



PUBLIC PERCEPTIONS OF NEW ZEALAND'S ENVIRONMENT: 2016

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

2016

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**Lincoln
University**
Te Whare Wānaka o Aoraki

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Trampers approach Onetahuti Beach on the Abel Tasman Coast Track.

ROSS CULLEN

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SUMMARY

The eighth survey (the series having begun in 2000) of people's perceptions of the state of the New Zealand environment was undertaken over February–March 2016. 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 second time this survey was undertaken only using the internet and this has made it challenging to compare the 2016 results with our 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 in other developed countries;
- The states of air, and native bush and forests were rated highest, while rivers and lakes, and marine fisheries were rated as being in the worst state;
- Management of all components of the environment was considered to be adequate to good, with management of national parks rated the highest. Rivers and lakes, and groundwater were judged to be the worst managed parts of the environment;
- 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 also considered an important cause of damage to several other resources; and
- Water related issues were again rated as the most important environmental issue facing New Zealand, while Greenhouse Gas Emissions and Climate Change was again the most commonly identified global issue.

One case study examined a few aspects of conservation. First, respondents were asked about the importance of conservation to them – the vast majority reported it was important. Respondents were asked to name their nearest national park – we had hypothesised that many respondents would name sites other than national parks, but about 70% of those who responded did accurately name a national park. Of course the large number of non respondents may not have known the name of their nearest national park, but this cannot be tested. Two environmentally friendly behaviours were explored to understand why people participated: namely in terms of visiting national parks and taking part in a group or organisation that restores or replants the environment. Lack of time was an important factor driving non participation in visits to national parks, and lack of participation in restoring the environment.

The second case study concerned predator control and priority species for conservation. Rats were much more prevalent near respondents homes than were possums, stoats and ferrets. Almost all respondents attempted to control rats near their home, but only 56% of respondents who had possums near their home attempted to control them. Trapping is widely used to control possums, stoats and ferrets, while poison are most commonly used to control rats. Fifty percent of the respondents thought that the Department of Conservation and/or Regional Councils should be doing much more than their current efforts to control rats, ferrets, stoats and possums.

We asked survey questions about risks to native species and which species were most in need of protection. Kiwi genera were perceived to be the most at risk and the most in need of protection. There was a tussle between Hector's/Maui dolphins and Kakapo for second and third places, with the Kakapo being more frequently perceived to be at risk than the two small dolphins, but not quite as commonly nominated as a priority for protection.

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- Selwyn District Council
- Environment Canterbury
- Dairy New Zealand
- Taranaki Regional Council
- Royal Forest & Bird Protection Society



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



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Male banded dotterel on nest, Broken River, Canterbury.
KEN HUGHEY

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). An electronic survey was introduced in 2010 and the postal survey was dropped in 2013 (see Hughey *et al.* 2013).

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 eighth environmental survey undertaken in 2016 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 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.



02

Early start at Onetahuti, beside Tonga Island Marine Reserve.
ROSS CULLEN

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 and 2016 only an electronic survey instrument was used. The electronic survey was selected as the most practical 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 e-survey 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 2016 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 160 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 was the most important environmental issue facing New Zealand and also the world today and why these issues were chosen.

Participation in fifteen activities was measured to explore relationships between environmental behaviour and responses to the PSR framework. Twelve questions sought demographic information. 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'. Finally, a fourth question was added in 2016: 'All things considered, how satisfied are you with your life as a whole these days?'. Measurement was on a ten-point scale anchored by 'completely dissatisfied' to 'completely satisfied'.

The state of the environment

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

Introduced mammalian predator control

A set of questions, designed in consultation with Predator Free New Zealand, was asked concerning the 'big four' predators: rats, possums, stoats and ferrets. Respondents were asked to identify whether or not they were involved in projects targeting any or all of the species, motivations for this work or why they are not involved, details of whether or not they financially supported such work, questions about who should pay, and finally some questions about the method of control, knowledge about the method and support and training.

Two open ended questions were asked about species most at risk of extinction, and about which of these should have the highest priority for protection.

Importance of conservation and related aspects

The Department of Conservation has been in recent years undertaking an 'annual survey of New Zealanders'. We decided to examine some aspects of that survey – looking for survey questions we might replicate, and looking at some areas of concern. In terms of questions that could be replicated we asked respondents how important conservation is to them personally. In relation to our 'participation in environmental activities' questions we further explored the motivations behind why or why not respondents had been a member of a club or group that restores/replants the natural environment. In similar fashion we asked about the motivation to visit or otherwise New Zealand national parks. We then further asked respondents to name the national park closest to where they live.

Management of introduced plants and animals

Two questions were asked. In the first respondents were asked to evaluate the relative importance of 13 introduced plants or animals on a 5-point Likert scale. In a related question respondents were asked to evaluate the relative acceptability of a range of forms of control for these species, on a 4-point Likert scale.

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 2016 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 2013). The following key points can be drawn about where the e-survey sample differs from New Zealand population-level data:

- Country born in: the e-survey over-represents those born in New Zealand, and Britain and Ireland, and underrepresents people born in Asia, Pacific Islands and North America;
- Education: the e-survey over-represents those with tertiary education qualifications, and underrepresents those with high school qualifications (17.8% cf 49.8% 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 2013 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 2016 survey results with those from previous surveys. Relationships between selected PSR framework components and demographics for the 2016 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 Z scores and t-tests where appropriate.

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 2016. 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, 2200 in 2013, and 2468 in 2016 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 2016 SURVEY

In summary the following changes and additions have been made from the 2013 survey:

- A question was added about 'life satisfaction';
- Whereas the special topic in 2013 concerned native freshwater fish, in 2016 we examined mammalian predator control, some aspects of conservation generally, and priorities for introduced species management.

Restoration planting at Richmond, Tasman District.





Tidal pool species, Anapai Bay
ROSS CULLEN

PRESSURE-STATE-RESPONSE ANALYSIS BY QUESTION

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

The 2016 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. Trend data are mostly reported graphically – because there is now a third consecutive set of e-survey data some statistical analyses have been undertaken for this data.

Most people considered their environmental knowledge to be 'adequate' (48.1%) or 'good' (32.6%, Figure 3.1). The vast majority considered the standard of living in New Zealand to be 'good' or 'adequate' (76.2%, Figure 3.2). The state of the New Zealand environment is considered to be 'adequate' to 'good' (68.1%, Figure 3.3).

3.2 THE STATE OF THE ENVIRONMENT

3.2.1 QUALITY OF THE NEW ZEALAND ENVIRONMENT

The 2016 Survey

The quality of the New Zealand environment was measured on a five-point Likert scale ranging from 'very good' to 'very bad'. Figure 3.4 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 2016 three specific resources (air – 59.1%, native bush and forests – 48.2%, and natural environment compared to other developed countries – 61.9%) scored very positively (scores of 'very high' or 'high' combined), with mean Likert scores of 3.67, 3.37 and 3.80 respectively. Rivers and lakes were considered to be in the worst condition (mean score = 2.67, with 45.4% of respondents rating them as 'bad' or 'very bad'. Marine fisheries, groundwater and wetlands received the largest number of 'don't know' responses (ranging from around 7.1 to 11% of responses).

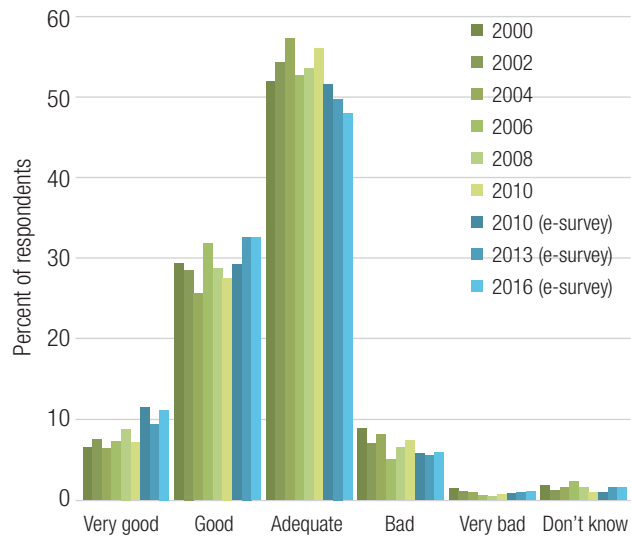


Figure 3.1. Knowledge of environmental issues.

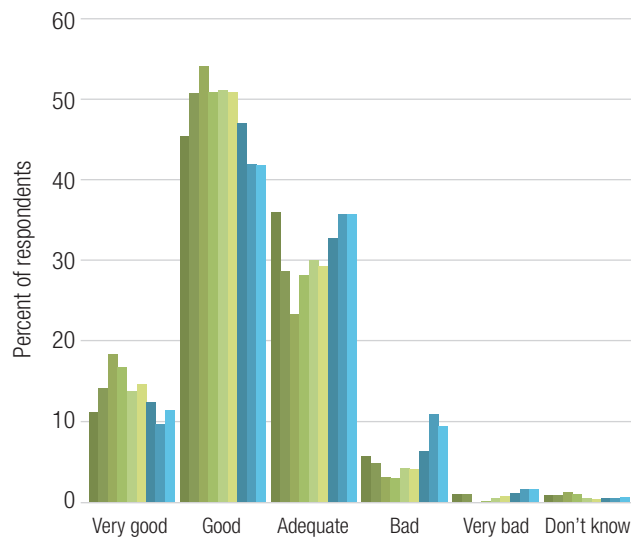


Figure 3.2. Standard of living in New Zealand.

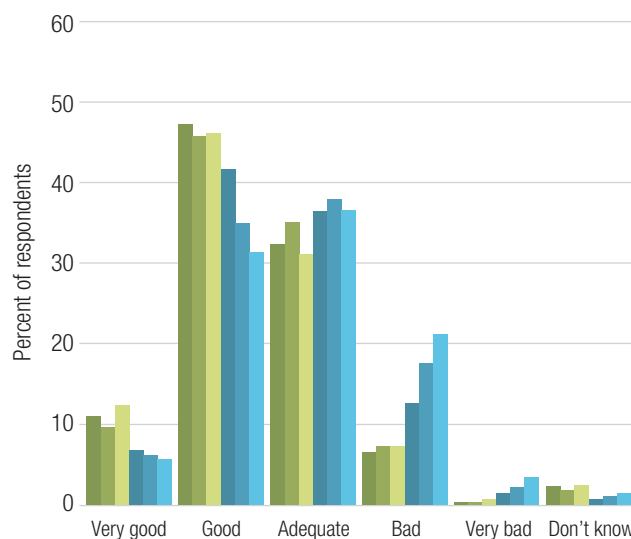


Figure 3.3. State of New Zealand's natural environment.

Trends 2000–2016

Figure 3.5 (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 2010–2016 e-survey data (dashed lines). Because of the differences in survey populations commentary is presented with great care.

In the postal surveys most aspects showed an improvement in perceived quality from 2000 to 2002, then a decline or a relatively static position from 2002 to 2010. Conversely, apart from air, almost all other aspects have shown a decline over the period of the three e-surveys: 2010–2016.

The state of New Zealand’s environment compared to other developed countries received the best rating each year, with a mean value between ‘good’ and ‘very good’ for the postal surveys and ‘good’ to ‘adequate’ in the e-surveys. For the postal surveys 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. For the latter the ‘trend’ for the latest e-survey is a decline to a mean Likert score of 2.67, in the ‘poor’ to ‘adequate’ range.

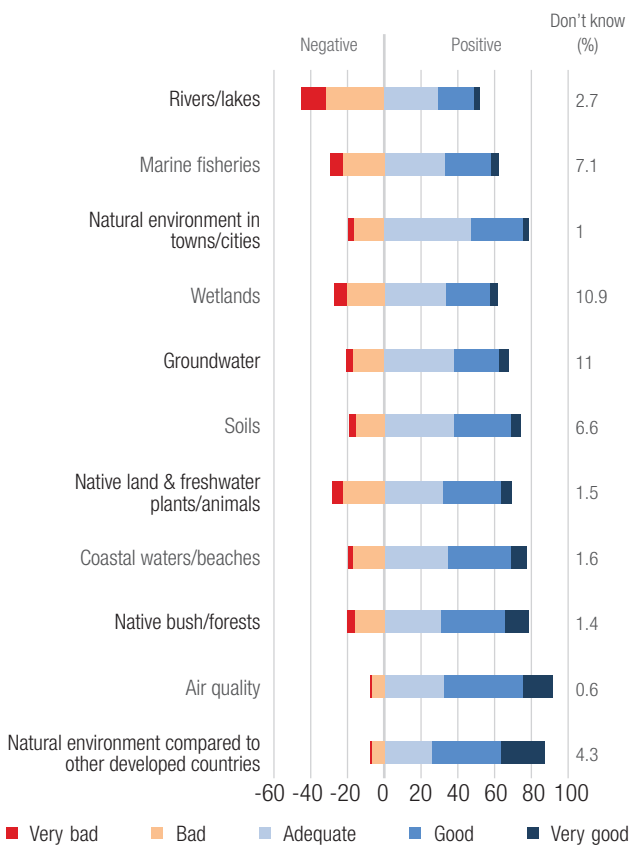


Figure 3.4. Perceived state of the environment.

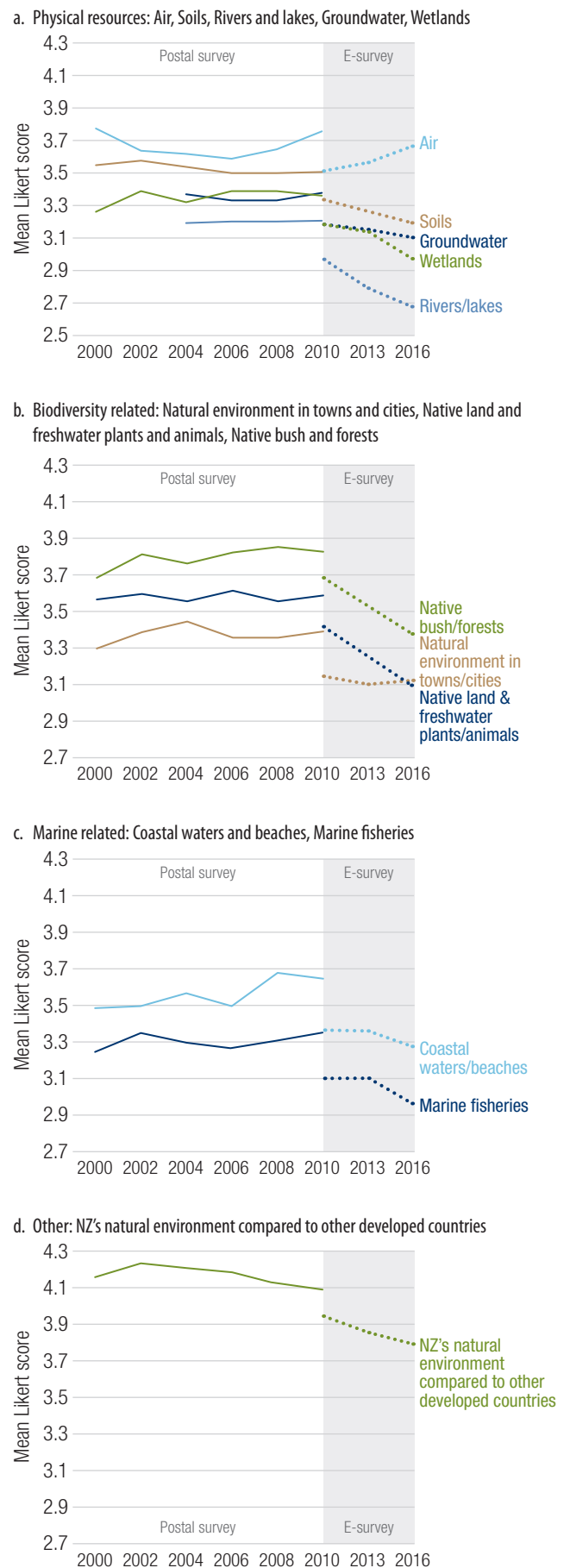


Figure 3.5 (a–d). Trends in perceived state of the environment (Scale: 1 = very bad, 2 = bad, 3 = adequate, 4 = good, 5 = very good).

3.2.2 RESOURCE AVAILABILITY

The 2016 Survey

Respondents' assessments of New Zealand resource availability are shown in Figure 3.6. The lowest availability rating was for reserves of oil and gas (Mean Likert score 2.83), with around a third of respondents rating availability as 'very low' or 'low'. Quantity of marine fisheries, 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 = 3.48), with 49.5% 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 availability of groundwater for human use were also rated 'high' or 'moderate'. Several resources received a high number of 'don't know' responses, especially reserves of oil and gas (30.5%), area of wetlands (13.9%) and the availability of ground water for human use (11.5%).

Trends 2000–2016

Figure 3.7 shows mean Likert scores for the eight natural resources that were included in all seven surveys, and the two additional resources included only from 2004 to 2016. Note there are two parts to each of the trend lines – the 2000–2010 postal survey data (solid lines); and the 2010–2016 e-survey data (dashed lines).

Perceptions about the reserves of oil and gas changed appreciably between 2006 and 2010, with an overall improvement occurring ($p < 0.001$). Ratings of the area of marine reserves retains a significant improving trend ($p < 0.001$) over that time period despite a slight decline in 2008.

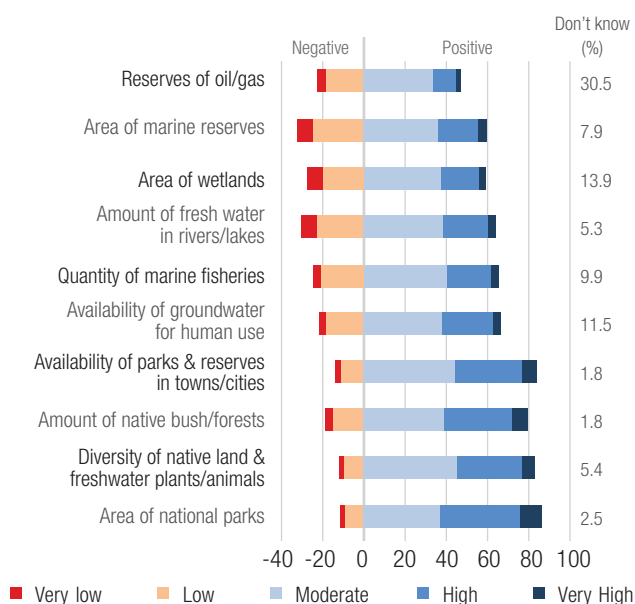


Figure 3.6. Perceived availability of natural resources.

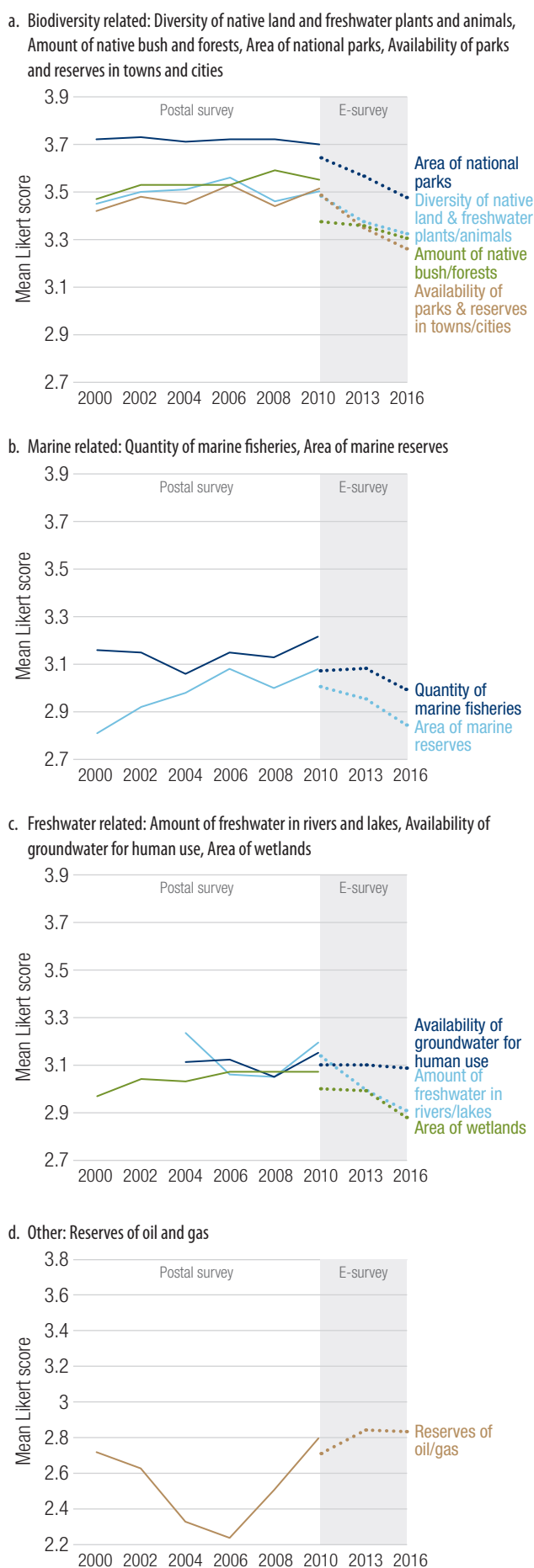


Figure 3.7 (a–d). Trends in perceived availability of natural resources.

The 2010–2016 e-surveys overall are different – there appears to be a trend of perceived decline for most resources, except for availability of groundwater for human use and reserves of oil and gas.

3.3 MANAGEMENT OF THE ENVIRONMENT

3.3.1 MANAGEMENT OF ENVIRONMENTAL ACTIVITIES

The 2016 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 3.8). A high percentage of respondents thought that the management of farm effluent and runoff (65.5%) was ‘bad’ or ‘very bad’ (mean Likert score = 2.08). Only management of sewage disposal achieved a combined ‘good’ or ‘very good’ management rating above 20% (21.3%) of respondents. Hazardous chemicals use and disposal had the largest ‘don’t know’ response (17.2%).

Trends 2000–2016

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 for the postal survey. Note with the inclusion of the 2013 and 2016 data there are two parts to each of the trend lines – the 2000–2010 postal survey data (solid lines); and the 2010–2016 e-survey data (dashed lines). Care is necessary in interpreting trends in these long term data series.

Figure 3.9 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. While the e-survey (2010–16) trend lines start at a lower point they tend to follow similar trajectories.

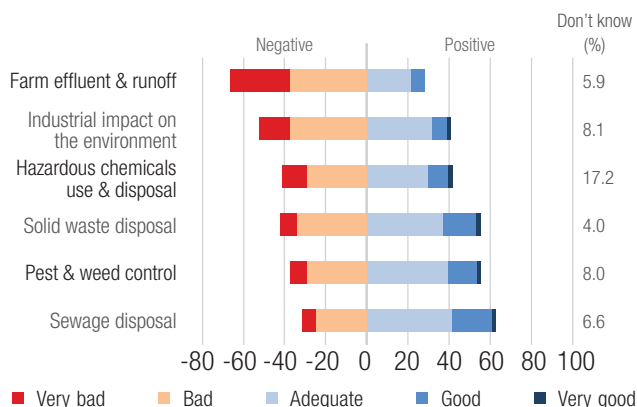


Figure 3.8. Perceived quality of management activities.

3.3.2. CURRENT MANAGEMENT OF THE ENVIRONMENT

The 2016 Survey

The quality of management of thirteen environments or resources was assessed on a scale ranging from ‘very well managed’ to ‘very poorly managed’ (Figure 3.10). In general, most environmental features were considered to be ‘adequately managed’, but with rivers and lakes scoring lowest (Mean Likert score 2.57). Nearly half (47.2%) of respondents felt that rivers and lakes were either ‘poorly managed’ or ‘very poorly managed’. Conversely, around half the respondents rated national parks (48.3%) and New Zealand’s natural environment compared to other developed countries (48.5%) as either ‘very well managed’ or ‘well managed’. There were high rates of ‘don’t know’ responses for five resources, namely soils (12.8%) marine fisheries (10.0%), marine reserves (10.0%), groundwater (16.0%) and wetlands (15.3%).

Trends 2000–2016

Mean Likert scores for most resources correspond with resources being ‘adequately managed’ (Figure 3.11 a–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. By contrast the e-surveys from 2010–2016 all show a downward slope, or perceived worsening of management. They almost all now sit within the ‘adequately’ to ‘poorly’ managed categories.

