PUBLIC PERCEPTIONS OF NEW ZEALAND'S ENVIRONMENT: 2013

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

2013

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SUMMARY

The seventh (having begun in 2000) survey of people's perceptions of the state of the New Zealand environment was undertaken over February-March 2013. The survey is based on the Pressure-State-Response (PSR) model of environmental reporting and remains the only long-running survey of this type in the world. For the first time this survey was undertaken only electronically and this has made it challenging to compare results with the earlier paper-based surveys.

New Zealanders' perceptions of all the main resource areas (e.g., air, freshwater, biodiversity) were tested. Statistical analyses identified the roles of several socio-demographic variables.

Amongst many PSR findings, some that are notable include:

▪ New Zealanders continue to consider the state and management of the New Zealand environment to be good, and better than other developed countries;

▪ The states of air and native bush and forests were rated highest – rivers and lakes, and marine fisheries were perceived to be in the worst state;

▪ Management of all components of the environment was considered to be adequate to good, with national parks rated the highest. Rivers and lakes, and groundwater were judged to be the worst managed environments;

▪ Management of farm effluent and runoff continued to be perceived very negatively;

▪ Farming is perceived to be one of the three main causes of damage to freshwater by over half the respondents and was considered an important cause of damage to several other resources too; and

▪ Water related issues were rated as the most important environmental issue facing New Zealand, while greenhouse gas emissions/climate change was the most commonly identified global issue.

In the first national level survey to explore perceptions of the state and management of whitebait respondents expressed concern about whitebait conservation. Shared contributions to habitat restoration were preferred, but with emphasis on user pays (a whitebait licence contribution) and exacerbater pays. Whitebait catch management is also an issue – whitebaiters (2.7% of respondents) and non-whitebaiters (although in significantly different proportions) favoured a daily catch limit, shortening the season, and banning traps in nets as preferred catch reduction methods. These insights give policy makers an opportunity to further explore options for whitebait management.

A second case study examined the importance and symbolism of a range of native and introduced animal species in New Zealand. Three broad groups of animals were identified. The most important and symbolic of New Zealand were native species (but also including trout). The smaller pest species, including Canada goose, wasp and feral cat, were judged to be of lowest importance and symbolism. Of particular note is the status of trout, by far the most highly regarded of the introduced species, sitting amongst the native species, albeit at the lower end (between giant weta and bat). The 'big four' game animals sit between the native and 'pest' species, reflecting contemporary debate about whether they are a pest or a resource.

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ACKNOWLEDGEMENTS

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

JACK PEZZEY

Punga
ROSS CULLEN

INTRODUCTION

1.1 BACKGROUND

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

The 2000 postal survey (Hughey *et al.* 2001) was designed to be undertaken biennially and subsequent surveys were undertaken in 2002, 2004, 2006, 2008 and 2010 (Hughey *et al.* 2002a, 2004, 2006, 2008, 2010). Some findings from the 2006 survey were included in the 2007 OECD *Environmental Performance Reviews – New Zealand* report (OECD 2007).

Following the 2010 survey the principal researchers reviewed the results and lessons learnt from the six prior surveys. They found a consistent pattern of results and thus resolved to change the survey to a triennial cycle. This publication thus reports the results of the seventh (formerly biennial and now triennial) environmental survey, undertaken in 2013, and includes a comparison with previous survey findings. As signalled in 2010, this survey was undertaken electronically, whereas previous surveys were administered via postal hard copy questionnaires (although a companion electronic survey was undertaken in 2010). This change has significant implications for ongoing trend analysis – these implications are detailed broadly in chapter 2 and specifically as required in chapter 3.

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 triennially, to measure and monitor New Zealanders' environmental attitudes, perceptions, and preferences;

- To report triennially, via a published report and other research publications, on findings from the research;

- Provide independent commentary on environmental issues of public concern as a contribution to public debate and a means of alerting government and others to these issues; and

- Provide opportunities for organisations and other researchers to derive one-off research data for individual areas of interest, including teaching purposes.

Riparian planting, Te Waihora/Lake Ellesmere tributary stream
KEN HUGHEY

02

SURVEY METHOD

An electronic questionnaire based on the Pressure-State-Response (PSR) model and previous surveys in this series was used to gather information on New Zealanders' perceptions of the environment and environmental management. In 2010 an electronic survey was introduced to complement the postal survey; in 2013 only an electronic survey instrument was used. The electronic survey was selected as the best method of gathering PSR information. The large number of questions deemed a telephone survey unsuitable and interviews would have been too expensive and cumbersome for adequately sampling the New Zealand population; likewise, the ongoing postal surveys were becoming administratively burdensome and overly expensive.

There are implications from changing to the electronic survey. The major implications are in three areas, and are of most concern for the PSR data and analyses. First, and perhaps of greatest concern, there appear to be differences in attitudes to the environment of the e-survey sample compared to those of the randomly drawn postal survey samples used in the past, i.e., the e-survey sample appears 'greener' and more pessimistic. This difference in attitude was first observed in 2010 when scores for almost all PSR Likert scale questions were lower (albeit non-significantly) than the postal survey responses. The second implication relates to issues around the extent to which the demographics of the e-survey respondents match postal survey respondent characteristics and those of the New Zealand population generally – this issue is addressed in detail in the final paragraph of section 2.1. The combination of these concerns raises the question about whether or not the e-survey data can be added to the postal survey data collected since 2000 and subjected to the same statistical trend analyses as previously undertaken. This is an important question – we have decided that it is appropriate to report the trend data in descriptive form, e.g., graphically, but not to analyse it statistically.

2.1   THE 2013 QUESTIONNAIRE

The electronic survey contained the same core set of questions as the earlier surveys and two new case studies (see Appendix 1). A letter of introduction stated the purpose of the questionnaire, introduced the questionnaire topics and invited voluntary participation. There were 162 questions, asked in sets.

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

Further questions supplemented the PSR framework.

Respondents were asked what were the most important environmental issues facing New Zealand and also the world today and why these issues were chosen.

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

Knowledge, Standard of Living and 'Clean Green'

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

The State of the Environment

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

The first question set was preceded by the instruction:

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

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

Adequacy of Environmental Management

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

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

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

Pressures on the Environment

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

Participation in Environmental Activities

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

Environmental Issues

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

Freshwater Fish, Especially Native Fish and their Management

In 2006 a case study was undertaken on exotic species freshwater angling, primarily about trout and salmon. In the 2013 survey we concentrated on native fish and fisheries, although our first question in this set sought to identify those respondents who fished for exotic fish species to determine the overlap with those fishing also for native fish, and for other relevant analyses.

The first set of native fish questions sought to determine the proportions of respondents fishing for flounder, eels and whitebait. Subsequent questions in this set then dealt with whitebait fishing effort and preferred fishing regions. The second set of questions concerned the conservation status of whitebait stocks, key impacts on whitebait, and options for future management of whitebait stocks including who should pay for this management.

Importance and Symbolism of Animals in New Zealand

Fraser (2001) reported on the relative importance and symbolism of a range of indigenous and exotic animals in New Zealand. In this survey we included two sets of questions that addressed similar issues: the first concerned the relative importance for New Zealand to have healthy numbers or populations in the wild of a wide range of animals; respondents were then asked, for the same animals, to consider how much of a positive symbol of New Zealand each is.

Demographic Information and Representativeness

Information was sought regarding gender, number of household members, age, country of birth, ethnicity, residential region, rural or urban residence, education, current situation (e.g., student, retired or in paid employment), the industry the person worked in or had last worked in, occupation and personal income. Where possible these were measured using categories closely corresponding to data categories reported in the New Zealand Census. Key demographic information for the 2013 survey is provided in Appendix 2. In the 2000, 2002 and 2004 surveys, numbering of each survey allowed identification of respondents' residential locations, which were subsequently categorised into three regions: Northern, representing north of the Bombay Hills; Central being the rest of the North Island; and Southern being the South Island. In the 2006 survey a specific question enabled respondents to identify which regional council area they lived in, with subsequent tabulation allowing Northern, Central, and Southern 'mega' regions to be identified. This change was retained for subsequent surveys.

To assess representativeness of the survey sample it was compared with currently available official statistics (Statistics NZ 2012). The following key points can be drawn about where the e-survey sample differs from NZ population-level data:

- Household size: the e-survey is over-represented by those with only 1–2 in the household;

- Country born in: the e-survey is over-represented by those born in the UK (10.6% of respondents cf 6.6% of the population);

- Ethnicity: the e-survey

  - Under-represents Maori (6.4% of respondents cf 12.6% of population);

  - It over-represents NZ European (88.6% cf 75.1% of the population);

  - It under-represents Pacific Islanders (2.1% cf 6.4% of the population) and Asian respondents (2.9% cf 10.3% of the population);

  Note that the Census participants can select more than one ethnicity, hence totals can add to more than 100%.

- Towns and cities: the e-survey under-represents those from large towns or cities of more than 30,000 people (60.9% cf 72.4% of the population);

- Education: the e-survey over-represents those with tertiary education (33.8% cf 19.7% of the population).

Some of these differences are 'significant' – one option was to weight the responses to correct for the differences. We chose not to weight as we had not done so for the previous postal surveys and to introduce weighting now would be a major change to data treatment. Despite the difference of these distributions from the 2012 Statistics NZ data, the large sample is judged to be an adequate basis for making comment on respondents' views about the environment. Ongoing sampling in the same manner will provide a valid indicator of changes in environmental perceptions for the population represented by survey respondents.

2.2 PRE-TESTING

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

2.3 METHODS OF ANALYSIS

Descriptive data from the survey are provided in Section 3, along with a descriptive, mainly graphical, comparison of 2013 survey results with those from previous surveys. Relationships between selected PSR framework components and demographics for the 2013 survey are also presented in Section 3. Chi-squared tests (χ^2) were used to test for variations in responses. Data aggregation was necessary in some areas because there were too few valid responses to enable robust tests to be applied. Due to the very large number of relationships tested, in general only summarised results for significant relationships (P<0.05 or greater) are reported. Significance of differences in means and proportions are assessed using t-tests throughout.

2.4 DISTRIBUTION

The survey was administered under contract by Horizon Research. They maintain a database of around 7000 volunteers who are on email – the database was open for electronic survey responses over the period 26 February-31 March 2013. All responses were recorded automatically by Horizon Research. Anonymity was assured.

2.5   RESPONSE

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

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

There were 2477 responses to the electronic survey in 2010, and 2200 in 2013, for which the response rates are unknown.

All surveys had maximum margins of error of 3% at the 95% confidence level.

2.6   MAJOR CHANGES IN THE 2013 SURVEY

In summary the following changes and additions have been made from the 2010 survey:

- In 2013 only an electronic survey was undertaken

- Whereas the major case study in 2010 addressed fresh water, in 2013 it concerned native freshwater fish.

Chionochloa

ROSS CULLEN

Sinclair Wetland, South Otago
ROSS CULLEN

PRESSURE-STATE-RESPONSE ANALYSIS BY QUESTION

03

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

The 2013 Survey

This section reports findings grouped by question type, which provides the clearest depiction of the relative evaluations of different environments. Chapter 4 presents an overview of all results for each environment. Appendix 3 reports data for each of the items addressed in this chapter. Note that for 2010 both the postal and e-survey data are reported. Also note that while trend data are reported graphically there is no statistical analysis due to the change in survey type – this situation will of course change when the third set of e-survey data are available.

Most people considered their environmental knowledge to be 'adequate' (49.9%) or 'good' (32.7%, Figure 3.1). The vast majority considered the standard of living in New Zealand to be 'good' or 'adequate' (77.8%, Figure 3.2). The state of the New Zealand environment is considered to be 'adequate' to 'good' (72.8%, Figure 3.3). Around 36% of respondents either 'strongly agreed' or 'agreed', or 'strongly disagreed' or 'disagreed' with the statement that New Zealand's environment is 'clean and green' (Figure 3.4).
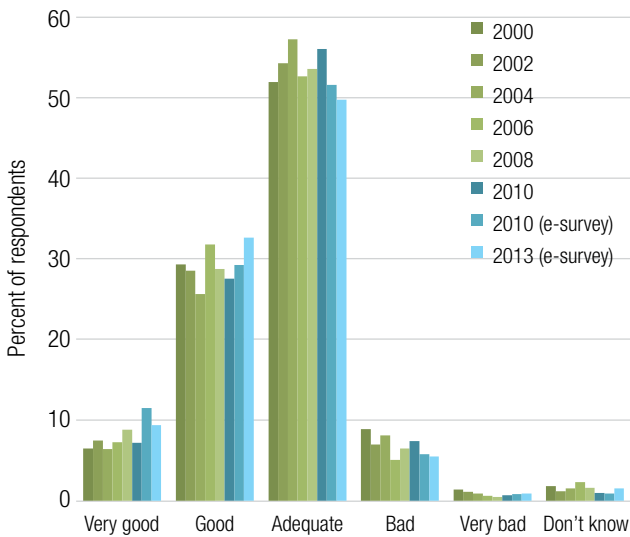
Figure 3.1. Knowledge of environmental issues.
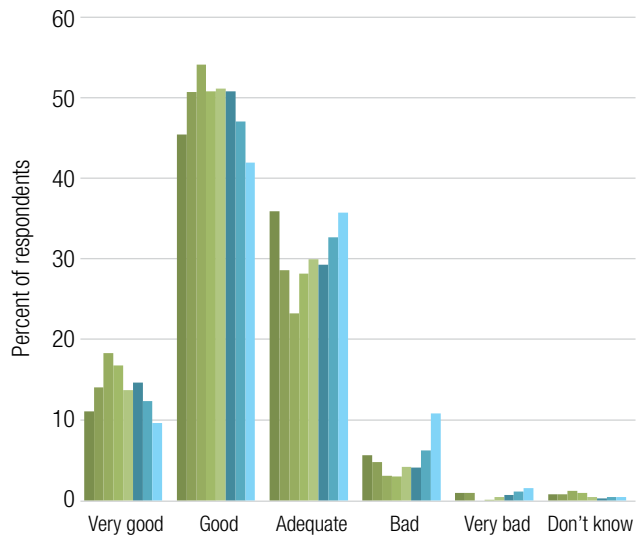
Figure 3.2. Standard of living in New Zealand.
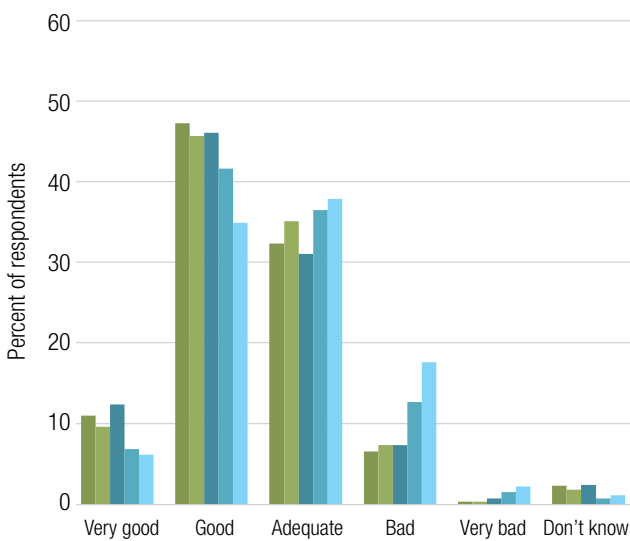
Figure 3.3. State of New Zealand's natural environment.
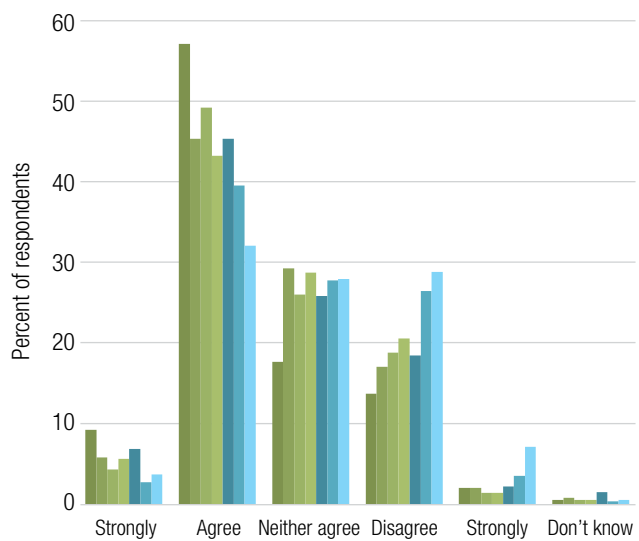
Figure 3.4. New Zealand's environment is 'clean and green'.

3.2   THE STATE OF THE ENVIRONMENT

3.2.1   QUALITY OF THE NEW ZEALAND ENVIRONMENT

The 2013 Survey

The quality of the New Zealand environment was measured on five-point Likert scales ranging from 'very good' to 'very bad'. Figure 3.5 shows that respondents generally rated the state of the New Zealand environment to be 'good' or 'adequate'. However, New Zealand's natural environment was rated to be 'good' or 'very good' when compared with other developed nations. In 2013 three specific resources (air – 55.7%, native bush and forests – 55%, and natural environment in towns and cities – 65.2%) scored very positively, with mean Likert scores of 3.56, 3.54 and 3.86 respectively. Rivers and lakes were considered to be in the worst condition (mean score = 2.80, with 41% of respondents rating them as 'bad' or 'very bad'. Wetlands, marine fisheries and groundwater received the largest number of 'don't know' responses (ranging from around 6 to 9% of responses).

Trends 2000–2013

Figure 3.6(a-d) shows mean Likert scores for 11 environmental aspects, including nine that have been included in all six surveys. Note there are two parts to each of the trend lines – the 2000–2010 postal survey data (solid lines); and the 2010–2013 e-survey data (dashed lines). Commentary can only be provided for the 2000–2010 postal data since there are only two e-survey data points. Most aspects showed an improvement in perceived quality from 2000 to 2002, then a decline or a relatively static position from 2002 to 2010.

The state of New Zealand's environment compared to other developed countries received the best rating each
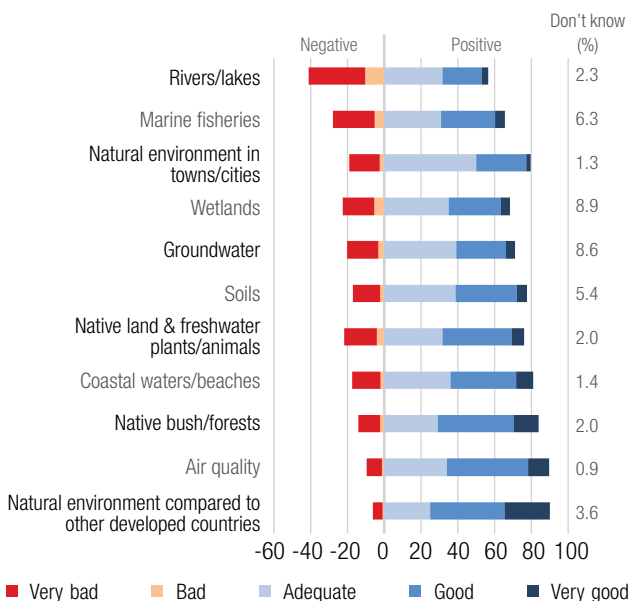
Figure 3.5. Perceived state of the environment.

a. Physical resources: Air, Soils, Rivers and lakes, Groundwater, Wetlands
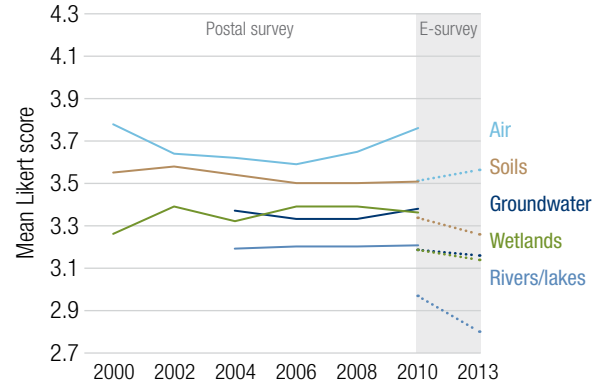
b. Biodiversity related: Natural environment in towns and cities, Native land and freshwater plants and animals, Native bush and forests
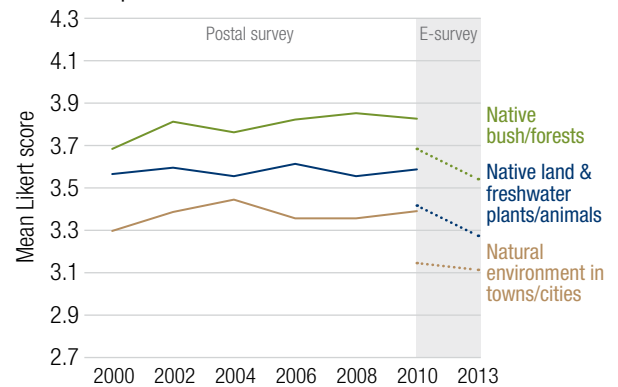
c. Marine related: Coastal waters and beaches, Marine fisheries
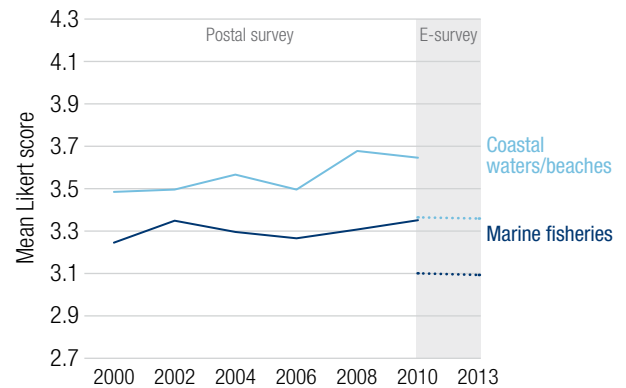
d. Other: NZ's natural environment compared to other developed countries
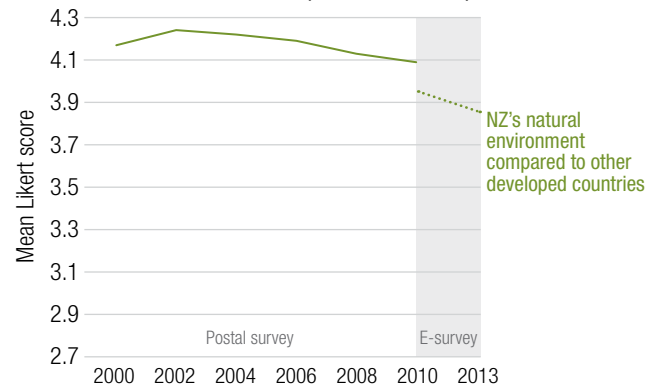
Figure 3.6. Trends in perceived state of the environment
(Scale: 1 = very bad, 2 = bad, 3 = adequate, 4 = good, 5 = very good).

year despite a small decline since 2002, with a mean value between 'good' and 'very good'. All other environmental aspects were rated as 'adequate' or 'good', with native bush and air quality receiving slightly higher ratings, and marine fisheries and wetlands receiving lower ratings. Rivers and lakes, measured as a combined resource from 2004 to 2013, received the lowest ratings.

3.2.2   RESOURCE AVAILABILITY

The 2013 Survey

Respondents' assessments of New Zealand resource availability are shown in Figure 3.7. The lowest availability rating was for reserves of oil and gas (Mean Likert score 2.84), with around a quarter of respondents rating availability as 'very low' or 'low'. Area of marine reserves, area of wetlands, and amount of freshwater in rivers and lakes also received mean Likert scores of 3 or less with around a quarter of respondents rating availability as 'very low' or 'low'. The area of national parks had the highest rating (mean score = 3.57), with 53.2% of respondents rating it 'high' or 'very high'. The availability of parks and reserves in towns and cities, the diversity of native land and fresh water plants and animals, the amount of native bush and forests, and the amount of fresh water in rivers and lakes were also rated 'high' or 'moderate'. Several resources received a high number of 'don't know' responses, especially reserves of oil and gas (23.2%) and area of wetlands (11.3%).

Trends 2000–2013

Figure 3.8 shows mean Likert scores for the eight natural resources that were included in all six surveys, and the two additional resources included only from 2004 to 2013. Note there are two parts to each of the trend lines – the 2000–2010 postal survey data (solid lines); and the 2010–2013 e-survey data (dashed lines). Commentary can only be provided for the 2000–2010 postal data since there are only
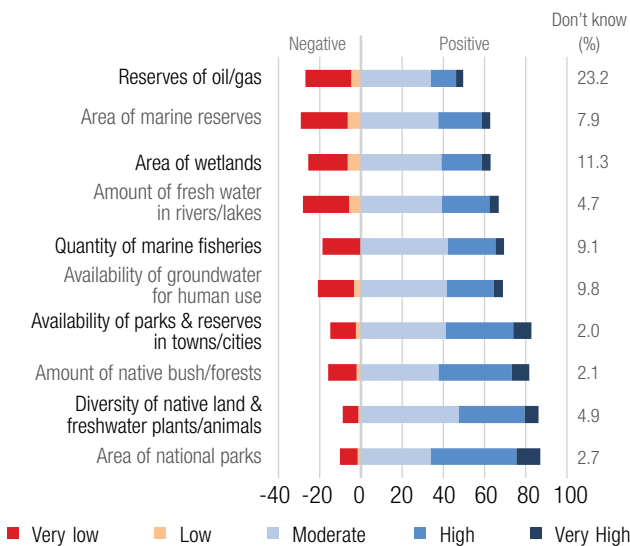
Figure 3.7.   Perceived availability of natural resources.

a. Biodiversity related: Diversity of native land and freshwater plants and animals, Amount of native bush and forests, Area of national parks, Availability of parks and reserves in towns and cities
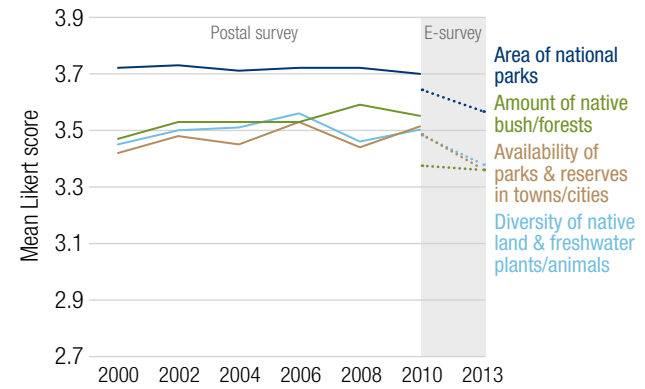
b. Marine related: Quantity of marine fisheries, Area of marine reserves
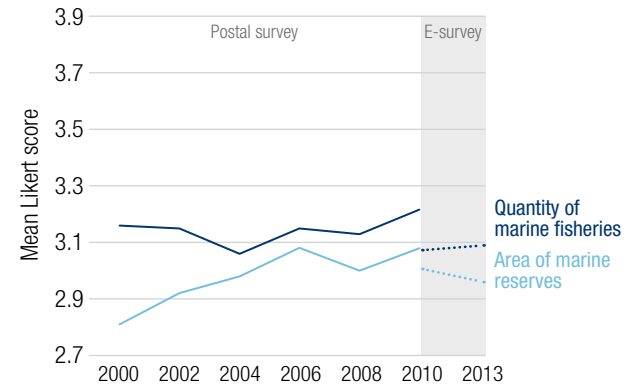
c. Freshwater related: Amount of freshwater in rivers and lakes, Availability of groundwater for human use, Area of wetlands
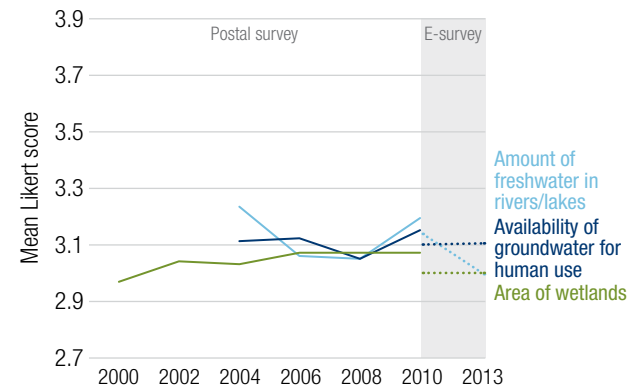
d. Other: Reserves of oil and gas
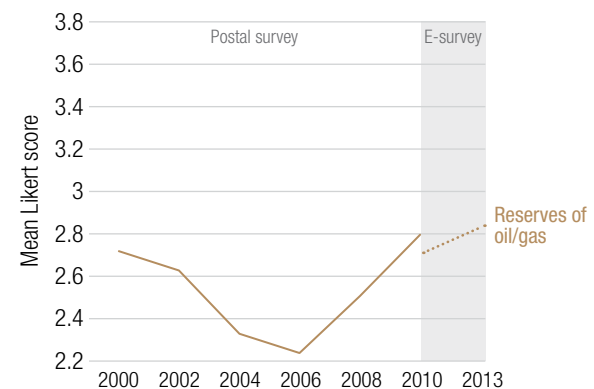
Figure 3.8(a-d).   Trends in perceived availability of natural resources.

two e-survey data points. Perceptions on the reserves of oil and gas changed appreciably between 2006 and 2010, with an overall improvement occurring (p<0.001). Ratings of the area of marine reserves retain a significant improving trend (p<0.001) over that time period despite a slight decline in 2008.

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

3.3 MANAGEMENT OF THE ENVIRONMENT

3.3.1 MANAGEMENT OF ENVIRONMENTAL ACTIVITIES

The 2013 Survey

Survey respondents were asked to evaluate the management of six items on a five-point Likert scale that ranged from 'very good' to 'very bad' (Figure 3.9). A high percentage of respondents thought that the management of farm effluent and runoff (64.3%) was 'bad' or 'very bad' (mean Likert score = 2.16). Only management of sewage disposal achieved a combined 'good' or 'very good' management rating above 20% (20.9%). Hazardous chemicals use and disposal had the largest 'don't know' response (14.1%).

Trends 2000–2013

In 2008, for the first time over the survey period the mean rating of quality of management activities rose above adequate for two activities, namely pest and weed control, and sewage disposal – these ratings were retained in 2010.
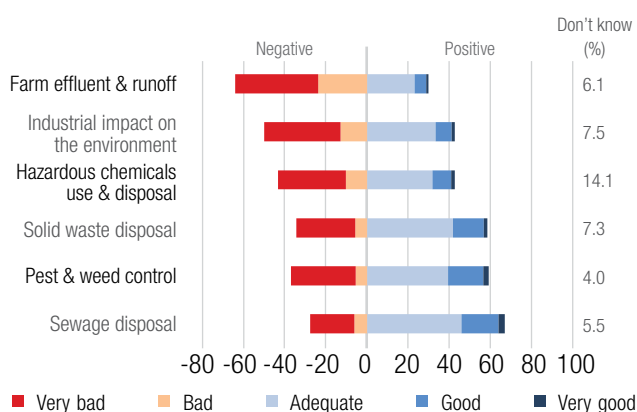
Figure 3.9. Perceived quality of management activities.

Note with the inclusion of the 2013 data there are two parts to each of the trend lines – the 2000–2010 postal survey data (solid lines); and the 2010–2013 e-survey data (dashed lines). Commentary can only be provided for the 2000–2010 postal data since there are only two e-survey data points. However, Figure 3.10(a–f) also shows continued improvement in people's rating of the management of solid waste disposal and (for 2002–2010) industrial impact on the environment. The exception was the management of farm effluent and runoff, for which the rating was much worse in 2002 than in 2000, but showed a slight improvement in 2004 and again in 2006, before once again declining in 2008 and still further in 2010.

3.3.2. CURRENT MANAGEMENT OF THE ENVIRONMENT

The 2013 Survey

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

Trends 2000–2013

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

The most evident emergent trend over the six postal surveys until 2010, for all resources examined, is the virtually uninterrupted perceptions of improved management. The biggest perceived changes for most resources occurred between 2004 and 2006.

