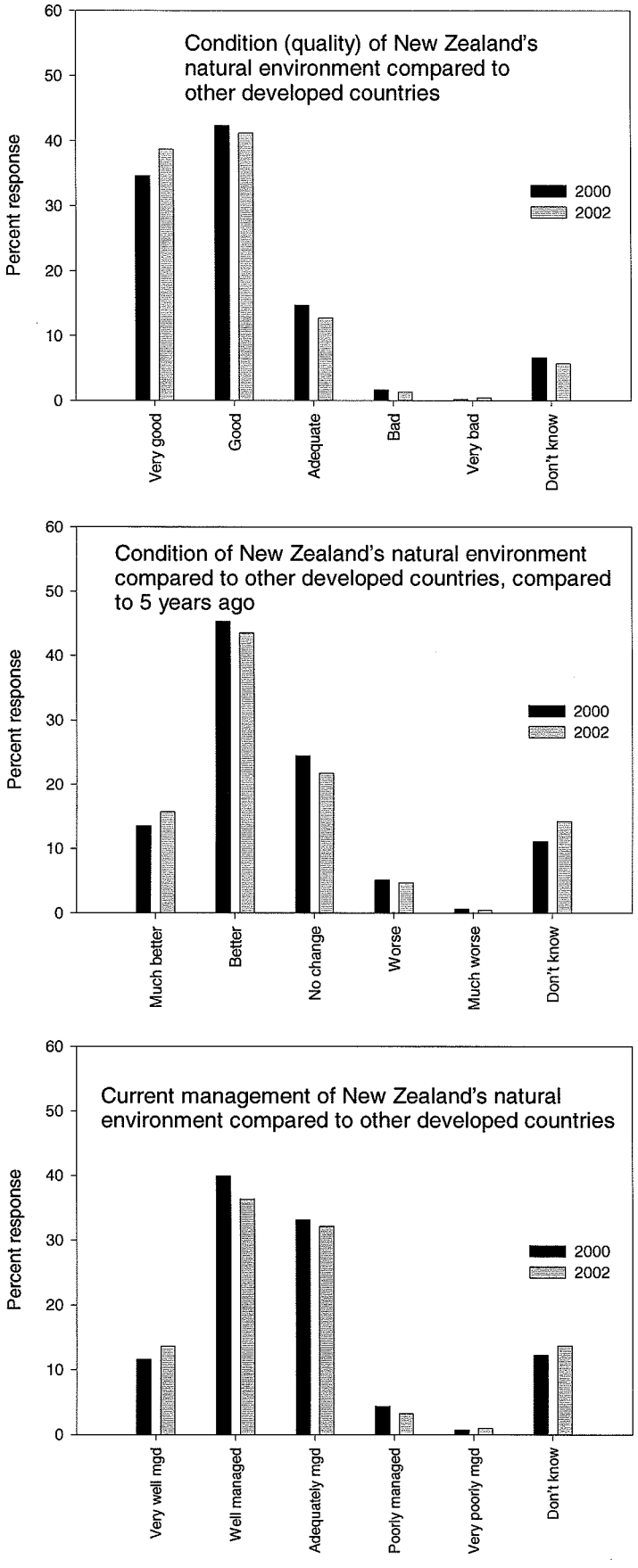


Figure 17. Perceptions (% response by category) of the status and management of New Zealand's natural environment compared to other developed countries.

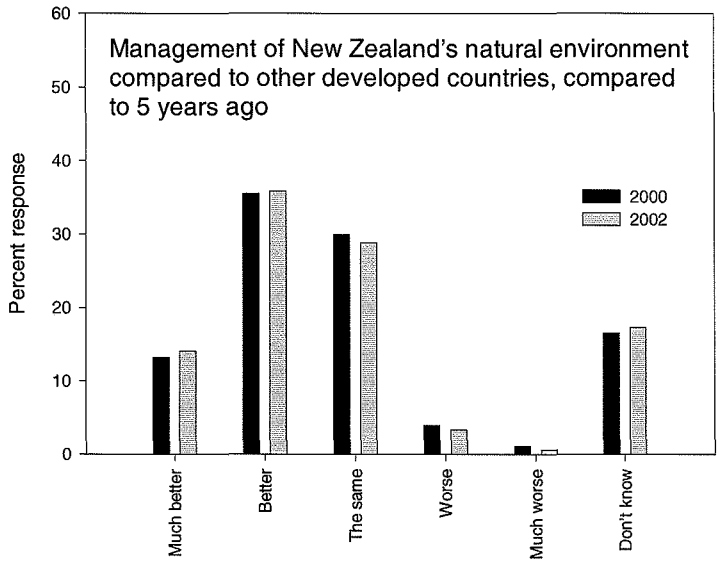


Figure 17 continued.

5. INDIVIDUAL ISSUES

5.1. Allocation of government expenditure

Three questions addressed citizen preferences for allocation of government spending. The questions sought information on preferred macro-level budget allocation, preferred environmental budget allocation, and stated preferences from a set of three budget options.

Preferred macro-budget allocation

In the macro-level budget allocation component survey participants were informed of current government spending on six items and asked to identify their preferred allocation over those items, given that total expenditure could not change from the initial total of $30 billion per year. The items were: defence, education, crime prevention, health, superannuation and income support, and conservation and the environment.

Results

564 respondents answered this question and fulfilled the requirement to maintain a balanced budget. Table 13 summarises responses. Figure 18 compares current and mean preferred budget allocations.

Table 13. Preferred macro-budget allocation.

Item	2001 spending	Preferred CHANGE in spending			
		Minimum ($b)	Maximum ($b)	Mean ($b)	Standard Error
Defence	$1 billion	-1.0	14.0	0.1271	0.0048
Education	$7 billion	-7.0	6.0	0.4537	0.0062
Crime Prevention	$1.5 billion	-1.5	13.5	0.3617	0.0050
Health	$7 billion	-7.0	13.0	0.8651	0.0074
Superannuation and Income Support	$13 billion	-13.0	2.0	-2.8275	0.1311
Conservation and the Environment	$0.5 billion	-0.5	29.5	1.0199	0.0095
Total	**$30 billion**			0.0000	

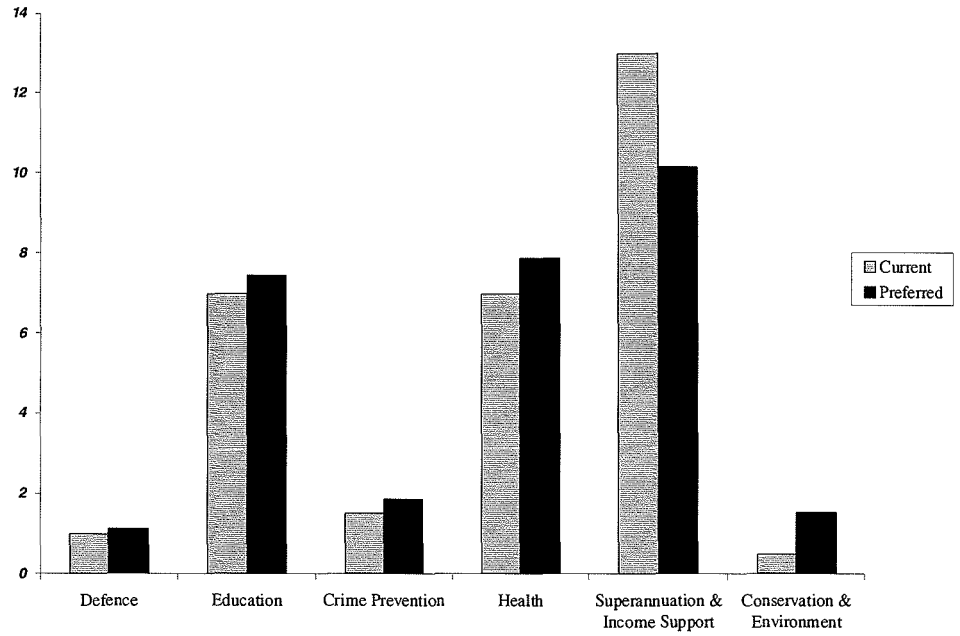


Figure 18. Current and mean preferred budget allocation ($billion).

Preferred levels of spending are all significantly different from their current levels. Respondents wanted a substantial decrease in spending on superannuation and income support (95% confidence interval: $2.6 ~ 3.1 billion decrease). An increase in spending was desired in all other categories, with the largest desired increase in spending on conservation and the environment (95% confidence interval: $1.0 ~ 1.4 billion increase). Respondents also preferred a substantial increase in health spending.

Preferred environmental budget allocation

Respondents were asked to indicate how spending on particular environmental elements should change, given that total environmental expenditure could not change. The 5-point response scale was anchored with "We should spend far more" and "We should spend far less".

Results

Respondents were not as good at balancing the budget in this exercise. Results (Table 14) indicate a reasonably uniform set of responses, with means and standard deviations being similar across all environmental aspects. Mean scores indicate a desire to spend more than at present on all environmental aspects, consistent with responses to the preceding macro-budget allocation question. The modal response was "no change", except for pest & weed control, air quality, and fresh waters, where the modal response was "spend more".

Table 14. Preferred environmental budget allocation.

Environmental item:	N	Spend far more (1)	Spend more (2)	No change (3)	Spend less (4)	Spend far less (5)	Don't know	Mean (1-5)	Std. Dev. (1-5)
		%							
Pest & weed control	781	13.4	41.7	34.8	2.2	0.9	6.9	2.31	.78
Endangered Species	783	12.9	36.5	39.0	4.5	1.4	5.7	2.42	.84
Air quality	775	13.5	40.5	35.7	3.5	1.2	5.5	2.25	.81
Native forests & bush	776	6.8	28.1	54.0	5.0	0.8	5.3	2.63	.73
Soils	760	5.3	27.9	46.3	8.6	0.8	11.2	2.68	.76
Beaches & coastal waters	780	11.5	36.4	40.9	4.1	0.5	6.5	2.42	.78
Marine fisheries	782	7.2	26.7	44.9	7.7	1.0	12.5	2.64	.80
Marine reserves	783	7.2	28.7	44.1	6.3	1.4	12.4	2.61	.80
Fresh waters	770	12.3	42.3	36.0	1.9	0.3	7.1	2.30	.73
National Parks	778	5.9	25.3	53.5	7.8	1.5	5.9	2.72	.77
Wetlands	783	6.0	26.4	42.1	9.3	1.9	14.2	2.71	.84

The 2002 question included a 'don't know' option and along with other structural changes meant it differed substantially from that asked in 2000, and therefore no statistical comparison can be drawn between the two surveys. Nevertheless the ordered preferences for each survey are shown in Figure 19. In 2000 endangered species received the highest ranking whereas in 2002 the highest ranking was for expenditure on fresh waters. The lowest ranking in 2000 was for soils, while in 2002 it was for National Parks.

