PUBLIC PERCEPTIONS OF NEW ZEALAND'S ENVIRONMENT: 2019

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

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Lincoln University
Te Whare Wānaka o Aoraki

ISSN 2230-4967 (Print)
ISSN 2230-4975 (Online)

Published in New Zealand by

EOS Ecology, P.O. Box 4262, Christchurch, www.eosecology.co.nz

Cover Photo

Wave and wind damage as Cyclone Gita lashes Tasman Cycle Trail.
ROSS CULLEN

Design and layout by

EOS Ecology, Christchurch

Reference information

We suggest this publication be referenced as:

Hughey, K.F.D., Kerr, G.N. and Cullen, R. 2019. Public Perceptions of New Zealand's Environment: 2019. EOS Ecology, Christchurch. vi+92 pp. ISSN 2230-4967.

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SUMMARY

The ninth survey (the series having begun in 2000) of people's perceptions of the state of the New Zealand environment was undertaken over March–April 2019. 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 third time this survey was undertaken only using electronic media. The changing nature and ability of these media have made it challenging to compare the 2019 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. Notably in 2019 there was a vastly increased proportion of younger (30 years and less) respondents and these relatively more positive, on average, respondents have led to significant differences from some key findings reported in 2016 —overall the perceptions are more positive albeit they remain overall negative about many aspects of Aotearoa-New Zealand's natural environment.

Amongst many PSR findings, some that are notable include the following:

- 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, marine fisheries, coastal resources and beaches, 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 although for the first time in the survey's history the proportion of respondents choosing this cause of damage declined.
- 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. Notably for New Zealand climate change increased hugely as an issue in the 2019 survey.

One case study concerned predator control and is directly comparable to the 2016 survey. Overall more people reported all of the 'big 4' predators close to their residence, and for all species more people reported undertaking unpaid control work. The main reasons for undertaking this work were linked to environmental and nuisance concerns. Over half or respondents thought more control is needed with a similar proportion suggesting the Department of Conservation should do more control work.

A second case study dealt with aspects of 1080 use. A number of positively and negatively framed statements were posed. The most prevalent response to these questions, irrespective of framing, was 'neither agree nor disagree', typically for around 40% of respondents. Support, or otherwise for the statements varied hugely. For example around 60% of respondents consider 1080 is an effective introduced predator killer; on the other hand around 25% considered 1080 to be humane. Relative to other controversial activities (e.g., compulsory vaccination, supported by around 75% of respondents) using more aerial 1080 garnered a much more divided response (around 35% for or against with the balance 'neither support nor oppose').

Finally, we asked survey questions about risks to native species and which species were most in need of protection. As per 2016, kiwi genera were perceived to be the most at risk and the most in need of protection. There was a tussle between Hectors/Māui dolphins and kākāpō for second and third places, with the kākāpō being more frequently perceived to be at risk than the two small dolphins, but not quite as commonly nominated as a priority for protection. Compared to 2016 the general pattern is similar, with almost exactly the same percent of respondent scores for kiwi. There are differences however: kākāpō is 2nd priority in 2019 (3rd in 2016), a position held by Hectors/Māui dolphins in 2016; kea is ranked 4th in 2019 but was only 7th in 2016; and kauri (with around 7.5% of respondents) was 4th in 2016 and 5th in 2019 (around 5% of respondents).

CONTENTS

ACKNOWLEDGEMENTS

We thank the following for their contributions to funding this survey:

- Hawkes Bay Regional Council
- Environment Canterbury
- Predator Free New Zealand

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

*Kaka beak (*Clianthus puniceus*)*
ROSS CULLEN

01 INTRODUCTION

1.1 BACKGROUND

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

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

Following the 2010 survey the principal researchers reviewed the results and lessons learnt from the six prior surveys. They found a consistent pattern of results and thus resolved to change the survey to a triennial cycle. This publication thus reports the results of the ninth (formerly biennial and now triennial) environmental survey undertaken in 2019 and includes a comparison with previous survey findings. As signalled in 2010, this survey was undertaken electronically, whereas prior to 2013 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
- report (since 2010) 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.

Clyde River, Canterbury.
KEN HUGHEY

02

SURVEY METHOD

An electronic questionnaire based on the Pressure-State-Response (PSR) model and previous surveys in this series was used to gather information on New Zealanders' perceptions of the environment and environmental management. In 2010 an electronic survey was introduced to complement the postal survey; in 2013, 2016 and 2019 only an electronic survey instrument was used. The electronic survey was selected as the best method of gathering PSR information. The large number of questions deemed a telephone survey unsuitable and interviews would have been too expensive and cumbersome for adequately sampling the New Zealand population; likewise, the ongoing postal surveys were becoming administratively burdensome and overly expensive.

There are implications from changing to the electronic survey. The major implications are in three areas, and are of most concern for the PSR data and analyses. First, and, perhaps of greatest concern, there appear to be differences in attitudes of the e-survey sample to the environment compared to those of the randomly drawn Electoral Roll-based 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 that 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 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 2019 QUESTIONNAIRE

The electronic survey contained the same core set of questions as the 2016 and earlier surveys and three[1] 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 49 'main' questions, comprising a total of 229 questions and sub questions, asked in sets.

The PSR framework guided the development of the ongoing core 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 15 activities was measured to explore relationships between environmental behaviour and responses to the PSR framework. Eight 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 and Green'

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

The State of the Environment

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

[1] Only three are reported as the fourth, regarding aspects of freshwater management, was undertaken for a commercial research client to help fund the survey.

over the years and by 2006 sufficient perceptions data were available from previous surveys to identify significant changes. This change has been retained in the 2019 survey.

The first question set in this section 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 11 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 10 natural resources. These were measured by asking: 'Now we would like your opinion on some of our natural resources'. The set of 10 natural resources was preceded by: 'New Zealand's …'. Five-point scales provided for measurement were anchored by 'very high' and 'very low'.

Adequacy of Environmental Management

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

The first set of questions in this section 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 13 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 10 resources with 15 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 15 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 15 activities related to the environment. In 2000 respondents were asked: 'Please indicate if in the last twelve months you have…' followed by 13 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 was asked concerning the 'big four' mammalian 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, whether or not they financially supported such work, questions about who should control pests, and questions on significance, importance and effects of pests and pest control. This case study addressed similar themes to a component in the 2016 survey, but with considerable modification.

Use of 1080

A separate case study considered aspects of the use of 1080 for pest control in New Zealand. Thirty four statements were presented to respondents who were asked to assess each on a 7-point scale ranging from 'strongly oppose' to 'strongly support'.

Species Conservation Priorities

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. This case study was undertaken also in 2016.

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 works 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 2019 survey is provided in Appendix 2 (but also see Appendix 4 which presents an analysis of a significant 2019 change in response demographics, namely a much higher proportion of younger respondents with significant changed perceptions). 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 (Stats NZ 2018). The following key points can be drawn about where the e-survey sample differs from NZ population-level data:

- Age: the e-survey over-represents age 60–69 and under represents age 18–19 and 70 plus.
- Ethnicity: the e-survey under-represents Māori and over-represents other ethnicities.
- Education: the e-survey over-represents those with tertiary education qualifications, and under-represents those with high school qualifications (19.5% cf 47.2% of the population).
- Rural-Urban population: the e-survey over-represents urban population and under-represents rural population.

Some of these differences are of great importance—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 2018 Stats 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, while other individuals were asked about questions introduced 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 2019 survey results with those from previous surveys. Relationships between selected PSR framework components and demographics for the 2019 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 March–April 2019. 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	Postal
2002	45%	N = 836	Postal
2004	43%	N = 820	Postal
2006	46%	N = 880	Postal
2008	40%	N = 752	Postal
2010	35%	N = 610	Postal
2010	na	N = 2477	Electronic
2013	na	N = 2200	Electronic
2016	na	N = 2468	Electronic
2019	na	N = 2073	Electronic

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

2.6 MAJOR CHANGES IN THE 2019 SURVEY

In summary the following changes and additions have been made from the 2016 survey:

- Special topics in 2016 which concerned mammalian predator control, and priorities for introduced species management have been repeated in this survey, with some modification.
- Options about use of aerially applied 1080 poison for pest control were examined as a case study in 2019.

Damage from Cyclone Gita, Moturoa/Rabbit Island, Tasman District.

ROSS CULLEN

*White-faced heron (*Egretta novaehollandiae*), Ahuriri Lagoon, Napier.*
ROSS CULLEN

03

PRESSURE-STATE-RESPONSE ANALYSIS BY QUESTION

This section reports findings grouped by question type, which provides the clearest depiction of the relative evaluations of different environments, within the organisational context of the Pressure State Response framework. 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 fourth consecutive set of e-survey data some statistical analyses have been undertaken for these data. Appendix 4 considers the importance of the demographic response change noted in Section 2.1, namely that a significantly higher proportion of younger people (<30 years old) responded to this survey than to 2016 and earlier, and that these same respondents also displayed significantly different perceptions than other age groups and to the same age group from the 2016 survey. Reasons for this demographic change are noted also.

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

The 2019 Survey

Most people considered their environmental knowledge to be 'adequate' (44.4%) or 'good' (35.4%, Figure 3.1). The vast majority considered the standard of living in New Zealand to be 'good' or 'adequate' (77%, Figure 3.2). The state of the New Zealand environment is considered to be 'adequate' to 'good' (67.9%, Figure 3.3). Around 39% of respondents either 'strongly disagreed' or 'disagreed' with the statement that New Zealand's environment is 'clean and green'; 34.4% 'agreed' or strongly agreed' (Figure 3.4).

There is a significant difference ($p<=0.001$) between responses to the four e-surveys in terms of levels of support with the statement that New Zealand's environment is 'clean and green. When 'neither agree' or 'disagree' responses are removed more people in 2019 either 'strongly disagreed' or 'disagreed' with the statement than in 2010 when more people 'strongly agreed' or 'agreed' with the statement (Figure 3.4).

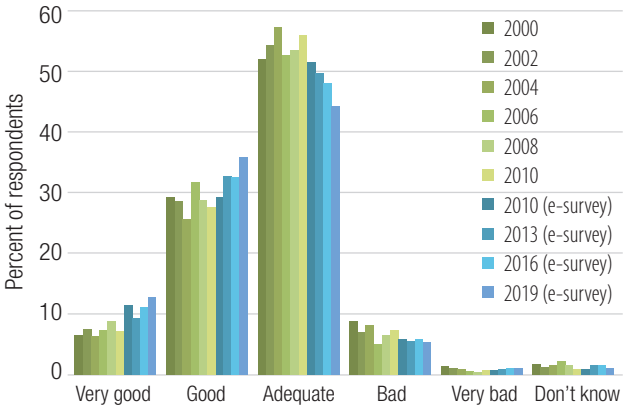


Figure 3.1. Knowledge of environmental issues.

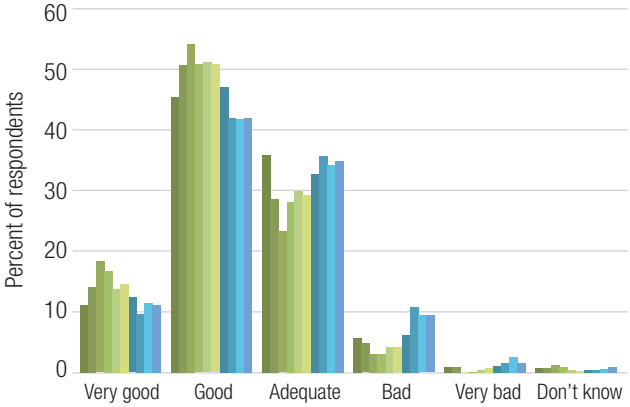


Figure 3.2. Standard of living in New Zealand.

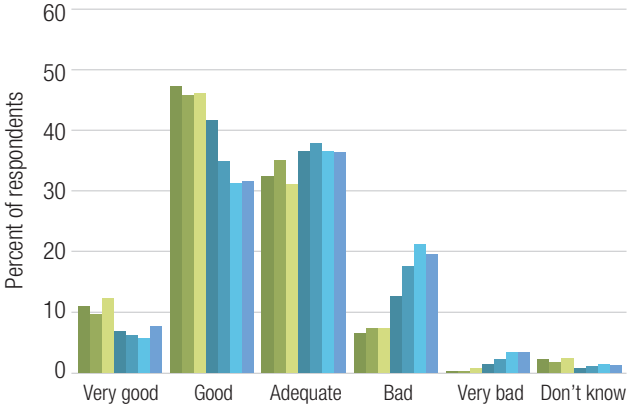


Figure 3.3. State of New Zealand's natural environment.

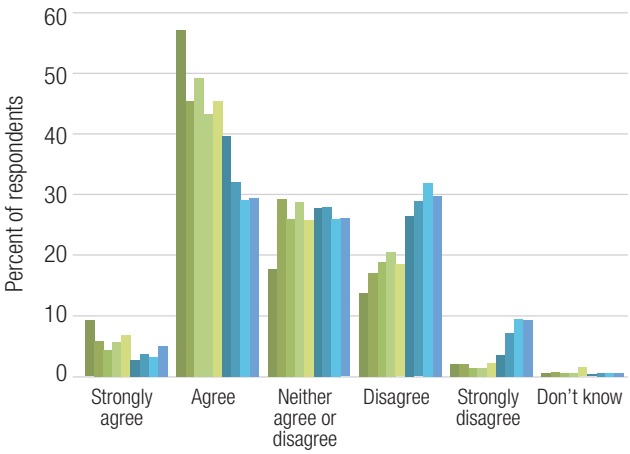


Figure 3.4. New Zealand's environment is 'clean and green'.

3.2 THE STATE OF THE ENVIRONMENT

3.2.1 QUALITY OF THE NEW ZEALAND ENVIRONMENT

The 2019 Survey

The quality of the New Zealand environment was measured on five-point Likert scales ranging from 'very good' to 'very bad'. Figure 3.5 shows that respondents generally rated

the state of the New Zealand environment to be 'good' or 'adequate'. However, New Zealand's natural environment was rated to be 'good' or 'very good' when compared with other developed nations. In 2019 two specific resources (natural environment compared to other developed countries – 63.3%; air – 62.6%) scored very positively (scores of 'very good' or 'good' combined), with mean Likert scores of 3.83 and 3.71 respectively. Rivers and lakes were considered to be in the worst condition (mean score = 2.79, with 42.1% of respondents rating them as 'bad' or 'very bad'. Wetlands, groundwater, marine fisheries and soils received the largest number of 'don't know' responses (ranging from 11.7 to 8% of responses).

Trends 2000–2019

Figure 3.6(a–d) shows mean Likert scores for 11 environmental aspects, including nine that have been included in all nine surveys. Note there are two parts to each of the trend lines—the 2000–2010 postal survey data (solid lines); and the 2010–2019 e-survey data (dashed lines). Commentary is presented with caution because of the differences in survey populations.

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. Apart from air, almost all other aspects have shown a decline over the period of the three e-surveys: 2010–2019.

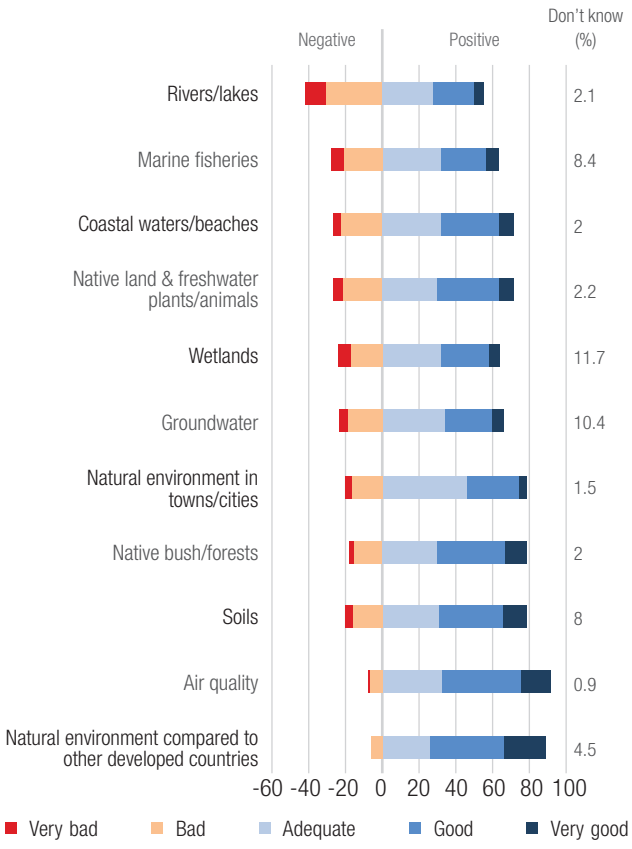
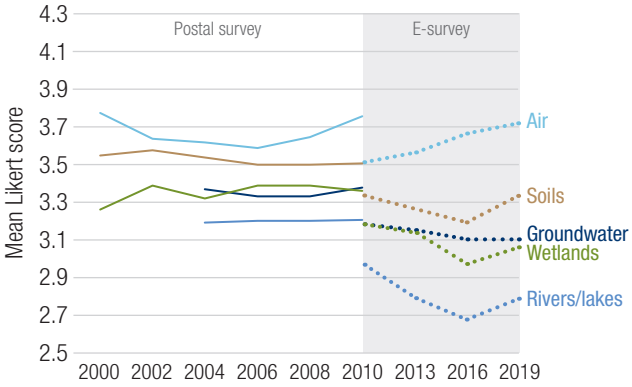
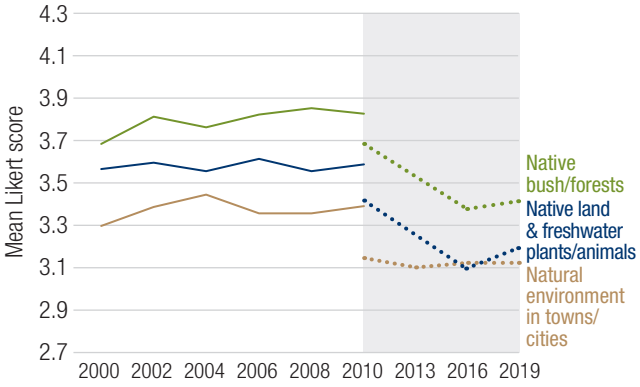


Figure 3.5. Perceived state of the environment.

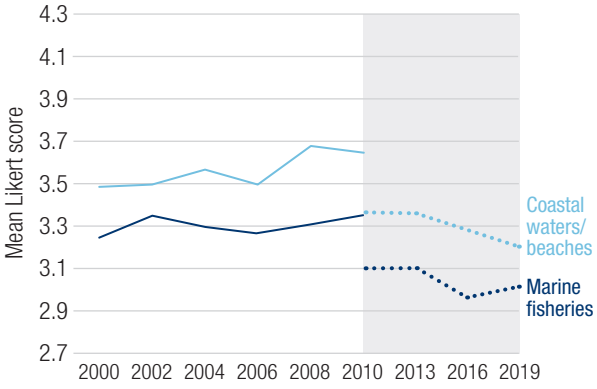
a. Physical resources: Air, Soils, Rivers and lakes, Groundwater, Wetlands



b. Biodiversity related: Natural environment in towns and cities, Native land and freshwater plants and animals, Native bush and forests



c. Marine related: Coastal waters and beaches, Marine fisheries



d. Other: NZ's natural environment compared to other developed countries

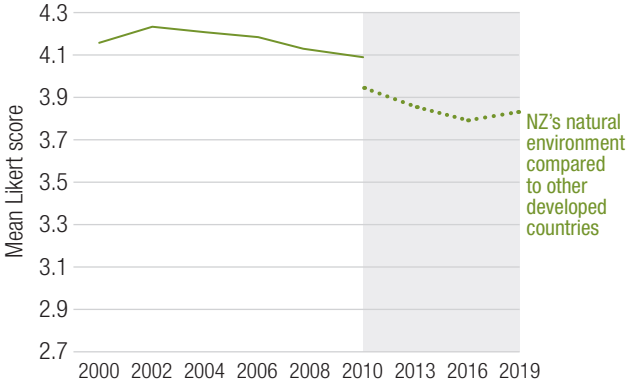


Figure 3.6(a–d). Trends in perceived state of the environment
(Scale: 1 = very bad, 2 = bad, 3 = adequate, 4 = good, 5 = very good).

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, for the 2010–2019 e-surveys, a 'hockey stick' shape is evident with a recent 2019 upturn to a mean Likert score of 2.67, still in the 'poor' to 'adequate' range.

3.2.2 RESOURCE AVAILABILITY

The 2019 Survey

Respondents' assessments of New Zealand resource availability are shown in Figure 3.7. The lowest mean Likert score for availability was for area of wetlands (mean Likert score 2.95), with around a quarter of respondents rating availability as 'very low' or 'low'. Area of marine reserves and reserves of oil and gas also received mean Likert scores of less than 3 with around a quarter of respondents rating availability as 'very low' or 'low'. The area of national parks had the highest rating (mean score = 3.49), with 48.3% of respondents rating it 'high' or 'very high'. Several resources received a high number of 'don't know' responses, especially reserves of oil and gas (29.8%), area of wetlands (13.8%) and the quantity of marine fisheries (11.9%).

Trends 2000–2019

Figure 3.8 shows mean Likert scores for the eight natural resources that were included in all nine surveys, and the two additional resources included from 2004 to 2019. Note there are two parts to each of the trend lines—the 2000–2010 postal survey data (solid lines); and the 2010–2019 e-survey data (dashed lines).

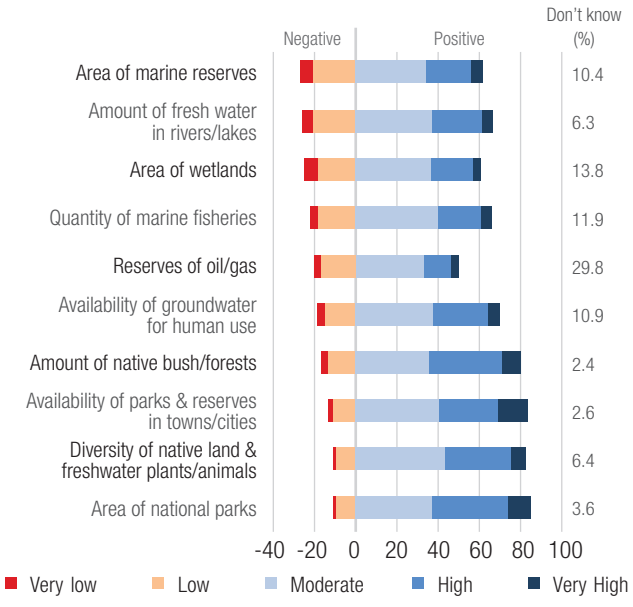


Figure 3.7. Perceived availability of natural resources.

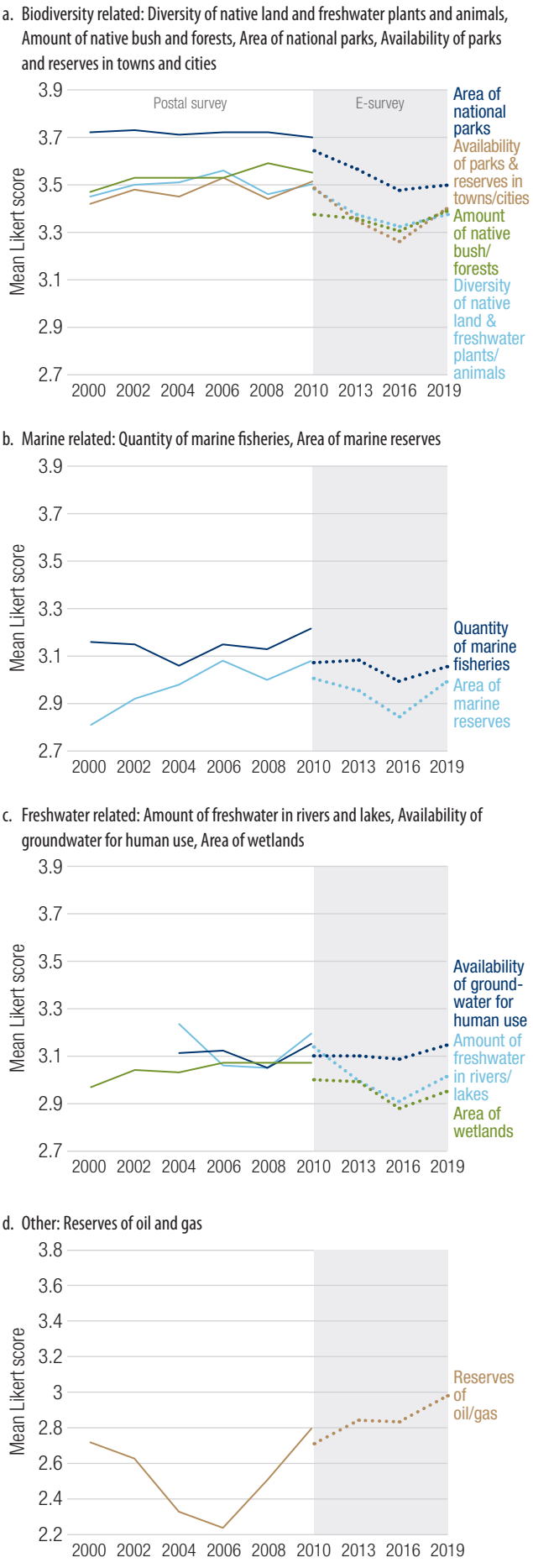


Figure 3.8(a–d). Trends in perceived availability of natural resources.

Perceptions about 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 retained a significant improving trend ($p<0.001$) over that time period despite a slight decline in 2008.

There has been little change in marine and freshwater related measures, albeit with minor decreases in 2016. There has been a decline in biodiversity-related measures, also with a notable dip in 2016 for three of those measures. There is a clearly improving trend in reserves of oil and gas.

3.3 MANAGEMENT OF THE ENVIRONMENT

3.3.1 MANAGEMENT OF ENVIRONMENTAL ACTIVITIES

The 2019 Survey

Survey respondents were asked to evaluate the management of six items on a five-point Likert scale that ranged from 'very good' to 'very bad' (Figure 3.9). A high percentage of respondents thought that the management of farm effluent and runoff (51.5% cf 65.5% in 2016) was 'bad' or 'very bad' (mean Likert score = 2.75). Only management of pests and weeds (25.6%) and sewage disposal (22.5%) achieved combined 'good' or 'very good' management ratings from 20% or more respondents. Solid waste disposal had the largest 'don't know' response (20%).

Trends 2000–2019

There are two parts to each of the trend lines—the 2000–2010 postal survey data (solid lines); and the 2010–2019 e-survey data (dashed lines). Care is necessary in interpreting trends in these long term data series.

Figure 3.10 shows continued improvement in people's rating of the management of solid waste disposal, sewage disposal and industrial impact on the environment. Noticeably, management of farm effluent and runoff, and hazardous chemicals use and disposal show marked increase in 2019 rating.

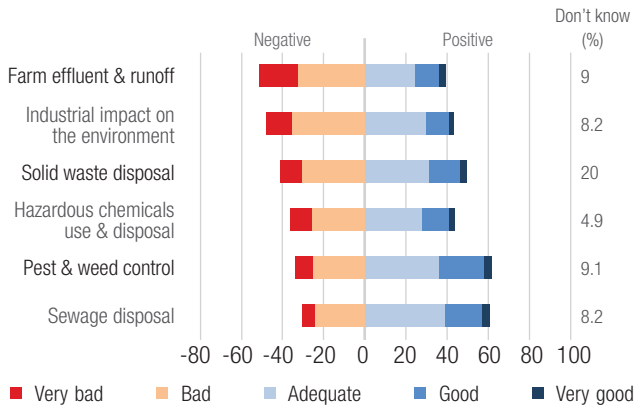


Figure 3.9. Perceived quality of management activities.

3.3.2. CURRENT MANAGEMENT OF THE ENVIRONMENT

The 2019 Survey

The quality of management of 13 environments or resources was assessed on a scale ranging from 'very well managed' to 'very poorly managed' (Figure 3.11). Generally, most environmental features were considered to be 'adequately managed' or better, with rivers and lakes scoring lowest (Mean Likert score 2.96). Nearly 40% of respondents felt that rivers and lakes were either 'poorly managed' or 'very poorly managed'. Conversely, around half of the respondents (48.7%) rated New Zealand's natural environment compared to other developed countries, and national parks (41.2%), as either 'very well managed' or 'well managed'. There were high rates of 'don't know' responses for five resources [soils (12.6%) marine fisheries (13.6%), marine reserves (13.4%), groundwater (14.7%) and wetlands (15.5%)].

Trends 2000–2019

Mean Likert scores for most resources correspond with resources being 'adequately managed' (Figure 3.12a–d). Exceptions are national parks, marine reserves and New Zealand's natural environment compared to other developed countries' natural environments, 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. The 2010 and beyond e-surveys tell a different story though; the 2013 and 2016 surveys witnessed declining scores for most resources, whereas in 2019 most increased markedly, with almost all now sitting within the 'adequately managed' to 'well managed' range, except rivers and lakes which are in the 'adequately managed' to 'poorly managed' range. This sudden increase is linked to more positive perceptions from younger respondents (see Appendix 4).

3.4 MAIN CAUSES OF DAMAGE TO THE ENVIRONMENT

The 2019 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.

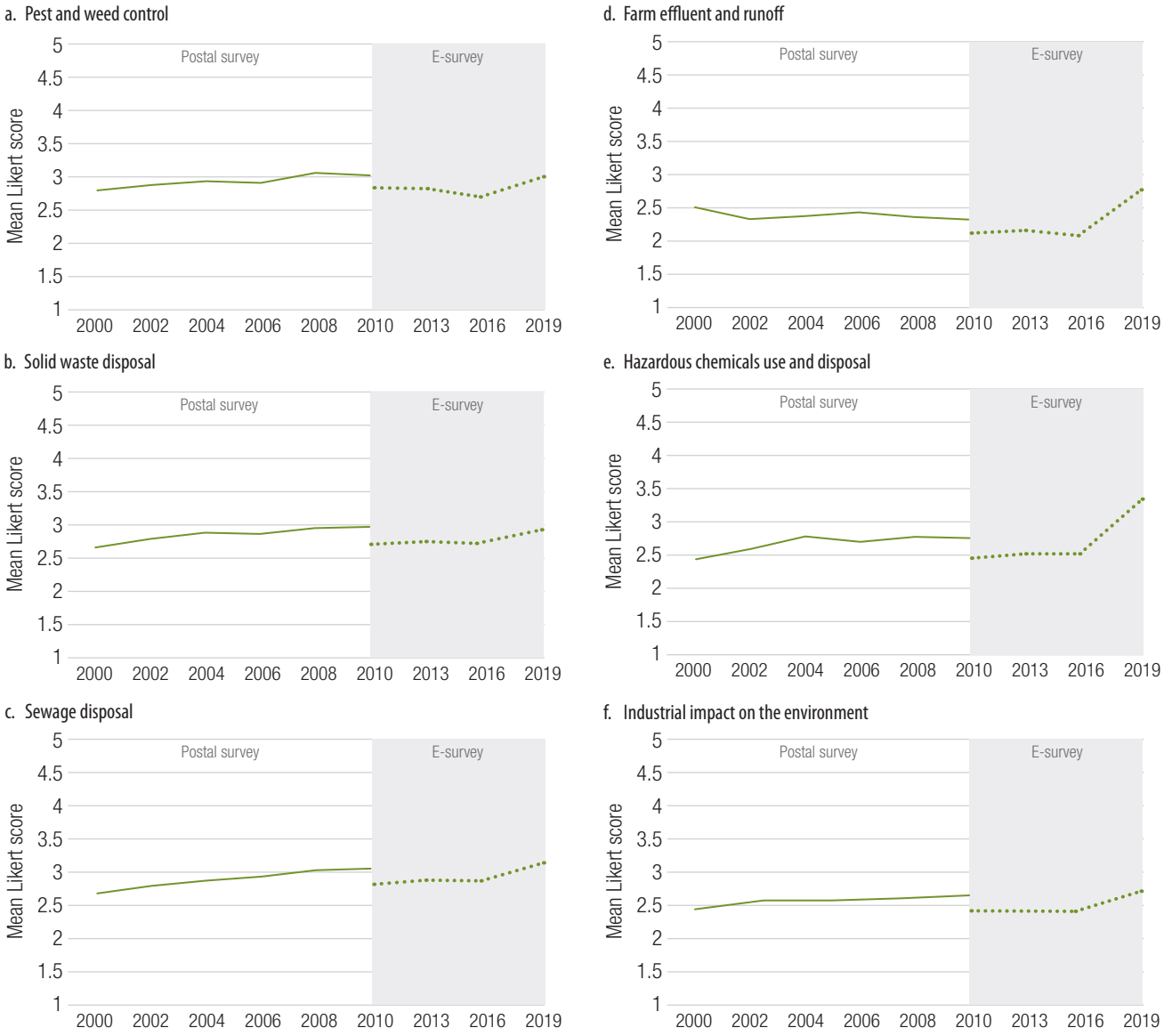


Figure 3.10 (a–f). Trends in perceived quality of management activities (Scale: 1 = very bad, 2 = bad, 3 = adequate, 4 = good, 5 = very good).