3.4 MAIN CAUSES OF DAMAGE TO THE ENVIRONMENT

The 2016 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 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 (85.5%), as well as industrial activities

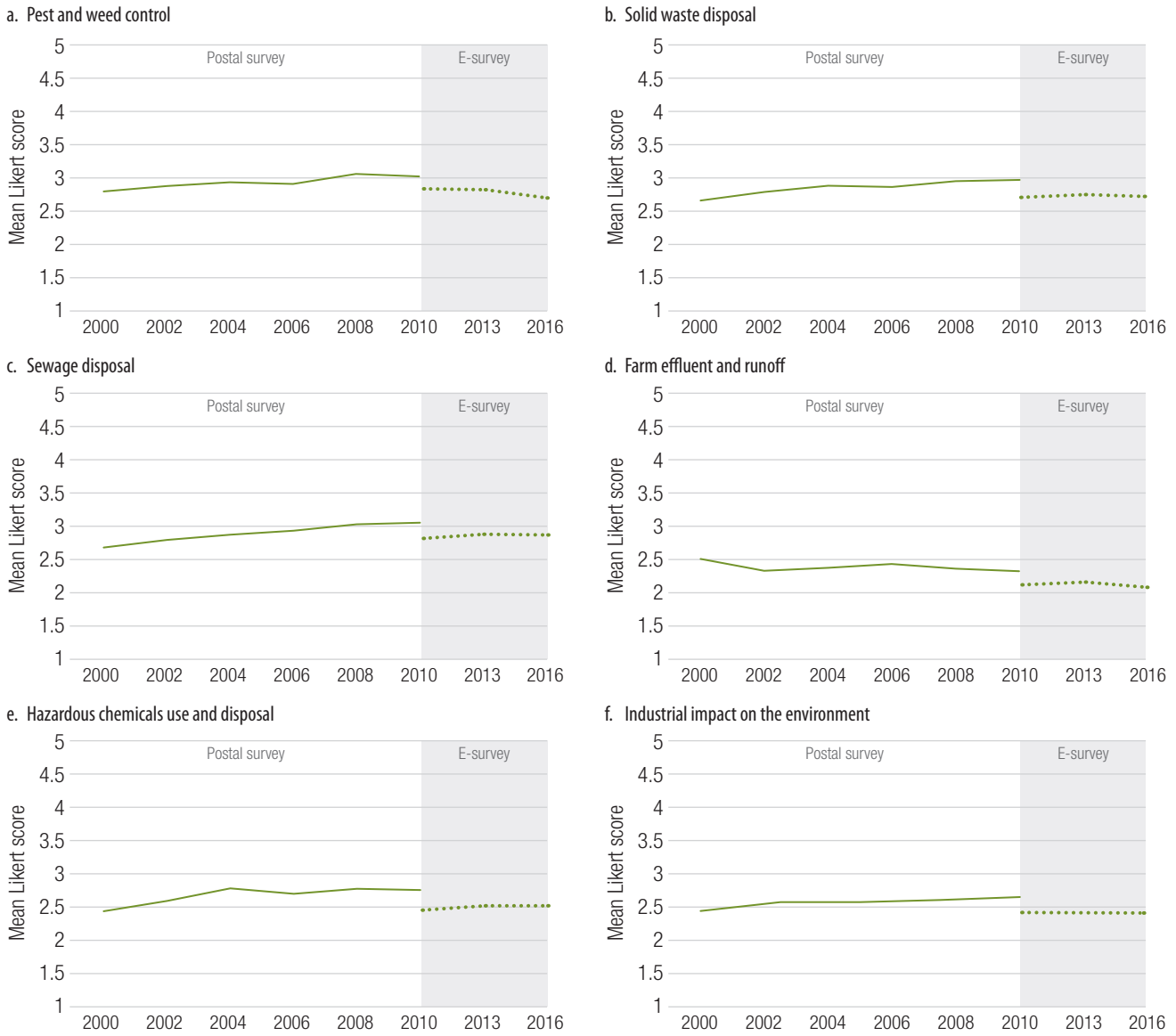


Figure 3.9 (a-f). Trends in perceived quality of management activities (Scale: 1 = very bad, 2 = bad, 3 = adequate, 4 = good, 5 = very good).

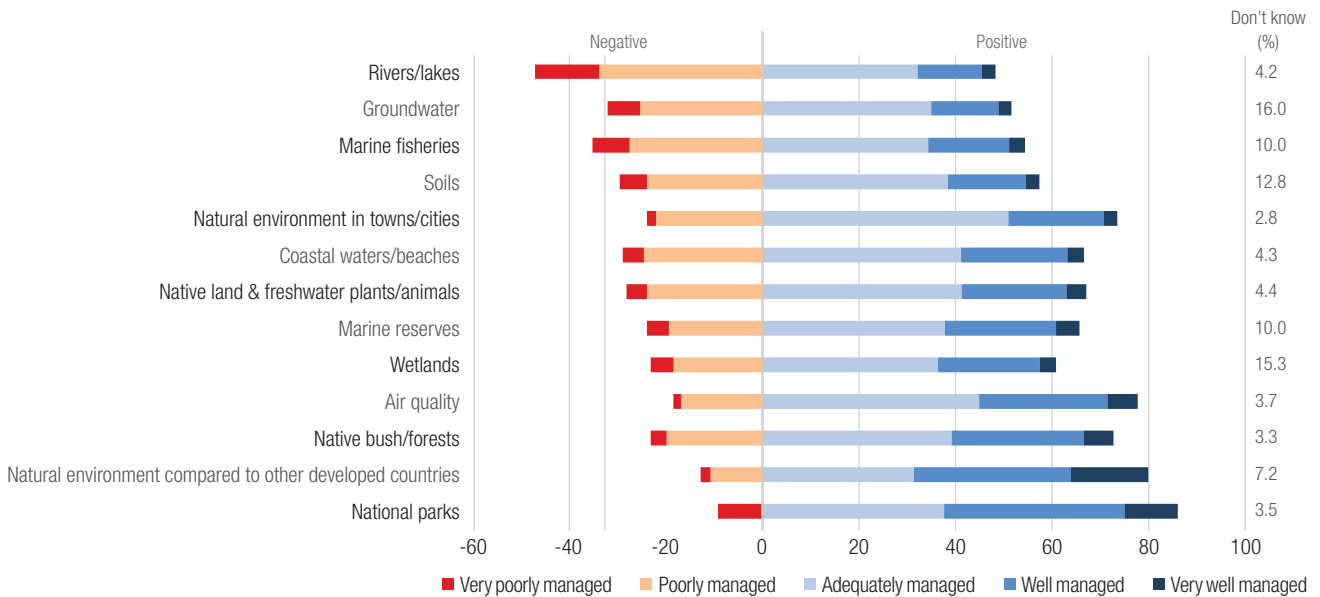
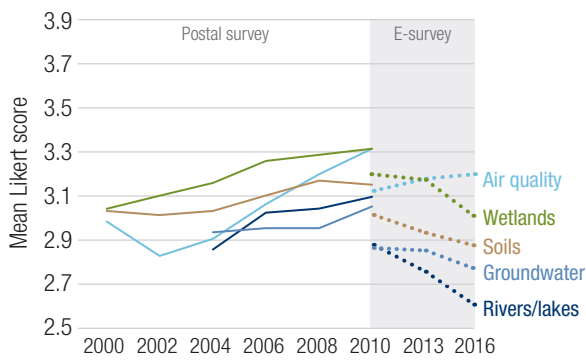
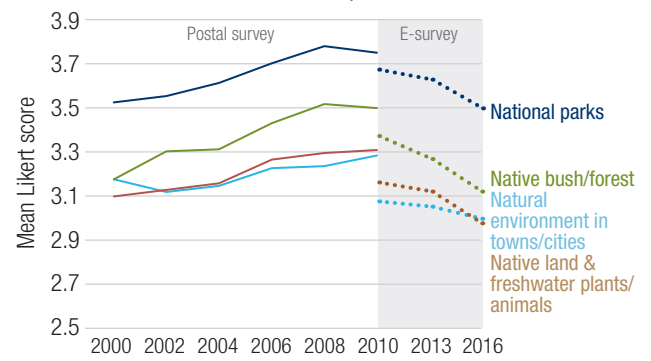


Figure 3.10. Perceived quality of management.

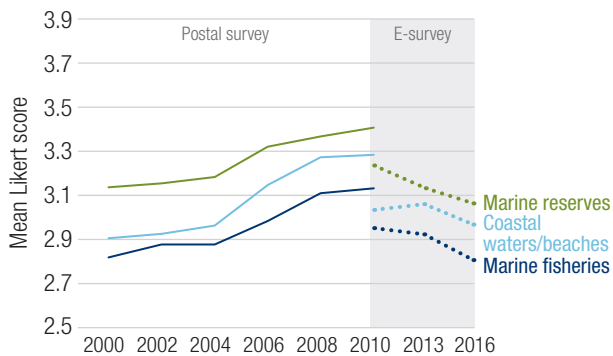
a. Air, Soils, Rivers and lakes, Groundwater, Wetlands



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

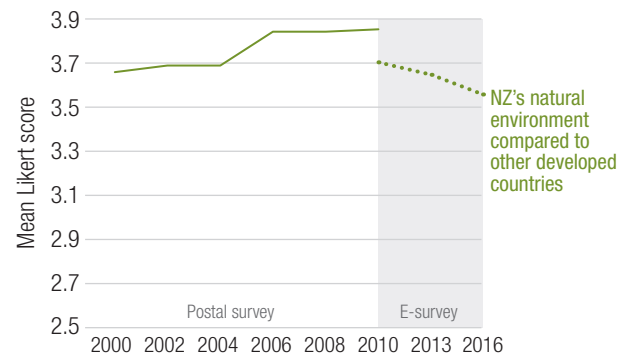


Figure 3.11 (a–d). Perceived quality of management (Scale: 1 = very poorly managed, 2 = poorly managed, 3 = adequately managed, 4 = well managed, 5 = very well managed).

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	85.5%	4.2%	3.4%	2.3%	5.8%	1.3%	1.9%	1.5%	8.7%	3.2%
Household Waste/Emissions	22.5%	12.9%	3.2%	15.8%	21.4%	7.2%	7.7%	18.9%	4.8%	9.8%
Industrial Activities	71.4%	26.0%	14.2%	33.3%	19.8%	16.5%	13.1%	28.5%	8.6%	19.1%
Pests/Weeds	3.3%	46.8%	59.1%	17.0%	7.4%	6.4%	11.1%	21.5%	48.5%	37.8%
Farming	17.9%	55.2%	32.6%	48.0%	16.2%	8.5%	9.5%	59.0%	13.3%	42.4%
Forestry	2.1%	16.5%	41.0%	12.9%	2.5%	1.6%	2.1%	10.8%	20.4%	12.9%
Urban Development	19.5%	24.7%	29.3%	16.7%	23.4%	4.0%	7.2%	15.5%	13.6%	27.0%
Mining	4.1%	11.7%	20.3%	18.9%	3.4%	4.1%	4.2%	5.4%	19.6%	5.3%
Sewage/Stormwater	4.5%	24.4%	3.5%	16.8%	62.9%	38.0%	35.5%	43.5%	4.8%	26.6%
Tourism	1.5%	6.2%	15.1%	0.9%	14.6%	4.8%	12.8%	4.7%	39.0%	7.3%
Commercial Fishing	1.6%	3.9%	0.7%	0.5%	25.7%	78.0%	50.8%	3.5%	0.9%	0.9%
Recreational Fishing	0.2%	1.6%	0.6%	0.2%	7.4%	25.4%	28.1%	4.8%	0.9%	1.2%
Dumping of Solid Waste	7.0%	18.1%	12.1%	36.4%	22.9%	15.4%	15.8%	17.8%	13.0%	17.8%
Hazardous Chemicals	19.9%	16.6%	10.5%	39.4%	18.0%	17.5%	17.2%	22.2%	8.4%	15.7%
Other	1.6%	2.0%	3.8%	2.5%	2.9%	4.8%	7.3%	2.6%	7.6%	6.8%

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

(71.4%), 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 62.9% of respondents nominating this cause, while 78% 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 2000–2016

Respondents' judgements of the main causes of damage to the 10 environmental components which were included in all seven surveys are shown in Figures 3.12 (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 and recreational fishing. Main causes of damage to soils and wetlands were also spread relatively evenly over several categories.

Most notable across many of the resources assessed is that farming is increasingly being chosen as one of the three main causes of damage. In particular, farming has now been chosen by 59% of respondents: when the survey first began in 2000 it was selected by only 24.7% of respondents.

3.4.1 ETHNICITY DIFFERENCES

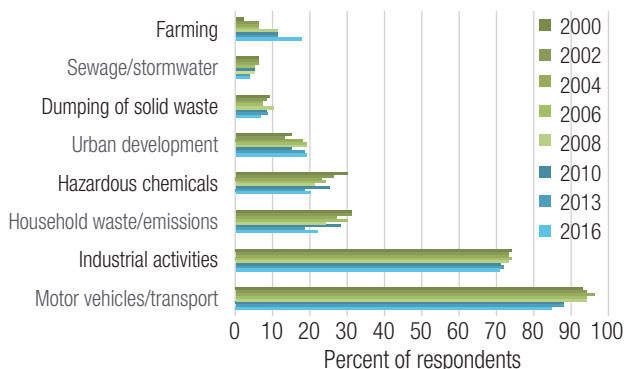
Z scores were used to assess the significance of differences between ethnic group ratings of main causes of damage to two key resources: air, and fresh waters. Absolute values of Z scores need to exceed 1.96 to be significant at the 5% level. The following significant differences in ratings of causes of damage to air (Figure 3.13) were found:

- Industrial chemicals: Maori significantly higher than NZ Europeans.
- Farming: Maori significantly higher than NZ Europeans.
- Industrial Activities: Maori and NZ Europeans higher than other ethnicities.
- Household waste and emissions: Maori and NZ Europeans higher than other ethnicities.
- Motor Vehicles/Transport: Other ethnicities higher than Maori .

There were six significant differences when ethnicity was evaluated against fresh water (Figure 3.14), namely:

- Industrial chemicals: Other ethnicities higher than NZ Europeans.
- Dumping of solid waste: Other ethnicities higher than NZ Europeans.
- Farming: NZ European higher than Other ethnicities.
- Industrial Activities: Maori higher than NZ Europeans and Other ethnicities.
- Household waste/emissions: Maori higher than Other ethnicities.

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.

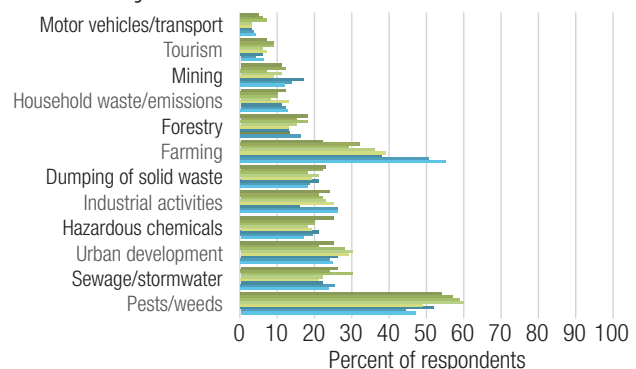
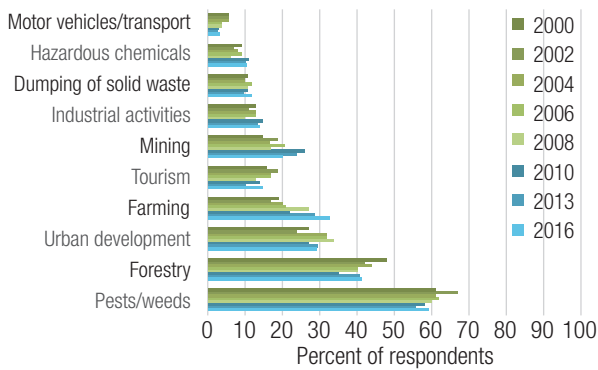
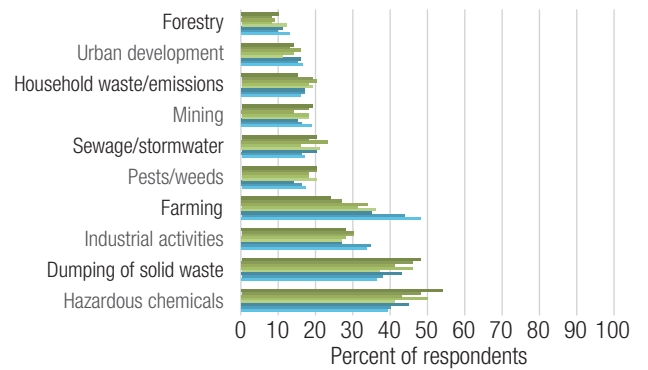


Figure 3.12 (a–j). Perceived main causes of damage.

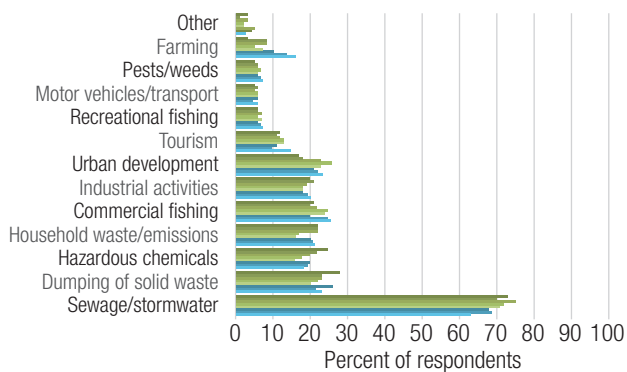
c. Perceived main causes of damage to native forests and bush. Categories less than 5% are omitted.



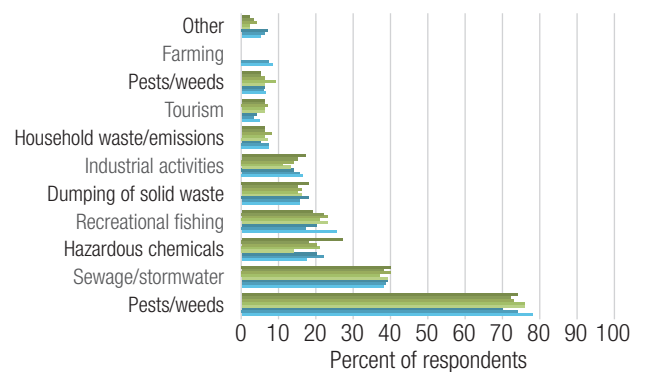
d. Perceived main causes of damage to soils. Categories less than 5% are omitted.



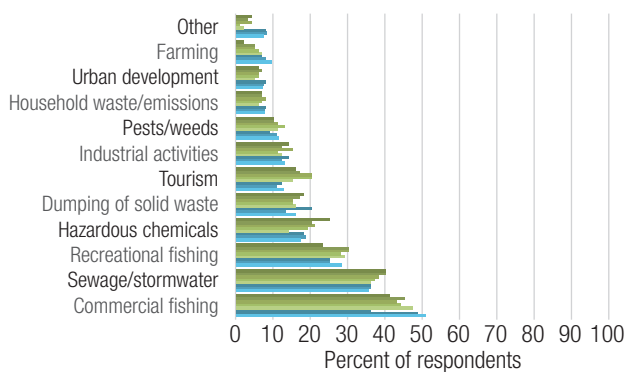
e. Perceived main causes of damage to beaches and coastal waters. Categories less than 5% are omitted.



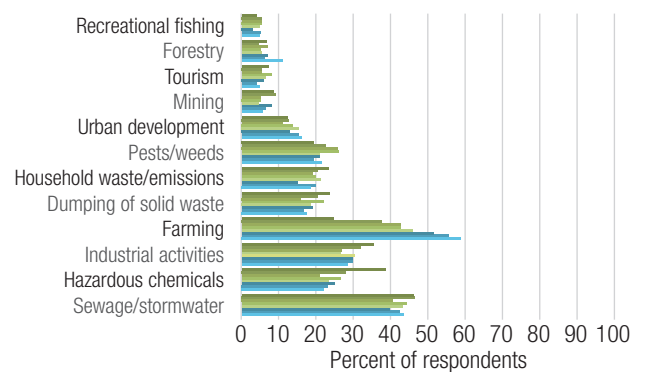
f. Perceived main causes of damage to marine fisheries. Categories less than 5% are omitted.



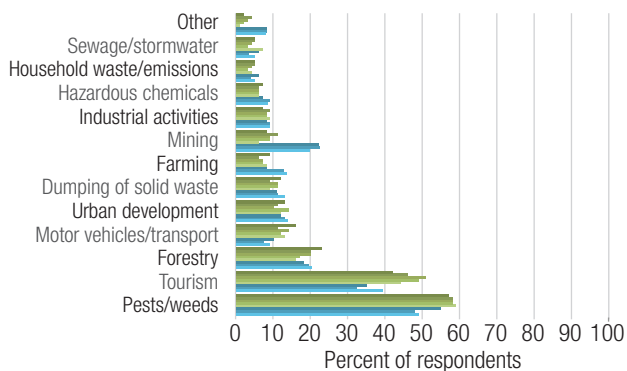
g. Perceived main causes of damage to marine reserves. Categories less than 5% are omitted.



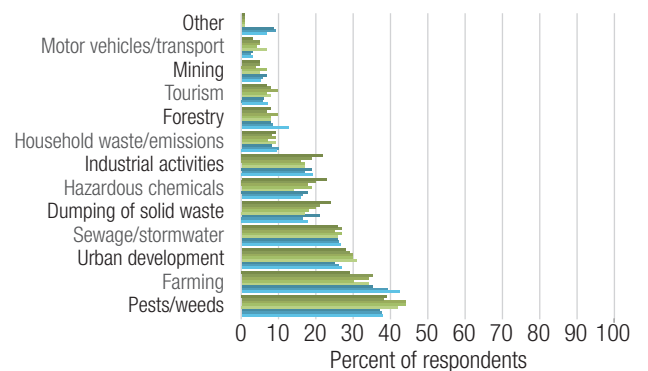
h. Perceived main causes of damage to fresh waters. Categories less than 5% are omitted.



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.



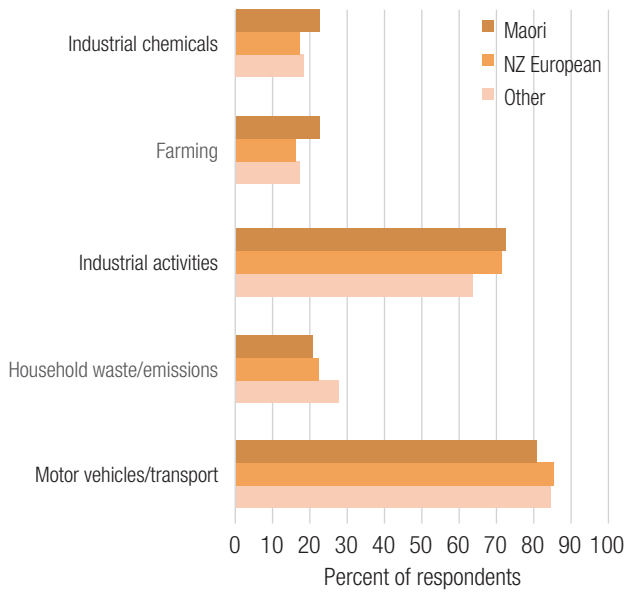


Figure 3.13. Perceived main causes of damage to air, by ethnicity. Categories less than 10% are omitted.

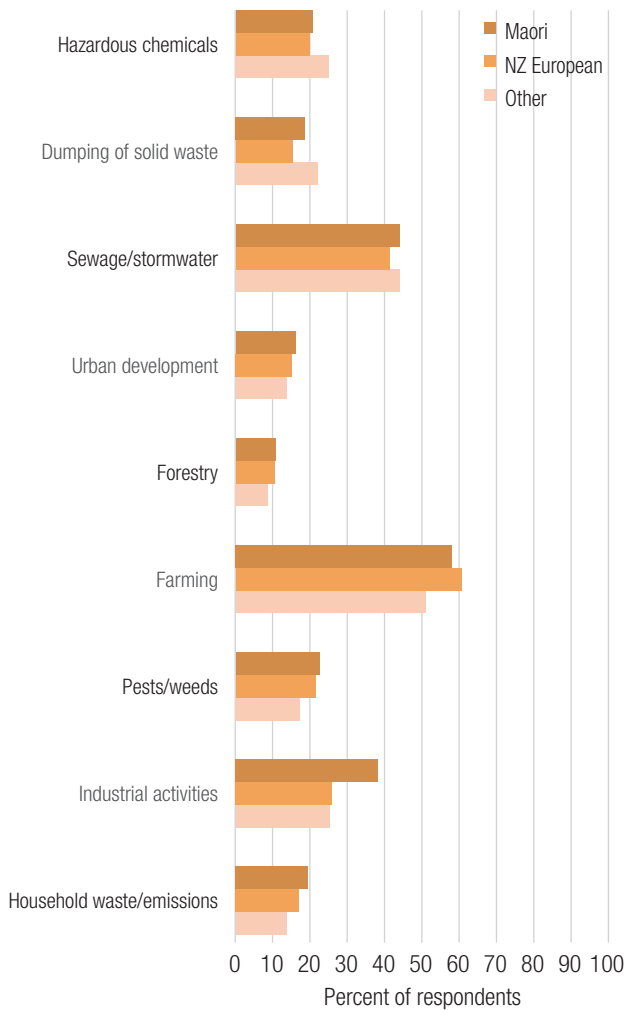


Figure 3.14. Perceived main causes of damage to fresh waters, by ethnicity. Categories less than 10% are omitted.