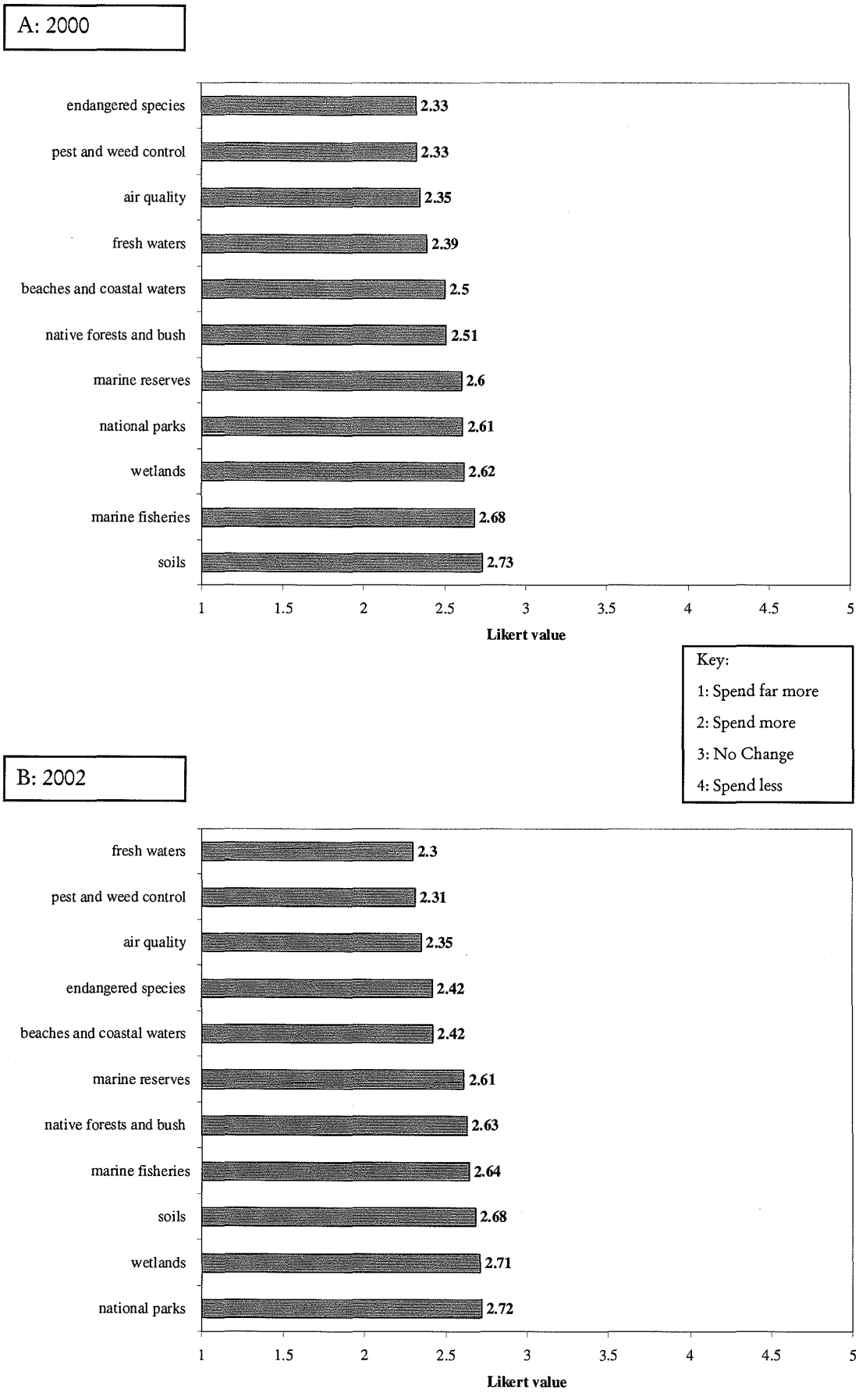


Figure 19. Preferred reallocation of government spending: 2000 versus 2002.

Choice experiment

The stated preference question provided survey participants with three options for allocation of government expenditure between Health, Education, Income Support, and Conservation and Environmental Management. Information was provided on public spending on these items in 2001. Each of the options was described by the level of spending on each item, which could be unchanged, or could increase or decrease by $50 million per year. There was no requirement to balance the budget, so it was possible to have options that entailed total budget changes in the range +$200 million to -$200 million. Each respondent faced only one question. However, nine different versions of the questionnaire allowed for combinations of options that allowed estimation of underlying utility functions.

Results

Survey participants faced three options and were able to select one that they preferred, signalling the combination of budget items that yielded the highest utility. Mathematical modelling was used to show how, on aggregate, respondents were willing to trade off budget allocations between sectors. This modelling exercise indicated that people obtained negative utility from allocating money to income support, consistent with the stated desire to cut spending on superannuation and income support in the first expenditure question. Older respondents were not as averse to spending on income support, but were still generally in favour of cuts in spending on this item. Spending on the other three items (health, education, environment) yielded positive benefits. Respondents saw significantly more benefits (at the 95% confidence level) from spending on health, rather than on education or the environment. Spending on education is expected to provide more benefits than is spending on the environment, although this difference is not significant at the 95% confidence level. There was a marginally significant effect that indicated that people born in New Zealand are more in favour of spending on the environment than are people not born in New Zealand. Willingness to spend on health was not affected by respondent age, but willingness to spend on education and the environment both declined with age.

5.2. A study of the state of the coastal-marine environment

The New Zealand Government has been developing an Oceans Policy. It was appropriate therefore, to devote a section of the 2002 survey to a set of questions about the coastal-marine environment, especially concerning water quality, fishing and management.

(a) Pollution—water quality

Three questions concerned pollution in the coastal-marine environment (Table 15). Most people thought beaches and waters were either *moderately* or *extremely clean*. Analysis following the removal of 'don't know' responses indicates there was a significantly different mean value for New Zealand's seas than for either beaches or coastal waters ($P < 0.001$; Figure 20), with seas perceived as being *much cleaner*.

Table 15. Levels of pollution (cleanliness) of the coastal-marine environment.

	N	Extremely clean (1)	Moderately clean (2)	Moderately polluted (3)	Extremely polluted (4)	Don't know	Mean (1-5)	Std. Dev.
		%						
NZ beaches are ...	643	10.6	63.0	21.8	2.6	2.0	2.17	0.64
Coastal waters around NZ are ...	807	11.8	57.4	24.0	2.4	4.5	2.18	0.67
Seas surrounding NZ are ...	803	20.0	54.9	14.7	1.6	8.7	1.98	0.67

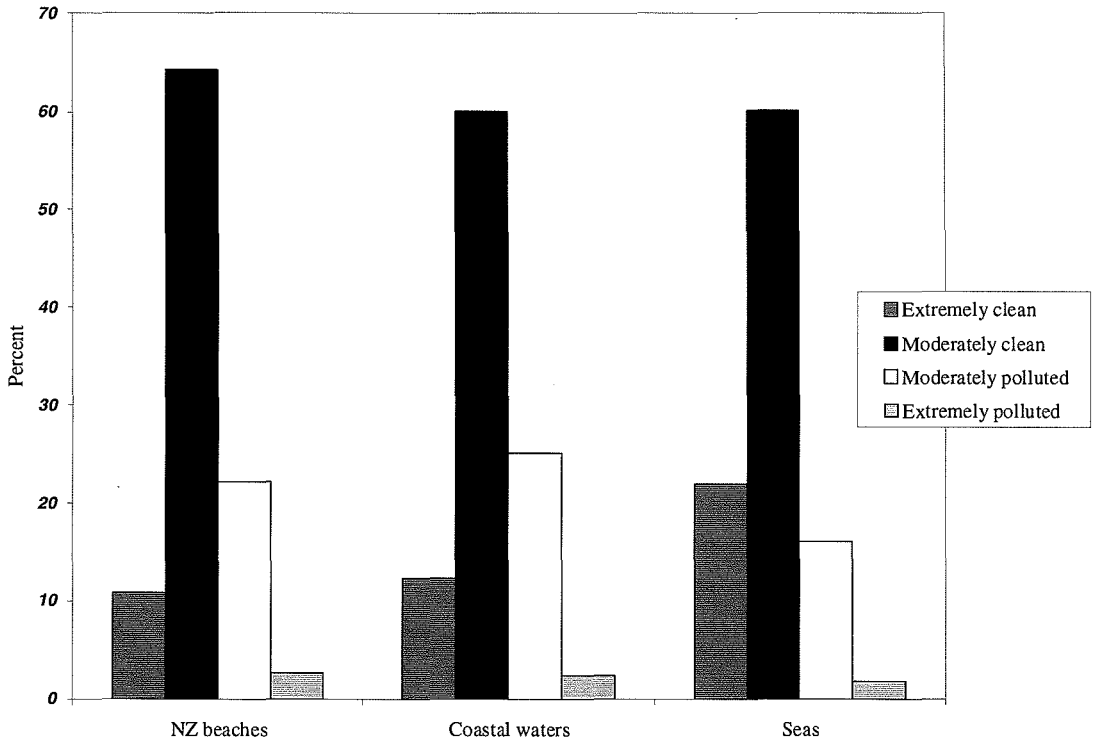


Figure 20. Pollution (cleanliness) of the coastal-marine environment.

Three questions concerned changes in levels of pollution over the last 5 years. While most people thought it was about the *same* or *less polluted*, more than 25% thought New Zealand beaches and coastal waters were *more polluted* than five years ago (Table 16).

Table 16. Perceived level of coastal-marine pollution compared to 5 years ago.

	N	Much less polluted (1)	Less polluted (2)	About the same (3)	More polluted (4)	Much more polluted (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
NZ beaches are ...	744	2.3	13	48.4	27.6	2.6	6.2	3.16	0.78
Coastal waters around NZ are ...	810	1.9	10.5	48.4	25.8	2.8	10.6	3.19	0.76
Seas surrounding NZ are ...	811	1.5	7.8	53.9	18.6	2.3	15.9	3.15	0.69

Analysis, after removal of the 'don't know' responses, indicated a significant difference between perceptions of change for beaches, coastal waters and seas ($P < 0.001$; Figure 21).