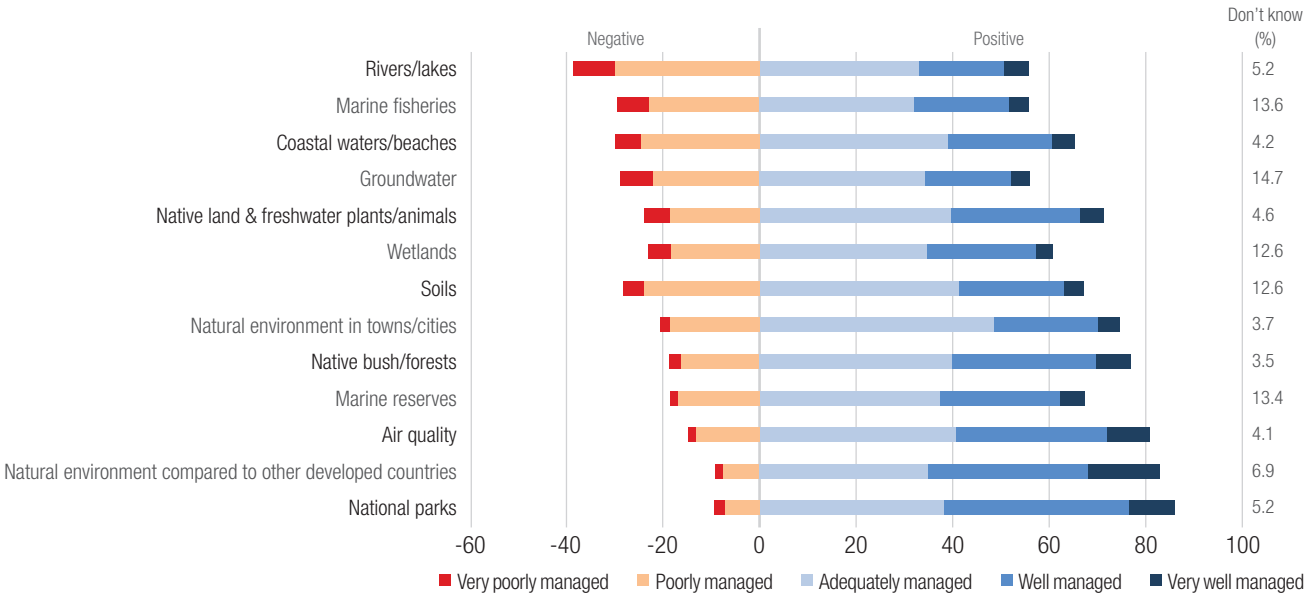


Figure 3.11. Perceived quality of management.

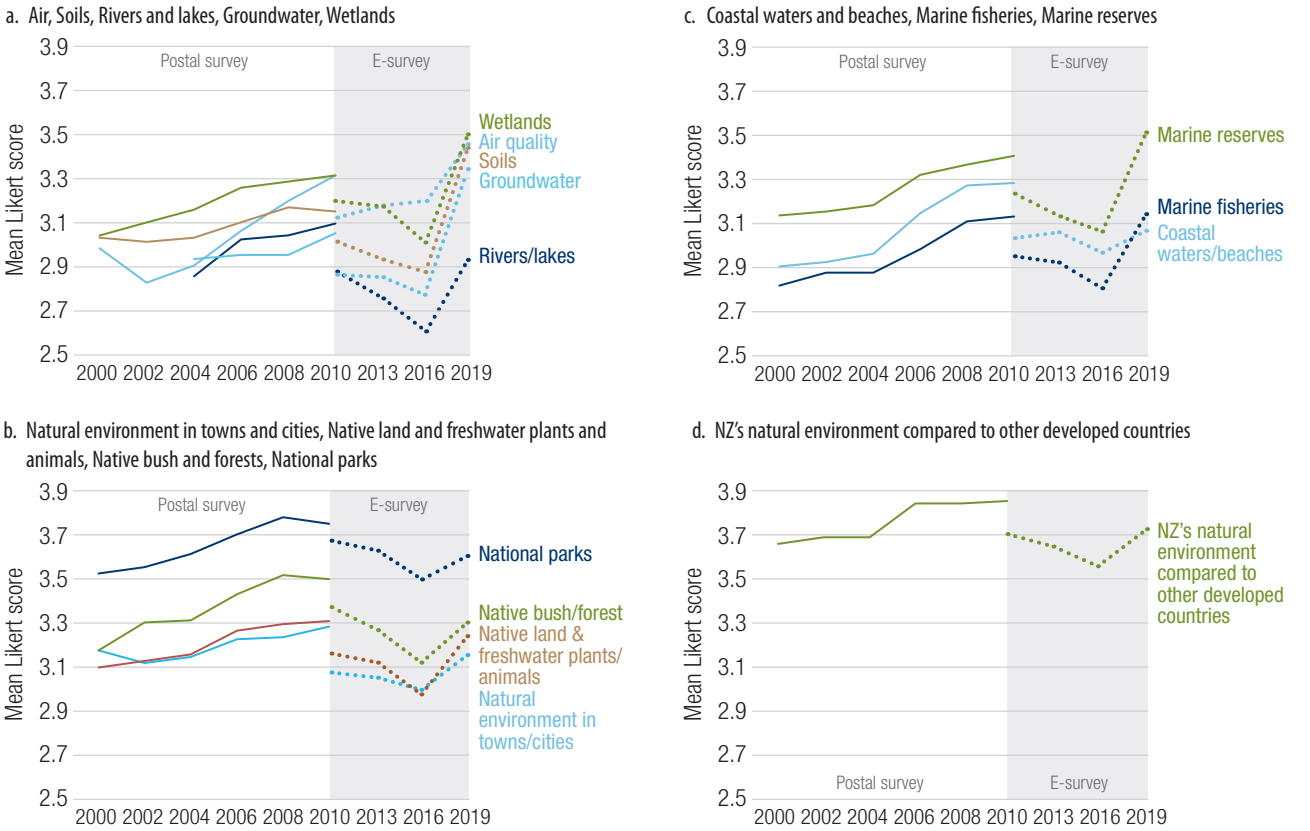


Figure 3.12(a–d). Perceived quality of management (Scale: 1 = very poorly managed, 2 = poorly managed, 3 = adequately managed, 4 = well managed, 5 = very well managed).

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

Perceived Cause of Damage	Air	Native Land & Freshwater Plants & Animals	Native Forests and Bush	Soil	Beaches & Coastal Waters	Marine Fisheries	Marine Reserves	Fresh Waters	National Parks	Wetlands
Motor Vehicles/ Transport	77.3%	4.7%	5.0%	3.1%	4.1%	1.8%	1.9%	2.5%	8.1%	3.6%
Household Waste/Emissions	25.0%	13.7%	4.9%	14.4%	22.8%	9.8%	8.9%	18.5%	6.4%	9.4%
Industrial Activities	64.1%	25.8%	16.3%	28.5%	19.4%	15.3%	11.7%	25.9%	9.2%	16.3%
Pests/Weeds	4.9%	38.6%	51.3%	16.6%	5.9%	4.9%	7.2%	14.7%	41.5%	31.4%
Farming	16.6%	42.1%	23.5%	39.7%	11.9%	6.8%	6.2%	43.0%	11.0%	32.7%
Forestry	3.5%	19.5%	42.5%	14.7%	4.1%	3.1%	2.5%	10.7%	21.3%	12.8%
Urban Development	19.9%	26.0%	30.4%	19.8%	21.3%	6.0%	6.8%	16.7%	18.2%	28.8%
Mining	4.0%	9.5%	14.7%	13.8%	2.3%	4.1%	3.4%	5.2%	12.7%	5.6%
Sewage/Stormwater	5.5%	24.0%	5.6%	18.9%	58.6%	35.0%	27.6%	43.6%	5.9%	28.0%
Tourism	4.9%	9.6%	19.6%	3.2%	19.7%	6.8%	12.7%	8.6%	44.9%	9.1%
Commercial Fishing	1.6%	5.7%	1.3%	1.7%	21.7%	69.0%	39.0%	6.9%	2.3%	2.0%
Recreational Fishing	0.4%	3.1%	1.1%	1.2%	7.5%	25.8%	23.8%	6.1%	1.3%	3.3%
Dumping of Solid Waste	9.4%	20.3%	13.8%	35.5%	26.9%	17.4%	15.1%	21.2%	14.5%	17.5%
Hazardous Chemicals	20.0%	16.7%	10.2%	35.6%	16.3%	16.4%	13.8%	20.8%	8.1%	14.2%
Other	2.4%	3.1%	4.5%	5.0%	5.3%	6.0%	7.1%	4.4%	7.1%	9.9%

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

For some environmental components, people have very clear ideas about sources of harm. For example, motor vehicles and transport (77.3%), as well as industrial activities (64.1%), were clearly judged to be the two 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 58.6% of respondents nominating this cause, while 69% 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

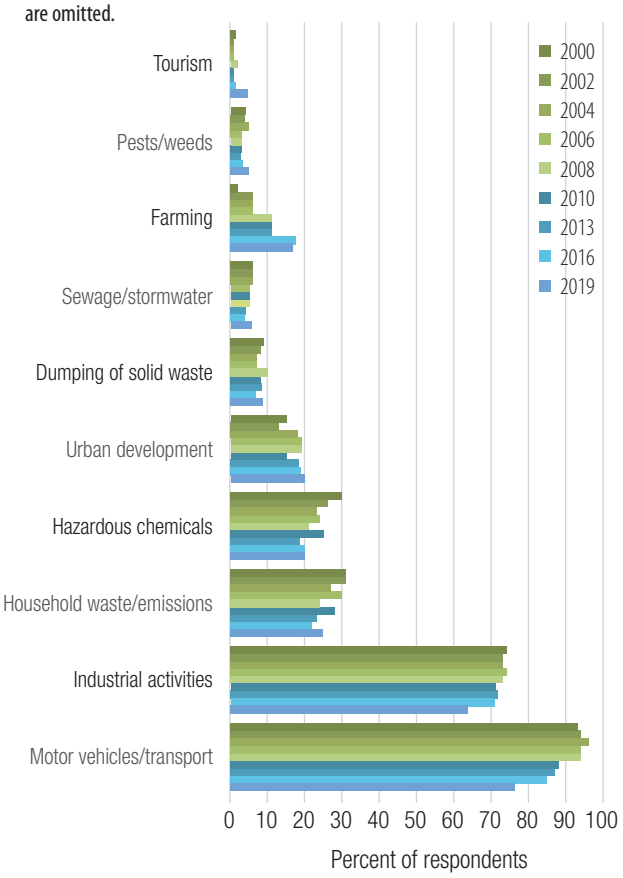
Respondents' judgements of the main causes of damage to the 10 environmental components which were included in all nine surveys are shown in Figures 3.13(a–j). Responses are consistent across years for a number of items. Motor vehicles and industrial activities clearly rate as the main causes of damage to air for all surveys. Similarly, sewage and storm water 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 storm water.

Over the full set of surveys the following are considered the major causes of damage to the 10 environmental components:

- Air: Motor vehicles and transport; Industrial activities
- Native land and freshwater plants and animals: Pests and weeds; Farming
- Native bush and forests: Pests and weeds; Forestry
- Soils: Farming; Hazardous chemicals; Dumping of solid waste
- Beaches and coastal waters: Sewage and storm water
- Marine fisheries: Commercial fishing; Sewage and storm water
- Marine reserves: Commercial fishing; Sewage and storm water; Recreational fishing
- Freshwater: Farming; Sewage and storm water
- National parks: Pests and weeds; Tourism
- Wetlands: Pests and weeds; Farming.

Perhaps the most notable change across many of the resources assessed is that up to 2016 farming was increasingly chosen as one of the three main causes of damage, but in 2019 this trend reversed with a large drop in attribution to farming although it remained important for key components such as freshwater. In contrast, tourism and forestry in 2019 were chosen by more respondents than in 2013 and 2016 as a source of damage to several resources.

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



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

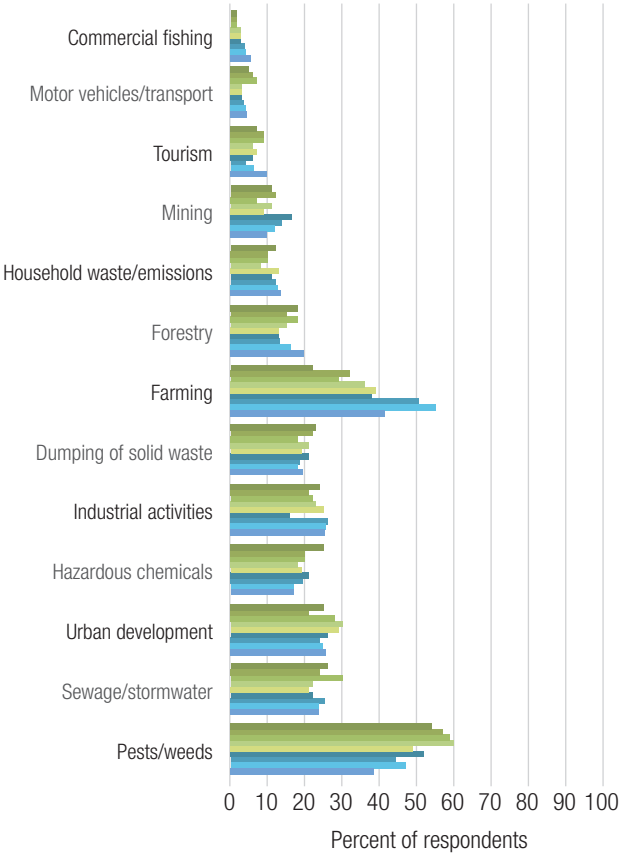
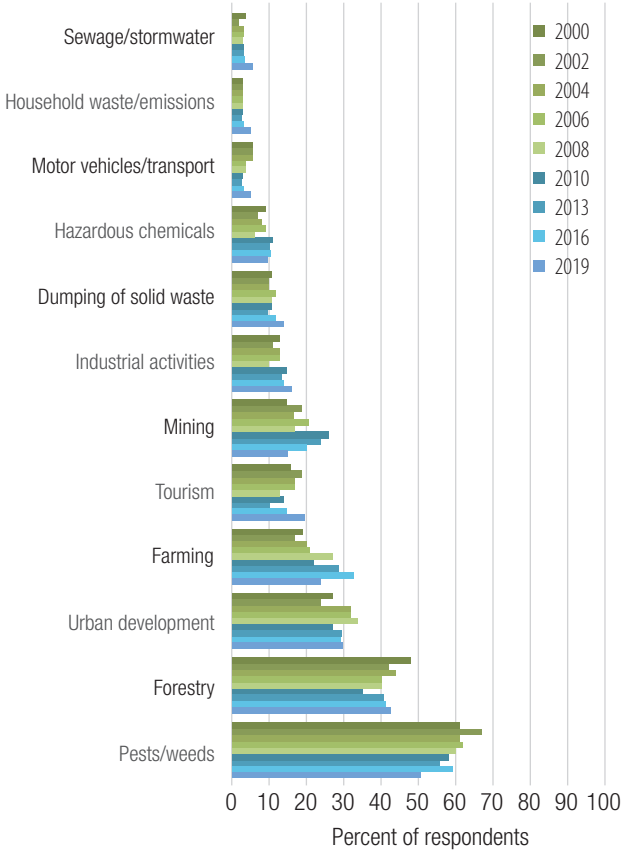
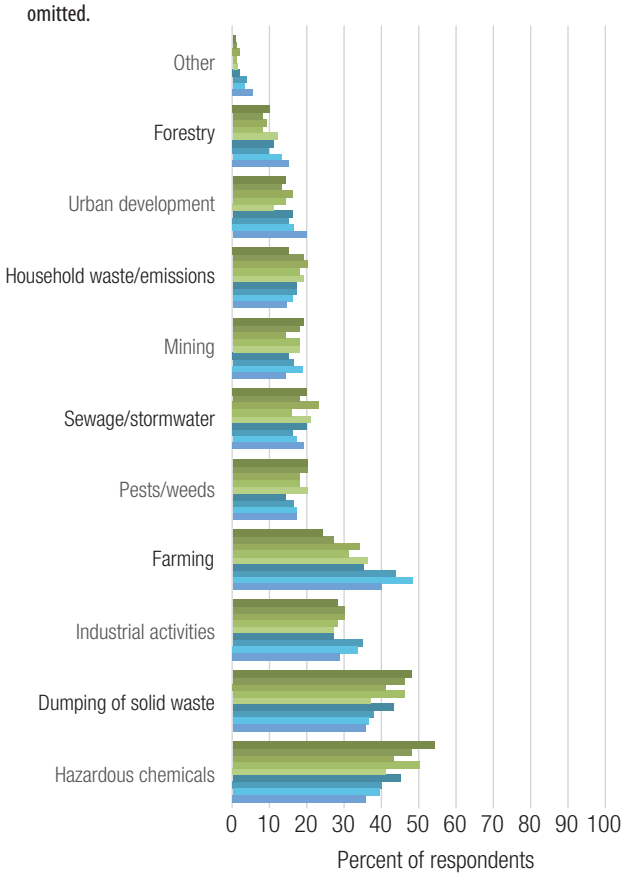


Figure 3.13(a–j). Perceived main causes of damage.

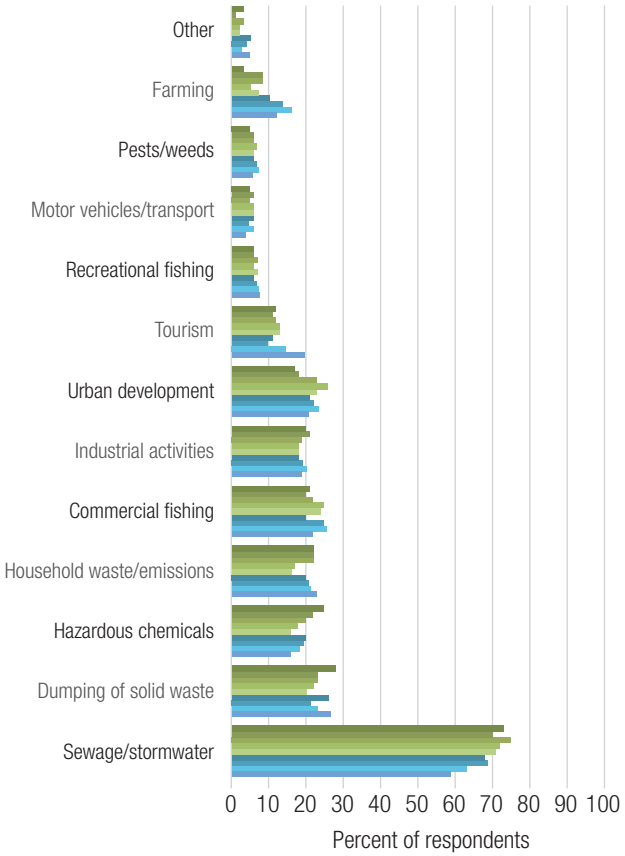
c. Perceived main causes of damage to native forests and bush. Categories less than 5% are omitted.



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



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



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

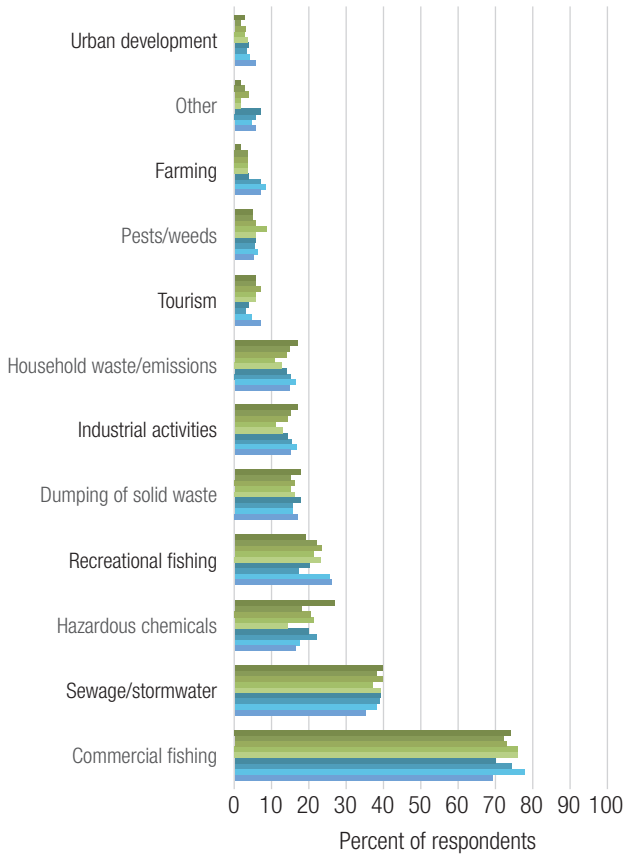
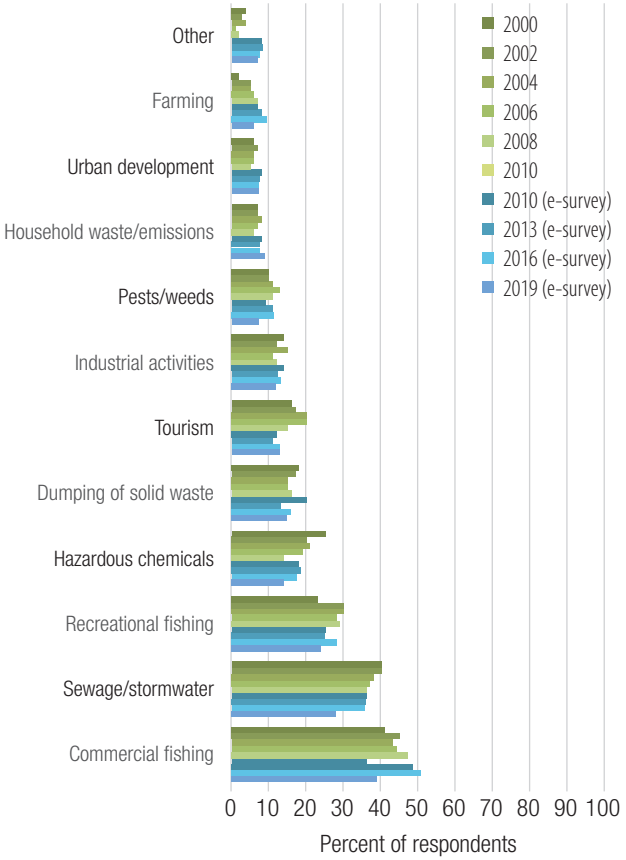
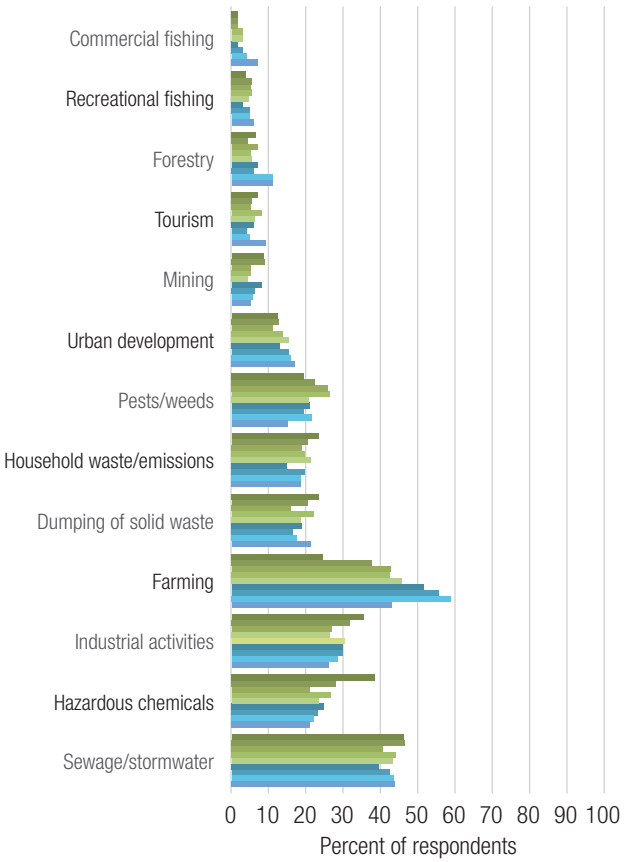


Figure 3.13(a–j). Perceived main causes of damage...*continued*

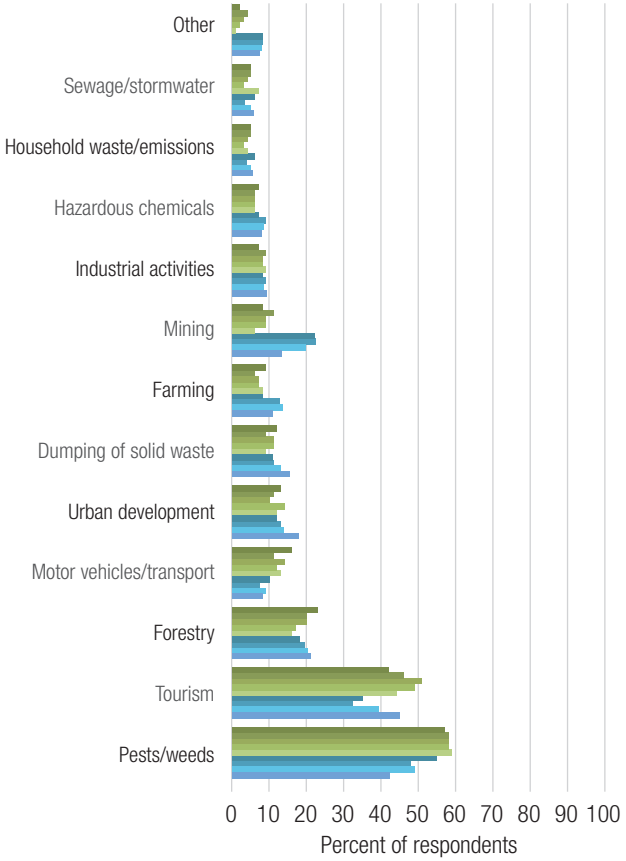
g. Perceived main causes of damage to marine reserves. Categories less than 5% are omitted.



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.

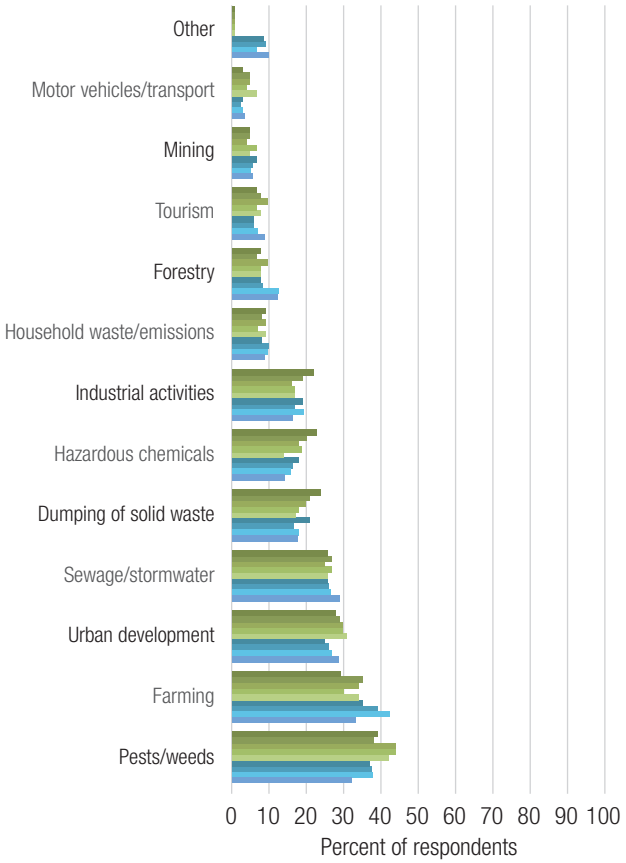


Figure 3.13(a–j). Perceived main causes of damage...*continued*

3.4.1 ETHNICITY DIFFERENCES

We examined (Z score) the significance of differences between ethnic group ratings of the main causes of damage to two key resources: air, and fresh waters.

Air: The following significant differences (Figure 3.14) were found:

- Industrial Activities: NZ Europeans > Other ethnicities (P(Z)<0.001)
- Motor Vehicles/Transport: NZ Europeans > Other ethnicities (P(Z)<0.01)
- Household waste and emissions: Other ethnicities > Māori (P(Z)<0.05).

Freshwater: There were four significant differences when ethnicity was evaluated against fresh water (Figure 3.15), namely:

- Sewage and stormwater: NZ European > Other ethnicities (P(Z)<0.001)
- Farming: NZ European > Māori (P(Z)<0.05); NZ European > Other ethnicities (P(Z)<0.001)
- Hazardous chemicals: Other ethnicities > NZ Europeans (P(Z)<0.01)
- Urban development: NZ European > Māori (P(Z)<0.01).

3.4.2 REGIONAL DIFFERENCES

We examined the significance of differences (Z scores) between 'regional' ratings of the main causes of damage to two key resources: air, and fresh waters. For spatial analysis the nation was divided into three regions. Southern Region is the South Island, Northern Region is the Auckland Council and Northland Regional Council area, and Central Region is the remainder of the North Island.