3.4.2 REGIONAL DIFFERENCES

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

Z scores were used again to compare proportions in each category. Figure 3.15 shows damage to air by region – in this case there were three significant differences:

- Household waste/emissions: Southern higher than Northern.
- Household waste/emissions: Southern higher than Central.
- Forestry: Northern less than Central.

For fresh waters (Figure 3.16) the following significant differences were identified:

- Farming: Northern less than Southern, Northern less than Central.
- Household wastes/emissions: Southern less than Central.

3.5 PARTICIPATION IN ENVIRONMENTAL ACTIVITIES

The 2016 Survey

Figure 3.17 shows levels of participation in 15 environment related activities during the preceding twelve months. More than 70% of respondents to the 2016 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 relatively few respondents had taken part in a hearing or consent process, 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 (Northern, Central, and Southern), gender and income. There were numerous significant effects, so we report only a selection (Table 3.2). Most notable findings include:

- Education: for all but two activities those with a tertiary education are far more likely to participate in pro-environmental behaviours;
- Ethnicity: consistent with the findings of Kerr *et al* (2016) the survey findings show that for almost all activities Maori are far more likely to report involvement in pro-environment behaviour than are NZ Europeans or those of other ethnicities.

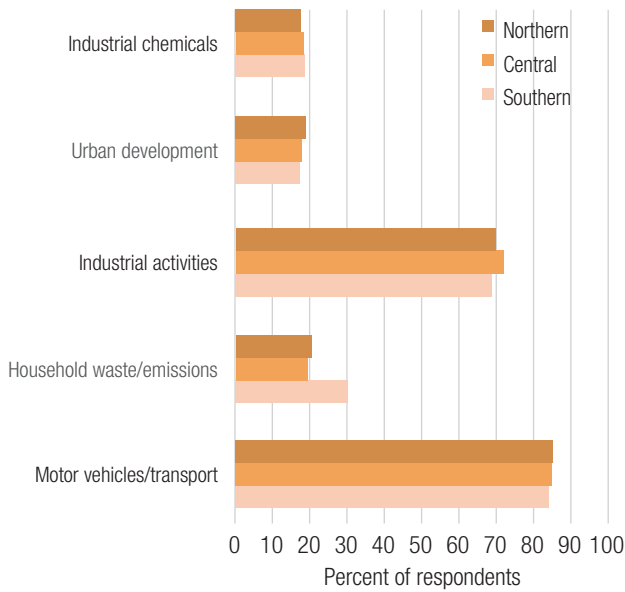


Figure 3.15. Perceived main causes of damage to air, by region. Categories less than 10% are omitted.

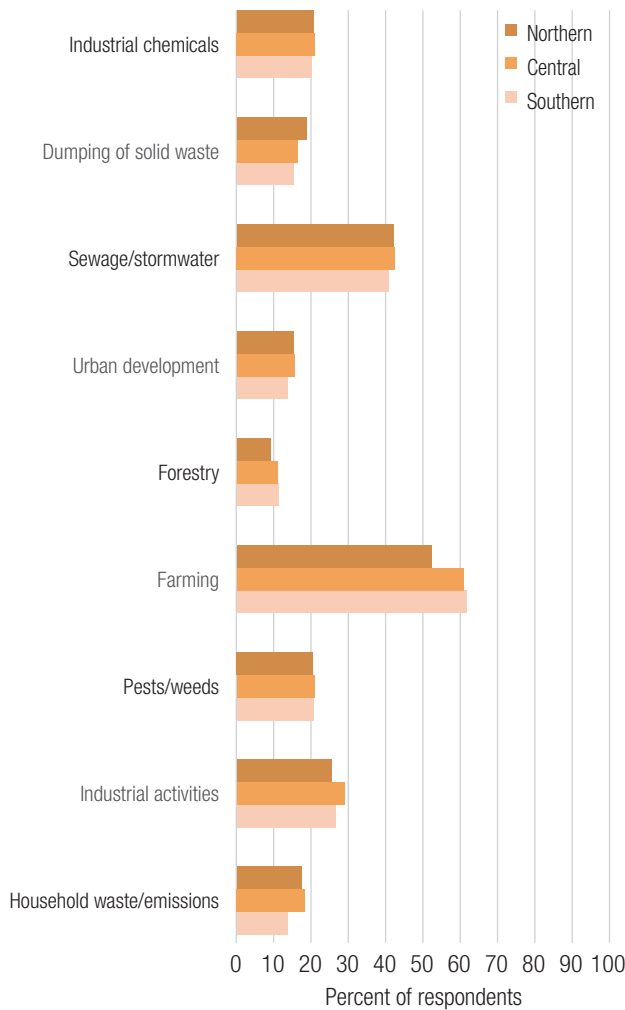


Figure 3.16. Perceived main causes of damage to fresh waters, by region. Categories less than 10% are omitted.

Trends 2002–2016

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 & Bird)’. Figure 3.18 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 (separately), and 2013 and 2016 are exclusively electronic survey. There is a high level of consistency between years, although respondents to e-surveys do appear to have different rates of participation in some activities when compared to postal surveys, e.g., ‘been involved in an environmental organisation’, ‘commuted by buses or trains’ and ‘recycled household waste’.

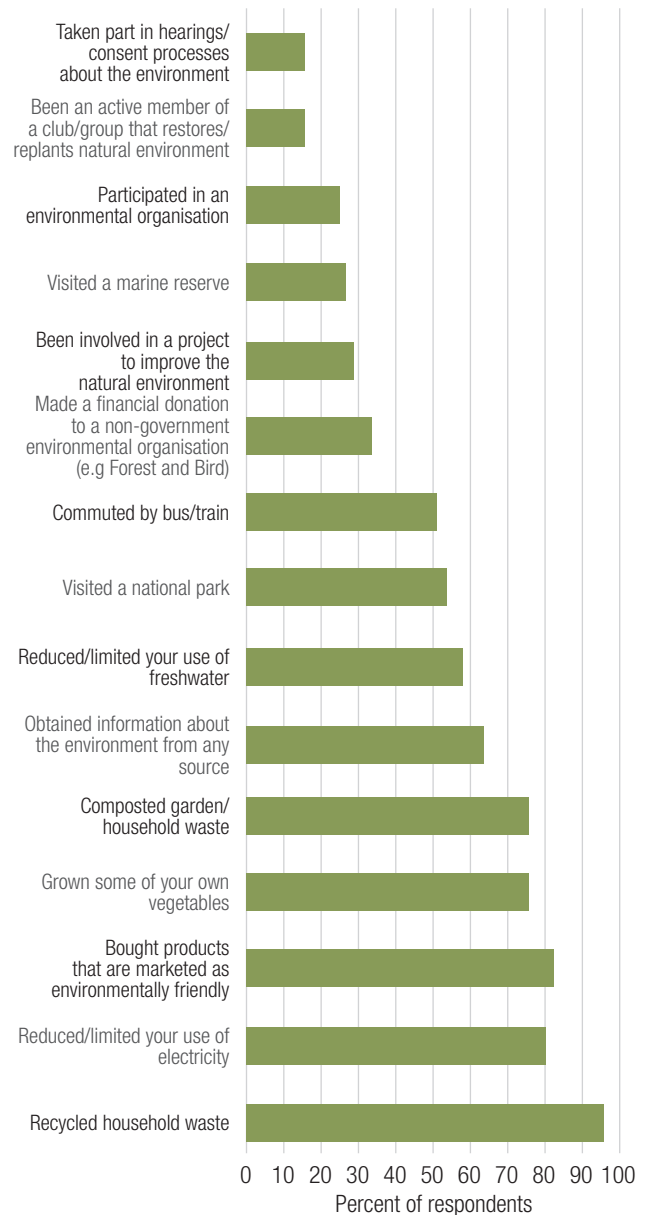


Figure 3.17. Reported participation in environmental activities, 2016.

Table 3.2. Rates of participation by a range of demographic characteristics – 2016 data.
(Gray highlighted cells indicated the cell with the highest pro-environment behaviour for that demographic, where p= or <0.05.)

Activity	Gender			Education				Income			Ethnicity			Region				
	Male (%)	Female (%)	P=	No qualification (%)	High School Equivalent (%)	University equivalent (%)	P=	<\$70000 (%)	>\$70000 (%)	P=	Maori (%)	NZ European (%)	Other (%)	P=	Northern	Central	Southern	P=
Reduced or limited use of electricity	78	84	0.003	81	81	81	NS	83	77	0.008	88	80	83	0.01	83	81	81	NS
Reduced or limited use of fresh water	78	84	0.003	52	54	67	NS	62	52	0.001	70	57	66	<.001	63	61	53	0.012
Visited a marine reserve	54	65	<.001	14	23	31	<.001	23	39	<.001	30	25	30	NS	32	23	21	<.001
Visited a national park	54	52	NS	35	43	63	<.001	48	66	<.001	55	52	52	NS	56	51	53	NS
Bought products marked as environmentally friendly	86	90	0.003	81	86	91	<.001	88	89	NS	90	88	85	NS	88	88	88	NS
Recycled household waste	97	95	0.038	95	95	97	0.053	96	96	NS	97	97	93	0.016	96	97	97	NS
Composted garden and/or household waste	78	77	NS	76	73	79	0.02	77	80	NS	79	77	72	NS	73	77	83	<.001
Been involved in a project to improve the natural environment	29	31	NS	16	19	40	<.001	28	36	0.006	42	28	29	<.001	31	28	31	NS
Grown some of your own vegetables	75	77	NS	69	74	79	0.006	76	76	NS	78	77	69	0.026	72	77	78	0.027
Obtained information about the environment from any source	66	67	NS	48	54	77	<.001	64	76	<.001	73	64	66	0.031	66	66	66	NS
Taken part in hearings/consent processes about the environment	18	14	0.056	13	11	19	<.001	14	20	0.013	27	13	15	<.001	16	16	16	NS
Participated in an environmental organisation	25	27	NS	18	18	32	<.001	25	28	NS	37	23	28	<.001	30	25	24	0.067
Commuted by bus/train	52	51	NS	37	43	54	<.001	51	51	NS	58	50	53	0.071	60	51	41	<.001
Been an active member of a club/group that restores/replants natural environment	17	16	NS	11	11	20	<.001	16	17	NS	26	14	15	<.001	16	16	15	NS
Made a financial donation to a non-government environmental organisation	34	34	NS	24	27	41	<.001	33	38	0.055	45	31	37	<.001	38	33	31	0.029

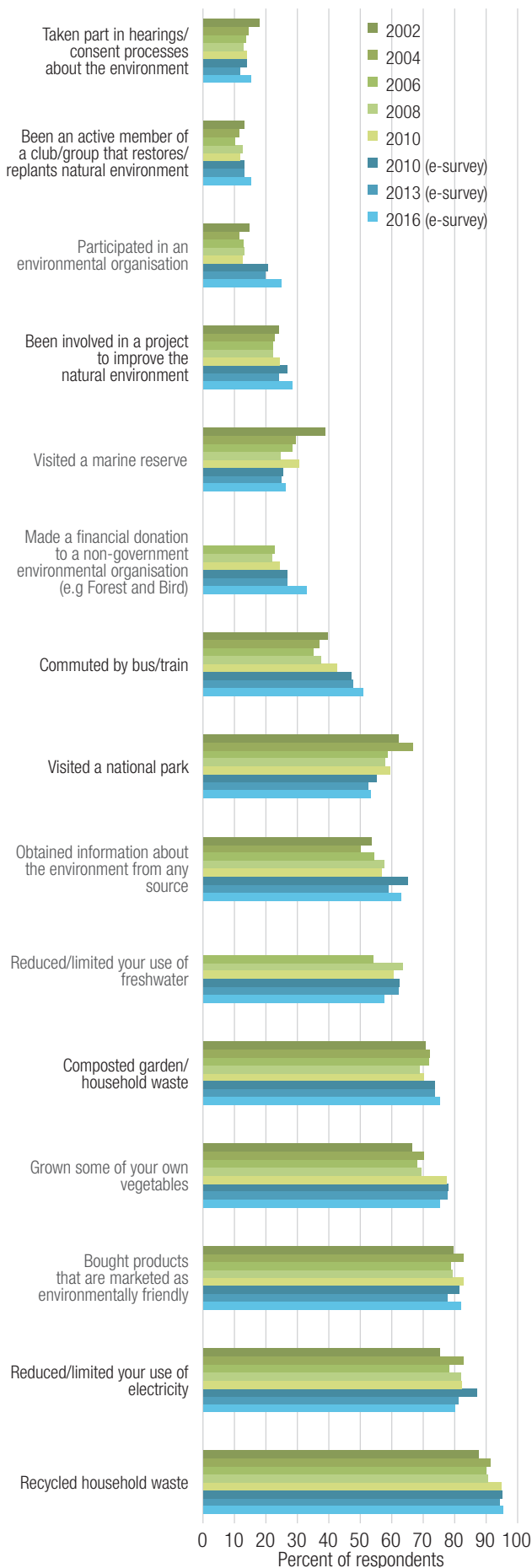


Figure 3.18. Trends in reported participation in environmental activities.

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 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. Nevertheless despite the inter-survey issue we do present trend analysis of these results for the three electronic surveys (2010–2016).

The 2016 Survey

‘Water related’ (31.1% of respondents) was identified as the most important environmental issue facing New Zealand (Figure 3.19), with ‘agriculture related’ (9.9%), ‘GHG, climate change and ozone’ (8.8%) and ‘waste’ (8.4%) the next most highly rated. Respondents identified ‘GHG, climate change and ozone’ (33.5%) as the single biggest issue facing the world (Figure 3.20). Then followed ‘water related’ (13.3%) and ‘population pressures’ (9.5%). The size of the ‘other’ categories for both the world and New Zealand are large, but with no individual component bigger than 2.5%.

2010–2016 surveys

Figures 3.21 and 3.22 show comparative New Zealand and World data respectively over the three electronic surveys (2010–2016). For New Zealand, ‘water related’ concerns have consistently been identified by around 30% of those who responded. For the World, items seen to link to ‘climate change’ were again consistently high at around 30% of respondents, with water-related issues of secondary important but at around 13% (2016) of those who responded.

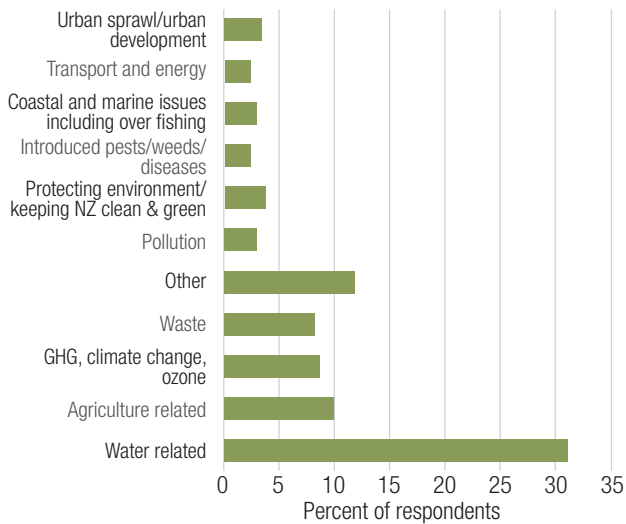


Figure 3.19. Most important issues facing New Zealand. (Note – items only included where at least 2.5% of respondents identified the issue)

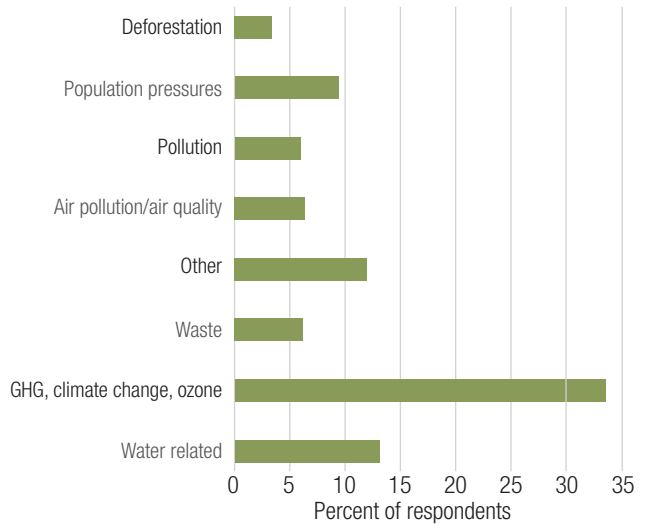


Figure 3.20. Most important issues facing the World. (Note – items only included where at least 2.5% of respondents identified the issue)

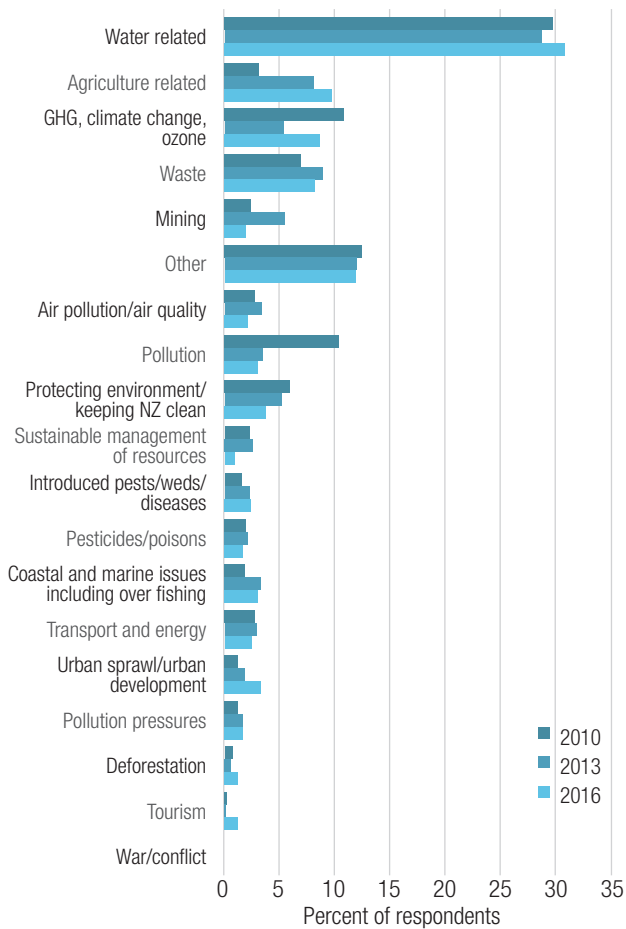
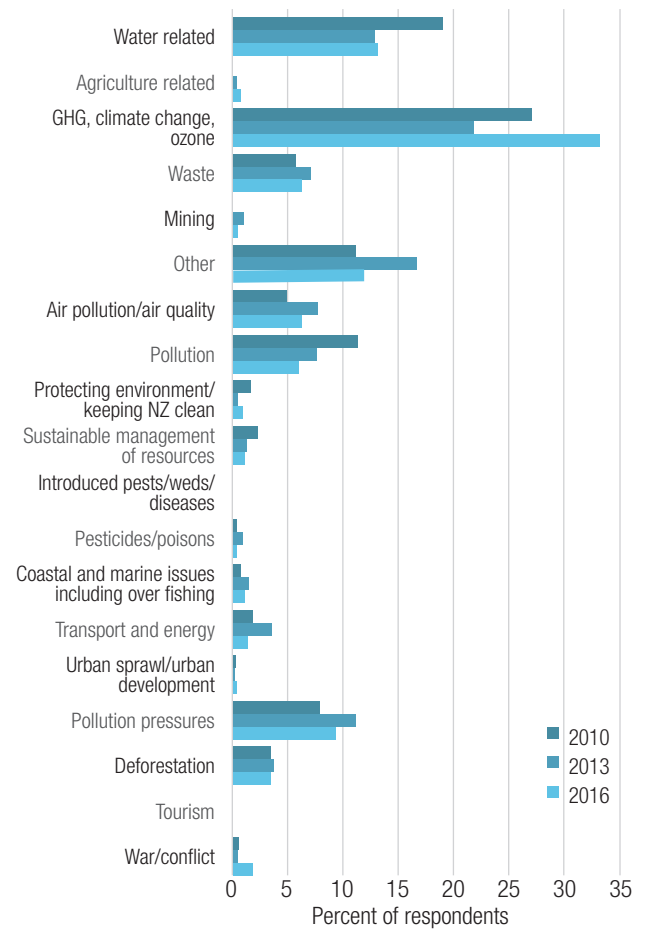


Figure 3.21. Perceived most important issues facing New Zealand – trends over the 2010, 2013, 2016 survey period.



Figures 3.22. Perceived most important issues facing the World – trends over the 2010, 2013, 2016 survey period.



Cordyline australis or *ti kouka*, Tiritiri Matangi Island.
ROSS CULLEN

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.

Where statistical analyses of the trends have been undertaken they are only for the period 2010–2016, i.e., the three e-surveys, due to the change from postal surveys to e-surveys and the implications thereof.

Where available, relevant biophysical PSR trend data are reported for comparative purposes. Environment Aotearoa (Ministry for the Environment & Statistics New Zealand (2015)) is now the primary reference point for comparison. It provides the most comprehensive and relatively the most up to date (data until 2013), high quality data on state of the New Zealand environment 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 Hsu *et al.* (2016) 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 ten other countries (see Table 4.1). These countries and the reasons for choosing them are:

- Iceland – 2nd ranked in the 2016 EPI. A small, high income island nation with a very high EIP score and higher rank than New Zealand;
- Norway – 17th ranked in the 2016 EPI. A hilly nation, very similar to New Zealand in total population and mainland land area. Very high income per capita;

- Sweden – 3rd ranked 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 – 12th equal ranked in the EPI. A high income, densely populated island nation. It has a significantly improved 2016 EPI rank;
- Canada – 25th in the EPI. A large, natural resource abundant, high income, low population density country;
- United States – 26th 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;
- Chile – 52nd ranked in the EPI, an upper middle income country with several geographic and economic similarities to New Zealand
- Malaysia – 63rd ranked in the EPI. An upper middle income, equatorial country, with considerable forestry and other natural resources;
- Australia – 13th ranked in the EPI and New Zealand's nearest neighbour. A country where there are enormous environmental issues and some institutional challenges. Uses some similar policy approaches to New Zealand;
- Fiji – 59th ranked in the EPI. A small, upper middle income Pacific Island nation, strongly dependent on its natural resources to generate jobs and incomes.

We accept there are limitations to the comparative use of these data; because of space limitations we have selected just five of the nine summary measures listed in the 2016 EPI report (Health impacts, Water and sanitation, Forests, Climate and Energy were excluded).

Table 4.1. Summary ranking and individual resource data from the EPI for New Zealand and ten other countries. (Data source: Hsu *et al.* 2016, extracted and summarised from relevant rows of the 2016 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)
Iceland	90.51 (2 nd)	97.04	88.20	88.89	57.27	66.04
Sweden	90.43 (3 rd)	93.26	96.08	100.00	50.82	88.76
New Zealand	88.00 (11 th)	95.67	90.52	65.32	27.89	92.75
United Kingdom	87.38 (12 th)	86.78	98.94	61.28	22.91	98.98
Australia	87.22 (13 th)	96.13	97.88	83.90	39.60	87.18
Norway	86.90 (17 th)	94.59	93.89	63.01	93.89	82.20
Canada	85.06 (25 th)	91.16	89.75	95.68	35.51	74.50
United States	84.72 (26 th)	89.73	84.16	99.40	43.10	79.35
Chile	77.67 (52 nd)	88.40	94.26	41.21	38.20	75.15
Fiji	75.29 (59 th)	92.06	57.38	66.91	64.86	59.23
Malaysia	74.23 (63 rd)	74.68	77.16	48.33	53.48	90.85

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 2014 project; Nielsen 2014)) 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 (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. The Quality of Life 2014 report covers six cities (Auckland, Porirua, Hutt, Wellington, Christchurch, and Dunedin) and has a section on Built and Natural Environment (www.qualityoflifeproject.govt.nz/survey.htm). It reports survey respondents’ views on seven domains, including Built and Natural Environment, including air, water and noise pollution as well as access to parks and reserves.