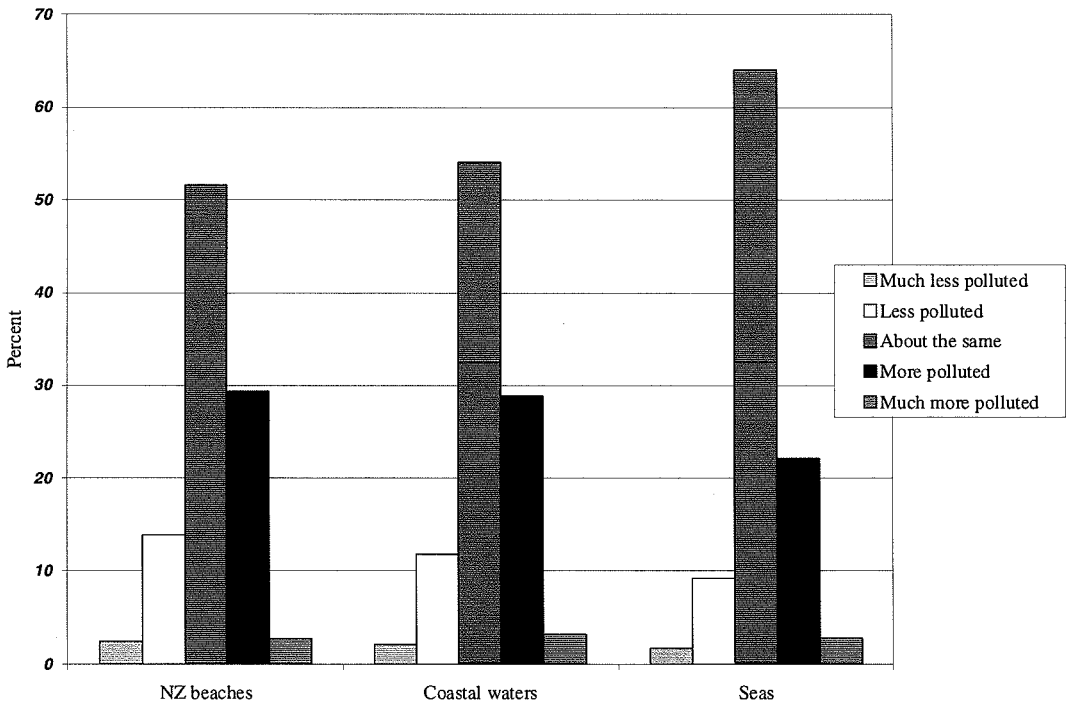


Figure 21. Change in levels of pollution (cleanliness) of the coastal-marine environment over the past 5 years.

(b) Marine farming

Over recent decades marine farming has been a growth industry in many parts of New Zealand, e.g., Northland, Coromandel, Marlborough, Banks Peninsula and Stewart Island. There has been increasing concern expressed in some quarters about the ongoing development of marine farming. This has led councils such as Environment Canterbury to impose moratoria on new developments until an appropriate planning framework is developed. Perceptions about the area of coastal waters used for marine farming were explored (Table 17) and subjected to a range of demographic analyses. The majority of respondents considered the area used for marine farming to be *acceptable*, with less than 10% considering it *too much* or *far too much*. Differences in responses between the three main regions, ethnicity groups and education levels were not significant.

Table 17. Acceptability of current area of coastal waters used for marine farming.

	N	Far too much (1)	Too much (2)	Acceptable (3)	Inadequate (4)	Highly inadequate (5)	Don't know	Mean (1-5)	Std. Dev.
The area of coastal waters used for marine farming is ...		%							
	813	2.3	6.3	59.3	9.5	1.6	21.0	3.02	0.63

(c) Access to the coast

Table 18 reports on how New Zealanders perceive the level of access to the New Zealand coast. The mean score of 1.98 indicates that most respondents considered access to be *good* or *extremely good*.

Table 18. Adequacy of access to the New Zealand coast.

	N	Extremely Good (1)	Good (2)	Acceptable (3)	Poor (4)	Extremely Poor (5)	Mean (1-5)	Std. Dev.
Public access to the NZ coast is ...		%						
	809	33.9	41.2	18.8	5.3	0.9	1.98	0.9

(d) Recreational fishing

Of 805 valid responses, 33.4% indicated they were marine recreational fishers. There was a significant difference in participation when analysed by ethnicity ($P < 0.1$; Figure 22), with relatively more NZ Europeans and Maori than 'others' being recreational fishers.

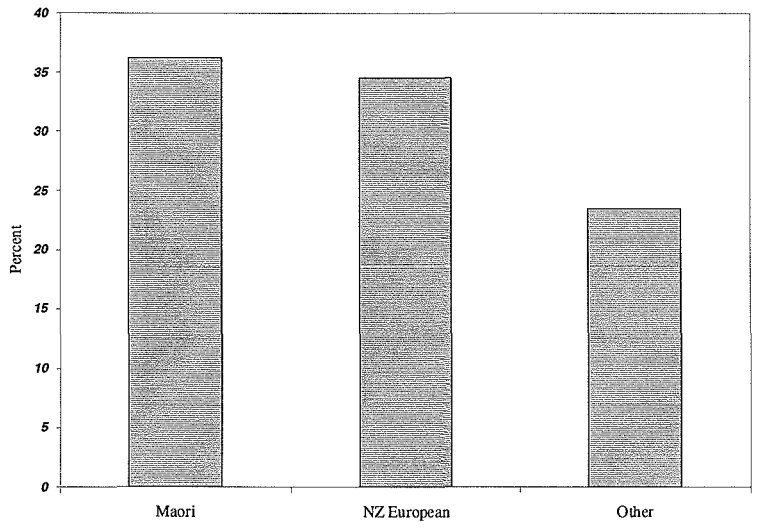


Figure 22. Participation in marine recreational fishing by *ethnicity* ($P < 0.1$).

Perceptions of fish stocks and recreational fishing effort (Table 19) and change over the last five years (Table 20) were examined. There was a substantial 'don't know' response to both questions with the vast majority of respondents being non-fishers (see Figure 23 for example). While slightly under 40% of respondents thought there were *moderate* to *good* fish numbers with only *moderate* to *low* effort required to catch fish, about 30% considered fish numbers were *low* and a *high* level of effort was required to catch fish. Although about 40% expressed a 'don't know' in terms of changes over the last five years, about the same proportion thought it was either *more difficult* or *much more difficult* to catch fish now. Less than 20% thought fishing had improved over the same time period.

There was no significant difference between the views of fishers versus non-fishers, after the 'don't knows' were removed, for both questions (Figures 23 & 24).

Table 19. Perceptions of fish availability and effort required to catch fish by whether or not a recreational fisher.

How do you rate fish abundance and effort required to catch fish in your region?	N	There are plenty of fish, very little effort is required. (1)	Good fish numbers, little effort is required. (2)	Moderate fish numbers, moderate effort required. (3)	Low fish numbers, lots of effort required. (4)	Very low fish numbers, very high effort required. (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
Not a recreational fisher	524	0.2	3.8	25.0	21.0	4.0	46.0	3.46	0.74
Recreational fisher	265	1.1	8.3	47.9	30.9	9.1	2.6	3.40	0.82

Table 20. Changes to fish availability and effort required to catch fish over the last 5 years.

How have recreational marine fish catch rates in your region changed over the last five years?	N	It is much easier to catch fish (1)	It is easier to catch fish (2)	It takes about the same effort to catch fish (3)	It is more difficult to catch fish (4)	It is much more difficult to catch fish (5)	Don't know	Mean (1-5)	Std. Dev.
		%							
Not a recreational fisher	528	0.4	0.9	10.8	23.7	6.3	58.0	3.81	0.74
Recreational fisher	265	1.9	3.4	28.7	44.5	16.6	4.9	3.74	0.86

The data in Tables 19 and 20 were also analysed by ethnicity (Figures 25 and 26). No significant difference existed for current stock and effort versus ethnicity (Figure 25; $P > 0.1$) but a marginally significant difference occurred for change over the last five years (Figure 26; $P = 0.1$). Relatively more New Zealand Europeans considered conditions had deteriorated over that time whereas both more Maori and 'others' considered conditions were much the same.

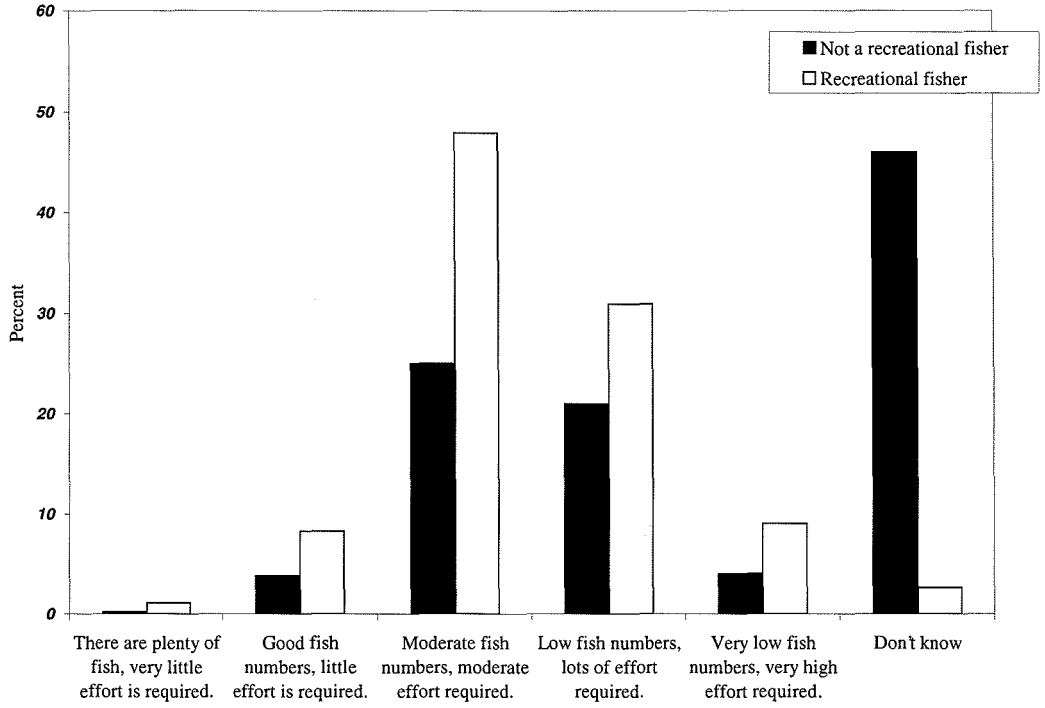


Figure 23. Recreational fish stocks and effort required, by fisher or non-fisher ('don't knows' *included*).