3.4 MAIN CAUSES OF DAMAGE TO THE ENVIRONMENT

The 2013 Survey

Respondents were instructed to select what they considered to be the main causes of damage from a list of 15 items for ten components of the environment. They could select up to three causes for each environmental component. The responses for each component are shown in Table 3.1. Colour coding helps to interpret the table, with red highlighted cells signifying the most frequently cited cause of damage to

a. Pest and weed control
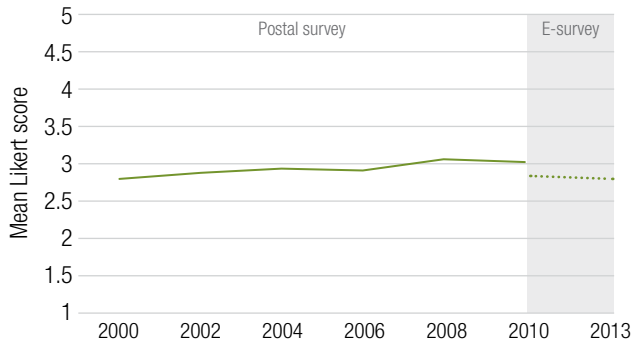
b. Solid waste disposal
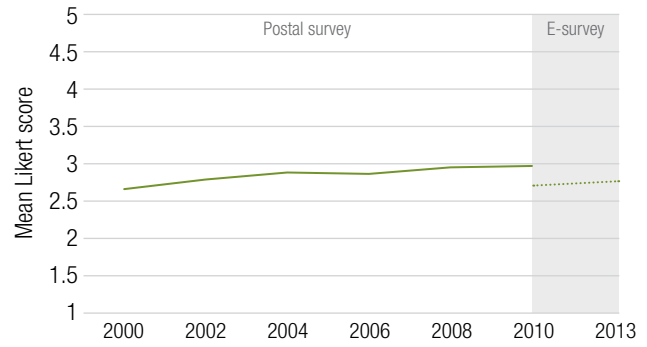
c. Sewage disposal
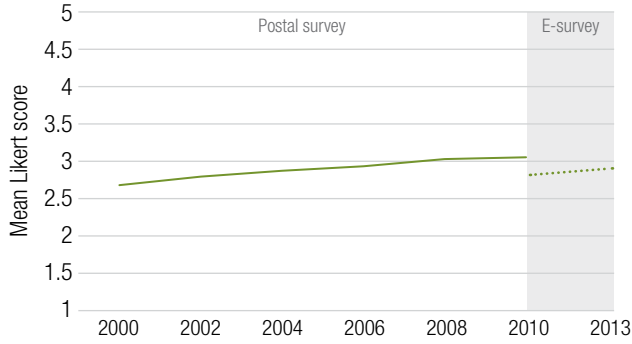
d. Farm effluent and runoff
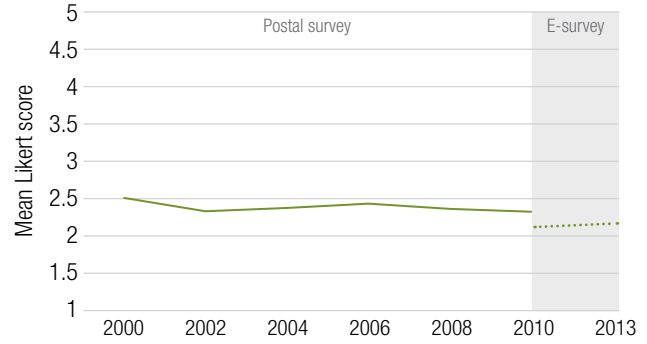
e. Hazardous chemicals use and disposal
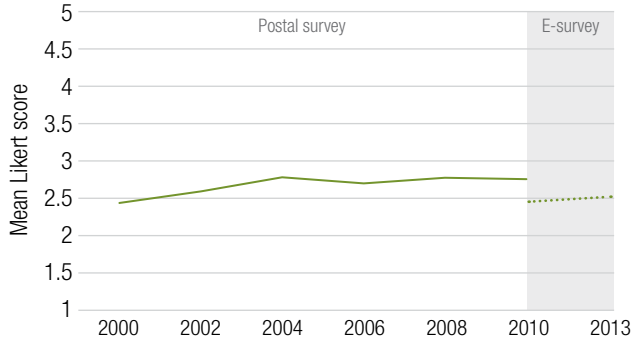
f. Industrial impact on the environment
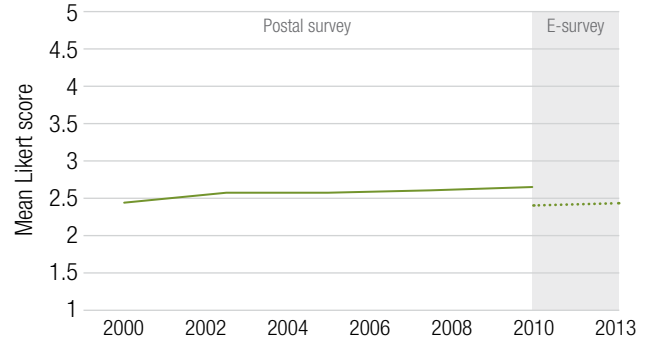
**Figure 3.10(a–f).** Trends in perceived quality of management activities (Scale: 1 = very bad, 2 = bad, 3 = adequate, 4 = good, 5 = very good).
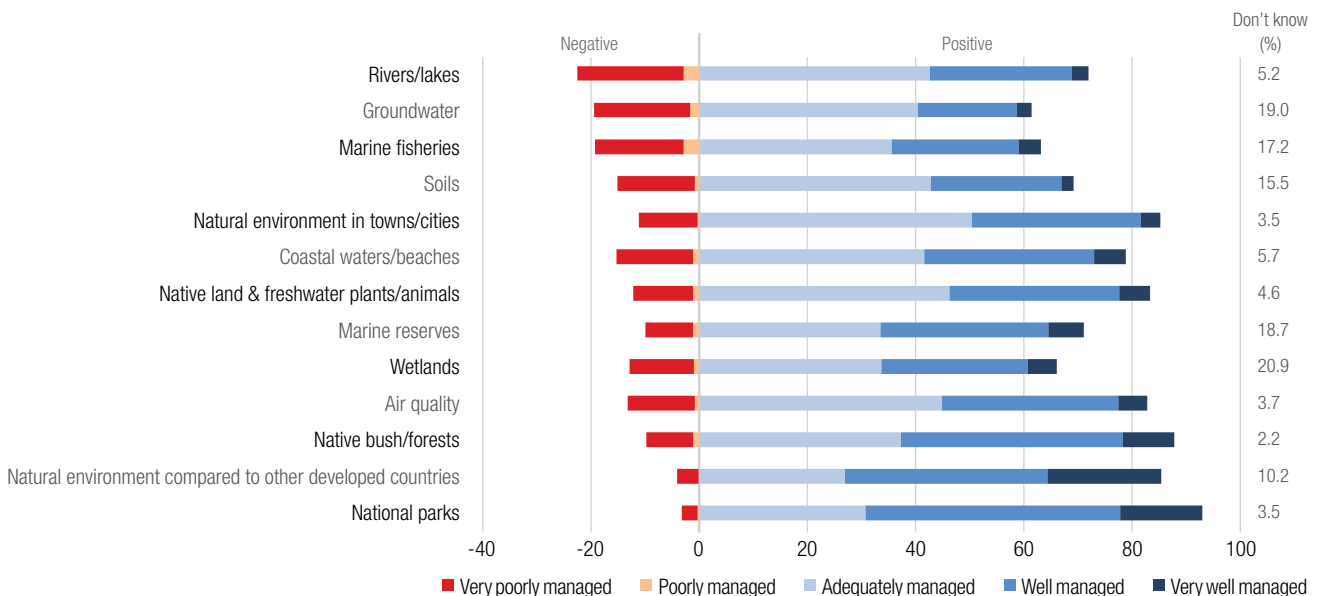
Figure 3.11. Perceived quality of management.

a. Air, Soils, Rivers and lakes, Groundwater, Wetlands
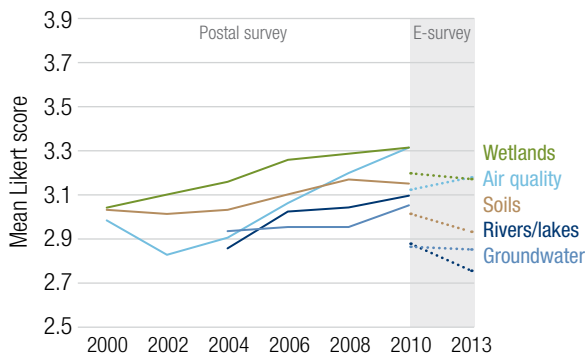
b. Natural environment in towns and cities, Native land and freshwater plants and animals, Native bush and forests, National parks
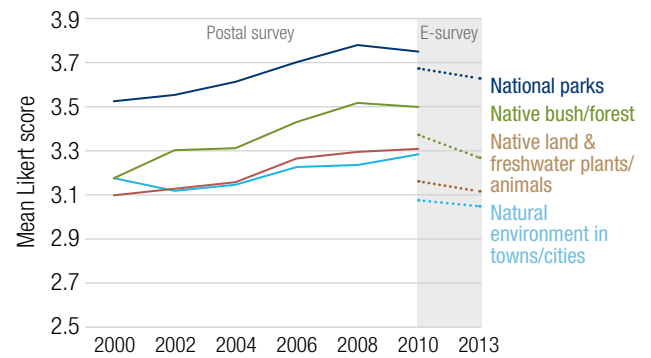
c. Coastal waters and beaches, Marine fisheries, Marine reserves
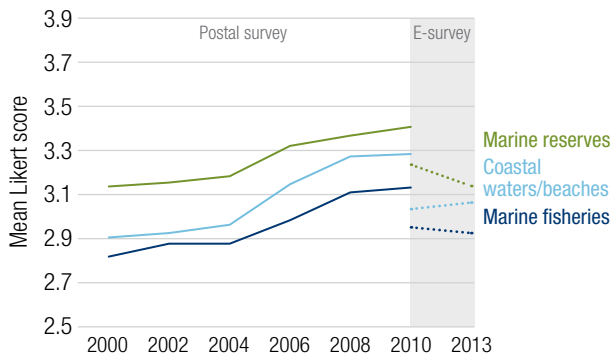
d. NZ's natural environment compared to other developed countries
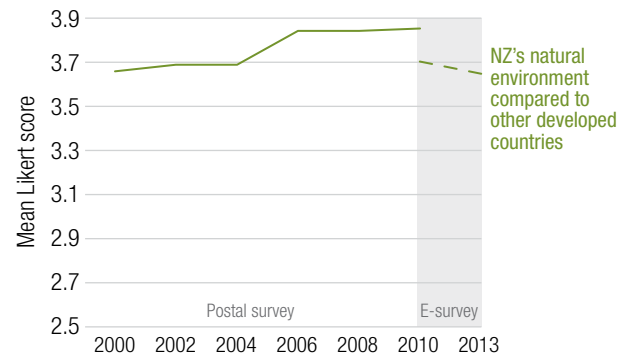
Figure 3.12(a-d). Perceived quality of management

(Scale: 1 = very poorly managed, 2 = poorly managed, 3 = adequately managed, 4 = well managed, 5 = very well managed).

Table 3.1. Perceived main causes of damage to the environment. The fill colours (■ ■ ■) indicate in order the three most-frequently-cited causes of damage to the individual environmental component.

Perceived Cause of Damage	Air	Native Land & Freshwater Plants & Animals	Native Forests and Bush	Soil	Beaches & Coastal Waters	Marine Fisheries	Marine Reserves	Fresh Waters	National Parks	Wetlands
Motor Vehicles/ Transport	87.7%	3.7%	2.9%	2.4%	4.6%	0.9%	1.6%	1.8%	7.3%	2.4%
Household Waste/Emissions	23.6%	12.0%	2.7%	17.0%	20.9%	7.2%	7.6%	19.9%	3.8%	9.9%
Industrial Activities	71.9%	26.2%	13.5%	34.7%	19.2%	15.5%	12.2%	30.0%	8.8%	16.9%
Pests/Weeds	2.6%	44.3%	55.6%	16.2%	7.0%	5.6%	10.9%	19.4%	47.8%	37.5%
Farming	11.2%	50.6%	28.8%	43.7%	13.5%	7.2%	8.0%	56.0%	12.7%	39.1%
Forestry	1.1%	13.3%	40.6%	9.7%	1.4%	1.1%	0.9%	6.1%	19.5%	8.5%
Urban Development	18.8%	23.9%	29.7%	15.1%	22.3%	3.5%	7.4%	15.3%	13.0%	26.3%
Mining	2.9%	13.6%	24.0%	16.2%	2.3%	1.9%	2.1%	6.3%	22.3%	5.9%
Sewage/Stormwater	4.2%	25.3%	2.9%	16.2%	68.7%	38.6%	35.9%	42.8%	3.4%	26.2%
Tourism	1.0%	3.9%	10.2%	0.5%	9.8%	3.0%	10.8%	4.0%	32.3%	5.9%
Commercial Fishing	0.6%	3.7%	0.4%	0.2%	25.0%	74.2%	48.5%	3.1%	0.4%	1.0%
Recreational Fishing	0.1%	1.9%	0.3%	0.3%	6.8%	17.2%	24.9%	5.0%	1.1%	1.1%
Dumping of Solid Waste	8.5%	18.7%	9.7%	37.7%	21.3%	15.3%	13.1%	16.6%	11.1%	16.5%
Hazardous Chemicals	18.5%	19.5%	10.2%	39.9%	19.6%	21.8%	18.5%	23.3%	8.9%	16.7%
Other	2.0%	2.3%	4.0%	3.3%	4.1%	6.0%	8.2%	3.0%	8.0%	9.2%

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

individual environmental components, orange indicating the second most frequently cited main cause, and the third most frequent response in yellow.

For some environmental components, people have very clear ideas about sources of harm. For example, motor vehicles and transport (88%), as well as industrial activities (72%), were clearly judged to be the main causes of damage to air. Similarly, sewage and stormwater was judged to be the main cause of damage to beaches and coastal waters, with 69% of respondents nominating this cause, while 74% percent of respondents identified commercial fishing as a major problem for marine fisheries.

Reading across the rows of Table 3.1 identifies sources of harm that are important across different areas of the environment. Sewage and stormwater, pests and weeds, and farming were each considered a main cause of damage to four components of the environment.

Trends 2000–2013

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

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

3.4.1 ETHNICITY

Differences were explored between ethnic group ratings of main causes of damage to two key resources: air, and fresh waters. There is no significant difference in ratings of causes of damage to air (p=0.08) (Figure 3.14).

In contrast to the situation with air, there were three significant differences when ethnicity was evaluated against fresh water (Figure 3.15). NZ Europeans were much more likely than Maori or other ethnicities to have defined farming as a key cause of damage to fresh waters (p<0.001), and to have identified pests and weeds as a source of damage (p<0.05). Those of other ethnicities were more likely to have identified hazardous chemicals (p<0.05) than were Maori or NZ European respondents. Solid waste was identified significantly more often (p<0.001) by Maori and Other ethnicities as a major cause of damage.

3.4.2 REGIONAL DIFFERENCES

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

Southern respondents were far more likely to identify household waste and emissions and urban development as major causes of damage to air (p<0.001) than were either Northern or Central respondents (Figure 3.16). Both Southern and Central respondents were more likely than Northern to have chosen industrial activities as a main cause of damage (p<0.001).

In contrast to the regional analysis against air there were no significant regional differences with fresh waters (Figure 3.17), although sewage and stormwater (p=0.07) and farming (p=0.09) demonstrated some differences.

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

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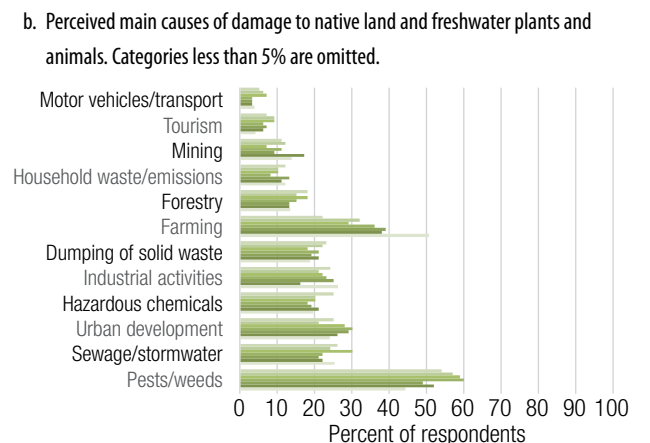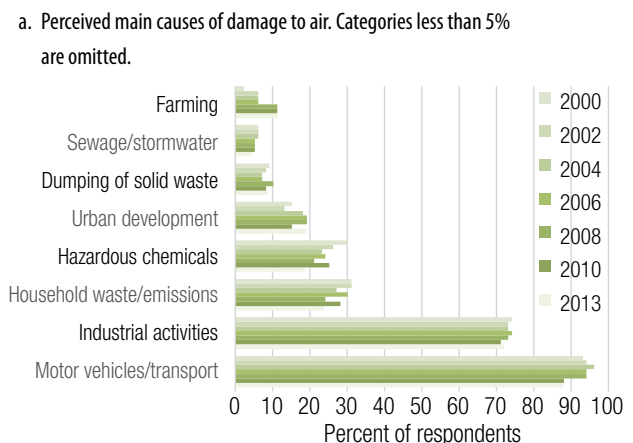
Figure 3.13(a–j). Perceived main causes of damage.

c. Perceived main causes of damage to native forests and bush. Categories less than 5% are omitted.
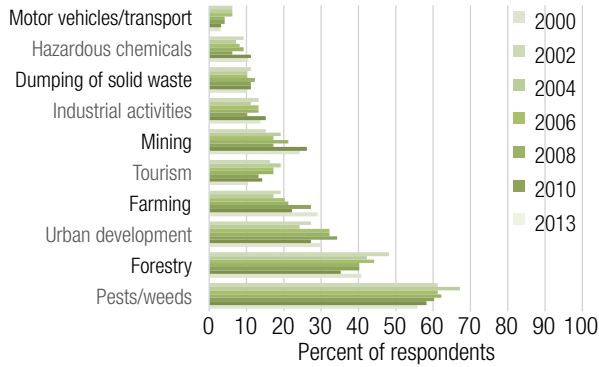
d. Perceived main causes of damage to soils. Categories less than 5% are omitted.
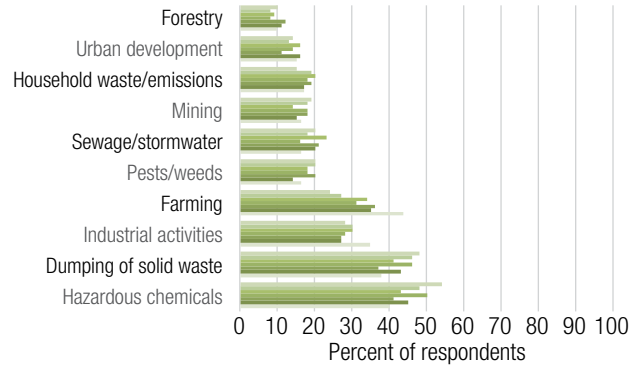
e. Perceived main causes of damage to beaches and coastal waters. Categories less than 5% are omitted.
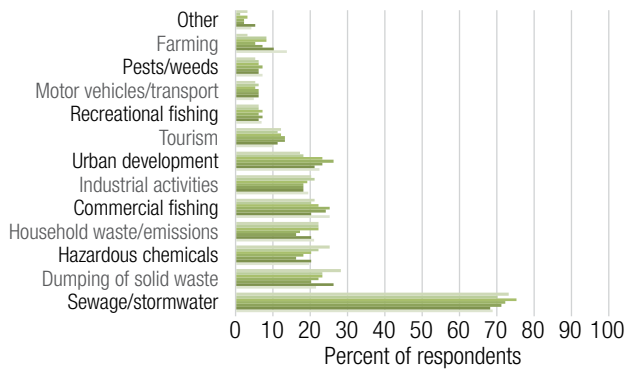
f. Perceived main causes of damage to marine fisheries. Categories less than 5% are omitted.
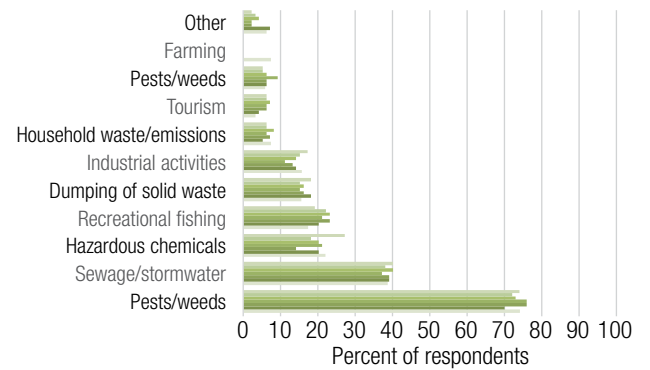
g. Perceived main causes of damage to marine reserves. Categories less than 5% are omitted.
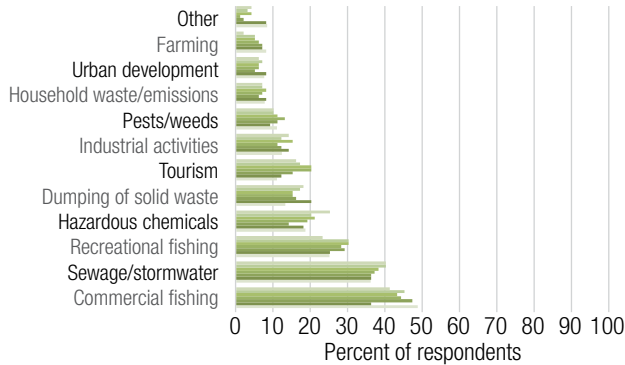
h. Perceived main causes of damage to fresh waters. Categories less than 5% are omitted.
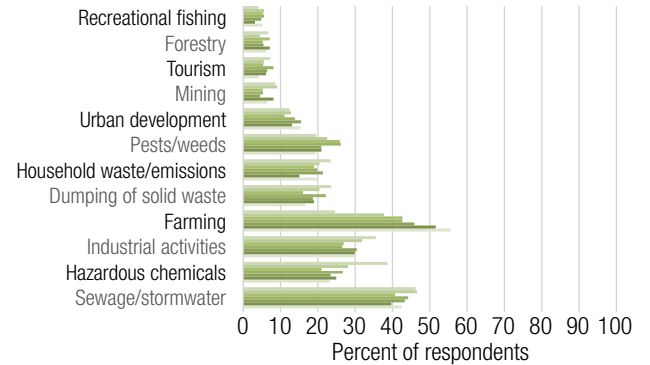
i. Perceived main causes of damage to national parks. Categories less than 5% are omitted.
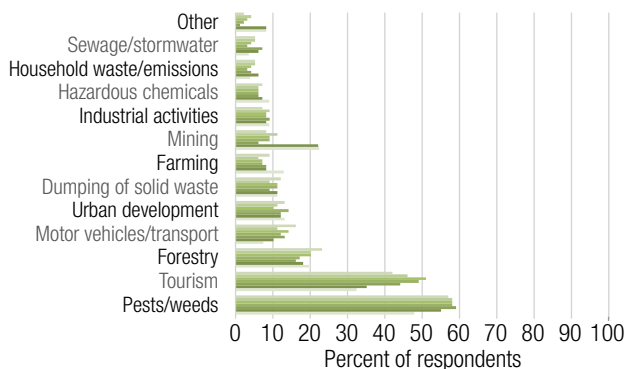
j. Perceived main causes of damage to wetlands. Categories less than 5% are omitted.
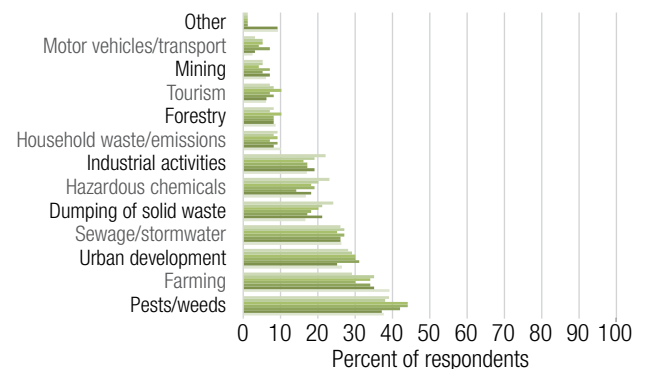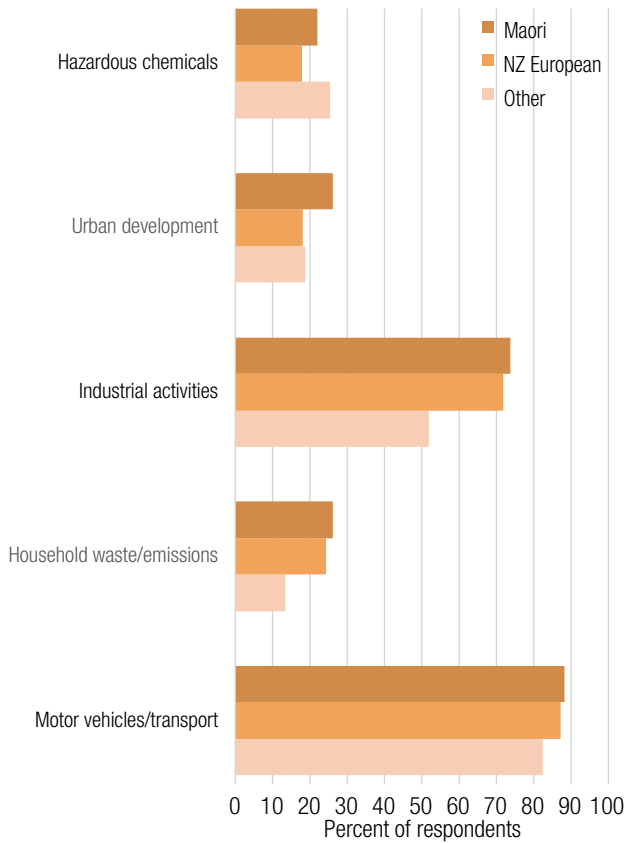
Figure 3.14. Perceived main causes of damage to air, by ethnicity. Categories less than 10% are omitted.
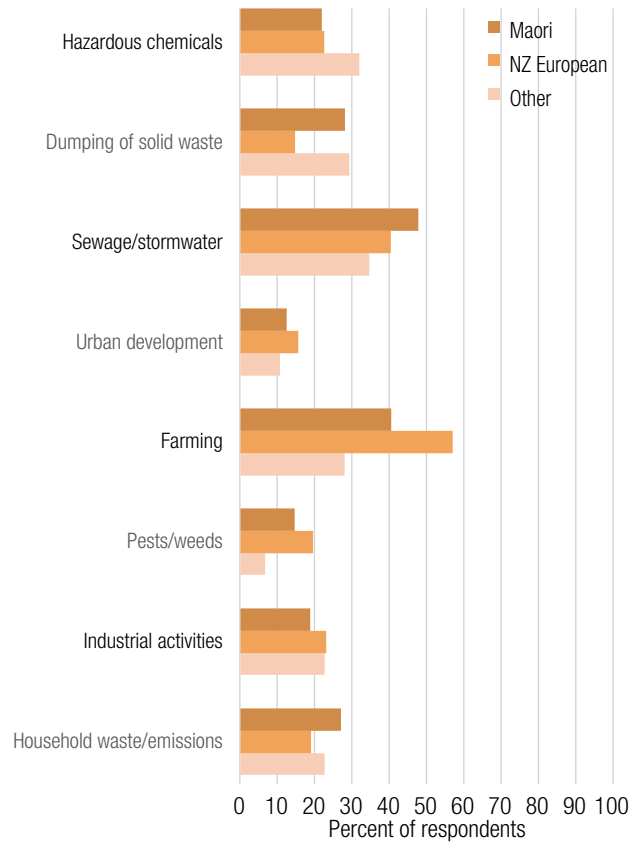
Figure 3.15. Perceived main causes of damage to fresh waters, by ethnicity. Categories less than 10% are omitted.
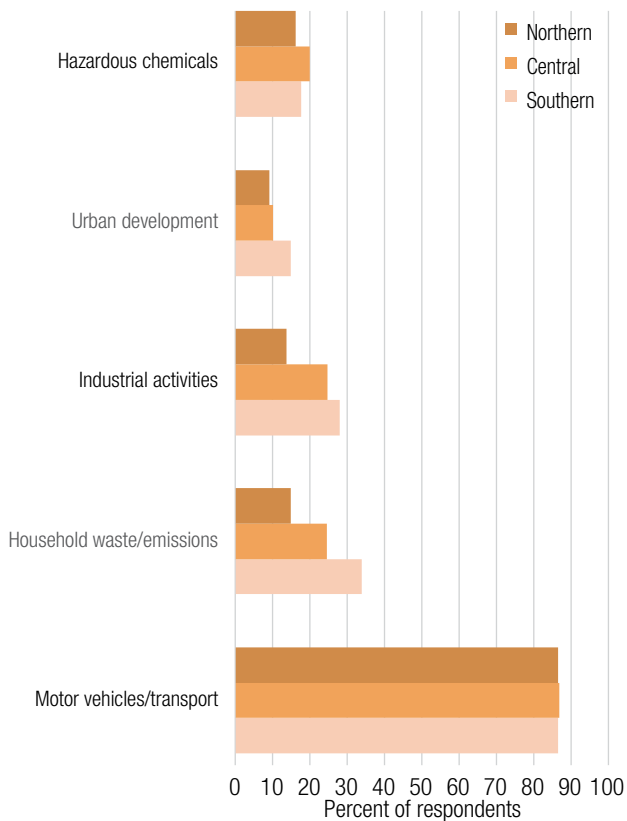
Figure 3.16. Perceived main causes of damage to air, by region. Categories less than 10% are omitted.
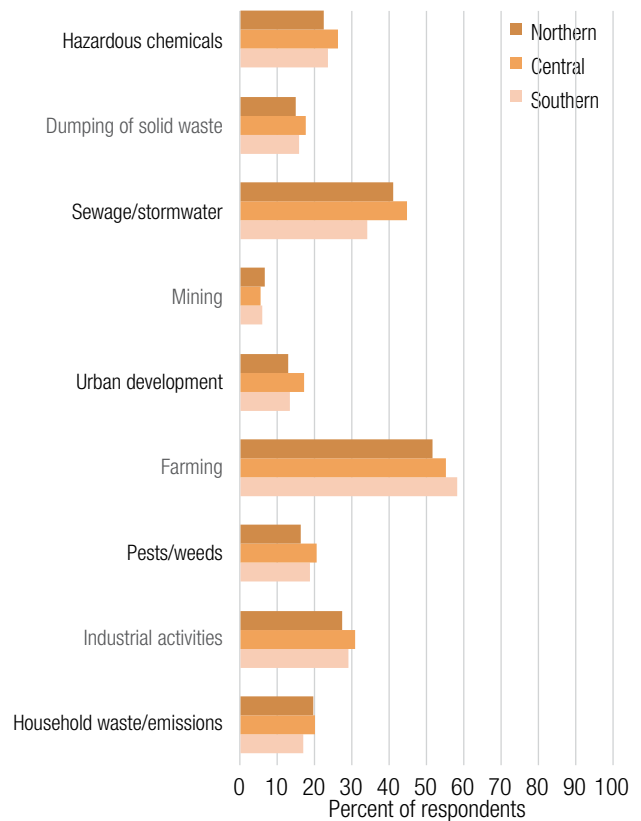
Figure 3.17. Perceived main causes of damage to fresh waters, by region. Categories less than 10% are omitted.

3.5 PARTICIPATION IN ENVIRONMENTAL ACTIVITIES

The 2013 Survey

Figure 3.18 shows levels of participation in 15 environment related activities during the preceding twelve months. More than 70% of respondents to the 2013 survey recycled household waste, bought products marketed as environmentally friendly, reduced or limited their use of electricity, had composted garden and/or household waste, or had grown some of their own vegetables. At the other end of the spectrum few respondents had been involved in hearings or consent processes, or had been an active member of a club or group that restores and/or replants natural environments.

Rates of participation were evaluated against ethnicity, education, region (north, central, and south), gender and income. There were numerous significant effects, so we report only a selection.
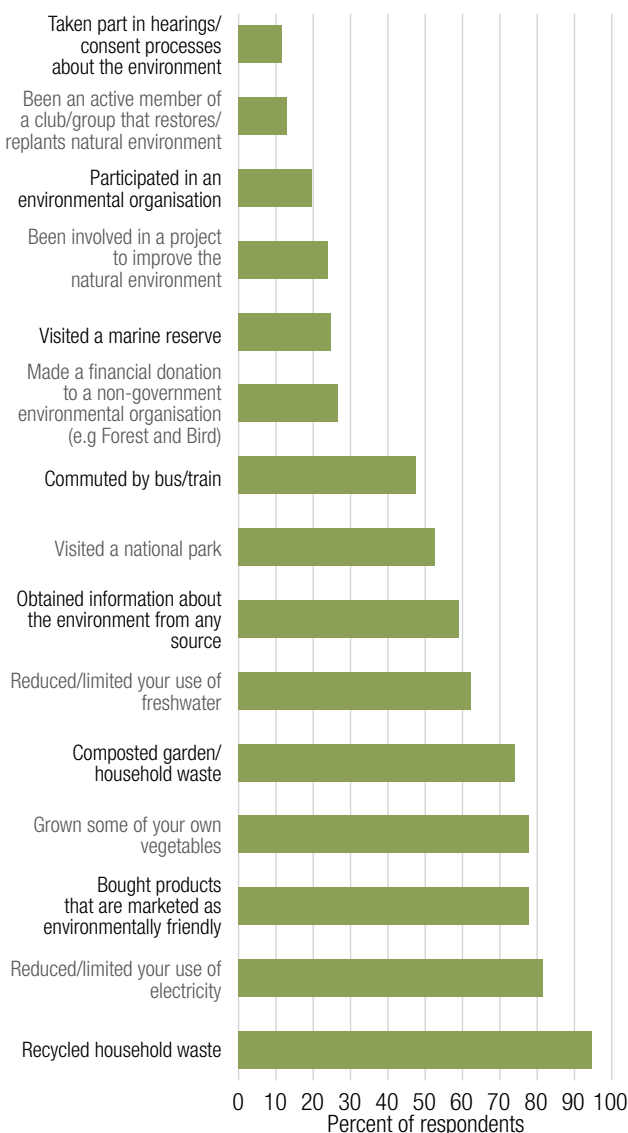
Figure 3.18. Reported participation in environmental activities, 2013.