However, 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 eight surveys that most people consider the natural environment in towns and cities to be ‘adequate’ or ‘good’ (Figure 4.1a), but only 3.2 % consider it ‘very good’. The availability of parks and reserves is ‘moderate’ or ‘high’ (Figure 4.1b). The natural environment in towns and cities is considered to be adequately managed (Figure 4.1c). All ‘indicators’ in this set scored positively, unlike any other environmental component that was examined.

Commentary

With 87.7% 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, and in other centres such as Timaru, Invercargill, Gore, and Alexandra) 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 and Statistics New Zealand (2015) have highlighted the many water quality issues (including total nitrogen, *E. coli*, and macroinvertebrate levels) associated with urban streams and rivers. More research may be helpful in exploring respondent understanding of the natural environment in towns and cities.

Wither Hills water reservoir, Blenheim.



ROSS OULLEN

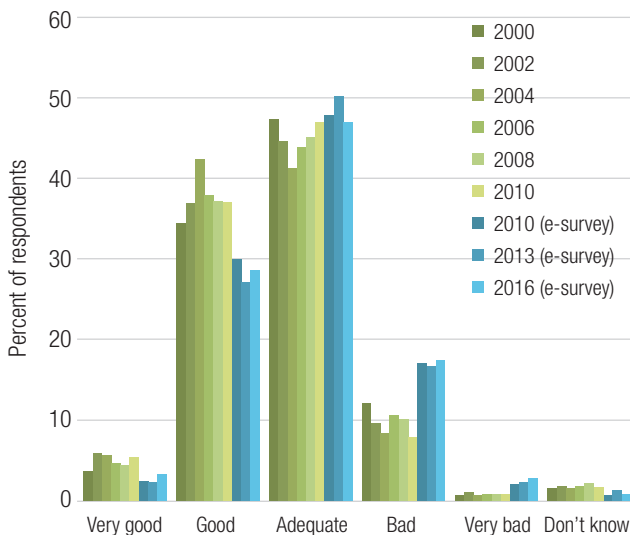


Figure 4.1a. Perceived condition of the natural environment in towns and cities.

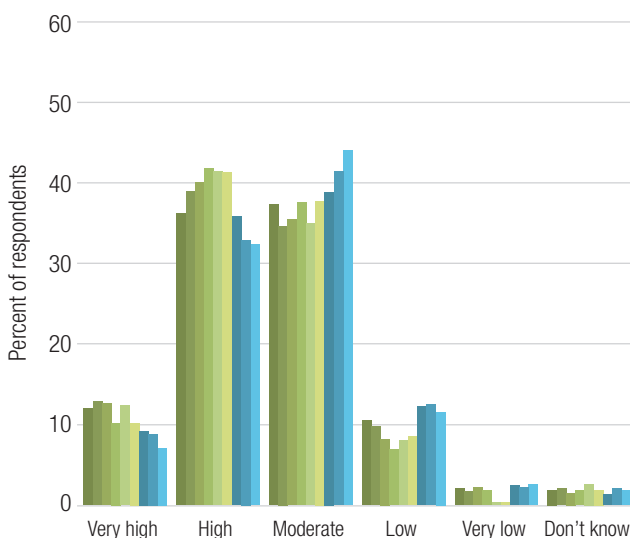


Figure 4.1b. Perceived availability of parks and reserves in towns and cities.

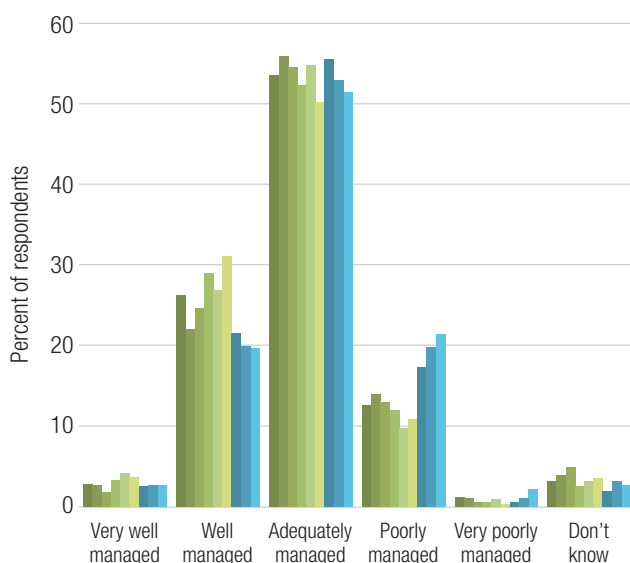


Figure 4.1c. Current management of the natural environment in towns and cities.

4.2 AIR

Scientific Information on State and Trends

While conflicting views have been expressed about air quality in New Zealand there is evidence of general improvements in air quality during the last decade (MfE and Statistics New Zealand 2015). 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 have identified 72 areas where air quality could breach the national air quality standards known as gazetted airsheds¹. These gazetted airsheds cover about 2% of New Zealand total land area. However, about two thirds of New Zealand's population live in a gazetted airshed as a result of a highly urbanised population.

National air standards were introduced in 2004 and 2008 was the first year that standards for carbon monoxide, sulphur dioxide, nitrogen oxide and ozone were not breached at any site.

Particulate concentrations for New Zealand towns and cities meet WHO standards for average annual PM₁₀ concentrations. In 2011, our annual average PM₁₀ concentration was the seventh-lowest of 34 Organisation for Economic Co-operation and Development (OECD) countries. In 2013, 45 sites out of 53 monitored (85%) met the WHO PM₁₀ guidelines. But six South Island towns and cities, an industrial site in Hawkes Bay, and a site near a busy road in Auckland exceeded the guidelines. Short term exceedances are more common: 20 of the 37 monitored airsheds which are managed for air quality exceeded the national short-term standard (based on the WHO short-term guideline) on two or more days in 2013 (MfE and Statistics New Zealand 2015). Idiosyncratic air quality issues arise from time to time, such as a recent breach of the air quality guideline for arsenic in Richmond airshed (www.radionz.co.nz/news/national/311939/arsenic-in-the-air-warning-in-richmond).

New Zealand's air quality as it affects humans rates very highly, with a score of 95.67 (Hsu *et al.* 2016) exceeding the rating for eight of the eleven nations included in Table 4.1, and reflecting the fact that over much of the country air quality is very high. This analysis leads to the conclusion that while 'rural' air quality is very high there are particulate issues in some South Island towns in winter and two North Island sites, and thus the state of air quality should be considered as 'good'.

Perceptions of State, Pressures and Management Trends

From all eight surveys it is clear that most New Zealanders consider air quality to be good or very good (combined 59.1% in 2016), and respondents believe its condition has

¹ "A gazetted airshed is a specific area, formally notified in the New Zealand Gazette, that is likely or known to have unacceptable levels of pollutants, or may require air-quality management. (See: www.mfe.govt.nz/more/environmental-reporting/air/air-domain-report-2014/glossary – accessed 21 August 2016).

improved since 2002 (Figure 4.2a) – analysis of trend from the three e-surveys indicates significantly more respondents believe air quality is either good or very good ($p < 0.001$).

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

Most respondents over the eight surveys consider the quality of air management to be good and improving.

The 2016 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

Air quality in New Zealand is high on most days of the year. There are spikes in emissions of particulates in some towns that can lead to health guidelines being temporarily exceeded when temperature inversions occur. But changes in heating technologies and government intervention both contribute to the long term downward trend in particulate levels in New Zealand – a good news story (PCE 2015). That good news is widely recognised and is reflected in the high rating for air quality given by respondents to the 2016 survey (Figure 4.2a). Three quarters of all respondents judge that air quality is adequately to very well managed (Figure 4.2b)

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 Hsu *et al.* (2016: score 92.75 and rank 39th

for Biodiversity and Habitat) 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 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 conservation efforts (e.g., a huge increase in the area of land subject to pest control by the Department of Conservation (DOC) since 2000 (MfE 2007: 395), the large proportion of terrestrial areas protected to varying degrees (over 30% of total land area), and the significant percentage of the New Zealand Exclusive Economic Zone protected by a Marine Protected Area, all of which is reflected in the Hsu *et al.* (2016) 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. Ninety percent of New Zealand’s wetlands have been lost since humans arrived in New Zealand. New Zealand has 71 different rare ecosystems, and 45 of them are classified as threatened under the red-list criteria of the International Union for Conservation of Nature (Holdaway *et al.* 2012).

Eighty-one percent of New Zealand resident bird species, 72 percent of freshwater fish species, 88 percent of reptile species, 100 percent of frog species, and 27 percent of resident marine mammal species face extinction (MfE and Statistics New Zealand 2015). 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. Since 2005, the threat of extinction has risen for seven percent of New Zealand’s threatened freshwater, land, and marine species.

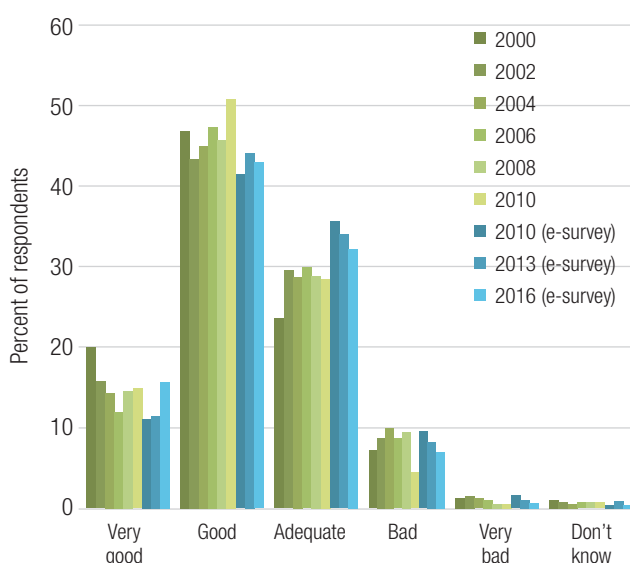


Figure 4.2a. Perceived state of air quality.

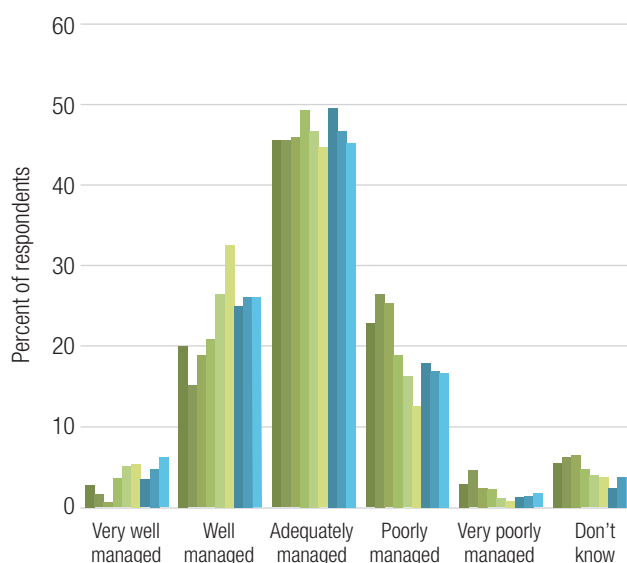


Figure 4.2b. Perceptions about management of air quality.

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 2016 rated the state as bad or very bad (28.8%) – this percentage has increased from 17.7% in the 2010 e-survey ($p < 0.001$). Key pressures have been identified (Figure 3.13b) as increasingly farming (22–57% between 2000 and 2016), and pests and weeds (47% of respondents). 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 or very poorly managed increased between 2010 and 2016 (from 19.1% to 28.4%; $p < 0.001$).

Commentary

Respondents rating the condition of New Zealand's native plants and animals as 'adequate' or 'good' continues to surprise 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 report 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. MfE and Statistics New Zealand (2015) observe that during 1996–2012, New Zealand lost 10,000 hectares of indigenous forests, and habitats such as wetlands and sand dunes are now only a fraction of their original size.

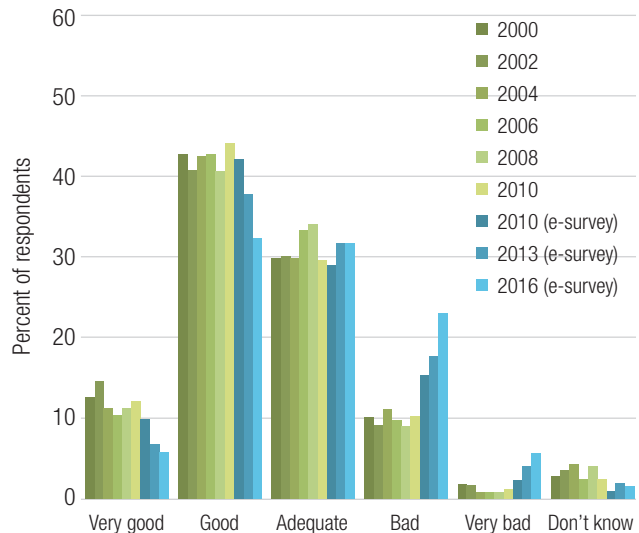


Figure 4.3a. Perceived state of native land and freshwater plants and animals.

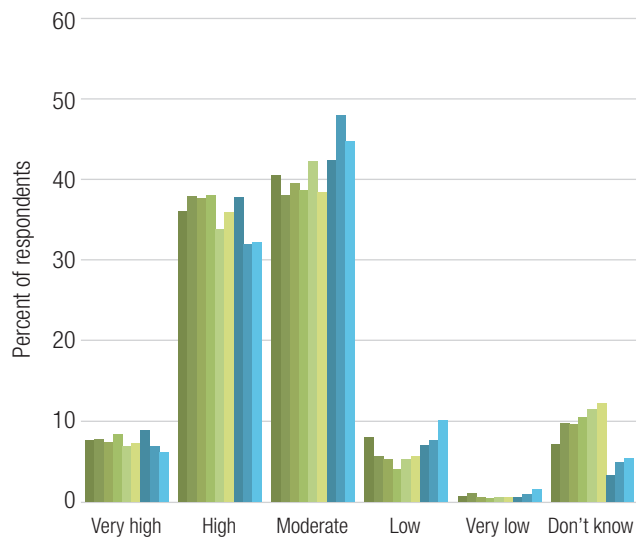


Figure 4.3b. Perceived diversity of native land and freshwater plants and animals.

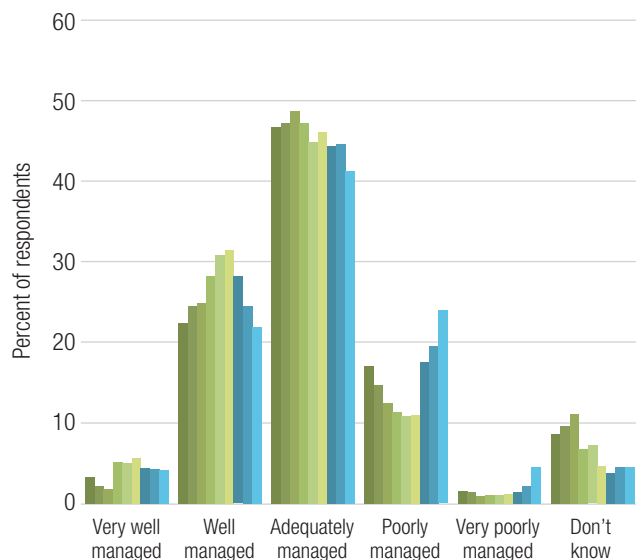


Figure 4.3c. Perceptions about management of native land and freshwater plants and animals.

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 land legally protected primarily for conserving biodiversity increased from 8,354,700,500 hectares in 2006 to 8,763,300 hectares in July 2009, an increase of 4.9% (MfE 2010b). 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). MfE (2007: 401) stated “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) noted that a net loss occurred of nearly 175 km² of indigenous habitat (including 24 km² of native forest) from 1996–2002. MfE and Statistics New Zealand (2015) report the area of indigenous forest and regenerating forest fell by 10,000ha during 1996–2012 and the area of scrub shrank by 3.1% during that period.

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 2010b). The area of QEII National Trust registered covenants (which include a range of habitats) has increased significantly from 71,648 ha in 2005 to reach 181,346 ha in 2015 (QEII National Trust, 2015).

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). The state of native forests is monitored by counting the numbers of eight indicator tree species per hectare on 869 public conservation and private sites (MfE and Statistics New Zealand 2015). The number of trees present was stable between surveys in 2002–07 and 2009–14. 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

Analysing trends over all surveys is difficult. Both perceived condition (Figure 4.4a) and perceived quality of management (Figure 4.4c) improved considerably over the six paper-based surveys, although the e-surveys show declining trends. 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 over the course of the surveys (Figure 3.13c) have been ‘pests and weeds’ (56–67% of respondents: 59% in 2016), ‘forestry’ (35–48%), and increasingly ‘farming’ (33% in 2016). Analysis of the three e-surveys show increasingly negative responses in all three aspects ($p < 0.001$).

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, Project Janszoon, a thirty year programme to restore the ecology of Abel Tasman National Park (www.janszoon.org), and Project Taranaki Mouna which aims to make Taranaki National Park predator-free (www.tfsnz.org.nz/project-taranaki-mouna).

It is 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.

Ripe nikau fruit, Tiritiri Matangi Island.



ROSS OULLEN

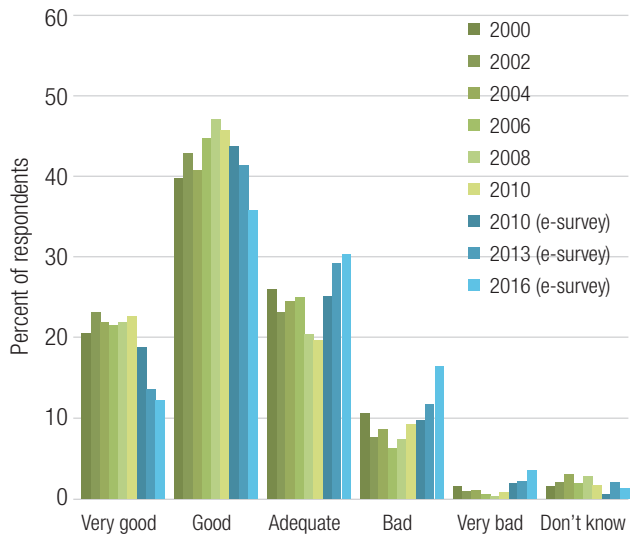


Figure 4.4a. Perceived condition of native bush and forests.

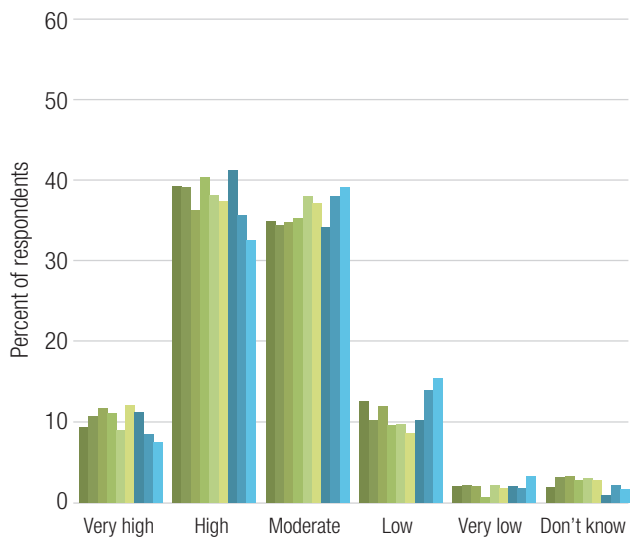


Figure 4.4b. Perceived quantity of native bush and forests.

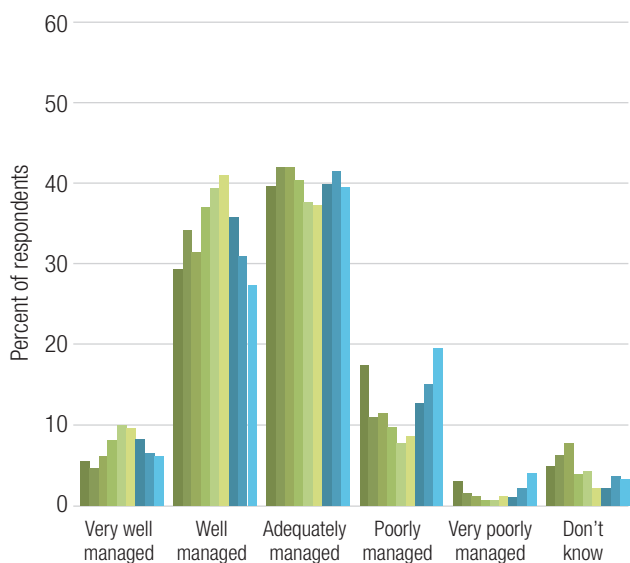


Figure 4.4c. Perceptions about management of native bush and forests.

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's (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 quality and flood mitigation (www.sluri.org.nz/Objectives/Display/3 – accessed 1 September 2016), yet they remain a largely unseen resource that receives little or no media attention or public interest. The Soil Health and Land Use Indicators report (www.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Land/soil-health-land-use.aspx) observes New Zealand soils are generally healthy, but there are issues for some soils. The Indicators report states that surveys completed during 2009–2013 found... “more than 80 percent of soil health indicators were within the target range for their respective land use.” But the proportion of soils within their target range for physical status decreased from 58 percent during 1995–2008 to 44 percent in the period 2009–2013.

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 2010a 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 2010a). 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).

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. MfE and Statistics New Zealand (2015: 82) report that an estimated 190 million tonnes of soil are lost each year to waterways and the ocean, about 1.5% of the global total despite New Zealand land area comprising only 0.2% of the global total.

Perceptions of State, Pressures and Management Trends

Most respondents consider the state of soils to be adequate to good (72.3 to 76.8% across all surveys). The main pressures on soils (Figure 3.13d) are ‘farming’ (24–48% from 2000 to 2016) and ‘hazardous chemicals’ (54 to 39% from 2000 to 2016 respectively). Around 60% of respondents thought management was adequate to good (Figure 4.5b).

Commentary

Information about soils is available from the Ministry for the Environment (MfE) website and from New Zealand’s Environmental Indicator series website, hence it is possible for the public to read about trends in the state of soils in New Zealand, although there are 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 soil compaction, rapid rates of erosion in some areas, urban and lifestyle sprawl and land use intensification.

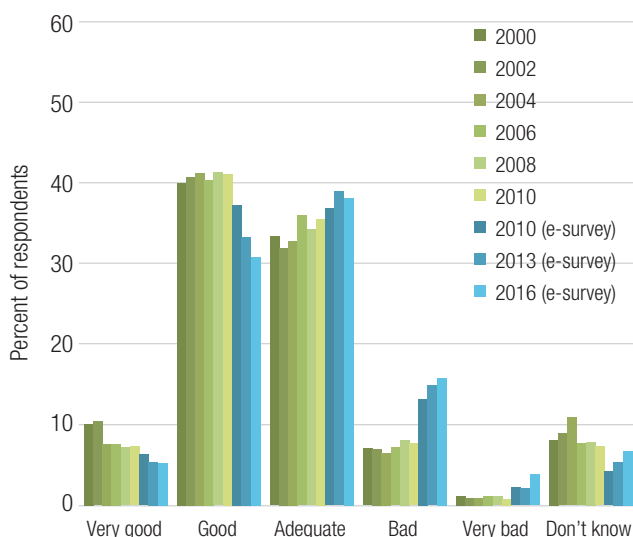


Figure 4.5a. Perceived quality or condition of soils.

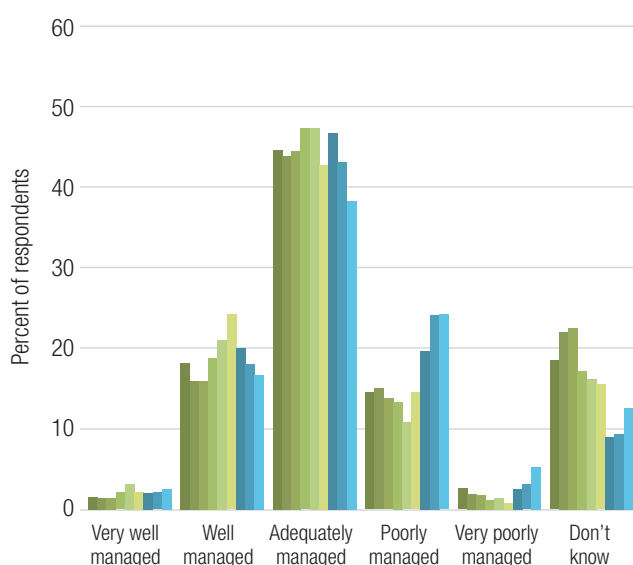


Figure 4.5b. Perceptions about management of soils.