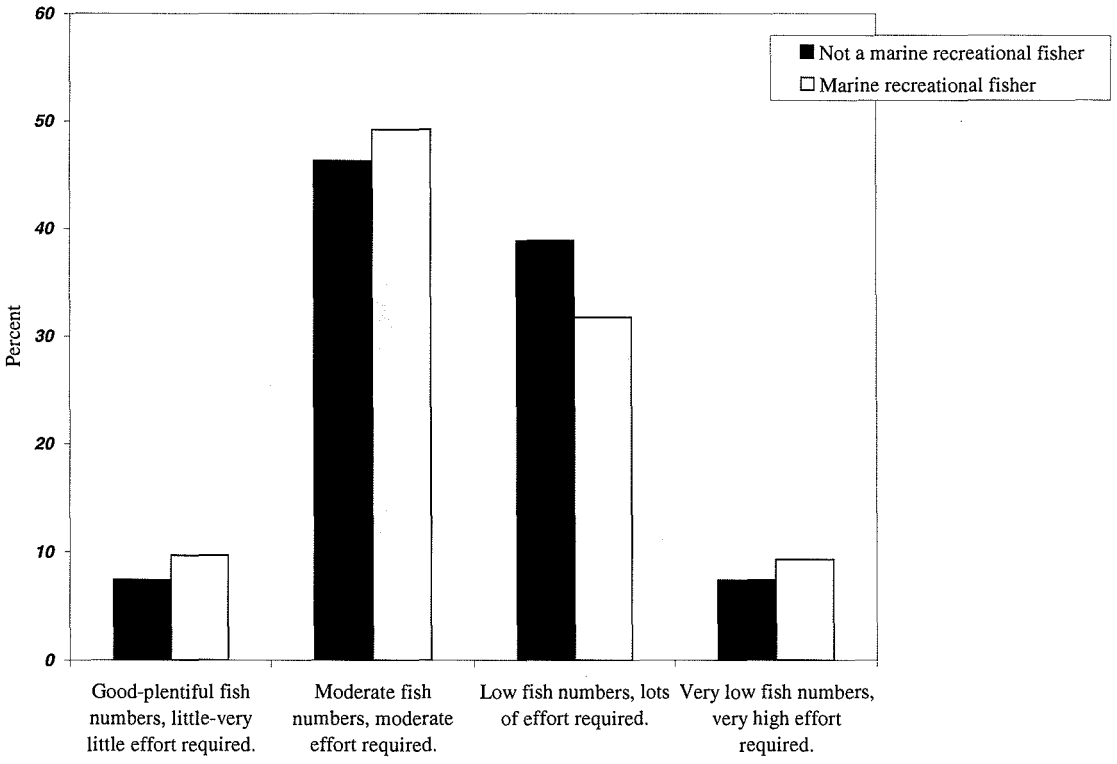


Figure 24. Recreational fish stocks and effort required, by fisher or non-fisher ('don't knows' *excluded*).

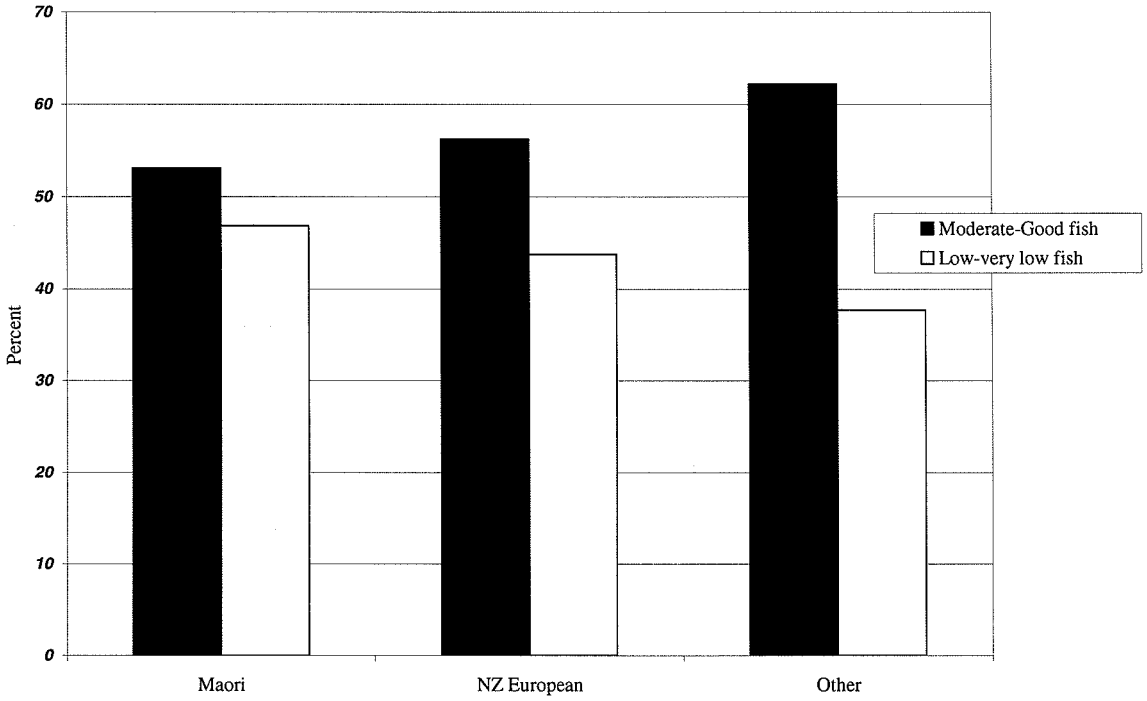


Figure 25. Recreational fish stocks and effort required by *ethnicity* (P > 0.1).

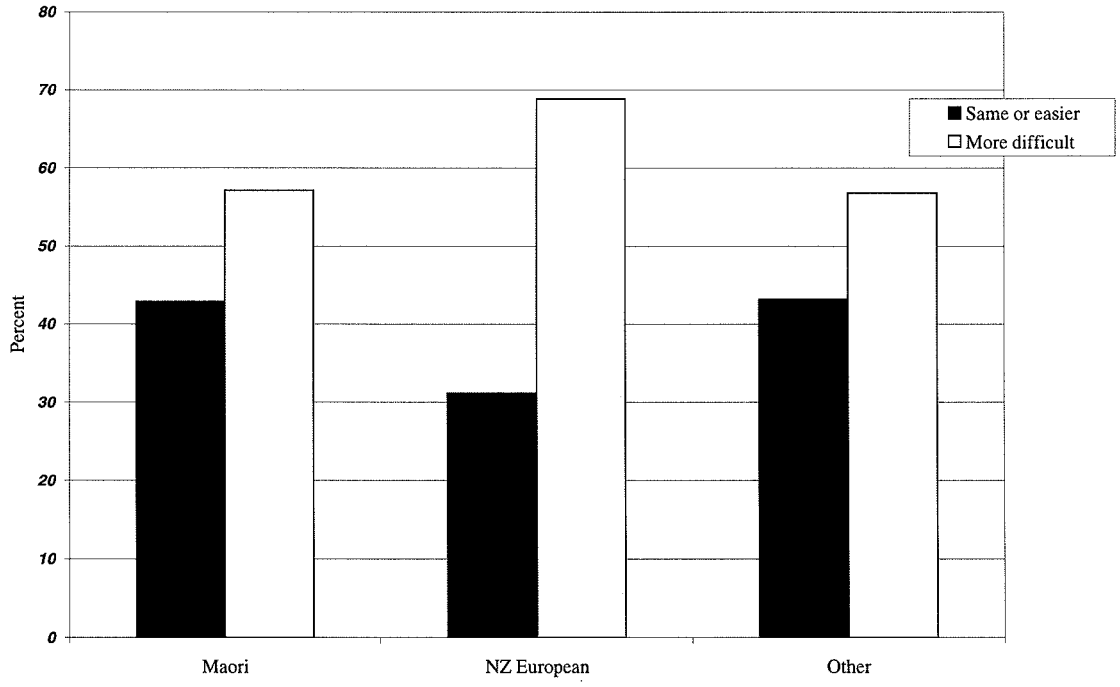


Figure 26. Analysis of change in fishing over the last 5 years by *ethnicity* (P = 0.1).

Change over the last five years was also analysed by whether respondents defined themselves as a recreational fisher or not (Figures 27 and 28). The 'don't knows' were removed from the data presented in Figure 30 and there is no significant difference between the views of fishers and non-fishers.

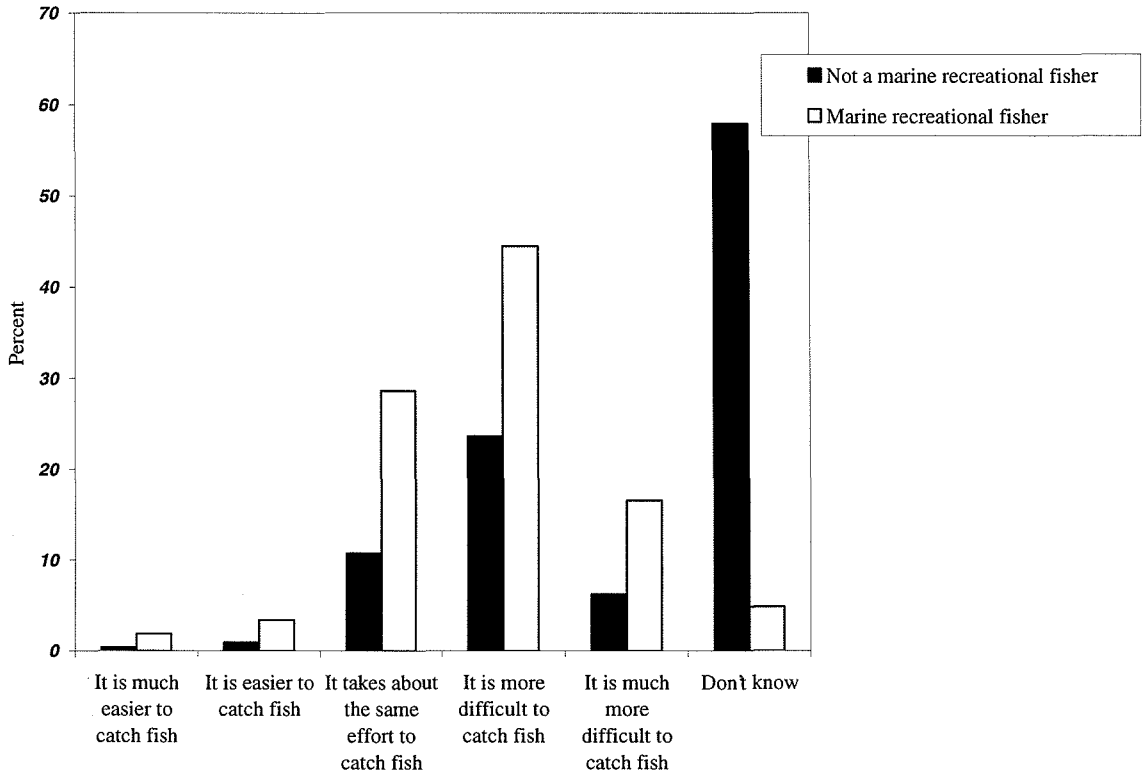


Figure 27. Change in fishing over the past 5 years, by fisher or non-fisher ('don't knows' included).