Ethnicity

▪ Maori generally had higher participation rates in environmental activities than did other groups. Examples include: limiting water use (Maori 77%, NZ European 63%; p<.0001), purchasing environmentally friendly products (Maori 90%, NZ European 85%, Other ethnicities 73%; p=.01), taking part in a hearing or consent process (Maori 21%, NZ European 10%, Other ethnicities 14%; p<.001), participation in an environmental organisation (Maori 37%, NZ European 18%, Other ethnicities 15%; p<.001), participation in a club or organisation that restores or replants the natural environment (Maori 21%, NZ European 12%, Other ethnicities 17%; p<.05), making a donation to a non-government environmental organisation (Maori 41%, NZ European 26%, Other ethnicities 25%; p<.01).

▪ Other ethnicities had the highest rate of commuting by bus or train (other ethnicities 68%, Maori 57%, NZ European 46%; p<.001), but were least involved in several other activities. These include purchasing environmentally friendly products (Other ethnicities 73%, Maori 90%, NZ European 85%; p=.01), recycling household products (Other ethnicities 90%, Maori & NZ European 96%; p=.05), composting household waste (Other ethnicities 63%, Maori 73%, NZ European 76%; p<.05), and growing some of their own vegetables (Other ethnicities 65%, Maori 77%, NZ European 79%; p<.01).

Education

To simplify analysis of education effects respondents were grouped into three categories:

1. University qualification (Undergraduate diploma/certificate, Bachelor's degree, or Postgraduate degree);

2. High school or technical qualification (High school (with qualifications) or Trade/technical qualifications or similar); and

3. No qualification (Primary school (standard 6 or year 8) or High school without qualifications).

Possession of a university qualification had a strong positive association with most environmental activities – Table 3.2.

Region

A three region model, Northern (Auckland and north), Central (rest of the North Island) and Southern (the South Island) was used.

▪ Northern region respondents were more likely to have reduced or limited their use of freshwater (North 69%,

Central & South 63%; p<.05), visited a marine reserve (North 32%, Central 23%, South 21%; p<.001) and commuted by bus or train (North 43%, Central 37%, South 27%; p<.001).

- On the other hand, Northern region respondents were least likely to have composted household waste (North 71%, Central 76%, South 78%; p<.05) or grown some of their own vegetables (North 74%, Central 80%, South 82%; p<.01).

Gender

- Female respondents were more likely to have reduced or limited their use of electricity (Female 87%, Male 79%; p<.001), reduced their use of fresh water (Female 69%, Male 59%; p<.001), purchased environmentally friendly products (Female 88%, Male 79%; p<.001), or made a donation to a non-government environmental organisation (Female 30%, Male 24%; p<.01).

- Male respondents were more likely to have visited a marine reserve (Male 28%, Female 23%; p<.05) or a national park (Male 56%, Female 51%; p<.05).

Income

To simplify analysis respondents were split into two groups, High income (>$70,000 p.a.) and Low income. The few people who declared a loss were excluded from this analysis.

- High income earners were more likely to have visited marine reserves (High 36%, Low 23%; p<.001) and national parks (High 71%, Low 50%; p<.001), to have recycled (High 98%, Low 95%; p<.05) and composted household waste (High 80%, Low 74%; p<.05), obtained information about the environment (High 70%, Low

59%; p<.001), and to have made a donation to a non-government environmental organisation (High 36%, Low 25%; p<.001).

- Low income earners were more likely to have reduced or limited their use of electricity (Low 84%, High 78%; p<.01).

These results indicate that there is, overall, a high level of participation in many environmental activities, irrespective of demographic influences.

Trends 2002–2013

Participation in a range of environmental activities has been monitored since 2000. Because the question was modified in 2002, results from the 2000 survey are excluded. Two activities added to the survey in 2006 were 'Reduced or limited your use of freshwater' and 'Made a financial donation to a non-government environmental organisation (e.g., Forest and Bird)'. Figure 3.19 shows the extent of between-survey changes in reported behaviour. Pre-2010 results are from postal surveys, 2010 includes both postal and electronic survey results, and 2013 is exclusively electronic survey. Consistent with other trend data, no statistical analyses have been undertaken due to the different types of surveys involved.

3.6 MAJOR ENVIRONMENTAL ISSUES – NEW ZEALAND AND THE WORLD

Respondents were asked, in two open-ended questions, to identify the most important environmental issues facing New Zealand and the World today. Responses to these questions are difficult to code (i.e., there is likely to be some within and between survey variability) and to analyse (e.g., should all fresh water related items be clustered or should some attempt

Table 3.2. Association between education and environmental activities.

Activity	University qualification	High school or technical qualification	No qualification	P
Visited a marine reserve	30%	22%	16%	<.001
Visited a national park	63%	46%	37%	<.001
Bought environmentally friendly products	88%	81%	81%	=.001
Recycled household waste	97%	94%	93%	<.01
Composted household waste	78%	73%	68%	<.01
Was involved in a project to improve the natural environment	18%	16%	16%	<.001
Obtained information about the environment	74%	49%	42%	<.001
Took part in a hearing or consent process	16%	8%	7%	<.001
Participated in an environmental organisation	27%	13%	11%	<.001
Commuted by bus or train	54%	43%	37%	<.001
Participated in a club or organisation that restores or replants the natural environment	17%	9%	9%	<.001
Made a donation to a non-government environmental organisation	32%	22%	21%	<.001
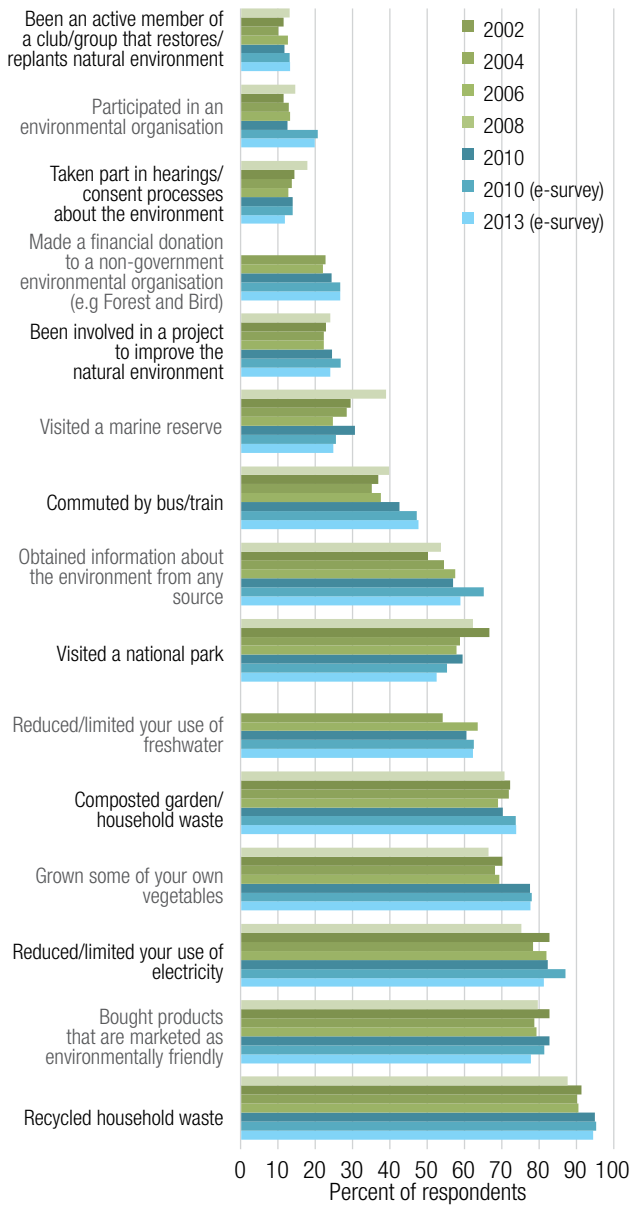
Figure 3.19. Trends in reported participation in environmental activities.

be made to sub categorise where possible?). Furthermore, there is evidence that some respondents are driven by the case study focus of the survey. For example, in 2006 transport was the case study and transport was identified as a significant New Zealand issue – transport was not the case study in 2008 and was not identified as a major environmental issue. Because of these difficulties some care needs to be taken when evaluating within- and between-year responses. Due to the significance of the inter-survey issue we do not present trend analysis of these results.

The 2013 Survey

'Water related' (28% of respondents) was identified as the most important environmental issue facing New Zealand (Figure 3.20), with 'agriculture related' (8%) and 'waste' (7%) next most highly rated. Respondents identified 'Global warming, climate change, ozone' (21%) as the single biggest issue facing the world (Figure 3.21). Excluding 'other', then followed 'water related' (13%) and 'population pressures' (11%). The size of the 'other' categories for both the world and New Zealand are large but with no individual component bigger than 2.5%.

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

Figure 3.20. Most important issues facing New Zealand (Note – items only included where at least 2.5% of respondents identified the issue).
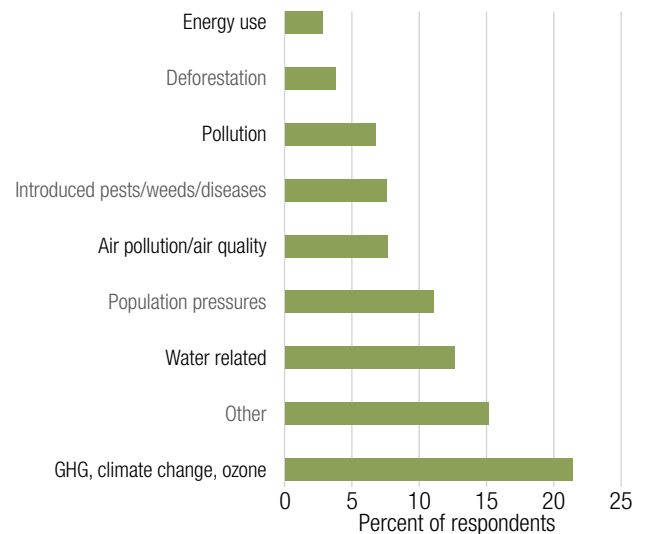
Figure 3.21. Most important issues facing the World (Note – items only included where at least 2.5% of respondents identified the issue).

04

Doubtful Sound
LIZ CLARK

INDIVIDUAL RESOURCES

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

Graphs illustrate response distributions for all the years for which data are available.

Consistent with elsewhere in this book no statistical analyses of the trends have been undertaken due to the change from postal surveys to e-surveys and the implications thereof. Despite this comment we nevertheless have observed an obvious difference for some resources in the 'don't know' responses (with sometimes far fewer e-survey 'don't knows' than for postal survey) and where these occur.

Where available, relevant biophysical PSR trend data are reported for comparative purposes. The Ministry for the Environment's national Environmental Report Cards are now the primary reference point for comparison. They provide the most up to date, high quality data on state of the New Zealand environment and are grouped into ten domains. Where necessary other published biophysical data and assessments of New Zealand's environmental performance are used, including the OECD (2007) country report for New Zealand. We now use Emerson *et al.* (2012) for the global context – their Environmental Performance Index (EPI) is the most widely cited source of comparable international data. We compare EPI New Zealand performance data to nine other countries (see Table 4.1). These countries and the reasons for choosing them are:

- Iceland – 13th ranked in the 2012 EPI. A small, high income island nation with a similar EPI rank to New Zealand;

- Norway – 3rd ranked in the 2012 EPI. A hilly nation, very similar to New Zealand in total population and mainland land area. Very high income per capita;

- Sweden – 9th equal rank in the EPI and often cited by the New Zealand government and researchers as of interest because of their environmental progress, policy frameworks and institutional arrangements;

- United Kingdom – 9th equal ranked in the EPI. A high income, densely populated island nation. It has a significantly improved 2012 EPI rank;

- Canada – 37th in the EPI. A large, natural resource abundant, high income, low population density country;

- United States – 49th ranked in the EPI. Natural resource abundant and amongst the largest users of environmental resources. A source of many 'ideas' on environmental issues and their management;

- Malaysia – 25th ranked in the EPI. An upper middle income, equatorial country, with considerable forestry and other natural resources;

- Australia – 48th ranked in the EPI and New Zealand's nearest neighbour. A country where there are enormous environmental issues and institutional questions to be considered. Uses some similar policy approaches to New Zealand;

- Chile – 58th ranked in the EPI, an upper middle income country with several geographic and economic similarities to New Zealand.

We accept there are limitations to the comparative use of this data, e.g., the water environmental effects index uses one measurement per country and it gives a rudimentary representation of the situation in each country.

Table 4.1. Summary ranking and individual resource data from the EPI for New Zealand and nine other countries.
(Data source: Emerson *et al.* 2012, extracted and summarised from relevant rows of the 2012 EPI dataset)

Country	EPI country score (/100) (rank from 132 nations)	Air – health impacts (/100)	Water – environmental effects (/100)	Biodiversity (/100)	Fisheries (/100)	Marine protected areas (/100)
Norway	69.92 (3rd)	100.0	54.37	63.74	13.68	100.00
Sweden	68.82 (9th)	100.0	51.49	52.14	23.23	87.81
United Kingdom	68.82 (9th)	100.0	38.48	100.0	15.08	100.0
Iceland	66.28 (13th)	100.0	64.27	70.58	14.00	68.39
New Zealand	66.05 (14th)	100.0	40.33	74.43	28.40	61.98
Malaysia	62.51 (25th)	97.30	48.40	90.10	31.04	74.15
Canada	58.41 (37th)	100.0	51.49	52.14	23.23	87.81
Australia	56.61 (48th)	100.0	33.21	85.43	36.70	100.0
United States	56.59 (49th)	100.0	12.59	71.76	17.18	100.0
Chile	55.34 (58th)	100.0	64.20	57.05	17.96	65.37

4.1 NATURAL ENVIRONMENT IN TOWNS AND CITIES

Scientific Information on State and Trends

Most New Zealanders, in common with people in other 'high income' countries, live in urban environments. There is no national set of urban environmental indicators (although see below regarding the Quality of Life '08 project) and hence it is not possible empirically to determine state of the environment trends for the urban environment. However, there is increasing research and management interest in questions around urban sustainability and quality of life. In terms of policy initiatives, the Ministry for the Environment has introduced the New Zealand Urban Design Protocol (MfE 2005). The Protocol aims to make New Zealand's towns and cities more successful by using quality urban design to help them become:

- competitive places that thrive economically and facilitate creativity and innovation

- liveable places that provide a choice of housing, work and lifestyle options

- environmentally responsible places that manage all aspects of the environment sustainably

- inclusive places that offer opportunities for all citizens

- distinctive places that have a strong identity and sense of place

- well-governed places that have a shared vision and sense of direction.

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

- initiatives councils have taken to address biodiversity through their Long Term Plans

- hectares of privately owned open space covered by QEII Trust registered covenants

- number of ecological heritage sites.

Unfortunately, none of these indicators provides a holistic measure of the status of the natural environment in towns and cities and therefore they are of limited value for tracking trends over time. Despite this concern, it is arguable that the state of some aspects of particular urban natural environments

around New Zealand is improving (e.g., riparian management, sand dune management, and management of weeds and pests in native bush).

Perceptions of State, Pressures and Management Trends

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

Kitesurfing in the Avon/Heathcote Estuary/Ihutai, Christchurch

EOS ECOLOGY / BRONWYN GAY

Commentary

With 86% of New Zealanders living in an urban environment (Census 2006 – cited in Statistics New Zealand, undated), their knowledge of environmental issues associated with this context should be high – as borne out by the low levels of 'don't know' responses (across both survey instruments). Although not explored in any detail, it does seem surprising that issues such as relatively poor air quality (especially in Auckland and Christchurch, including following the September 2010 and February 2011 earthquakes) do not appear to have resulted in any downgrading of people's perceptions—this might be because people perceive the "towns and cities" survey questions to relate more to other aspects of town and city environments, such as parks, reserves, streams and beaches. Having said this, MfE (2007) has highlighted the many water quality issues associated with urban streams and rivers. More research may be helpful in exploring the respondent understanding of the natural environment in towns and cities.

4.2   AIR

Scientific Information on State and Trends

While conflicting views have been expressed about air quality in New Zealand during the last decade there is recent evidence of general improvements in air quality. Analysis of the information available from MfE indicates that in general air quality is good in most New Zealand locations. Regional councils and unitary authorities in New Zealand have identified 42 areas where air quality could breach the national air quality standards known as gazetted airsheds[1]. These gazetted airsheds cover only 1.5 % of New Zealand's total land area. However, "about 65 % of New Zealanders live in a gazetted airshed as a result of New Zealand having a highly urbanised population" (MfE 2007: 156).

The MfE (May 2010) air quality report card notes that 2008 was the first year since national standards were introduced in 2004 that standards for carbon monoxide, sulphur dioxide, nitrogen oxide and ozone were not breached at any site. As well … "all 16 airsheds required to meet the National Environmental Standard for PM_{10} by 2011 did so" (MfE October 2012 PM10 scorecard). Six South Island airsheds had annual average concentrations that were above the National Ambient Air Quality Guideline value, and twelve per cent of New Zealand's population reside in these six airsheds. Numbers of exceedances of the PM10 standard vary across regions but a spike occurred in Christchurch during 2011 that has been attributed to the Canterbury

1   "A gazetted airshed is a specific area identified by a council where air quality standards are (or may be) breached. These areas have been made public through the New Zealand Gazette and are known as gazetted airsheds" (See: http://www.mfe.govt.nz/laws/standards/airsheds/faqs.html – accessed December 2010).
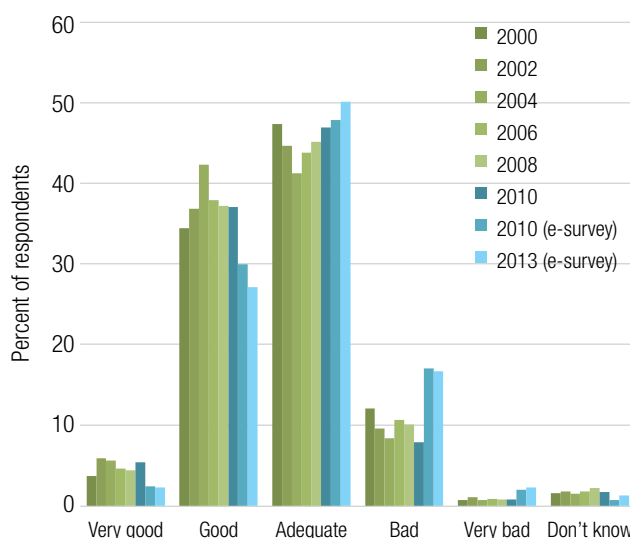
Figure 4.1a.   Perceived condition of the natural environment in towns and cities.
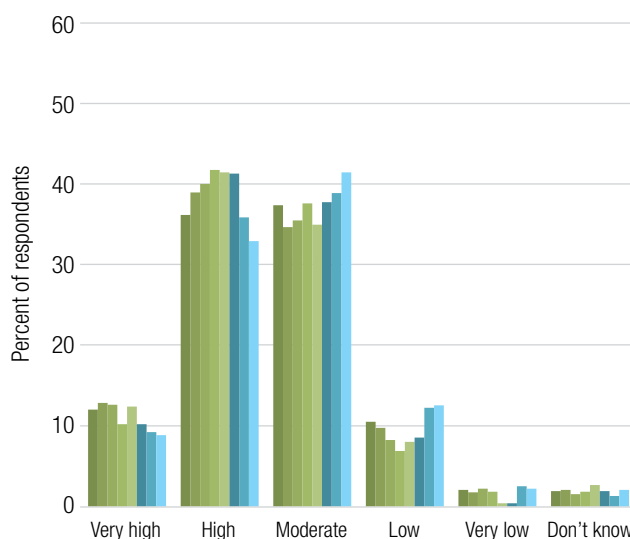
Figure 4.1b.   Perceived availability of parks and reserves in towns and cities.
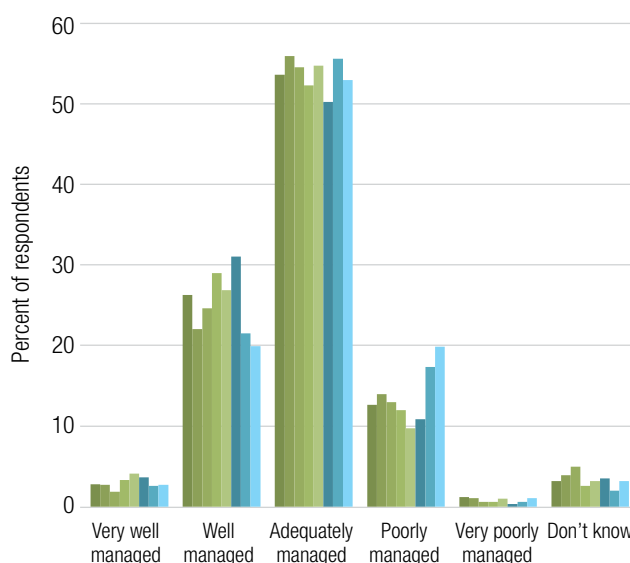
Figure 4.1c.   Current management of the natural environment in towns and cities.

earthquakes. There is an upward trend in exceedances in Dunedin, attributed to dust generated from construction and road works (MfE October 2012 PM10 Scorecard)

New Zealand's air quality as it affects humans rates very highly with a score of 100.0 (Emerson et al. 2012) matching the rating given for eight of the nine nations included in Table 4.1, and reflecting the fact that over much of the country air quality is very high. However, the Emerson et al. (2012) assessment of New Zealand air pollution impacts on ecosystems is much lower (SO2CAP - 27.39 and SO2GDP http://sedac.ciesin. columbia.edu/data/set/epi-environmental-performance-index-pilot-trend-2012/data-download – accessed 22 November 2013). This analysis leads to the conclusion that while 'rural' air quality is high there are issues in some major urban areas and thus the state of air quality should be considered as 'good'. Urban air quality issues include winter PM10 levels, nitrogen oxide levels in Auckland, and sulphur dioxide levels in Christchurch (Woolston site).

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

Perceptions of State, Pressures and Management Trends

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

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

Most respondents over the seven surveys consider the quality of air management to be adequate and improving.

The 2013 survey was subjected to a limited regional level analysis with respondents from the Canterbury and Auckland regional councils separated and compared to the rest of New Zealand – no significant differences were found.

Commentary

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

- seven standards banning activities that discharge significant quantities of dioxins and other toxics into the air

- five standards for ambient (outdoor) air quality

- a design standard for new wood burners installed in urban areas

- a requirement for landfills over 1 million tonnes of refuse to collect greenhouse gas emissions.

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

4.3 NATIVE LAND AND FRESHWATER PLANTS AND ANIMALS

Scientific Information on State and Trends

While Esty *et al.* (2005: Appendix B: 200) ranked New Zealand very poorly in terms of biodiversity performance—indeed one of the worst of 142 nations evaluated, the evaluation of Emerson *et al.* (2012: data set variable EVBH, score 74.43) indicates New Zealand is performing reasonably well compared to similar countries (albeit some countries have vastly differing biodiversity contexts). Both findings are predictable. In the first instance, New Zealand has a record
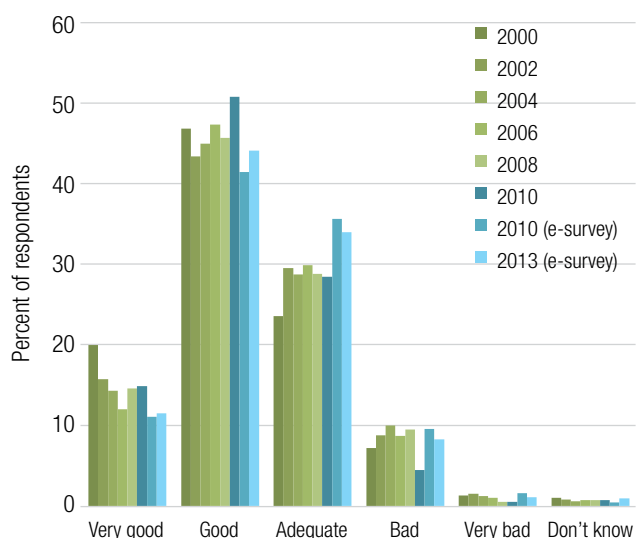
Figure 4.2a. Perceived state of air quality.
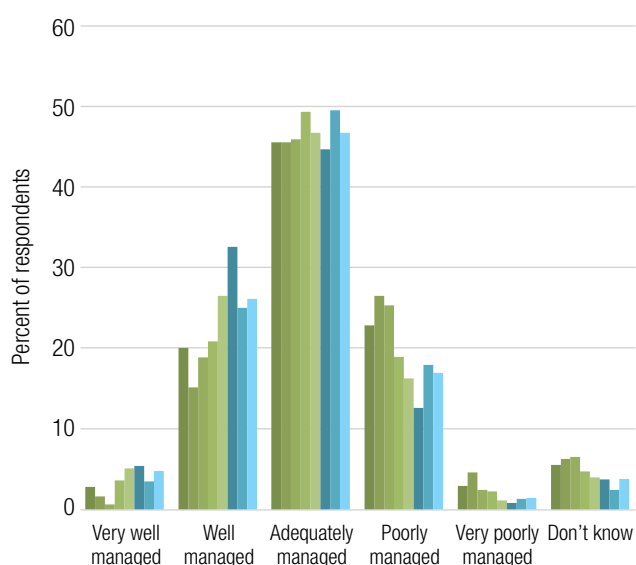
Figure 4.2b. Perceptions about management of air quality.

of large numbers of extinctions of bird, bat, freshwater fish and other species, and many species remain under threat. However, credit needs to be given for New Zealand's improving conservation efforts (e.g., a huge increase in the area of land subject to pest control by DOC since 2000 (MfE 2007: 395), the large proportion of terrestrial areas protected to varying degrees (33.4% of total land area), and the significant percentage of the New Zealand EEZ protected by an MPA), all of which is reflected in the Emerson *et al.* (2012) evaluation.

Even given the above mixed score cards, conservation of New Zealand's native plants and animals remains one of the country's main environmental issues (DOC and MfE 2000). New Zealand's diverse flora and fauna comprises many endangered plants and animals, some of which, e.g., kiwi and kakapo, remain as national symbols and attract high levels of media interest and corporate sponsorship. There are periodic re-evaluations of the risk of extinction for New Zealand's threatened and potentially threatened species of animals and non-vascular plants using the New Zealand Threat Classification System. The number of species listed as Threatened increased to 870 in 2011 from 672 in 2007 and the number listed as At Risk increased to 2723 in 2011 from 2123 in 2007 (DOC 2012).

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

The Controller and Auditor General (2012) completed an audit performance report on the work of the Department of Conservation, directed at biodiversity protection, and concluded that despite DOC having about $202 million available during 2012/13 to meet its objective of maintaining and restoring indigenous biodiversity .. 'its efforts have, at best, resulted in merely slowing its decline' (page 12).

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

Perceptions of State, Pressures and Management Trends

Survey respondents have continued to rate the condition (Figure 4.3a) and diversity (Figure 4.3b) of native land and freshwater plants and animals as adequate to good, although a substantial percentage of respondents in 2013 rated the state as bad. Key pressures have been identified (Figure 3.13b) as pests and weeds (44–60% of respondents), forestry, urban development and, increasingly, farming (22–51%). And, while native land and freshwater plants and animals are rated as adequately to well managed (Figure 4.3c), the proportion rating this category as poorly managed increased between 2006 and 2008.
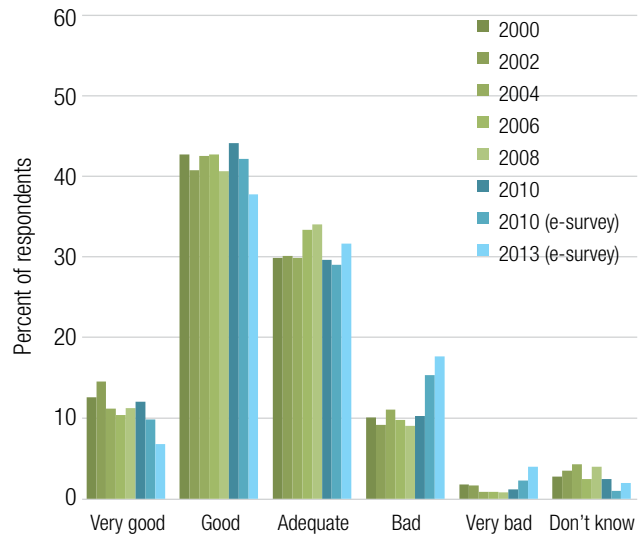
Figure 4.3a. Perceived state of native land and freshwater plants and animals.
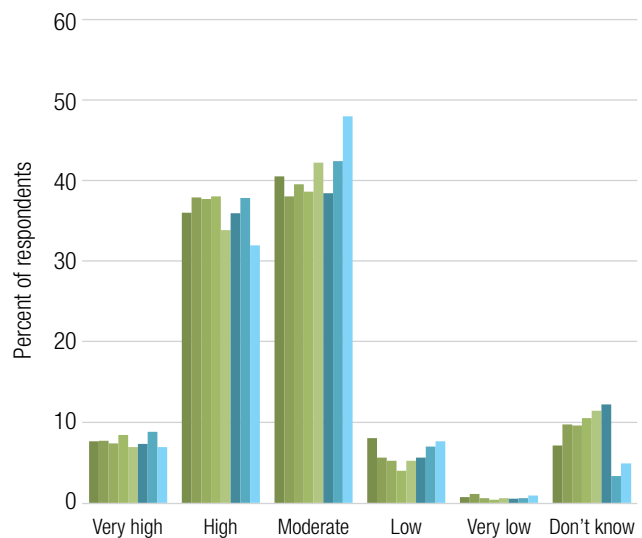
Figure 4.3b. Perceived diversity of native land and freshwater plants and animals.
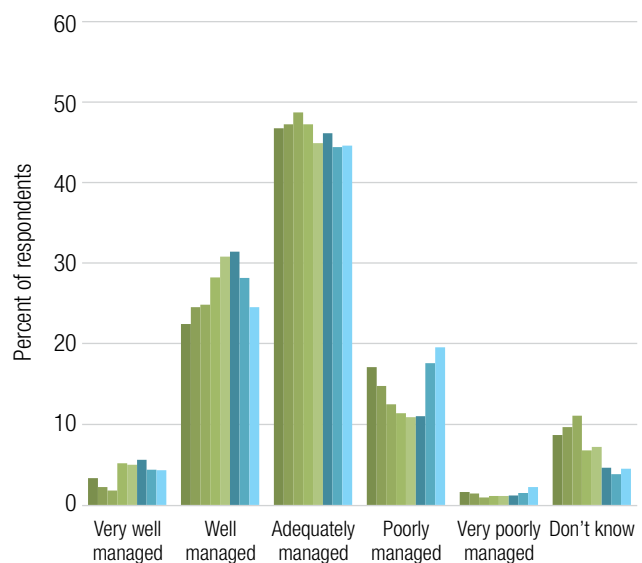
Figure 4.3c. Perceptions about management of native land and freshwater plants and animals.

Commentary

Respondents continuing to rate the condition of New Zealand's native plants and animals as 'adequate' or 'good' remains surprising when clearly it is not the case. There are 2723 threatened and at risk species in New Zealand (Department of Conservation 2012), key indicator species' ranges continue to decline (MfE 2007) and the conclusions drawn in the Controller and Auditor General (2012) attest to the poor biodiversity performance of New Zealand. We hypothesise that the large amount of apparently 'good' news about endangered species management projects (e.g., increases in kakapo numbers, high profile investments in growing numbers of fenced sanctuaries) masks the gravity of the biodiversity situation in New Zealand for many, but not all, people. The fact that OECD (2007) reported that 175km^2 of indigenous habitat disappeared during 1996–2002 and experts claim the true figure is at least double that (B. Clarkson pers. comm. 2007) lends weight to this argument. Equally, loss of biodiversity to urban development is likely to be miniscule compared to losses due to farming intensification and other activities, given the enormous differences in scale and location.

4.4 NATIVE BUSH AND FORESTS

Scientific Information on State and Trends

The ongoing need for sustainable and conservation-based management of native bush and forests is now little debated in New Zealand. The area of legally protected public land increased from 8,138,500 hectares in 2006 to 8,525,000 hectares in 2009, an increase of 4.7% (MfE April 2010 INFO 492). While there are some ongoing contentious issues, including sustainable logging of indigenous forests and the future of the South Island Landless Natives Act forests in Southland, mostly the emphasis is on protecting what remains, especially from pests and weeds. New Zealand's original forest cover has been reduced from around 85–90% of terrestrial area to about 24% (McWethy et al., 2010; MfE 2007: 216). About 80% of this remaining forest is now managed for conservation purposes by the Department of Conservation (Ministry of Agriculture and Forestry 2001). However, MfE (2007: 401) reported that over the last decade "the clearance of native forests has reduced to low levels as a result of sectoral initiatives and stronger legislation, such as the New Zealand Forest Accord 1991 and amendments to the Forests Act 1949, the latter of which largely stopped the clear-felling of native forest". However, other types of New Zealand native land cover, such as broadleaved native hardwoods, mānuka and kānuka, matagauri, and tall tussock grassland, continue to be modified. The OECD (2007) note that a net loss occurred of nearly 175 km^2 of indigenous habitat (including 24 km^2 of native forest) from 1996–2002. Despite these losses an expansion of conservation covenants on private land has been reported (MfE 2007: 401). The area of legally protected private land increased from 216,200 hectares in 2006 to 238,300 hectares in 2009, an increase of 10.2% (MfE April 2010 INFO 492). The area of QEII National Trust registered covenants (which include a range of habitats) has increased steadily from 71,648 ha in 2005 to reach 99,782.67 ha in 2012 (QEII National Trust, 2005, 2012).