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 (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 discharges of concentrated nutrients into estuaries and harbours, and ongoing reclamations and extensive development on previously undeveloped coastlines (e.g., see: www.nrc.govt.nz/Maritime). MfE (2012b) 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’.

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.

Rising sea levels erode the coast at Moturoa/Rabbit Island.



ROSS CULLEN

Perceptions of State, Pressures and Management Trends

Over all surveys respondents have considered the condition of coastal waters and beaches to be 'adequate' to 'very good' (Range: 77.6–89.7%). Management is considered also to be 'adequate' to 'very good' (Range: 64.2–80.8%). In terms of pressures (Figure 3.13e), 'sewage and stormwater' continues to be, by far, the largest perceived contributor (63–73%).

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 (2012b) report no trend in swimming beach water quality, there may be other factors influencing the degree of positive feeling by the public in this area.

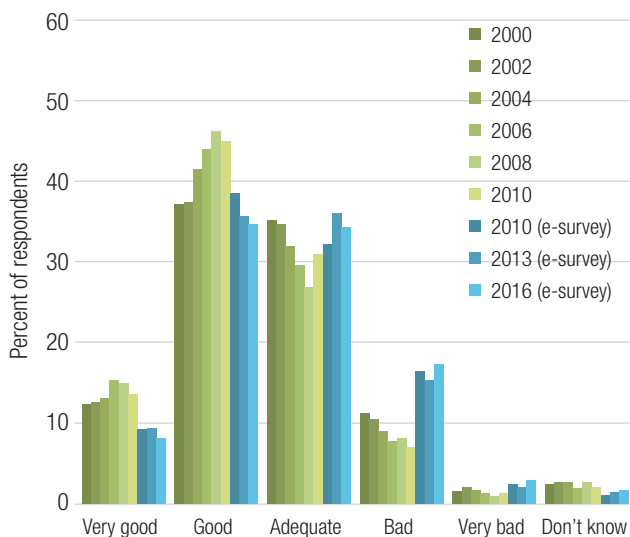


Figure 4.6a. Perceived quality or condition of coastal waters and beaches.

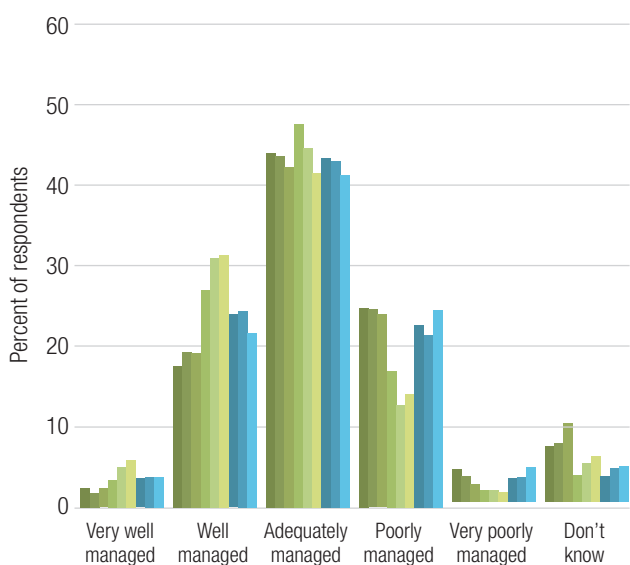


Figure 4.6b. Perceptions about management of coastal waters and beaches.

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.* 2004), 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 Primary Industries (MPI) (2016: 3) reports that there are...“currently 628 fish stocks in the Quota Management System (QMS). Of these, 292 stocks are considered to be “nominal” stocks (fish stocks for which a significant commercial or non-commercial potential has not been demonstrated), leaving 346 QMS stocks or sub-stocks”. After further subdivisions and including some migratory and Antarctic stock that are managed via international management organisations, there are a total of 377 species, stocks or sub-stocks.

The 2015 fish stock assessments provide information on the status of fish stocks and sub-stocks (www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/fisheries) and indicate New Zealand's commercial fish stocks are generally satisfactory. 130 stocks or sub-stocks with known status were above their 'soft limit' (the lower bound on the desirable stock size), but 27 stocks were below their soft limit. For 2015 based upon tonnage landed, 96.8% of stocks of known status were above the soft limit. Eleven stocks were assessed as being below their hard limit (collapsed) and overfishing was identified for 18 stocks which, if continued, would lead to stocks falling below soft or hard limits (MPI 2016: 9).

Quota levels have changed for most fish stocks since they were introduced to the QMS. For example, the initial quota² for Orange Roughy (1983/84) in the Challenger region was 4,950 tonnes per year. By the 1987/88 fishing year this quota had increased to 12,000 tonnes. Within two years, the quota was dropped to 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. By 2015 the stock biomass was assessed as being within the management target range (MPI 2016: 8).

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,

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).

Worm *et al.* 2009), within New Zealand there is debate about some aspects of fisheries and sea floor management. Bycatch of various types is declining in New Zealand waters but still poses risks. The estimated number of seabirds caught each year between 2001/02 and 2013/14 year fell, from 7,280 to 4,380 (MfE and Statistics New Zealand 2015: 97). The number of sea lions estimated to have been caught as bycatch decreased from 59 in 2003/04 to 33 in 2012/13, perhaps partly due to the use of devices that help sea lions escape from nets. The estimated bycatch of fish and invertebrates such as sponges, crustaceans, and cold-water corals fell 72 percent, to 32,098 tonnes between 2001/02 and 2011/12 (MfE and Statistics New Zealand 2015: 97).

Trawling can be very destructive of soft species on the sea floor, and reductions in the amount of trawling each year decreases that damage. Between 1997 and 2014 the number of trawl tows reported each year decreased more than 50 percent and the number of dredge tows reported in New Zealand waters decreased 83 percent between 1996 and 2014 (MfE and Statistics New Zealand 2015: 98).

Overall, the state of marine fisheries (including habitat) in New Zealand is therefore mixed but improving.

Perceptions of State, Pressures and Management Trends

The relatively high levels of ‘don’t know’ responses reduced greatly 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 New Zealand fisheries to be adequate to good (Figure 4.7a), with the quantity of fish stocks considered to be moderate (Figure 4.7b) by most respondents who expressed an opinion. 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’ (70–78% of respondents), ‘sewage and wastewater’ (37–40%) and ‘recreational fishing’ (17–25%). During the period of postal surveys there was a perceived improvement in management, with the modal response being ‘adequate’ (Figure 4.7c). The three e-surveys are giving a different picture: with a perceived shift to a worsening management of marine fisheries ($p < 0.001$).

Commentary

In 2015 96.8 percent of fish caught were from stocks that are not overfished. Public perceptions of fisheries and management are moving counter to scientific evidence as most fish stocks meet soft targets, and bycatch and numbers of trawls per year decrease. Allowing even for the e-survey reductions, in all eight 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

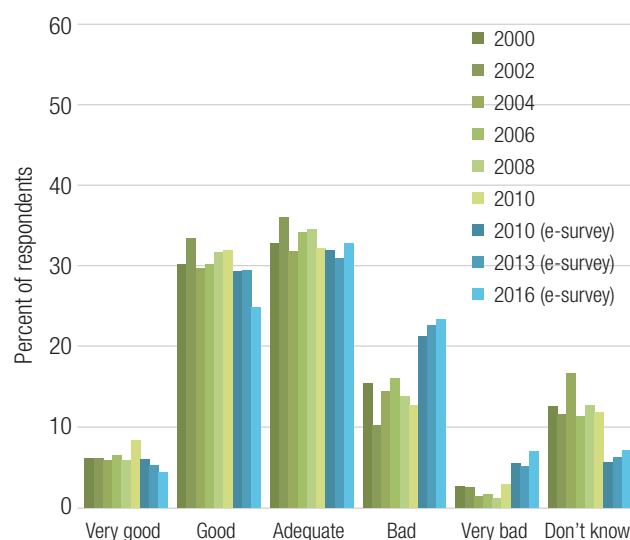


Figure 4.7a. Perceived quality or condition of marine fisheries.

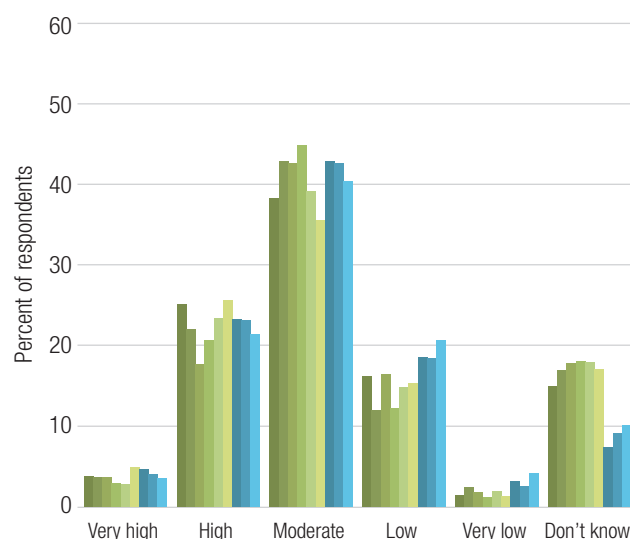


Figure 4.7b. Perceived quantity of marine fisheries.

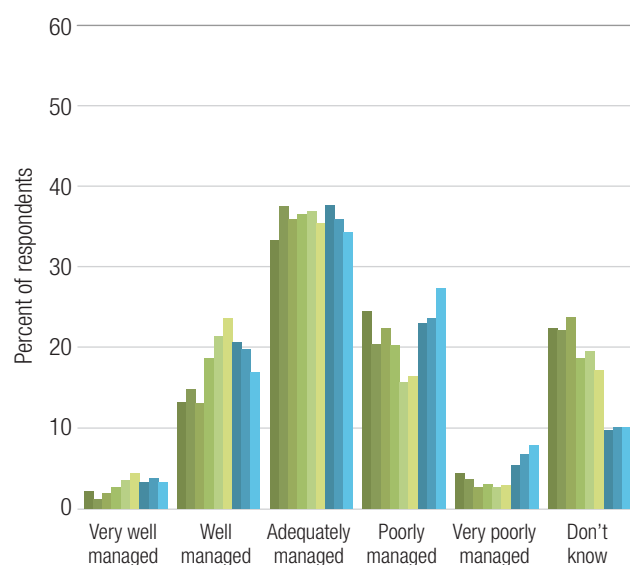


Figure 4.7c. Perceptions about management of marine fisheries.

rates of 'don't know' responses might, in part, reflect the 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.

4.8 MARINE RESERVES

Scientific Information on State and Trends

There are forty-nine Marine Protected Areas including 44 Marine Reserves located within New Zealand's territorial sea. In total, the reserves cover 17,430 square kilometres, about 10 percent of our territorial sea and 0.4 percent of the territorial sea and EEZ combined. This fraction is low when compared to terrestrial reserves which cover 33.4% of New Zealand's land area. It is notable that 99% of the Marine Reserves area is around the distant Auckland and Kermadec Islands. As well, 18 seamounts in New Zealand's territorial sea are closed for trawling (www.doc.govt.nz/conservation/marine-and-coastal/marine-protected-areas/marine-reserves-a-z – accessed 2 September 2016). A large Benthic Protected Area (BPA) was proposed in 2007 (www.fish.govt.nz/NR/rdonlyres/B058B3F1-1FAC-497C-A76A-86E16D14B5BF/0/FAP_BPACostRecovery.pdf – accessed 2 September 2016) 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. The Department of Conservation observe that large areas of the New Zealand EEZ are legally protected but not yet to the standard required to qualify as Marine Reserves (www.doc.govt.nz/nature/habitats/marine/other-marine-protection – accessed 2 September 2016).

The overall state of resources in these 44 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 2012b).

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 e-surveys (7–11%). Most respondents think there is a moderate–high quantity of marine reserves in New Zealand. The most frequently identified pressures (Figure 3.13g) are 'commercial fishing' (36–51% of respondents), 'sewage and stormwater' (36–40%) and 'recreational fishing' (23–30%). Marine reserves are considered to be adequately to well managed, although the e-survey results are more negative than the earlier 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 2016 consider there to be a 'low' or

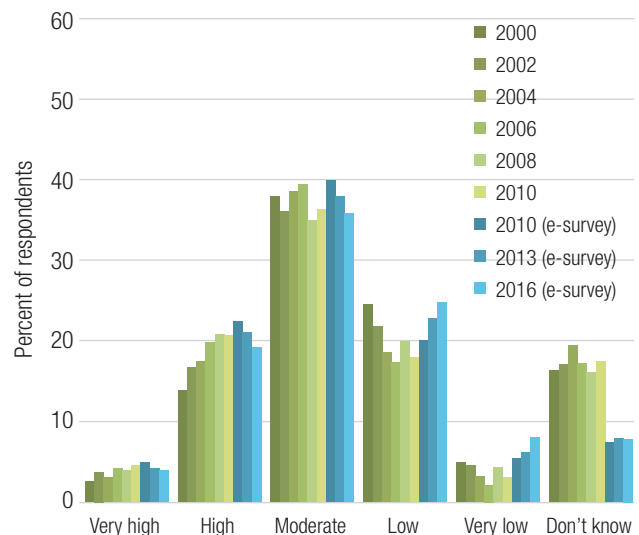


Figure 4.8a. Perceived area of marine reserves

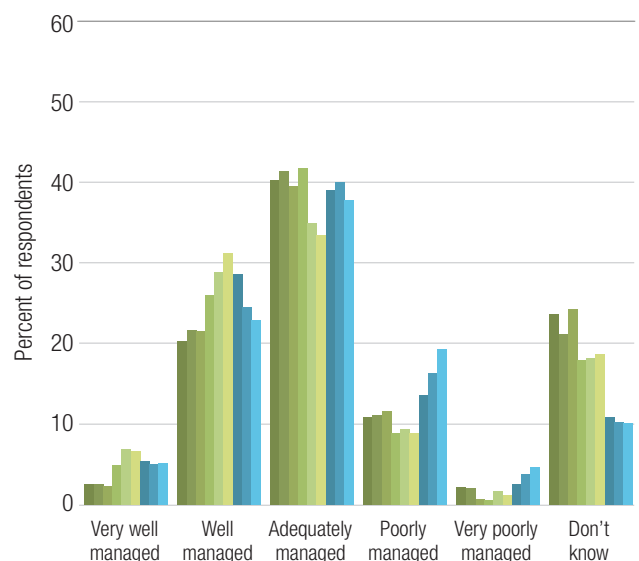


Figure 4.8b. Perceptions about management of marine reserves.

‘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 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 and Statistics New Zealand (2015: 54) judge that: *‘The quality of water in New Zealand’s lakes, rivers, streams, and aquifers is variable, and depends mainly on the dominant land use in the catchment. Water quality is very good in areas with indigenous vegetation and less intensive use of land, and poorer where there are pressures from urban and agricultural land use. Rivers in these areas have reduced water clarity and aquatic insect life, and higher levels of nutrients and Escherichia coli (E. coli) bacteria.’*

Water quantity is also of 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)’*.

We extract a series of summary statements on the quality of New Zealand freshwater from MfE and Statistics New Zealand (2015).

‘Between 1989 and 2013, water clarity improved overall. Total nitrogen and, to a lesser extent, nitrate-nitrogen increased (worsened) overall, while ammonia-nitrogen (ammoniacal nitrogen) decreased (improved) overall (see table 1). A trend could not be determined for total phosphorus, while dissolved reactive phosphorus (dissolved phosphorus) increased (worsened) overall. We could not determine a trend for the macroinvertebrate community index (MCI) at most sites’ (MfE and Statistics New Zealand 2015: 63).

‘Dissolved phosphorus levels increased (worsened) in the large rivers sampled by NIWA between 1989 and 2013, with 51 percent of the 77 monitored sites showing statistically significant increases. These sites contain low to moderate levels of phosphorus (median of 5.0 milligrams per cubic metre). As dissolved phosphorus levels were significantly higher at regional council sites that are concentrated in pastoral areas (median of 13.6

milligrams per cubic metre), we also used these sites to assess phosphorus trends. Compared with the rivers sampled by NIWA, dissolved phosphorus levels decreased (improved) at the regional council sites between 1994 and 2013, with 48 percent of the 132 monitored sites showing statistically significant decreases. There has been no clear trend for total phosphorus over the 25-year period, although levels decreased (improved) from 2004 to 2013’ (MfE and Statistics New Zealand 2015: 64).

‘Nitrogen levels are higher in urban and pastoral lowland sites. The elevated levels of nitrogen are mainly due to an increase in nitrate-nitrogen from nitrogen fertiliser and untreated effluent. The contribution from ammonia-nitrogen from sewage treatment plants, dairy sheds, and industrial operations is relatively minor in comparison. About 49 percent of monitored river sites currently have enough nitrogen to trigger nuisance periphyton growth, as long as there is enough sunlight, phosphorus, and a lack of flood events for periphyton to bloom. High levels of nitrogen can also be harmful to fish, but less than 1 percent of monitored river sites in New Zealand have nitrate-nitrogen levels high enough (>6,900 milligrams per cubic metre) to affect the growth of multiple fish species’ (MfE and Statistics New Zealand 2015: 65).

‘Like nutrients, levels of E.coli are higher in urban and pastoral lowland sites. E. coli in rivers or lakes comes from animal or human faeces. Higher levels of E. coli are indicative of higher risks of infection from pathogens like Campylobacter while swimming, wading, or boating. Median E. coli levels in New Zealand rivers meet acceptable standards for wading and boating at 98 percent of monitored sites. The 2 percent of sites that exceed acceptable levels for wading and boating (>1,000 E. coli per millilitre) are in urban and pastoral areas in Auckland, Canterbury, Southland, and Wellington’ (MfE and Statistics New Zealand 2015: 67).

‘Macroinvertebrates were assessed at 512 river sites between 2009 and 2013. The best MCI values were in catchments with predominantly indigenous vegetation in hilly areas. Most pastoral sites (in lowland and hilly areas) had MCI scores classed as fair to good. Fifty-five sites (about 11 percent) had a poor MCI value. All these sites were in urban and pastoral areas’ (MfE and Statistics New Zealand 2015: 67).

MfE (2012) reported 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.

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 clearly is 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 2004–2016 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'.

Perceptions of the quality of rivers and lakes have changed over time, particularly over the course of the 2010–2016 e-surveys (Figure 4.9a). Earlier surveys showed people thought the condition was adequate–good; in 2016 45.4% of respondents thought it was bad–very bad, a very significant change ($p < 0.001$). Groundwater (Figure 4.9d), by contrast, is judged to be 'adequate' or 'good', and the amount of water available in both (Figures 4.9b and 4.9e) is mostly considered to be either 'moderate' or 'high'. The main causes of damage to fresh waters (Figure 3.13g), and the range of variations from 2000–2016, are considered to be 'farming' (25–59%, from 2000–2016) 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 (2000–2016). In terms of freshwater management 47.2% of respondents in 2016 thought management of rivers and lakes was poor or very poor (Figure 4.9c); for groundwater the figure was 32.4% with most reporting it to be adequately to well managed (Figure 4.9f).

There were very high levels of 'don't know' responses for most postal survey questions regarding freshwater; these levels reduced by about half in the e-surveys (although there were higher reported values again in 2016).

Commentary

Water quality and quantity issues have been of high public interest in New Zealand for at least a decade. 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 in its four reports and the government has introduced a National Policy Statement for Freshwater Management. It has also completed many policy and regulatory changes to help deal with some of the concerns about freshwater and its management in New Zealand. There is sustained media interest in water quality issues in response to the prominent 'dirty dairying' campaign implemented by Fish and Game New Zealand, and the recent community-wide water quality contamination at Havelock North that affected the health of over 5200 residents (www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11702384).

4.10 NATIONAL PARKS

Scientific Information on State and Trends

New Zealand has 13 national parks (www.doc.govt.nz/parks-and-recreation/national-parks), with four added during the last 20 years (Whanganui (1986), Paparoa (1987), Kahurangi (1996), Rakiura (2002)). The passing of Ngāi Tūhoe Treaty of Waitangi Settlement Act in 2014 led to the disestablishment of Te Urewera National Park, and the establishment of Te Urewera as a separate legal entity. Te Urewera is still open to the public, and is overseen by the Te Urewera Board which comprises joint Tūhoe and Crown membership.

A disproportionate number of national parks (10 out of 13) 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.

Sunlit Maniniaro/Angelus Peak, Nelson Lakes National Park.



ROSS CHILLEN

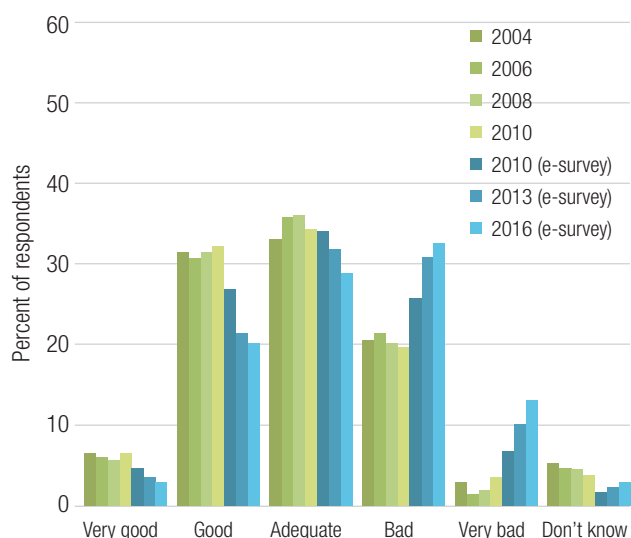


Figure 4.9a. Perceived quality or condition of rivers and lakes.

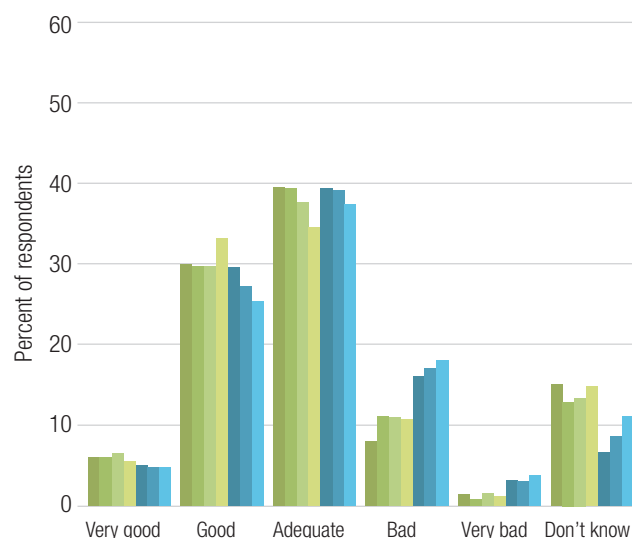


Figure 4.9d. Perceived quality of groundwater.

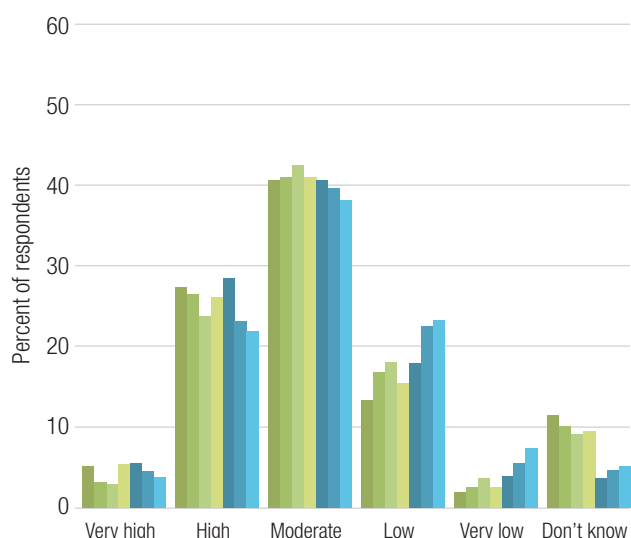


Figure 4.9b. Perceived amount of freshwater in rivers and lakes.

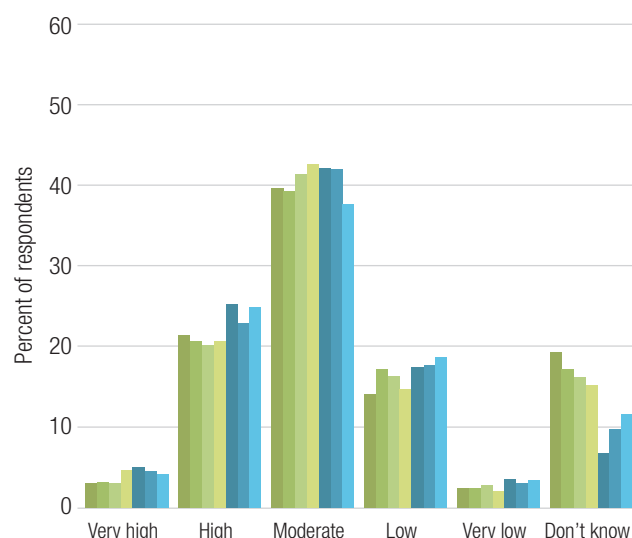


Figure 4.9e. Perceived availability of groundwater for human use.