Figure 3.16 shows damage to air by region—in this case there were two significant differences:

- Household waste and emissions: Southern > Northern P(Z)<0.01)
- Industrial activities: Southern > Northern (P(Z)<0.01); Southern > Central (P(Z)<0.05)
- Hazardous chemicals: Central > Northern (P(Z)<0.05).

For fresh waters (Figure 3.17) the following significant differences were identified:

- Household wastes and emissions: Northern > Southern (P(Z)<0.001); Central > Southern (P(Z)<0.05)
- Pests and weeds: Central > Northern (P(Z)<0.05)

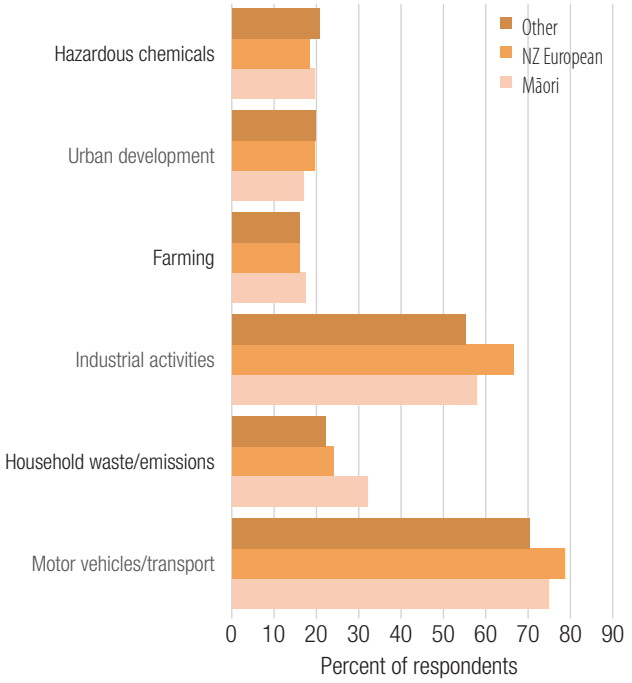


Figure 3.14. Perceived main causes of damage to air, by ethnicity. Categories less than 10% are omitted.

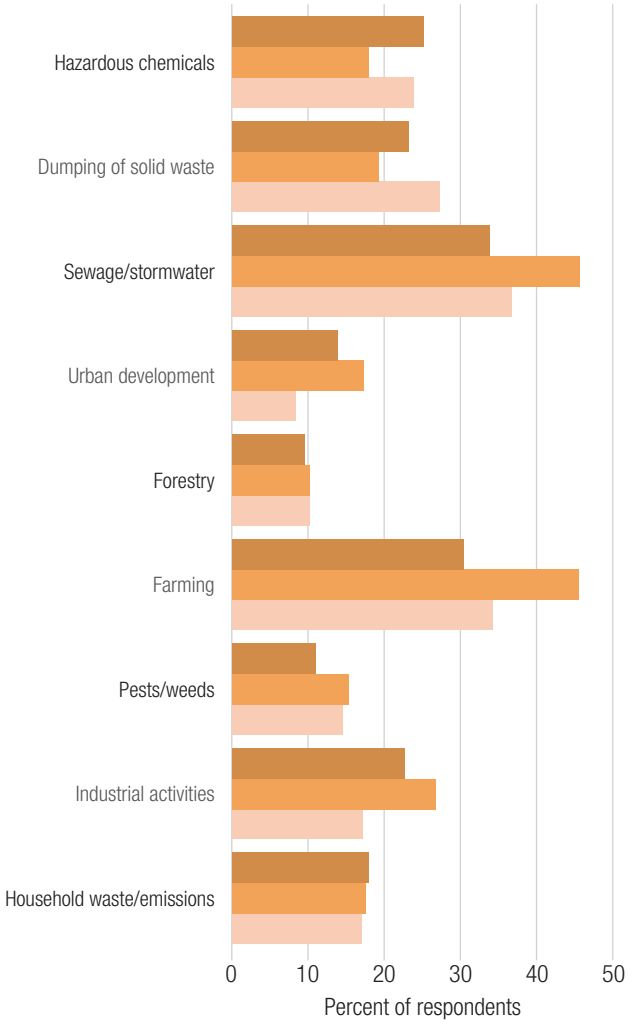


Figure 3.15. Perceived main causes of damage to fresh waters, by ethnicity. Categories less than 10% are omitted.

- Farming: Central > Northern (P(Z)<0.01); Southern > Northern (P(Z)<0.001)
- Sewage and stormwater: Central > Northern (P(Z)<0.001).

3.5 PARTICIPATION IN ENVIRONMENTAL ACTIVITIES

The 2019 Survey

Figure 3.18 shows levels of participation in 15 environment related activities during the preceding twelve months. More than 70% of respondents to the 2019 survey recycled household waste, bought products marketed as environmentally friendly, and reduced or limited their use of electricity. 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 gender, education, income, ethnicity and region (north, central, and south). There were numerous significant (Z scores) effects (Table 3.2). Most notable findings include:

- Gender: Males were much more likely to have visited a marine reserve than females. Females were far more likely to have 'bought products marked as environmentally friendly' or to 'have recycled household waste'.
- Education: For all bar the activity 'reduced or limited use of electricity' respondents with the highest levels of education were those that reported the most pro environmental behaviours. And for 10 of these 14 activities these differences were significant.
- Income: There were no significant income differences. However, nine of 15 pro environmental behaviours were exhibited by those in the higher income category.
- Ethnicity: For nine of the 15 activities highest participation rates were reported by Māori, consistent with the findings of Kerr *et al.* (2016). Notably the reported level of engagement by Māori in 'been an active member of a club/group that restores/replants the natural environment' was significantly higher than both NZ European and Other ethnicity respondents. Interestingly other ethnicity respondents were significantly more likely to have 'visited a national park' than were Māori or NZ Europeans.
- Region: For nine (seven significantly) of 15 activities those from the North were more likely to have participated than respondents from either Central or South. Two highly significant activities were 'visited a marine reserve' and 'commuted by bus or train'.

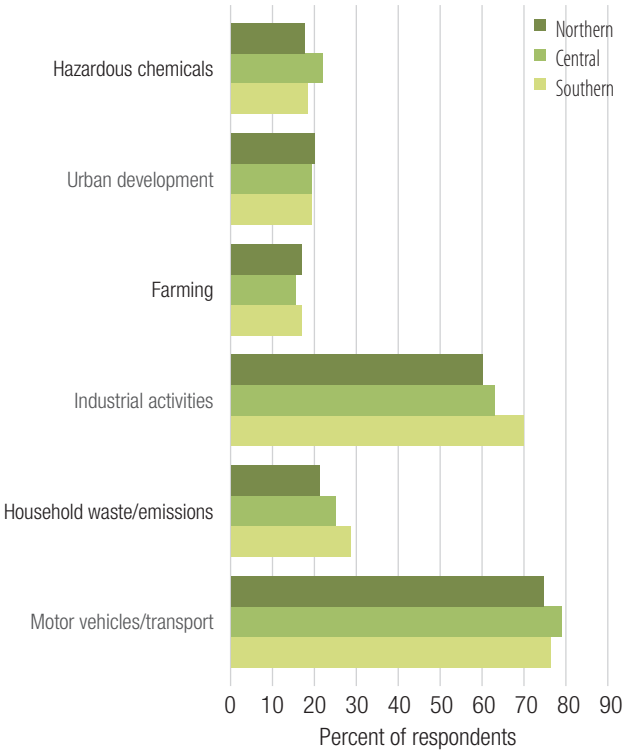


Figure 3.16. Perceived main causes of damage to air, by region. Categories less than 10% are omitted.

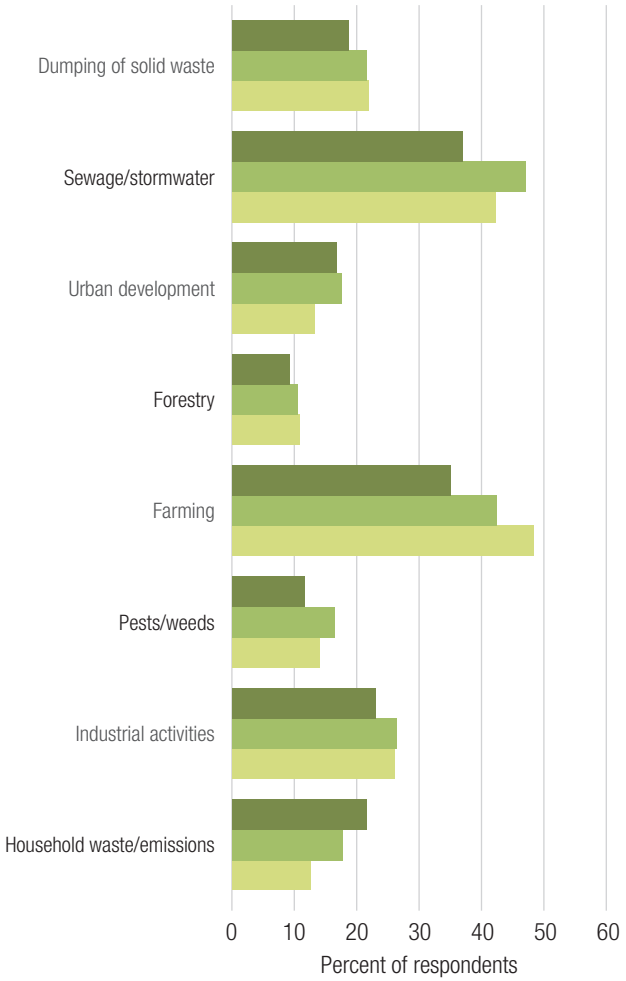


Figure 3.17. Perceived main causes of damage to fresh waters, by region. Categories less than 10% are omitted.

Trends 2000–2019

Participation in a range of environmental activities has been monitored since 2000. Because the question was modified in 2002, results from the 2000 survey are excluded. Two activities added to the survey in 2006 were 'reduced or limited your use of freshwater' and 'made a financial donation to a non-government environmental organisation (e.g., Forest and Bird)'. Figure 3.19 shows the extent of between-survey changes in reported behaviour. Pre-2010 results are from postal surveys, 2010 includes both postal and electronic survey results (shown separately), and 2013 to 2019 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. For the 2010–2019 e-surveys there has been a downward trend in respondents reporting they have 'reduced of limited their use of electricity' (87% in 2010 to 74% in 2019) or 'grown some of their own vegetables' (78% in 2010 to 68% in 2019). Conversely, there have been increasing trends for those who 'commuted by buses or trains' (47% in 2010 to 52% in 2019) and those who have 'been an active member of a club or group that restores/or replants natural environments' (13% in 2010 to 18.6% in 2019). As a general observation, it appears increases are all low participation-rate activities and decreases are all high participation-rate activities.

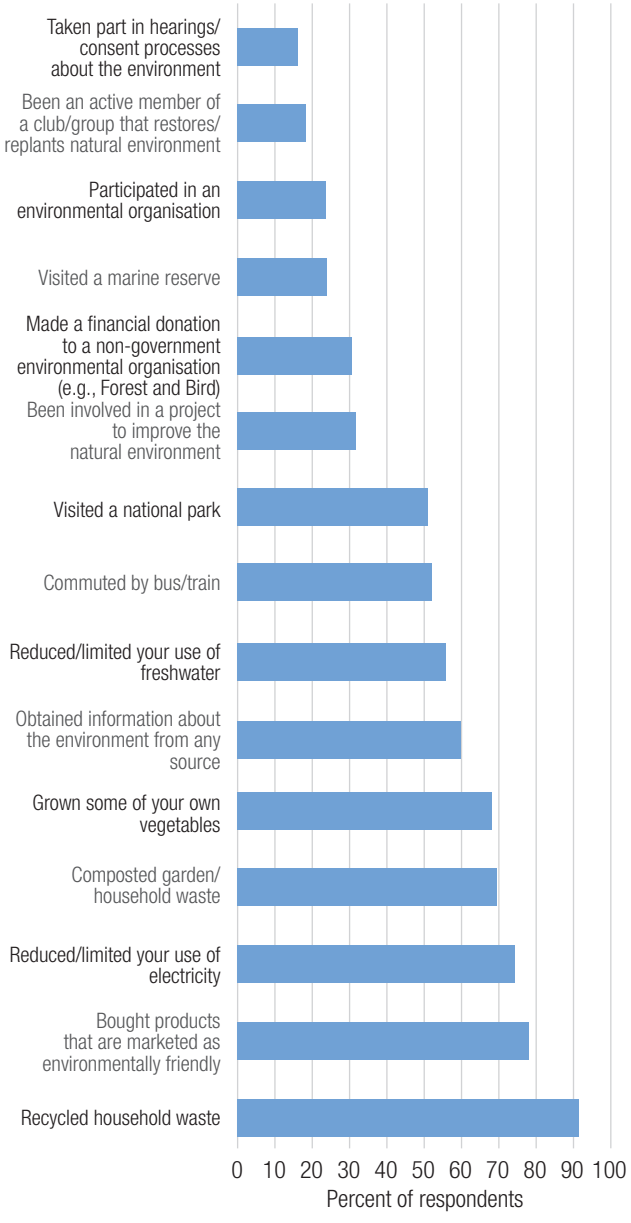


Figure 3.18. Reported participation in environmental activities, 2019.

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. In 2019 the 1080 case study could have had a similar influence. Because of these difficulties some care needs to be taken when evaluating within- and between-year responses. Nevertheless, despite the intra-survey issue we present trend analysis of these results for the four electronic surveys (2010–2019).

The 2019 Survey

'Water related' (27% of respondents) issues are the most commonly identified "most important" environmental issue facing New Zealand (Figure 3.20), with 'GHG, climate change and ozone' (20%) and 'waste' (12%) the next most highly rated. Respondents most often identified 'GHG, climate change and ozone' (42%) as the most important issue facing the world. This was followed by 'waste' (11%), 'water' (9%), 'pollution' (9%) and 'other' (9%). The size of the 'other' categories for both the world and New Zealand are large but contained numerous very small (few respondents) individual components.

Two matters stood out in the 'why' explanatory comments, especially for New Zealand. First, of those who identified pesticides/poisons as their most important environmental issue, a substantial number explained this choice by linking it to the use of 1080 in New Zealand. Second, plastics were identified heavily within the 'waste' category. Both of these matters have been subject to intense political and public scrutiny, particularly in the year prior to the 2019 survey; and 1080 was a case study in this survey.

Table 3.2. Rates of participation by a range of demographic characteristics – 2019 data (Grey highlighted cells indicate the cell with the highest pro-environment behaviour for that demographic; demographic columns are labelled a or b (for 2-class variables) and a,b,c (for 3-class variables); superscript labels in cells represent significant Z scores: *** p<0.001, ** p<0.01, * p<0.05, and related columns, e.g., for 'gender' column a (males), cell 3, regarding 'visited a marine reserve' males are statistically (*** p<0.001) much more likely to visit than are females (column b).

	Gender		Education			Income		Ethnicity			Region		
	Male (%)	Female (%)	No qualification (%)	High School Equivalent (%)	University equivalent (%)	<$70000 (%)	>$70000 (%)	Māori (%)	NZ European (%)	Other (%)	Northern	Central	Southern
Activity	a	b	a	b	c	a	b	a	b	c	a	b	c
Reduced or limited use of electricity	75	78	71	78	76	77	74	82	75	80^{*b}	76	75	80^{*b}
Reduced or limited use of fresh water	57	59	55	57	59	59	55	64	55	65^{***b}	58	57	60
Visited a marine reserve	30^{***b}	21	18	22	28^{**a,b}	22	36	35^{**b}	21	33^{***b}	33^{***b,c}	22	18
Visited a national park	54	50	33	46^{**a}	60^{***a,b}	49	64	45	50	63^{***a,***b}	57^{*b}	49	53
Bought products marked as environmentally friendly	79	90^{***a}	73	83^{*a}	88^{***a,**b}	85	85	85	85	83	84	85	86
Recycled household waste	90	96^{***a}	86^{*b,**c}	93	94	93	92	92	94*c	89	90	94^{*a}	94^{*a}
Composted garden and/or household waste	70	72	67	70	72	71	67	70	72*c	66	65	72^{**a}	75^{**a}
Been involved in a project to improve the natural environment	34	32	30	27	36^{***b}	31	36	46^{***b}	30	37^{*b}	36^{*b}	30	34
Grown some of your own vegetables	65	72^{**a}	60^{*b,c}	69	70	68	70	63	71**c	63	65	69	73^{**a}
Obtained information about the environment from any source	62	63	49	53	70^{***a,b}	61	64	66	61	63	64	60	63
Taken part in hearings/consent processes about the environment	18	16	12	14	19^{**a,*b}	16	18	28^{**b}	14	22^{***b}	20^{***b}	13	18^{*b}
Participated in an environmental organisation	26	23	20	18	28^{*a,***b}	23	26	32^{*b}	22	27	27^{*b}	21	25
Commuted by bus/train	56^{*b}	50	39	49	60^{***a,b}	53	56	52	50	64^{*a,***b}	59^{*b,***c}	53^{*c}	46
Been an active member of a club/ group that restores/replants natural environment	22^{***b}	16	18	15	21^{**b}	19	17	34^{***b,*c}	15	24^{***b}	23^{**b,*c}	16	17
Made a financial donation to a non-government environmental organisation	34	30	22	24	37^{***a,b}	30	35	39*b	29	35^{*b}	33	30	30

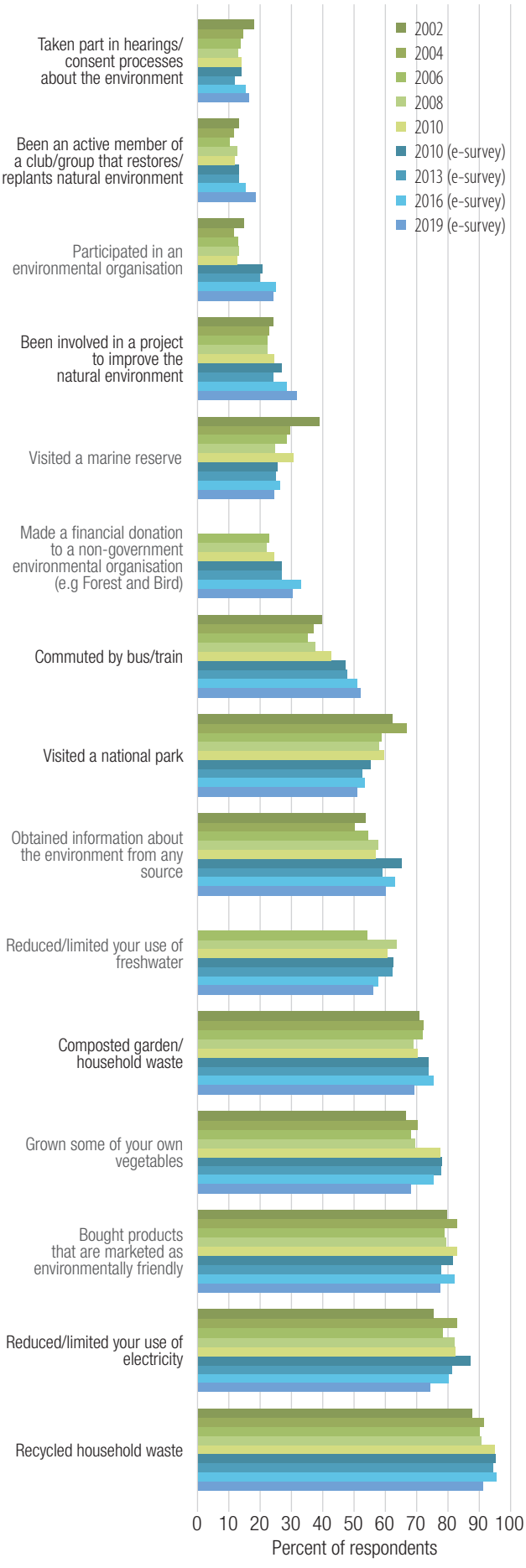


Figure 3.19. Trends in reported participation in environmental activities.

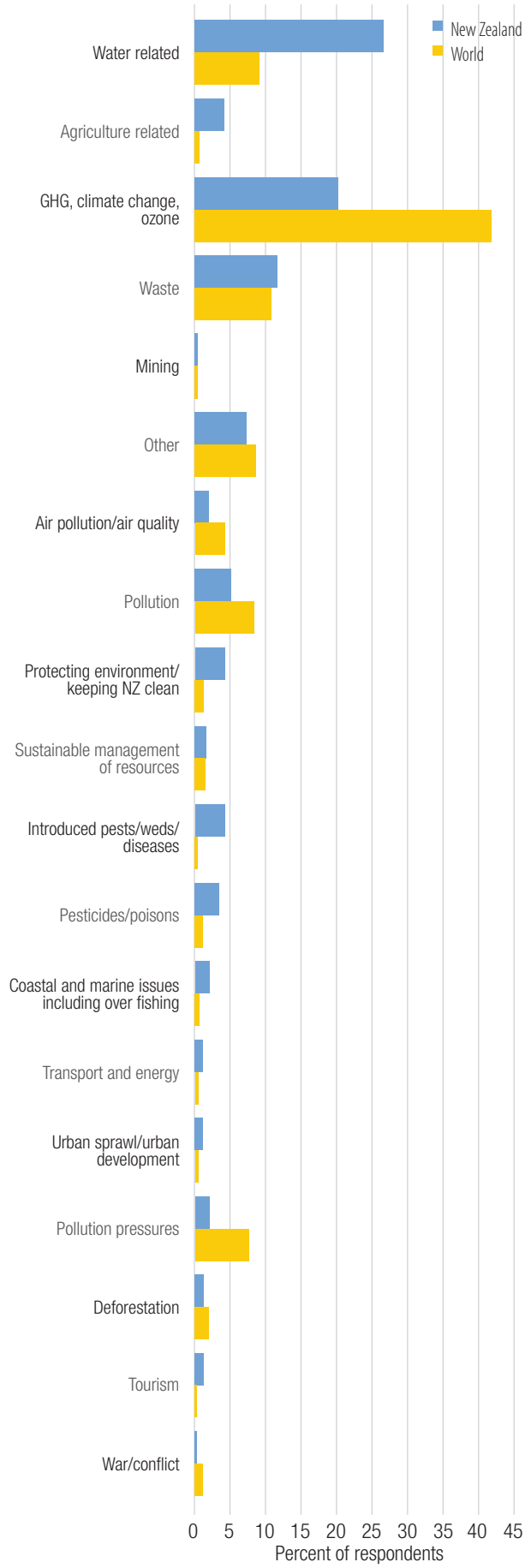


Figure 3.20. Most important issues facing New Zealand and the World, 2019.

2000–2019 Surveys

Figures 3.21 and 3.22 show comparative New Zealand and world data respectively over the four electronic surveys (2010–2019). For New Zealand, 'water related' concerns have consistently been identified by around 30% of respondents. For the world, items seen to link to 'climate change' were high at 42% of respondents, with water-related issues of secondary importance at 9% (2019) of those who responded. There are several notable temporal changes across the four e-surveys from 2010 to 2019:

- New Zealand:
  - items linked to 'climate change' have increased from 11% to 20%
  - waste has increased from 7% to 12%
  - 'other' items have declined from 13% to 7%
  - pollution has declined from 10% to 5%.
- World:
  - items linked to 'climate change' have increased from 27% to 42%
  - waste has increased from 6% to 11%
  - water has declined from 19% to 9%
  - 'other' items have declined from 11% to 9% (although there was an intermediate high of 17% in 2013.

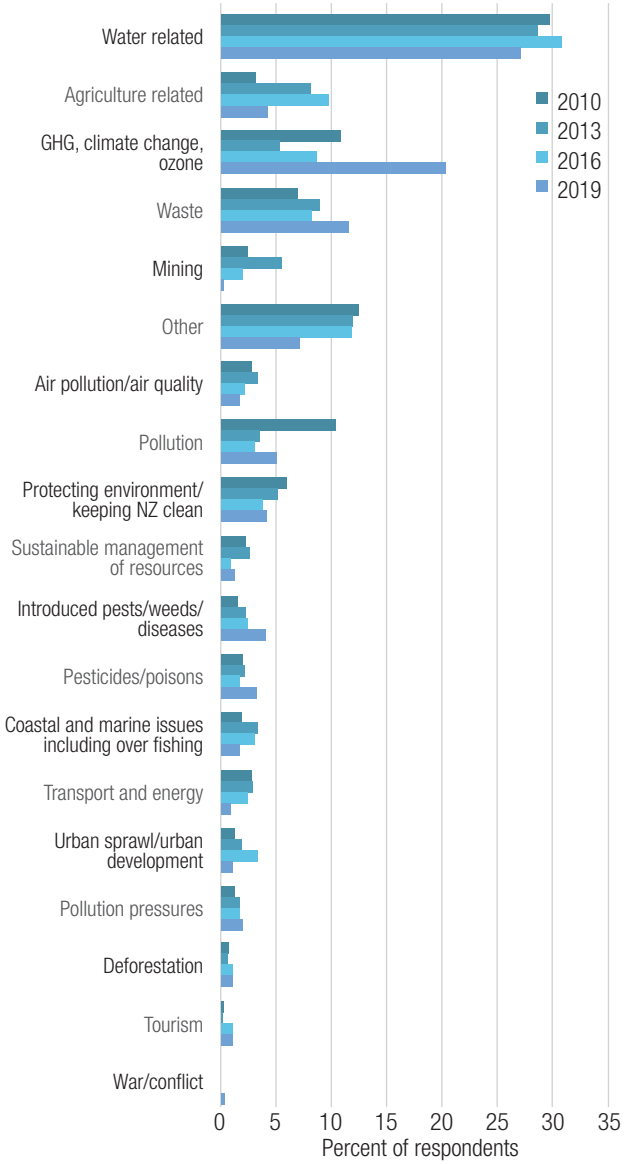
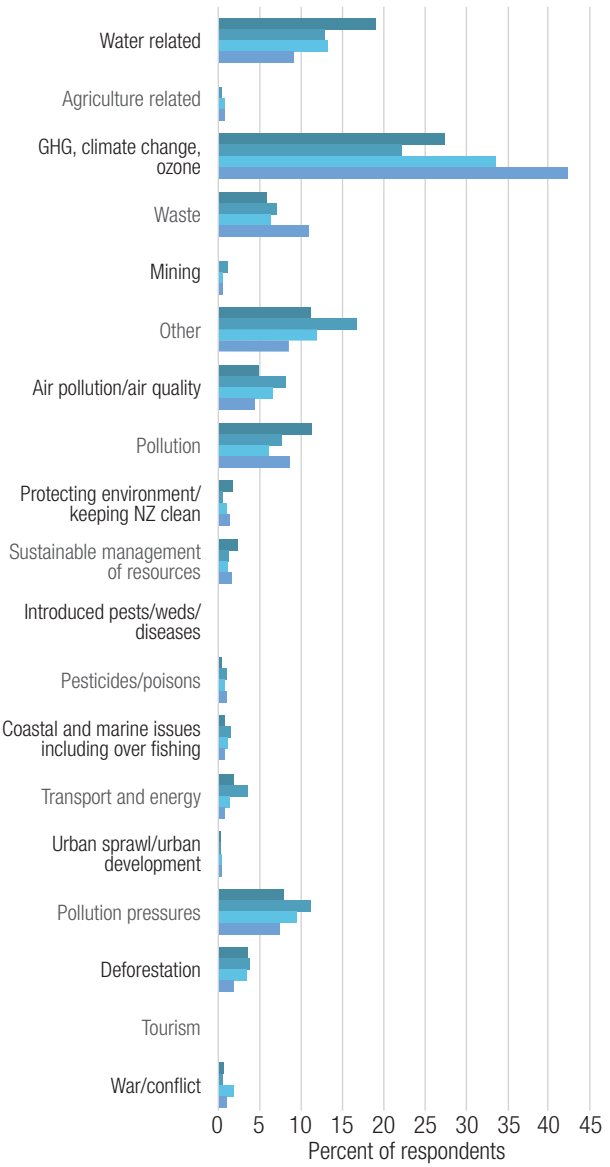


Figure 3.21. Perceived most important issues facing New Zealand: Trends 2010–2019



Figures 3.22. Perceived most important issues facing the World: Trends 2010–2019

Ramaria samuelsii, *Kahurangi National Park.*
ROSS CULLEN

04

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, but note that for 2010 both the postal, and e-surveys are reported.

Where statistical analyses of the trends have been undertaken they are only for the period 2010–2019, i.e., the four 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 (MfE & Stats NZ (2019)) is now the primary reference point for comparison. It provides the most comprehensive and up-to-date, high quality data on state of the New Zealand environment. Where necessary other published biophysical data and assessments of New Zealand's environmental performance are used, including the OECD (2017) country report for New Zealand. We now use the global Environmental Performance Index (EPI) for international comparison as it is the most widely cited source of comparable international data (see Wendling *et al.* 2018; https://epi.envirocenter.yale.edu). The Index uses 24 indicators over 10 issue areas.

We compare EPI New Zealand performance data to ten other countries using six specific indicators (see Table 4.1). These countries and the reasons for choosing them are:

- Sweden – 5th 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 – 6th ranked in the EPI. A high income, densely populated island nation with very close links to New Zealand. It has a significantly improved 2019 EPI rank.
- Iceland – 11th ranked in the EPI. A small, high income island nation.
- Norway – 14th ranked in the EPI. A hilly nation, very similar to New Zealand in total population and mainland land area. Very high income per capita.
- Australia – 21st ranked in the EPI and New Zealand's nearest neighbour. Another large, natural resource abundant, high income, low population density country. A country with major climate change related issues.
- Canada – 25th in the EPI. A large, natural resource abundant, high income, low population density country.
- United States – 27th ranked in the EPI. Natural resource abundant and amongst the largest users of environmental resources.
- Chile – 84th ranked in the EPI, an upper middle-income country with several geographic and economic similarities to New Zealand.
- Fiji – 107th ranked in the EPI. A small, upper middle-income Pacific Island nation, strongly dependent on its natural resources to generate jobs and incomes, and with close links to New Zealand.
- China – 120th ranked in the EPI, the world's largest population and New Zealand's biggest single trading partner.

Table 4.1. Summary ranking and individual resource data from the EPI for New Zealand and ten other countries (Data source: https://epi.envirocenter.yale.edu/epi-topline)

			Rank and score					
Country	EPI rank (/180)	EPI score (/100)	Air	Marine Protected Areas	Species protection index	Fisheries (Fish stock)	Water (waste water/ or sanitation)	Forest (tree cover loss)
Sweden	5th	80.51	24th; 92.84	26th; 98.67	38th; 98.58	109th; 49.60	22nd; 95.62	126th; 5.53
UK	6th	79.89	18th; 94.43	1st; 100	1st; 100	40th; 77.46	1st; 100	122nd; 6.90
Iceland	11th	78.57	9th; 98.55	89th; 75.62	87th; 81.01	121st; 36.11	1st; 100	NA
Norway	14th	77.49	11th; 97.14	78th; 80.70	61st; 91.14	25th; 85.96	1st; 100	71st; 22.08
New Zealand	17th	75.96	7th; 98.99	1st; 100	42nd; 96.93	93rd; 57.85	28th; 96.16	108th; 10.33
Australia	21st	74.12	1st; 100	1st; 100	64th; 89.41	132nd; 16.96	1st; 100	105th; 10.54
Canada	25th	72.18	4th; 99.28	71st; 82.22	105th; 71.31	106th; 51.60	23rd; 94.69	101st; 11.57
US	27th	71.19	10th; 97.52	1st; 100	102nd; 71.81	73rd; 66.91	31st; 81.84	115th; 8.84
Chile	84th	57.49	85th; 69.22	1st; 100	107th; 67.31	97th; 55.85	32nd; 79.41	12th; 98.55
Fiji	107th	53.09	79th; 70.36	66th; 82.67	128th; 48.66	54th; 73.33	110th; 42.29	44th; 29.72
China	120th	50.74	177th; 14.39	46nd; 89.28	100th; 72.21	16th; 90.52	56th; 66.82	72nd; 21.89

We accept there are limitations to the comparative use of this data and that there is no perfect data set nor match with the resource categories we have used—nevertheless the global comparison does provide some science derived benchmarks against which to compare perceptions.