The state of native forests varies, but is not reported on in the national State of the Environment Report (MfE 2007). It is widely believed that browsing pressure from possums, goats, deer, and other introduced species is substantially modifying many forest environments. It has been suggested that 'alien species threaten a third of our protected forests (1.8 million hectares) (such that) when not being smothered or overshadowed by exotic weeds, native plants are being eaten by browsing and grazing animals' (DOC, undated). Some very large pest control programmes, particularly those targeting possums, are attempting to redress some of this damage (MfE 2007: 395). Currently, there is no comprehensive monitoring programme based on a universal set of indicators against which to report trends; however, work on developing such a programme is being conducted by the Department of Conservation.

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

Perceptions of State, Pressures and Management Trends

Both the perceived condition (Figure 4.4a) and perceived quality of management (Figure 4.4c) have improved considerably over the six paper-based surveys, although the e-surveys report declines. Respondents consider condition of native bush and forests to be adequate to very good, with management being adequate to good. Most respondents report a moderate to high amount of native bush and forests. The main perceived pressures (Figure 3.13c) have been 'pests and weeds' (56–67% of respondents), 'forestry' (35–48%), 'urban development' and 'farming'.

Native forest in the Nina Valley, Lewis Pass

EOS ECOLOGY / SHELLEY McMURTRIE

Commentary

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

4.5   SOILS

Scientific Information on State and Trends

Seventeen percent of New Zealand's GDP depends on the top 150 mm of the country's soil (MfE 2007: 237, citing Sustainable Land Use Research initiative, no date). Given their importance, it is not surprising that soils are included in Statistics New Zealand (2008) Measuring New Zealand's progress using a Sustainable Development Approach. Soils are critical resources for agriculture, horticulture and forestry, and contribute to several ecosystem services including ground water quality and flood mitigation (http://www.sluri.org.nz/Objectives/Display/3 – accessed 10 October 2013), yet they remain a largely unseen resource that receives little or no media attention or public interest. It is clear from the Soil Health Environmental Report Card (MfE January 2010: INFO 471) that all is not well with some of our soils. MfE (2010) note that '...just over one third of monitored soil under productive land uses meet all soil health target ranges.'

Soil quality is assessed against four indicators: organic reserves, fertility, acidity, and physical status. Repeat sampling of soil quality at about 300 sites in 1995 and 2009 provides useful insights on level and trends in soil quality under a range of land uses (MfE January 2010: INFO 471 citing Hill and Sparling 2009). Only 24% of soils at sites used for drystock farming, 30% of soils at sites under dairying and 35% of sites for all productive land uses meet all soil target ranges. Over half of the sites used for dairying have compacted soil, as do a third of dry stock sites. Intensively farmed sites tend to have above target ranges of organic reserves and fertility. Other dry stock sites tend to be below target fertility levels (MfE January 2010 INFO 471). The trend from resampling in 2009 indicates soil fertility levels have improved ... 'likely due to decreasing fertility in those soils that had earlier levels above target ranges' (MfE January 2010 INFO 471, p.5).
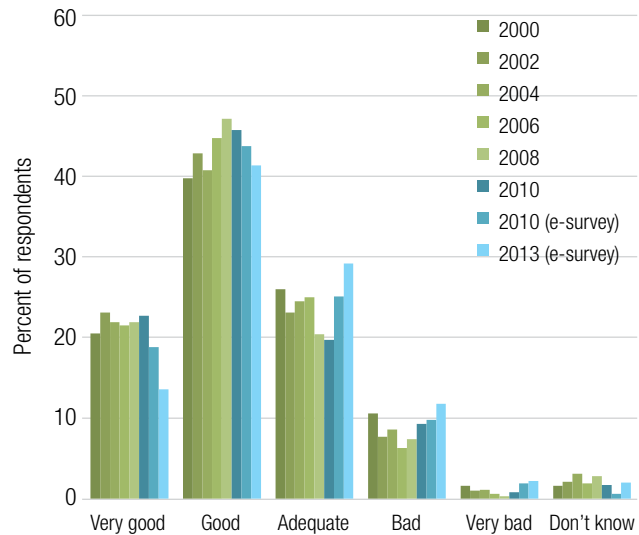
Figure 4.4a. Perceived condition of native bush and forests.
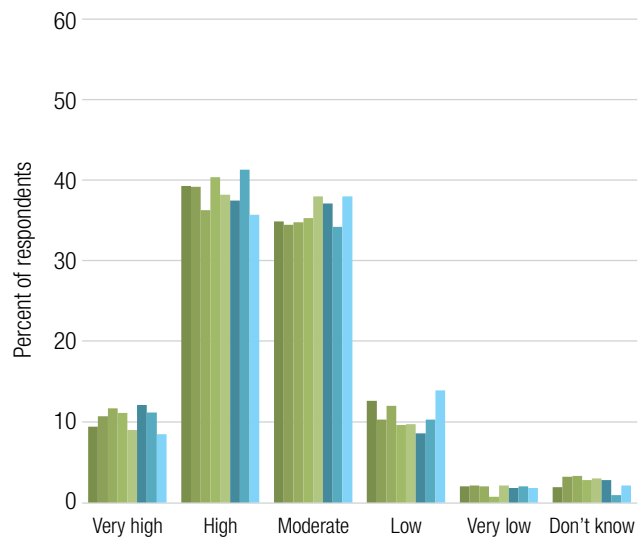
Figure 4.4b. Perceived quantity of native bush and forests.
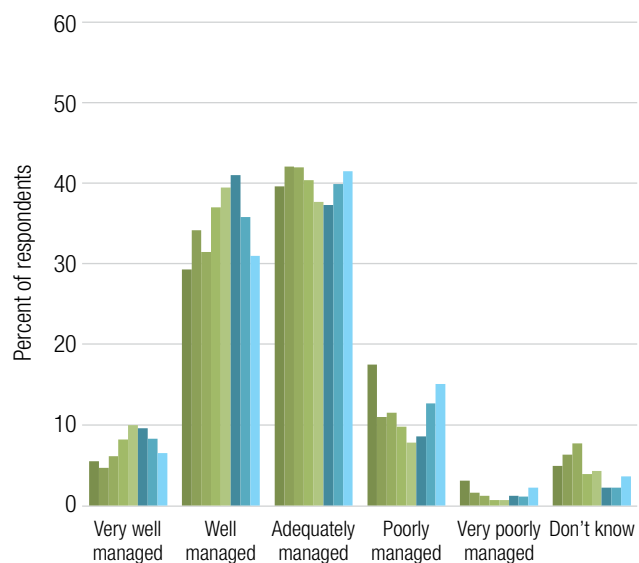
Figure 4.4c. Perceptions about management of native bush and forests.

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

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

Perceptions of State, Pressures and Management Trends

'Don't know' responses for soils are substantially lower for e-survey respondents than for postal survey respondents. As a consequence the shift in distribution of e-survey respondents is toward more pessimistic views of the quality or condition of soils, and the management of soils. Most respondents believe the quality or condition of soils is good to adequate (Figure 4.5a). The main pressures on soils (Figure 3.13d) are 'hazardous chemicals' (41–54% of respondents), 'dumping of solid waste' (37–48%) and 'farming' (24–44%), with the latter increasing since the first survey in 2000. Around half the respondents thought management was adequate (Figure 4.5b.

Commentary

Information about soils is readily available from the MfE website, hence it is possible for the public to read about trends in the state of soils in New Zealand, although there is no data to suggest they are doing so. People's perceptions about soils are more favourable than their state warrants. There are several soil health issues associated with particular land management practices, including urban and lifestyle sprawl and land use intensification.

4.6 COASTAL WATERS AND BEACHES

Scientific Information on the State and Trends

New Zealand has the fourth largest Exclusive Economic Zone and the eighth longest coastline of any nation. About 80% of the coast is directly exposed to the sea, with the remainder in sheltered harbours and estuaries (http://www.teara.govt.nz/en/natural-environment/2). It is near the latter areas where most of the New Zealand population lives. No overall trends in the state of coastal waters and beaches has been reported, but regional council reports note a range of pressures including continued discharges of concentrated nutrients into estuaries and harbours, and ongoing reclamations and extensive development on previously undeveloped coastlines (e.g., see: http://www.nrc.govt.nz/upload/6435/NRC%20SOE%20Report%20Cards_Part3.pdf). MfE (2012 INFO 653) data shows that of the 458 monitored beaches that were graded in 2012:

- 18 per cent of the coastal beaches were graded as 'very good'. A further 42 per cent of coastal beaches were graded as 'good'

- 25 per cent of coastal beaches were graded as 'fair'

- 13 per cent of coastal beaches were graded as 'poor'

- 3 per cent of coastal beaches used for recreation were graded as 'very poor'.

These new grades cannot be compared with earlier grades and recent trends are not available.

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

Figure 4.5a. Perceived quality or condition of soils.
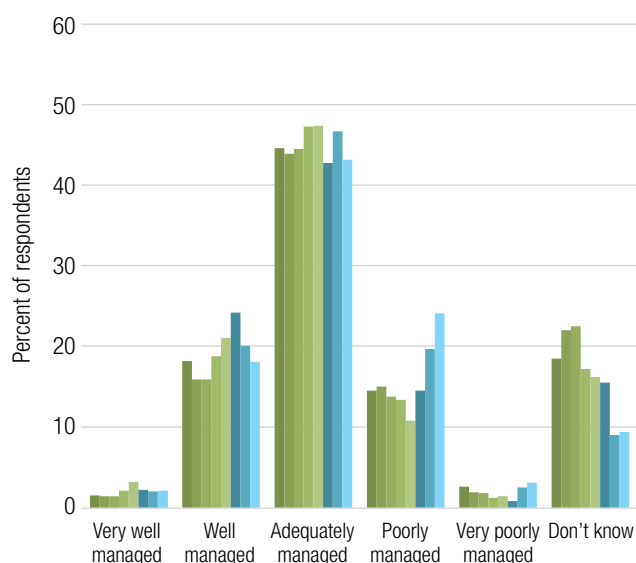
Figure 4.5b. Perceptions about management of soils.

Perceptions of state, pressures and management trends

The 2010 postal survey demonstrated the continuation of a trend toward perceptions of improving condition, whereas the two e-surveys were much more pessimistic (Figure 4.6a) about the state of coastal waters and beaches and of their management (Figure 4.6b). Overall, respondents consider the resource to be in an adequate to good condition and coastal waters and beaches to be adequately to well managed. In terms of pressures (Figure 3.13e), 'sewage and stormwater' continues to be, by far, the largest perceived contributor (68–75%).

Commentary

Respondent perceptions seem, in the main to match the biophysical monitoring results. While MfE (1997: section 7:88) notes that point source discharges have become better managed over the last 20–30 years, and MfE (2012 INFO 653) report no trend in swimming beach water quality, there may be other factors influencing the degree of positive feeling by the public in this area.

4.7   MARINE FISHERIES

Scientific Information on State and Trends

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

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

Quota levels have changed for most fish stocks since they were introduced to the QMS. For example, the initial quota[2] for Orange Roughy (1983/84) in the Challenger region was 4,950 tonnes per year. By the 1987/88 fishing year this quota had increased to 12,000 tonnes. Within two years, the quota was dropped to 2,500 tonnes in response to declining fish stocks, and the fishery was effectively closed in October 2000. A decade later MFish announced the Challenger Plateau Orange Roughy fishery would reopen with a limit of 500 tonnes (http://www.scoop.co.nz/stories/BU1009/S00757/orange-roughy-recovery-a-major-success-story.htm – accessed 1 November 2010).

The 2013 fish stock assessments have recently been completed (http://www.mpi.govt.nz/news-resources/news/release-of-new-fish-stock-assessments – accessed 10 October 2013) and indicate several commercial fish stocks have increased in the last few years.

Questions about the sustainable management of New Zealand's marine fisheries remain topical. While some aspects of New Zealand fisheries management are viewed internationally as world-leading (e.g., Hughey *et al.* 2002b, Worm *et al.* 2009), within New Zealand there is much debate

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2   This was termed an Enterprise Allocation (EA) when issued prior to the 1986 introduction of the Quota Management System. In 1986 EAs were changed to Individual Transferable Quotas (ITQs).
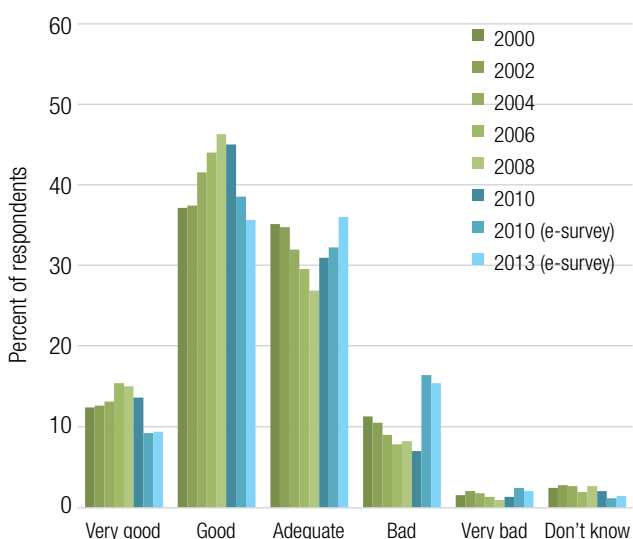
Figure 4.6a.   Perceived quality or condition of coastal waters and beaches.
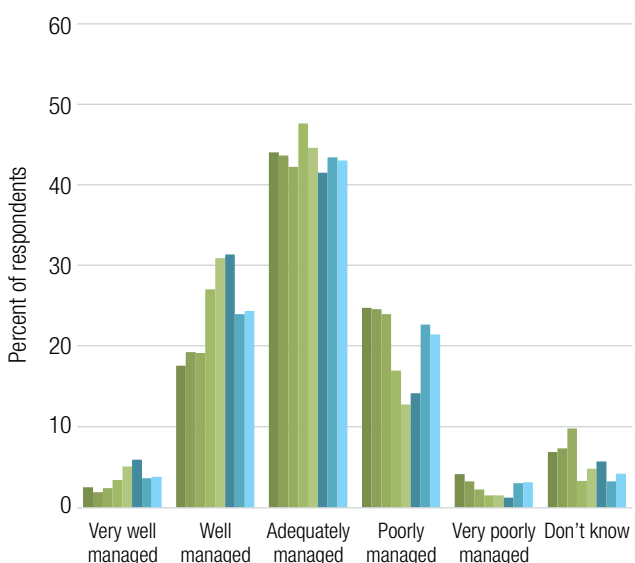
Figure 4.6b.   Perceptions about management of coastal waters and beaches.

about the direction of management. There are initiatives underway to establish integrated fisheries plans, including stakeholder-led fisheries plans and Ministry-led fisheries plans to overcome remaining management issues (Harte 2008).

Measures of fisheries habitat sustainability have been defined but do not provide information on sea floor impacts (MfE 2007: 319). A Benthic Impacts Standard is being developed. It will establish criteria that can be used to determine the effect of fishing on the seabed (MFish 2010: 9). However, there is monitoring of fishing-related mortality of protected species. The fishing- related mortality limit for sealions in the Auckland Islands squid trawl fishery was increased in 2008 but the limit was not reached in 2008/09 nor 2009/10. Seabirds and marine mammals can all be impacted by fishing. Marine mammal operating procedures, exclusion devices and large stretches of coastline closed for fishing, are in place to help prevent bycatch of birds and marine mammals.

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

Perceptions of State, Pressures and Management Trends

The relatively high levels of 'Don't know' responses halved in the e-surveys when compared with preceding postal surveys. This pattern has meant that proportionately more responses from e-survey respondents are allocated to actual views on condition and management of marine fisheries. Overall, respondents considered the quality or condition of NZ fisheries to be adequate to good (Figure 4.7a), with the quantity of fish stocks considered to be adequate (Figure 4.7b) by most respondents who expressed an opinion. The consequence of the lower rates of 'don't know' responses in the e-surveys is a much higher proportion of negative responses from these participants. Key pressures on marine fisheries (Figure 3.13f) are perceived to be 'commercial fishing' (70–76% of respondents), 'sewage and wastewater' (37–40%) and 'hazardous chemicals' (17–23%). As with all other resources, there is a perceived improvement in management over time, with the modal response being 'adequate' (Figure 4.7c).

Commentary

Allowing even for the e-survey reductions, in all seven surveys large numbers of people expressed 'don't know' responses for many marine fishery-related questions, the proportions ranging between 12–24% of postal respondents and 6–10% for the e-survey. The high rates of 'don't know' responses might, in part, reflect the high level of scientific uncertainty about the status of many marine fisheries and may also reflect ongoing claims and counter claims made by fishery and environmental organisations about the status of New Zealand marine fisheries (see, for example, Anderton 2006). They could also be indicative of relatively low familiarity with the resource for many New Zealanders.
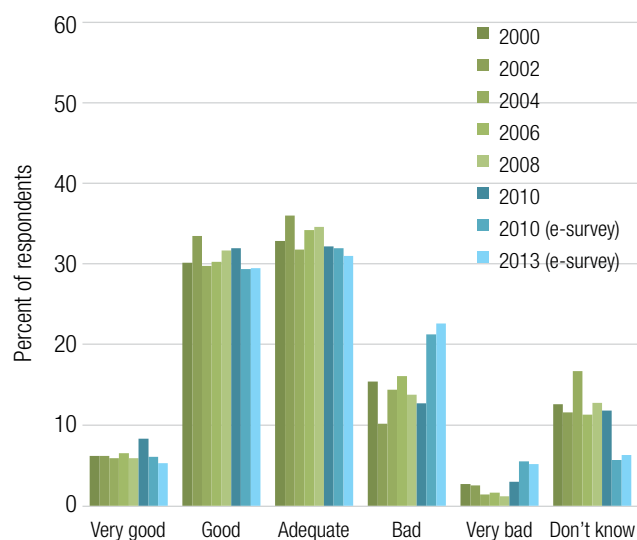
Figure 4.7a. Perceived quality or condition of marine fisheries.
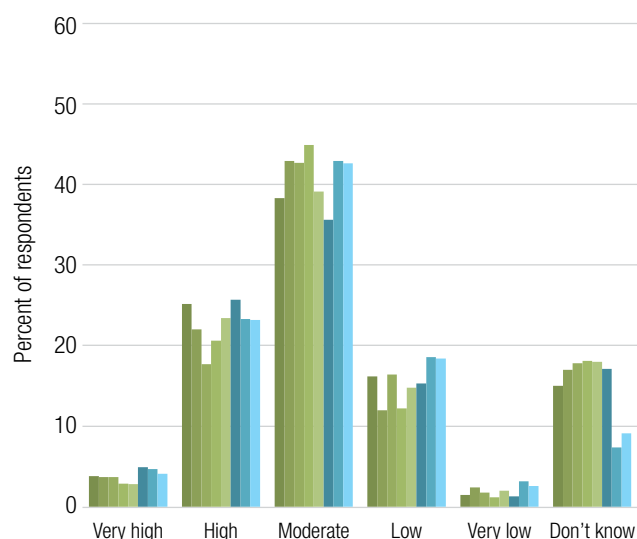
Figure 4.7b. Perceived quantity of marine fisheries.
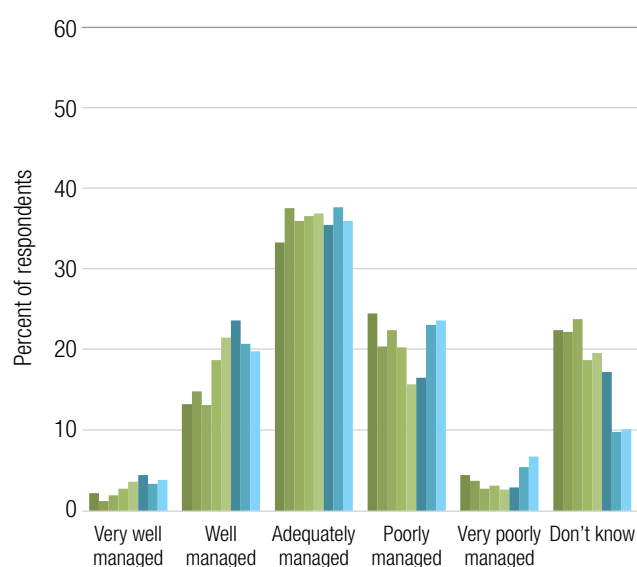
Figure 4.7c. Perceptions about management of marine fisheries.

4.8 MARINE RESERVES

Scientific Information on State and Trends

Forty-nine Marine Protected Areas including 34 Marine Reserves cover 8.2 per cent (14,869 km²) of New Zealand's Exclusive Economic Zone (EEZ). However 99% of the Marine Reserves area is around the distant Auckland and Kermadec Islands. Just 0.3% of New Zealand's total marine environment is protected in marine reserves. As well, 18 seamounts in New Zealand's territorial sea are closed for trawling, which brings the total marine protected area to just over 3% (http://www.doc.govt.nz/conservation/marine-and-coastal/marine-protected-areas/marine-reserves-a-z/ – accessed 1 November 2010). This fraction is very low when compared to terrestrial reserves which cover 33.4% of New Zealand's land area. A large Benthic Protected Area was proposed in 2007 (http://www.fish.govt.nz/NR/rdonlyres/B058B3F1-1FAC-497C-A76A-86E16D14B5BF/0/FAP_BPACostRecovery.pdf – accessed 1 November 2010) and has been gazetted. Spear and Cannon (2012: 4) note that 30 percent of New Zealand's EEZ now comprises BPAs, with minimal impact on the catch sector, but through a process which was not perfect – controversy over the results continues, MfE comment that large areas of the New Zealand EEZ are legally protected but not yet to the standard required to qualify as Marine Reserves (MfE 2012 INFO 655).

The overall state of resources in these 34 reserves has not been quantified, but is likely to be very good compared to surrounding areas (see Willis *et al.* 2003a re snapper abundance). However, internationally there is a lack of empirical research that demonstrates gains in resource quality inside marine reserves (Willis *et al.* 2003b: 101). More recent research indicates that marine reserves are playing a role in fisheries replenishment and habitat restoration (Langlois and Ballantine 2005, Langlois *et al.* 2006). It is also clear that the marine reserves network remains far from representative of the diversity of marine environments present in the New Zealand EEZ (see for example MfE 2012 INFO 655).

Given the above observations it appears likely that while the existing marine reserves are in good condition, the overall network is not representative of New Zealand's marine environments.

Perceptions of state, pressures and management trends

Like marine fisheries there have been high rates of 'don't know' responses for postal survey responses (16–24%); these are much reduced in the two e-surveys (7–10%). Most respondents think there is a moderate quantity of marine reserves in New Zealand. The most frequently identified pressures (Figure 3.13g) are 'commercial fishing' (36–49% of respondents), 'sewage and stormwater' (36–40%) and 'recreational fishing' (23–30%). Marine reserves

are considered to be adequately to well managed, with this perception improving significantly over time. The e-survey results are more negative than the postal surveys.

Commentary

Given the tiny fraction of New Zealand's marine area in reserves, it may appear surprising that only about a quarter of all respondents in 2012 consider there to be a 'low' or 'very low' quantity of marine reserves in New Zealand. However, most of New Zealand's marine reserves are near major cities or tourism destinations, which may have led to the impression that marine reserves are more common than they really are. Respondents may also be unaware of the magnitude of New Zealand's EEZ (the fourth largest in the world), and perceptions of the marine area may be focused on the coastal zone. There are other differences between marine
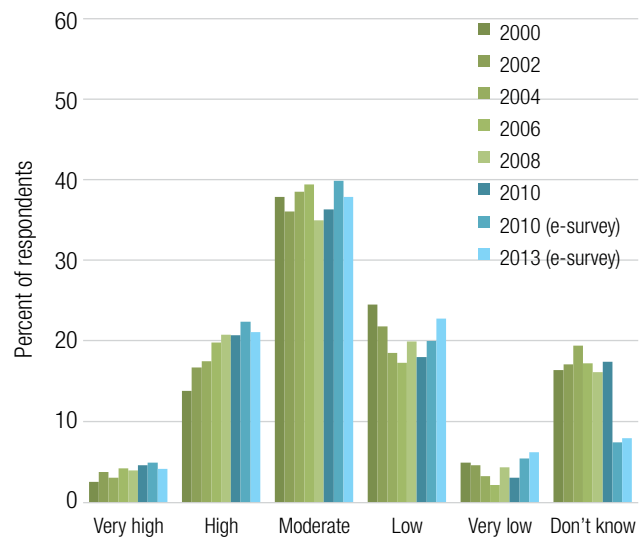
Figure 4.8a. Perceived area of marine reserves
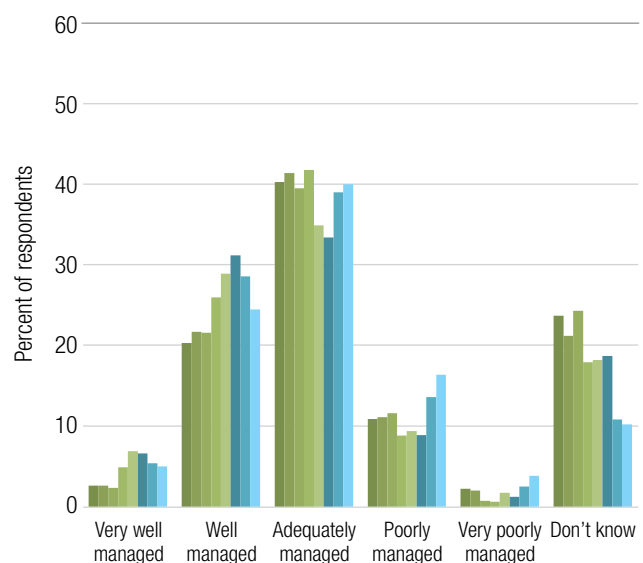
Figure 4.8b. Perceptions about management of marine reserves.

and terrestrial reserves. Harvest of native terrestrial species is generally forbidden—wherever they occur. However, 33.8% of survey respondents participate in marine recreational fishing, a figure consistent with estimates in Hughey *et al.* (2002a), and may lose recreational fishing opportunities with an increase in marine reserves—an outcome that does not apply to terrestrial reserves.

4.9   RIVERS, LAKES AND GROUNDWATER

Scientific Information on State and Trends

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

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

Recent research by NIWA on lake water quality (Verburg *et al.* 2010) also provides evidence of declining quality. 'Trends in nutrient status between 2005 and 2009 were assessed for 68 lakes, and found that 19 (28%) of the lakes had deteriorated and eight lakes (12%) had improved. This pattern varied across lakes with different land covers. Around 40% of lakes with predominantly native catchment cover had deteriorated, compared with 25% of lakes with predominantly pastoral catchment cover. Of the monitored lakes, 112 have nutrient data between 2005 and 2009 available to provide an indication of current state. Of these: 44% have high to very high levels of nutrients, meaning the water quality is degraded; 33% have low or very low levels of nutrients. Extrapolating from the monitored lakes to provide an estimate for the whole of NZ suggests that 32% are likely to be degraded, whilst 43% are likely to have good or excellent water quality.' 'Of the 155 lakes that had data on ecological condition (measured by using submerged plants as an indicator) available: 37% have poor ecological condition or had no submerged plants; 33% have high or excellent ecological condition' (Verburg *et al.* 2010).

MfE report that 210 freshwater beaches used for recreation have been assigned a beach grade based on monitoring data acquired over five consecutive summers (including the 2011–12 summer). The beach grades are based upon potential sources of faecal coliform. Thirty two percent of the beaches were graded Very Good or Good, 24 percent Fair, 24 percent Poor and 21 percent Very Poor (see MfE 2012 INFO 653)

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

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

Perceptions of State, Pressures and Management Trends

In 2000 and 2002, respondents were asked about condition, quantity and management of freshwater. In 2004 and subsequent surveys, the freshwater category was replaced by two separate categories, 'rivers and lakes' (Figures 4.9 a–c) and 'groundwater' (Figures 4.9 d–f), because of the different environmental impacts and management issues relating to them. Whereas Hughey *et al.* (2004, 2006) combined these categories for comparison with the earlier data, that practice has been discontinued and only the 2004–2013 data are reported in detail. An exception occurs in terms of pressure, where the term 'freshwater' remains in use.

Although most people have opinions on the quality, quantity and management of rivers and lakes, there is a higher proportion of 'don't know' responses for questions on groundwater (but with rates for e-survey respondents around half those of postal survey respondents), possibly because groundwater is not 'seen'.

The quality of rivers and lakes and of groundwater (Figures 4.9a and 4.9e) is judged to be 'adequate' or 'good', and the amount of water available in both (Figures 4.9b and 4.9e) is mostly considered to be either 'moderate' or 'high'. However, in these two measures there are large increases in the percentage of respondents who assess water quality as 'bad' and amount of water as 'low' respectively.

The main causes of damage to fresh waters (Figure 3.13g), and the range of variations from 2000–2013, are considered to be 'farming' (25–56%) and 'sewage and stormwater' (40–47%), and 'industrial activities' (27–36%). Farming, in particular, has increased hugely in perceived importance over the course of the survey period (2000–2013).

A range of 13–24% of postal survey respondents for groundwater, and 4–11% for rivers and lakes, expressed 'don't know' responses to perceptions of management of each resource (Figures 4.9c and 4.9f respectively); for e-survey respondents these figures are 7–14% and 2–5% respectively.

Commentary

Water quality and quantity issues remain of high public interest. For example, 26% of chapter downloads from the Environment 2007 report from the MfE website were of the freshwater chapter, with the next closest being biodiversity at 12% (MfE 2008: 3). More recently, the Government's 'collaborative' Land and Water Forum has made many recommendations, and the government in its 'Fresh Start for Freshwater' is making policy and regulatory changes to help deal with some of the concerns about freshwater and its management in New Zealand (see http://www.mfe. govt.nz/issues/water/freshwater/fresh-start-for-fresh-water/index.html – accessed 3 October 2013). Concerns about water quality might be a response to ongoing media interest in water quality issues, such as the prominent 'dirty dairying' campaign implemented by Fish and Game New Zealand, and many high profile articles in popular media, including increased prominence of water footprinting (see for example http://sciblogs.co.nz/waiology/2011/12/12/water-footprints-what-do-they-mean-for-us-in-new-zealand/ – accessed 22 November 2013) and reporting on biophysical monitoring findings.