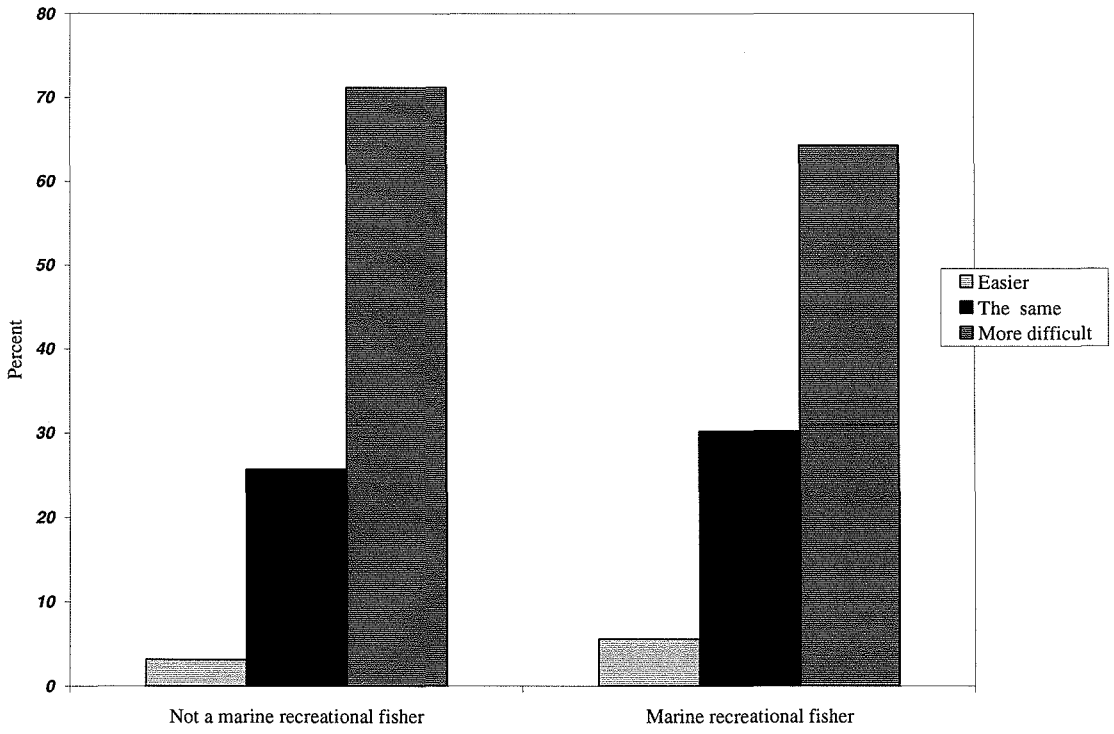


Figure 28. Change in fishing over the past 5 years by fisher or non-fisher.

Respondents who had considered catch rates to have changed were invited to identify the main cause of change (Figure 29). From the 350 responses, 46 categories could be separately identified, although for many of these there was only one respondent. Responses which equal or exceed 2% of the total responses to this question are plotted. This leaves nine categories and one ('other reasons') for the remaining 37 types of responses. Clearly the main causes associated with the perceived negative change to fishing are associated with commercial fishing, overfishing from all sources and poaching. These three categories alone account for 73% of all responses.

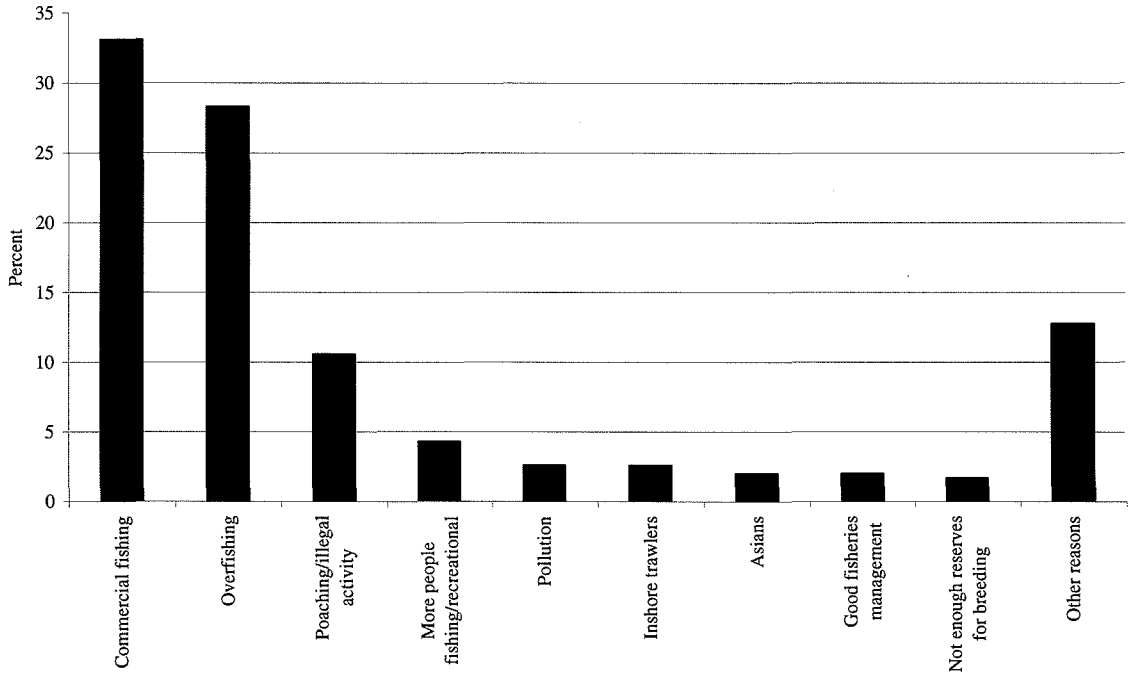


Figure 29. Perceived causes of marine recreational fish catch rate changes.

(e) Marine fishing licence purchase behaviours

A contingent behaviour question was used to model intended purchases of marine recreational fishing licences, subject to their introduction. The question was:

> "Imagine the government has just changed and the new administration has introduced a marine recreational fishing licence. Funds collected from licence sales are used to enable fishers to manage their own resources. Marine fishing licence holders elect a board that decides how to use licence fees to manage and improve recreational marine fisheries. Suppose the marine fishing licence cost **$X** per adult per year, **would you buy one?** Remember, it would be illegal to fish in the sea without a licence."

The cost of the licence ($X) was varied randomly across nine different amounts in the range $10 to $100, allowing prediction of the level of licence sales at different licence fees. Respondents could make one of four responses:

1. No, I wouldn't fish in the sea, so I wouldn't need a licence.
2. No, I wouldn't buy a licence, but I would still fish in the sea.
3. Yes, I would buy a licence.
4. Don't know.

Results

A total of 241 active recreational marine fishers gave useable responses to the fishing licence purchase question. Logit models were fitted to the data using maximum likelihood methods to model participation in the marine recreational fishery at different licence fee levels (Figure 30). Total participation is the sum of participation by licensed users, and by poachers (people who continue to fish but who do not purchase a licence). Total participation is important because it is the primary determinant of harvest and some fishery management costs. Licensed participation drives licence revenues.

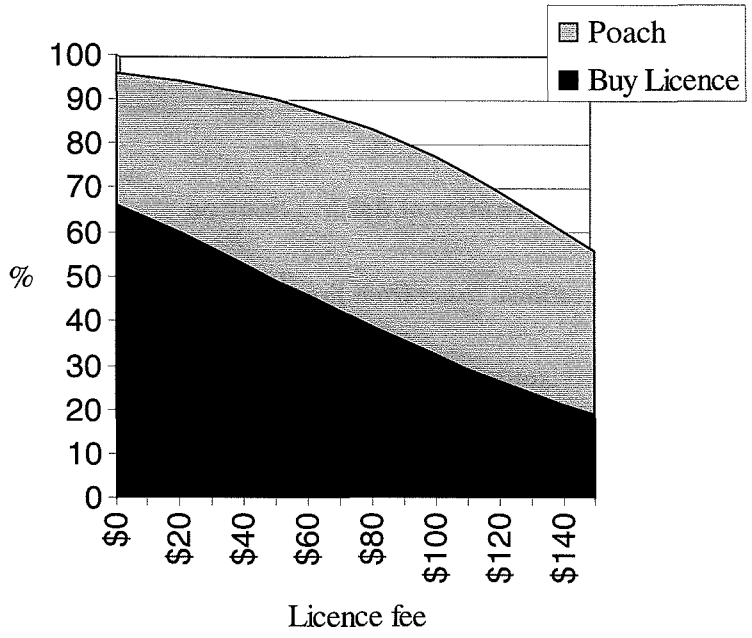


Figure 30. Response to marine recreational fishing licence.

As the price of the marine recreational fishing licence increases participation declines. At a price of $100 participation falls to about 77% of the present level. However, only about 32% of current fishers would purchase a licence if it cost $100, the remaining 45% choosing to poach. Because fishing licence purchases are expected to decline as the price of a licence increases, increased prices may ultimately result in decreased revenue. Maximum fishing licence revenue is expected to occur at a price of about $100 (Figure 31). A marine recreational fishing licence can raise a maximum of about $32 per fisher, which would result in total revenue generation in the order of $30 million per year for marine recreational fisheries management purposes.