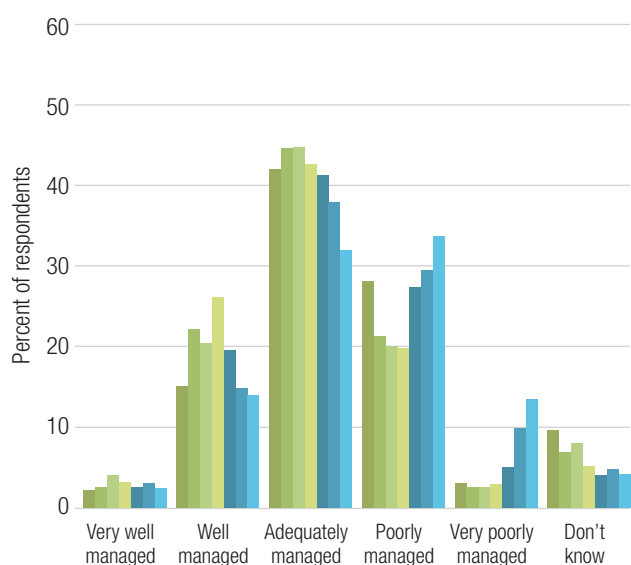


Figure 4.9c. Perceptions about management of rivers and lakes.

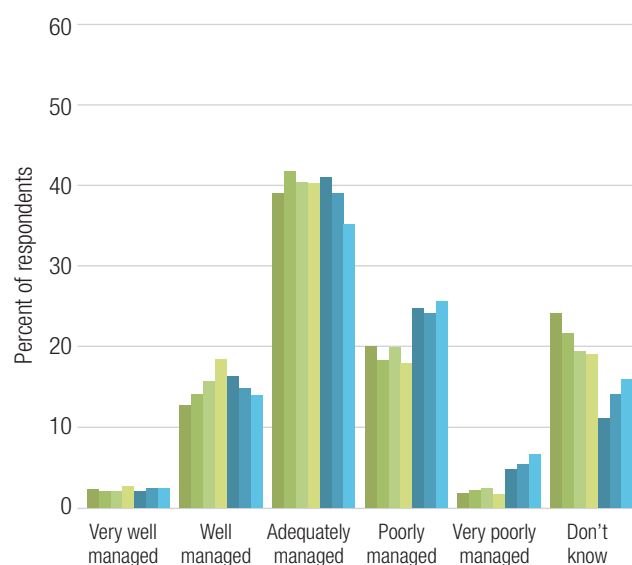


Figure 4.9f. Perceptions about management of groundwater.

Perceptions of State, Pressures and Management Trends

Respondents reported the area of national parks in New Zealand to be moderate to high (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 (doc.govt.nz/parks-and-recreation/national-parks/tongariro – accessed 1 September 2016). This importance and the level of management input may be reflected in survey responses which evaluate national parks and their management very positively.

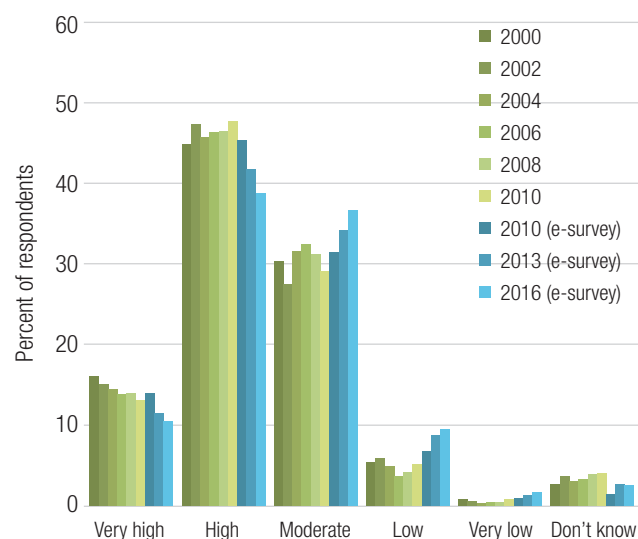


Figure 4.10a. Perceived area of national parks.

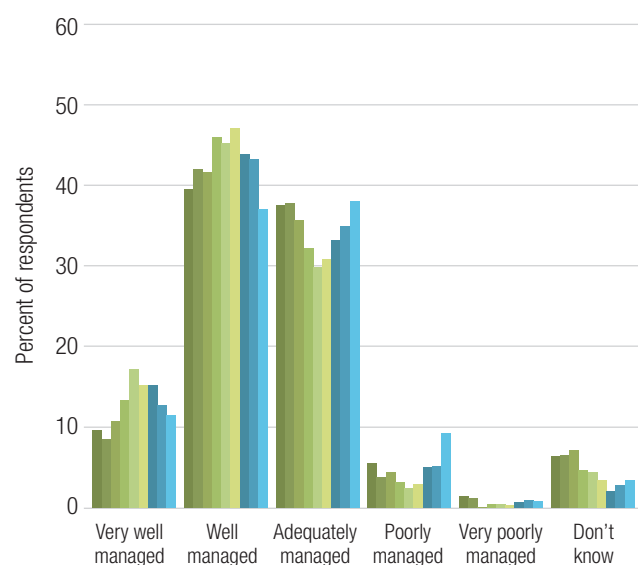


Figure 4.10b. Perceptions about management of national parks.

4.11 WETLANDS

Scientific Information on State and Trends

Wetlands occupy about 250,000 hectares, one percent of New Zealand land area. Only an estimated 10% of the pre-human extent of wetlands remain (MfE and Statistics New Zealand 2015). Overall, the percentage remaining is lower in the North Island (4.9%) than in the South Island (16.2%), 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.

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

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 little overall change over the eight surveys (Figure 4.11a). However, as with area of wetlands (Figure 4.11b) there has been an ongoing increase in the those reporting 'bad-very bad' and 'low-very low' perceptions ($p < 0.001$). The area of wetlands is considered to be moderate, with almost equal numbers (c.20%) considering it high to very high or low to very low, but around 15% expressing a 'don't know' view in 2016 (Figure 4.11b). The perceived main causes of damage to wetlands (Figure 3.13j) are 'farming' (29–42% of respondents) (which was the highest in 2016), and 'pests and weeds' (37–44% of respondents). Wetlands are considered to be adequately to well managed, but with an increasing proportion of respondents expressing negative views about wetland management (Figure 4.11c) ($p < 0.001$).

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.

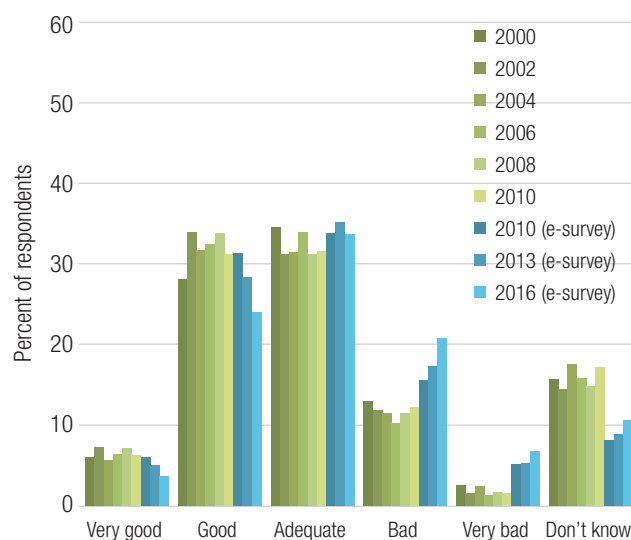


Figure 4.11a. Perceived condition of wetlands.

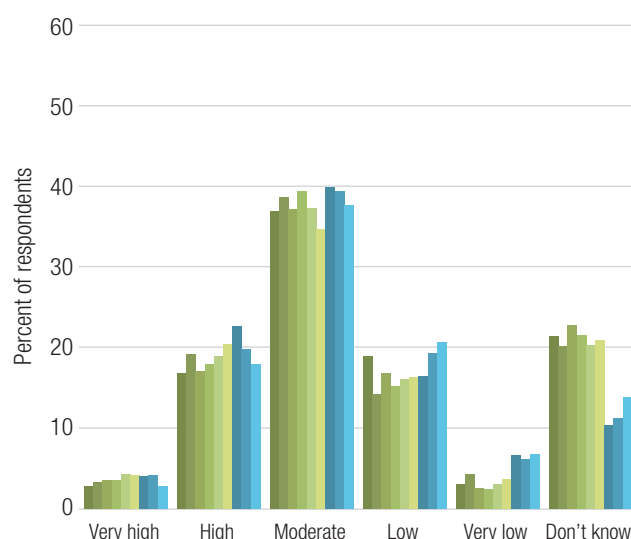


Figure 4.11b. Perceived area of wetlands.

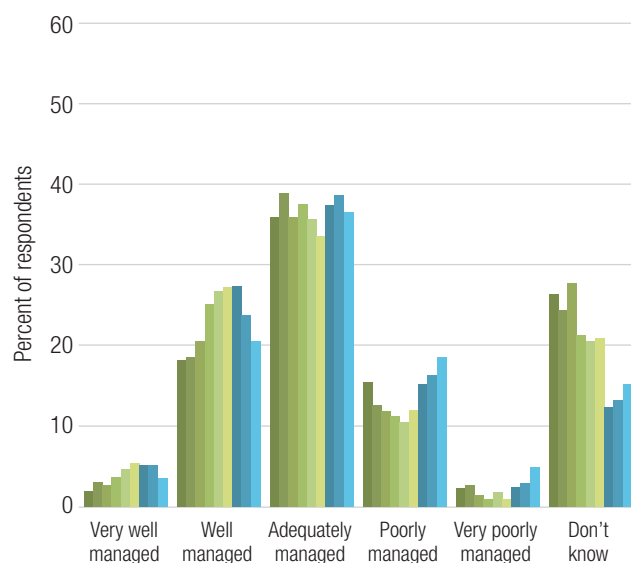


Figure 4.11c. Perceptions about management of wetlands.

More recently, an alternative ranking system, the Environmental Performance Index (EPI), was released on a trial basis in 2006, subsequently confirmed in 2008 and repeated biennially (Esty *et al.* 2008, Emerson *et al.* 2010, Emerson *et al.* 2012, Hsu *et al.* 2014, Hsu *et al.* 2016). The EPI has been built around two objectives: 1) reducing environmental stresses on human health; and, 2) protecting ecosystem vitality. The five 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, in 2012 it ranked 14th out of 132 countries, in 2014 it ranked 16th out of 178 countries and in 2016 it ranked 11th out of 180 countries. In the 2016 EPI evaluation New Zealand was assessed to be performing very strongly in reducing stresses on human health, but only fair on protecting ecosystem vitality. Table 4.1 (page 24) provides a summary comparison of New Zealand's 2016 performance for five of the 20 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.

Perceptions of State, Pressures and Management Trends

While the majority of respondents in 2016 (61.8%) considered the condition of New Zealand's natural environment to be good or very good when compared to other developed countries (Figure 4.12a), there is a declining trend overall, and in the 2010–2016 e-surveys ($p < 0.001$ for the latter). In terms of management, respondents consider New Zealand to be performing well to adequately (Figure 4.12b), but again there is a trend.

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 (now) 4.7 million people have a significant impact on some parts of the New Zealand environment.

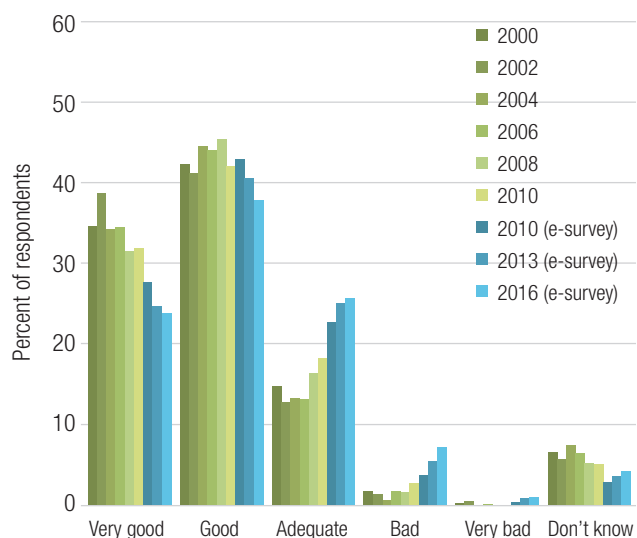


Figure 4.12a. Perceived condition of New Zealand's natural environment compared to other developed countries.

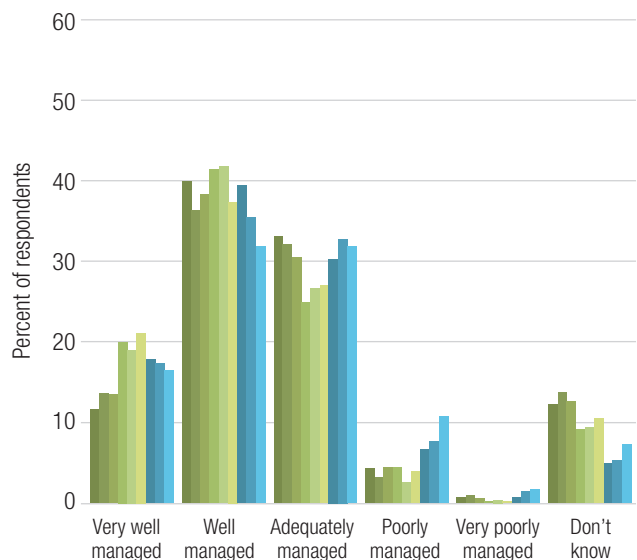


Figure 4.12b. Perceptions about current management of New Zealand's natural environment compared to other developed countries.



05

Granodiorite boulders and White-fronted terns, Boulder Bank, Nelson.
ROSS CULLEN

STATE OF THE ENVIRONMENT

The overall findings and, where appropriate, trends (remembering limitations imposed in comparing paper-based 2000–2010 surveys with 2010–2016 e-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 adequate to 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 adequate to good. However, it is notable that nearly 50% 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.

Furthermore, there are six separate environment-related activities that were 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 (13.1%);
- Participated in an environmental organisation (24.9%);
- Been involved in a project to improve the natural environment (28.5%);
- Made a financial donation to a non government environmental organisation (e.g., Forest and Bird) (33.2%);
- Obtained information about the environment from any source (63.2%);
- Bought products that are marketed as environmentally friendly (82%).

An interesting and significant observation about this finding is in terms of demographics. Maori 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 eight surveys, with cumulative real GDP growth of 50.7% since 2000. During the same period the New Zealand population has grown by 21.6%. Growth in the economy and population growth can both increase environmental pressures. Each of the eight 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 2016 (and in the 2008-2013 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 sixteen 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 fourth (19.6% of respondents – and much higher than the 6% in 2008). This continued relatively high recognition of mining damage might still be 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 eight surveys conducted between 2000 and 2016 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 2004–2016 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 over 2008–2013 with a substantial increase. Perceived availability of this resource remains less than moderate, but is now static.

Perceptions about availability of all other resources are now mostly showing declines or a few are relatively static (Figure 3.8).

Steam and other gases emitted from industries at Wakatu, Nelson



ROSS CULLEN

5.4 MANAGEMENT OF THE ENVIRONMENT

New Zealanders generally judge that the environment is adequately managed, but that (at least over the course of the e-surveys) environmental management is worsening – this trend has emerged strongly over the course of the three e-surveys, reversing the earlier postal survey trends. However, this statement conceals a wide range of views about management of specific parts of the environment.

- For rivers and lakes (47.2%), for marine fisheries (35.2%) and for groundwater (32.5%) many respondents considered management to be poor or extremely poor.
- As in 2010 and 2013, 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 eight 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.



06

Kayla Sutton of Matakana School is one of many young New Zealanders actively learning about conservation and predator control through CatchIT school programmes.

LIZ MAIRE

SPECIAL TOPICS

The special topics in 2016 concerned aspects of conservation, with an emphasis on pest management, but also interest in visitation to national parks, reasons for involvement in conservation activities, and for supporting conservation. Descriptive results are provided, plus some comparative analysis with other research results where appropriate.

6.1 ASPECTS OF CONSERVATION

Many surveys have tried to determine how many people visit New Zealand's national parks (e.g., Ipsos 2016 undertakes the Department of Conservation's annual Survey of New Zealanders). Some surveys, including recent DOC surveys, have been used to estimate the number of visits to public conservation land (land administered by the Department of Conservation). We hypothesised that a significant number of New Zealanders cannot distinguish national parks from forest or conservation parks, or even from other reserves.

We also explored the importance of conservation to individuals in New Zealand by asking respondents to rate on a 5-point scale how important conservation was to them personally.

Finally, we looked at reasons why, and why not, people reported involvement in two environmentally relevant behaviours reported in chapter 3, namely 'visits to national parks' and involvement in a 'club or group involved with restoring or replanting the natural environment'.

Simple descriptive analysis of results for these aspects are given below.

Results

Knowledge of national parks

A total of 866 respondents named their closest 'national park' (Figure 6.1). Of these nearly 70% named actual national parks, but over 30% of respondents named other places they thought were national parks. Tongariro NP was the single most named site (25% of respondents) – this of course is the national park closest to Auckland, New Zealand's largest population centre and place of residence for very many respondents. Significant sites named, which are not national parks, included the Waitakeres (4%) and the Tararuas (4%).

Individual importance of conservation

As shown in Figure 6.2, 73.1% of respondents considered conservation to be quite important, or very important, with less than 5% considering it to be not at all important, or of limited importance. This compares with Ipsos (2016) who reported 85% in the combined categories important, and very important.

Reasons for visiting national parks

Respondents were able to choose up to 7 response options – a total of 2406 responses were given from 914 respondents (Figure 6.3). The two main reasons given were to 'enjoy the scenery' (72%) and to 'spend time in nature' (66%).

Reasons for not visiting national parks

Respondents were able to choose up to seven options – a total of 1196 responses were provided from 906 respondents (Figure 6.4). The main reason given was that the respondent did not have enough time (46%).

Reasons for belonging to an organisation involved with the natural environment

This question was designed to elicit more information about those who had earlier indicated (see chapter 3) they had been an active member of a club or group that restores and/or replants natural environments. Respondents could provide their own reasons or could choose up to eight of the reasons offered in the survey. A total of 777 responses were given from 292 respondents with the highest proportions being to 'look after my local area' (65%) and 'to protect and enhance the local environment' (76%) (Figure 6.5). These proportions are similar to those found by Ipsos (2016: 21), namely 72% and 80% respectively, to a similar question.

Reasons for not belonging to an organisation involved with the natural environment

This question was designed to elicit more information about those who had earlier indicated (see chapter 3) they have not been an active member of a club or group that restores and/or replants natural environments. Respondents could provide their own reasons or could choose all nine reasons listed in the survey. A total of 2345 responses were given from 1523 respondents with the highest proportion being because the respondent 'could not commit the time' (49%) or was 'not physically able or fit enough' (29%); only 7% stated it was because they were not interested in conservation (Figure 6.6).

Takahe



ROSS CHILLEN

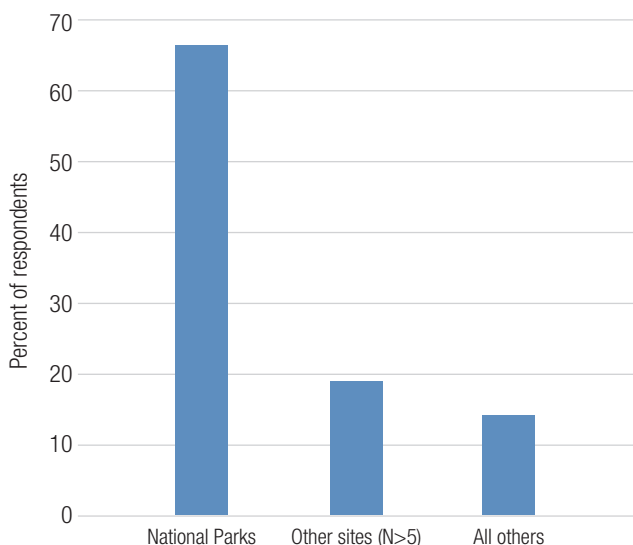


Figure 6.1. Proportions of survey respondents correctly providing national park names.

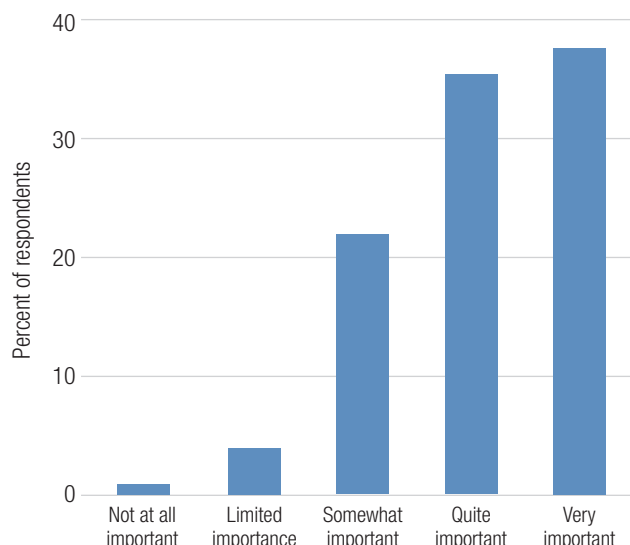


Figure 6.2. Overall importance of conservation to individual respondents.

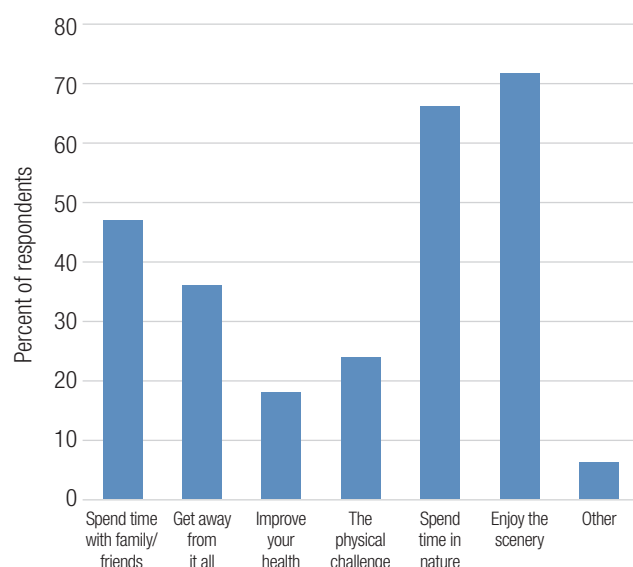


Figure 6.3. Main reasons for visiting national parks.

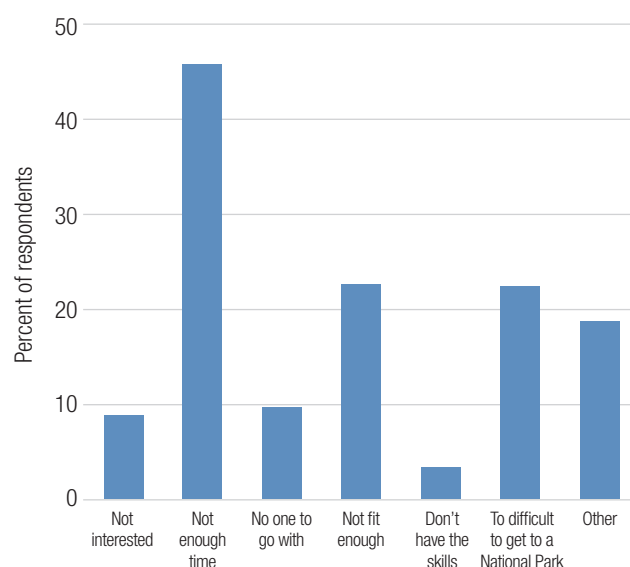


Figure 6.4. Main reasons for not visiting national parks.