4.10 NATIONAL PARKS

Scientific Information on State and Trends

New Zealand has 14 national parks (http://www.doc.govt. nz/parks-and-recreation/national-parks/), with 23% of the land area added relatively recently (Whanganui (1986), Paparoa (1987), Kahurangi (1996), Rakiura (2002)). A disproportionate number of national parks (10 out of 14) and other reserves are located in the South Island, mostly in difficult-to-access mountainous areas. New Zealand national parks are dominated by mountain lands and forests. While the state of the mountain lands is likely of high quality, the state of forests within national parks is mixed because of the relatively high level of impacts of weeds and pests (see section 4.4). The overall state of national parks can therefore be considered as good.
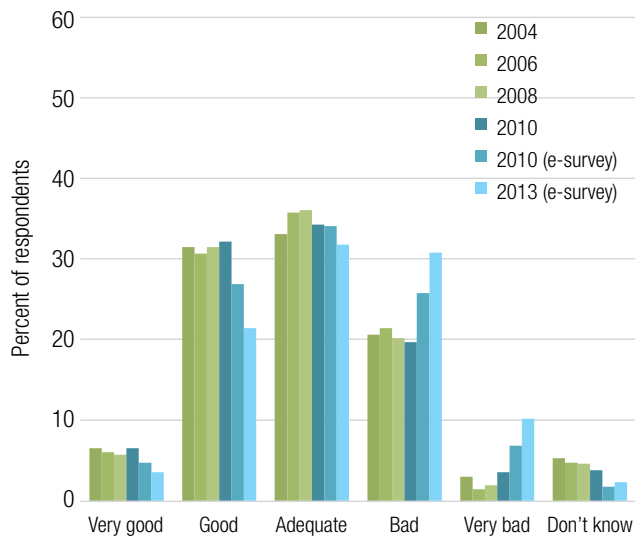
Figure 4.9a. Perceived quality or condition of rivers and lakes.
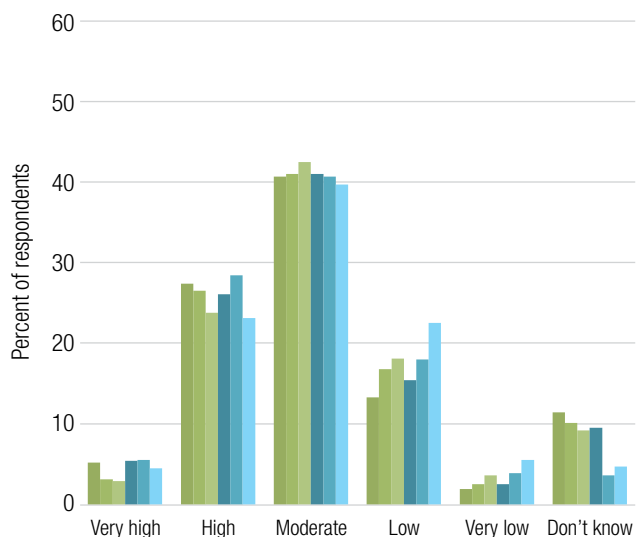
Figure 4.9b. Perceived amount of freshwater in rivers and lakes.
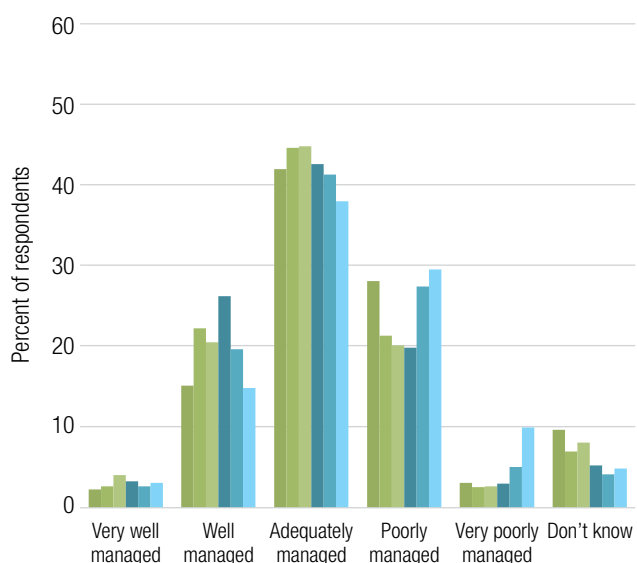
Figure 4.9c. Perceptions about management of rivers and lakes.
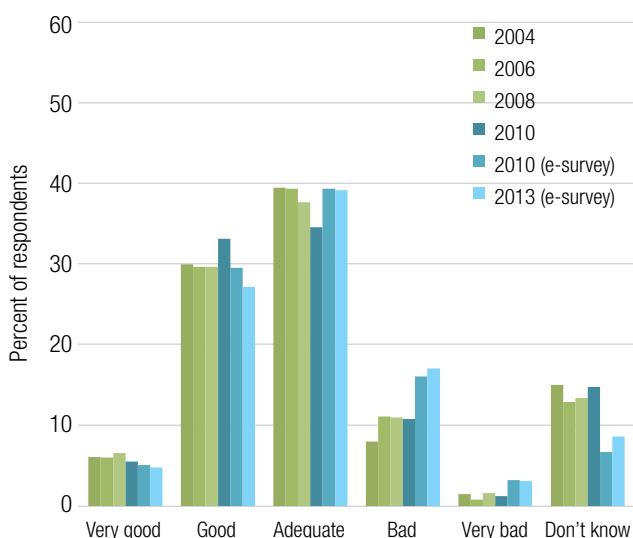
Figure 4.9d. Perceived quality of groundwater.

Perceptions of State, Pressures and Management Trends

Respondents reported the area of national parks in New Zealand to be adequate to good (Figure 4.10a). Key pressures (Figure 3.13i) on national parks are 'pests and weeds' (48–59% of respondents) and 'tourism' (32–51% of respondents). Respondents report that national parks are adequately to well managed (Figure 4.10b).

Commentary

National parks are sometimes considered the 'jewels in the crown' of conservation. They are important to conservation in New Zealand, and have been for many years – Tongariro National Park was established in 1887 (http://doc.govt.nz/parks-and-recreation/national-parks/tongariro/ – accessed 10 October 2013). This importance and the level of management input may be reflected in survey responses which evaluate national parks and their management very positively.

Figure 4.9e. Perceived availability of groundwater for human use.
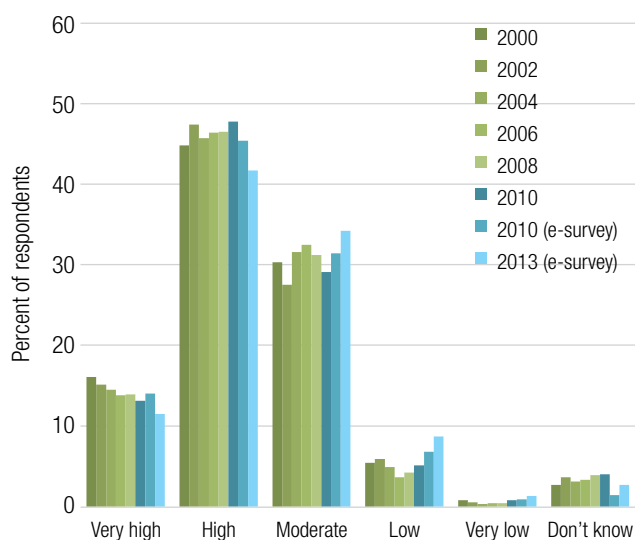
Figure 4.10a. Perceived area of national parks.

Figure 4.9f. Perceptions about management of groundwater.
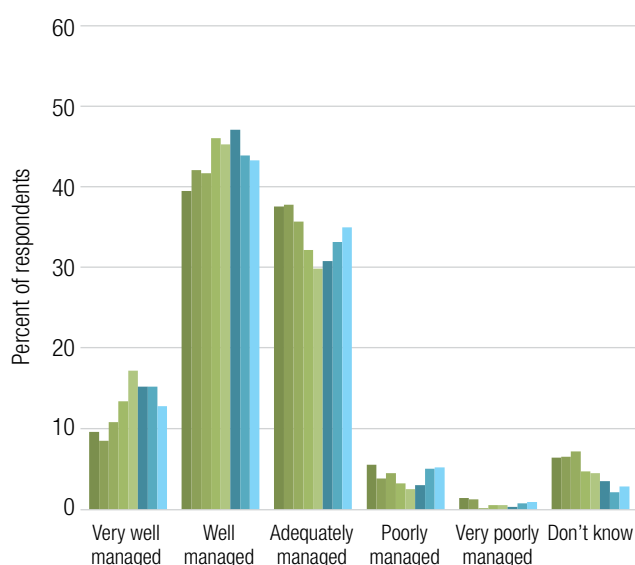
Figure 4.10b. Perceptions about management of national parks.

4.11 WETLANDS

Scientific Information on State and Trends

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

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

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

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

'There are no comparisons over time of scientific information on water and biological quality or surveys of the wetland areas. Nevertheless, after questioning key professionals and others involved in the protection and management of wetlands, we concluded that there is strong subjective evidence that suggests a failure to achieve the desired outcome of the Convention[3]'.

More recently, but also at the national level, Ausseil *et al.* (2012) conclude that their data indicate that New Zealand's wetland biodiversity may be severely depleted and what remains may be threatened. Some wetland types and their associated communities may face extinction.

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

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

Perceptions of State, Pressures and Management Trends

Respondents generally consider the state or condition of wetlands to be adequate to good, with no detectable change over the seven surveys (Figure 4.11a). The area of wetlands is considered to be moderate, with almost equal numbers (15–20%) considering it high to very high or low to very low, but in excess of 20% expressing a 'don't know' view (Figure 4.11b). The perceived main causes of damage to wetlands (Figure 3.13j) are 'pests and weeds' (37–44% of respondents) and 'farming' (29–39% of respondents). Wetlands are considered to be adequately to well managed, with an increasing proportion of respondents expressing very positive views about wetland management (Figure 4.11c).

Commentary

There is a lack of knowledge about trends in the pressures, state and responses to wetland issues in New Zealand–mirrored to some extent by the high frequency of 'don't know' responses to most wetland related questions (postal survey around 15–20%; e-survey around 10%). Having said this, it is somewhat surprising that around 60–80% of respondents consider the condition or quality of wetlands to be adequate to good, and the area to be moderate to very high.

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

Scientific Information on State and Trends

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

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

More recently, an alternative ranking, the Environmental Performance Index (EPI), was released on a trial basis in 2006, subsequently confirmed in 2008 and repeated in 2010 and 2012 (Esty *et al.* 2008, Emerson *et al.* 2012). The EPI has been built around two objectives: 1) reducing

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3   The Ramsar Convention is the Convention on Wetlands of International Importance adopted in 1971 and signed by New Zealand in 1976.
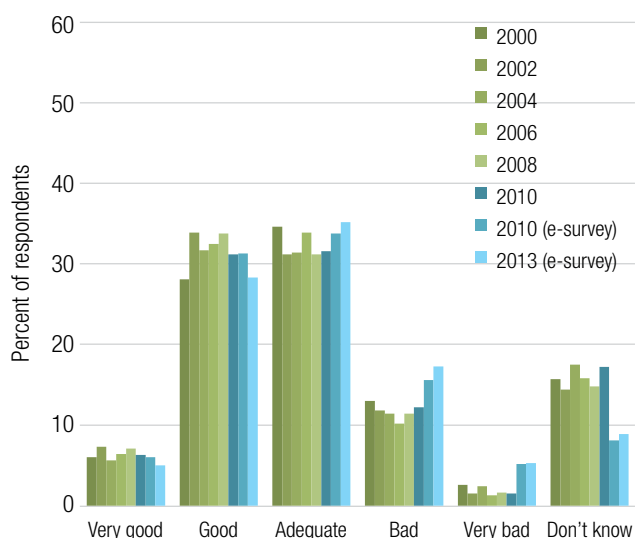
Figure 4.11a. Perceived condition of wetlands.
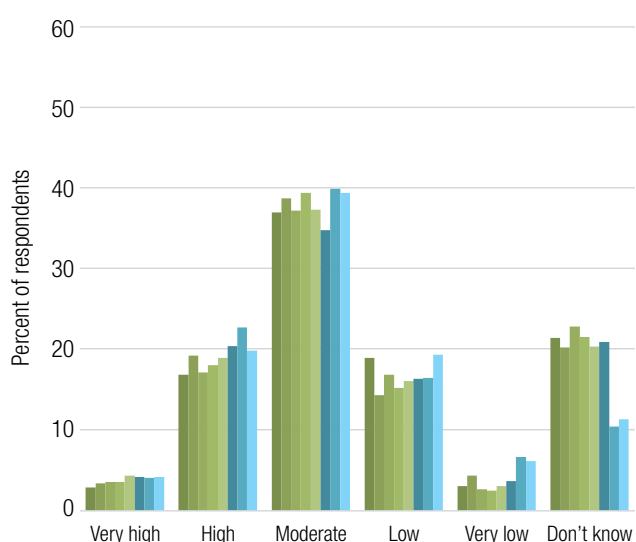
Figure 4.11b. Perceived area of wetlands.
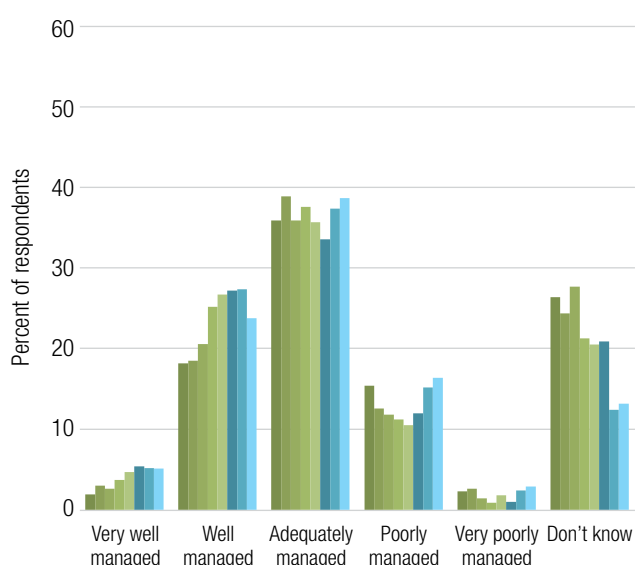
Figure 4.11c. Perceptions about management of wetlands.

environmental stresses on human health; and, 2) protecting ecosystem vitality. The four EPI reports have used different numbers and combinations of indicators, and different sets of weightings, thus making inter-survey comparisons challenging. However, the EPI still gives an indication of comparative nation rankings. In 2006 New Zealand ranked 1st of 133 nations evaluated, in 2008 it ranked 7th of 149 nations considered, in 2010 it ranked 15th out of 163 countries and in 2012 it ranked 14th out of 132 countries. In the 2012 EPI evaluation New Zealand was assessed to be performing very strongly in reducing stresses on human health (EH = 95.03), but only fair on protecting ecosystem vitality (EV = 53.63). Table 4.1 provides a summary comparison of New Zealand's 2012 performance for five of the 22 performance indicators.

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

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

Whangarei Harbour Marine Reserve and Marsden Point oil refinery
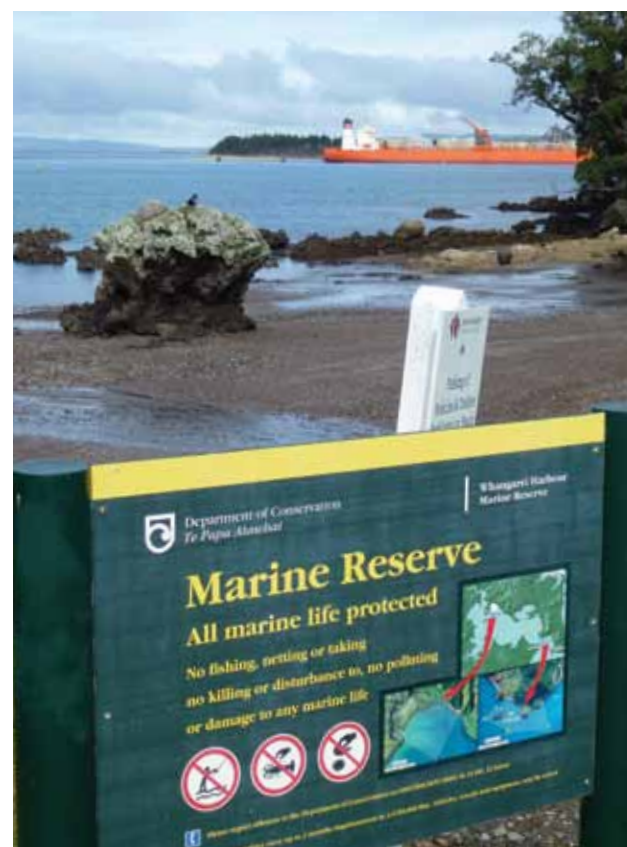
Perceptions of State, Pressures and Management Trends

The vast majority of respondents considered the condition of New Zealand's natural environment to be good or very good when compared to other developed countries (Figure 4.12a). In terms of management, respondents consider New Zealand to be performing well to adequately (Figure 4.12b).

Commentary

Survey responses reinforce the view that New Zealanders believe they live in a cleaner and greener environment than is found in many other developed countries. This view concurs with the conclusions from the ESI and the EPI, which rank New Zealand highly for environmental sustainability and performance. However, the Bradshaw *et al.* (2010) study does reveal that the actions of just 4.4 million people have a significant impact on some parts of the New Zealand environment.
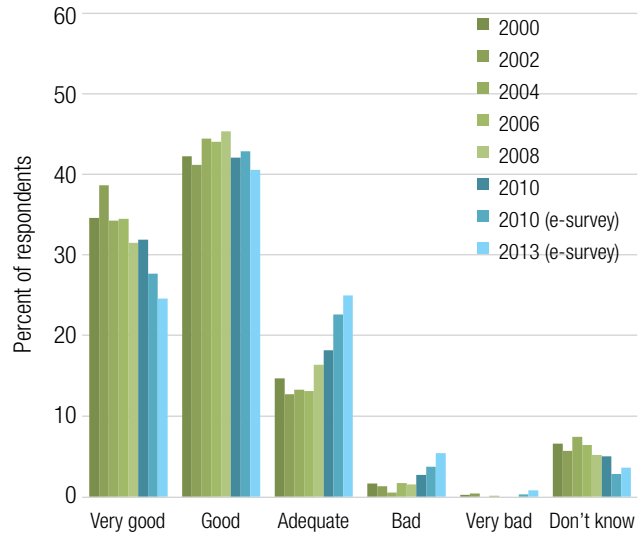
Figure 4.12a. Perceived condition of New Zealand's natural environment compared to other developed countries.
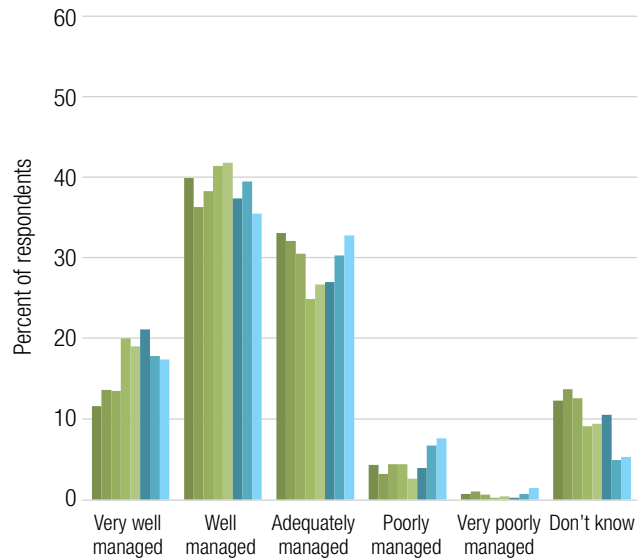
Figure 4.12b. Perceptions about current management of New Zealand's natural environment compared to other developed countries.

South Ashburton River, Arrowsmith Range
GEOFF KERR

05

STATE OF THE ENVIRONMENT

The overall findings and, where appropriate, trends (remembering comments made in Section 2 about the analytic implications of the e-survey of 2013 versus previous paper-based surveys) evident from the detailed results reported in sections three and four are presented in this section.

5.1   OVERALL STATE OF THE ENVIRONMENT

Respondents continue to believe the standard of living in New Zealand is good. Their assessment is that New Zealand is a 'clean and green' land and they also indicate the state of the New Zealand natural environment is good to adequate. However, it is notable that around 40% of respondents consider the state of rivers and lakes to be bad or very bad. Respondents believe that they have good knowledge of the environment. While the quality of their knowledge is unknown to us, respondents' concern about the environment is evident. For example, there are six separate environment-related activities that are engaged in by more than 10% of respondents during the past year (Figure 3.18), from lowest to highest participation these are:

- Been an active member of a club or group that restores and/or replants natural environments (13%)

- Participated in an environmental organisation (20%)

- Been involved in a project to improve the natural environment (24%)

- Made a financial donation to a non government environmental organisation (e.g., Forest and Bird) (27%)

- Obtained information about the environment from any source (59%)

- Bought products that are marketed as environmentally friendly (78%).

An interesting and significant observation about this finding is in terms of demographics. Maori typically had higher rates of participation than did other ethnic groups in many of these activities.

5.2   PRESSURES ON THE ENVIRONMENT

The New Zealand economy has grown during the period of the seven surveys, with cumulative real GDP growth of 44.4% since 2000 (data extracted from www.stats.govt.nz). During the same period the New Zealand population has grown by 15.9%. Growth in the economy and population growth can both increase environmental pressures. Each of the seven surveys asked respondents about the pressures on the New Zealand environment. Responses indicate a belief that growth in production and consumption, as well as intensification of some activities, farming and urban development in particular, are increasing pressures on the environment.

- Respondents in 2013 (and in the 2008 and 2010 surveys) considered fresh water related issues to be the most important environmental issues facing New Zealand (Figure 3.20).

- Some sources of environmental pressures are perceived to affect several resources. Notably, respondents most frequently identified farming as the cause of damage to native land and freshwater plants and animals, soils, freshwaters, and wetlands (Table 3.1). Over the thirteen years of these surveys farming has been increasingly perceived as problematic for almost all resources monitored.

- New Zealand European respondents, as observed previously (e.g., Hughey et al. 2008), were significantly more likely than others to judge that farming exerts pressure on fresh waters.

- Forestry and urban development were judged to exert considerable pressure on native forests and bush.

- Commercial fishing was judged to be the main source of pressures on marine fisheries and marine reserves.

- Of continuing interest is that tourism was listed as second only to pests and weeds as a major cause of damage to national parks (Table 3.1). Also notable is the increased prominence of mining, which ranked third (22% of respondents in 2013 and 2010, an increase from 6% in 2008). This recent high recognition of pressure from mining is almost certainly due to the controversial proposal in 2010 for mining in national parks (e.g., Hembry 2010).

5.3   STATE OF THE ENVIRONMENT

Respondents rate the state of the New Zealand environment highly compared to the environment in other developed countries (Figure 3.5). The seven surveys conducted between 2000 and 2013 have each asked respondents to assess the state of nine components of the environment.

- In the 2000 and 2002 surveys New Zealanders rated the state of marine fisheries as worse than other parts of the environment. However, the 2004–2013 surveys, which disaggregated freshwater into two separate categories, found that rivers and lakes are rated much worse than are marine fisheries (Figure 3.5).

- Three distinct clusters reflect the perceived availability of natural resources in New Zealand. (i) Area of national parks, parks and reserves in towns and cities, diversity of native and freshwater plants and animals, and amount of native bush and forest are tightly grouped at moderate to high availability. (ii) Area of marine reserves, area of wetlands, amount of groundwater, amount of freshwater in rivers and lakes, and quantity of marine fish are rated as having moderate availability. (iii) Oil and gas reserves are perceived to be moderate to low (Figure 3.7).

- The downward trend in perceptions of the amount of oil and gas reserves from 2000 to 2006 was reversed in 2008, 2010 and 2013 with a substantial increase. Perceived availability of this resource remains less than moderate.

- Perceptions about availability of all other resources remain relatively static (Figure 3.8).

5.4   MANAGEMENT OF THE ENVIRONMENT

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

- For rivers and lakes, for groundwater, and for marine fisheries around 20% of respondents thought that management was bad or very bad.

- As in 2010, management of New Zealand's natural environment compared to other developed countries and management of national parks, were both rated much more highly than other parts of the environment (Figure 3.11).

- Across the seven surveys, air quality, marine fisheries and soils have consistently been rated amongst the worst managed environmental sectors (Figure 3.12), joined more recently by rivers and lakes, and by groundwater.

Bream Head dune restoration project

KEN HUGHEY

Whitebaiting stands on the Mokihinui River
KEN HUGHEY

06

SPECIAL TOPICS

Two topic areas of contemporary interest are considered in this chapter. First, research is presented into freshwater fish, with an emphasis on native fish, especially whitebait. Aspects related to fishing participation and effort, conservation status, and management are all considered. The second topic concerns the relative importance and symbolism of a range of introduced and indigenous animal species in New Zealand – interest in this issue relates to policy questions around priorities for conservation work and policy directions.

6.1 FRESHWATER FISH

6.1.1 Introduction

In 2010, given that extractive demand for freshwater in New Zealand continued to increase, especially from agriculture, but also for energy generation, other industries and for domestic water supply, we examined freshwater resources, largely in terms of quantity and quality (see Hughey et al. 2010). With continued interest in freshwater issues, and because there is a dearth of quantitative data about native freshwater fisheries and their management, we chose this as one of our case studies for 2013. Particular attention was given to whitebait (*Galaxius* spp.) because it is a symbol of New Zealand, is an important recreational and 'commercial' fishery in many regions, and is under pressure.

6.1.2 Methods

Thirty three items addressed survey participants' perceptions of (mostly) native freshwater fish issues in New Zealand. Respondents were asked:

- Whether or not they fished for introduced fish in New Zealand – this question was designed to clarify the relationship between fishers for native and introduced freshwater species

- Whether they had in the past, did so now, or intended in the future to fish for native fish

- Relative fishing effort for eel, flounder and whitebait

- Fishing effort for whitebait and the regional or unitary council area in which whitebaiting occurred

- About the conservation status of whitebait, the state of fish stocks now compared to 10 years ago, and the importance to New Zealanders of having healthy stocks of whitebait

- What were the most significant causes of impacts on whitebait habitat and fish stocks

- Who should pay for habitat fencing and revegetation, amongst a variety of agency and land owner choices

- And, assuming a decision had been made to reduce fishing pressure then, from a range of seven management options which were considered most and least preferred.

A range of descriptive data are provided and, where appropriate, responses are cross tabulated and subjected to Chi-squared analysis. Appendix 3 reports data for this topic area.

6.1.3 Results

Fishing Characteristics

Respondents were asked whether they fished for a range of introduced fish species. Of 1785 valid responses 11.7% indicated they fish for introduced fish species, including a large number of respondents (7.4%) who fish for either brown or rainbow trout.

We next sought to determine whether respondents fish for native fish (Figure 6.1). Of 1821 valid responses 122 (or 6.7%) stated they fish for them now. Overall, 754 (or 41.4%) respondents had either fished for native species in the past (some of whom won't fish for native species again, and others who do intend to fish for them again), fish for them now, or had not fished for them but intend to in the future. The remaining 58.6% have not fished for native freshwater fish, and do not intend to.

Respondents who stated they currently fish for native fish were then asked whether they fished for eels, flounder or whitebait and whether this fishing was commercial, recreational or for customary Maori reasons (they could select several of these options) (Figure 6.2). Clearly, most were fishing for recreational reasons. Thirty two per cent of eel fishers were involved in customary fishing, far more than for flounder or whitebait. Very few claimed to be fishing for commercial reasons for any of these three species.

'Whitebaiters' were asked about the number of days they fished in 2012. Seventy one people responded to this question. The 46 who fished for whitebait in 2012 did 458 days of whitebaiting, a mean of 10 days per fisher.

We also sought to determine the regional or unitary council where the respondents mostly whitebaited (Figure 6.3). The most fished councils were Taranaki, followed by Wellington and Bay of Plenty. When compared on an island basis, 64% of respondents fished in the North and 36% in the South.

Whitebait Conservation

Survey respondents were asked three questions about whitebait conservation. First, they were asked about how threatened they considered whitebait to be (Figure 6.4). Around 73% of the 1815 valid responses considered whitebait to be either 'extremely' or 'somewhat' threatened; only 5% considered them 'not threatened at all'. Currently active whitebaiters were much less likely to consider the species extremely threatened than were non-whitebaiters (p<0.01).

A second question explored perceptions of change in whitebait numbers over the last 10 years (Figure 6.5). Of the 1812 valid responses, 68% considered the abundance of whitebait was either 'much less' or a 'little less' than 10 years ago. By contrast, only 5% thought there were more whitebait than 10 years ago. Sixty-nine percent of non-whitebaiters
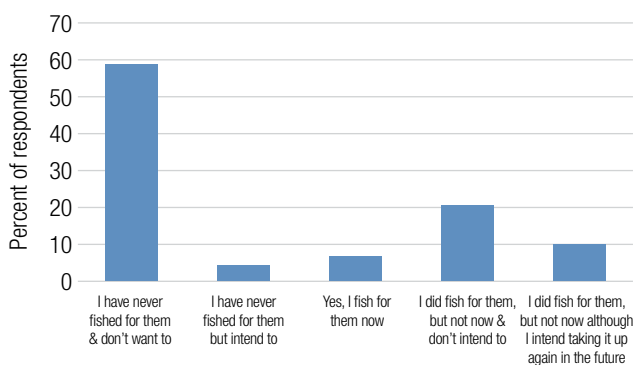
Figure 6.1. Respondent participation in fishing for native fish in New Zealand (N=1821).
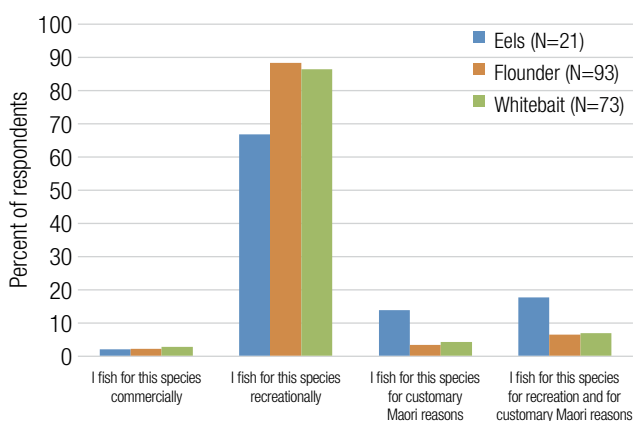
Figure 6.2. Numbers fishing for key native fish species.
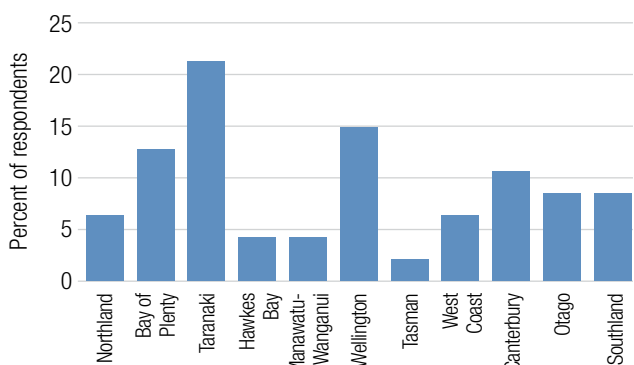
Figure 6.3. Regional or Unitary councils in which respondents undertook most of their whitebaiting (N=47).
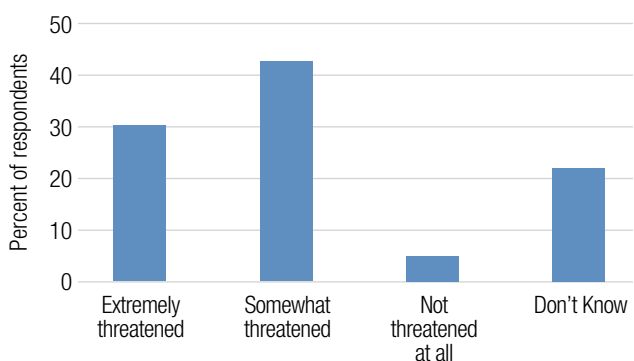
Figure 6.4. Perceived conservation status of whitebait (N=1815).

and 47% of whitebaiters thought whitebait were much less abundant now, a highly significant difference (p<0.001).

The third question in this set sought to determine how important it is for New Zealand to have plentiful and healthy whitebait (Figure 6.6). A total of 75% of respondents thought it was 'very' or 'somewhat' important to New Zealand, with less than 1% thinking it was 'not at all' important.

A fourth question asked about the activities having the most detrimental impact on whitebait (Figure 6.7). The three most cited impacts were 'loss of whitebait spawning habitat' (38%), 'water pollution (excluding sediment)' (28%) and 'overfishing' (21%). There was no significant difference in responses between whitebaiters and non-whitebaiters (p=0.31).
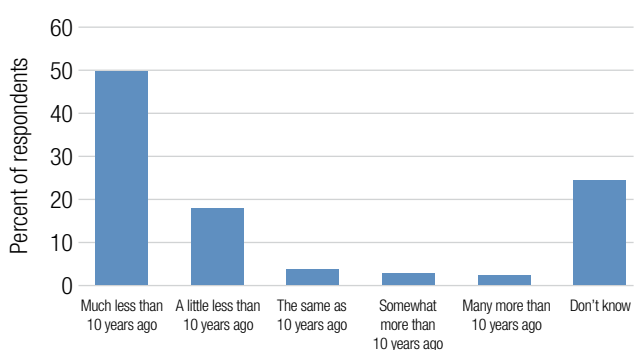
Figure 6.5. Numbers of whitebait in New Zealand compared to 10 years ago (N=1812).
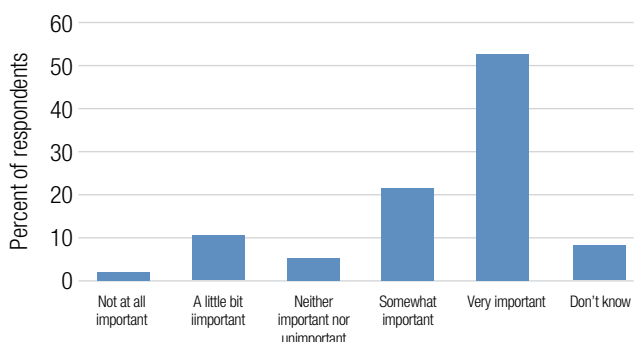
Figure 6.6. Importance to New Zealanders of having plentiful and healthy whitebait (N= 1815).
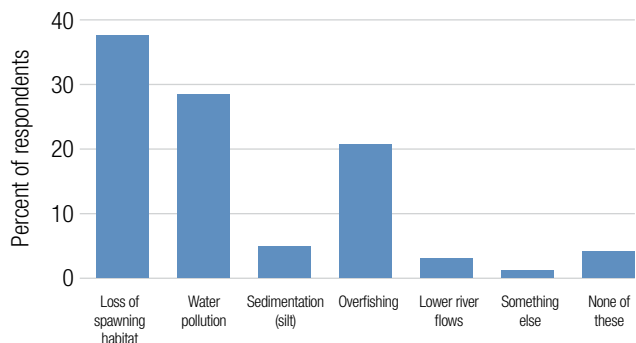
Figure 6.7. Main impacts on whitebait (N= 1817).

Potential Management Actions and Funding Options

The two key management actions that can influence the whitebait fishery are rules and regulations around catching whitebait, and habitat management. Aspects of both were explored. The analysis that follows presents the overall survey response and, where appropriate, considers just whitebaiters. Seven options that might reduce total whitebait catch were ranked by respondents, with 1 being 'most preferred' and 7 'least preferred' (Figure 6.8).