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 and the 2018 survey; Nielsen 2018) and hence it is not possible empirically to determine state of the environment trends for the urban environment. However, there remains 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.

Despite the existence of this protocol there is no evidence of any audit or evaluation having been undertaken to assess its effectiveness.

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 2018 survey report covers eight cities (Auckland, Hamilton, Tauranga, Porirua, Hutt, Wellington, Christchurch and Dunedin) and Greater Wellington Region—in total 62% of the New Zealand population (see www.qualityoflifeproject.govt.nz/survey.htm). It reports survey respondents' views on seven domains, including the Built and Natural Environment and that section includes air, water and noise pollution as well as access to parks and reserves. 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 (noting also that biodiversity is not one of the indicators recorded, nor is there any significant reference to parks and reserves). Despite this concern, 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).

- www.coastalrestorationtrust.org.nz/resources/coastal-reference-database
- www.pmcsa.org.nz/wp-content/uploads/PMCSA-Freshwater-Report.pdf

Perceptions of State, Pressures and Management Trends

It is clear from all nine surveys that most people (74.6%) consider the natural environment in towns and cities to be 'adequate' or 'good' (Figure 4.1a), although only 4% consider it 'very good'. The availability of parks and reserves is 'moderate' or 'high' (74.2%) (Figure 4.1b). The natural environment in towns and cities is considered to be adequately managed (48.7%) (Figure 4.1c). All 'indicators' in this set scored positively, unlike any other environmental component examined. There have been significant changes in the distribution of responses across the four e-surveys for all three questions reported here:

- $p=0.001$ – Condition of the natural environment in towns and cities
- $p=0.003$ – Availability of parks and reserves in towns and cities
- $p<0.001$ – Current management of the natural environment in towns and cities.

Commentary

With 84% of New Zealanders living in an urban environment (http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7981&_ga=2.6153328.296463819.1565585519-913960326.1563424197 – accessed 14 August 2019) 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 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

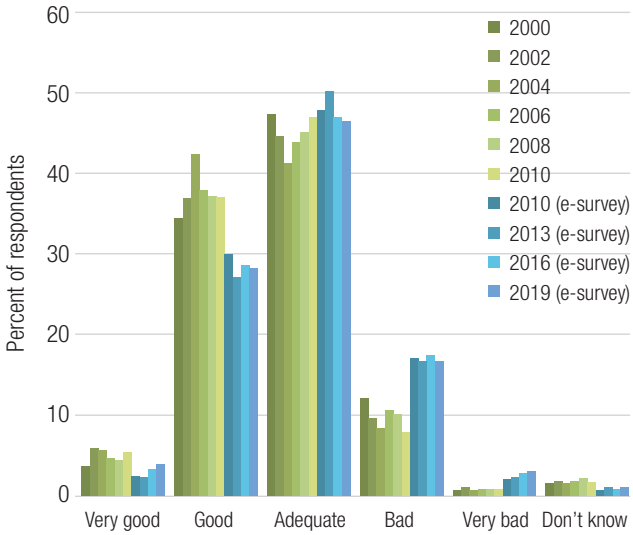


Figure 4.1a. Perceived condition of the natural environment in towns and cities.

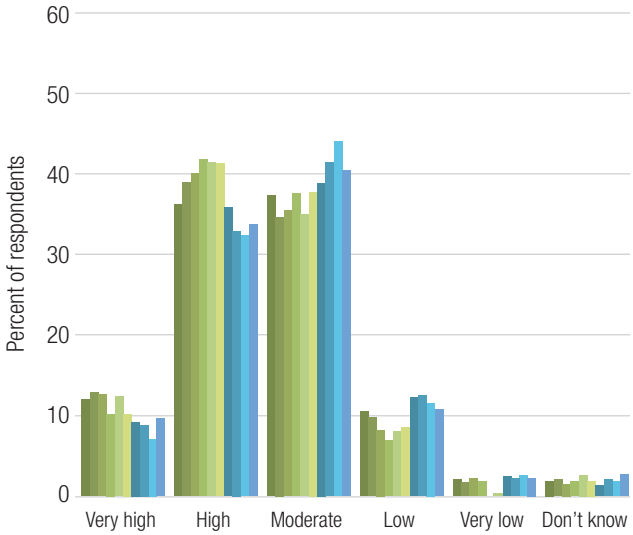


Figure 4.1b. Perceived availability of parks and reserves in towns and cities.

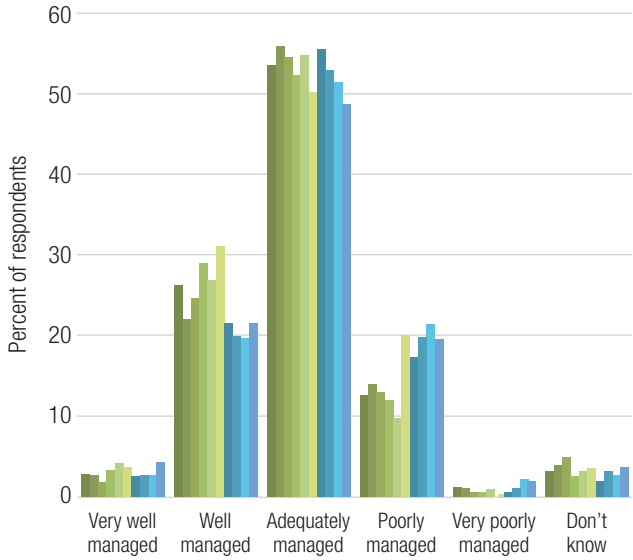


Figure 4.1c. Current management of the natural environment in towns and cities.

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, OECD (2017: 44) note "urban growth sometimes leads to inability to maintain urban water quality… sewerage infrastructure expansion and stormwater management have not kept pace with population growth. This has resulted in frequent overflows of sewerage systems in rainy periods, which can have severe impacts on water quality. More than half of Auckland's freshwater streams and a third of marine waters are in a degraded or poor state." MfE and Stats NZ (2018) have highlighted the many water quality problems (including total nitrogen, *E. coli*, and macroinvertebrate levels) associated with urban streams and rivers. For example, computer models are used to estimate median concentrations of nutrients, *Escherichia coli* (*E. coli*), clarity, and turbidity in New Zealand waterways for 2013–17 (Whitehead, 2018; cited in MfE and Stats NZ 2018: 65). These models show that river water quality in urban areas was much worse than expected for natural conditions for 2013–17 and for urban rivers, modelled median nitrate-nitrogen levels were 19.5 times higher, dissolved reactive phosphorus levels 4.7 times higher, turbidity 3.3 times higher, and *E. coli* 30 times higher than in river reaches dominated by native land cover. The river water quality in urban areas was even poorer than in pastoral areas for the same time period, based on the modelled median concentrations of these pollutants.

4.2 AIR

Scientific Information on State and Trends

MfE and Stats NZ (2019: 64) conclude that "Our air quality is good in most places and at most times of the year, particularly when compared with heavily industrialised countries". Evidence suggests there are general improvements in air quality over the last decade or more (MfE and Stats NZ 2015), with localised exceptions. Some towns with confined airsheds and many inefficient wood burners in homes breach air quality standards during winter months with Arrowtown described as equal to the worst in Australasia (www.odt.co.nz/regions/queenstown/air-quality-bad-anywhere-australasia – accessed 14 August 2019).

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. Data reported are typically up to 2017.

The Health Effects Institute (2018; cited in MfE and Stats NZ 2018) explain that for New Zealand and worldwide, the most significant human health impacts from poor air quality are associated with exposure to PM. This particulate matter, in the air, can cause shortness of breath and coughing or more severe health effects, such as heart or lung disease. Models generated for and used in reporting show that PM10

contributed to 8% fewer premature adult deaths in 2016 than in 2006 as more people live in areas with less pollution (MfE and Stats NZ 2018).

OECD (2017: 23) note that New Zealand monitors PM2.5 particles, which have greatest health impacts, at only a few sites in major cities. (See also http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Air/pm2_5-concentrations.aspx – accessed 14 August 2019.)

New Zealand's air quality as it affects humans rates very highly with a score of 98.99 (Wendling *et al.* 2018) exceeding the rating given 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, including in New Zealand's largest city Auckland. Overall, the state of air quality should be considered as 'good' to 'very good'.

Perceptions of State, Pressures and Management Trends

Most New Zealanders, in all nine surveys, consider air quality to be 'good' or 'very good' (combined 62.6% in 2019) (see Figure 4.2a). Interestingly though, the proportion considering it to be 'very good' has followed a U-shape over the full suite of surveys and increased from 11.1% to 16.7% over the four e-surveys. Analysis of trend from the four e-surveys indicate those considering air quality to be 'very good' or 'good' has gone up, while those considering it to be 'adequate' or 'bad' have decreased.

The main pressures on air are considered to be 'motor vehicles and transport' and 'industrial activities' (Figure 3.13a; Table 3.1).

Most respondents over the nine surveys consider air to be adequately to very well managed (Figure 4.2b) and improving over time (see Figure 3.12) ($p<0.001$).

The 2019 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—this is 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 and 2019 surveys (Figure 4.2a). In addition, over 80% 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

Global concern about the state of nature is increasing rapidly. For example IPBES (2019:4) conclude the following: "An average of around 25% of species in assessed animal and plant groups are threatened …, suggesting that around 1 million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss. Without such action, there will be a further acceleration in the global rate of species extinction, which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years."

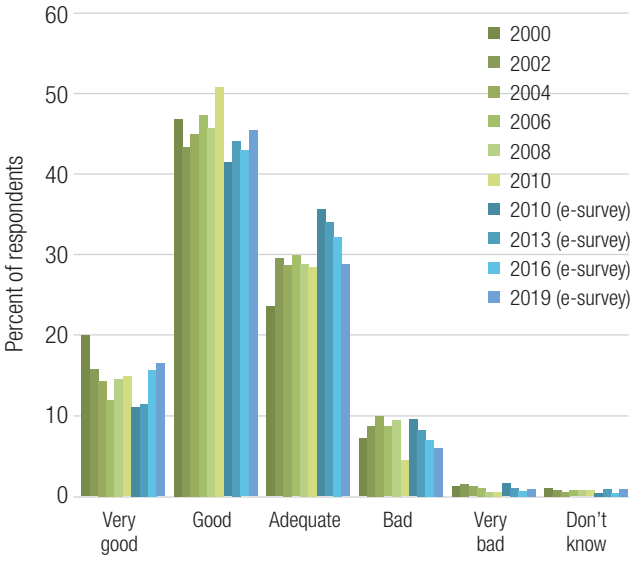


Figure 4.2a. Perceived state of air quality.

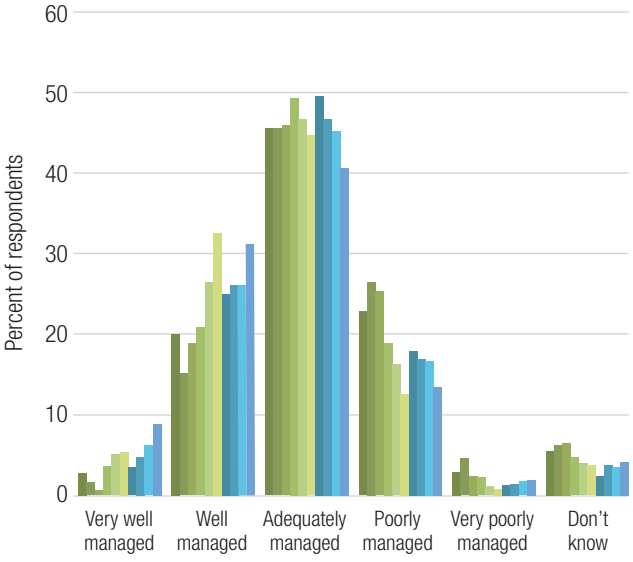


Figure 4.2b. Perceptions about management of air quality.

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 then evaluated, the evaluation of Wendling *et al.* (2018: score 96.93 and rank 42nd of 180 nations ranked on the Species Protection Index) indicates New Zealand is performing reasonably well compared to similar countries (albeit some countries have vastly differing biodiversity contexts). Both findings are expected. First, New Zealand has a record of large numbers of extinctions of bird species in particular, and many species of bird, native freshwater fish, reptiles and frogs, lizards, marine mammals, plants and invertebrates remain under threat—3,747 of 10,667 species with a defined status (noting this is only a small fraction of the total number of species thought to exist in New Zealand), are either at risk or threatened with extinction (see MfE and Stats NZ 2018: 17).

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 TBfreeNZ, DOC, regional councils and private landowners averaging 557,000 ha per year 2006–2016 (Parkes *et al.*, 2017), the large proportion of terrestrial areas protected to varying degrees (over 30% of total land area), and the significant percentage of the New Zealand EEZ protected by an MPA, all of which is reflected in the Wendling *et al.* (2018) evaluation.

Despite the above mixed score cards, conservation of New Zealand's native plants and animals remains one of the country's main environmental issues. Recently the Parliamentary Commissioner for the Environment suggested translations for the Department of Conservation's threat classifications: Threatened = in serious trouble; At risk = in some trouble; and Not threatened = doing okay (Parliamentary Commissioner for the Environment, 2017). Using these translations MfE and Stats NZ (2018: 98) concluded that of 'land' taxa that have been assessed:

- most reptiles and frogs (85% or 103 taxa)
- most bats (83% or five taxa)
- and most birds (82% or 177 taxa)

were classified as threatened or at risk of extinction.

Over one-third of plants, including vascular plants, mosses, hornworts, and liverworts (37% or 1,232 taxa) were threatened or at risk of extinction. In addition many freshwater fish species are under threat as too are most marine mammals.

DOC undertakes 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. MfE and Stats NZ (2019: 21) summarise these changes as showing "… across all native, resident, and living species from land, freshwater, and marine environments showed that the extinction risk worsened for 86 species in the past 15 years. This included 61 plants, 10 land invertebrates, 5 land birds, 2 seabirds, 3 reptiles, 1 marine invertebrate, 3 freshwater invertebrates, and 1 freshwater fish".

The news is not all bad. MfE and Stats NZ (2019: 21) note that "The conservation status of 26 species improved within the past 10 years. This included 2 plants, 1 bat, 1 freshwater fish, 2 shorebirds, 7 seabirds, 12 land birds, and 1 whale. The improvement was conservation-dependent for more than half (57.7%) of the species—meaning that if the management stopped, the species would be expected to decline to a worse conservation status over three of their generations." These gains are made after ongoing considerable investment by DOC including major campaigns such as Tiakina Ngā Manu (formerly referred to as Battle for our Birds—see www.doc.govt.nz/our-work/Tiakina-Nga-Manu – accessed 26 July 2019) and relatively new large scale strategies linked to Predator Free 2050 (www.doc.govt.nz/nature/pests-and-threats/predator-free-2050 – accessed 26 July 2019).

Despite the above successes we consider the findings of the Controller and Auditor General (2012) who completed an audit performance report on the work of the Department of Conservation directed at biodiversity protection, still apply. He 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' (p12).

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).

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 2019 rated the state as 'bad' or 'very bad' (26.2%)—this percentage has increased by 48% since the 2010 e-survey ($p<0.001$). Key pressures have been identified (Figure 3.13b) as increasingly farming (22–42% between 2000 and 2019), and pests and weeds (39% of respondents in 2019). 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%; $p<0.001$), but then declined relatively to 23.8% in 2019.

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. As noted there are 3747 threatened and at risk species in New Zealand, 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 frequent public media items of apparently 'good' news about endangered species management projects (e.g., increases in Kākāpō numbers, high profile

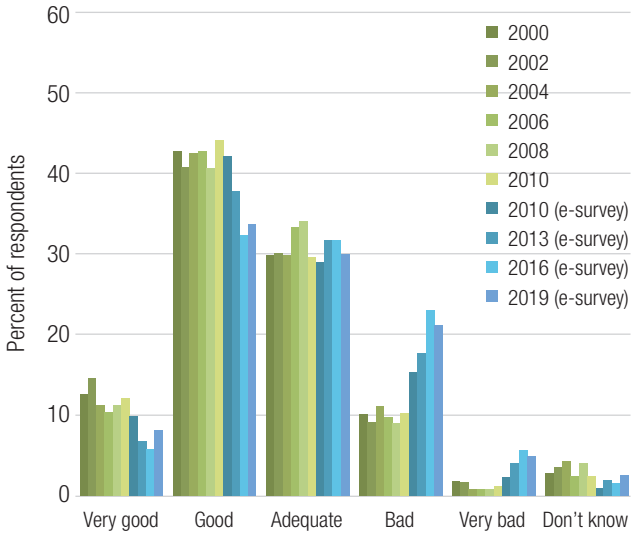


Figure 4.3a. Perceived state of native land and freshwater plants and animals.

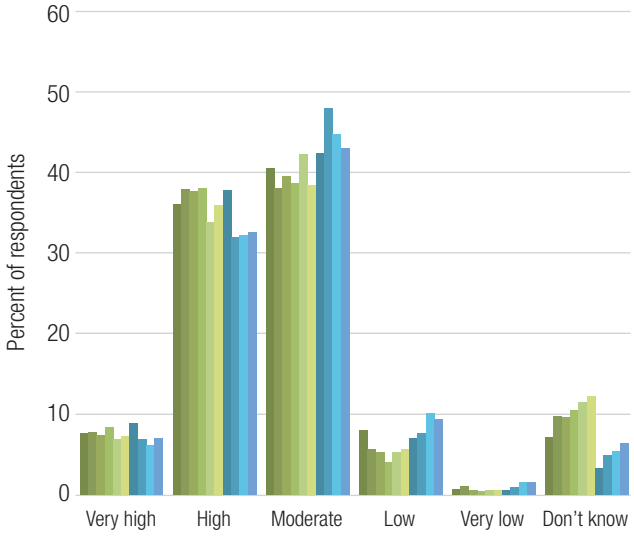


Figure 4.3b. Perceived diversity of native land and freshwater plants and animals.

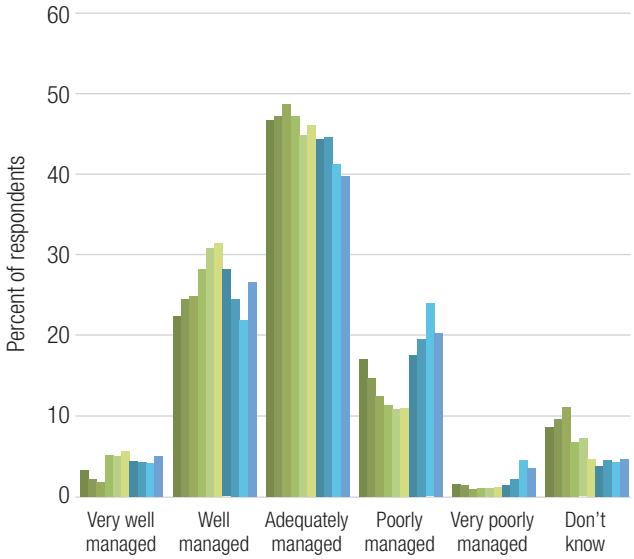


Figure 4.3c. Perceptions about management of native land and freshwater plants and animals.

investments in Predator Free 2050 projects) and improvement in conservation status of 26 species (0.7% of those threatened or endangered) masks the gravity of the biodiversity situation in New Zealand for many, but not all, people.

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—indeed attention now is focused on the need to plant more trees, for biodiversity conservation, carbon offsetting and other reasons.

The area of conservation land increased from approximately 7.4 million hectares in 1990 to 8.5 million hectares in 2016 (i.e., over 30% of New Zealand's total land area) (MfE and Stats NZ 2018: 43). While some ongoing contentious issues remain, 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, notably now introduced fungal pathogens including 'kauri dieback' (*Phytophthora agathidicida*) (see www.kauridieback.co.nz – accessed 26 July 2019) and 'myrtle rust' (*Austropuccinia psidii*) (see www.myrtlerust.org.nz – accessed 26 July 2019). Several woody weed species have invaded indigenous forests thereby reducing their ecological integrity.

New Zealand's original forest cover has been reduced from around 80% of terrestrial area to about 33% (MfE and Stats NZ 2019: 21). The OECD (2017, p.75) report that 60% of natural forest is protected in public conservation land. 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. MfE and Stats NZ (2019: 34) report that between 1996 and 2012 there was a 1.3% loss of tussock grassland (reduced by 31,000 hectares), a 1.3% loss of indigenous shrubland (reduced by 24,000 hectares), and a 0.2 % loss of native forests (reduced by 16,000 hectares)

Despite these losses an expansion of conservation covenants on private land has been reported (See for example QEII National Trust 2018: 19). The area of QEII National Trust (the largest covenanting organisation in New Zealand) registered covenants which include a range of habitats, has increased significantly from over 100,000ha in 1990 to 184,211ha in 2018 (QEII National Trust, 2018: 19).

It is widely understood that browsing pressure from possums, goats, deer, and other introduced species is substantially modifying many forest environments. As noted in 4.3 there are very large predator control programmes now

underway—where these programmes target possum in particular then there are major gains for the state of native bush and forests.

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 Stats NZ 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 mail-based surveys, although the e-surveys show declining trends. Respondents consider condition of native bush and forests to be 'adequate' to 'very good' (62.6% thought the state or condition was 'good' or 'very good' in 2010, which had reduced to 49.2% in 2019), with management being 'adequate' to 'good' (69.8% in 2019). 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' (51–67% of respondents: 51.3% in 2019), 'forestry' (35–48%), and in 2019 'urban development' (30.4%). Analysis of the three e-surveys show increasingly negative responses in all three aspects ($p<0.001$).

Commentary

It is difficult to 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 (with the increasing presence of potentially devastating fungal pathogens now important). 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 (see https://projectcrimson.org.nz – accessed 26 July 2019), 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 Mounga which aims to make Taranaki National Park predator-free (http://taranakimounga.nz).

It is somewhat surprising that respondents identify forestry and urban development as the second and third most important causes of damage to native forests and bush. Little indigenous forestry logging occurs in New Zealand (less than 0.1% of total area per year (OECD 2017: 75)) and urban development into forest areas is absolutely minimal, especially compared to the much larger impacts from farming.

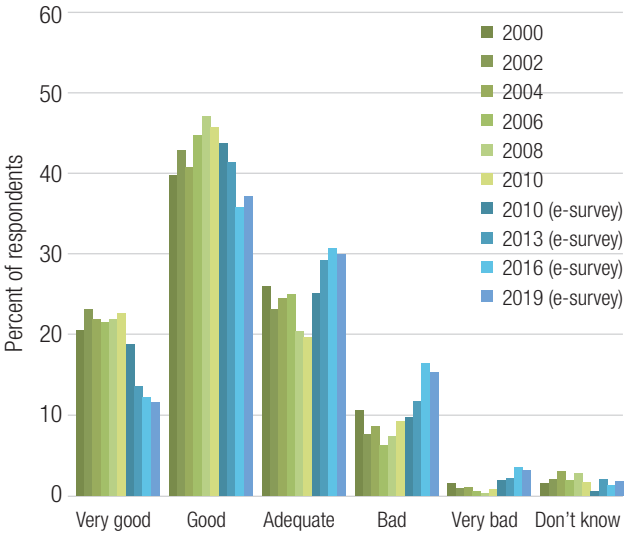


Figure 4.4a. Perceived condition of native bush and forests.

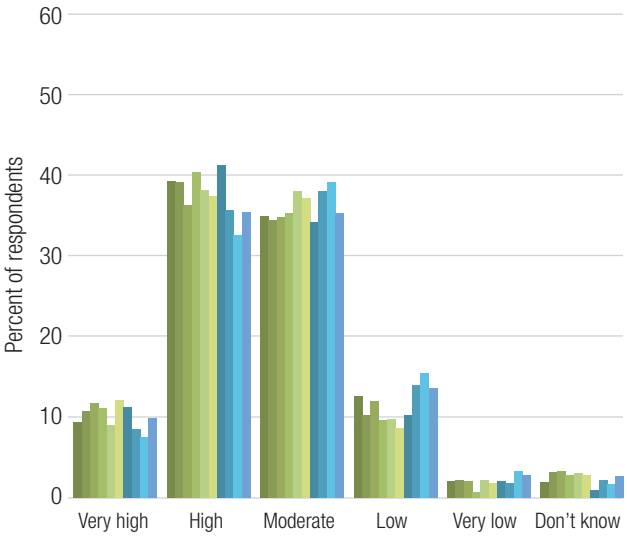


Figure 4.4b. Perceived quantity of native bush and forests.

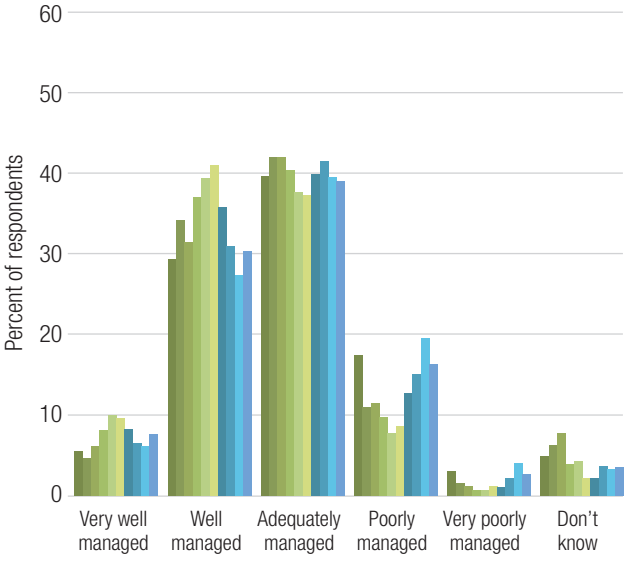


Figure 4.4c. Perceptions about management of native bush and forests.

4.5 SOILS

Scientific Information on State and Trends

17% of New Zealand's GDP depends on the top 150 mm of the country's soil (see www.sluri.org.nz – accessed 26 July 2019)—and good soil management is vital to continuing productive processes that were the basis of over $35.4 billion in exports in 2016 (MPI 2017; cited in MfE and Stats NZ 2018: 73). As such, soils are critical resources for agriculture, horticulture and forestry, and contribute to several ecosystem services including groundwater 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.

Modelling indicates New Zealand loses around 192 million tonnes of soil into waterways and the ocean every year (MfE and Stats NZ 2019: 35). It is estimated this contributes about 1.7% to global sediment loss, despite New Zealand only making up 0.2% of the global land area (Syvitski *et al.* 2005; Walling, 2008 – cited in MfE and Stats NZ 2018: 76). While a considerable portion is likely natural much is also from pastoral, farmed, forested or otherwise developed lands.

Measuring and determining trends in soil health has proven problematic. MfE and Stats NZ (2018) rely heavily on regional council monitoring but note major data deficiencies and that some councils do not monitor at all. Reported data indicate that surveys "between 2014 and 2017 found 83% or more of assessed sites were within target range for five of seven soil quality indicators (soil pH, total carbon, total nitrogen, mineralisable nitrogen, bulk density). However, for the remaining two indicators (macroporosity and Olsen phosphorus), more than 48% of assessed sites were outside target ranges" (See http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Land/soil-quality-land-use.aspx – accessed 26 July 2019). Long term trends could not be reported.

Earlier reported work does provide some insight in the likely state. Soil quality, is assessed against four indicators: organic reserves, fertility, acidity, and physical status. Repeat sampling at about 300 sites in 1995 and 2009 provides these now older insights under a range of land uses (MfE 2010: INFO 471 citing Hill and Sparling 2009). Only 24% of soils at sites used for drystock farming, 30% of soils at sites under dairying and 35% of sites for all productive land uses meet all soil target ranges. Over half of the sites used for dairying have compacted soil, as do a third of dry stock sites. Intensively farmed sites tend to have above target ranges of organic reserves and fertility. Other dry stock sites tend to be below target fertility levels (MfE 2010 INFO 471). The trend from resampling in 2009 indicates soil fertility levels have improved ... 'likely due to decreasing fertility in those soils that had earlier levels above target ranges' (MfE 2010 INFO 471, p5).

Given all the above, soils are likely to be another area where public perceptions differ from research and monitoring findings. MfE and Stats NZ (2019: 41) report that between 1990 and 2008, 29% of new urban areas were on 'versatile' land. This type of land has many potential agricultural uses. The largest areas of versatile land converted from agricultural to urban use were in Canterbury (4,800 hectares) and Auckland (2,600 hectares) (Andrew & Dymond, 2013: cited in MfE & Stats NZ 2019).

Perceptions of State, Pressures and Management Trends

Most respondents consider the state of soils to be 'adequate' to 'good' (67.4 to 76.8% across all surveys). The main pressures on soils (Figure 3.13d) are 'farming' (24–48% from 2000 to 2016; 39.7% in 2019) and 'dumping of solid waste' (48 to 35.5% from 2000 to 2019 respectively). Around 60% of respondents thought management was 'adequate' to 'good' (Figure 4.5b).

Commentary

Information about soils is available from the Stats NZ website (http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Land/soil-quality-land-use.aspx – accessed 26 July 2019). But as with some other areas, people's perceptions about soils are more favourable than their actual state warrants.

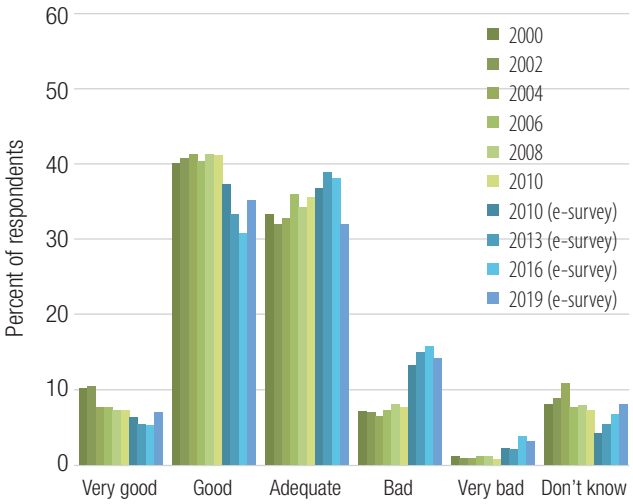


Figure 4.5a. Perceived quality or condition of soils.