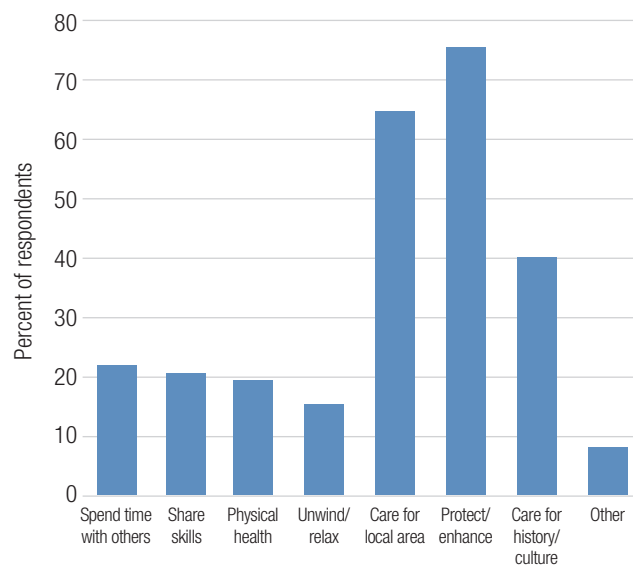


Figure 6.5. Reasons for participating in a group actively involved with restoring the natural environment.

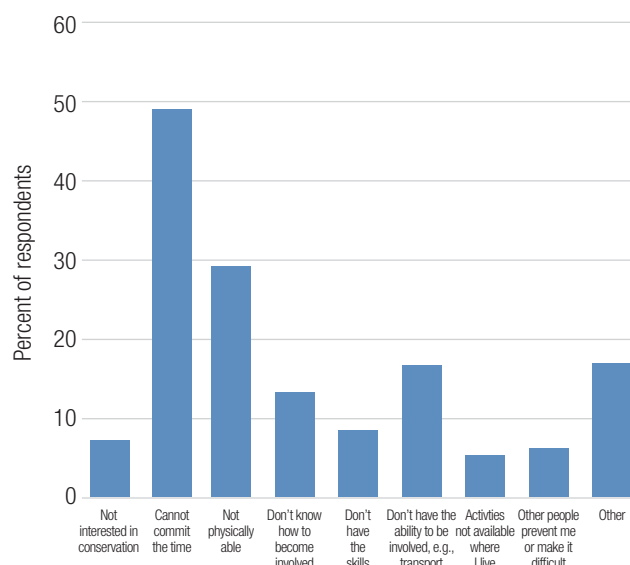


Figure 6.6. Reasons for not participating in a group actively involved with restoring the natural environment.

6.2 THE BIG FOUR PREDATOR CONTROL

In collaboration with Predator Free New Zealand (PFNZ), we investigated the community's control efforts for PFNZ's "Big Four" predator species; rats, possums, stoats and ferrets. Respondents stated that rats were the most common of these pests and were the focus of most control efforts (Figure 6.7).

Twenty nine percent of respondents reported rats at their residence, and nearly all of them (27% of respondents) attempted to control rats at their residence. A smaller, but highly significant, proportion (16%) did unpaid rat control work. Possums were much less common at people's residences (14%), and stoats (3%) and ferrets (2%) were rare. Notably, for all three of these species, control efforts were more common away from home than at home. Whereas people with rats, ferrets and stoats at their residence nearly always attempted to control them, only 56% of respondents with possums at home attempted to control them.

Figure 6.8 illustrates the reasons citizens controlled each of the Big Four Predator species. Of the 27% of people who controlled rats at their residence, the strongest motivation (23%) was because rats were a nuisance, although environmental (11%) and human disease (10%) motivations were also prominent. Possums were controlled less frequently (by 14% of respondents), but environmental motivations were more prominent (6%). Stoats and ferrets were similar in that the most prominent control motivator was the environment, followed by nuisance.

The methods citizens used to control the Big Four Predator species varied (Figure 6.9). Trapping was the most common method for controlling possums, stoats and ferrets, with shooting a strong secondary approach for possums. Rats were somewhat different, with 16% of the 27% of households that controlled rats using ground-based poison. More than one in nine of the households that controlled rats used cats or dogs to do so.

Survey respondents were strongly in support of maintaining or increasing citizen and agency effort to control the Big Four predators (Figure 6.10). Half of the respondents thought that the Department of Conservation and/or Regional Councils should be doing much more than their current efforts to control these species.

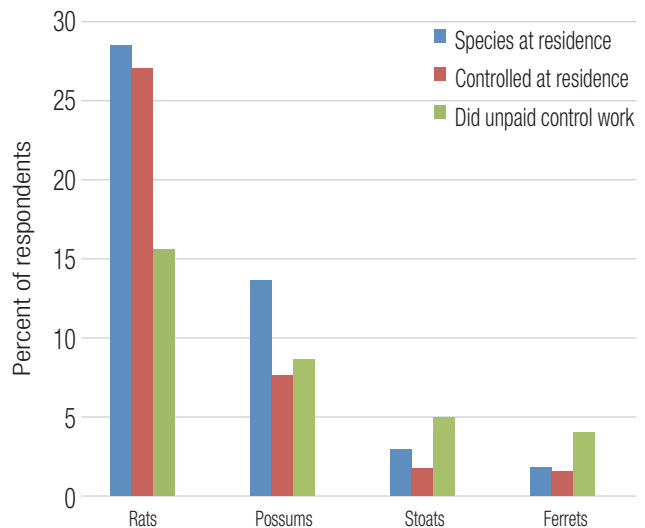


Figure 6.7. Big four prevalence and control activity.

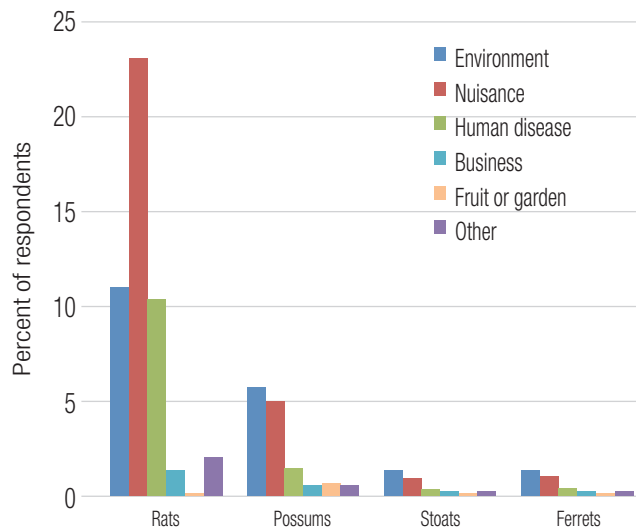


Figure 6.8. Respondents' Big Four Species Control Methods

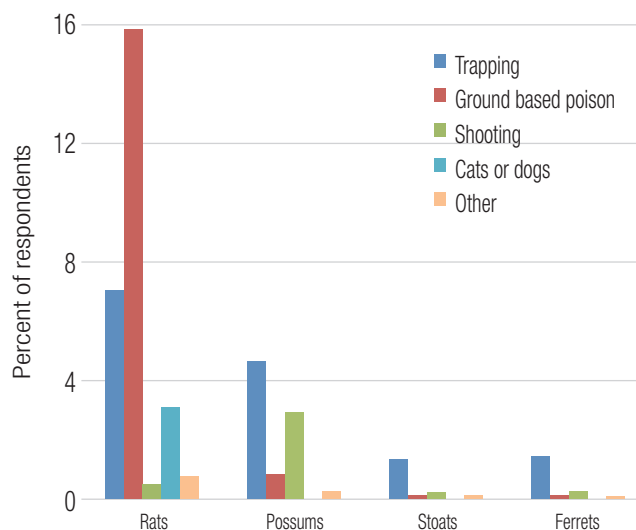


Figure 6.9. Big four prevalence and control activity.

6.3 ENDANGERED NATIVE SPECIES

We asked respondents to nominate in order, the three native species they considered most at risk of extinction. Results were sometimes difficult to interpret because many people nominated genera (e.g. kiwi, bats), or even phylla (e.g. trees or fish), rather than species. Because of the relatively common reference to genera, we retained these and labelled them SNS (species not stated). There were also many non-native species nominated, which we ignored in the results. For simplicity, we do not report outcomes by individual ranks, but list the results for species named in each individual's top three at risk species (Figure 6.11).

Similarly, we asked people to rank their three top priority native species for protection. Responses were qualitatively

similar to those for the at-risk species, and we treated them in a similar manner. Figure 6.11 also reports these results. Note that all species appearing in the top 10 frequency for each variable are included in Figure 6.11. There were 12 species occurring in either top 10.

Responses were very similar between categories, with close alignment between risk and priority for protection. Kiwi (SNS) were perceived to be both the most at risk and the highest priority for protection. There was a close tussle between Hector's/Maui dolphins and Kakapo for second and third places, with the Kakapo being more frequently perceived to be at risk than the two small dolphins, but not quite as commonly nominated as a priority for protection. Kauri and Takahe were fourth and fifth respectively in both categories, with no other species' nominations exceeding 3%.

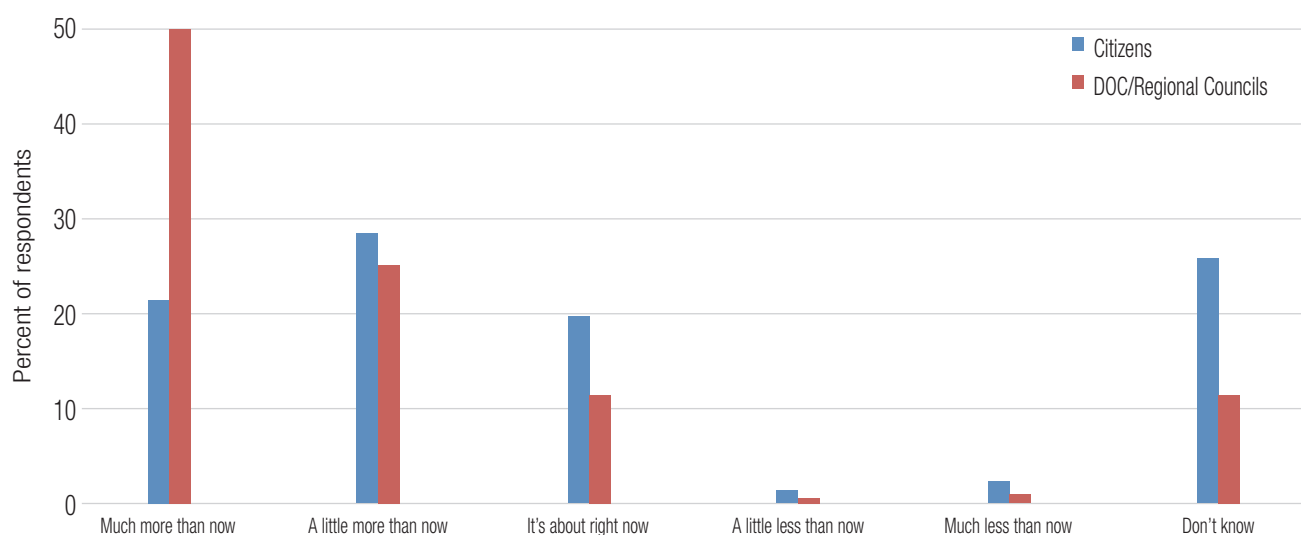


Figure 6.10. Desired effort to control Big Four predator species compared to now

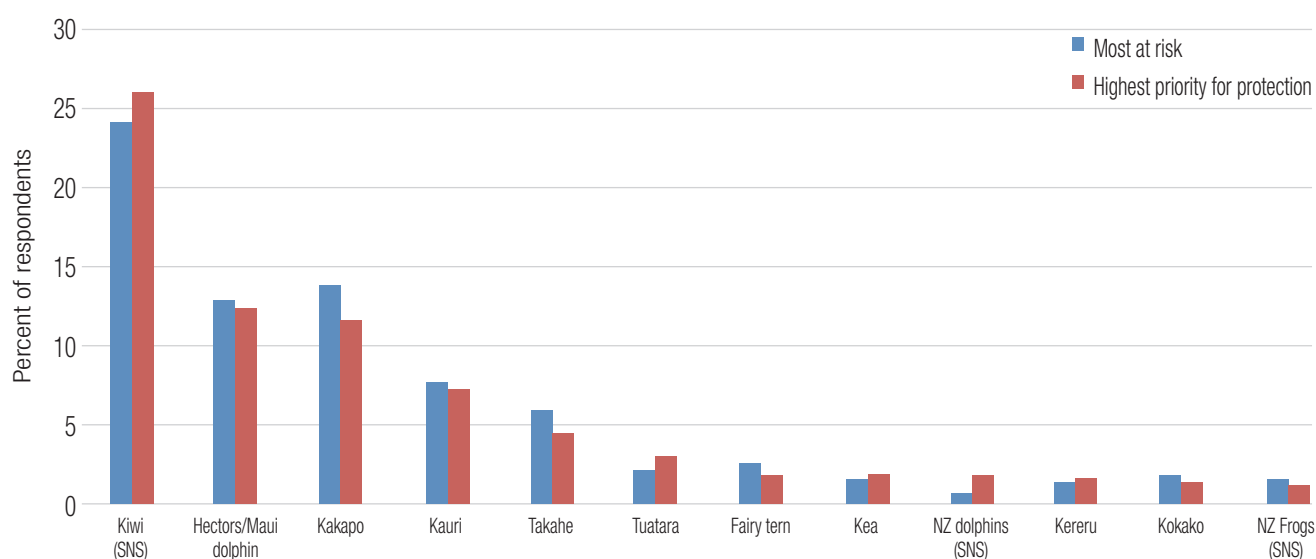


Figure 6.11. Extinction risk and protection priority by species



Springtime spraying to control pests on grape vines.
ROSS CULLEN

DISCUSSION AND CONCLUSIONS

The now triennial survey of people's perceptions of the state of the New Zealand environment continues to be the only long running research the authors are aware of that systematically studies perceptions of the state of the environment using public surveys, while applying the Pressure–State–Response (PSR) model¹. In this section the main findings and implications from the 2016 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).

7.1 THE 2016 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 Hsu *et al.* 2016). This position is consistent with New Zealanders' perceptions that, on average, the state of their natural environment is adequate or good, 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 a very poor state: 'biodiversity' is a notable example (see for example Hughey *et al.* 2007). Reasons for dissonance between science and perceptions are not always clear – this is one area where more research would 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, growing some of your own vegetables, composting some of your garden or household waste, and reducing or limiting use

of electricity were all claimed to be undertaken by over 75% of year 2016 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.

Respondents stated the single most important environmental issue for New Zealand in 2016 is again freshwater quality and related issues (31% of respondents compared to 29% in 2013).

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.

7.2 IMPLICATIONS FOR POLICY MAKERS

There are outcomes from this survey 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; they can be aware of and recognise problems that are unknown or not recognised by management agencies and policy makers, simply because individuals can be 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. Third, public perceptions of environmental issues may run ahead of policy, and failure of policy makers to pick up on those issues will undermine confidence in environmental management and policy making generally. 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 Aotearoa 2015 report (MfE & Statistics NZ 2015) and the global Environmental Performance Index (Hsu *et al.* 2016) indicate otherwise. This public lack of understanding of the seriousness of the problem could ultimately hinder acceptance of additional expenditures and programmes in this area.

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.

- The perceived impact of farming on the environment has always been negative, and it has worsened in 2016. 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 'Sustainable Dairying: Water Accord' (DCANZ and DairyNZ 2015, 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 Parliamentary Commissioner for the Environment (2016, 30) stated ... "There is no question that climate change is by far the most serious environmental issue we face. Moreover, it will have big impacts on virtually every other aspect of our environment." Respondents to the survey, Fig 3.21 support that assessment, but the limited and largely ineffectual actions taken so far by New Zealand to combat climate change fly in the face of public concerns over the dangers it poses.



08

Rotomaninitua/Lake Angelus, Nelson Lakes National Park.
ROSS CULLEN

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09

Volunteer working bee at Moturoa/Rabbit Island
ROSS CULLEN

APPENDICES

9.1 APPENDIX 1: SURVEY

ENVIRONMENTAL PERCEPTIONS SURVEY 2016

Conducted on behalf of Lincoln University

QUESTIONNAIRE



New Zealand's environment

All

1. Firstly, we would like your opinion on the following:

- 1.1. Your knowledge of environmental issues is
- 1.2. The overall standard of living in New Zealand is
- 1.3. The overall state of the natural environment in New Zealand is
 - A. Very good
 - B. Good
 - C. Adequate
 - D. Bad
 - E. Very bad
 - F. Don't know

2. All things considered, how satisfied are you with your life as a whole these days? Score using a scale of 1 to 10 where 1 means "Completely dissatisfied" and 10 means "Completely satisfied"

- A. 1 - Completely dissatisfied
- B. 2
- C. 3
- D. 4
- E. 5
- F. 6
- G. 7
- H. 8
- I. 9
- J. 10 - Completely satisfied

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

The condition of New Zealand's...

- 3.1. Natural environment in towns & cities is
- 3.2. Air is
- 3.3. Native land and freshwater plants and animals is
- 3.4. Native bush and forests is
- 3.5. Soils is
- 3.6. Coastal waters and beaches is
- 3.7. Marine fisheries is
- 3.8. Rivers and lakes is
- 3.9. Groundwater is

- 3.10. Wetlands is
- 3.11. Natural environment compared to other developed countries is
 - A. Very good
 - B. Good
 - C. Adequate
 - D. Bad
 - E. Very bad
 - F. Don't know

Natural resources

4. 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
- 4.2. Amount of native bush and forests is
- 4.3. Quantity of marine fisheries is
- 4.4. Area of marine reserves is
- 4.5. Amount of fresh water in rivers and lakes is
- 4.6. Availability of ground water for human use is
- 4.7. Area of national parks is
- 4.8. Area of wetlands is
- 4.9. Availability of parks and reserves in towns and cities is
- 4.10. Reserves of oil and gas are
 - A. Very high
 - B. High
 - C. Moderate
 - D. Low
 - E. Very low
 - F. Don't know

5. What do you think of the management of the following items?

Management of New Zealand's...

- 5.1. Pest and weed control is
- 5.2. Solid waste disposal is
- 5.3. Sewage disposal is
- 5.4. Farm effluent and runoff is

- 5.5. Hazardous chemicals use and disposal is
- 5.6. Industrial impact on the environment is
- Very good
 - Good
 - Adequate
 - Bad
 - Very bad
 - Don't know
 - Don't know

6. And what do you think of the management of each of the following?

Currently New Zealand's...

- Natural environment in towns and cities is
- Air quality is
- Native land and freshwater plants and animals are
- Native bush and forests are
- Soils are
- Coastal waters & beaches are
- Marine fisheries are
- Marine reserves are
- Rivers and lakes are
- Groundwater is
- National parks are
- Wetlands are
- Natural environment compared to other developed countries is
 - Very well managed
 - Well managed
 - Adequately managed
 - Poorly managed
 - Extremely poorly managed
 - Don't know

7. Please tell us what you think are the main causes of damage, if any, to each of the following parts of the New Zealand environment by ticking up to 3 causes on each row for each of the following:

- Air
- Native land & freshwater plants & animals
- Native forests & bush
- Soils
- Beaches & coastal waters
- Marine fisheries
- Marine reserves
- Fresh waters
- National parks
- Wetlands
 - Motor vehicles and transport
 - Household waste and emissions
 - Industrial activities

- Pests and weeds
- Farming
- Forestry
- Urban development
- Mining
- Sewage and stormwater
- Tourism
- Commercial fishing
- Recreational fishing
- Dumping of solid waste
- Hazardous chemicals
- Other

Personal actions

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

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

Most important environmental issues

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

(Open response)

10. Why did you choose this issue?

(Open response)

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

(Open response)

12. Why did you choose this issue?

(Open response)

Predators in New Zealand

This section enquires about control activities for the “Big Four” predators (rat, possum, stoat & ferret) and their impact on conservation in NZ. (Other animals and plants are also considered pests in NZ but are not the focus of this section of the survey).

13. In the past 12 months, have you undertaken any unpaid control work of the “Big Four” predators in New Zealand?

- 13.1. Rats
- 13.2. Possums
- 13.3. Stoats
- 13.4. Ferrets
 - A. Yes
 - B. No
 - C. Don't know

IF INVOLVED IN RAT CONTROL

- 14.1. How many rats did you kill?

IF INVOLVED IN POSSUM CONTROL

- 14.2. How many possums did you kill?

IF INVOLVED IN STOAT CONTROL

- 14.3. How many stoats did you kill?

IF INVOLVED IN FERRET CONTROL

- 14.4. How many ferrets did you kill?

Control work

15. What would motivate you to undertake unpaid control work of the Big Four predators?

(Open response)

Donations

16. In the past 12 months, have you donated money to a voluntary organisation that undertakes control of the Big Four predators?

- A. Yes
- B. No
- C. Don't know

IF YES IN 16 – OTHERS GO TO 18

17. How much money did you donate in the past 12 months?

(Open response)

ALL

18. What would most motivate you to donate money to a voluntary organisation to help with the control of the Big Four predators?

(Open response)

19. In your opinion, how much effort should private citizens be contributing to controlling the Big Four predators?

- A. Much more than now
- B. A little more than now
- C. It's about right
- D. A little less than now
- E. Much less than now
- F. I don't know

20. And how much effort should the Department of Conservation and Regional Councils be contributing to controlling the Big Four predators?

- A. Much more than now
- B. A little more than now
- C. It's about right
- D. A little less than now
- E. Much less than now
- F. I don't know

Controlling the Big Four predators

The next section is about control of the Big Four predators at your residence.

21. Do you rent or own your main residence?

- A. Rent
- B. Own
- C. Other

22. Which of the following best describes the land size of your main residence?

- A. No land (e.g. an apartment)
- B. A suburban section or similar
- C. A small lifestyle block
- D. A farm

23. Have any of the Big Four predators been present at your main residence in the past 12 months?

- 23.1. Rats
- 23.2. Possums
- 23.3. Stoats
- 23.4. Ferrets
 - A. Yes
 - B. No
 - C. Don't know

24. Which of the Big Four predators, if any, have you controlled at your main residence in the past 12 months? (Tick all that apply)

- A. Rats
- B. Possums
- C. Stoats
- D. Ferrets
- E. None of these – GO TO 34

IF CONTROLLED RATS**25. Why did you control rats?**

- A. To protect the environment
- B. To eliminate nuisance (e.g. rat in compost or house)
- C. To prevent human disease
- D. To minimize impact to business
- E. Another reason (please tell us what that is)

26. What was your main control method for rats?

- A. Trapping
- B. Aerial poison
- C. Ground poison
- D. Shooting
- E. Other (please tell us what that is)

IF CONTROLLED POSSUMS**27. Why did you control possums?**

- A. To protect the environment
- B. To eliminate nuisance
- C. To prevent human disease
- D. To minimize impact to business
- E. Another reason (please tell us what that is)

28. What was your main control method for possums?

- A. Trapping
- B. Aerial poison
- C. Ground poison
- D. Shooting
- E. Other (please tell us what that is)

IF CONTROLLED STOATS**29. Why did you control stoats?**

- A. To protect the environment
- B. To eliminate nuisance
- C. To prevent human disease
- D. To minimize impact to business
- E. Another reason (please tell us what that is)

30. What was your main control method for stoats?

- A. Trapping
- B. Aerial poison
- C. Ground poison
- D. Shooting
- E. Other (please tell us what that is)

IF CONTROLLED FERRETS**31. Why did you control ferrets?**

- A. To protect the environment
- B. To eliminate nuisance
- C. To prevent human disease
- D. To minimize impact to business
- E. Another reason (please tell us what that is)

32. What was your main control method for ferrets?

- A. Trapping
- B. Aerial poison
- C. Ground poison
- D. Shooting
- E. Other (please tell us what that is)

IF CONTROLLED RATS, POSSUMS, STOATS OR FERRETS**33. How much money have you spent in total on Big Four predator control for your main residence in the past 12 months?***(Open response)***ALL****34. How easy is it to find information (print or online) on different methods of predator control?**

- A. Extremely difficult
- B. Difficult
- C. Acceptable
- D. Easy
- E. Extremely easy
- F. I'm not sure

35. Have you previously obtained information (print or online) on different methods of predator control?**IF OBTAINED INFORMATION ON PREDATOR CONTROL – OTHERS GO TO 37****36. How helpful was the information (print or online) you obtained?**

- A. Not helpful at all
- B. Very limited help
- C. Some help
- D. Quite helpful
- E. Extremely helpful

ALL**37. How easy is it to find hands-on training in predator control?**

- A. Extremely difficult
- B. Difficult
- C. Acceptable
- D. Easy
- E. Extremely easy
- F. I really don't know

38. Have you received any hands-on training in predator control?

- A. Yes
- B. No

IF OBTAINED TRAINING IN PREDATOR CONTROL – OTHERS GO TO 40**39. How helpful did you find the hands-on training in predator control?**

- A. Not helpful at all
- B. Very limited help
- C. Some help
- D. Quite helpful
- E. Extremely helpful

ALL

40. How easy is it to obtain traps for predator control?

- A. Extremely difficult
- B. Difficult
- C. Acceptable
- D. Easy
- E. Extremely easy
- F. I'm really not sure

41. Have you used traps for predator control?

IF USED TRAPS FOR PREDATOR CONTROL – OTHERS GO TO 43

42. How effective were the traps?

- A. Not effective at all
- B. Very limited effect
- C. Some effect
- D. Quite effective
- E. Extremely effective

ALL

43. How easy is it to obtain poisons for predator control?

- A. Extremely difficult
- B. Difficult
- C. Acceptable
- D. Easy
- E. Extremely easy
- F. I'm really not sure

44. Have you used poisons for predator control?

- A. Yes
- B. No

IF USED POISONS FOR PREDATOR CONTROL – OTHERS GO TO 46

45. How effective were the poisons?

- A. Not effective at all
- B. Very limited effect
- C. Some effect
- D. Quite effective
- E. Extremely effective

ALL

46. How easy is it to find a professional predator controller?

- A. Extremely difficult
- B. Difficult
- C. Acceptable
- D. Easy
- E. Extremely easy
- F. I'm really not sure

47. Have you ever used a professional predator controller?

IF USED A PROFESSIONAL PREDATOR CONTROLLER – OTHERS GO TO 49

48. How effective was the professional predator controller?

- A. Not effective at all
- B. Very limited effect

- C. Some effect
- D. Quite effective
- E. Extremely effective

ALL

49. Thinking about conservation overall, how important is conservation to you personally?

- A. Not at all important
- B. Limited importance
- C. Somewhat important
- D. Quite important
- E. Very important

IF WAS AN ACTIVE MEMBER OF A CLUB RESTORING OR REPLANTING NATURAL ENVIRONMENTS IN 8.14 ANSWER Q50 THEN GO TO 52 – OTHERS GO TO 51.