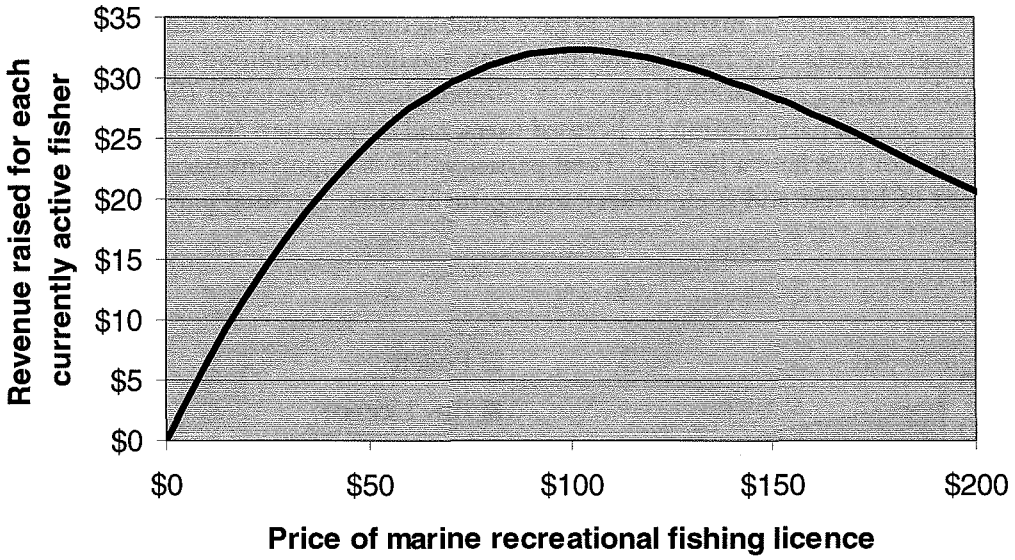


Figure 31. Revenue per current marine recreational fisher from licence sales.

(f) Management of the coastal-marine environment

Respondents were invited to give their opinion as to who should manage the New Zealand coastline. Ten choices were provided and respondents could tick as many boxes as they liked. The options were:

- No-one
- City and District Councils
- Ministry of Fisheries
- Regional Councils
- Department of Conservation
- Local user groups
- Local iwi
- Private ownership
- A new government department
- Don't know.

From the 795 responses there were 75 different selections provided, although many combinations had only one or very few responses. Figure 32 reports percentage responses for categories where a minimum of 25 responses was received. Thus, only nine separate categories are recorded, most of these representing selection of a single preferred agency by respondents. The largest category, representing about 32% of respondents, contains the remaining 66 categories that respondents selected.

Of the major categories examined:

- MFish was represented in 31.2% of responses;
- The Department of Conservation was represented in 37.9% of responses; and
- Regional Councils were represented in 13.7% of responses.

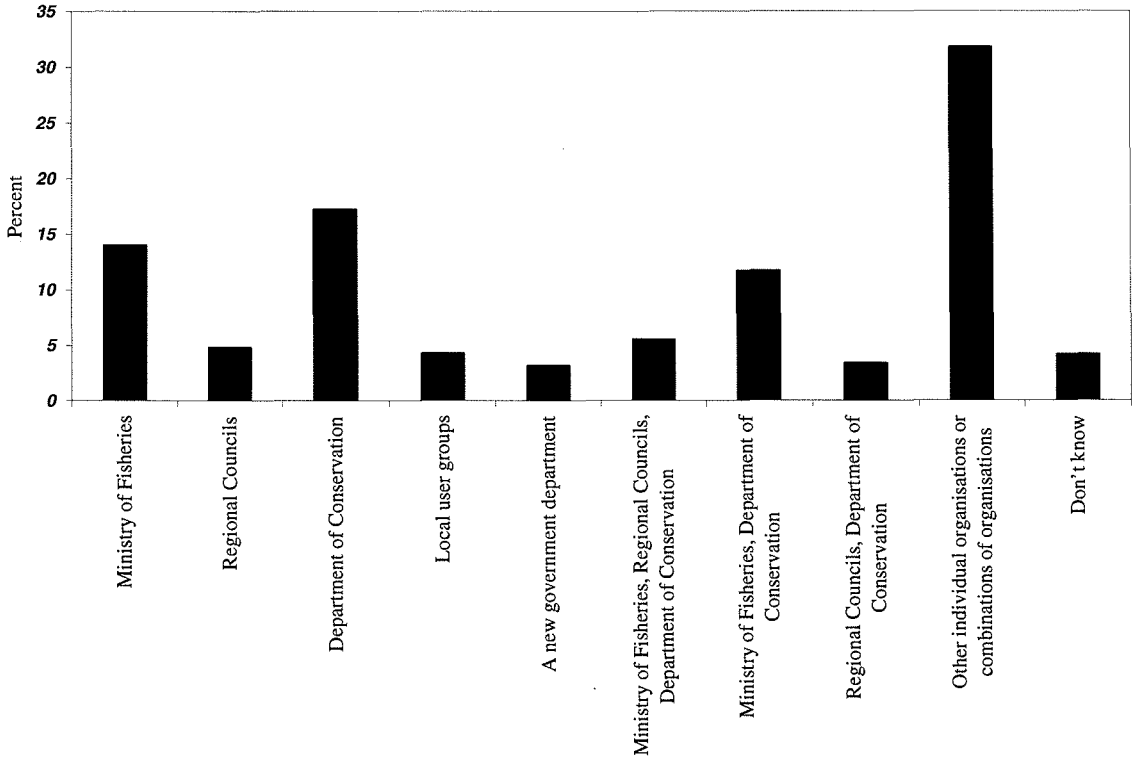


Figure 32. Preferences for management of the New Zealand coastline.

6. DISCUSSION AND CONCLUSIONS

6.1. Survey representativeness

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. As with biophysical measures of SER, there are issues with representativeness of the data. The survey is not perfectly representative of the population at large, over representing the old, those with higher incomes, New Zealand Europeans and the better educated (see Appendix 1). The overall impact of sample bias is likely to be small. Extensive tests were conducted to identify differences in responses between demographic groups. These tests generally showed non-significant differences, the key exception being ethnicity. Often where differences are significant their magnitude is small. Given the large sample size, the high response rate and small margin of error, the results in this study provide an accurate representation of New Zealanders' perceptions of the environment. As with the 2000 survey, high numbers of respondents stated they lacked knowledge about some resources (soils, wetlands, marine reserves, oil and gas reserves), and their unwillingness to give uninformed responses should add credibility to the results presented.

6.2. Perceived state of the New Zealand environment

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

On average New Zealanders consider the state of their environment to be adequate to good. Many New Zealanders also still think the country is clean and green. While the environment overall, and the urban environment in particular, are thought of very highly, the same findings do not occur for a number of other resources. Notably the beach and coastal environment and marine fisheries, both commercial and recreational, are considered to have declined in condition in recent years.

Management of the New Zealand environment is not highly rated by survey respondents. From the environment issues questions (Table 7) respondents give the poorest ratings to management of farm effluent and runoff, and industrial impact on the environment. Questions about management of resources reveal that respondents rate management of air quality, coastal water and beaches and marine fisheries lowest. They give the lowest ratings for the change in management of air quality, soils and marine fisheries over the last five years.

Pests and weeds, dumping of solid wastes, farming, hazardous chemicals, sewage and stormwater are perceived to be significant causes of damage to many parts of the environment. It is notable that farming recorded significant increases as a cause of damage for nine out of ten resources examined.

Most New Zealanders report that they reduced or limited their use of electricity during the past year. Similarly, people commonly participate in other environmentally friendly actions. Those actions generally involve low cost or effort. In contrast, less than twenty percent of respondents restore or replant natural habitat, have taken part in consent hearings, or participated in an environmental organisation.

6.3. Inter survey comparisons

There are three notable exceptions to the generally high level of consistency in the responses to the two surveys.

Air

Responses to all air-related questions were increasingly negative (see Table 4), perhaps indicative of growing concern about pollution issues. Air quality/pollution was the single most important environmental issue identified (see Table 12). However, from the survey it is clear that New Zealanders nevertheless believe that air quality is good and management of air is deemed to be adequate. This view is consistent with the World Economic Forum (2002) finding that ranks New Zealand first of 142 nations in terms of air quality.

Water

The state of fresh water is generally viewed positively. Nevertheless there were large shifts toward attributing damage to fresh water to farming and to judging management of farm effluent and runoff to be worse. These views may reflect the increased public profile of water allocation issues, including for dairy farming. This concern is reflected in the desire to see increased expenditure on fresh waters which was ranked first in 2002 but only fourth in 2000.

Behaviours

There were two notable behavioural shifts. A vastly increased proportion of respondents in 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. 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. There is no obvious explanation for the commuting response. However, it mirrors a similar, unexplained outcome recorded by Environment Canterbury (Richard Ball, Environment Canterbury, pers. comm., 2002).

6.4. Coastal-marine issues

The 2002 survey included a one-off study into various aspects of the coastal-marine environment. This study complements the questions considered in the PSR part of the survey (see section 6.2). Respondents generally think the state of the coastal-marine environment is good, but in some questions there was a high 'don't know' response. Access to the coastline is considered very good and about 60% of people think the level of aquaculture is acceptable. The latter seems somewhat at odds with the prevailing political concern about the level of aquaculture development occurring in New Zealand.

Recreational fishing

About one third of respondents classified themselves as marine recreational fishers. Most people thought there were moderate to low fish numbers and that fishing is getting more difficult. It was notable that there was no significant difference between the views of recreational fishers and non-fishers.

There has been much debate over the past few years about marine recreational fishing licencing (see Joint NZRFC/MFish Working Group on Recreational Fishing Rights, 2001). Licencing has been dispensed with as a policy option by the Minister of Fisheries (Hodgson, 2001):

"As expected, licensing for marine recreational fishing has been roundly rejected by the fishing public. Licensing is contrary to Labour's election policy and I have no hesitation in ruling it out as an option for the future management of marine recreational fishing."

However, it is clear that despite considerable opposition, as shown in the survey responses, significant revenue would be generated from licence sales and could provide a significant boost for management of marine recreational fisheries.

6.5. Demographic analysis

Many responses were evaluated against a wide range of demographic variables with few significant responses. The notable exception was ethnicity (see sections 3.5 and 5.3 for example).

Clean and green

Most respondents agreed with the statement that New Zealand is 'clean and green'. However, it is clear that neither Maori nor New Zealand European are as convinced about this view as the 'other' ethnic group is. One possible explanation for this result is the 'other' ethnic group may contain a high proportion of relatively recent immigrants to New Zealand who judge that New Zealand is 'clean and green' compared to the environment in their source country. Further research is needed to determine if that is a valid explanation for the difference in view.

Water

Responses to many questions vary significantly by ethnicity of respondents. Probably the most important research finding from the 2002 survey is the notable influence of ethnicity on responses to water-related questions. For seven of nine factors studied there are significant differences in responses between ethnic groups. It appears, generally, that the 'other ethnicity' group have a relatively positive view of almost all water-related matters. This might be because many of these respondents were born outside New Zealand and their prior experience of fresh water has been somewhat negative. 'Other ethnicity' people includes, Pacific Island people, and Asians. There is some evidence that Asian people have differing attitudes toward environmental management than do New Zealand Europeans and Maori (MfE, 1997: section 2:9).