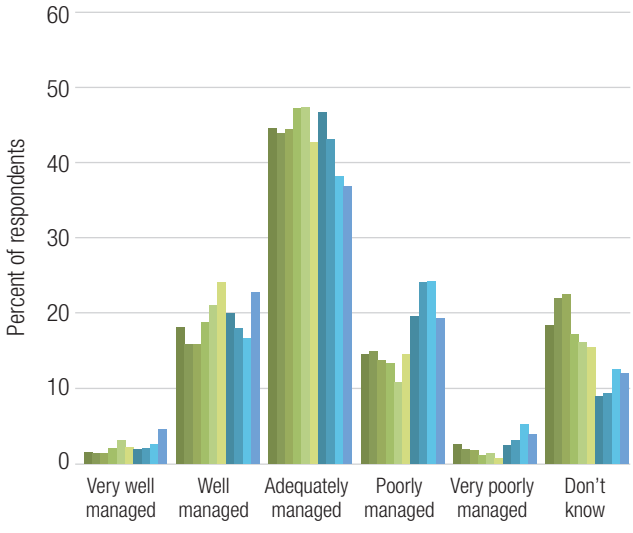


Figure 4.5b. Perceptions about management of soils.

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 country's coast is directly exposed to the sea, with the remainder in sheltered harbours and estuaries (www.teara.govt.nz/en/natural-environment/2 – accessed 26 July 2019). 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 and Stats NZ 2019: 23). MfE (2012a) data shows that of the 458 monitored beaches that were graded in 2012:

- 18% of the coastal beaches were graded as 'very good'. A further 42% of coastal beaches were graded as 'good'
- 25% of coastal beaches were graded as 'fair'
- 13% of coastal beaches were graded as 'poor'
- 3% of coastal beaches used for recreation were graded as 'very poor'.

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

MfE and Stats NZ (2016: 7) state that "The most important coastal pressures, alongside ocean acidification and climate change impacts, are:

- excess sedimentation
- seabed trawling and dredging for fish and shellfish
- marine pests
- excess nutrients carried down waterways."

Recent events—localised water pollution, coastal erosion, exposure of landfill sites and dispersal of rubbish over many kilometres of coastline (www.stuff.co.nz/national/114326700/volunteers-race-to-clear-rubbish-in-fox-river-before-spring-floods – accessed 14 August 2019), plastics and other debris despoiling beaches and causing harm (www.stuff.co.nz/environment/109702522/beach-litter-hurts-more-kiwis-than-sharks-with-595-injured-in-one-year – accessed 14 August 2019), and forestry debris inundating some beaches (www.rnz.co.nz/news/national/359092/forestry-waste-clean-up-after-tolaga-bay-rain-to-cost-10-million – accessed 14 August 2019) impact the overall state of New Zealand's coastal waters and beaches which at most can be considered to be good. Whether there is an overall worsening trend is unknown, but in places there are significant pressures. The Hauraki Gulf is one of these problem sites yet as Moger (2019) notes there is now a race to clean toxic pollution ahead of the 2021 America's Cup, but it is unclear how much progress is being made. This follows release of the 'State of our Gulf 2017' report (Hauraki Forum 2017) which painted a serious picture of the challenges faced by that water body.

Perceptions of State, Pressures and Management Trends

Over all nine surveys respondents have considered the condition of coastal waters and beaches to be 'adequate' to 'very good' (range: 71.6–89.7%, with 2019 reporting the lowest combined score and 22.1% stating condition is 'bad'). Management is considered also to be 'adequate' to 'very good' (range: 64.2–80.8%). However, the proportion of respondents considering management to be poor or very poor has increased over the e-survey period (25.7% in 2010 to 30% in 2019). There is highly significant variation over

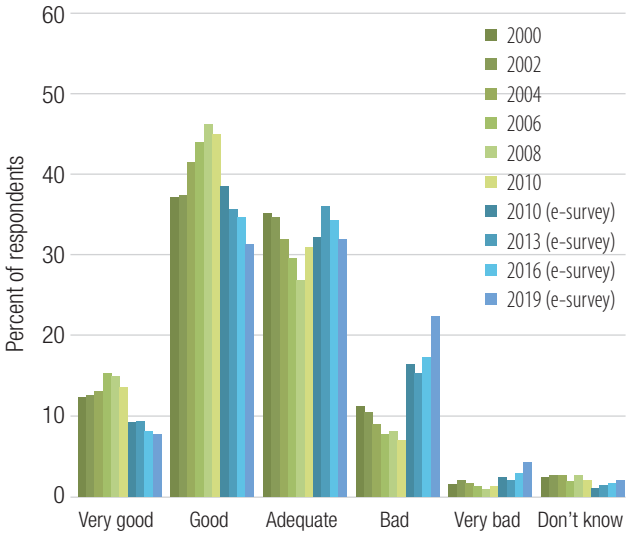


Figure 4.6a. Perceived quality or condition of coastal waters and beaches.

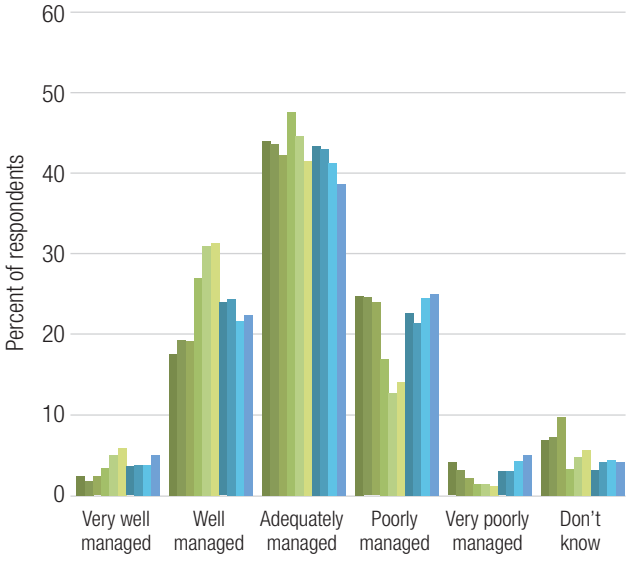


Figure 4.6b. Perceptions about management of coastal waters and beaches.

time in the range of these responses (P<0.001). In terms of pressures (Figure 3.13e), 'sewage and stormwater' continues to be, by far, the largest perceived contributor (58.6–73%), followed in 2019 by 'Dumping of solid waste' (26.9%) and 'Household waste and emissions' (22.8%).

Commentary

Respondent perceptions seem, in the main to match the biophysical monitoring results. MfE (2012) report no trend in swimming beach water quality, and there are few RMA abatement notices or infringement notices issued for coastal zone actions (OECD 2017: 91). But recent massive scale log inundation of some beaches after severe storms and coastal erosion may have reduced positive feelings by the public about coastal water and beaches and their management.

4.7 MARINE FISHERIES

Scientific Information on State and Trends

According to Wendling *et al.* (2018) comparative international analysis of the state of New Zealand's fish stocks is relatively poor (93rd of 180 nations assessed). Thus it is not surprising that in New Zealand and elsewhere scientific and public debate continues about this state. 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 are under pressure because of recreational fishing, illegal fishing activities including poaching, high grading, and misreporting of bycatch, and the environmental effects of fishing are all recognised as being important. Declines in mahinga kai can limit the capacity of tangata whenua to put kaimoana on the table for daily consumption, and for significant events and occasions (Paul-Burke *et al.* 2018).

MfE and Stats NZ (2016: 53) reported that "Information on the status of the main commercial species has markedly improved over the last decade. In 2015, of 344 fish stocks which cover most of the main commercial species, we knew the status of 157 stocks for assessing stocks against the soft limit—the management limit when fish stocks are assessed as depleted and need to be actively rebuilt." MfE and Stats NZ (2019: 85) report that "Between 2009 and 2017, more than 80 percent of New Zealand's assessed fish stocks were considered to be managed sustainably, and almost all of the annual catch was from these stocks". And, "The proportion of stocks that were overfished reduced from 19 percent in 2009 to 16 percent in 2017."

While aspects of New Zealand fisheries management were viewed internationally as world-leading (e.g., Hughey *et al.* 2002b, Worm *et al.* 2009), within New Zealand there is debate about some other aspects of fisheries and sea floor management. Bycatch of various types is declining in New Zealand waters but still poses risks. The estimated fur seal bycatch fell from 1443 in 2005 to 387 in 2014. 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 Stats NZ 2015: 97). The estimated number of seabirds caught each year fell from 7,736 in 2005 to 5075 in 2014 (MfE and Stats NZ 2019: 85). The number of sea lions estimated to have been caught as bycatch decreased from 51 in 2005 to 34 in 2014, perhaps partly due to the use of devices that help sea lions escape from nets (MfE and Stats NZ 2019: 86).

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% and the number of dredge tows reported in New Zealand waters decreased 83% between 1996 and 2014 (MfE and Stats NZ 2016: 51). Total trawled area fell from 80,000 km^2 in 2003 to 40–44,000 km^2 during 2008–2018 (MfE and Stats NZ 2019: 86).

Overall, the state of marine fisheries (including habitat) in New Zealand is therefore mixed. Practices may be improving but cumulative effects, imperfectly monitored, make trend assessment difficult. Global trends such as increasing sea temperature and acidification are also affecting marine fisheries and ecosystems (OECD 2017: 78).

Perceptions of State, Pressures and Management Trends

The relatively high levels of 'Don't know' responses to the question on state of fisheries fell when the e-surveys commenced when compared with preceding postal surveys, but increased from 5.7% in 2010 to 8.4% in 2019. Overall, respondents considered the quality or condition of NZ fisheries to be 'adequate' to 'good' (Figure 4.7a), with the quantity of fish stocks considered to be '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 appears to be higher rates of negative assessments from these participants. Key pressures on marine fisheries (Figure 3.13f) are perceived to be 'commercial fishing' (69–78% of respondents), 'sewage and wastewater' (37–40%) and 'recreational fishing' (17–25.8%). During the period of postal surveys there was a perceived improvement in management over time, with the modal response being 'adequate' (Figure 4.7c). The four e-surveys are giving a different picture: with a perceived shift towards worsening management of marine fisheries.).

Commentary

In the four 2010–2019 e-surveys the proportion of people expressing 'don't know' responses for marine fishery-related questions ranged between 7–13.6%. Those rates of 'don't know' responses might, in part, reflect the level of scientific uncertainty about the status of many marine fish stocks but 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; or more recently WWF-New Zealand 2016). They could also be indicative of relatively low familiarity with the resource for many New Zealanders.

But in 2018 95% of fish caught (by weight) were from stocks that are not overfished (www.mpi.govt.nz/dmsdocument/11950-the-status-of-new-zealands-fisheries-2018 – accessed 14 August 2019). Public perceptions of fisheries and management are moving (mildly) counter to scientific evidence as most fish stocks meet soft targets, and bycatch numbers and trawled area per year decrease.

4.8 MARINE RESERVES

Scientific Information on State and Trends

There are 55 Marine Protected Areas including 44 Marine Reserves located within New Zealand's territorial sea. The reserves cover 17,430 square kilometres, about 10% of our territorial sea and 0.4% of the territorial sea and EEZ combined. This fraction is low when compared to terrestrial reserves which cover around 33% 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.mfe.govt.nz/sites/default/files/publications/marine/getting-priorities-right-jun05/html/images/map-4.pdf – accessed 14 August 2019). A very large Benthic Protected Area is in place covering 32% of New Zealand's seabed (www.fisheries.govt.nz/protection-and-response/sustainable-fisheries/protected-areas/benthic-protection-areas – accessed 14 August 2019). Spear and Cannon (2012: 4) note that New Zealand's BPAs (Benthic Protection Areas) operate with minimal impact on the catch sector, but through a process which is 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). On a global basis Wendling *et al.* (2018; see Table 4.1) ranks New Zealand equal first for marine protected areas.

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.* 2016). While generally there is a lack of research around marine reserve benefits Willis (2016: 1) has found that "Estimates of recovery have now been obtained from several reserves, showing that snapper (*Pagrus auratus*), blue cod (*Parapercis colias*), and rock lobster (*Jasus edwardsii*) all respond positively to protection". 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.

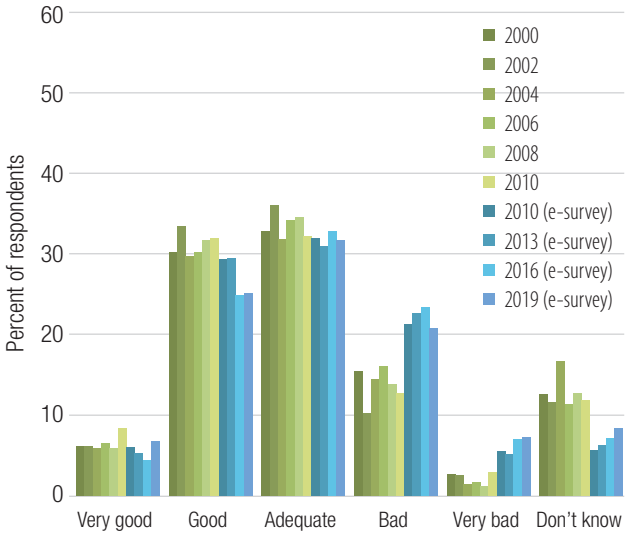


Figure 4.7a. Perceived quality or condition of marine fisheries.

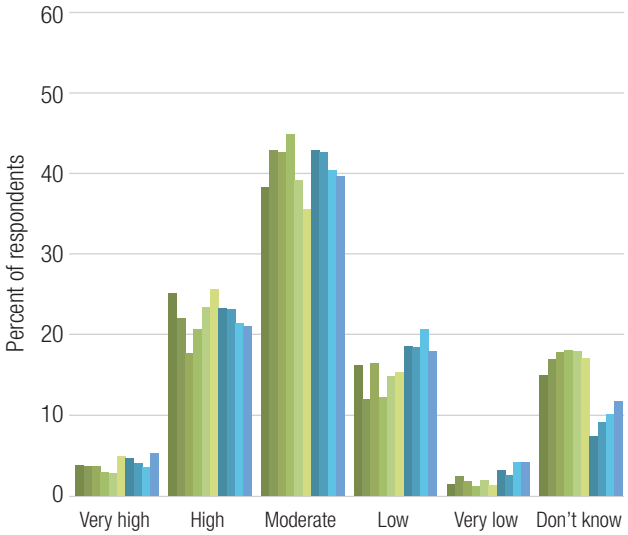


Figure 4.7b. Perceived quantity of marine fisheries.

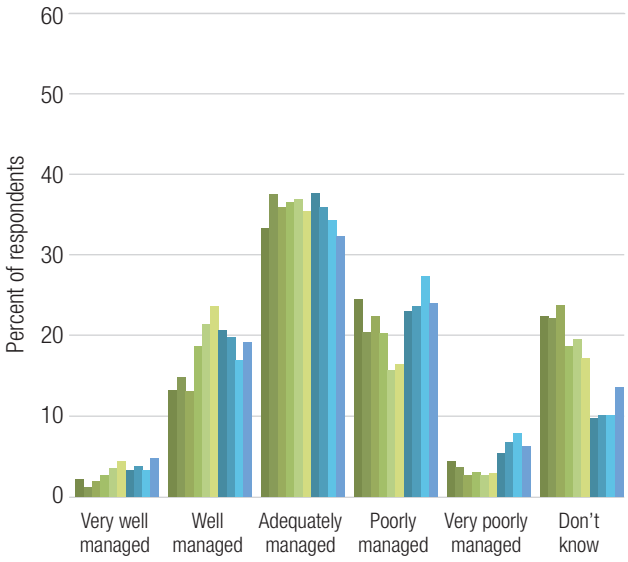


Figure 4.7c. Perceptions about management of marine fisheries.

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 (7–13%) but increased in 2019. Most respondents think there is a 'moderate' to 'high' quantity of marine reserves in New Zealand (Figure 4.8a). The most frequently identified pressures (Figure 3.13g) are 'commercial fishing' (36–51% of respondents), 'sewage and stormwater' (28–40%) and 'recreational fishing' (23–30%). Marine reserves are considered to be 'adequately' to 'well' managed although the e-survey results remain more negative than the earlier postal surveys (Figure 4.8b).

Commentary

Given the tiny fraction of New Zealand's marine area in reserves, it may appear surprising that only 27.4% of all respondents in 2019 consider there to be a 'low' or 'very low' quantity of marine reserves in New Zealand. However, most of New Zealand's marine reserves are near major cities or tourism destinations, which may have led to the impression that marine reserves are more common than they really are. Respondents may also be unaware of the magnitude of New Zealand's EEZ (the fourth largest in the world), and perceptions of the marine area and its diverse ecosystems may be focused on the coastal zone. There are other differences between marine and terrestrial reserves. Harvest of native terrestrial species is generally forbidden on the latter—wherever they occur. However, 33.8% of 2002 survey respondents participate in marine recreational fishing, a figure consistent with estimates in Hughey *et al.* (2002a) and may lose recreational fishing opportunities with an increase in marine reserves—an outcome that does not apply to terrestrial reserves.

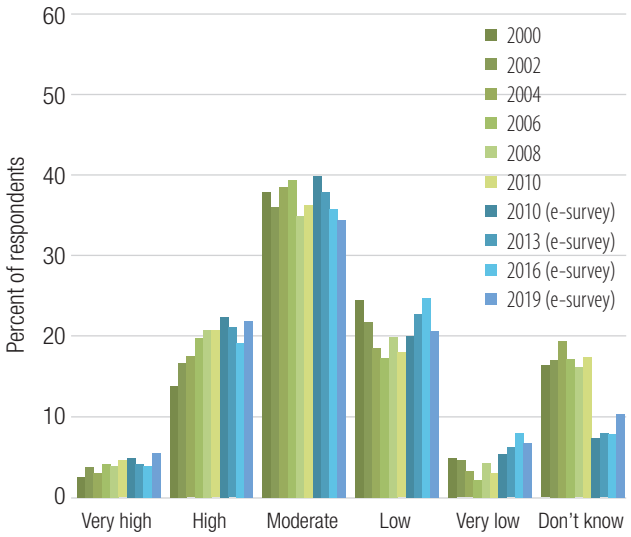


Figure 4.8a. Perceived area of marine reserves

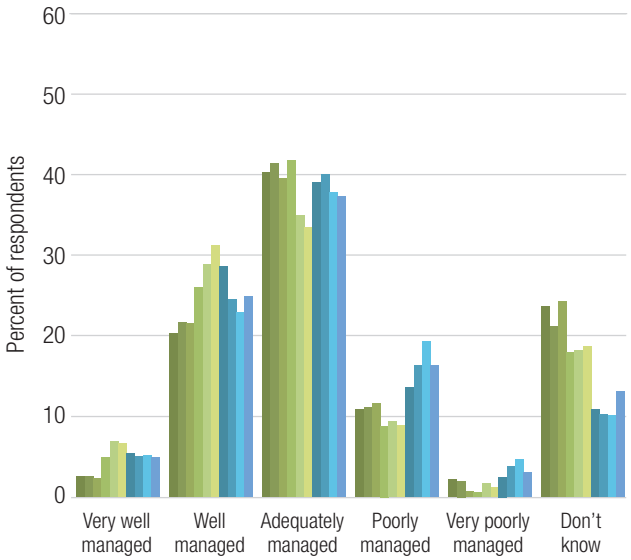


Figure 4.8b. Perceptions about management of marine reserves.

4.9 RIVERS, LAKES AND GROUNDWATER

Scientific Information on State and Trends

MfE and Stats NZ (2015: 54) judged 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." There is insufficient data to judge the quality of water in lakes across New Zealand (MfE and Stats NZ 2019: 20). Given the limitations of current data inadequacies we have drawn from earlier work both in terms of quality and quantity, but amplified it where possible with contemporary material.

MfE and Stats NZ (2019: 53) cite new methods from multiple authors (e.g., Larned *et al.* 2018) that have enabled

Ruakawa Gecko, Te Hoiere/Maud Island.

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trends in river water quality to be detected according to levels of certainty. Somewhat surprisingly however, they report a mixed set of non-spatially uniform trends in nitrate-nitrogen, dissolved reactive phosphorus, *E. coli* and turbidity. Notably there seems to be similar trends in terms of catchments deemed to be pastoral and native, with an overall improving trend for most of these indicators. Despite this MfE and Stats NZ (2019: 49) report that rivers in the pastoral land-use class are far more polluted than those considered native. The data are insufficient to define relationships for lakes or estuaries or trends for each.

When considering groundwater the report card is different. MfE and Stats NZ (2019: 54) reported around two thirds of monitored sites had worsening trends for nitrate-nitrogen, ammoniacal nitrogen and *E. coli* for the 2005–14 period. They report that nationally it is difficult to assess trends against farming due to a lack of recording land use with monitoring sites, but for Canterbury there was a link between land cover and nitrate-nitrogen.

Data for water quantity is surprisingly sparse, at least in terms of the MfE and Stats NZ (2019) report. MfE (2007: 304) report 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 have found nothing that would contradict this 'older' finding.

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

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

Perceptions of State, Pressures and Management Trends

In 2000 and 2002, respondents were asked about condition, quantity and management of freshwater. In 2004 and subsequent surveys, the freshwater category was replaced by two separate categories, 'rivers and lakes' (Figures 4.9a–c) and 'groundwater' (Figures 4.9d–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 2004–2019 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, but seemingly increasing over time), possibly because groundwater is not 'seen'.

Perceptions of the quality of rivers and lakes have changed over time, particularly over the course of the 2010–2019 e-surveys (Figure 4.9a). Earlier surveys showed people thought the condition was 'adequate' to 'good'; in 2019 42.1% of respondents thought it was 'bad' to '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 2000–2019, are considered to be 'sewage and stormwater' (40–47%; and 44% in 2019) 'farming' (25–59%, from 2000 to 2016, and then 43% in 2019), and 'industrial activities' (27–36%). While farming, in particular, increased hugely in perceived importance up to 2016, surprisingly there was a 16 percentage point decline in 2019. In terms of freshwater management 39% of respondents in 2019 thought management of rivers and lakes was 'poor' or 'very poor' (Figure 4.9c); for groundwater the figure was 28.8% 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 and 2019).

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) (note – more recent data are not available). More recently, the Government's 'collaborative' Land and Water Forum has made many recommendations in its reports and the government introduced a National Policy Statement for Freshwater Management, a policy amended and subject to further consultation in 2019. 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 relatively recent community-wide water quality contamination at Havelock North in 2016 that affected the health of over 5200 residents (www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11702384 – accessed 14 August 2019). Recently the government has announced policy and institutional changes for drinking water (see for example Clark and Mahuta, 2019, Dedicated watchdog for water quality: Beehive. Govt.nz press release: www.beehive.govt.nz/release/dedicated-watchdog-water-quality – accessed 14 August 2019), and is embarking on national level consultation around freshwater management and water quality rules generally later in 2019.

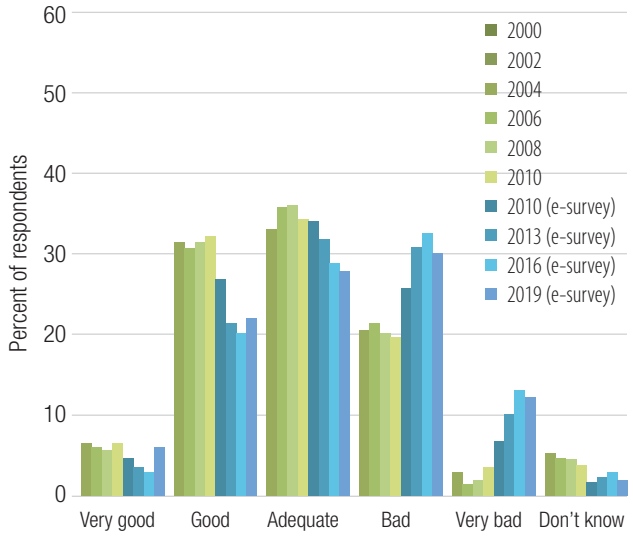

Figure 4.9a. Perceived quality or condition of rivers and lakes.

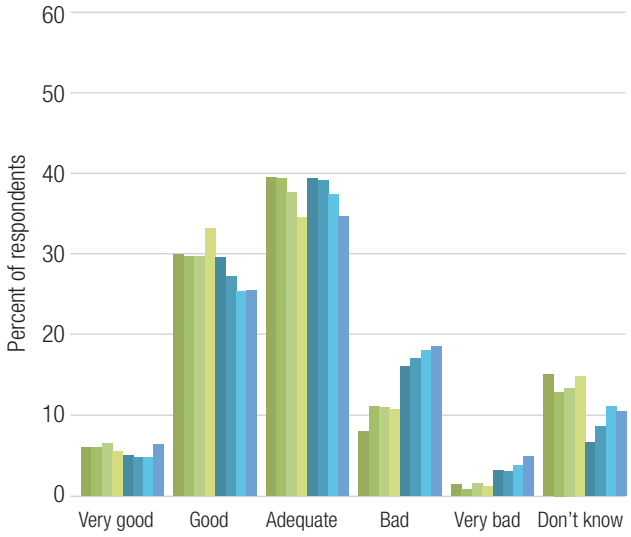

Figure 4.9d. Perceived quality of groundwater.

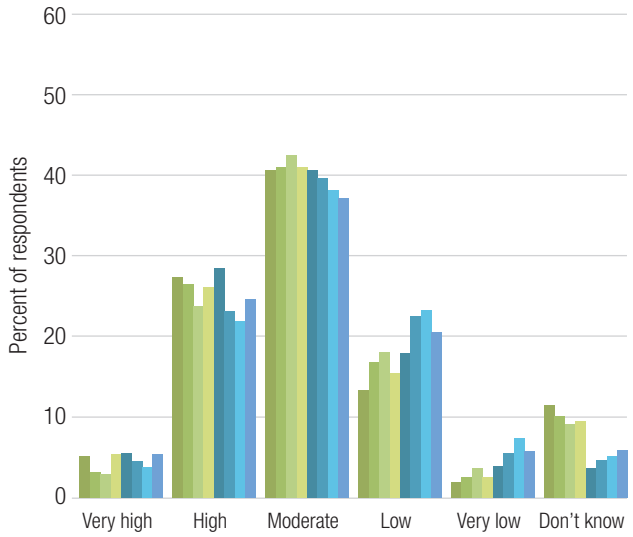

Figure 4.9b. Perceived amount of freshwater in rivers and lakes.

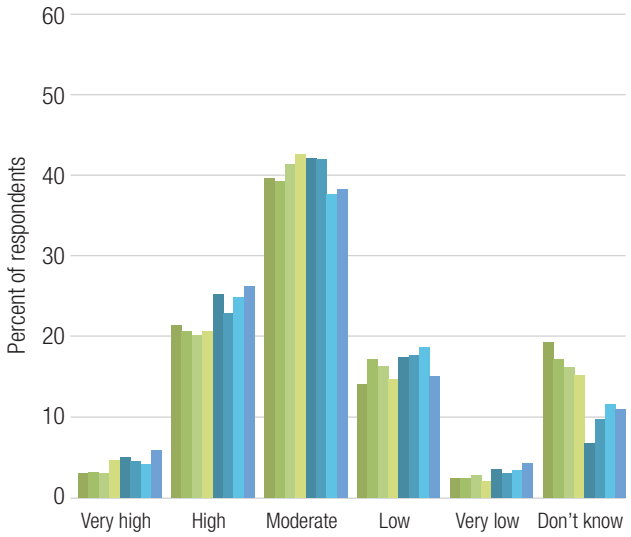

Figure 4.9e. Perceived availability of groundwater for human use.

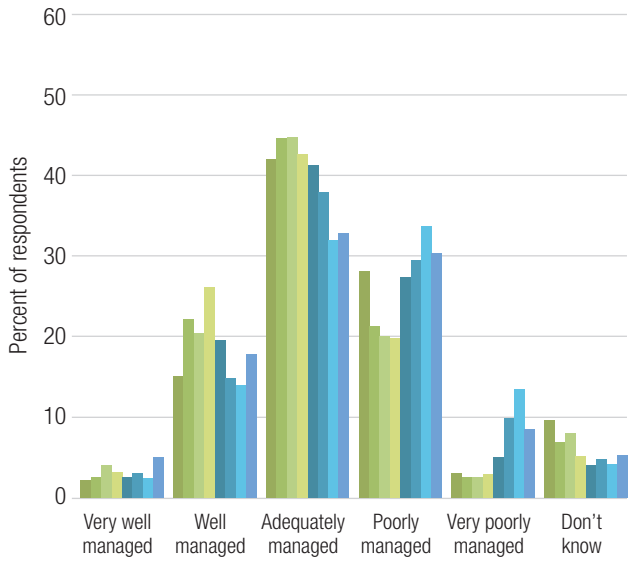

Figure 4.9c. Perceptions about management of rivers and lakes.

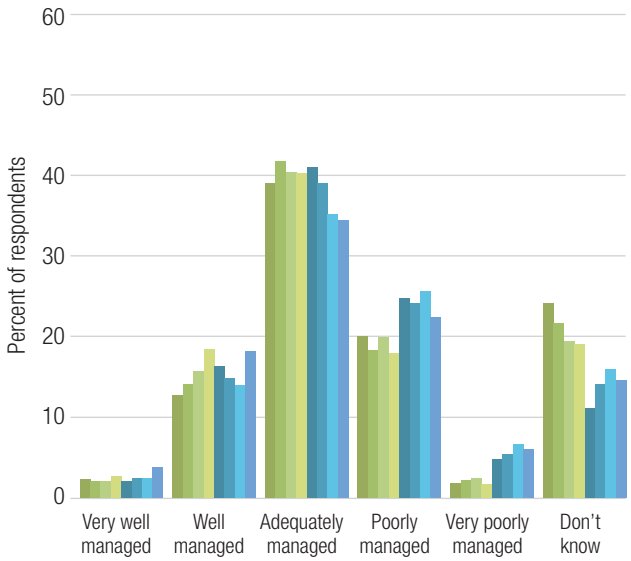

Figure 4.9f. Perceptions about management of groundwater.

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 the 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 some national parks is mixed because of the relatively high level of impacts of weeds and pests (see Section 4.4), e.g., Abel Tasman NP has a significant wilding tree problem. The overall state of national parks can therefore be considered as good.

Perceptions of State, Pressures and Management Trends

Respondents reported the area of national parks in New Zealand to be moderate to high (Figure 4.10a). Key pressures (Figure 3.13i) on national parks are 'pests and weeds' (42–59% of respondents, with 42% being the lowest recorded for this category in 2019) and 'tourism' (32–51% of respondents; but the highest pressure recorded in 2019 at 45%). Respondents report that national parks are 'adequately' to 'well' managed (Figure 4.10b; 76.1% in 2019).

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 (www.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 the area of national parks and their management very positively.

4.11 WETLANDS

Scientific Information on State and Trends

Wetlands occupy about 250,000 hectares, 1% of New Zealand land area. Only an estimated 10% of the pre-human extent of wetlands remain (MfE and Stats NZ 2019). Robertson *et al.* (2019) found that between 1990 and 2012, 7395 ha of wetlands in Southland were lost (no longer present) or considered at risk—a decline of 23% of wetlands in the region since 1990. A second analysis of Southland wetlands by Ewans (2016), calculated that for the period 2007–2014, wetland loss of 1235 ha occurred on private land at a rate of 1.3% loss of area per year.