The distributions of ranks for the seven alternatives were all significantly different, based on Chi-squared tests. Mean ranks for each option are presented from most (1) to least (7) preferred:

Introducing a 5kg daily catch limit	*2.55*
Shorten the fishing season by two weeks	*2.95*
Making it illegal to have traps in nets	*2.99*
Closing some rivers	*4.11*
Morning only fishing	*4.72*
Making it illegal to sell whitebait	*5.01*
Afternoon only fishing	*5.25*

The means of ranks for shortening the fishing season (2.95) and making traps illegal (2.99) are not significantly different (t = 0.89). However, all other mean ranks are significantly different at very high confidence levels (minimum t-score = 5.22).

The influence of fishing for whitebait was evaluated for each of the three overall highest ranked options. To facilitate analysis, and to permit Chi-squared tests, ranks were amalgamated into three classes: High (ranks 1&2), Moderate (ranks 3–5), and Low (ranks 6&7).

- Whitebaiters (17%) were more likely than non-whitebaiters (6%) to provide a Low rank for introducing a 5kg catch limit (p<0.01)

- Whitebaiters (53%) were more likely than non-whitebaiters (47%) to provide a High rank for shortening the fishing season by two weeks. In contrast, whitebaiters (22%) were more likely than non-whitebaiters (11%) to provide a Low rank for shortening the fishing season by two weeks (p<0.001)

- Whitebaiters (28%) were more likely than non-whitebaiters (11%) to provide a Low rank for banning traps in nets (p<0.001).

Funding options for two management actions designed to improve whitebait habitat were explored. In both cases respondents were asked to consider five different sources of funding and to allocate funding sources in 20% blocks according to their preferences. Figure 6.9 reports the distribution of preferred funding sources for fencing while Figure 6.10 reports on preferred funding of revegetation of river banks or wetland areas. Notably respondents:
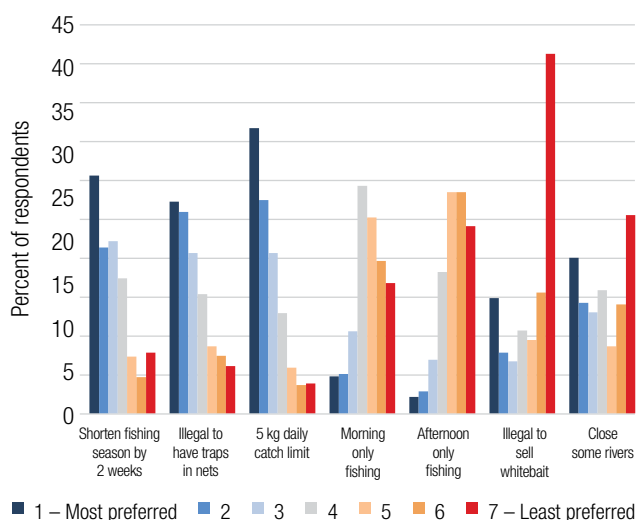
Figure 6.8. Preferences for options aimed at reducing whitebait fishing effort.
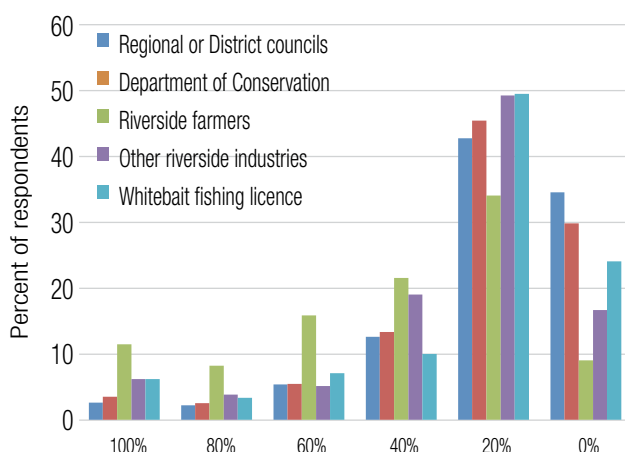
Figure 6.9. Options for funding the fencing of whitebait spawning areas in the lower sections of rivers.
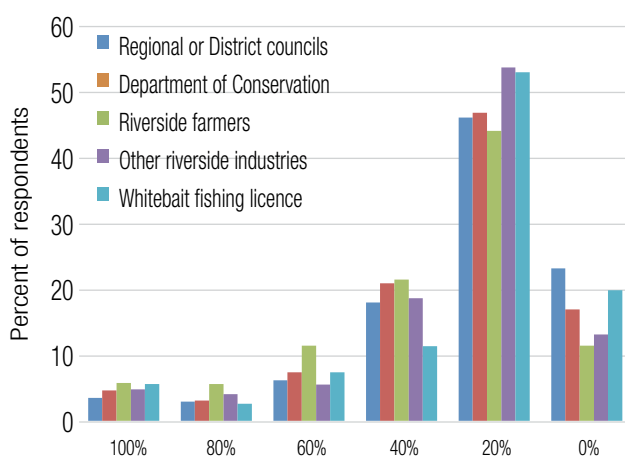
Figure 6.10. Options for funding revegetation of riverbanks and wetlands to enhance whitebait habitat.

- Tend to support roughly equal contributions from the range of potential funding sources

- Seem to strongly support a user pays principle, whitebait licence contributions, even though there is no licence at present

- Possibly support the exacerbater pays principle, i.e., riverside farmers and other industries causing habitat damage should pay larger contributions.

6.1.4 Discussion

As far as we are aware there is no published material on New Zealand participation rates in whitebaiting. According to our survey, 73 respondents (2.5% of the survey respondents) currently fish for whitebait; this compares to 11.7% who report fishing for introduced fish, including 7.4% who fish for brown and/or rainbow trout. By contrast, Unwin (2008) reported around 2% of New Zealand's adult population held a whole-season fishing licence in the 2007/08 season (this was an underestimate due to non-availability of Taupo Conservancy figures).

There appears to be a high level of concern about the state of the whitebait fishery. A large proportion of respondents who expressed an opinion (i.e., excluding 'don't knows') considered whitebait to be either extremely threatened (39%) or somewhat threatened (55%). Similarly, 65% of those who expressed an opinion thought there were much fewer whitebait than 10 years ago, while 57% thought it very important or somewhat important to New Zealanders to have plentiful and healthy whitebait. The three main impacts on the fishery, loss of habitat, water pollution and overfishing were considered in terms of how best to manage the fishery. Loss of habitat and pollution are both habitat related issues. In response to habitat issues, we asked respondents to consider who should fund the fencing of whitebait spawning areas and who should fund revegetation of riverbanks and wetlands. In both cases there was a high level of support for a shared approach to payment, with between 30% and 60% of respondents in favour of each of the potential contributing parties paying 20% of the cost. When this was considered further, 57% of respondents considered riverside farmers should pay for 40–100% of these costs, perhaps reflecting an exacerbater-pays principle. In terms of fishing effort the most preferred option was introducing a daily catch limit.

Another way of addressing the acknowledged high level of concern about the state of the fishery is to explore a range of catch options. Of seven options considered the most favoured were: introduction of a 5kg daily catch limit, shorten the fishing season by two weeks, and making it illegal to have traps in nets. Interestingly, non-whitebaiters favoured each of these options more than did whitebaiters.

Whitebait/Inanga

EOS ECOLOGY / SHELLEY McMURTRIE

From a policy making perspective, potentially also interesting would be an evaluation of how manageable each of these options is. Some preliminary considerations might include:

▪ Having a daily limit bag of 5kg would be very difficult to police because whitebaiters frequently fish over two tides in one day, there are many whitebaiting rivers and many whitebaiters, and there are very few staff enforcing whitebait regulations

▪ The remaining two preferred options would both be easy to police – nets have or do not have traps and checks would quickly identify transgressions; and season length could be shortened without anything more than a publicity campaign and some limited policing required.

The survey provides a range of relatively clear opportunities for policy makers to consider further.

6.2 IMPORTANCE AND SYMBOLISM OF DIFFERENT ANIMAL SPECIES IN NEW ZEALAND

6.2.1 Introduction

In 1994 Fraser (2001) surveyed the New Zealand public to examine attitudes to introduced wildlife in New Zealand. To our knowledge his work has not been followed by more recent surveys. In this survey we concentrate on just one comparative element of his work, namely attitudes to introduced species, and take it further. We do this by looking at 19 species, including a mix of indigenous and introduced animals. We look at people's perceptions of the importance of having these species in the wild and also the degree to which they are positive symbols of New Zealand. For methodological reasons we could not ask the same questions as Fraser (2001), so comparison with his results is not possible.

6.2.2 Methods

Two questions examined respondent views on 19 different indigenous and introduced animals in New Zealand – the first looked at importance and the second at positive symbolism of the animals for New Zealand. For both questions respondents were required to select from Likert scales: in the first question this was a 5-point scale anchored by 'not important at all' and 'very important'; for the second it was a 3-point scale anchored by 'not at all symbolic' and 'extremely symbolic'. Descriptive statistics are presented for both sets of responses.

6.2.3 Results

Importance

The relative importance for New Zealand of having healthy numbers or populations in the wild of a range of animal species was examined (Figure 6.11). Eight species, including the introduced trout species, had scores in the range from 3.88 (bats) to 4.86 (kiwi), indicating a high level of importance; chamois, deer, pigs and tahr (the 'big four' game animals in NZ) scored between 2.5 and 3.0 (neither important nor unimportant); the remaining seven species scored less than 2.5, with possums and wild cats scoring lowest.
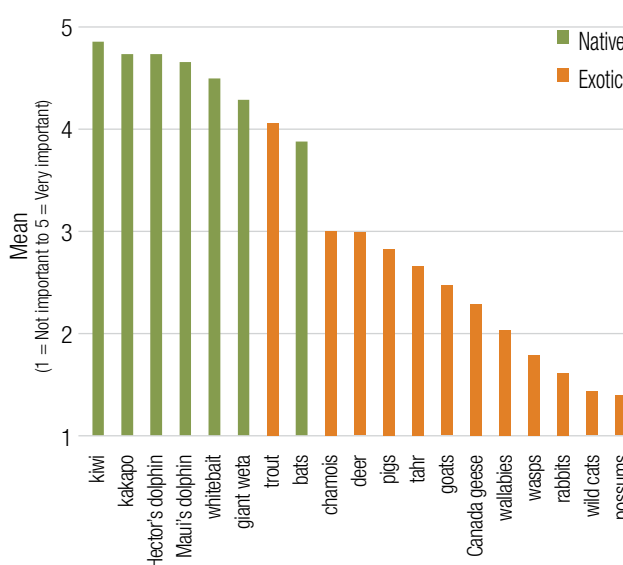
Figure 6.11. Ranked importance for New Zealand of having healthy numbers or populations in the wild for nominated animal species.
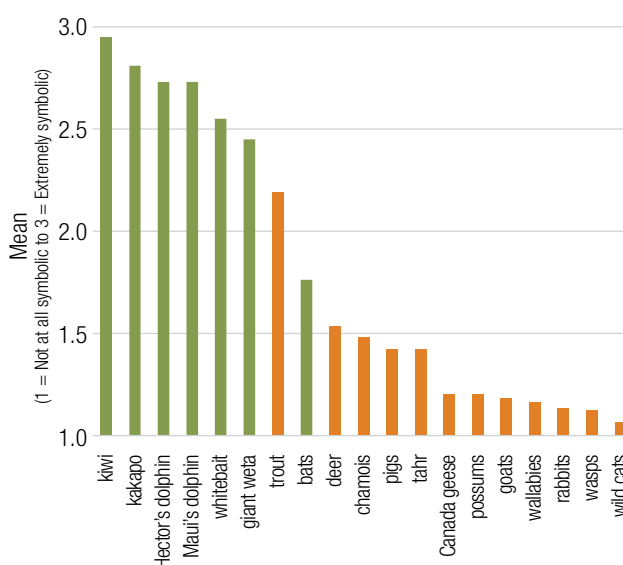
Figure 6.12. Ranked positive symbolism to New Zealand for nominated animal species.

Symbolism

The second question looked at the extent to which the same 19 animal species were a positive symbol of New Zealand (Figure 6.12). For the first six species on this graph more than 50% of respondents recorded 'extremely symbolic' scores. Two species, trout and bats, had 50% of respondents choosing 'somewhat symbolic' or 'extremely symbolic' – notably for bats 40.7% of respondents chose 'not at all symbolic'. The 'big four' game animals were all considered 'not at all symbolic' by around 50–60% of respondents. The remaining seven species were considered 'not at all symbolic' by over 75% of respondents, with wild cats the lowest rated (92% of respondents considered them 'not at all symbolic').

6.2.4   Discussion

Perhaps not surprisingly, endemic species such as kiwi scored very highly in terms of their relative importance to respondents, while introduced animals, in the main, scored extremely poorly – the exception was trout which was considered important.

A similar pattern emerged for symbolism of New Zealand, although bats rated much lower than trout. As far as we are aware the only other study that has undertaken a comparative species evaluation is Premium Research (2011), which reports results of a survey undertaken by the Department of Conservation to gauge the iconic status of species. The survey asked participants to "List up to ten species … you think are quintessentially kiwi because they help define who we are as New Zealanders" (DOC, 2011). The relative ranking of native and introduced species obtained from the DOC survey may not be reliable because of mixed messages and interpretations about consideration of native and introduced species.

Whereas our study asked respondents to score a researcher-nominated list of species, the DOC survey asked people to self-nominate their ten most important species, which is quite a different approach. Nevertheless, the kiwi came at the top of both scales, nominated by 85% of respondents to the DOC survey. The next three most frequently nominated fauna species in the DOC survey were tui (22%), kakapo (18%), and kea (15%). Dolphins (including Hector's and Maui) were mentioned by only 2.6% of respondents to the DOC survey, but were rated highly in our survey. The most frequently nominated introduced species in the DOC survey were sheep (1.0%), cows and deer (both 0.47%).

Looking at responses to the questions about importance and symbolism it is possible to identify three broad clusters of species, with some overlap at the margins:

▪ The native species: kiwi to bats– these are species that people associate positively with New Zealand. Introduced trout fall into the tail of this group;

▪ The introduced but high profile 'big four' game animals: deer to tahr;

▪ The typically smaller introduced species: Canada geese and goats through to wild cats. These species are neither symbolic nor valued and are often considered pests.

Acknowledging this grouping is in keeping with Fraser (2001), who examined aspects of the 'pest-resource' characteristics of animals such as deer. Responses to our survey place large game species between the native species, which are considered to be resources, and the species that are commonly considered to be pests. The lack of clarity about the role of the large game species presents some challenges for identifying appropriate management objectives for them.

Maintaining many of our symbolic species requires considerable intervention

KEN HUGHEY

Lake Coleridge from Peak Hill
GEOFF KERR

07

DISCUSSION AND CONCLUSIONS

The biennial survey of people's perceptions of the state of the New Zealand environment is the only research the authors are aware of that systematically studies perceptions of the state of the environment using public surveys, while applying the Pressure–State–Response (PSR) model[1]. In this section the main findings and implications from the 2013 PSR survey are identified and key observations over all seven surveys examined (noting the limitations discussed in section 2 resulting from the change from paper-based to electronic surveying[2]).

7.1 THE 2013 SURVEY

7.1.1 Pressure–State–Response

The survey aimed to determine how New Zealanders perceived pressures, states and responses to various aspects of the New Zealand environment. Our brief review of biophysical resources is consistent with measures that show New Zealand is in the top quartile of countries in terms of sustainability (see Emerson *et al.* 2012). This position is consistent with New Zealanders' perceptions that, on average, the state of their natural environment is adequate or good, New Zealand is 'clean and green', and that they have good knowledge of the environment. The pressure on the New Zealand environment is much lower than in many other countries, but it is likely to be increasing steadily with population and economic growth.

The environment overall, and the urban environment in particular, are thought of very highly. Nevertheless, people's perceptions of some resources being in good or very good state is at odds with the fact that they are in fact very poor, 'biodiversity' is a notable example (see for example Hughey *et al.* 2008). Reasons for dissonance between science and perceptions are not always clear—this is one area where more research might be useful.

Overall, survey respondents judge that the environment is adequately managed. Considering broad-scale management issues, respondents continue to give the poorest ratings to management of farm effluent and runoff, and industrial impact on the environment (Figures 3.9 and 3.10). Questions about management of specific resources (rather than broad-scale issues, see Figure 3.11) reveal that respondents rate lowest the management of rivers and lakes, groundwater, marine fisheries and soils.

There are some environment enhancing activities that are widely adopted. For example, recycling household waste, buying products marketed as environmentally friendly, and reducing or limiting use of electricity were all claimed to be undertaken by over 80% of year 2013 respondents. Relatively

few respondents, however, are involved in the restoration or replanting of the natural environment, participate in an environmental organisation, or take part in environmental hearings or consent processes.

The respondents' single most important environmental issue for New Zealand in 2013 is again freshwater quality and related issues (28% of respondents compared to 24% in 2010).

As with the previous surveys, high numbers of respondents state they lack knowledge about some resources (soils, wetlands, marine reserves, oil and gas reserves, groundwater), and their unwillingness to give uninformed responses adds credibility to the results. Having said this, e-survey respondents recorded much lower rates of 'don't know' responses than did respondents to our earlier paper based surveys.

7.1.2 Whitebait fishery

There is very little published information about how New Zealanders generally, and whitebaiters in particular, view aspects of the whitebait fishery. The 73 people who stated they currently fish for whitebait (2.7% of survey respondents) provided the opportunity to explore perceptions and policy options within the angler population.

Generally, survey respondents, including non-whitebaiters, have a high level of concern about the state of the whitebait fishery, including the conservation status of the species. An exploratory analysis of funding options for managing habitat was undertaken for riparian fencing and for revegetation projects – in both instances respondents showed a strong level of support for user pays (a whitebait fishing licence, which does not exist at present) and exacerbater pays (mainly farmers). Another whitebait conservation issue is catch management. We asked respondents to rank seven catch management options. Three options – introducing a daily 5kg catch limit, shortening the season by 2 weeks, and making it illegal to have traps in nets were most preferred, although non-whitebaiters were more in favour of these options than whitebaiters were. The least preferred options were making it illegal to sell whitebait and introducing afternoon only fishing.

The relatively consistent nature of the responses should give policy makers some direction for further research and the exploration of policy initiatives, particularly around catch management as a conservation measure.

7.1.3 Animal 'values'

The relative importance and symbolism of different animals, native and exotic, to New Zealanders, and the implications for policy, have been debated for some time. While Fraser (2001) and DOC (2011) explored some aspects of these questions, our research encompasses a wider range of animal species. As observed in section 6.2.4, there appear to be three clusters of animals in terms of their positive symbolism to New Zealand, supported to some extent by the importance to New Zealand of having healthy numbers or populations of them in the wild:

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1   A project undertaken, initially biennially, in the Environment Waikato region assessed environmental awareness, attitudes and actions but did not apply the PSR model (Environment Waikato & Gravitas Research and Strategy Ltd 2007). The Waikato project completed three biennial surveys and undertook a fourth survey in late 2006.

2   For 2016 we are considering undertaking both a paper-based survey and an e-survey, subject to funding availability.

- The native species – kiwi, kakapo, Hector's and Maui's dolphins, giant weta, whitebait, and bats. An anomaly is introduced trout, which are viewed similarly to these native species.

- The high profile 'big four' introduced big game animals – deer, chamois, pigs and tahr.

- The 'mainly pest' species – Canada geese, possums, goats, wallabies, rabbits, wasps and, lowest rated of all, wild cats.

Of particular note in these lists is where trout sit, amongst the native species of New Zealand, albeit at the lower end (between giant weta and bat) of this continuum. The 'big four' game animals sit between the native and 'pest' species, reflecting contemporary debate about whether they are a pest or a resource.

7.2 IMPLICATIONS FOR POLICY MAKERS

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

- Most respondents, consistent with previous surveys, considered the condition of New Zealand's native plants and animals to be 'adequate' or 'good' although the National Biodiversity Strategy (DOC and MfE 2000), the Environment New Zealand 2007 report (MfE 2007) and the global Environmental Sustainability Index (Emerson *et al.* 2012) indicate otherwise. The public's lack of understanding of the seriousness of the problem could ultimately hinder acceptance of additional expenditures and programmes in this area.

- The perceived impact of farming on the environment has always been negative, and it has not improved in 2013. Continued monitoring will be instructive as to how well the public detects resource improvements, should current policy responses be effective. Audited positive results arising from the 'Dairying and Clean Streams Accord' (see Hill 2004, for example) may change the public's

perceptions when they are more widely known, although Deans and Hackwell (2008) present a pessimistic view of the outcomes from this type of initiative.

The whitebait case study provides an opportunity for more targeted exploration with whitebait policy makers and whitebait fishers about:

- Implementation of, and payment for, habitat enhancement initiatives to help conserve whitebait

- Catch related measures to conserve the whitebait fishery.

Regarding the latter, a 5kg daily limit was the most favoured option but this would be a difficult option to police. In contrast, policies that would shorten the season or that would result in traps being excluded from nets are very enforceable. Policy makers could consider these options in more detail.

The case study about relative importance and symbolism of a range of animal species to New Zealanders could help explain some of the ongoing debate about the future of big game animal management in New Zealand. Respondents clumped these species in a group between those species that are both native and very symbolic of New Zealand, and species that are more clearly considered pests. Policy makers, as they are now doing with the Game Animal Council Bill, need to look more carefully at how to manage these 'pest-resource' species into the future.

Finally, our results show significant disparities between data collected from postal and electronic surveys. Clearly, both cannot be representative of the population – neither may be. As we have shifted from postal to electronic data collection our ability to detect recent temporal trends is limited. Continued application of the same data collection method will reveal such trends, but with only two electronic surveys completed we are at the start of that process.

Takahe
ROSS CULLEN

08

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Mountain Beech
ROSS CULLEN

APPENDICES

09

9.1   APPENDIX 1: SURVEY

ENVIRONMENTAL PERCEPTIONS SURVEY 2013
Conducted on behalf of Lincoln University

QUESTIONNAIRE

HorizonResearch
LISTENING TO NEW ZEALAND

New Zealand's Environment

Firstly, we would like your opinion on the following:

1.1.   Your knowledge of environmental issues is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

1.2.   The overall standard of living in New Zealand is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

1.3.   The overall state of the natural environment in New Zealand is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

2.2.   New Zealand's environment is "clean and green"
1   Strongly agree
2   Agree
3   Neither agree nor disagree
4   Disagree
5   Strongly disagree
6   Don't know

Please indicate what you think the condition of each of the following is:

3.1.   Natural environment in towns & cities is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.2.   Air is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.3.   Native land and freshwater plants and animals is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.4.   Native bush and forests is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.5.   Soils is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.6.   Coastal waters and beaches is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.7.   Marine fisheries is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.8.   Rivers and lakes is
1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

3.9.　　Groundwater is
1　Very good
2　Good
3　Adequate
4　Bad
5　Very bad
6　Don't know

3.91.　　Wetlands is
1　Very good
2　Good
3　Adequate
4　Bad
5　Very bad
6　Don't know

3.92.　　Natural environment compared to other developed countries is
1　Very good
2　Good
3　Adequate
4　Bad
5　Very bad
6　Don't know

Now we would like your opinion on some of our natural resources. New Zealand's ....

4.1.　　Diversity of native land and freshwater plants and animals is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.2.　　Amount of native bush and forests is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.3.　　Quantity of marine fisheries is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.4.　　Area of marine reserves is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.5.　　Amount of fresh water in rivers and lakes is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.6.　　Availability of ground water for human use is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.7.　　Area of national parks is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.8.　　Area of wetlands is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.9.　　Availability of parks and reserves in towns and cities is
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

4.91.　　Reserves of oil and gas are
1　Very high
2　High
3　Moderate
4　Low
5　Very Low
6　Don't know

What do you think of the management of the following items? Management of New Zealand's ....

5.1.　　Pest and weed control is
1　Very good
2　Good
3　Adequate
4　Bad
5　Very bad
6　Don't know

5.2.　　Solid waste disposal is
1　Very good
2　Good
3　Adequate
4　Bad
5　Very bad
6　Don't know

5.3.　　Sewage disposal is
1　Very good
2　Good
3　Adequate
4　Bad
5　Very bad
6　Don't know

5.4.   Farm effluent and runoff is

1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

5.5.   Hazardous chemicals use and disposal is

1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

5.6.   Industrial impact on the environment is

1   Very good
2   Good
3   Adequate
4   Bad
5   Very bad
6   Don't know

And what do you think of the management of each of the following?
Currently New Zealand's ....

6.1.   Natural environment in towns and cities is

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.2.   Air quality is

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.3.   Native land and freshwater plants and animals are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.4.   Native bush and forests are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.5.   Soils are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.6.   Coastal waters & beaches are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.7.   Marine fisheries are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.8.   Marine reserves are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.9.   Rivers and lakes are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.91.   Groundwater is

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.92.   National parks are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.93.   Wetlands are

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

6.94.   Natural environment compared to other developed countries is

1   Very well managed
2   Well managed
3   Adequately managed
4   Poorly managed
5   Extremely poorly managed
6   Don't know

Please say what you think are the main causes of damage, if any, to each of the following parts of the New Zealand environment by selecting up to 3 causes on each row for each of the following:

7.1.   Air
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.2.   Native land & freshwater plants & animals
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.3.   Native forests & bush
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.4.   Soils
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.5.   Beaches & coastal waters
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.6.   Marine fisheries
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.7.   Marine reserves
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.8.   Fresh waters
   A. Motor vehicles and transport
   B. Household waste and emissions
   C. Industrial activities
   D. Pests and weeds
   E. Farming
   F. Forestry
   G. Urban development
   H. Mining
   I. Sewage and stormwater
   J. Tourism
   K. Commercial fishing
   L. Recreational fishing
   M. Dumping of solid waste
   N. Hazardous chemicals
   O. Other

7.9. National parks

    A. Motor vehicles and transport
    B. Household waste and emissions
    C. Industrial activities
    D. Pests and weeds
    E. Farming
    F. Forestry
    G. Urban development
    H. Mining
    I. Sewage and stormwater
    J. Tourism
    K. Commercial fishing
    L. Recreational fishing
    M. Dumping of solid waste
    N. Hazardous chemicals
    O. Other

7.91. Wetlands

    A. Motor vehicles and transport
    B. Household waste and emissions
    C. Industrial activities
    D. Pests and weeds
    E. Farming
    F. Forestry
    G. Urban development
    H. Mining
    I. Sewage and stormwater
    J. Tourism
    K. Commercial fishing
    L. Recreational fishing
    M. Dumping of solid waste
    N. Hazardous chemicals
    O. Other

Personal Actions

In the last 12 months have you have done any of the following?

Please provide an answer for each statement

8.1. Reduced, or limited your use of electricity

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.2. Reduced, or limited your use of fresh water

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.3. Visited a marine reserve

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.4. Visited a national park

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.5. Bought products that are marketed as environmentally friendly

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.6. Recycled household waste

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.7. Composted garden and/or household waste

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.8. Been involved in a project to improve the natural environment

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.9. Grown some of your own vegetables

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.91. Obtained information about the environment from any source

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.92. Taken part in hearings or consent processes about the environment

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.93. Participated in an environmental organisation

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.94. Commuted by buses or trains

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.95. Been an active member of a club or group that restores and/or replants natural environments

    1 Yes
    2 Regularly
    3 No
    4 Don't know

8.96.   Made a financial donation to a non government environmental organisation (e.g., Forest and Bird)

1   Yes
2   Regularly
3   No
4   Don't know

Most Important Environmental Issues

9.   What do you think is the most important environmental issue facing New Zealand today?

[Open-ended question]

10.   Why did you choose this issue?

[Open-ended question]

11.   What do you think is the most important environmental issue facing the world today?

[Open-ended question]

12.   Why did you choose this issue?

[Open-ended question]

Freshwater Fish

We would now like to ask some questions about freshwater fish in New Zealand.

13.   Do you fish for any of the following introduced freshwater fish in New Zealand?
Please select all that apply

A.   I do not fish for introduced fish
B.   Brown trout
C.   Rainbow trout
D.   Chinook or Quinnat salmon
E.   Perch
F.   Tench
G.   Rudd
H.   Koi Carp

14.   Do you fish for native freshwater fish (e.g. whitebait, flounder, eel)?

A.   I have never fished for them and don't want to
B.   I have never fished for them, but I intend to
C.   Yes, I fish for them now
D.   I did fish for them, but not now and don't intend to
E.   I did fish for them, but not now, although I intend taking it up again in the future

Fishing for Native fFish

We would like to find out which native fish you fish for and why.

15.   Firstly, eel fishing...
Please select all that apply

A.   I don't fish for eels
B.   I fish for eels commercially
C.   I fish for eels recreationally
D.   I fish for eels for customary Maori reasons

16.   Next, flounder fishing...
Please select all that apply

A.   I don't fish for flounder
B.   I fish for flounder commercially
C.   I fish for flounder recreationally
D.   I fish for flounder for customary Maori reasons

17.   Finally, whitebait fishing...
Please select all that apply

A.   I don't fish for whitebait
B.   I fish for whitebait commercially
C.   I fish for whitebait recreationally
D.   I fish for whitebait for customary Maori reasons

If answered 'I Fish for Whitebait':

18.   On how many separate days did you fish for whitebait in 2012?

A.   I did not fish for whitebait at all in 2012
B.   1
C.   2
D.   3
E.   4
F.   5
G.   6
H.   7
I.   8
J.   9
K.   10
L.   11
M.   12
N.   13
O.   14
P.   15
Q.   16
R.   17
S.   18
T.   19
U.   20
V.   21
W.   22
X.   23
Y.   24
Z.   25
ZA.   26
ZB.   27
ZC.   28
ZD.   29
ZE.   30
ZF.   31
ZG.   More than 31 days (please tell us how many that was)

19.   During 2012 in which regional or unitary council area did you mostly go whitebaiting:

Results for 47 total responses (format: Multichoice)

A.   North Island: Northland
B.   North Island: Auckland
C.   North Island: Waikato
D.   North Island: Bay of Plenty
E.   North Island: Taranaki
F.   North Island: Gisborne
G.   North Island: Hawkes Bay
H.   North Island: Manawatu-Wanganui
I.   North Island: Wellington
J.   South Island: Tasman
K.   South Island: Nelson
L.   South Island: Marlborough
M.   South Island: West Coast
N.   South Island: Canterbury
O.   South Island: Otago
P.   South Island: Southland
Q.   On the Chatham Islands

ALL RESPONDENTS

Whitebait

The following questions are about the conservation status, abundance and importance of whitebait in New Zealand.

20.   How threatened do you think whitebait are?

    A.   Extremely threatened
    B.   Somewhat threatened
    C.   Not threatened at all
    D.   Don't know

21.   How do you think numbers of whitebait in New Zealand have changed over the last 10 years?

    A.   Much less than 10 years ago
    B.   A little less than 10 years ago
    C.   The same as 10 years ago
    D.   Somewhat more than 10 years ago
    E.   Many more than 10 years ago
    F.   Don't know

22.   In your opinion, how important is it for New Zealand to have plentiful and healthy whitebait?

    A.   Not at all important
    B.   A little bit important
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

Management of Whitebait

In your opinion, which of the following, if any, is having the most detrimental impact on whitebait?

Please do not select any option more than once

23.1. Most impact

    A.   Loss of whitebait spawning habitat in the lower sections of rivers
    B.   Water pollution (excluding sediment)
    C.   Sedimentation (silt)
    D.   Overfishing
    E.   Lower river flows
    F.   Something else
    G.   None of these

23.2.   Second highest impact

    A.   Loss of whitebait spawning habitat in the lower sections of rivers
    B.   Water pollution (excluding sediment)
    C.   Sedimentation (silt)
    D.   Overfishing
    E.   Lower river flows
    F.   Something else
    G.   None of these

23.3.   Third highest impact

    A.   Loss of whitebait spawning habitat in the lower sections of rivers
    B.   Water pollution (excluding sediment)
    C.   Sedimentation (silt)
    D.   Overfishing
    E.   Lower river flows
    F.   Something else
    G.   None of these

24.1.   You said that you thought that something we hadn't listed was having the most detrimental impact on New Zealand whitebait. Would you please tell us what that is?

    [Open-ended responses]

24.2.   You said that you thought that something we hadn't listed was having the second most detrimental impact on New Zealand whitebait. Would you please tell us what that is?

    [Open-ended responses]

24.3.   You said that you thought that something we hadn't listed was having the third most detrimental impact on New Zealand whitebait. Would you please tell us what that is?

    [Open-ended responses]

Whitebait Habitat

Management measures could be put in place to help sustain whitebait habitat. These include fencing to prevent stock access to spawning areas, and revegetation of river banks or wetland areas important for whitebait.

In answering these questions, please make sure that the percentages you allocate to each of the potential funding groups add up overall to 100%.

If fencing to prevent stock access to spawning areas became a requirement, what share of the fencing cost, in your opinion, should be paid by each of the following?