Conversely, Maori responses were often highly negative. Maori judge that water quality is lower, and management of water is worse than do New Zealand Europeans and 'other ethnicity' respondents, perhaps because Maori have particular affinities with water and their recent experiences with pollution are unsatisfactory. Maori recognition of the land and resources as taonga, and their concerns for guardianship (kaitiakitanga) might have adverse effects on New Zealand's environmental reputation. New Zealand Europeans tend to take a middle ground between the aforementioned groups. There were examples, however, where Maori and NZ European responses were similar, e.g., in terms of their adverse views of management of farm effluent and runoff. There are clear policy implications associated with Treaty obligations and related matters concerned with Resource Management Act and other policy implementation processes.

Age and responses

Age was also of interest, with some separation around the 40–49 age group. For example, while younger people tended to think there was a *moderate* amount of water available, those in the 50+ age groups considered there was a *high-moderate* amount of water. Similarly those in the 50+ group thought management of sewage was adequate (and often good), whereas younger respondents thought it was adequate to bad. Why this split should occur is unknown but may relate to a longer reference period for older people. Younger respondents have had less chance to observe

improvements in water management. It could also be caused by exposure of younger audiences to environmental education, or to different levels of exposure to, or use of, water bodies by different age groups.

6.6. Discussion of findings

Relative to many other countries it is probably true that the state of the New Zealand environment is adequate to good. However, relative to even a few decades ago the picture is much more complex. For example:

- the quantity and quality of fresh waters in many rural South Island streams and rivers has declined (NIWA, 2002);
- while threatened and endangered species management has improved, the numbers of species considered threatened has increased and habitat loss continues (DoC and MfE, 2000);
- air quality has declined in some areas (Statistics New Zealand, 2002); and
- the quality of water discharged into the coastal marine environment has probably improved (MfE, 1997).

It is not easy to make overall judgments about the state of the New Zealand environment and trends in the state. Respondents to the survey appear to be aware of some divergent trends and gave differing ratings to the state of separate parts of the environment, their management and changes in management quality. The experts also are equivocal, as evidenced by the very mixed signals reported in Statistics New Zealand (2002).

6.7. 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. 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 real environmental issues to the detriment of overall environmental quality.

Some examples of potential issues along these lines are:

- It is clear the public considers the state of marine fisheries is only *adequate*, getting *worse*, and that marine fisheries are *not well managed*. If these perceptions are not correct policy makers should inform the public of the facts. And, despite the Minister of Fisheries discounting licencing as a management option for marine recreational fisheries, it is clear from the results from this research that this option deserves reconsideration.
- There is a clear perception that air quality is worsening. Policy makers need to react positively to some of the long running issues in this area and ensure that air quality is perceived to be improving.
- Generally speaking farming comes out negatively in this survey. The public give a very low rating to management of farm effluent and runoff and farming is perceived as an increasing threat to many resources. Policy makers should consider whether new policies are needed to combat these problems.
- The recent effort to monitor progress towards a sustainable New Zealand (Statistics New Zealand, 2002) does not include any perceptions information. Future development of the Environmental Perceptions survey might be able to more explicitly consider people's perceptions of sustainability and therefore contribute to such progress monitoring.

6.8. Concluding remarks in relation to the 'clean green' image and trade

Kiwis' perceptions of and pride in their environment are likely to be communicated to current and potential visitors and trade partners. Consequently, for New Zealand to maintain its international reputation of a 'clean green' environment it would appear important that New Zealanders retain the same view. The critical importance of perceptions of New Zealand's 'clean green' environment to overseas purchasers of our products has already been shown (Thornton et al., 2001). Our data indicate perceptions of a worsening environment and a growing level of interest in the impact of farming on natural resources. If these trends continue, then in time there could be spillover effects on international trade. Given that both tourism and farming, e.g., viticulture, horticulture and aquaculture, obtain premiums based on the 'clean green' image, then politicians and policy makers should consider undertaking actions to enhance environmental management in order to buttress environmental quality. The fact that respondents want more spent on water and conservation and the environment is a signal that the New Zealand public thinks so too.

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APPENDIX 1. SURVEY REPRESENTATIVENESS

The following analysis compares 2002 survey demographic data with comparable data from the 2002 census of New Zealand. Note that in some situations the populations are different in terms of the distributions recorded, 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. The Chi square test is used to test for differences between the two sets of distributions.

Gender

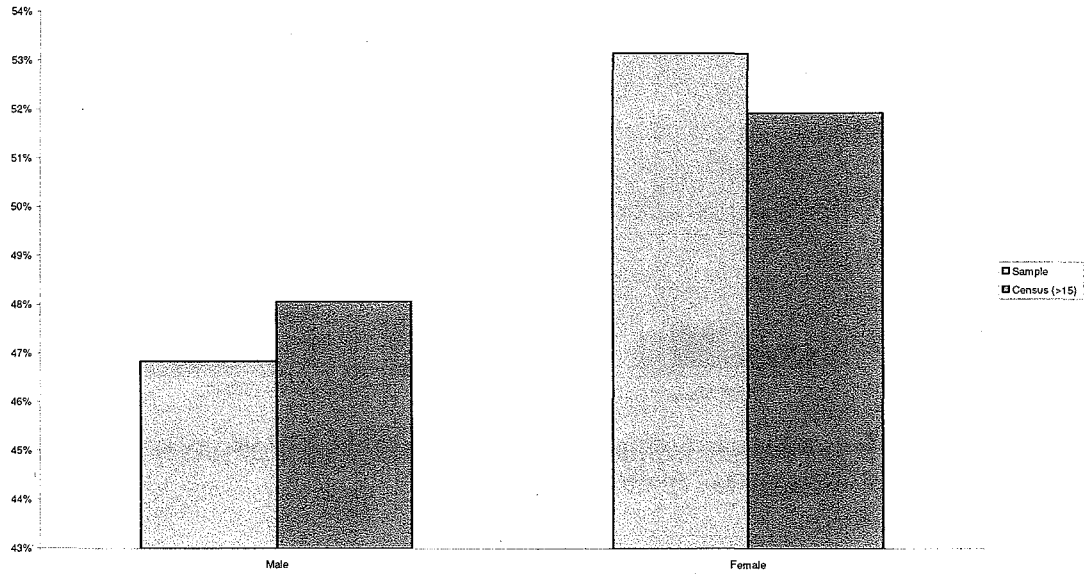

Figure a. Distribution of respondents according to *gender* between the 2002 survey and the 2001 census of all New Zealanders aged 15 or over.

Ethnicity

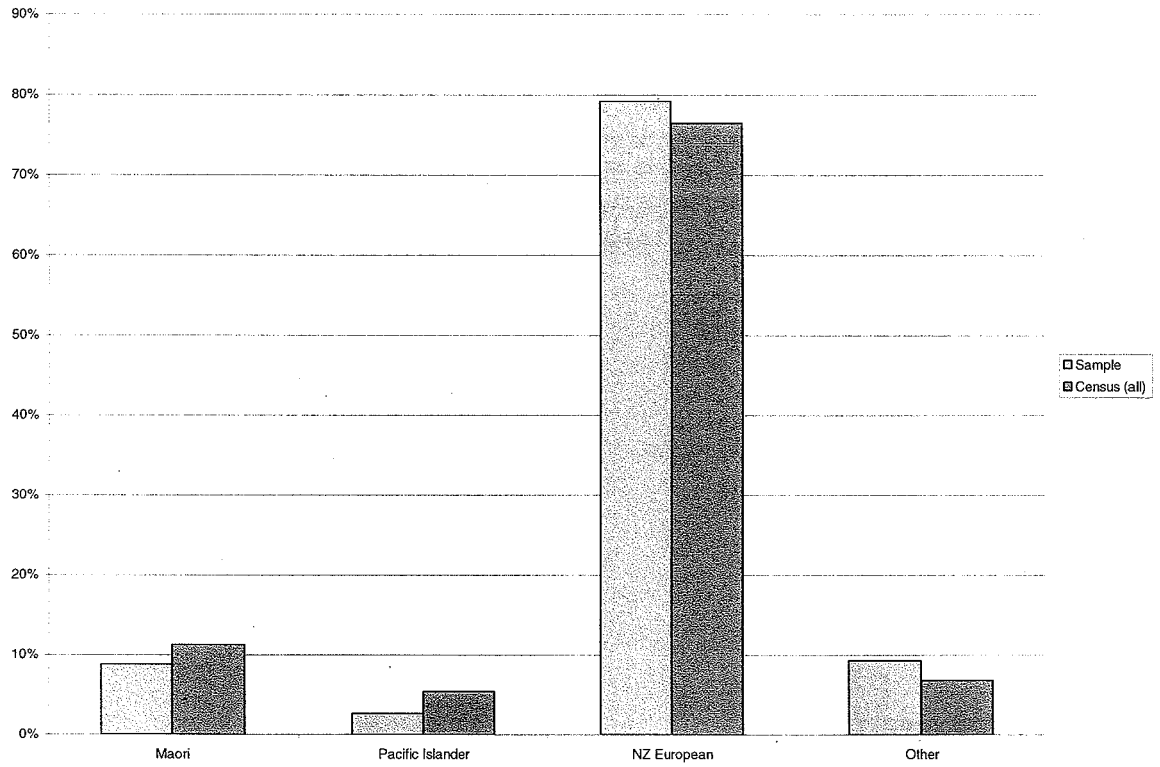

Figure b. Distribution of respondents according to *ethnicity* between the 2002 survey and the 2001 census of all New Zealanders ($P < 0.001$).