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), and a review of the reservation status of wetlands (Robertson 2016), 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

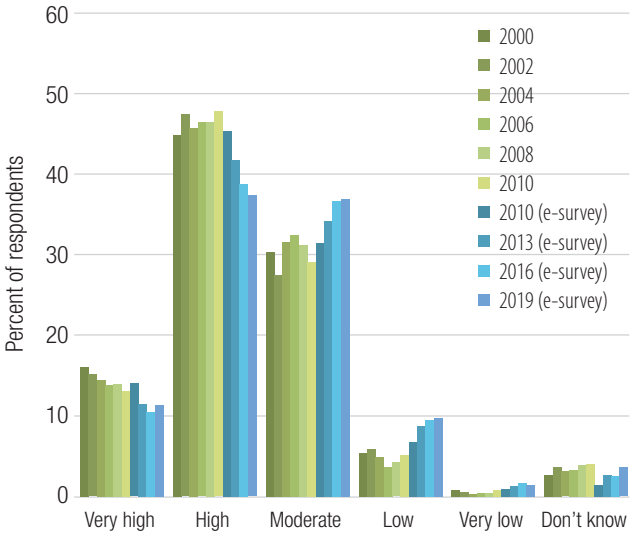

Figure 4.10a. Perceived area of national parks.

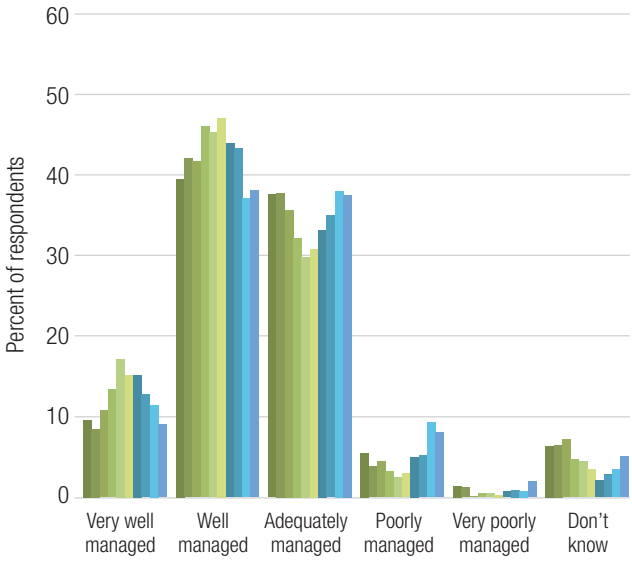

Figure 4.10b. Perceptions about management of national parks.

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.'

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 Ford *et al.* (2017) report a mixed state of one of New Zealand's biggest and most important wetlands, Te Waihora/Lake Ellesmere, for which some values are in a healthy state but many values have greatly reduced over time and continue to be threatened by habitat destruction including drainage, burning and over grazing, inappropriate water level management, and by pests and weeds.

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

Perceptions of State, Pressures and Management Trends

Respondents generally consider the state or condition of wetlands to be 'adequate' to 'good', with a generally worsening trend over the nine surveys (Figure 4.11a; $p<0.001$). However, as with area of wetlands (Figure 4.11b) there has been a general increase in the those reporting 'bad' to 'very bad' and 'low' to 'very low' respectively 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 14% expressing a 'don't know' view in 2019 (Figure 4.11b). The perceived main causes of damage to wetlands (Figure 3.13j) are 'farming' (29–42% of respondents) and 'pests and weeds' (31–44% of respondents; with 2019 being the lowest recorded). Wetlands are considered to be 'adequately' to 'well' managed, but with an increasing proportion of respondents expressing negative views about wetland management and an increasing proportion of 'don't know' responses (Figure 4.11c) ($p<0.001$).

Commentary

There is a lack of knowledge about trends in the pressures, state and responses to wetland issues at national level in

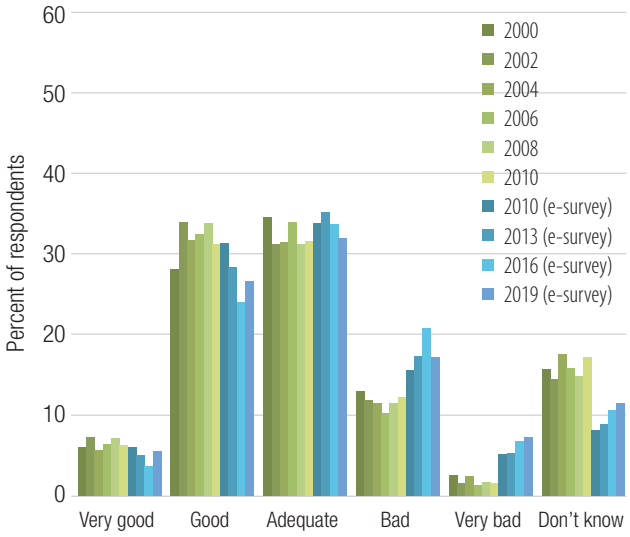

Figure 4.11a. Perceived condition of wetlands.

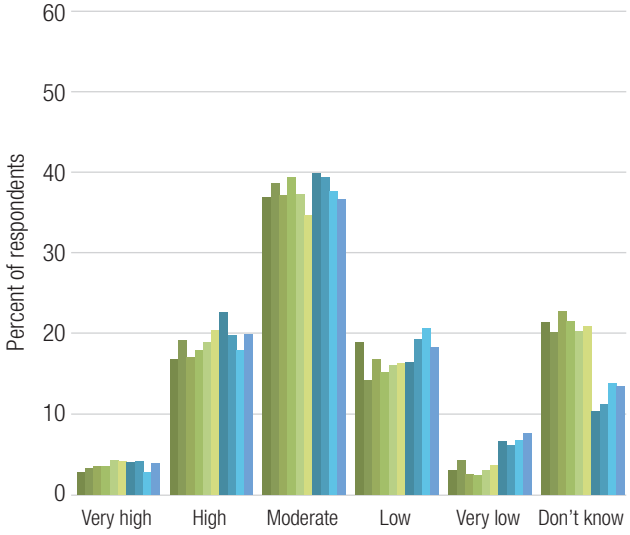

Figure 4.11b. Perceived area of wetlands.

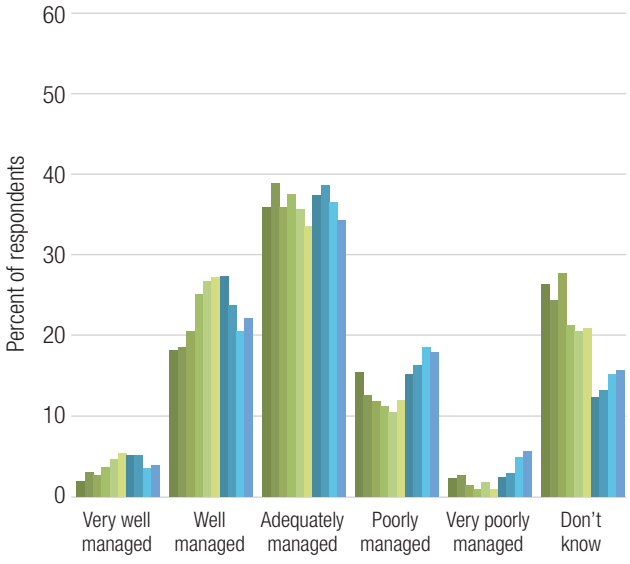

Figure 4.11c. Perceptions about management of wetlands.

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 12–16% for the three questions). Having said this, it is very surprising that around 60% of respondents consider the condition or quality of wetlands to be 'adequate' to 'very good', and the area to be 'moderate' to 'very high'.

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

Scientific Information on State and Trends

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

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

More recently, an alternative ranking, the Environmental Performance Index (EPI), was released on a trial basis in 2006, subsequently confirmed in 2008 and repeated biennially (Esty *et al.* 2008, Emerson *et al.* 2010, Emerson *et al.* 2012, Hsu *et al.* 2014, Hsu *et al.* 2016, Wendling *et al.* 2018). The EPI has been built around two objectives: 1) reducing environmental stresses on human health; and, 2) protecting ecosystem vitality. The six 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, in 2016 it ranked 11th out of 180 countries, and in 2018 it ranked 17th of 180 countries. In the 2018 EPI evaluation New Zealand was assessed to be performing very strongly in marine protected areas and air for example. Table 4.1 provides a summary comparison of New Zealand's 2018 performance for six of the 24 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 2019 (63.3%) 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 over time, including in the 2010–2019 e-surveys ($p<0.001$). In terms of management, respondents consider New Zealand to be performing 'well' to 'adequately' (Figure 4.12b), but again there is a trend of fewer 'well' to 'very well' managed responses, and more 'adequately' or 'poorly' managed.

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, noting that there are 51 high-income countries. (https://en.wikipedia.org/wiki/List_of_countries_by_GNI_(nominal)_per_capita#High-income_group – accessed 14 August 2019). However, the Bradshaw *et al.* (2010) study does reveal that the actions of (now) 4.9 million people have a significant impact on some parts of the New Zealand environment.

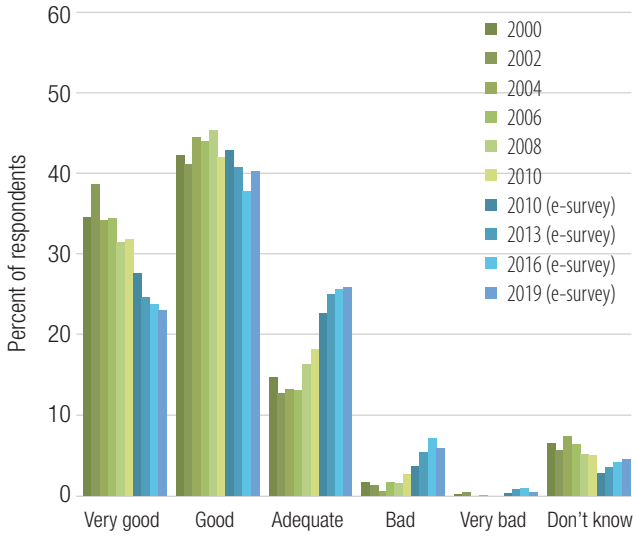

Figure 4.12a. Perceived condition of New Zealand's natural environment compared to other developed countries.

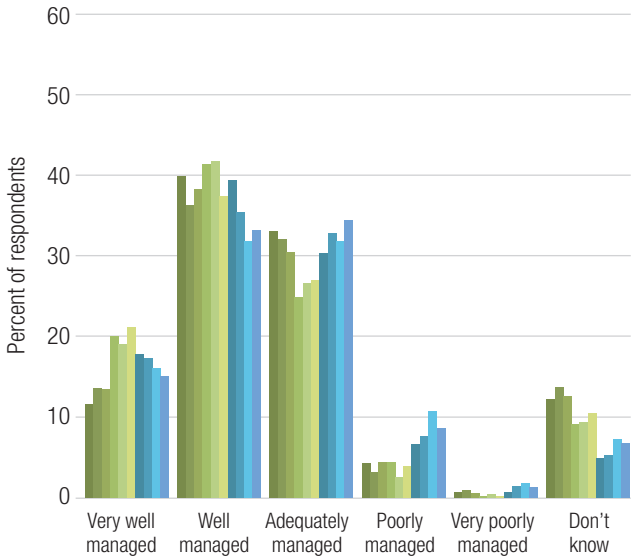

Figure 4.12b. Perceptions about current management of New Zealand's natural environment compared to other developed countries.

Piwakawaka/Fantail.

ROSS CULLEN

Hoar frost, Mackenzie Basin.

ROSS CULLEN

Restoration planting, Otamahua/Quail Island, Whakaraupō/Lyttelton Harbour.
ROSS CULLEN

05

STATE OF THE ENVIRONMENT

The overall findings and, where appropriate, trends (remembering comments made in Section 2 about the analytic implications of the e-surveys undertaken from 2010, versus 2010 and earlier paper-based surveys, and the commentary regarding the 'young' dynamic apparent in this survey (see Appendix 4)) evident from the detailed results reported in sections three and four are presented in this section.

5.1 OVERALL STATE OF THE ENVIRONMENT

Respondents continue to believe the standard of living in New Zealand is good. Their assessment is that New Zealand is 'clean and green' and they also indicate the state of the New Zealand natural environment is 'good' to 'adequate'. However, it is notable that over 40% of respondents consider the state of rivers and lakes to be 'bad' or 'very bad'. Respondents believe that they have 'adequate' to 'good' knowledge of the environment—this trend has been improving over time. While the extent and quality of their knowledge is unknown to us, respondents' concern about the environment is evident. For example, there are six separate environment-related activities that 19% or more of respondents engaged in 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 (19%).
- Participated in an environmental organisation (24%).
- Made a financial donation to a non-government environmental organisation (e.g., Forest and Bird) (31%).
- Been involved in a project to improve the natural environment (32%).
- Obtained information about the environment from any source (60%).
- Bought products that are marketed as environmentally friendly (78%).

All of these are increases over 2016. As with earlier surveys, Māori had higher rates of participation than did other ethnic groups in many of these activities. Unsurprisingly, a similar pattern emerged for those with a University equivalent qualification.

5.2 PRESSURES ON THE ENVIRONMENT

The New Zealand economy has grown over the period of the nine surveys, with cumulative real GDP growth of 68.6% since 2000. During the same period the New Zealand population has grown by 28.0%. Growth in the economy and population growth can both increase environmental pressures.

Each survey asked respondents about specific pressures on selected aspects of 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 2019 (and in the 2010–2016 surveys) considered fresh water related issues to be the most important environmental issues facing New Zealand (Figure 3.20).
- Some 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 and wetlands, and, for the first time in several surveys, as the secondary pressure on fresh waters (Table 3.1, Figure 3.13h). For the first time, the pressure exerted by farming on fresh waters is perceived to have reduced—this is surprising and challenging to explain. Possible explanations include reduced harm because of improved farming practices, and an outcome of extensive media campaigns by farming organisations.
- Tourism surpassed pests and weeds as the single most important pressure on national parks (Figure 3.13i).
- Commercial fishing was judged to be the main source of pressures on marine fisheries and marine reserves (Table 3.1).
- Mining, which had been prominent (over 20% of respondents) in 2010 as a key pressure on national parks, declined to 13% in 2019 (Figure 3.13i) possibly because the high recognition of pressure from mining was due to the controversial proposal in 2010 for mining in national parks (e.g., Hembry 2010), something now not on the policy agenda.

More generally, two open ended questions have explored for New Zealand and the world, what respondents considered the most important environmental issues to be. Over the course of the e-surveys the responses have given a relatively consistent pattern, with water being the biggest issue (27–32% of respondents) for New Zealand, and climate change (22–42% of respondents) being biggest for the world. Interestingly, for 2019 the proportion of respondents choosing climate change related responses has grown for both New Zealand (5% in 2013 to 20% in 2019) and the world (22% in 2013 to 42% in 2019). Neither is surprising given recent media, political and public interest in climate change.

5.3 STATE OF THE ENVIRONMENT

Respondents continue to rate the state of the New Zealand environment highly compared to the environment in other developed countries (Figure 3.5). The nine surveys conducted from 2000–2019 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 2004–2019 surveys, which disaggregated freshwater into two separate categories, rated rivers and lakes much worse than marine fisheries (Figure 3.5).
- Two relatively distinct resource 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, quantity of marine fish, and oil and gas reserves are perceived to be 'moderate' to 'low' (Figure 3.7).
- Interestingly, the downward to static trends in perceptions of all resources from 2010–2016 changed in 2019, with all (Figures 3.8a–d) exhibiting increased perceived availability. As noted earlier the increase in the proportion of young respondents to this survey and their relatively more positive perception toward the state and management of the environment could help explain this occurrence (see Appendix 4).

5.4 MANAGEMENT OF THE ENVIRONMENT

New Zealanders generally judge that the environment is adequately managed. However, this statement masks an interesting and difficult to explain pattern:

- During the paper-based surveys there was a trend in improved perceptions of management.
- The first three e-surveys (2010–2016) reversed the direction of trend, from positive to negative.
- The 2019 e-survey has reversed this latter trend and introduced a 'hockey stick' effect, i.e., respondents now regard resources as 'adequate' to 'well' managed.

As noted in Appendix 4 the changing age-related demographic recorded in this survey helps explain this occurrence, i.e., a much higher proportion of younger respondents with on average better perception of management.

Despite the above there remains a wide range of views about management of specific parts of the environment.

- For rivers and lakes (39%), marine fisheries (30%), coastal waters and beaches (30%), and for ground water (29%) many respondents thought that management was 'poor' or 'very poor'.
- Consistent with 2010 to 2016, management ('well' and 'very well' managed combined) of New Zealand's natural environment compared to other developed countries (49%) and management of national parks (47%), were both rated more highly than other parts of the environment (Figure 3.11).
- Across the surveys, rivers and lakes have consistently been rated amongst the worst managed environmental sectors (Figure 3.12), joined more recently by coastal waters and beaches.

Cauliflower harvesting, Waimea Plains, Tasman

ROSS CULLEN

Volunteer inspects rodent tracking card, Brook Waimarama Sanctuary, Nelson.
ROSS CULLEN

06 SPECIAL TOPICS

The special topics in 2019 concerned aspects of conservation, with an emphasis on pest management, use of 1080, and extinction risk and priorities for endangered species management. Descriptive results are provided, plus some comparative analysis with relevant 2016 findings.

6.1 PEST MANAGEMENT – 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 (Figure 6.1a), with one third of respondents reporting rats at their residence. Prevalence of all four species has increased slightly since 2016.

Similarly, there was an increase in control effort at respondents' residences (Figure 6.1b). Nearly everyone who thought rats, stoats or ferrets were at their residence undertook control for those species. However, that was not the case for possums. While 17% reported the presence of possums at their residence, only 9% controlled possums there.

Unpaid Big Four control effort increased notably since 2016 (Figure 6.1c). Percentage increases in numbers of respondents involved in unpaid control work were; rats 23%, possums 20%, stoats 56%, and ferrets 76%. The large percentage increases for stoats and ferrets are from very small bases, so total involvement remains very low.

Figure 6.2 illustrates the main reasons citizens controlled each of the Big Four Predator species at their residence. For rats, the strongest motivation (23%) was nuisance, although environmental (15%) and human disease (14%) motivations were also prominent and increased since 2016. Possums were controlled less frequently, with both environmental and nuisance motivations about equally prominent, albeit with a small increase in environmental motivation since 2016. There has been a marked percentage increase in all motivations for controlling stoats and ferrets, although there is very low participation in these activities. The most prominent motivators of control for stoats and ferrets were environmental and nuisance.

The methods citizens used to control the Big Four Predator species varied (Figure 6.3). 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 similar numbers of households controlling rats using ground-based poison and trapping. There has been a notable increase since 2016 in the number of households involved in trapping the Big Four Predator species, except for possums. The increase in rat trapping participation is particularly notable, and appears to have come about at least partly because of a decrease in poisoning.

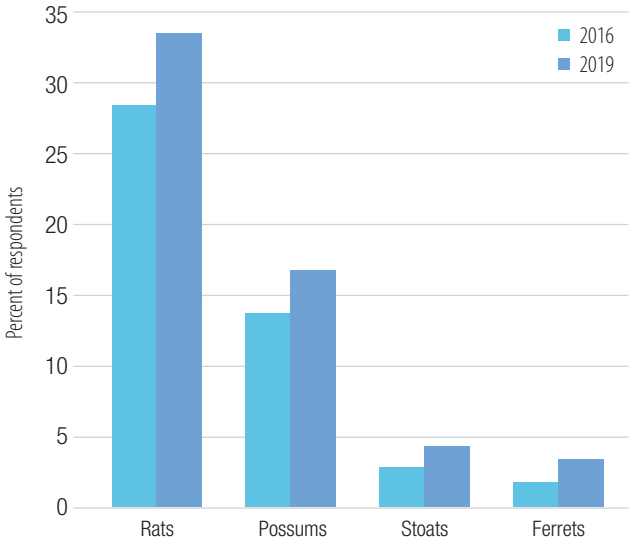

Figure 6.1a. Big four prevalence at your residence.

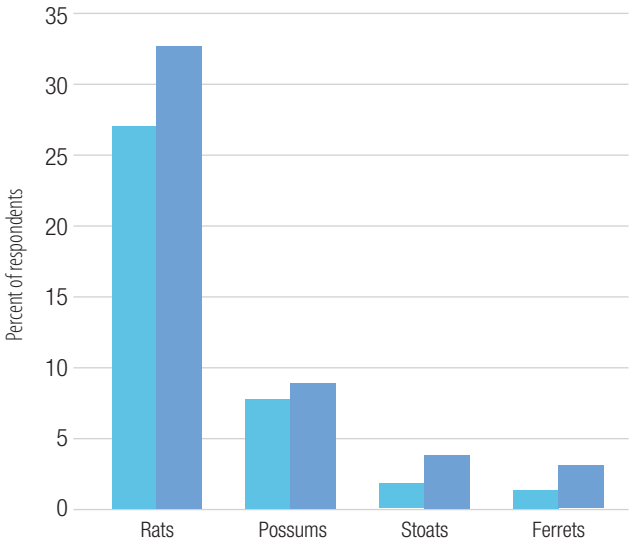

Figure 6.1b. Big four control at residence.

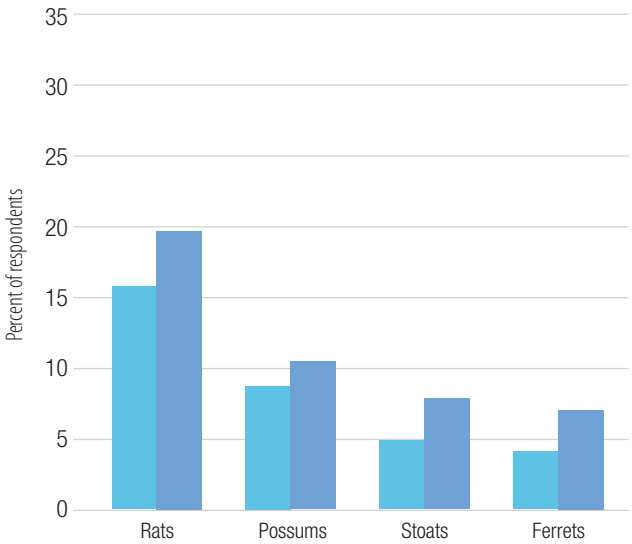

Figure 6.1c. Big four unpaid control work.

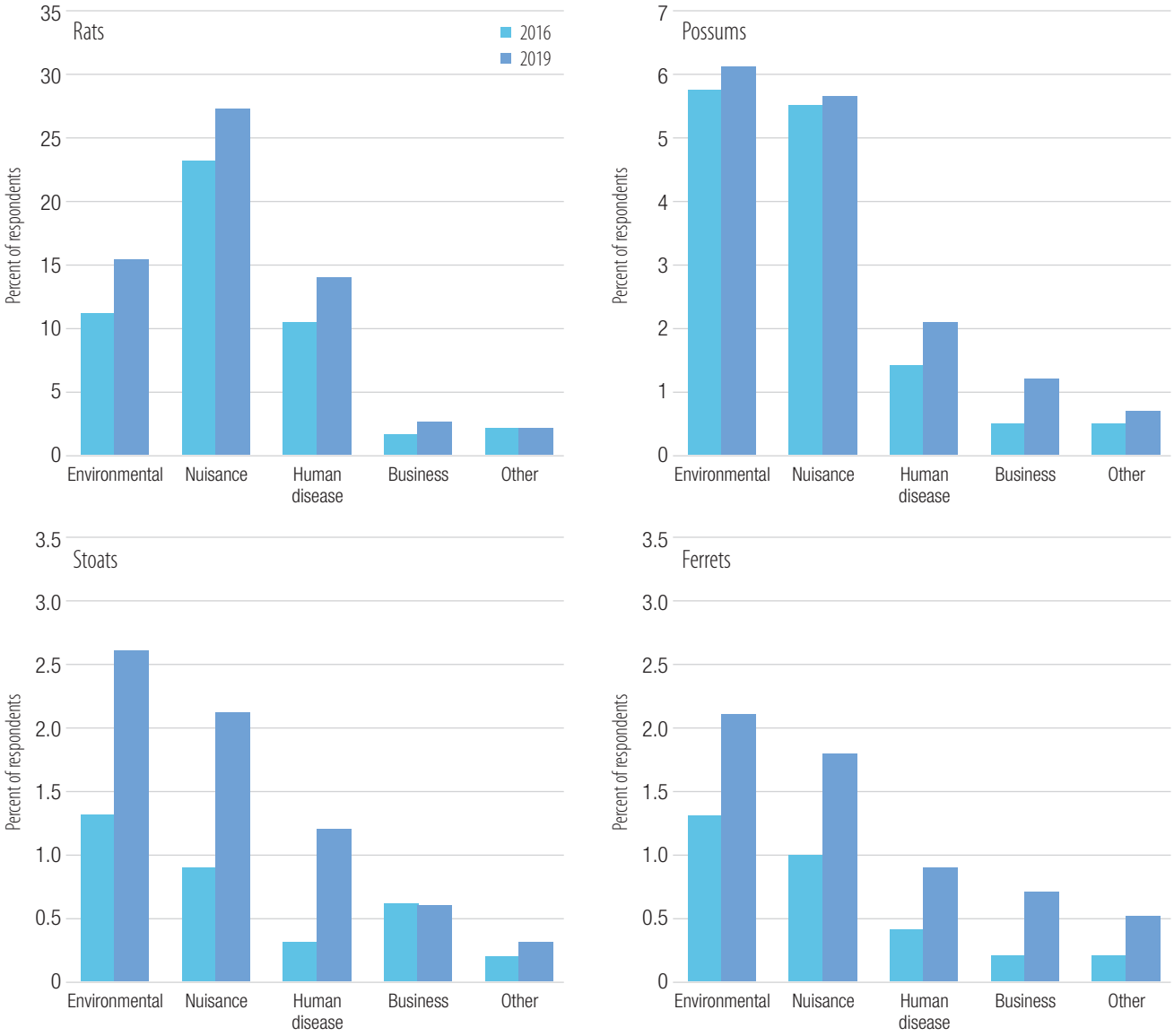

Figure 6.2. Reasons for killing Big Four Predator species.

Alpine vegetation, upper Otira Valley

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Survey respondents were strongly in support of maintaining or increasing citizen and agency effort to control the Big Four Predators (Figure 6.4a). A decrease in frequency of 'Don't Know' responses for citizen effort has almost completely shifted into 'It's about right now'.

6.2 PEST CONTROL OPINIONS

Predator Free New Zealand (PFNZ) and Manaaki Whenua Landcare Research developed a set of questions designed to evaluate New Zealanders' opinions about pest control (Figures 6.5 and 6.6 organised by statements supportive or unsupportive of pest control respectively). Respondents agree that pests are a significant threat to native species, and are in agreement with activities that protect native species by killing pests. However, about a quarter of respondents disagree that domestic cats are a significant threat, and that government agencies can be trusted. On the other hand, respondents largely agreed that government funded science can be trusted, while acknowledging that pest control has unknown effects and interferes with nature. Respondents were divided equally about the effectiveness of pest control.

6.3 USE OF 1080

Aerial application of 1080 poison (*sodium monofluoroacetate*) applied to cereal baits to kill rats and possums, and to kill stoats through secondary poisoning, is contentious. The major users of 1080 are OSPRI, to help eliminate bovine tuberculosis, and the Department of Conservation for indigenous species protection, particularly to control predator irruptions in

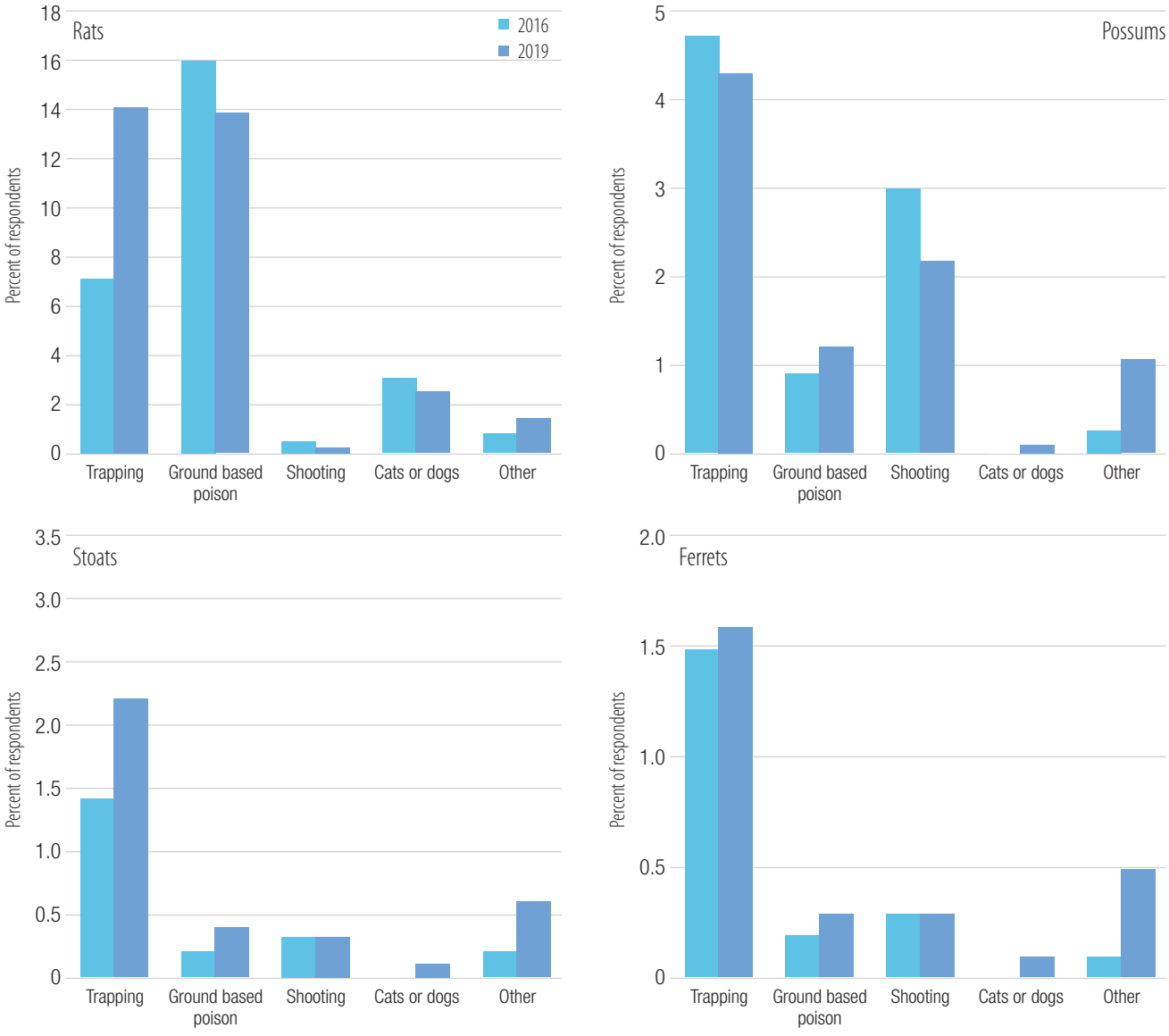

Figure 6.3. Respondents' Big 4 Species Control Methods.