50. You indicated earlier in the survey that you have been an active member of a club or group that restores and/or replants natural environments. For what reasons did you participate in those activities?

Please select all that apply

- A. To spend time with others
- B. To develop or share my skills
- C. To improve my physical health/ or get some exercise
- D. To feel better about myself or unwind and relax
- E. To look after my local area
- F. To protect and enhance the environment
- G. To care for our history and culture
- H. Some other reason (please tell us what that is)

IF WAS NOT AN ACTIVE MEMBER OF A CLUB RESTORING OR REPLANTING NATURAL ENVIRONMENTS IN 8.14 ANSWER 51 – OTHERS GO TO 52.

51. You indicated earlier in the survey that in the past 12 months you have not been an active member of a club or group that restores and/or replants natural environments. Could you please tell us why that is?

Please select all that apply

- A. I'm not interested in conservation activities
- B. I'm unable to commit on an ongoing basis
- C. I'm not physically able or not fit enough
- D. I don't know how to get involved
- E. I don't have the skills to get involved
- F. I don't have the ability to get involved (e.g. no transport, not enough money)
- G. The activities I want to participate in are not available where I live
- H. Other people prevent me or make it difficult (e.g. partner or people I care for)
- I. Some other reason (please tell us what that is)

IF VISITED A NATIONAL PARK IN 8.4 ANSWER 52 – OTHERS GO TO 53.

52. You stated earlier in the survey that you had visited a national park in the last 12 months. What are your main reasons for visiting national parks?

Please select all that apply

- A. To spend time with friends and family

- B. To get away from it all
- C. To improve my health
- D. For the physical challenge
- E. To spend time in nature
- F. To enjoy the scenery
- G. Some other reason (please tell us what that is)

IF HAVE NOT VISITED A NATIONAL PARK IN 8.4 ANSWER 53 – OTHERS GO TO 53.5

53. You indicated earlier in the survey that you have not visited a national park in the past 12 months. What are the main reasons that you did not visit a national park in the last 12 months?

Please select all that apply

- A. I'm not interested in visiting a national park
- B. I don't have enough time (e.g. too many work or family commitments) C.I don't have anyone to go with
- D. I'm not physically able or not fit enough
- E. I don't have the right skills
- F. It's too difficult for me to get to a national park
- G. Some other reason (please tell us what that is)

ALL

53.5. Can you please name the national park that is closest to where you live?

- A. I don't know
- B. Nearest national park: (*Open responses for name of nearest National Park*)

Introduced species

ALL

54. The following is a list of species that have been introduced to New Zealand. Based on what you have seen or heard, to what extent do you believe each is a threat to New Zealand's native plants, birds, animals or natural environments?

- 54.1. Rats
- 54.2. Mice
- 54.3. Stoats/ferrets/weasels
- 54.4. Possums
- 54.5. Deer
- 54.6. Domestic cats
- 54.7. Wild feral cats
- 54.8. Didymo
- 54.9. Kauri dieback fungus (also known as PTA)
- 54.10. Trout and salmon
- 54.11. Introduced freshwater fish, such as Koi carp and catfish (but excluding trout and salmon)
- 54.12. Wasps
- 54.13. Wilding pine trees
 - A. Not really a threat at all
 - B. Minor threat
 - C. Moderate threat

- D. Serious threat
- E. A very serious threat
- F. I really don't know

55. There are a number of ways that species that are considered to be pests can be controlled. For each of the possible ways listed below, please indicate your general attitude to the Department of Conservation using this method of pest control.

- 55.1. Hunting
- 55.2. Trapping
- 55.3. Poison bait laid by hand
- 55.4. Poison bait spread by aircraft
- 55.5. Herbicide sprayed from aircraft
- 55.6. Herbicide sprayed from the ground
 - A. This method should never be used in any circumstances
 - B. This method should only be used as a last resort
 - C. I am reasonably comfortable with this method as long as appropriate controls are in place
 - D. I have no concerns at all about this method
 - E. I really don't know

Species at risk...

56. Please list the three native species you think are most at risk of extinction (place the most at risk species at the top of your list)

1: (*Open response*)

2: (*Open response*)

3: (*Open response*)

57. A species being near extinction doesn't necessarily mean it should have the highest priority for protection. Please list three native species you think should have the highest priority for protection (place the highest priority species for protection at the top of your list).

1: (*Open response*)

2: (*Open response*)

3: (*Open response*)

About you

Finally, some questions about you....

60. Are you:

- A. Male
- B. Female

61. 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*)

62. In which year were you born?

(*Open response*)

63. 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*)

64. Are you:

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

65. 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. Tasman
- K. Nelson
- L. Marlborough
- M. Canterbury
- N. West Coast
- O. Otago
- P. Southland
- Q. Chatham Islands

66. To help us with our analysis, what is the post code where you live?

(*Open response*)

67. 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

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

- A. Primary school/Intermediate school (standard 6/form 2)
- 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

69. 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

70. What industry do you work in, or if you are not 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

71. What is your occupation?

- 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. Retired
- K. Student
- L. Have never been in paid employment
- M. Not currently employed
- N. Other (*please tell us what that is*)

72. 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

We appreciate your help and thank you for the time you have taken to fill out this survey.

79. Please take this opportunity to add anything further that you want to say in the space below:

(Open response)

9.2 APPENDIX 2: SURVEY DEMOGRAPHICS AND COMPARABLE DATA

The tables that follow present demographic results from the 2016 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	2016	2013 Census results
Male	44.1	46.8	45.8	46.1	45.1	48.4	47.4	45.3	48.7
Female	55.9	53.2	54.2	53.9	54.9	51.6	52.6	54.7	51.3
N	883	822	818	856	730	601	1758	1797	4,242,048

Table 2. Age of respondents (%).

Year ...	2000	2002	2004	2006	2008	2010	2013	2016	2013 Census results
18 to 19	1.4	1.1	1	1.3	1.3	0.9	0.1	0.3	2.8
20 to 29	15	9.5	9	8.7	7.4	8.3	6.5	5.3	12.9
30 to 39	18.2	15.9	15.6	15	12.9	12.5	9.6	11.7	12.4
40 to 49	19.7	22.8	22.5	22.8	18.0	18.0	16.1	17.0	14.3
50 to 59	18.1	20.8	22.2	19.6	22.7	21.5	22.4	22.5	13.2
60 to 69	12.8	16.1	16.1	17.5	20.6	18.5	27.6	24.1	10.1
70 and over	14.8	13.8	13.6	15.2	17.0	20.3	17.7	19.1	9.7
N	846	807	796	848	688	567	1619	1731	4,242,048

Table 3. Country of birth (%).

Country/region ...	2002	2004	2006	2008	2010	2013	2016	2013 Census results
New Zealand	80.0	77.8	77.1	78.3	77.6	78.6	80.9	74.8
Australia	1.7	1.7	1.8	2.9	2.5	1.3	1.7	1.6
Pacific Islands	2.6	0.7	2.5	3.0	2.3	0.6	1.2	3.8
Britain/Ireland	8.7	11.3	9.4	7.4	8.8	10.8	9.1	6.7
Rest of Europe	1.8	1.8	2.6	2.3	1.7	0.7	1.2	1.8
USA and Canada	0.4	1.4	0.9	0.4	1.4	1.3	1.4	0.8
Asia	2.9	3.6	3.4	3.3	4.3	2.9	2.8	7.9
Other	1.7	1.5	2.5	2.1	1.4	3.8	1.7	2.6
N	817	812	849	728	599	1750	1786	3,982,614

Table 4. Ethnicity (%).

Category ...	2002	2004	2006	2008	2010	2013	2016	2013 Census results
Maori	5.8	8.1	5.3	9.0	7.3	6.4	13.8	14.9
NZ European	81.9	79	77.4	74.9	79.2	88.6	71.3	74.0
Other	12.3	12.9	17.3	16.1	13.6	5.0	14.9	11.1
N	810	810	854	722	590	1503	1751	4,450,356

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

Council ...	2006	2008	2010	2013	2016	2013 Census results
Northland	4.3	4.8	5.2	4.5	4.5	3.6
Auckland	27.1	27.3	27.2	29.8	26.8	33.4
Waikato	8.4	8.7	9.8	7.7	8.1	9.5
Bay of Plenty	5.6	8.6	8.2	7.6	6.1	6.3
Gisborne/Poverty Bay	0.7	0.4	0.5	0.6	0.4	1.0
Taranaki	3.6	3.0	2.5	2.2	1.9	2.6
Hawkes Bay	4.2	2.7	4.5	3.1	4.2	3.6
Manawatu-Wanganui	6.1	4.5	3.5	6.2	6.1	5.2
Wellington	11.1	10.9	12.7	13.8	18.9	11.1
Tasman						1.1
Nelson	2.1	3.0	3.3	2.1	1.9	1.1
Marlborough	1.5	0.8	1.0	1.3	1.2	1.0
Canterbury	16.5	15.7	12.3	13.7	11.5	12.7
West Coast	0.7	0.5	1.0	0.8	0.8	0.8
Otago	5.6	5.9	6.8	5.0	5.7	4.8
Southland	2.6	3.0	1.5	1.8	1.8	2.2
N	859	732	600	1764	1797	4,242,048

Table 6. Urban or rural respondents (%).

Area	2006	2008	2010	2013	2016	2013 Census results
Urban	81.4	83.8	84.2	87.3	87.7	86.2
Rural	18.6	16.2	15.8	12.7	12.3	13.8
N	854	721	588	1760	1796	4,442,100

Table 7. Education status (%).

Year	2000	2002	2004	2006	2008	2010	2013	2016	2013 Census results
Primary	4.2	4.3	3.8	3.3	3.0	3.0	0.6	0.6	20.9
High school without qualifications	18.4	19.8	17.8	18.7	18.7	15.2	11.8	10.7	
High school with qualifications	21.9	24.4	25.1	21.9	23.9	26.0	19.4	17.0	49.8
Trade or technical qualification	22.0	19.5	18.5	19.4	16.1	19.0	18.3	17.2	9.3
Undergraduate diploma	11.9	14.1	12.8	12.2	15.8	11.8	16.1	16.9	
Bachelors degree	13.7	12.0	14.3	14.9	14.7	15.2	19.0	18.7	13.6
Postgraduate	7.9	5.9	7.7	9.6	7.8	9.8	14.8	18.9	6.4
N	876	815	813	852	728	600	1765	1798	3,000,636

Note: For consistency over time the same measures of education were used in the 2016 survey as used in previous surveys.

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	2016	2013 Census
Resource based	13.3	15.4	17.2	12.3	11.8	9.1	9.9	7.2
Manufacturing and transport	22.4	20.5	20.8	22.3	23.3	18.6	15.5	14.1
Accommodation, retail and leisure	17.0	18.3	16.1	14.0	14.6	14.8	11.8	19.7
Government services and defence	7.9	7.8	6.9	8.6	10.4	11.9	13.3	5.1
Health services	14.5	14.2	13.6	15.1	14.2	13.7	15.2	10.2
Education	12.5	11.4	12.5	10.1	13.7	16.2	18.3	8.0
Communication and financial services	9.9	10.7	11.2	14.2	10.6	14.7	14.0	7.3
Never been in paid employment	2.5	1.7	1.7	3.5	1.3	1.0	1.8	NA
N	751	755	825	636	527	1729	1739	1,921,395

Table 10. Income, before tax (%).

Income bracket	2000	2002	2004	2006	2008	2010	2013	2016	2013 Census
Loss	0	2.0	2.4	1.4	0.9	1.1	1.5	1.8	0.5
\$0–\$10,000	17.1	14.4	11.5	9.4	8.5	7.2	5.7	4.9	17.6
\$10,001–\$20,000	20.1	18.9	19.5	17.5	13.7	14.6	13.7	10.5	15.8
\$20,001–\$30,000	15.4	13.9	16.5	15.0	13.0	15.2	12.3	11.1	12.4
\$30,001–\$40,000	13.6	13.3	13.4	14.5	12.6	13.1	10.1	7.1	10.7
\$40,001–\$50,000	10.6	11.1	7.4	9.7	10.5	10.5	8.6	8.5	8.6
\$50,001–\$70,000	7.5	9.4	10.5	13.3	16.1	14.4	12.8	10.4	11.7
\$70,001–\$100,000	4.3	4.1	4.1	6.7	5.9	9.8	7.8	8.8	7.1
\$100,000 +	3.2	3.7	5.0	5.1	5.9	5.6	4.6	6.2	10.3
Not stated	8.1	9.2	9.6	7.4	12.9	8.4	22.8	30.6	9.7
N	894	836	820	880	752	610	2220	2468	3,376,419

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
2016 (e-survey)	2441	11.1	32.6	48.1	5.8	0.9	1.5	2.52	0.81
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
2016 (e-survey)	2383	11.5	41.8	34.4	9.4	2.3	0.6	2.49	0.90
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
2016 (e-survey)	2392	5.7	31.4	36.7	21.2	3.5	1.5	2.85	0.94

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
2016 (e-survey)	Question used the wrong response scale and results are therefore not reported								

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
2016 (e-survey)	2383	3.2	28.6	46.9	17.4	2.9	1.0	2.88	0.84
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
2016 (e-survey)	2373	16.0	43.1	32.3	7.3	0.8	0.6	2.33	0.86
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
2016 (e-survey)	2376	5.6	32.4	31.6	23.1	5.7	1.5	2.91	1.01
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
2016 (e-survey)	2386	12.3	35.9	30.4	16.4	3.6	1.4	2.63	1.02
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
2016 (e-survey)	2386	5.2	30.7	38.3	15.6	3.6	6.6	2.81	0.92
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
2016 (e-survey)	2388	8.2	34.9	34.5	17.6	3.1	1.6	2.12	0.96

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
2016 (e-survey)	2383	4.4	25.1	32.9	23.5	7.0	7.1	3.04	1.01
freshwater									
2000	875	11.7	35.3	35.1	12.2	1.9	3.8	2.56	0.93
2002	803	12.1	34.2	36.5	11.1	2.4	3.7	2.56	0.94
2004									
Question not asked after 2002									
rivers and lakes									
2000									
Question not asked in 2000									
2002									
Question not asked in 2002									
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
2016 (e-survey)	2376	2.9	20.1	28.9	32.4	13.0	2.7	3.33	1.04
groundwater									
2000									
Question not asked in 2000									
2002									
Question not asked in 2002									
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
2016 (e-survey)	2381	4.7	25.3	37.4	17.9	3.7	11.0	2.90	0.92
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
2016 (e-survey)	2367	3.8	24.0	33.7	20.7	6.8	10.9	3.03	0.99
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
2016 (e-survey)	2249	23.9	38.0	25.7	7.2	0.9	4.3	2.20	0.93

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
2016 (e-survey)	2280	6.1	32.1	44.8	10.0	1.5	5.4	2.67	0.81
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
2016 (e-survey)	2280	7.6	32.6	39.2	15.5	3.3	1.8	2.74	0.93
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
2016 (e-survey)	2279	3.5	21.5	40.5	20.7	4.0	9.9	3.00	0.89
area of marine reserves									
2000	849	2.5	13.8	37.9	24.5	4.9	16.4	3.19	0.88
2002	808	3.7	16.7	36.1	21.8	4.6	17.1	3.08	0.93
2004	790	3.0	17.5	38.5	18.5	3.2	19.4	3.02	0.87
2006	850	4.2	19.8	39.4	17.3	2.1	17.2	2.92	0.87
2008	722	3.9	20.8	35.0	19.9	4.3	16.1	3.00	0.94
2010	593	4.6	20.7	36.3	18.0	3.0	17.4	2.93	0.91
2010 (e-survey)	2449	4.9	22.4	39.9	20.0	5.4	7.4	2.99	0.95
2013 (e-survey)	2114	4.1	21.1	37.9	22.8	6.2	7.9	3.06	0.96
2016 (e-survey)	2271	3.9	19.3	36.0	24.8	8.1	7.9	3.15	0.99
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 after 2002									
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
2016 (e-survey)	2273	3.9	22.0	38.1	23.3	7.4	5.3	3.09	0.97

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
2016 (e-survey)	2270	4.0	24.8	37.7	18.5	3.4	11.5	2.91	0.90
area of National Parks									
2000	858	16.1	44.8	30.3	5.4	0.8	2.7	2.28	0.83
2002	812	15.1	47.4	27.5	5.9	0.5	3.6	2.27	0.81
2004	795	14.5	45.7	31.6	4.9	0.3	3.1	2.29	0.79
2006	855	13.8	46.4	32.5	3.6	0.4	3.3	2.28	0.76
2008	722	13.9	46.5	31.2	4.2	0.4	3.9	2.28	0.78
2010	594	13.1	47.8	29.1	5.1	0.8	4.0	2.30	0.80
2010 (e-survey)	2458	14.0	45.4	31.4	6.8	0.9	1.4	2.34	0.84
2013 (e-survey)	2122	11.5	41.7	34.2	8.7	1.3	2.7	2.45	0.86
2016 (e-survey)	2281	10.6	38.9	36.8	9.4	1.7	2.5	2.52	0.88
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
2016 (e-survey)	2260	2.9	18.1	37.6	20.7	6.8	13.9	3.12	0.94
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
2016 (e-survey)	2266	7.1	32.6	44.3	11.6	2.6	1.8	2.69	0.87
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
2016 (e-survey)	2279	2.2	10.6	34.0	18.8	3.9	30.5	3.17	0.86

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
2016 (e-survey)	2228	2.6	19.7	51.2	21.5	2.3	2.8	3.01	0.79
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
2016 (e-survey)	2221	6.2	26.2	45.4	16.7	1.7	3.7	2.81	0.86
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
2016 (e-survey)	2215	4.1	22.0	41.1	23.9	4.5	4.4	3.03	0.92
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
2016 (e-survey)	2219	6.0	27.3	39.6	19.6	4.1	3.3	2.88	0.95
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
2016 (e-survey)	2226	2.7	16.8	38.4	24.1	5.3	12.8	3.14	0.90
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
2016 (e-survey)	2219	3.7	21.7	41.4	24.7	4.3	4.3	3.04	0.90

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
2016 (e-survey)	2221	3.4	16.9	34.5	27.4	7.8	10.0	3.21	0.97
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)	2044	5.0	24.5	40.0	16.4	3.8	10.2	2.88	0.92
2016 (e-survey)	2219	5.2	22.9	37.9	19.3	4.6	10.0	2.95	0.95
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 after 2002									
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
2016 (e-survey)	2221	2.5	14.0	32.1	33.8	13.4	4.2	3.43	0.99
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
2016 (e-survey)	2206	2.4	14.0	35.2	25.7	6.8	16.0	3.24	0.92
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
2016 (e-survey)	2204	11.3	37.0	38.1	9.3	0.8	3.5	2.49	0.85
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
2016 (e-survey)	2190	3.7	20.7	36.7	18.6	5.1	15.3	3.01	0.94
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
2016 (e-survey)	2200	16.5	32.0	31.9	10.7	1.7	7.2	2.45	0.97

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
	2016 (e-survey)	1979	17.8	52.0	27.8	2.4
	reduced or limited their use of freshwater ¹	2006	849	43.8	35.8	18.4
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
2016 (e-survey)		1950	39.2	33.9	23.8	3.0
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	2016 (e-survey)	1967	72.4	23.9	2.3	1.3
	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	
2016 (e-survey)	1966	45.5	48.5	4.9	1.1	

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
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
	2016 (e-survey)	1971	10.8	60.9	21.1	7.2
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
	2016 (e-survey)	1966	3.9	58.8	36.7	0.6
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
	2016 (e-survey)	1973	23.5	48.4	27.1	1.1
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
	2016 (e-survey)	1961	69.1	22.4	6.1	2.3
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
	2016 (e-survey)	1973	24.1	55.0	20.4	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
	2016 (e-survey)	1953	33.0	51.4	11.8	3.8
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
	2016 (e-survey)	1978	83.7	13.3	2.0	1.1

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
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
	2016 (e-survey)	1973	73.8	20.1	4.8	1.2
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
	2016 (e-survey)	1971	48.4	40.9	9.9	0.8
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
	2016 (e-survey)	1967	83.6	11.8	3.5	1.1
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
	2016 (e-survey)	1970	65.2	28.2	5.0	1.6

Table 8. Importance of conservation to individuals.

N	Not at all important	Limited importance	Somewhat important	Quite important	Very important
1850	1%	4%	22%	35%	38%

Table 9. Reasons for involvement in restoring or replanting natural environments (Respondents could choose any number from the list given).

N	Spend time with others	Share skills	Physical health	Unwind and relax	Care for local area	Protect and enhance	Care for history and culture	Other
292	22%	21%	19%	15%	65%	76%	40%	8%

Table 10. Reasons for not participating in restoring or replanting natural environments (Respondents could choose any number from the list given).

N	Not interested in conservation	Cannot commit the time	Not physically able	Don't know how to become involved	Don't have the skills	Don't have the ability to be involved, e.g., transport	Activities are not available where I live	Other people prevent me or make it difficult	Other
1523	7%	49%	29%	14%	9%	17%	6%	6%	17%

Table 11. Main reasons for visiting a national park (Respondents could choose any number from the list given).

N	Spend time with family and friends	Get away from it all	Improve your health	The physical challenge	Spend time in nature	Enjoy the scenery	Other
914	47%	36%	18%	24%	66%	72%	6%

Table 12. Main reasons for not visiting a national park (Respondents could choose any number from the list given).

N	Not interested	Not enough time	No one to go with	Not fit enough	Don't have the skills	Too difficult to get to a National Park	Other
906	9%	46%	10%	23%	4%	23%	19%

Table 13. Big Four species presence and control. Percent of all respondents.

	Rats	Possums	Stoats	Ferrets
Species at residence	28.7	13.7	3.0	1.9
Controlled at residence	27.2	7.7	1.9	1.5
Did unpaid control work	15.8	8.7	5.0	4.1

Table 14. Reasons for respondents killing Big Four species. Percent of all respondents.

	Rats	Possums	Stoats	Ferrets
Environment	11.0	5.7	1.3	1.3
Nuisance	23.2	4.9	0.9	1.0
Human disease	10.3	1.4	0.3	0.4
Business	1.3	0.5	0.2	0.2
Fruit or garden		0.6		
Other	2.0	0.5	0.2	0.2

Table 15. Big Four species control methods. Percent of all respondents.

	Rats	Possums	Stoats	Ferrets
Trapping	7.1	4.7	1.4	1.5
Ground based poison	15.9	0.9	0.2	0.2
Shooting	0.5	3.0	0.3	0.3
Cats or dogs	3.2			
Other	0.8	0.3	0.2	0.1

Table 16. Desired effort to control Big Four species compared to now. Valid percent.

	Desired effort by citizens	Desired effort by DOC/ Regional Councils
Much more than now	21.5	50
A little more than now	28.7	25.2
It's about right now	20.1	11.6
A little less than now	1.4	0.7
Much less than now	2.4	0.9
Don't know	25.9	11.6