Age

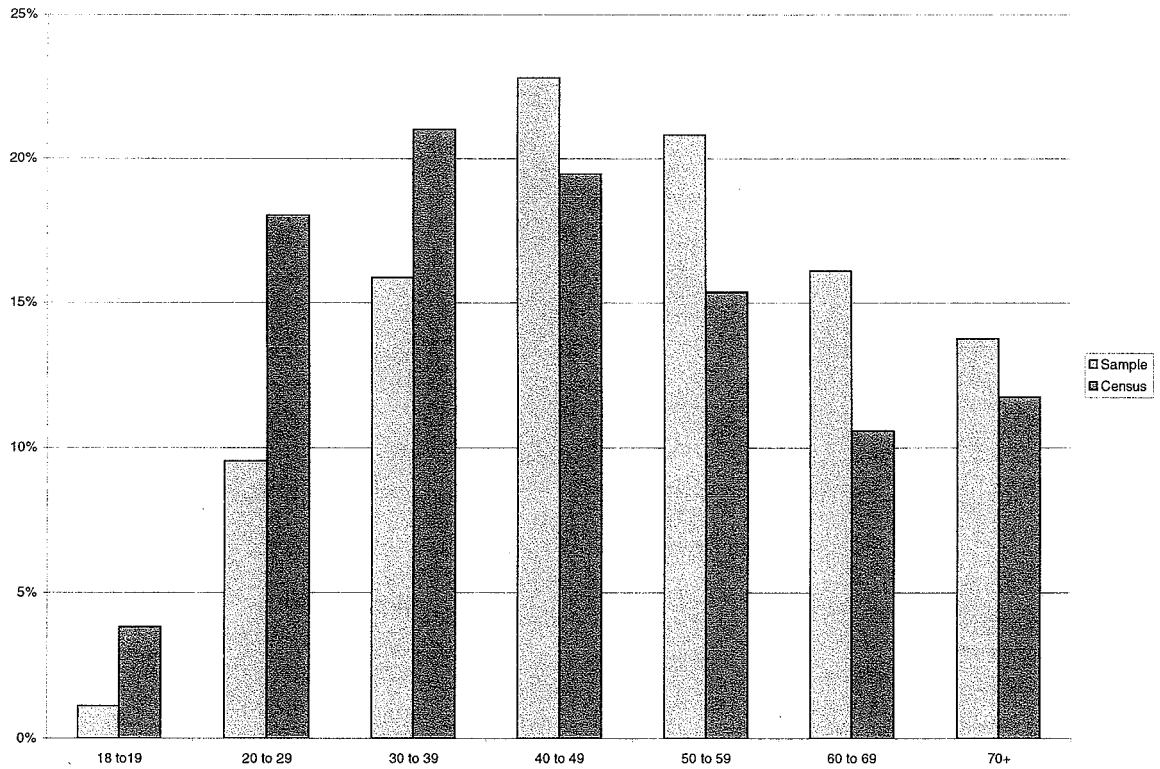

Figure c. Distribution of respondents according to *age* between the 2002 survey and the 2001 census of all New Zealanders aged 15 or over ($P < 0.001$).

Income

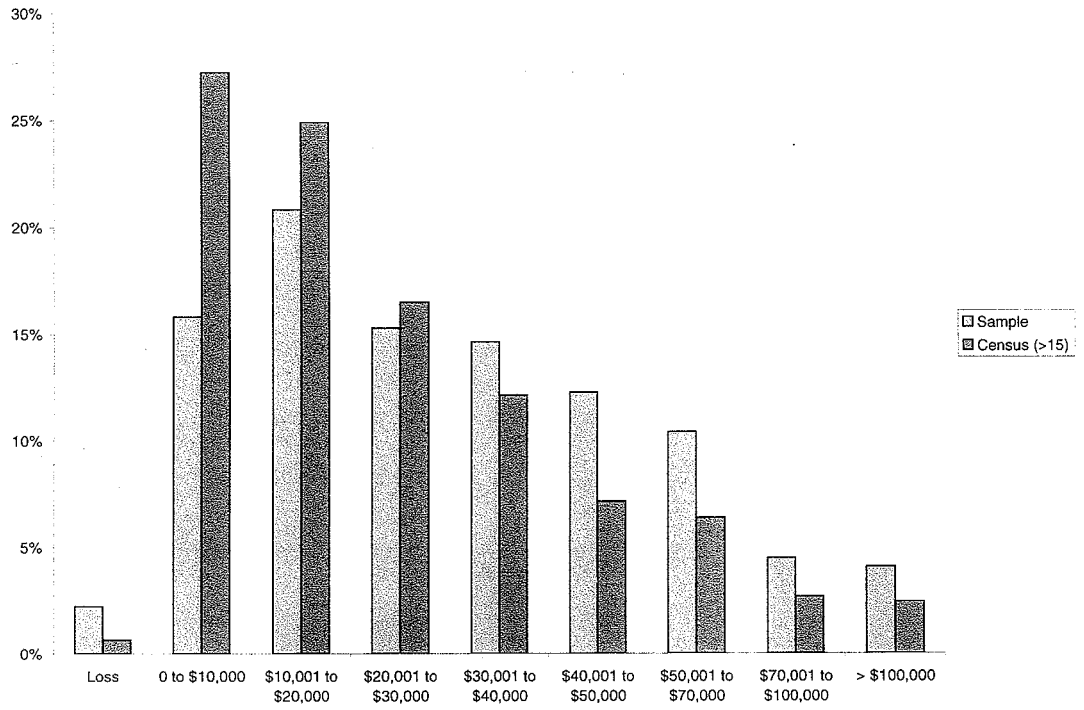

Figure d. Distribution of respondents according to *income* between the 2002 survey and the 2001 census of all New Zealanders aged 15 or over ($P < 0.001$).

Employment

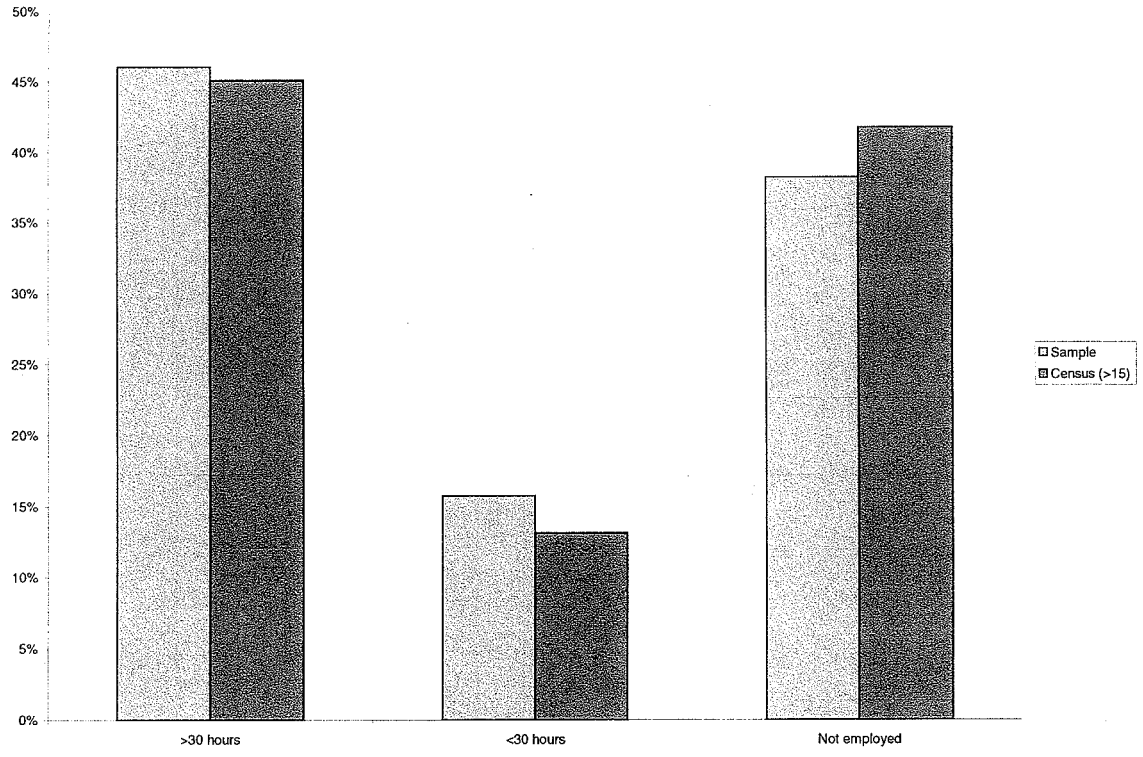

Figure e. Distribution of respondents according to *employment* between the 2002 survey and the 2001 census of all New Zealanders aged 15 or over ($P < 0.05$).

Education

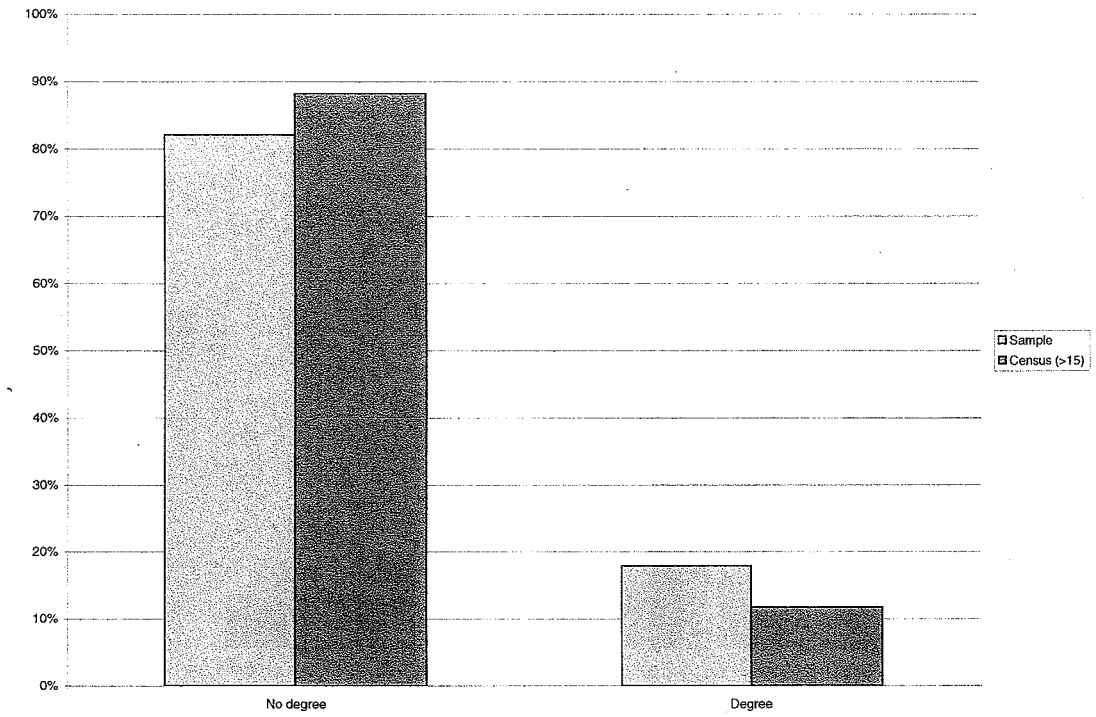

Figure f. Distribution of respondents according to *education* between the 2002 survey and the 2001 census of all New Zealanders aged 15 or over ($P < 0.05$).