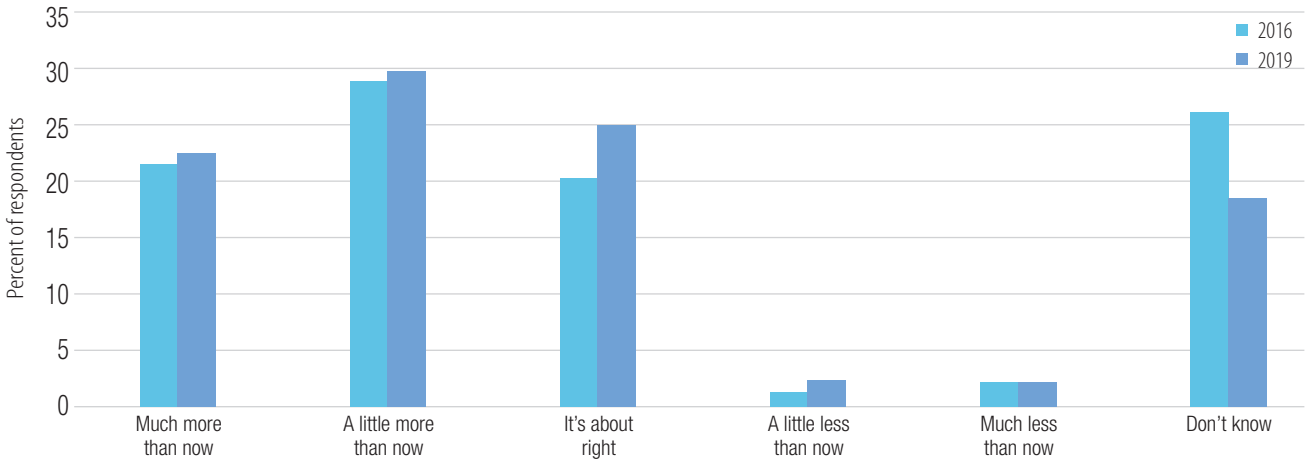

Figure 6.4a. Desired effort to control Big Four predator species by citizens compared to now.

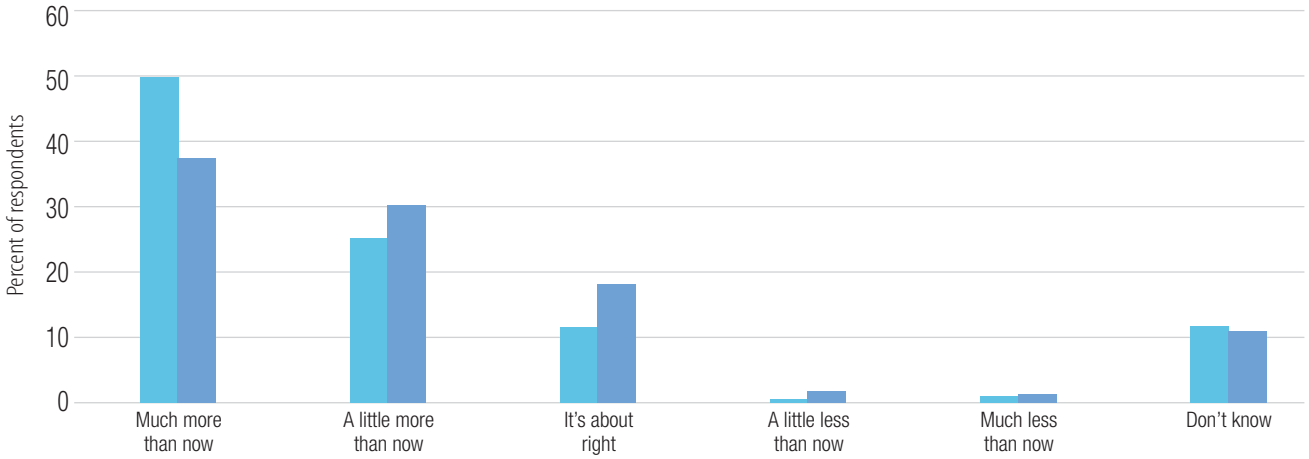

Figure 6.4b. Desired effort to control Big Four predator species by the Department of Conservation and Regional Councils compared to now.

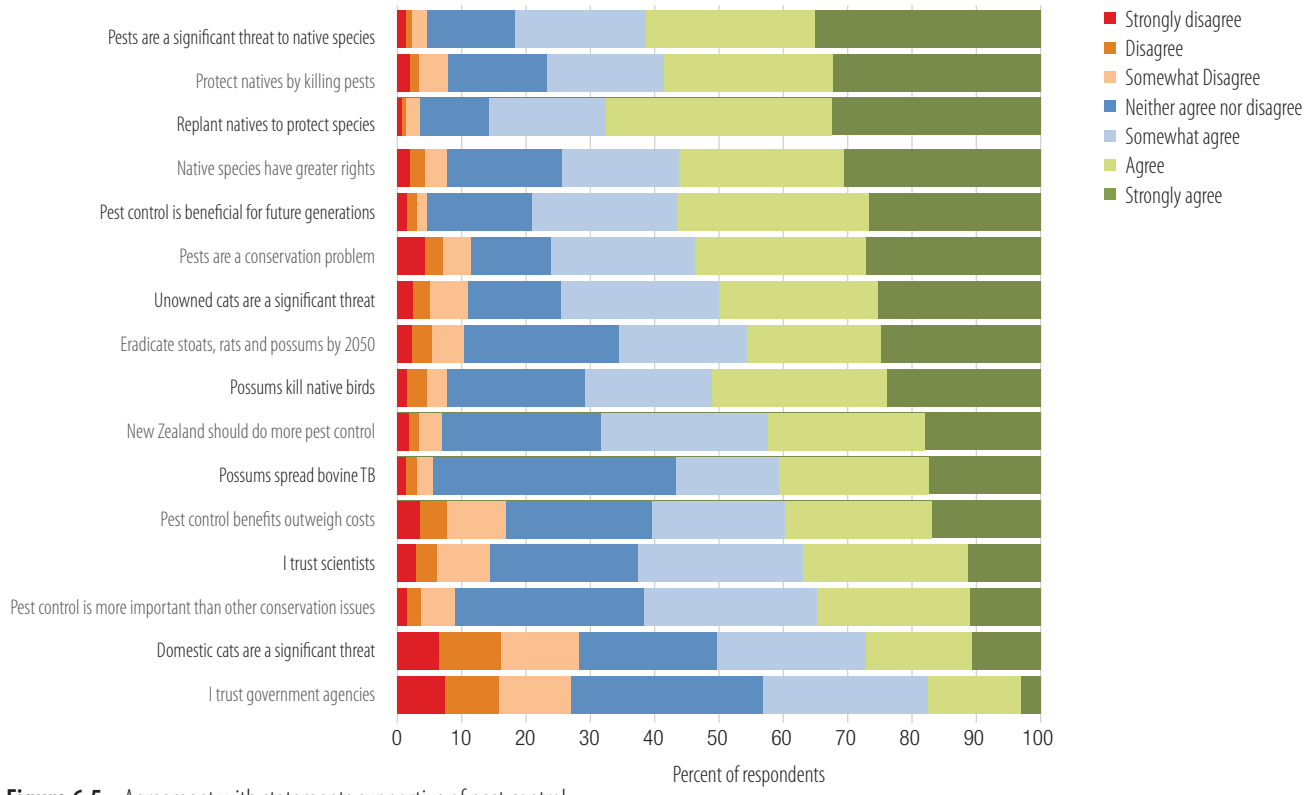

Figure 6.5. Agreement with statements supportive of pest control.

mast years. Opponents to 1080 raise concerns about human health and safety, its effectiveness, undesirable conservation outcomes, and ulterior motives of the users. We tested the prevalence and strength of opinions about the purposes and outcomes of aerial 1080 application. Responses were on a 7 point Likert scale anchored on strongly disagree and strongly agree, without a "don't know" option. Some questions were framed positively (Figure 6.7; 7 items) and some negatively (Figure 6.8; 13 items).

The most prevalent response to these items, whether positively or negatively framed, was "neither agree nor disagree". Strongest agreement with positively framed questions was about effectiveness and cheapness of 1080 for killing pests and protecting birds. Over 30% of respondents disagreed to some level that aerial 1080 is humane or safe. Strongest agreement with negatively framed questions was about the conflict with New Zealand's clean and green image, with over half of the respondents agreeing at some level with that statement. Over 40% of respondents concurred to some degree that 1080 is a risk to human health, kills native animals in waterways, and is cruel.

To frame the significance of opinions about 1080 relative to other controversial social policy matters we asked a series of questions about support for actions related to 1080, as well as other actions (Figure 6.9). Compulsory vaccination had the highest support, closely followed by more effort to reduce greenhouse gases. Banning 1080 and using more aerial 1080 obtained very similar responses, with a roughly even split of opposition and support across respondents. A similar outcome occurred for growing genetically modified crops. There is no clear mandate from respondents to prevent or encourage these activities. Respondents endorsed increases in trapping and shooting pests to reduce use of 1080 poison, for which there was very little opposition.

6.4 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 non-native species nominated, which we ignored in the results. Outcomes by

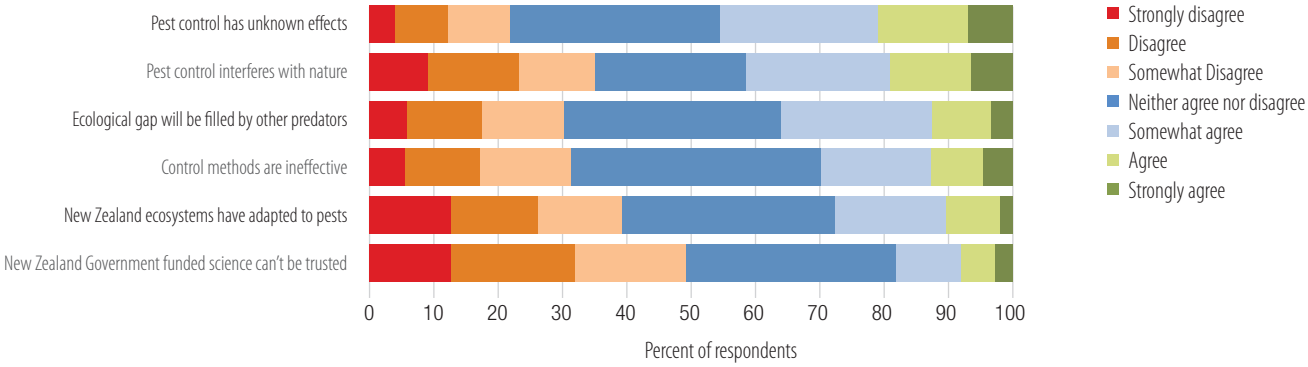

Figure 6.6. Agreement with statements unsupportive of pest control.

1080 protestors express their thoughts.

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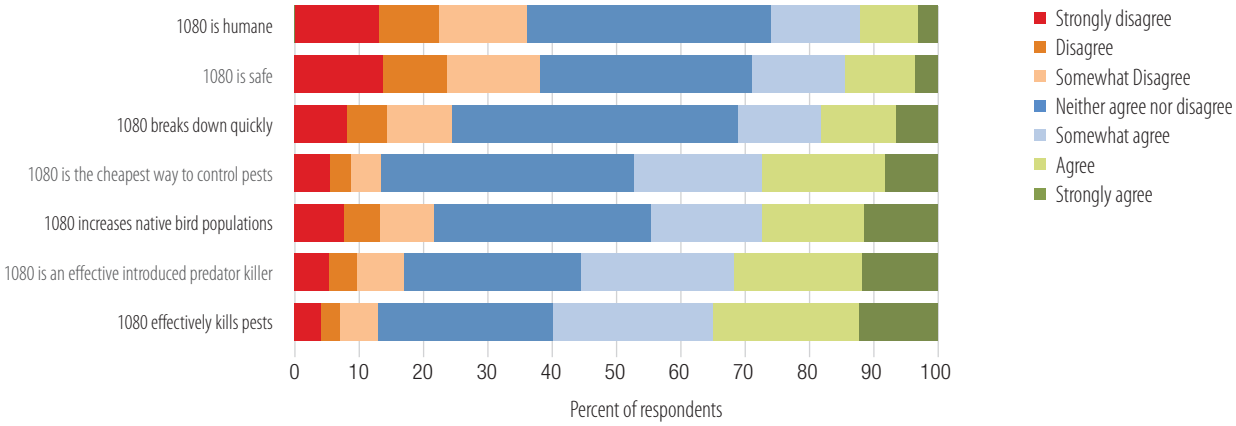

Figure 6.7. Positively-framed aerial 1080 question responses.

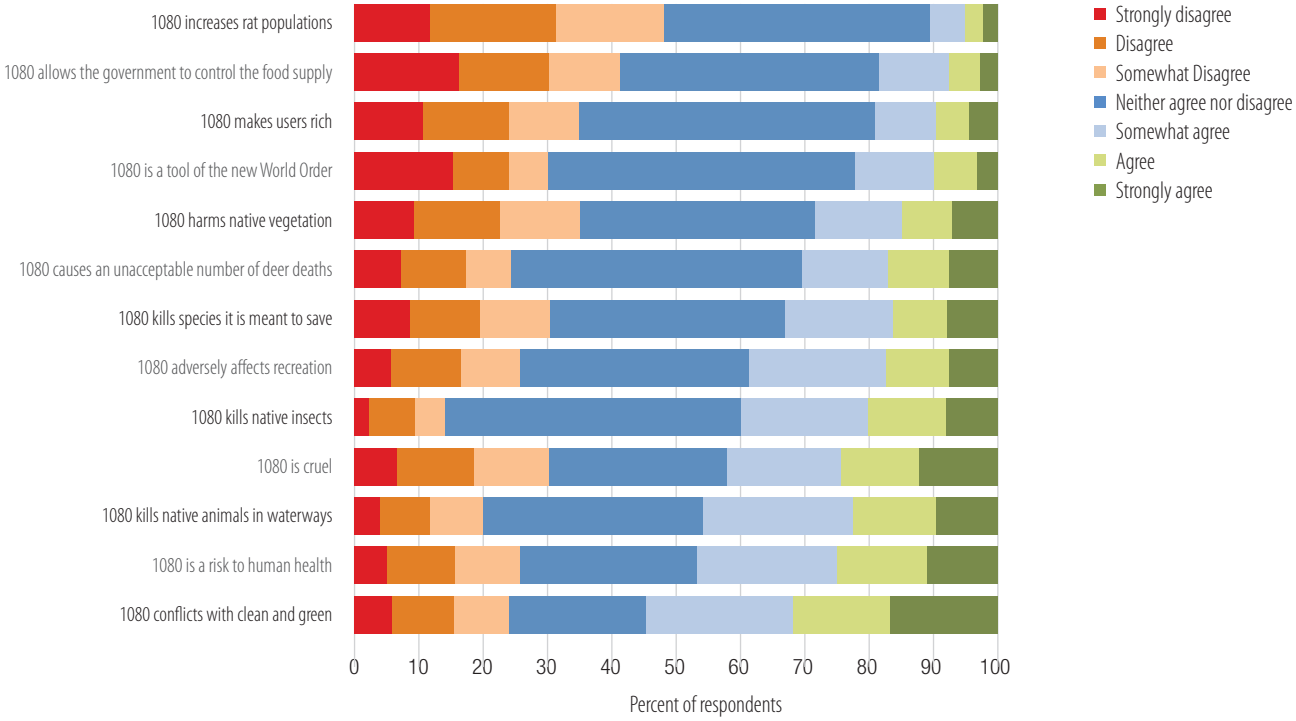

Figure 6.8. Negatively-framed aerial 1080 question responses.

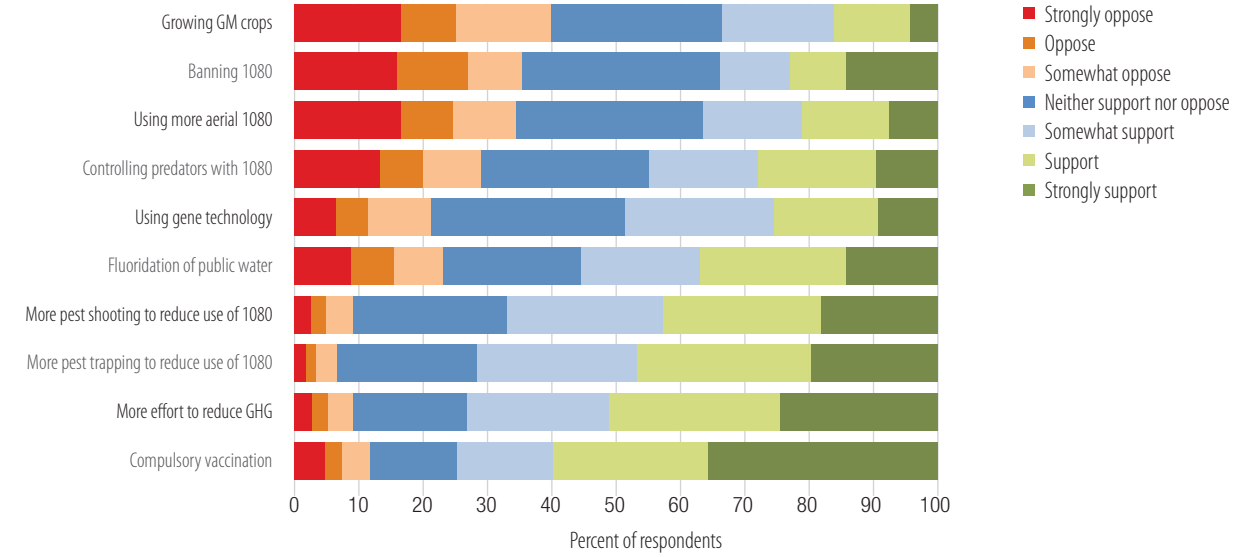

Figure 6.9. Opinions about controversial policy-related activities.

individual ranks and overall (Figure 6.10) vary between levels of extinction risk priority, e.g., kiwi were selected as 1st priority by nearly 40% of respondents but when considered over all three priorities represented around 25% of responses, which is far more than any other species. A similar pattern of findings was recorded for species protection priorities (Figure 6.11), with kiwi considered number one priority by nearly half (48%) of respondents.

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 most in need of protection. There was a close tussle between Hectors/Māui dolphins and Kākāpō for second and third places, with the Kākāpō 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 Takahē were fourth and fifth respectively in both categories, with no other species' nominations exceeding 3%.

An overall comparison of those species considered most at risk of extinction versus the highest priority for management species (Figure 6.12) indicates a high level of similarity between the two, with the biggest gap being for kiwi (24.6% of all responses identified kiwi as one of the three most at risk species and 27% considered kiwi were one of the three highest priority species for protection).

Compared to 2016 (Hughey *et al.* 2016: 49) the general pattern is similar, with almost exactly the same percent of respondent scores for kiwi. There are differences however:

- Kākāpō is 2nd priority in 2019 (3rd in 2016), a position held by Hectors/Māui dolphins in 2016.
- Kea is ranked 4th in 2019 (5–6% of respondents) but was only 7th in 2016 (around 2–2.5% of respondents).
- Kauri (around 7.5% of respondents) was 4th in 2016 and 5th in 2019 (around 5% of respondents).

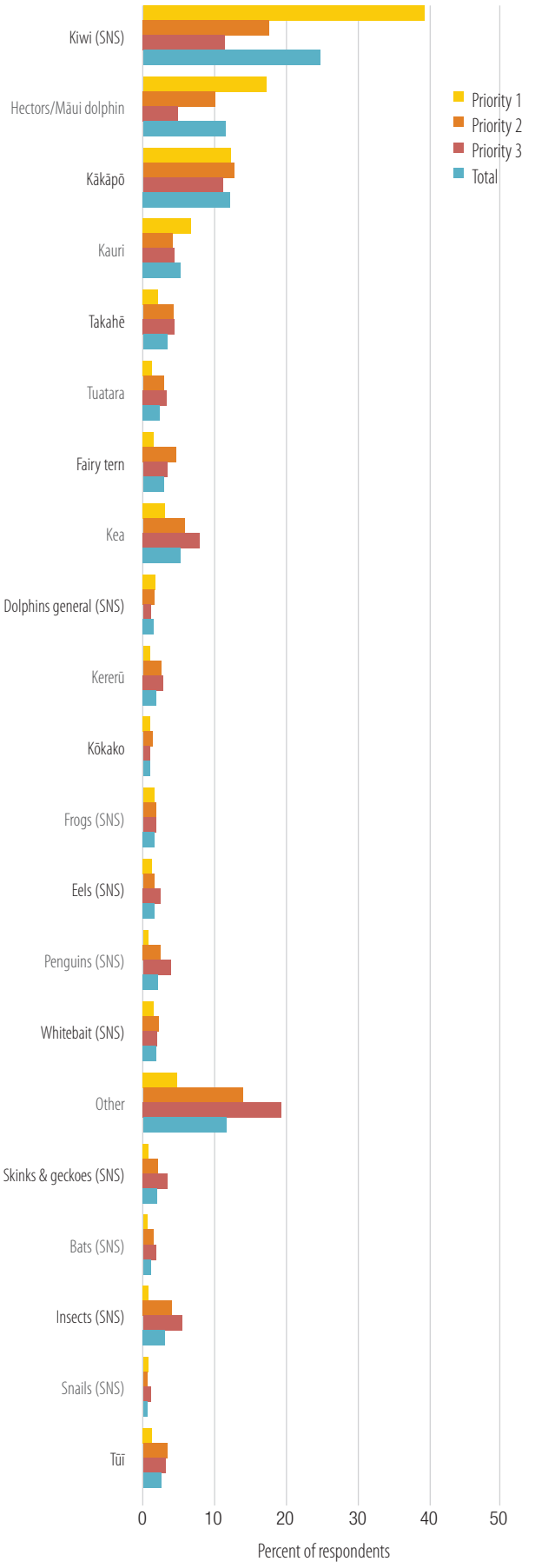

Figure 6.10. Native species most at risk of extinction (1–3 priority order responses, and overall responses).

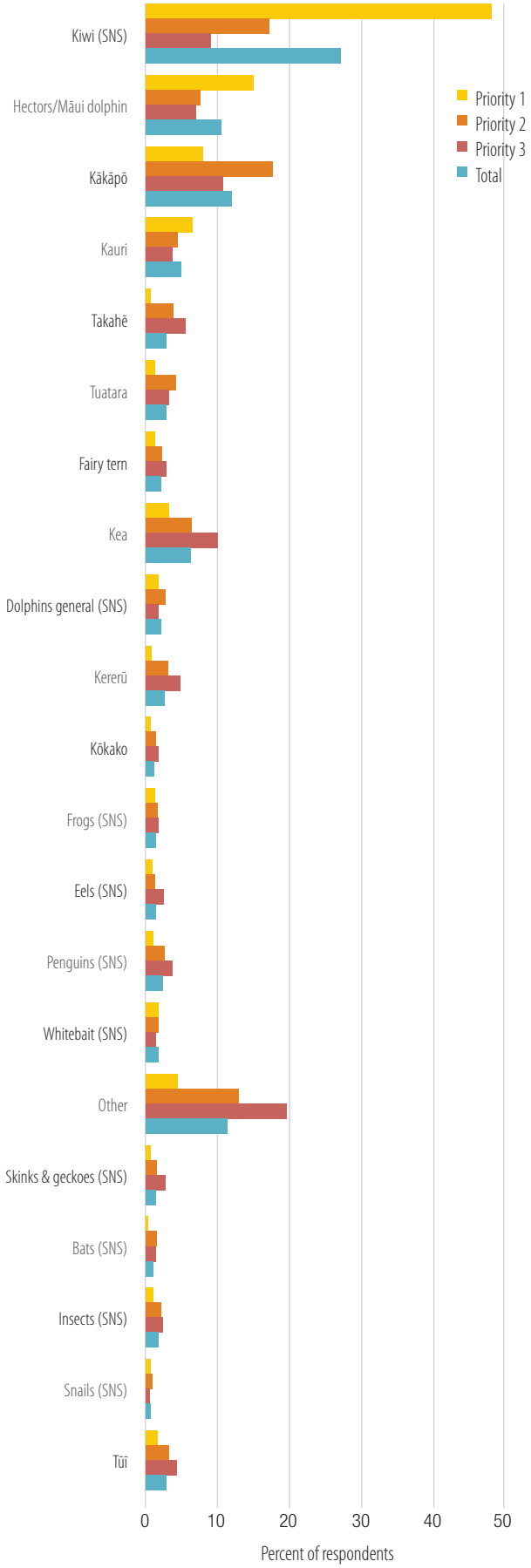

Figure 6.11. Native species with the highest priority for protection (1–3 priority order responses, and overall responses).

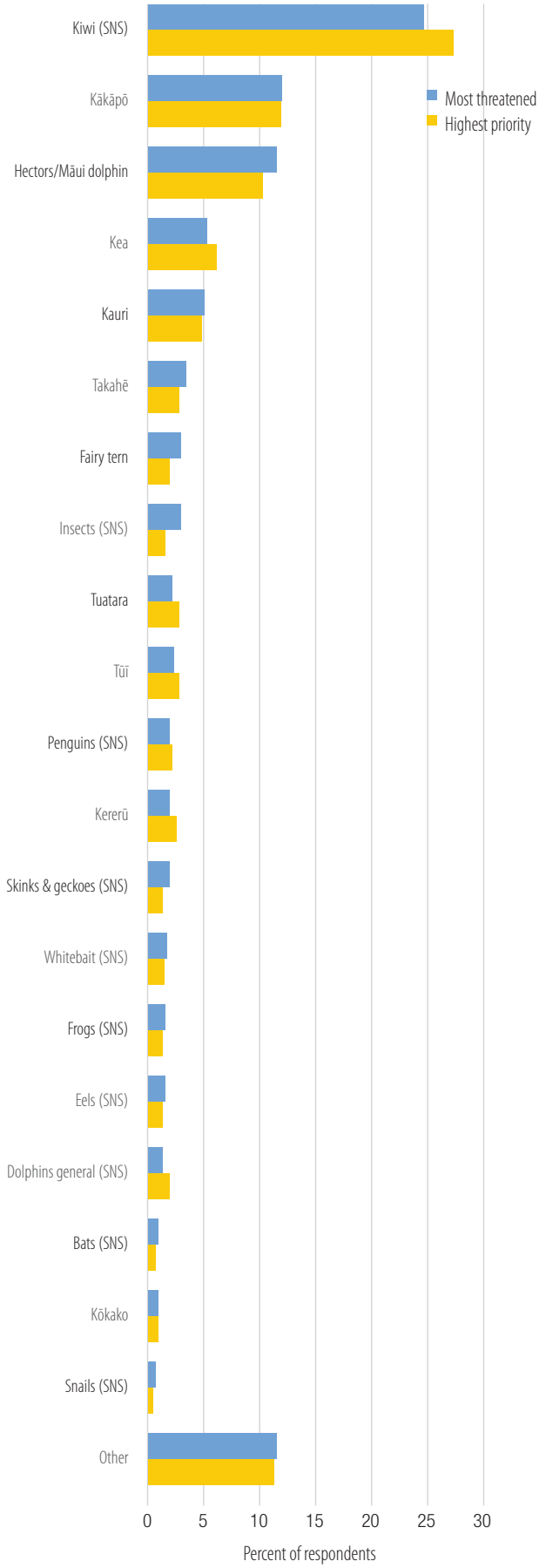

Figure 6.12. Comparison of extinction risk and protection priority by species.

Sunset over Te Tai-o-Aorere/Tasman Bay.
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07

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) model[1]. In this section the main findings and implications from the 2019 survey are identified, and key observations over all nine surveys are examined, noting the limitations discussed in Section 2 resulting from the change from paper-based to electronic surveying, and noting also the implications of the changed age demographic of respondents for the 2019 survey (see Appendix 4).

7.1 THE 2019 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 Wendling *et al.* 2018). This position is consistent with New Zealanders' perceptions that, on average, the state of their natural environment is 'adequate' or 'good', New Zealand is 'clean and green', and that they have good knowledge of the environment. The pressure on the New Zealand environment is lower than in many other countries, but it is likely to be increasing steadily with land use intensification, increased forestry, fishing and tourism, population and general 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 their actual very poor states: 'biodiversity' (see for example Hughey *et al.* 2007) and soils (as identified in this report) are notable examples. Reasons for dissonance between science and perceptions are not always clear—we continue to advocate this as one area where more research would be useful.

Overall, survey respondents judge that the environment is adequately managed—but notable in this survey is the observed 'hockey stick' of generally much more positive views on management in 2019, something that appears linked to the changed age demographic of respondents—a far higher proportion of young people with on average more positive views. 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, marine fisheries, coastal waters and beaches and groundwater.

There are some environment enhancing activities that are widely adopted. For example, recycling household waste, buying products marketed as environmentally friendly, reducing or limiting use of electricity, composting garden or household waste and growing vegetables, were all claimed to be undertaken by over 75% of respondents in 2019. 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, although for some of these, e.g., those associated with restoration and environmental improvement, there were reported increases in 2019 (see Figure 3.19).

One of the most surprising findings from the 2019 survey concerns freshwater, and in particular its link to farming pressures. For the first time in the survey series there was a decrease in the proportion of respondents who chose farming as one of three most important causes of damage to freshwater (see Figure 3.13h). Potential explanations include improvements in farming practices and fencing of many waterways, the relatively recent change of government with a clear focus on freshwater, and the ongoing advertising campaigns being run by farming and producing organisations.

Respondents stated the single most important environmental issue for New Zealand in 2019 is again freshwater quality and related issues (27% of respondents compared to 31% in 2016). This decline is more than matched by the increase in proportion of respondents identifying climate change related matters as their most important New Zealand issue (20% compared to 9% in 2016). This finding is not surprising given the global and New Zealand levels of interest in this issue.

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 continue to record much lower rates of 'don't know' responses than did respondents to our earlier paper based surveys.

[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.

7.2 IMPLICATIONS FOR POLICY MAKERS

A massive surprise has been the dramatic increase in the proportion of younger people responding to the survey in 2019. This increase could be due to technology improvements, to increased interest in the environment or to other influences. Whatever the case this increase has influenced the general trend of findings over time to a more positive, but in many cases still a negative, perception of state and management of the natural environment. Younger people are more openly expressing their views and increasingly these are important for policy considerations.

Outcomes from the survey should prompt policy makers into action. Differences between perceptions and scientific results can be indicative of potential problems. First, the science may not be correct. For example, species monitoring conducted 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 all previous surveys, considered the condition of New Zealand's native plants and animals to be 'adequate' or 'good'. However, DOC (2019), MfE & Stats NZ (2019) and the global Environmental Performance Index (Wendling *et al.* 2019) indicate otherwise. This lack of public understanding of the seriousness of the problem could ultimately hinder acceptance of additional expenditures and programmes in this area or, as noted, lead to scarce resources going to the 'wrong' areas.
- The perceived impact of farming on the environment has always been negative, but surprisingly this negativity reduced in 2019, albeit from a very high level. Continued monitoring will be instructive as to how well the public detects resource improvements, should current and new policy responses be effective. Audited positive results arising from the 'Sustainable Dairying: Water Accord' (DCANZ and DairyNZ 2015, for example) and positive media coverage (e.g., Water Accord progress 'huge' for dairy industry – www.nzherald.co.nz/the-country/listen/news/article.cfm?c_id=600&objectid=12264132 – accessed 5 September 2019) may be changing the public's perceptions as they become more widely known. However, 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 (see for example: New Zealand's greenhouse gas emissions; www.stats.govt.nz/indicators/new-zealands-greenhouse-gas-emissions – accessed 5 September 2019) continue to fly in the face of public concerns over the dangers it poses.