25.1.   Regional or District councils (ratepayers)

    A.   100%
    B.   80%
    C.   60%
    D.   40%
    E.   20%
    F.   0%

25.2.   Department of Conservation (taxpayers)

    A.   100%
    B.   80%
    C.   60%
    D.   40%
    E.   20%
    F.   0%

25.3.   Riverside farmers

    A.   100%
    B.   80%
    C.   60%
    D.   40%
    E.   20%
    F.   0%

25.4.   Other riverside industries

    A.   100%
    B.   80%
    C.   60%
    D.   40%
    E.   20%
    F.   0%

25.5. Whitebait fishing licence
   A. 100%
   B. 80%
   C. 60%
   D. 40%
   E. 20%
   F. 0%

If revegetation of river banks or wetland areas important for whitebait became a requirement, what share of the revegetation cost, in your opinion, should be paid by each of the following?

26.1. Regional or District councils (ratepayers)
   A. 00%
   B. 80%
   C. 60%
   D. 40%
   E. 20%
   F. 0%

26.2. Department of Conservation (taxpayers)
   A. 100%
   B. 80%
   C. 60%
   D. 40%
   E. 20%
   F. 0%

26.3. Riverside farmers
   A. 100%
   B. 80%
   C. 60%
   D. 40%
   E. 20%
   F. 0%

26.4. Other riverside industries
   A. 100%
   B. 80%
   C. 60%
   D. 40%
   E. 20%
   F. 0%

26.5. Whitebait fishing licence
   A. 100%
   B. 80%
   C. 60%
   D. 40%
   E. 20%
   F. 0%

Whitebait Fishing

In answering this question, please make sure that you select each rank only once (in other words, you cannot have two different options with the same ranking).

Suppose a decision had been made to reduce the amount of whitebait fishing. A range of options that could reduce the amount of whitebait fishing are listed below. Please rank these from (1) (most preferred) to (7) (least preferred).

27.1. Making the fishing season 2 weeks shorter
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

27.2. Making it illegal to have traps in nets
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

27.3. Introducing a 5 kg daily catch limit
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

27.4. Morning only fishing
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

27.5. Afternoon only fishing
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

27.6. Making it illegal to sell whitebait
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

27.7. Closing some rivers
   A. 1 – Most preferred
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7 – Least preferred

Animals in New Zealand

Lastly, two questions about the importance and symbolism of a range of animals in New Zealand.

In your opinion, how important is it for New Zealand to have healthy numbers or populations in the wild of the following animals?

Please provide an answer for every animal listed

31.   Deer
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.1.   Goats
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.2.   Kakapo
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.3.   Hector's dolphin
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.4.   Trout
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.5.   Pigs
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.6.   Kiwi
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.7.   Chamois
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.8.   Whitebait
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.91.   Tahr
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.92.   Wallabies
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.93.   Giant weta
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.94.   Canada geese
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.95.   Rabbits
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.96.   Maui's dolphin
    A.   Not important at all
    B.   Somewhat unimportant
    C.   Neither important nor unimportant
    D.   Somewhat important
    E.   Very important
    F.   Don't know

31.97. Wild cats
  A. Not important at all
  B. Somewhat unimportant
  C. Neither important nor unimportant
  D. Somewhat important
  E. Very important
  F. Don't know

31.98. Possums
  A. Not important at all
  B. Somewhat unimportant
  C. Neither important nor unimportant
  D. Somewhat important
  E. Very important
  F. Don't know

31.99. Wasps
  A. Not important at all
  B. Somewhat unimportant
  C. Neither important nor unimportant
  D. Somewhat important
  E. Very important
  F. Don't know

In your opinion, how much of a positive symbol of New Zealand is each of the following animals?

Please provide an answer for every animal listed

32. Deer
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.1. Goats
  A. Not at all symbolic
  B. Somewhat symbolic
  C.   Extremely symbolic
  D. Don't know

32.2. Kakapo
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.3. Hector's dolphin
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.4. Trout
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.5. Pigs
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.6. Kiwi
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.7. Chamois
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.8. Whitebait
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.9. Bats
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.91. Tahr
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.92. Wallabies
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.93. Giant weta
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.94. Canada geese
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.95. Rabbits
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.96. Maui's dolphin
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.97. Wild cats
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.98. Possums
  A. Not at all symbolic
  B. Somewhat symbolic
  C. Extremely symbolic
  D. Don't know

32.99. Wasps

    A. Not at all symbolic
    B. Somewhat symbolic
    C. Extremely symbolic
    D. Don't know

About You

Finally, some questions about you

33.   Are you:

    A. Male
    B. Female

34.   Including yourself, how many people live in your household?

    A. 1
    B. 2
    C. 3
    D. 4
    E. 5
    F. 6
    G. 7
    H. 8
    I. 9
    J. 10
    K. 11
    L. 12
    M. 13
    N. 14
    O. 15
    P. More than 15 (please tell us how many)

35.   In what year were you born?

    [Open-ended responses]

36.   In what country were you born?

    A. New Zealand
    B. Australia
    C. Brazil
    D. Canada
    E. China
    F. France
    G. Germany
    H. India
    I. Indonesia
    J. Iran
    K. Iraq
    L. Ireland
    M. Japan
    N. Korea
    O. Malaysia
    P. Pakistan
    Q. Phillipines
    R. South Africa
    S. Sri Lanka
    T. Thailand
    U. United Kingdom
    V. United States of America
    W. Somewhere else (please tell us where that is)

37.   Are you:

    A. Maori
    B. New Zealand European
    C. Pacific Islander
    D. Asian
    E. Other ethnicity (please tell us what that is)

38.   In which of the following regions do you live?

    A. Northland
    B. Auckland
    C. Waikato/Coromandel
    D. Bay of Plenty
    E. Gisborne/Poverty Bay
    F. Taranaki
    G. Hawkes Bay
    H. Manawatu/Wanganui
    I. Wellington/Wairarapa
    J. Nelson
    K. Marlborough
    L. Canterbury
    M. West Coast
    N. Otago
    O. Southland

39.   Do you live in:

    A. The countryside or a town of less than 1,000 people
    B. A town of 1,000 to 10,000 people
    C. A town of 10,001 to 30,000 people
    D. A large town or city of more than 30,000 people

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

    A. Primary school (standard 6)
    B. High school, without qualifications
    C. High school, with qualifications
    D. Trade/technical qualification or similar
    E. Undergraduate diploma/certificate
    F. Bachelors degree
    G. Postgraduate

41.   Please tick one of the following that best describes your current situation

    A. Paid employment, working 30 or more hours per week
    B. Paid employment, working less than 30 hours per week
    C. Unemployed
    D. Retired
    E. Unpaid voluntary work
    F. Student
    G. Home duties
    H. Other

42.   What industry do you work in, or if you are not currently working, what industry did you last work in?

    A. Resource based
    B. Manufacturing and transport
    C. Accommodation, retail and leisure services
    D. Government services and defence
    E. Health services
    F. Education
    G. Communication and financial services
    H. Have never been in paid employment

43.   What is your occupation, or what was your occupation when you were working?

    A. Clerical or sales employee
    B. Semi-skilled worker
    C. Technical or skilled worker
    D. Business manager or executive
    E. Business owner or self-employed
    F. Teacher, nurse, police or other trained service worker
    G. Professional or senior government official
    H. Labourer, manual, agricultural or domestic worker
    I. Farm owner or manager
    J. Have never been in paid employment
    K. Other (please tell us what that is)

44. What is your personal annual income from all sources before tax?
    A. Loss
    B. $0 to $10,000
    C. $10,001 to $20,000
    D. $20,001 to $30,000
    E. $30,001 to $40,000
    F. $40,001 to $50,000
    G. $50,001 to $70,000
    H. $70,001 to $100,000
    I. $100,001 or more

Final Comments

Thanks for all of your views, those are all the questions we have

45. Do you have any final comments on this survey?
    [Open-ended responses]

46. Would you like us to let you know any of the published results of this survey?
    A. Yes
    B. No

9.2   APPENDIX 2: SURVEY DEMOGRAPHICS AND COMPARABLE DATA

The tables that follow present demographic results from the 2013 survey. Comparable data collected from earlier surveys is also shown. In addition, readily available, census results from Statistics New Zealand are included.

Table 1. Gender (%).

Year …	2000	2002	2004	2006	2008	2010	2013	Census results
Male	44.1	46.8	45.8	46.1	45.1	48.4	47.4	48.8
Female	55.9	53.2	54.2	53.9	54.9	51.6	52.6	51.2
N	**883**	**822**	**818**	**856**	**730**	**601**	**1758**	**4,027,947**

Table 2. Age of respondents (%).

Year …	2000	2002	2004	2006	2008	2010	2013	Census results
18 to 19	1.4	1.1	1	1.3	1.3	0.9	0.1	4.9
20 to 29	15	9.5	9	8.7	7.4	8.3	6.5	21.9
30 to 39	18.2	15.9	15.6	15	12.9	12.5	9.6	24.6
40 to 49	19.7	22.8	22.5	22.8	18.0	18.0	16.1	25.9
50 to 59	18.1	20.8	22.2	19.6	22.7	21.5	22.4	20.7
60 to 69	12.8	16.1	16.1	17.5	20.6	18.5	27.6	14.0
70 and over	14.8	13.8	13.6	15.2	17.0	20.3	17.7	14.8
N	**846**	**807**	**796**	**848**	**688**	**567**	**1619**	**2,346,756**

Table 3. Country of birth (%).

Country/region …	2002	2004	2006	2008	2010	2013
New Zealand	80.0	77.8	77.1	78.3	77.6	78.6
Australia	1.7	1.7	1.8	2.9	2.5	1.3
Pacific Islands	2.6	0.7	2.5	3.0	2.3	0.6
Britain/Ireland	8.7	11.3	9.4	7.4	8.8	10.8
Rest of Europe	1.8	1.8	2.6	2.3	1.7	0.7
USA and Canada	0.4	1.4	0.9	0.4	1.4	1.3
Asia	2.9	3.6	3.4	3.3	4.3	2.9
Other	1.7	1.5	2.5	2.1	1.4	3.8
N	**817**	**812**	**849**	**728**	**599**	**1750**

Table 4. Ethnicity (%).

Category …	2002	2004	2006	2008	2010	2013	Census results
Maori	5.8	8.1	5.3	9.0	7.3	6.4	12.6
NZ European	81.9	79	77.4	74.9	79.2	88.6	71.6
Other	12.3	12.9	17.3	16.1	13.6	5.0	9.4
N	**810**	**810**	**854**	**722**	**590**	**1503**	**4,501,551**

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

Council …	2006	2008	2010	2013	Census results
Northland	4.3	4.8	5.2	4.5	3.8
Auckland	27.1	27.3	27.2	29.8	29.5
Waikato	8.4	8.7	9.8	7.7	9.7
Bay of Plenty	5.6	8.6	8.2	7.6	6.2
Gisborne/Poverty Bay	0.7	0.4	0.5	0.6	1.3
Taranaki	3.6	3.0	2.5	2.2	2.9
Hawkes Bay	4.2	2.7	4.5	3.1	2.9
Manawatu-Wanganui	6.1	4.5	3.5	6.2	6.3
Wellington	11.1	10.9	12.7	13.8	11.4
Nelson	2.1	3.0	3.3	2.1	1.1
Marlborough	1.5	0.8	1.0	1.3	1.1
Canterbury	16.5	15.7	12.3	13.7	12.9
West Coast	0.7	0.5	1.0	0.8	0.9
Otago	5.6	5.9	6.8	5.0	5.1
Southland	2.6	3.0	1.5	1.8	2.7
N	**859**	**732**	**600**	**1764**	**4,140,300**

Table 6. Urban or rural respondents (%).

Area	2006	2008	2010	2013	Census results
Urban	81.4	83.8	84.2	87.3	85.8
Rural	18.6	16.2	15.8	12.7	14.2
N	**854**	**721**	**588**	**1760**	**3,735,519**

Table 7. Education status (%).

Year	2000	2002	2004	2006	2008	2010	2013	Census results*
Primary	4.2	4.3	3.8	3.3	3.0	3.0	0.6	33.9
High school without qualifications	18.4	19.8	17.8	18.7	18.7	15.2	11.8	33.9
High school with qualifications	21.9	24.4	25.1	21.9	23.9	26.0	19.4	25.7
Trade or technical qualification	22.0	19.5	18.5	19.4	16.1	19.0	18.3	25.4
Undergraduate diploma	11.9	14.1	12.8	12.2	15.8	11.8	16.1	25.4
Bachelors degree	13.7	12.0	14.3	14.9	14.7	15.2	19.0	5.7
Postgraduate	7.9	5.9	7.7	9.6	7.8	9.8	14.8	2.8
N	**876**	**815**	**813**	**852**	**728**	**600**	**1765**	**2,786,220**

Note: For consistency over time the same measures of education were used in the 2013 survey as used in previous surveys.

*Aged 15 and over.

Table 8. Employment status (%).

Status	2006	2008	2010	2013
Paid more 30hrs	47.4	47.9	47.0	41.6
Paid less 30hrs	13.4	11.4	9.6	14.6
Unemployed	0.5	1.5	2.3	4.0
Retired	20.8	22.9	28.2	25.1
Unpaid Voluntary Work	2.3	3.5	1.3	2.2
Student	4.6	5.6	3.0	3.7
Homes Duties	5.1	1.0	5.0	5.1
Other	6.0	6.2	3.5	3.8
N	**857**	**712**	**602**	**1766**

Table 9. Employment sector (%).

Industry	2002	2004	2006	2008	2010	2013	2001 Census
Resource based	13.3	15.4	17.2	12.3	11.8	9.1	8.9
Manufacturing and transport	22.4	20.5	20.8	22.3	23.3	18.6	24.4
Accommodation, retail and leisure	17.0	18.3	16.1	14.0	14.6	14.8	23.7
Government services and defense	7.9	7.8	6.9	8.6	10.4	11.9	3.6
Health services	14.5	14.2	13.6	15.1	14.2	13.7	11.1
Education	12.5	11.4	12.5	10.1	13.7	16.2	7.7
Communication and financial services	9.9	10.7	11.2	14.2	10.6	14.7	20.4
Never been in paid employment	2.5	1.7	1.7	3.5	1.3	1.0	NA
N	**751**	**755**	**825**	**636**	**527**	**1729**	**1,636,407**

Note: Statistics NZ is unable to provide corresponding data from the 2006 or 2013 census.

Table 10. Income, before tax (%).

Income bracket	2000	2002	2004	2006	2008	2010	2013	Census results
Loss	0	2.0	2.4	1.4	0.9	1.1	1.5	0.5
$0–$10,000	17.1	14.4	11.5	9.4	8.5	7.2	5.7	18.8
$10,001–$20,000	20.1	18.9	19.5	17.5	13.7	14.6	13.7	19.5
$20,001–$30,000	15.4	13.9	16.5	15.0	13.0	15.2	12.3	13.8
$30,001–$40,000	13.6	13.3	13.4	14.5	12.6	13.1	10.1	12.8
$40,001–$50,000	10.6	11.1	7.4	9.7	10.5	10.5	8.6	8.3
$50,001–$70,000	7.5	9.4	10.5	13.3	16.1	14.4	12.8	8.9
$70,001–$100,000	4.3	4.1	4.1	6.7	5.9	9.8	7.8	4.0
$100,000 +	3.2	3.7	5.0	5.1	5.9	5.6	4.6	3.3
Not stated	8.1	9.2	9.6	7.4	12.9	8.4	22.8	10.2
N	**894**	**836**	**820**	**880**	**752**	**610**	**2220**	**3,160,371**

9.3 APPENDIX 3: PSR AND SPECIAL TOPIC DATA

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

Respondents perceptions of …	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1–5)	Std. Dev.
their own knowledge of environmental issues									
2000	878	6.5	29.4	52.1	8.9	1.4	1.8	2.69	0.78
2002	810	7.5	28.6	54.4	7.0	1.1	1.2	2.65	0.77
2004	812	6.4	25.7	57.4	8.1	0.9	1.5	2.71	0.74
2006	864	7.3	31.9	52.8	5.1	0.6	2.3	2.59	0.73
2008	739	8.8	28.8	53.7	6.5	0.5	1.6	2.66	0.87
2010	593	7.2	27.6	56.2	7.4	0.7	1.00	2.66	0.75
2010 (e-survey)	2470	11.5	29.3	51.7	5.8	0.8	0.9	2.55	0.80
2013 (e-survey)	2199	9.4	32.7	49.9	5.5	0.9	1.5	2.55	0.80
the overall standard of living in New Zealand									
2000	863	11.1	45.5	36.0	5.6	0.9	0.8	2.39	0.80
2002	766	14.1	50.8	28.6	4.8	0.9	0.8	2.27	0.80
2004	781	18.3	54.2	23.3	3.1	0.0	1.2	2.11	0.73
2006	864	16.8	50.9	28.2	3	0.1	0.9	2.18	0.74
2008	730	13.7	51.2	30.0	4.2	0.4	0.4	2.28	0.80
2010	603	14.7	50.9	29.3	4.1	0.7	0.30	2.25	0.78
2010 (e-survey)	2448	12.4	47.1	32.7	6.2	1.1	0.4	2.36	0.82
2013 (e-survey)	2191	9.6	42.0	35.8	10.8	1.5	0.4	2.52	0.85
the overall state of the natural environment in New Zealand									
2006	861	11	47.3	32.4	6.6	0.3	2.3	2.37	0.78
2008	731	9.6	45.7	35.1	7.4	0.3	1.8	2.70	0.94
2010	581	12.4	46.1	31.1	7.4	0.7	2.40	2.36	0.83
2010 (e-survey)	2440	6.9	41.7	36.5	12.7	1.5	0.7	2.60	0.85
2013 (e-survey)	2182	6.2	34.9	37.9	17.6	2.2	1.1	2.74	0.90

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

	N	Strongly agree (1)	Agree (2)	Neither agree or disagree (3)	Disagree (4)	Strongly disagree (5)	Don't know	Mean (1–5)	Std. Dev.
New Zealand's environment is regarded as "clean and green"									
2000				Question not asked in 2000					
2002	816	9.2	57.0	17.6	13.7	2.0	0.5	2.42	0.91
2004	799	5.8	45.3	29.2	17.0	2.0	0.8	2.64	0.90
2006	863	4.3	49.1	26	18.8	1.4	0.5	2.64	0.88
2008	731	5.6	43.2	28.7	20.5	1.4	0.5	2.70	0.94
2010	583	6.8	45.3	25.8	18.4	2.2	1.50	2.63	0.94
2010 (e-survey)	2455	2.7	39.5	27.7	26.4	3.5	0.3	2.88	0.95
2013 (e-survey)	2178	3.7	32.0	27.9	28.8	7.1	0.5	3.04	1.02

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

Respondents perceived quality of...	N	Very good(1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1–5)	Std.Dev.
natural environment in towns and cities									
2000	875	3.7	34.5	47.4	12.1	0.7	1.6	2.71	0.75
2002	815	5.9	36.9	44.7	9.6	1.1	1.8	2.62	0.79
2004	806	5.6	42.4	41.3	8.4	0.7	1.5	2.56	0.76
2006	868	4.6	38.0	43.9	10.7	0.9	1.8	2.65	0.77
2008	732	4.4	37.3	45.2	10.1	0.8	2.2	2.65	0.76
2010	593	5.4	37.1	47.0	7.9	0.8	1.7	2.61	0.74
2010 (e-survey)	2466	2.4	30.0	47.9	17.1	2.0	0.7	2.86	0.79
2013 (e-survey)	2205	2.3	27.2	50.2	16.7	2.3	1.3	2.89	0.79
air quality									
2000	866	20.0	47.0	23.6	7.2	1.3	1.0	2.22	0.89
2002	795	15.8	43.5	29.6	8.8	1.5	0.8	2.36	0.91
2004	803	14.3	45.1	28.8	10.0	1.2	0.6	2.38	0.90
2006	859	12.0	47.5	30.0	8.7	1.0	0.7	2.41	0.90
2008	734	14.6	45.8	28.9	9.5	0.5	0.7	2.35	0.87
2010	603	14.9	50.9	28.5	4.5	0.5	0.7	2.24	0.78
2010 (e-survey)	2448	11.1	41.6	35.7	9.6	1.6	0.4	2.49	0.87
2013 (e-survey)	2200	11.5	44.2	34.1	8.3	1.1	0.9	2.43	0.84
native land and freshwater plants and animals									
2000	870	12.6	42.8	29.9	10.1	1.8	2.8	2.44	0.91
2002	808	14.6	40.8	30.2	9.2	1.7	3.5	2.41	0.92
2004	810	11.2	42.6	29.9	11.1	0.9	4.3	2.45	0.88
2006	859	12.0	47.5	30.0	8.7	1.0	0.7	2.39	0.85
2008	734	11.3	40.7	34.1	9.1	0.8	4.0	2.45	0.85
2010	593	12.1	44.2	29.7	10.3	1.2	2.5	2.43	0.88
2010 (e-survey)	2460	9.9	42.2	29.1	15.4	2.3	1.0	2.58	0.95
2013 (e-survey)	2195	6.8	37.8	31.7	17.7	4.0	2.0	2.74	0.97
native bush and forests									
2000	870	20.5	39.8	26.0	10.6	1.6	1.6	2.32	0.97
2002	808	23.1	42.9	23.1	7.7	1.0	2.1	2.19	0.92
2004	807	21.9	40.8	24.5	8.6	1.1	3.1	2.24	0.94
2006	864	21.5	44.8	25.0	6.3	0.6	1.9	2.18	0.87
2008	740	21.9	47.2	20.4	7.4	0.3	2.8	2.15	0.86
2010	603	22.7	45.8	19.7	9.3	0.8	1.7	2.18	0.92
2010 (e-survey)	2466	18.8	43.8	25.1	9.8	1.9	0.6	2.32	0.95
2013 (e-survey)	2204	13.6	41.4	29.2	11.8	2.2	2.0	2.47	0.95
soils									
2000	862	10.1	40.1	33.4	7.1	1.2	8.1	2.45	0.84
2002	797	10.4	40.8	32.0	7.0	0.9	8.9	2.42	0.83
2004	800	7.6	41.3	32.9	6.5	.9	10.9	2.46	0.79
2006	859	7.6	40.4	36.0	7.2	1.2	7.7	2.50	0.80
2008	732	7.2	41.4	34.3	8.1	1.1	7.9	2.50	0.81
2010	599	7.3	41.2	35.6	7.7	0.8	7.3	2.50	0.79
2010 (e-survey)	2461	6.3	37.3	36.9	13.2	2.2	4.2	2.66	0.87
2013 (e-survey)	2204	5.4	33.3	39.0	14.9	2.1	5.4	2.74	0.87
coastal waters and beaches									
2000	873	12.4	37.2	35.2	11.3	1.5	2.4	2.51	0.91
2002	817	12.6	37.5	34.8	10.5	2.0	2.7	2.50	0.92
2004	810	13.1	41.6	32.0	9.0	1.7	2.6	2.43	0.90
2006	859	7.6	40.4	36.0	7.2	1.2	7.7	2.50	0.80
2008	741	15.0	46.4	26.9	8.2	0.9	2.6	2.32	0.87
2010	597	13.6	45.1	31.0	7.0	1.3	2.0	2.36	0.86
2010 (e-survey)	2465	9.2	38.6	32.3	16.4	2.4	1.1	2.64	0.95
2013 (e-survey)	2207	9.4	35.7	36.1	15.4	2.0	1.4	2.64	0.93

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

Respondents perceived quality of...	N	Very good(1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1–5)	Std.Dev.
marine fisheries									
2000	875	6.2	30.2	32.9	15.4	2.7	12.6	2.75	0.93
2002	801	6.2	33.5	36.0	10.2	2.5	11.6	2.65	0.88
2004	808	5.9	29.8	31.8	14.4	1.4	16.7	2.70	0.89
2006	859	6.5	30.3	34.2	16.1	1.6	11.3	2.73	0.90
2008	732	5.9	31.7	34.6	13.8	1.2	12.8	2.69	0.87
2010	600	8.3	32.0	32.2	12.7	3.0	11.8	2.66	0.95
2010 (e-survey)	2462	6.1	29.4	32.0	21.3	5.5	5.7	2.90	1.01
2013 (e-survey)	2204	5.3	29.5	31.0	22.6	5.2	6.3	2.93	1.00
freshwater									
2000	875	11.7	35.3	35.1	12.2	1.9	3.8	2.56	0.93
2002	803	12.1	34.2	36.5	11.1	2.4	3.7	2.56	0.94
2004				Question not asked in 2004					
2006				Question not asked in 2006					
2008				Question not asked in 2008					
2010				Question not asked in 2010					
2010 (e-survey)				Question not asked in 2010					
2013 (e-survey)				Question not asked in 2013					
rivers and lakes									
2000				Question not asked in 2004					
2002				Question not asked in 2006					
2004	810	6.5	31.5	33.1	20.6	3.0	5.3	2.81	0.96
2006	866	6.0	30.7	35.8	21.4	1.4	4.7	2.80	0.91
2008	737	5.7	31.5	36.1	20.2	1.9	4.6	2.80	0.91
2010	600	6.5	32.2	34.3	19.7	3.5	3.8	2.81	0.96
2010 (e-survey)	2464	4.7	26.9	34.1	25.8	6.8	1.7	3.03	1.00
2013 (e-survey)	2203	3.5	21.4	31.8	30.8	10.2	2.3	3.23	1.02
groundwater									
2000				Question not asked in 2004					
2002				Question not asked in 2006					
2004	801	6.1	30.0	39.5	8.0	1.5	15.0	2.63	0.82
2006	861	6.0	29.7	39.4	11.1	0.8	12.9	2.67	0.82
2008	738	6.6	29.7	37.7	11.0	1.6	13.4	2.67	0.86
2010	602	5.5	33.2	34.6	10.8	1.2	14.8	2.64	0.83
2010 (e-survey)	2461	5.1	29.6	39.4	16.1	3.2	6.7	2.81	0.90
2013 (e-survey)	2199	4.8	27.2	39.2	17.1	3.1	8.6	2.85	0.90
wetlands									
2000	872	6.0	28.1	34.6	13.0	2.6	15.7	2.74	0.91
2002	836	7.3	33.9	31.2	11.8	1.5	14.4	2.61	0.89
2004	805	5.6	31.7	31.4	11.4	2.4	17.5	2.68	0.90
2006	865	6.4	32.5	33.9	10.2	1.3	15.8	2.61	0.85
2008	730	7.1	33.8	31.2	11.4	1.6	14.8	2.61	0.89
2010	599	6.3	31.2	31.6	12.2	1.5	17.2	2.65	0.89
2010 (e-survey)	2454	6.0	31.3	33.8	15.6	5.2	8.1	2.81	0.98
2013 (e-survey)	2180	5.0	28.3	35.2	17.3	5.3	8.9	2.89	0.97
New Zealand's natural environment compared to other developed countries									
2000	879	34.6	42.3	14.7	1.6	0.2	6.6	1.83	0.77
2002	821	38.7	41.2	12.7	1.3	0.4	5.7	1.76	0.76
2004	806	34.3	44.5	13.3	0.5	0.0	7.4	1.78	0.70
2006	863	34.5	44.1	13.1	1.7	0.1	6.4	1.81	0.75
2008	736	31.5	45.4	16.4	1.5	0.0	5.2	1.87	0.74
2010	598	31.9	42.1	18.2	2.7	0.0	5.0	1.91	0.80
2010 (e-survey)	2372	27.7	42.9	22.6	3.7	0.3	2.8	2.03	0.83
2013 (e-survey)	2108	24.6	40.6	25.0	5.4	0.8	3.6	2.14	0.89

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

Respondent perceptions of …	N	Very high (1)	High (2)	Moderate (3)	Low (4)	Very low (5)	Don't know	Mean (1–5)	Std. Dev.
diversity of native land and freshwater plants and animals									
2000	841	7.6	36.0	40.5	8.0	0.7	7.1	2.55	0.79
2002	807	7.7	37.9	38.0	5.6	1.1	9.7	2.50	0.79
2004	794	7.4	37.7	39.5	5.2	0.6	9.6	2.49	0.76
2006	841	8.4	38.0	38.6	4.0	0.4	10.5	2.44	0.74
2008	713	6.9	33.8	42.2	5.2	0.6	11.4	2.54	0.75
2010	588	7.3	35.9	38.4	5.6	0.5	12.2	2.50	0.76
2010 (e-survey)	2452	8.8	37.8	42.4	7.0	0.6	3.3	2.51	0.78
2013 (e-survey)	2117	6.9	31.9	47.9	7.6	0.9	4.9	2.62	0.77
amount of native bush and forests									
2000	855	9.4	39.3	34.9	12.6	2.0	1.9	2.58	0.90
2002	812	10.7	39.2	34.5	10.3	2.1	3.2	2.52	0.90
2004	797	11.7	36.3	34.8	12.0	2.0	3.3	2.55	0.93
2006	853	11.1	40.4	35.3	9.6	0.7	2.8	2.47	0.85
2008	722	9.0	38.2	38.0	9.7	2.1	3.0	2.56	0.87
2010	595	12.1	37.5	37.1	8.6	1.8	2.9	2.49	0.89
2010 (e-survey)	2455	11.2	41.3	34.2	10.3	2.0	0.9	2.50	0.90
2013 (e-survey)	2119	8.5	35.7	38.0	13.9	1.8	2.1	2.64	0.90
quantity of marine fisheries									
2000	846	3.8	25.2	38.3	16.2	1.5	15.0	2.84	0.84
2002	808	3.7	22.0	42.9	12.0	2.4	17.0	2.85	0.92
2004	793	3.7	17.7	42.7	16.4	1.8	17.8	2.94	0.82
2006	849	2.9	20.6	44.9	12.2	1.2	18.1	2.85	0.76
2008	718	2.8	23.4	39.1	14.8	2.0	18.0	2.87	0.83
2010	595	4.9	25.7	35.6	15.3	1.3	17.1	2.79	0.87
2010 (e-survey)	2457	4.7	23.3	42.9	18.6	3.2	7.4	2.92	0.89
2013 (e-survey)	2120	4.1	23.2	42.6	18.4	2.6	9.1	2.92	0.86
area of marine reserves									
2000	849	2.5	13.8	37.9	24.5	4.9	16.4	3.19	0.88
2002	808	3.7	16.7	36.1	21.8	4.6	17.1	3.08	0.93
2004	790	3.0	17.5	38.5	18.5	3.2	19.4	3.02	0.87
2006	850	4.2	19.8	39.4	17.3	2.1	17.2	2.92	0.87
2008	722	3.9	20.8	35.0	19.9	4.3	16.1	3.00	0.94
2010	593	4.6	20.7	36.3	18.0	3.0	17.4	2.93	0.91
2010 (e-survey)	2449	4.9	22.4	39.9	20.0	5.4	7.4	2.99	0.95
2013 (e-survey)	2114	4.1	21.1	37.9	22.8	6.2	7.9	3.06	0.96
amount of freshwater									
2000	851	11.2	41.2	32.4	8.5	1.8	4.9	2.46	0.88
2002	813	8.6	40.0	35.4	8.1	2.0	5.9	2.52	0.86
2004					Question not asked in 2004				
2006					Question not asked in 2006				
2008					Question not asked in 2008				
2010					Question not asked in 2010				
2010 (e-survey)					Question not asked in 2010				
2013 (e-survey)					Question not asked in 2010				
rivers and lakes									
2000					Question not asked in 2000				
2002					Question not asked in 2002				
2004	787	5.2	27.4	40.6	13.5	1.9	11.4	2.77	0.85
2006	850	3.1	26.5	41.0	16.8	2.5	10.1	2.88	0.85
2008	722	2.9	23.8	42.5	18.1	3.6	9.2	2.95	0.86
2010	597	5.4	26.1	41.0	15.4	2.5	9.5	2.87	0.88
2010 (e-survey)	2452	5.5	28.4	40.7	18.0	3.9	3.6	2.86	0.92
2013 (e-survey)	2117	4.5	23.1	39.7	22.5	5.5	4.7	3.01	0.95

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

Respondent perceptions of ...	N	Very high (1)	High (2)	Moderate (3)	Low (4)	Very low (5)	Don't know	Mean (1–5)	Std. Dev.
groundwater									
2000				Question not asked in 2000					
2002				Question not asked in 2002					
2004	794	3.1%	21.4%	39.7%	14.1%	2.4%	19.2%	2.89	0.84
2006	849	3.2%	20.7%	39.3%	17.2%	2.5%	17.2%	17.2%	0.85
2008	720	3.0%	20.2%	41.4%	16.3%	2.8%	16.2%	2.95	0.84
2010	591	4.7%	20.6%	42.6%	14.7%	2.0%	15.2%	2.87	0.85
2010 (e-survey)	2460	5.0	25.3	42.1	17.4	3.5	6.7	2.88	0.90
2013 (e-survey)	2113	4.5	22.9	42.0	17.7	3.0	9.8	2.91	0.88
area of National Parks									
2000	858	16.1	44.8	30.3	5.4	0.8	2.7	2.28	0.83
2002	812	15.1	47.4	27.5	5.9	0.5	3.6	2.27	0.81
2004	795	14.5	45.7	31.6	4.9	0.3	3.1	2.29	0.79
2006	855	13.8	46.4	32.5	3.6	0.4	3.3	2.28	0.76
2008	722	13.9	46.5	31.2	4.2	0.4	3.9	2.28	0.78
2010	594	13.1	47.8	29.1	5.1	0.8	4.0	2.30	0.80
2010 (e-survey)	2458	14.0	45.4	31.4	6.8	0.9	1.4	2.34	0.84
2013 (e-survey)	2122	11.5	41.7	34.2	8.7	1.3	2.7	2.45	0.86
area of wetlands									
2000	855	2.8	16.8	37.0	18.9	3.0	21.4	3.03	0.87
2002	807	3.3	19.2	38.7	14.3	4.3	20.2	2.96	0.90
2004	794	3.5	17.1	37.2	16.8	2.6	22.8	2.97	0.87
2006	850	3.5	18.0	39.4	15.2	2.4	21.5	2.93	0.85
2008	723	4.3	18.9	37.3	16.0	3.0	20.3	2.93	0.90
2010	589	4.1	20.4	34.8	16.3	3.6	20.9	2.94	0.92
2010 (e-survey)	2453	4.0	22.7	39.9	16.4	6.6	10.4	2.99	0.95
2013 (e-survey)	2109	4.1	19.8	39.4	19.3	6.1	11.3	3.04	0.95
availability of parks and reserves in towns and cities									
2000	856	12.0	36.2	37.4	10.5	2.0	1.9	2.53	0.91
2002	812	12.8	39.0	34.7	9.7	1.7	2.0	2.47	0.90
2004	801	12.6	40.0	35.5	8.2	2.2	1.5	2.47	0.90
2006	856	10.2	41.8	37.6	6.9	1.8	1.8	2.47	0.84
2008	725	12.4	41.5	35.0	8.0	0.4	2.6	2.41	0.83
2010	598	10.2	41.3	37.8	8.5	0.3	1.8	2.47	0.81
2010 (e-survey)	2457	9.2	35.9	38.9	12.2	2.5	1.3	2.63	0.91
2013 (e-survey)	2107	8.8	32.9	41.5	12.5	2.2	2.0	2.66	0.89
reserves of oil and gas									
2000	851	1.2	10.0	32.8	24.7	3.9	27.5	3.28	0.83
2002	812	1.4	7.3	29.9	28.7	3.8	28.9	3.37	0.81
2004	796	1.5	3.8	23.6	34.4	10.9	25.8	3.67	0.86
2006	855	1.1	3.0	21.9	36.3	12.9	24.9	3.76	0.83
2008	722	1.8	7.5	24.4	30.7	8.0	27.6	3.49	0.91
2010	594	3.0	9.8	25.9	21.7	3.7	35.9	3.21	0.93
2010 (e-survey)	2458	2.7	11.0	34.8	25.4	7.0	19.1	3.28	0.92
2013 (e-survey)	2117	3.5	12.2	34.3	22.2	4.5	23.2	3.16	0.92

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

Respondent perceptions of management of …	N	Very good (1)	Good (2)	Adequate (3)	Bad (4)	Very bad (5)	Don't know	Mean (1–5)	Std. Dev.
pest and weed control									
2000	852	2.9	18.8	34.5	30.2	7.0	6.6	3.21	0.95
2002	812	4.2	17.6	40.6	26.4	6.0	5.2	3.13	0.94
2004	783	5.7	22.3	33.6	26.8	7.0	4.5	3.07	1.02
2006	859	5.0	18.4	39.6	26.9	5.5	4.7	3.10	0.95
2008	728	4.4	24.0	40.7	23.9	2.2	4.8	2.95	0.88
2010	596	3.9	24.2	40.1	23.3	4.2	4.4	3.00	0.91
2010 (e–survey)	2454	2.6	18.7	41.4	27.6	6.7	3.1	3.18	0.91
2013 (e–survey)	2055	2.6	17.0	39.2	31.5	5.6	4.0	3.22	0.90
solid waste disposal									
2000	854	1.6	12.8	38.8	32.8	7.4	6.7	3.34	0.87
2002	807	2.4	14.3	42.5	27.0	5.8	8.1	3.21	0.87
2004	779	3.5	17.3	41.7	24.0	5.9	7.6	3.12	0.92
2006	857	2.6	15.2	45.0	24.3	4.2	8.8	3.14	0.84
2008	728	2.7	18.7	44.1	24.5	2.2	7.8	3.05	0.83
2010	593	2.0	20.7	43.8	22.4	3.7	7.3	3.05	0.84
2010 (e–survey)	2446	1.5	14.3	42.4	28.7	7.8	5.4	3.29	0.86
2013 (e–survey)	2055	1.8	14.8	41.6	28.5	6.0	7.3	3.24	0.87
sewage disposal									
2000	853	2.0	14.0	39.7	31.4	8.6	4.3	3.32	0.90
2002	806	3.0	13.6	46.5	24.6	6.8	5.5	3.20	0.88
2004	782	3.6	19.3	38.0	26.9	5.6	6.6	3.12	0.94
2006	858	3.0	17.5	47.7	21.8	3.6	6.4	3.06	0.84
2008	728	3.3	22.1	47.0	18.5	3.3	5.8	2.96	0.84
2010	592	2.5	24.2	47.8	17.9	3.4	4.2	2.95	0.83
2010 (e–survey)	2447	2.1	18.3	43.4	25.5	6.2	4.5	3.16	0.88
2013 (e–survey)	2048	2.9	18.0	45.7	21.5	6.3	5.5	3.11	0.89
farm effluent and runoff									
2000	849	0.7	9.2	29.8	32.7	9.2	18.4	3.50	0.87
2002	811	1.0	6.9	25.4	34.8	14.9	17.0	3.67	0.91
2004	783	1.3	8.8	24.3	37.9	13.8	13.9	3.63	0.92
2006	855	0.8	7.1	28.8	38.5	9.2	15.6	3.57	0.83
2008	729	1.4	7.1	26.3	38.3	13.3	13.6	3.64	0.90
2010	593	0.8	7.8	25.0	40.5	14.2	11.8	3.67	0.88
2010 (e–survey)	2453	0.7	5.1	24.3	39.6	24.4	5.9	3.87	0.89
2013 (e–survey)	2052	1.1	5.6	22.9	40.5	23.8	6.1	3.85	0.91
hazardous chemicals use and disposal									
2000	854	1.6	8.1	28.1	29.2	13.5	19.6	3.56	0.95
2002	806	1.9	9.4	30.8	28.9	8.4	20.6	3.41	0.91
2004	785	2.3	14.1	30.7	24.7	5.7	22.4	3.22	0.93
2006	857	0.8	10.9	36.1	25.3	5.5	21.5	3.30	0.83
2008	728	2.1	13.2	32.8	26.0	4.8	21.2	3.23	0.89
2010	597	2.2	12.2	35.3	24.6	6.0	19.6	3.25	0.90
2010 (e–survey)	2450	1.5	9.6	31.6	31.1	13.0	13.1	3.51	0.94
2013 (e–survey)	2046	1.8	9.1	31.5	33.1	10.4	14.1	3.48	0.91
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	0.83
2004	781	1.3	9.0	36.1	31.9	8.2	13.6	3.43	0.86
2006	858	0.9	7.1	39.9	31.5	7.3	13.3	3.43	0.80
2008	729	1.1	8.9	38.7	32.6	7.0	11.7	3.40	0.82
2010	596	1.7	9.1	37.8	33.6	5.4	12.6	3.36	0.82
2010 (e–survey)	2450	1.0	7.2	35.0	37.1	12.9	6.8	3.58	0.86
2013 (e–survey)	2051	1.5	7.7	33.1	37.2	13.0	7.5	3.57	0.89

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

Perceived quality of management of ...	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1–5)	Std. Dev.
natural environment in towns and cities									
2000	852	2.8	26.4	53.8	12.7	1.2	3.2	2.82	0.73
2002	814	2.7	22.1	56.1	14.0	1.1	3.9	2.88	0.72
2004	784	1.9	24.7	54.7	13.0	0.6	5.0	2.85	0.69
2006	856	3.3	29.1	52.5	12.0	0.6	2.6	2.77	0.73
2008	723	4.1	27.0	54.9	9.8	1.0	3.2	2.76	0.73
2010	597	3.7	31.2	50.4	10.9	0.3	3.5	2.72	0.72
2010 (e-survey)	2463	2.6	21.6	55.8	17.4	0.6	2.0	2.92	0.72
2013 (e-survey)	2056	2.7	20.0	53.1	19.9	1.1	3.2	2.97	0.75
air quality									
2000	851	2.8	20.1	45.7	22.9	2.9	5.5	3.03	0.84
2002	805	1.6	15.2	45.7	26.6	4.6	6.3	3.19	0.82
2004	779	0.6	18.9	46.1	25.4	2.4	6.5	3.11	0.77
2006	851	3.6	20.9	49.5	19.0	2.2	4.7	2.95	0.82
2008	719	5.1	26.6	46.9	16.3	1.1	4.0	2.81	0.82
2010	594	5.4	32.7	44.8	12.6	0.8	3.7	2.70	0.80
2010 (e-survey)	2454	3.5	25.1	49.7	18.0	1.3	2.4	2.88	0.79
2013 (e-survey)	2051	4.8	26.2	46.9	17.0	1.4	3.8	2.83	0.82
native land and freshwater plants and animals									
2000	849	3.3	22.5	46.8	17.1	1.6	8.7	2.90	0.80
2002	805	2.2	24.6	47.3	14.8	1.4	9.7	2.87	0.76
2004	775	1.8	24.9	48.8	12.5	0.9	11.1	2.84	0.72
2006	852	5.2	28.3	47.3	11.4	1.1	6.8	2.73	0.79
2008	726	5.0	30.9	45.0	10.9	1.1	7.2	2.70	0.79
2010	591	5.6	31.5	46.2	11.0	1.2	4.6	2.69	0.80
2010 (e-survey)	2450	4.4	28.2	44.5	17.6	1.5	3.8	2.83	0.83
2013 (e-survey)	2054	4.3	24.6	44.7	19.6	2.2	4.5	2.90	0.85
native bush and forests									
2000	850	5.5	29.3	39.6	17.5	3.1	4.9	2.82	0.91
2002	807	4.7	34.2	42.1	11.0	1.6	6.3	2.69	0.81
2004	781	6.1	31.5	42.0	11.5	1.2	7.7	2.68	0.82
2006	856	8.2	37.0	40.4	9.8	0.7	3.9	2.56	0.82
2008	727	10.0	39.5	37.7	7.8	0.7	4.3	2.47	0.82
2010	592	9.6	41.0	37.3	8.6	1.2	2.2	2.50	0.83
2010 (e-survey)	2462	8.3	35.8	39.9	12.7	1.1	2.2	2.62	0.86
2013 (e-survey)	2051	6.5	31.0	41.5	15.1	2.2	3.6	2.75	0.88
soils									
2000	847	1.5	18.2	44.6	14.5	2.6	18.5	2.98	0.78
2002	800	1.4	15.9	43.9	15.0	1.9	22.0	3.00	0.75
2004	773	1.4	15.9	44.5	13.8	1.8	22.5	2.98	0.74
2006	848	2.1	18.8	47.3	13.4	1.2	17.2	2.91	0.74
2008	722	3.2	21.1	47.4	10.8	1.4	16.2	2.84	0.76
2010	594	2.2	24.2	42.8	14.5	0.8	15.5	2.85	0.76
2010 (e-survey)	2457	2.0	20.1	46.7	19.7	2.5	9.0	3.00	0.80
2013 (e-survey)	2049	2.1	18.1	43.2	24.1	3.1	9.4	3.09	0.83
coastal waters and beaches									
2000	846	2.5	17.6	44.1	24.8	4.1	6.9	3.11	0.85
2002	808	1.9	19.3	43.7	24.6	3.2	7.3	3.09	0.83
2004	782	2.4	19.2	42.3	24.0	2.2	9.8	3.05	0.83
2006	853	3.4	27.1	47.7	17.0	1.5	3.3	2.86	0.80
2008	725	5.1	31.0	44.7	12.8	1.5	4.8	2.73	0.82
2010	592	5.9	31.4	41.6	14.2	1.2	5.7	2.72	0.84
2010 (e-survey)	2459	3.6	24.0	43.5	22.7	3.0	3.2	2.97	0.87
2013 (e-survey)	2053	3.8	24.4	43.1	21.5	3.1	4.2	2.96	0.87

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

Perceived quality of management of …	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1–5)	Std. Dev.
marine fisheries									
2000	848	2.2	13.2	33.3	24.5	4.4	22.4	3.20	0.89
2002	809	1.2	14.8	37.6	20.4	3.7	22.2	3.14	0.83
2004	780	1.9	13.1	36.0	22.4	2.7	23.8	3.14	0.83
2006	852	2.7	18.7	36.6	20.3	3.1	18.7	3.03	0.87
2008	724	3.6	21.5	36.9	15.7	2.6	19.6	2.90	0.88
2010	594	4.4	23.6	35.5	16.5	2.9	17.2	2.88	0.91
2010 (e-survey)	2462	3.3	20.7	37.7	23.1	5.4	9.8	3.07	0.93
2013 (e-survey)	2044	5.0	24.5	40.0	16.4	3.8	10.2	2.88	0.92
marine reserves									
2000	853	2.6	20.3	40.3	10.9	2.2	23.7	2.87	0.80
2002	802	2.6	21.7	41.4	11.1	2.0	21.2	2.85	0.79
2004	769	2.3	21.6	39.5	11.6	0.7	24.3	2.82	0.75
2006	850	4.9	26.0	41.8	8.8	0.6	17.9	2.68	0.77
2008	724	6.9	28.9	34.9	9.4	1.7	18.2	2.63	0.87
2010	593	6.6	31.2	33.4	8.9	1.2	18.7	2.59	0.84
2010 (e-survey)	2456	5.4	28.6	39.0	13.6	2.5	10.8	2.77	0.88
2013 (e-survey)									
freshwater									
2000	846	3.3	20.1	45.3	17.6	3.2	10.5	2.97	0.84
2002	807	2.4	20.4	45.5	18.1	3.2	10.4	2.99	0.82
2004					Question not asked in 2004				
2006					Question not asked in 2006				
2008					Question not asked in 2008				
2010					Question not asked in 2010				
2010 (e-survey)					Question not asked in 2010				
2013 (e-survey)					Question not asked in 2013				
rivers and lakes									
2004	779	2.2	15.1	42.0	28.1	3.0	9.6	3.16	0.83
2006	855	2.6	22.2	44.6	21.3	2.5	6.9	2.99	0.83
2008	723	3.7	18.9	41.4	18.5	2.4	7.4	3.0	0.85
2010	591	3.2	26.2	42.6	19.8	2.9	5.2	2.93	0.86
2010 (e-survey)	2455	2.6	19.6	41.3	27.4	5.0	4.1	3.13	0.89
2013 (e-survey)	2044	3.0	14.8	38.0	29.5	9.9	4.8	3.30	0.96
groundwater									
2004	774	2.3	12.7	39.0	20.0	1.8	24.2	3.08	0.80
2006	852	2.0	14.1	41.7	18.3	2.2	21.7	3.06	0.79
2008	722	1.9	14.5	37.3	18.4	2.3	17.9	3.1	0.82
2010	588	2.7	18.4	40.3	17.9	1.7	19.0	2.97	0.82
2010 (e-survey)	2443	2.0	16.3	41.0	24.7	4.8	11.1	3.1	0.86
2013 (e-survey)	2031	2.5	14.8	39.0	24.2	5.4	14.1	3.18	0.89
National Parks									
2000	848	9.6	39.5	37.6	5.5	1.4	6.4	2.46	0.81
2002	810	8.5	42.1	37.8	3.8	1.2	6.5	2.43	0.77
2004	779	10.8	41.7	35.7	4.5	0.1	7.2	2.37	0.76
2006	853	13.4	46.1	32.2	3.2	0.5	4.7	2.20	0.78
2008	728	17.2	45.3	29.9	2.5	0.5	4.5	2.57	1.09
2010	594	15.2	47.1	30.8	3.0	0.3	3.5	2.24	0.76
2010 (e-survey)	2449	15.2	43.9	33.2	5.0	0.7	2.1	2.31	0.82
2013 (e-survey)	2042	12.8	43.3	35.0	5.2	0.9	2.8	2.36	0.81
wetlands									
2000	842	1.9	18.2	35.9	15.4	2.3	26.4	2.97	0.83
2002	807	3.0	18.5	38.9	12.6	2.6	24.4	2.91	0.84
2004	772	2.6	20.6	35.9	11.8	1.4	27.7	2.85	0.80

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

Perceived quality of management of ...	N	Very well managed (1)	Well managed (2)	Adequately managed (3)	Poorly managed (4)	Very poorly managed (5)	Don't know	Mean (1–5)	Std. Dev.
2006	854	3.7	25.2	37.6	11.2	0.9	21.3	2.75	0.80
2008	722	4.7	26.7	35.7	10.5	1.8	20.5	2.72	0.85
2010	593	5.4	27.2	33.6	12.0	1.0	20.9	2.70	0.85
2010 (e-survey)	2433	5.2	27.4	37.4	15.2	2.4	12.4	2.80	0.89
2013 (e-survey)	2033	5.1	23.8	38.7	16.4	2.9	13.2	2.86	0.90
New Zealand's natural environment compared to other developed countries									
2000	852	11.6	39.9	33.1	4.3	0.7	12.3	2.35	0.80
2002	815	13.6	36.3	32.1	3.2	1.0	13.7	2.32	0.82
2004	776	13.5	38.3	30.5	4.4	0.6	12.6	2.32	0.82
2006	846	20.0	41.4	24.9	4.4	0.2	9.1	2.16	0.83
2008	722	19.0	41.8	26.7	2.6	0.4	9.4	2.16	0.80
2010	589	21.1	37.4	27.0	3.9	0.2	10.5	2.16	2.84
2010 (e-survey)	2441	17.8	39.5	30.3	6.7	0.7	4.9	2.29	0.88
2013 (e-survey)	2044	17.4	35.5	32.8	7.6	1.4	5.3	2.37	0.92

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

In the last 12 months the respondent had…	Year	N	No	Yes	Regularly	Don't know
reduced or limited their use of electricity	2002	803	22.2	60.3	15.1	2.5
	2004	798	15.9	63.3	19.7	1.1
	2006	856	19.9	57.0	21.5	1.6
	2008	722	17.4	61.1	21.0	0.4
	2010	603	15.1	58.0	24.9	2.0
	2010 (e-survey)	2307	11.5	53.8	33.4	1.2
	2013 (e-survey)	1878	16.8	52.7	28.8	1.8
reduced or limited their use of freshwater[1]	2006	849	43.8	35.8	18.4	2.0
	2008	722	35.00	39.17	24.4	1.4
	2010	599	37.4	38.9	21.7	2.0
	2010 (e-survey)	2299	35.1	34.2	28.4	2.3
	2013 (e-survey)	1872	34.7	36.2	26.2	2.9
visited a marine reserve	2002	801	59.8	36.0	2.9	1.4
	2004	790	69.9	27.5	1.9	0.8
	2006	851	70.9	26.7	1.6	0.8
	2008	726	74.7	22.8	1.8	0.7
	2010	598	69.2	26.9	3.7	0.2
	2010 (e-survey)	2292	73.6	22.5	2.9	1.0
	2013 (e-survey)	1868	73.9	21.9	2.8	1.3
visited a national park	2002	801	36.8	55.6	6.7	0.9
	2004	797	32.6	61.9	4.9	0.6
	2006	853	41.0	53.6	5.3	0.1
	2008	719	41.79	51.72	6.2	0.3
	2010	598	40.1	53.7	5.9	0.3
	2010 (e-survey)	2294	44.0	48.3	7.0	0.7
	2013 (e-survey)	1869	46.3	45.2	7.4	1.1
bought products that are marketed as environmentally friendly	2002	805	11.7	64.8	15.	8.3
	2004	799	12.1	66.6	16.4	4.9
	2006	850	15.1	63.3	15.6	6.0
	2008	722	15.1	64.7	14.8	5.4
	2010	600	13.0	66.0	16.5	4.5
	2010 (e-survey)	2299	12.6	56.7	24.8	5.9
	2013 (e-survey)	1877	14.8	56.0	21.9	7.2

Table 7. Perceptions of current management of the environment (%) *continued.*

In the last 12 months the respondent had…	Year	N	No	Yes	Regularly	Don't know
recycled household waste	2002	800	11.8	63.3	24.5	0.5
	2004	802	8.1	62.8	28.7	0.4
	2006	848	9.3	62.6	27.8	0.2
	2008	725	8.9	65.4	25.3	0.4
	2010	600	4.7	61.7	33.5	0.2
	2010 (e-survey)	2303	4.1	53.0	42.5	0.4
	2013 (e-survey)	1870	4.8	56.0	38.6	0.5
composted garden and/or household waste	2002	804	28.5	50.2	20.6	0.6
	2004	802	27.4	50.4	21.9	0.2
	2006	853	27.4	48.9	23.1	0.6
	2008	720	30.64	48.3	20.8	0.3
	2010	605	29.6	45.3	25.1	0.0
	2010 (e-survey)	2296	25.3	42.4	31.5	0.7
	2013 (e-survey)	1872	25.4	45.5	28.5	0.7
been involved in a project to improve the natural environment	2002	797	74.7	20.3	3.6	1.4
	2004	784	75.5	19.4	3.4	1.7
	2006	844	76.9	17.8	4.4	0.9
	2008	718	76.9	19.1	3.1	1.0
	2010	592	75.2	19.9	4.4	0.5
	2010 (e-survey)	2296	71.1	19.3	7.4	2.1
	2013 (e-survey)	1860	73.8	18.5	5.4	2.2
grown some of their own vegetables	2002	812	33.0	54.9	11.6	0.5
	2004	806	29.5	54.7	15.5	0.2
	2006	856	31.5	52.9	15.4	0.1
	2008	718	30.4	54.6	14.9	0.1
	2010	604	22.4	58.4	19.2	0.0
	2010 (e-survey)	2298	21.7	54.6	23.6	0.2
	2013 (e-survey)	1870	21.7	56.3	21.6	0.5
obtained information about the environment from any source	2002	805	44.2	46.0	7.7	2.1
	2004	791	48.4	43.9	6.3	1.4
	2006	845	43.9	46.5	8.0	1.5
	2008	724	41.6	48.3	9.3	0.8
	2010	598	41.1	48.3	8.7	1.8
	2010 (e-survey)	2293	33.1	52.0	13.2	1.7
	2013 (e-survey)	1861	38.2	47.6	11.4	2.8
taken part in hearings or consent processes about the environment	2002	810	81.1	15.1	2.6	1.2
	2004	795	84.8	12.5	1.8	1.0
	2006	853	85.6	12.2	1.4	0.8
	2008	729	87.1	10.9	1.7	0.4
	2010	602	86.0	11.8	2.0	0.2
	2010 (e-survey)	2302	85.5	11.5	2.3	0.7
	2013 (e-survey)	1876	87.6	10.1	1.5	0.7
participated in an environmental organisation	2002	802	84.0	12.3	2.2	1.4
	2004	793	87.3	10.1	1.3	1.4
	2006	852	86.5	10.4	2.3	0.7
	2008	726	86.4	11.3	1.8	0.6
	2008	727	77.0	19.7	2.3	1.0
	2010	599	87.6	9.2	3.2	0.0
	2010 (e-survey)	2297	78.8	16.1	4.5	0.7
	2013 (e-survey)	1866	79.5	16.1	3.6	0.7
commuted by buses or trains	2002	806	59.4	34.9	4.8	0.9
	2004	796	62.7	32.0	4.8	0.5
	2006	851	64.5	29.5	5.6	0.4
	2008	727	62.1	31.40	6.2	0.3
	2010	595	57.5	36.1	6.4	0.0
	2010 (e-survey)	2299	52.5	36.6	10.6	0.3
	2013 (e-survey)	1872	51.6	36.3	11.4	0.7

Table 7. Perceptions of current management of the environment (%) *continued.*

In the last 12 months the respondent had…	Year	N	No	Yes	Regularly	Don't know
been an active member of a club or group that restores and/or replants natural environments	2002	807	86.0	11.9	1.1	1.0
	2004	792	87.8	10.4	1.0	0.9
	2006	847	89.7	8.3	1.7	0.4
	2008	725	87.0	10.2	2.3	0.4
	2010	593	88.2	9.9	1.7	0.2
	2010 (e-survey)	2289	86.5	10.1	2.9	0.6
	2013 (e-survey)	1865	86.1	10.2	2.9	0.9
made a financial donation to a non NGO[2]	2006	852	76.2	20.0	2.7	1.2
	2010	602	75.1	20.6	3.8	0.5
	2010 (e-survey)	2298	72.3	22.5	4.1	1.0
	2013 (e-survey)	1873	72.2	23.6	3.0	1.2

[1]   Not asked in 2002 or 2004.
[2]   Not asked in 2002, 2004 or 2008.

Table 8. Participation in fishing for introduced freshwater fish (%) (N=1785).

Do not fish for introduced fish	Brown trout	Rainbow trout	Chinook or quinnat salmon	Perch	Tench	Rudd	Koi carp	Brown and rainbow trout	Rainbow trout & chinook salmon	Rainbow trout & perch
88.3	1.9	1.7	0.2	0.1	0.1	0.0	0.1	7.4	0.2	0.1

Table 9. Participation in fishing for native freshwater fish (%) (N=1821).

Never fished for them and don't want to	Never fished for them but intend to in the future	Fish for them now	Did fish for them, don't now, and don't intend to in future	Did fish for them, don't now, but intend to in the future
58.6	4.2	6.7	20.5	10.0

Table 10. Participation in eel fishing (%) (N=51).

Commercial	Recreational	Customary Maori	Recreational and Customary Maori
2.0	66.7	17.6	13.7

Table 11. Participation in flounder fishing (%) (N=93).

Commercial	Recreational	Customary Maori	Recreational and Customary Maori
2.2	88.2	6.5	3.2

Table 12. Participation in whitebait fishing (%) (N=73).

Commercial	Recreational	Customary Maori	Recreational and Customary Maori
2.7	86.3	6.8	4.1

Table 13. Days spent whitebaiting in 2012.

Number of days fished	Number of whitebaiters	Number of whitebaiter days
0	25	0
1	4	4
2	7	14
3	6	18
4	3	12
5	2	10
7	1	7
8	2	16
10	5	50
12	1	12
13	1	13
15	2	30
17	1	17
20	5	100
21	1	21
25	1	25
28	1	28
30	1	30
51	1	51

Table 14. Regional or Unitary Council most fished by whitebaiters.

Council	Number of whitebaiters	Percent
Northland	3	6.4
Bay of Plenty	6	12.8
Taranaki	10	21.3
Hawkes Bay	2	4.3
Manawatu-Wanganui	2	4.3
Wellington	7	14.9
Tasman	1	2.1
West Coast	3	6.4
Canterbury	5	10.6
Otago	4	8.5
Southland	4	8.5

Table 15. Threat status of whitebait (%).

N	Extremely threatened	Somewhat threatened	Not threatened at all	Don't know
1815	30.3	42.8	4.8	22.0

Table 16. Changes in whitebait numbers over last 10 years (%).

N	Much less than 10 years ago	A little less than 10 years ago	The same as 10 years ago	Somewhat more than 10 years ago	Many more than 10 years ago	Don't know
1812	49.6	17.8	3.6	2.6	2.1	24.2

Table 17. Importance of having plentiful and healthy whitebait (%).

N	Not at all important	A little bit important	Neither important nor unimportant	Somewhat important	Very important	Don't know
1815	1.9	10.4	5.2	21.5	52.8	8.1

Table 18. Most detrimental impact on whitebait (%).

N	Loss of whitebait spawning habitat in lower sections of rivers	Water pollution (excluding sediment)	Sedimentation (silt)	Overfishing	Lower river flows	Other	None of these
1817	37.5	28.5	4.9	20.8	3.0	1.2	4.2

Table 19. Options for paying for fencing to protect whitebait spawning areas (%).

Source of funding	N	Proportion of funding to be paid by different sources					
		100%	80%	60%	40%	20%	0%
Regional or District councils	1395	2.7	2.2	5.4	12.6	42.7	34.5
Department of Conservation	1392	3.5	2.5	5.5	13.4	45.3	29.8
Riverside farmers	1645	11.5	8.2	15.8	21.5	34.0	9.0
Other riverside industries	1414	6.2	3.8	5.2	19.0	49.2	16.6
Whitebait fishing licence	1433	6.2	3.3	7.0	10.0	49.4	24.0

Table 20. Options for paying for revegetation of river banks or wetland areas important for whitebait (%).

Source of funding	N	Proportion of funding to be paid by different sources					
		100%	80%	60%	40%	20%	0%
Regional or District councils	1395	3.5	2.9	6.2	18.0	46.2	23.2
Department of Conservation	1438	4.7	3.1	7.4	20.9	46.9	17.0
Riverside farmers	1540	5.8	5.6	11.5	21.5	44.1	11.5
Other riverside industries	1397	4.8	4.1	5.5	18.7	53.8	13.2
Whitebait fishing licence	1411	5.6	2.6	7.4	11.4	53.0	19.9

Table 21. Ranked preferences for options to reduce the amount of whitebait fishing (%).

	N	1 Most preferred	2	3	4	5	6	7 Least preferred
Shorten fishing season by 2 weeks	1789	27.6	19.2	19.9	15.6	6.5	4.2	7.0
Illegal to have traps in nets	1789	24.5	23.3	18.6	13.8	7.7	6.7	5.5
5kg daily catch limit	1789	33.0	24.7	18.6	11.6	5.3	3.3	3.5
Morning only fishing	1788	4.3	4.6	9.5	26.3	22.7	17.6	15.1
Afternoon only fishing	1786	1.9	2.6	6.2	16.4	25.6	25.6	21.7
Illegal to sell whitebait	1788	13.3	7.0	6.0	9.6	8.4	14.0	41.6
Close some rivers	1789	18.0	12.7	11.7	14.3	7.7	12.6	23.0

Table 21. Ranked preferences for options to reduce the amount of whitebait fishing (%).

Species	N	Not important at all (1)	Somewhat unimportant (2)	Neither important nor unimportant (3)	Somewhat important (4)	Very important (5)	Don't know	Mean (1–5)	Std. Dev.
deer	1766	23.6	12.2	18.3	28.0	15.3	2.5	2.99	1.42
goats	1766	34.1	16.1	21.7	18.0	7.4	2.7	2.47	1.33
kakapo	1764	0.5	1.0	3.7	12.8	79.6	2.4	4.74	0.63
Hector's dolphin	1765	0.8	1.2	3.2	12.0	80.5	2.3	4.74	0.65
trout	1764	4.7	5.3	12.8	30.6	43.9	2.7	4.06	1.11
pigs	1765	23.5	15.8	23.4	22.9	11.7	2.7	2.83	1.35
kiwi	1765	0.7	0.8	1.6	5.6	88.7	2.6	4.86	0.54
chamois	1752	20.0	10.1	20.1	23.8	13.0	13.0	3.00	1.38
whitebait	1764	1.2	1.8	5.9	26.6	61.3	3.2	4.50	0.79
Bats	1761	7.8	6.3	14.9	24.1	40.1	6.8	3.88	1.27
tahr	1758	25.4	12.1	19.2	18.7	8.0	16.6	2.66	1.36
wallabies	1763	46.1	17.0	18.7	7.0	5.4	5.8	2.03	1.22
giant weta	1763	4.3	5.1	8.9	17.6	60.3	3.7	4.29	1.12
Canada geese	1763	36.0	18.5	20.3	12.5	5.8	7.0	2.29	1.27
rabbits	1757	68.0	12.9	7.9	4.3	4.4	2.5	1.61	1.10
Maui's dolphin	1748	1.5	1.6	4.2	14.0	74.9	3.8	4.66	0.77
wild cats	1763	76.9	8.1	5.9	3.8	2.7	2.6	1.43	0.97
possums	1761	78.0	9.4	4.8	2.9	2.7	2.2	1.39	0.92
wasps	1761	60.1	11.8	11.8	8.3	3.9	4.1	1.79	1.19

Species	N	Not at all symbolic (1)	Somewhat symbolic (2)	Extremely symbolic (3)	Don't know	Mean (1–3)	Std. Dev.
deer	1760	53.1	34.3	8.5	4.1	1.53	0.65
goats	1753	80.1	13.0	2.3	4.6	1.18	0.45
kakapo	1758	1.5	15.1	79.8	3.5	2.81	0.43
Hector's dolphin	1758	3.2	20.0	72.7	4.2	2.73	0.52
trout	1754	18.3	41.7	36.7	3.4	2.19	0.73
pigs	1751	62.1	28.1	6.1	3.7	1.42	0.61
kiwi	1754	1.1	2.5	94.5	1.9	2.95	0.26
chamois	1758	50.4	27.6	6.3	15.7	1.48	0.63
whitebait	1758	8.4	36.3	52.2	3.1	2.45	0.65
Bats	1753	40.7	31.7	19.0	8.7	1.76	0.77
tahr	1760	53.8	23.6	5.5	17.1	1.42	0.61
wallabies	1757	83.4	9.4	2.8	4.3	1.16	0.44
giant weta	1759	9.9	23.1	62.9	4.0	2.55	0.67
Canada geese	1751	77.3	13.2	2.7	6.8	1.20	0.47
rabbits	1754	86.5	8.0	2.2	3.3	1.13	0.40
Maui's dolphin	1753	4.1	17.8	73.1	5.0	2.73	0.53
wild cats	1760	92.0	3.2	1.1	3.7	1.06	0.27
possums	1762	80.1	14.0	2.8	3.1	1.20	0.47
wasps	1752	84.9	7.9	1.7	5.5	1.12	0.37