Finally, some words of caution referred to also in Chapter 2 (and considered and demonstrated further in Appendix 4)—online surveys, while very cost effective, contain risk, but so do all survey types. Some of these risks are linked to changing technologies and the ability of those potentially responding to such surveys to in fact properly and easily engage in the survey. In this survey we observed a notable increase in the proportion of younger respondents, at the relative expense of the older. We can tell that these younger respondents, perhaps to be expected, have different views—but what also we have observed is that the younger respondents in this survey are far more optimistic than those responding in 2016. Tracking these changes is important and while there have been changes in the directions of many trends, overall the nature of the responses have remained relatively consistent, i.e., high levels of concern or support for particular questions have remained irrespective of such changes.

Wind effects on terrain, Peel Range, Kahurangi National Park.
ROSS CULLEN

08

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Sewage discharge sign, Richmond.
ROSS CULLEN

09

APPENDICES

9.1 APPENDIX 1: SURVEY

ENVIRONMENTAL PERCEPTIONS SURVEY 2019

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

1.4. New Zealand's environment is "clean and green"

A. Strongly agree
B. Agree
C. Neither agree nor disagree
D. Disagree
E. Strongly disagree
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

- A. Very good
- B. Good
- C. Adequate
- D. Bad
- E. Very bad
- F. Don't know

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

Currently New Zealand's...

6.1. Natural environment in towns and cities is

6.2. Air quality is

6.3. Native land and freshwater plants and animals are

6.4. Native bush and forests are

6.5. Soils are

6.6. Coastal waters & beaches are

6.7. Marine fisheries are

6.8. Marine reserves are

6.9. Rivers and lakes are

6.10. Groundwater is

6.11. National parks are

6.12. Wetlands are

6.13. Natural environment compared to other developed countries is

- A. Very well managed
- B. Well managed
- C. Adequately managed
- D. Poorly managed
- E. Extremely poorly managed
- F. 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:

7.1. Air

7.2. Native land & freshwater plants & animals

7.3. Native forests & bush

7.4. Soils

7.5. Beaches & coastal waters

7.6. Marine fisheries

7.7. Marine reserves

7.8. Fresh waters

7.9. National parks

7.10. Wetlands

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

Personal actions

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

8.1. Reduced, or limited your use of electricity

8.2. Reduced, or limited your use of fresh water

8.3. Visited a marine reserve

8.4. Visited a national park

8.5. Bought products that are marketed as environmentally friendly

8.6. Recycled household waste

8.7. Composted garden and/or household waste

8.8. Grown some of your own vegetables

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

8.10. Obtained information about the environment from any source

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

8.12. Participated in an environmental organisation

8.13. Commuted by buses or trains

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

8.15. Made a financial donation to a non-government environmental organisation

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

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)

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

9.1. Rats

9.2. Possums

9.3. Stoats

9.4. Ferrets

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

Donations

10. 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

11. 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

12. 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.

13. Do you rent or own your main residence?

A. Rent
B. Own
C. Other

14. 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

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

15.1. Rats

15.2. Possums

15.3. Stoats

15.4. Ferrets

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

16. 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 – Ask 17 and 18
B. Possums – Ask 19 and 20
C. Stoats – Ask 21 and 22
D. Ferrets – Ask 23 and 24
E. None of these – Ask 25

IF CONTROLLED RATS

17. 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)

18. 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

19. 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)

20. 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

21. 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)

22. 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

23. 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)

24. 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)

25. How much money have you spent in total on Big Four predator control for your main residence in the past 12 months?

(Open response)

26. Do you monitor the abundance of native birds at your residence?

A. Yes
B. No

27. We would like your opinion on each of the following statements:

27.01. Pest species are a significant conservation problem

27.02. Pest control interferes with nature

27.03. The benefits of pest control outweigh the risk to nature

27.04. Pest control has unknown side effects

27.05. Native species have greater rights than pest species

27.06. Today's pest control methods are proven to be ineffective

27.07. Investment in pest control is beneficial for future generations

27.08. Pest control is important compared to other conservation issues

27.09. NZ should do more pest control

27.10. To protect native species we should kill rats, possums and stoats

27.11. Domestic cats are a significant threat to native species

27.12. Unowned cats are a significant threat to native species

27.13. We should replant native plants/bush to protect NZ native species

27.14. I trust government agencies

27.15. I trust scientists

27.16. All stoats, rats and possums should be eradicated from NZ by 2050

27.17. I have control over my own impact on the environment

27.18. Science funded by the NZ government can't be trusted

27.21. Possums kill native birds

27.22. Possums spread bovine tuberculosis (TB) to cattle

27.23. NZ ecosystems have adapted to possums, rats and stoats

27.24. Possums, rats and stoats are a significant threat to native species

27.25. Other predators will fill an ecological gap created by removal of possums, rats and stoats

A. Strongly disagree
B. Disagree
C. Somewhat disagree
D. Neither agree nor disagree
E. Somewhat agree
F. Agree
G. Strongly agree

1080

We would like your opinion on each of the following statements about dropping 1080 poison from helicopters to kill possums, rats and stoats.

28. Aerial 1080 use:

28.01. Results in an overall increase in native bird populations

28.02. Kills native animals living in waterways

28.03. Is cruel

28.04. Breaks down quickly to become harmless

28.05. Harms native vegetation

28.06. Is a risk to human health

28.07. Effectively kills pest species

28.08. Kills native insects

28.09. Increases rat populations

28.11. Conflicts with NZ's clean, green image

28.12. Is the cheapest way to control pests

28.13. Is safe

28.14. Is a tool of the New World Order

28.15. Makes people who use it rich

28.16. Adversely affects recreation on public land

28.17. Kills the species it is supposed to save

28.21. Is humane

28.22. Is a way for the government to control the food supply

28.23. Is an effective method of killing introduced predators

28.24. Results in an unacceptable number of deer deaths

A. Strongly disagree
B. Disagree
C. Somewhat disagree
D. Neither agree nor disagree
E. Somewhat agree
F. Agree
G. Strongly agree

29. Please tell us whether you support or oppose the following activities in New Zealand:

29.01. Doing more to reduce greenhouse gas emissions

29.02. Fluoridation of public water supplies

29.03. Compulsory vaccination of children against contagious diseases

29.04. Growing genetically modified crops

29.05. Using gene technology to manage pest animals

29.06. Controlling predators with aerial 1080

29.07. Using more aerial 1080

29.08. More pest trapping to reduce use of 1080

29.09. More pest shooting to reduce use of 1080

29.10. Banning aerial 1080

A. Strongly oppose
B. Oppose
C. Somewhat oppose
D. Neither support nor oppose
E. Somewhat support
F. Support
G. Strongly support

Species at risk...

30. 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)

30.1: Species 1 *(Open response)*

30.2: Species 2 *(Open response)*

30.3: Species 3 *(Open response)*

31. 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).

31.1: Species 1 *(Open response)*

31.2: Species 2 *(Open response)*

31.3: Species 3 *(Open response)*

Demographics

Finally, some questions about you....

32. Are you:

A Male
B. Female

33. 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)*

34. In which year were you born?

(Open response)

35. 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. Philippines
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)*

36. Are you:

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

37. 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

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

(Open response)

39. Do you live in:

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

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

A. Primary school/Intermediate school (standard 6/form 2/year 8)
B. High school, without qualifications
C. High school, with qualifications
D. Trade/technical qualification or similar
E. Undergraduate diploma/certificate
F. Bachelors degree
G. Postgraduate

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

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

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

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

43. What is your occupation?

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)

44. What is your personal annual income from all sources before tax?

A. Loss
B. $0 to $10,000
C. $10,001 to $20,000
D. $20,001 to $30,000
E. $30,001 to $40,000
F. $40,001 to $50,000
G. $50,001 to $70,000
H. $70,001 to $100,000
I. $100,001 or more

Finally: Most important environmental issues

NEW ZEALAND

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

(Open response)

46. Why did you choose this issue?

(Open response)

WORLD

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

(Open response)

48. Why did you choose this issue?

(Open response)

Thank you!

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

49. 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 data from the 2019 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	2019	2018 Census results
Male	44.1	46.8	45.8	46.1	45.1	48.4	47.4	45.3	44.1	49.3
Female	55.9	53.2	54.2	53.9	54.9	51.6	52.6	54.7	55.9	51.7
N	**883**	**822**	**818**	**856**	**730**	**601**	**1758**	**1797**	**1956**	**4,793,358**

Table 2. Age of respondents (%)

Year …	2000	2002	2004	2006	2008	2010	2013	2016	2019	2018 Census results
18 to 19	1.4	1.1	1	1.3	1.3	0.9	0.1	0.3	2.0	3.4
20 to 29	15	9.5	9	8.7	7.4	8.3	6.5	5.3	18.0	18.5
30 to 39	18.2	15.9	15.6	15	12.9	12.5	9.6	11.7	17.9	17.0
40 to 49	19.7	22.8	22.5	22.8	18.0	18.0	16.1	17.0	16.9	16.8
50 to 59	18.1	20.8	22.2	19.6	22.7	21.5	22.4	22.5	17.1	16.9
60 to 69	12.8	16.1	16.1	17.5	20.6	18.5	27.6	24.1	17.6	13.9
70 and over	14.8	13.8	13.6	15.2	17.0	20.3	17.7	19.1	10.5	13.6
N	**846**	**807**	**796**	**848**	**688**	**567**	**1619**	**1731**	**1657**	**3,698,092**

Table 3. Country of birth (%)

Country/region …	2002	2004	2006	2008	2010	2013	2016	2019	2018 Census results
New Zealand	80.0	77.8	77.1	78.3	77.6	78.6	80.9	76.8	72.6
Australia	1.7	1.7	1.8	2.9	2.5	1.3	1.7	1.5	1.6
Pacific Islands	2.6	0.7	2.5	3.0	2.3	0.6	1.2	1.0	3.6
Britain/Ireland	8.7	11.3	9.4	7.4	8.8	10.8	9.1	7.3	5.9
Rest of Europe	1.8	1.8	2.6	2.3	1.7	0.7	1.2	1.4	1.9
USA and Canada	0.4	1.4	0.9	0.4	1.4	1.3	1.4	1.6	0.8
Asia	2.9	3.6	3.4	3.3	4.3	2.9	2.8	7.8	10.8
Other	1.7	1.5	2.5	2.1	1.4	3.8	1.7	2.7	2.8
N	**817**	**812**	**849**	**728**	**599**	**1750**	**1786**	**1724**	**4,699,755**

Table 4. Ethnicity (%)

Category …	2002	2004	2006	2008	2010	2013	2016	2019	2018 Census results
Māori	5.8	8.1	5.3	9.0	7.3	6.4	13.8	6.8	16.5
NZ European	81.9	79	77.4	74.9	79.2	88.6	71.3	70.7	70.2
Other	12.3	12.9	17.3	16.1	13.6	5.0	14.9	22.5	13.3
N	**810**	**810**	**854**	**722**	**590**	**1503**	**1751**	**1709**	**4,699,755**

Table 5. Respondent's regional council (%)

Council …	2006	2008	2010	2013	2016	2019	2013 Census results
Northland	4.3	4.8	5.2	4.5	4.5	3.7	3.8
Auckland	27.1	27.3	27.2	29.8	26.8	30.2	33.4
Waikato	8.4	8.7	9.8	7.7	8.1	7.5	9.8
Bay of Plenty	5.6	8.6	8.2	7.6	6.1	6.2	6.6
Gisborne/Poverty Bay	0.7	0.4	0.5	0.6	0.4	0.7	1.0
Taranaki	3.6	3.0	2.5	2.2	1.9	2.2	2.5
Hawkes Bay	4.2	2.7	4.5	3.1	4.2	3.2	3.5
Manawatu-Wanganui	6.1	4.5	3.5	6.2	6.1	5.5	5.1
Wellington	11.1	10.9	12.7	13.8	18.9	16.3	10.8
Tasman							1.1
Nelson	2.1	3.0	3.3	2.1	1.9	2.5	1.1
Marlborough	1.5	0.8	1.0	1.3	1.2	1.4	1.0
Canterbury	16.5	15.7	12.3	13.7	11.5	13.8	12.8
West Coast	0.7	0.5	1.0	0.8	0.8	0.5	0.7
Otago	5.6	5.9	6.8	5.0	5.7	4.6	4.8
Southland	2.6	3.0	1.5	1.8	1.8	1.6	2.4
N	**859**	**732**	**600**	**1764**	**1797**	**1735**	**4,699,089**

Table 6. Urban or rural respondents (%)

Area	2006	2008	2010	2013	2016	2019	2013 Census results
Urban	81.4	83.8	84.2	87.3	87.7	89.5	85.6
Rural	18.6	16.2	15.8	12.7	12.3	10.5	14.4
N	**854**	**721**	**588**	**1760**	**1796**	**1722**	**4,598,300**

Table 7. Education status (%)

Year	2000	2002	2004	2006	2008	2010	2013	2016	2019	2018 Census results
Primary	4.2	4.3	3.8	3.3	3.0	3.0	0.6	0.6	0.7	18.2
High school without qualifications	18.4	19.8	17.8	18.7	18.7	15.2	11.8	10.7	8.1	
High school with qualifications	21.9	24.4	25.1	21.9	23.9	26.0	19.4	17.0	19.5	47.2
Trade or technical qualification	22.0	19.5	18.5	19.4	16.1	19.0	18.3	17.2	15.6	9.8
Under-graduate diploma	11.9	14.1	12.8	12.2	15.8	11.8	16.1	16.9	16.4	
Bachelors degree	13.7	12.0	14.3	14.9	14.7	15.2	19.0	18.7	23.6	14.6
Postgraduate	7.9	5.9	7.7	9.6	7.8	9.8	14.8	18.9	16.1	10.2
N	**876**	**815**	**813**	**852**	**728**	**600**	**1765**	**1798**	**1734**	**3,532,122**

Note: For consistency over time the same measures of education were used in the 2019 survey as used in previous surveys.

Table 8. Employment status (%)

Status	2006	2008	2010	2013	2016	2019
Paid more 30 hrs	47.4	47.9	47.0	41.6	43.2	44.4
Paid less 30 hrs	13.4	11.4	9.6	14.6	12.7	15.3
Unemployed	0.5	1.5	2.3	4.0	5.2	6.8
Retired	20.8	22.9	28.2	25.1	23.3	14.3
Unpaid Voluntary Work	2.3	3.5	1.3	2.2	2.4	1.8
Student	4.6	5.6	3.0	3.7	2.5	6.5
Homes Duties	5.1	1.0	5.0	5.1	6.3	7.1
Other	6.0	6.2	3.5	3.8	4.4	3.7
N	**857**	**712**	**602**	**1766**	**1801**	**1728**

Note: Aged 15 and over.

Table 9. Employment sector (%)

Industry	2002	2004	2006	2008	2010	2013	2016	2019	2018 Census results
Resource based	13.3	15.4	17.2	12.3	11.8	9.1	9.9	9.9	6.8
Manufacturing and transport	22.4	20.5	20.8	22.3	23.3	18.6	15.5	16.7	14.0
Accommodation, retail and leisure	17.0	18.3	16.1	14.0	14.6	14.8	11.8	17.3	17.2
Government services and defence	7.9	7.8	6.9	8.6	10.4	11.9	13.3	10.5	5.4
Health services	14.5	14.2	13.6	15.1	14.2	13.7	15.2	13.4	9.5
Education	12.5	11.4	12.5	10.1	13.7	16.2	18.3	15.2	8.1
Communication and financial services	9.9	10.7	11.2	14.2	10.6	14.7	14.0	13.1	8.3
Never been in paid employment	2.5	1.7	1.7	3.5	1.3	1.0	1.8	3.8	NA
N	**751**	**755**	**825**	**636**	**527**	**1729**	**1739**	**1691**	**2,446,141**

Table 10. Income, before tax (%)

Income bracket	2000	2002	2004	2006	2008	2010	2013	2016	2019	2018 Census results
Loss	0	2.0	2.4	1.4	0.9	1.1	1.5	1.8	3.1	0.5
$0–$10,000	17.1	14.4	11.5	9.4	8.5	7.2	5.7	4.9	8.9	17.1
$10,001–$20,000	20.1	18.9	19.5	17.5	13.7	14.6	13.7	10.5	10.1	16.9
$20,001–$30,000	15.4	13.9	16.5	15.0	13.0	15.2	12.3	11.1	11.6	13.7
$30,001–$40,000	13.6	13.3	13.4	14.5	12.6	13.1	10.1	7.1	8.1	10.6
$40,001–$50,000	10.6	11.1	7.4	9.7	10.5	10.5	8.6	8.5	10.1	9.7
$50,001–$70,000	7.5	9.4	10.5	13.3	16.1	14.4	12.8	10.4	13.9	14.4
$70,001–$100,000	4.3	4.1	4.1	6.7	5.9	9.8	7.8	8.8	10.2	9.6
$100,000 +	3.2	3.7	5.0	5.1	5.9	5.6	4.6	6.2	7.8	7.6
Not stated	8.1	9.2	9.6	7.4	12.9	8.4	22.8	30.6	16.2	0.0
N	**894**	**836**	**820**	**880**	**752**	**610**	**2220**	**2468**	**2007**	**3,776,355**

9.3 APPENDIX 3: PSR AND SPECIAL TOPIC DATA

NOTE – great care is needed in comparing the data below to that in the figures used in the text—this is because many of the scales have been reversed in order to generate the positive Likert scales and mean values referred to.

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	1.0	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
2019 (e-survey)	2001	12.8	35.4	44.4	5.4	0.9	1	2.46	0.82
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	0.3	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
2019 (e-survey)	1983	11.4	42.1	34.9	9.4	1.4	0.8	2.47	0.87
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	2.4	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
2019 (e-survey)	1973	7.7	31.5	36.4	19.5	3.5	1.4	2.79	0.96

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)	2400	3.2	28.9	26.0	32.0	9.3	0.5	3.15	1.05
2019 (e-survey)	1958	5.1	29.3	26.0	29.6	9.3	0.7	3.09	1.08

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
2019 (e-survey)	1973	4.0	28.4	46.2	16.6	3.2	1.5	2.87	0.86
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
2019 (e-survey)	1973	16.7	45.9	28.8	6.7	0.9	0.9	2.29	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
2019 (e-survey)	1979	8.2	33.5	29.9	21.2	5.0	2.2	2.81	1.03
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
2019 (e-survey)	1976	12.1	37.1	29.9	15.4	3.4	2.0	2.60	1.01
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
2019 (e-survey)	1976	7.2	35.1	32.3	14.3	3.1	8.0	2.68	0.94
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
2019 (e-survey)	1978	8.0	31.6	32.0	22.1	4.2	2.0	2.83	1.01

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
2019 (e-survey)	1975	6.6	25.2	31.7	20.9	7.2	8.4	2.97	1.05
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
2019 (e-survey)	1979	6.0	22.1	27.7	29.9	12.2	2.1	3.21	1.11
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
2019 (e-survey)	1972	6.4	25.4	34.5	18.5	4.8	10.4	2.89	0.99
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
2019 (e-survey)	1961	5.5	26.4	32.0	17.2	7.3	11.7	2.94	1.03
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
2019 (e-survey)	1910	23.0	40.3	25.9	5.8	0.5	4.5	2.17	0.88

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
2019 (e-survey)	1948	7.1	32.4	43.0	9.6	1.5	6.4	2.64	0.83
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
2019 (e-survey)	1941	10.1	35.4	35.4	13.7	3.0	2.4	2.63	0.95
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
2019 (e-survey)	1941	5.2	21.1	39.8	18.0	4.0	11.9	2.94	0.93
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
2019 (e-survey)	1940	5.5	21.9	34.8	20.7	6.7	10.4	3.01	1.01
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
2019 (e-survey)	1940	5.3	24.6	37.1	20.8	5.9	6.3	2.97	0.98

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
2019 (e-survey)	1940	5.8	26.1	38.1	15.0	4.1	10.9	2.84	0.94
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
2019 (e-survey)	1936	11.4	36.9	37.0	9.6	1.5	3.6	2.51	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
2019 (e-survey)	1935	4.2	20.1	36.7	17.8	7.4	13.8	3.05	0.99
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
2019 (e-survey)	1938	9.7	33.6	40.6	11.1	2.4	2.6	2.62	0.90
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
2019 (e-survey)	1941	3.6	13.7	33.1	16.7	3.1	29.8	3.03	0.90

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
2016 (e-survey)	2223	1.8	15.5	37.1	33.5	8.0	4.0	3.32	0.91
2019 (e-survey)	1924	4.2	21.4	36.2	25.3	8.0	4.9	3.12	1.00
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
2016 (e-survey)	2226	1.6	14.2	39.2	29.0	8.1	8.0	3.30	0.89
2019 (e-survey)	1923	3.3	14.5	31.5	30.7	11.0	9.1	3.35	1.10
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
2016 (e-survey)	2220	2.8	18.5	41.6	24.8	5.8	6.6	3.13	0.90
2019 (e-survey)	1918	4.0	18.5	38.4	24.1	6.7	8.2	3.12	0.96
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
2016 (e-survey)	2220	0.9	6.3	21.3	36.7	28.8	5.9	3.92	0.94
2019 (e-survey)	1917	3.2	11.8	24.4	32.8	18.7	9.0	3.57	1.06
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
2016 (e-survey)	2214	1.8	9.8	30.0	29.5	11.7	17.2	3.48	0.95
2019 (e-survey)	1911	3.2	13.0	27.8	25.2	10.7	20.0	3.34	1.03
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
2016 (e-survey)	2221	0.9	7.4	31.9	36.9	14.8	8.1	3.62	0.88
2019 (e-survey)	1908	2.5	11.4	29.5	35.4	13.0	8.2	3.49	0.97

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
2019 (e-survey)	1916	4.2	21.8	48.7	19.3	2.2	3.7	2.93	0.83
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
2019 (e-survey)	1921	8.8	31.1	40.7	13.5	1.8	4.1	2.67	0.89
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
2019 (e-survey)	1914	5.0	26.9	39.7	20.4	3.4	4.6	2.90	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
2019 (e-survey)	1913	7.4	30.3	39.5	16.5	2.9	3.5	2.76	0.93
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
2019 (e-survey)	1905	4.3	22.6	37.0	19.5	4.0	12.6	2.96	0.93

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.
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
2019 (e-survey)	1908	4.8	22.2	38.8	25.1	4.9	4.2	3.03	0.95
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
2019 (e-survey)	1916	4.7	19.1	32.5	23.9	6.3	13.6	3.09	1.00
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
2019 (e-survey)	1916	5.0	24.8	37.4	16.4	2.9	13.4	2.85	0.91
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
2019 (e-survey)	1922	4.9	18.1	32.8	30.5	8.5	5.2	3.21	1.10
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
2019 (e-survey)	1913	3.8	18.3	34.4	22.5	6.3	14.7	3.11	0.97

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.
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
2019 (e-survey)	1918	9.0	38.2	37.9	8.0	1.8	5.2	2.53	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
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
2019 (e-survey)	1909	4.0	22.6	34.3	18.0	5.7	15.5	2.99	0.97
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
2019 (e-survey)	1912	15.4	33.3	34.5	8.7	1.3	6.9	2.43	0.92

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

In the last 12 months the respondent had…	Year	N	No	Yes	Regularly	Don't know
Reduced or limited their use of electricity	2002	803	22.2	60.3	15.1	2.5
	2004	798	15.9	63.3	19.7	1.1
	2006	856	19.9	57.0	21.5	1.6
	2008	722	17.4	61.1	21.0	0.4
	2010	603	15.1	58.0	24.9	2.0
	2010 (e-survey)	2307	11.5	53.8	33.4	1.2
	2013 (e-survey)	1878	16.8	52.7	28.8	1.8
	2016 (e-survey)	1979	17.8	52.0	27.8	2.4
	2019 (e-survey)	1837	22.8	45.4	29.0	2.8
Reduced or limited their use of freshwater	2002			Question not asked in 2002		
	2004			Question not asked in 2004		
	2006	849	43.8	35.8	18.4	2.0
	2008	722	35.0	39.2	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
	2019 (e-survey)	1790	40.4	30.1	26.0	3.5
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
	2016 (e-survey)	1967	72.4	23.9	2.3	1.3
	2019 (e-survey)	1827	73.1	18.8	5.5	2.6
Visited a national park	2002	801	36.8	55.6	6.7	0.9
	2004	797	32.6	61.9	4.9	0.6
	2006	853	41.0	53.6	5.3	0.1
	2008	719	41.8	51.8	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
	2019 (e-survey)	1819	46.6	42.2	9.0	2.3
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
	2019 (e-survey)	1836	13.6	58.8	19.1	8.5
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
	2019 (e-survey)	1831	6.9	59.5	31.9	1.7

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

In the last 12 months the respondent had…	Year	N	No	Yes	Regularly	Don't know
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	30.7	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
	2019 (e-survey)	1831	28.6	45.4	24.3	1.6
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
	2019 (e-survey)	1832	64.7	23.0	8.9	3.3
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
	2019 (e-survey)	1829	30.8	49.5	18.6	1.1
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
	2019 (e-survey)	1828	36.2	46.6	13.7	3.6
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
	2019 (e-survey)	1831	81.3	11.4	5.0	2.3
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
	2019 (e-survey)	1819	73.4	17.4	6.5	2.6

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
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	31.4	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
	2019 (e-survey)	1832	46.1	40.3	11.8	1.7
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
	2019 (e-survey)	1825	79.2	12.2	6.4	2.2
Made a financial donation to a non NGO[2]	2002			Question not asked in 2002		
	2004			Question not asked in 2004		
	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
	2019 (e-survey)	1831	66.5	23.7	6.8	2.9

Table 8. Big Four species presence and control (% 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 9. Reasons for respondents killing Big Four species (% 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 10. Big Four species control methods (% 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 11. Desired effort to control Big Four species compared to now (valid %)

	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

9.4 APPENDIX 4: A SIGNIFICANT DEMOGRAPHIC DIFFERENCE IN 2019 – THE ADDED PROPORTION OF YOUNGER RESPONDENTS

1. Introduction

We were advised, mid survey, by the survey company that an increasing number of respondents were answering the survey on their cell phones or similar mobile technology. This is likely to have an effect on survey findings if mobile-technology access affects overall respondent demographics. In particular, it appeared likely that mobile-technology adopters are most likely to be younger, and increasing mobile technology access may have shifted the sample to increased representation of younger age groups. To investigate this potential affect we have looked at response rates by age for the 2016 and 2019 surveys, and at how responses varied by age for selected categorical questions.

2. Findings

Figure 1 shows the age distribution of respondents for the two surveys and shows clearly a large proportional increase in young respondents (under 30 years of age) and a corresponding decrease in proportion of older (60 years and over) respondents. Those aged 30–59 remained proportionally almost the same.

For 2019 we then first examine responses to questions of respondent knowledge about the environment (Figure 2), overall state of the natural environment in New Zealand (Figure 3) and the level of agreement with New Zealand's 'clean and green' image (Figure 4). There were highly significant differences (Chi squared tests) for all three questions:

- Older respondents reported a higher level of knowledge than did either middle aged or younger respondents (Figure 2; $p<0.001$).
- Younger respondents rated the overall state of the environment in New Zealand higher than either middle or older age groups (Figure 3; $p<0.001$).
- Younger respondents were much more likely to agree with the statement that New Zealand is 'clean and green' than were the older age group (Figure 4; $p<0.001$); virtually no one from the older age group agreed it was 'clean and green'.

Further analysis was undertaken for 2016 and 2019 by age group for the state and response questions. Again these were subject to Chi squared tests. Overall:

- For almost all questions there were significant within 2019 response differences, with younger respondents being far more positive than older respondents.
- A comparison between 2016 and 2019 shows similar significant differences.

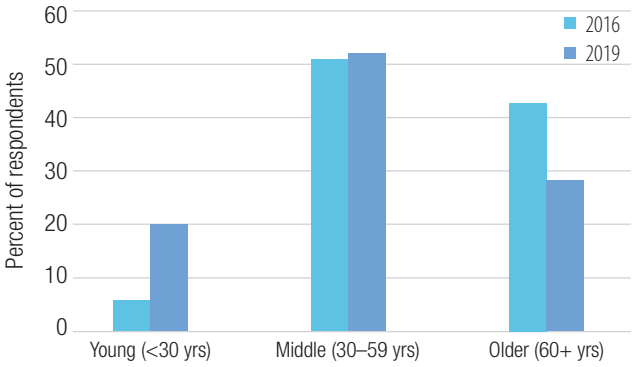

Figure 1. Age distribution of respondents for the 2016 and 2019 surveys.

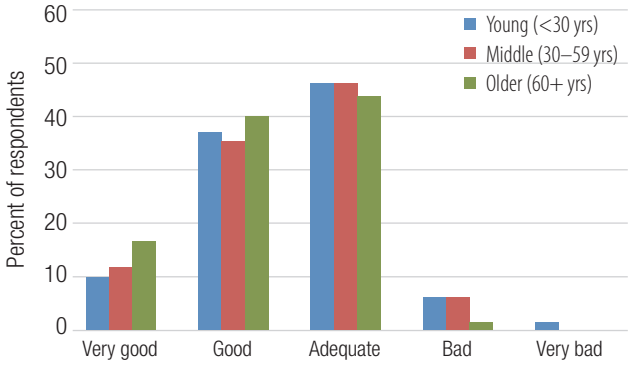

Figure 2. Knowledge of environmental issues by age group – 2019.

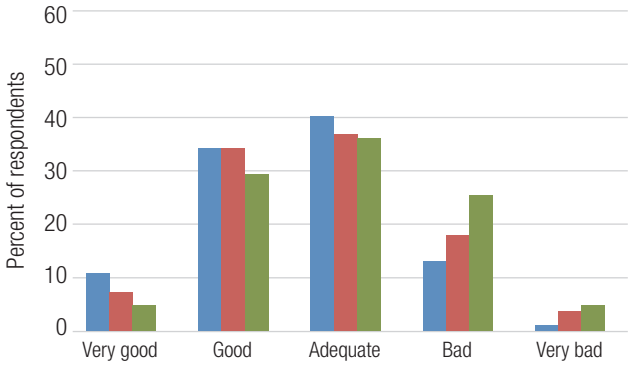

Figure 3. Overall state of the natural environment in New Zealand by age group – 2019.

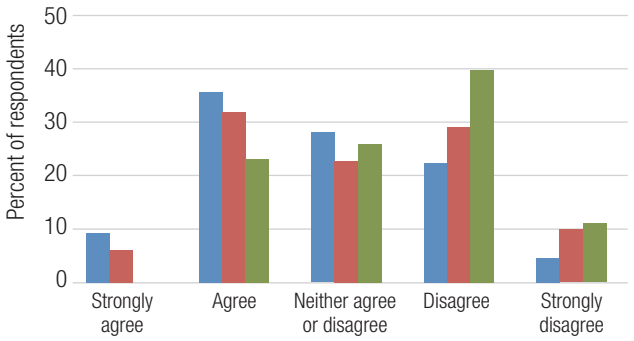

Figure 4. New Zealand's environment is 'clean and green' by age group – 2019.

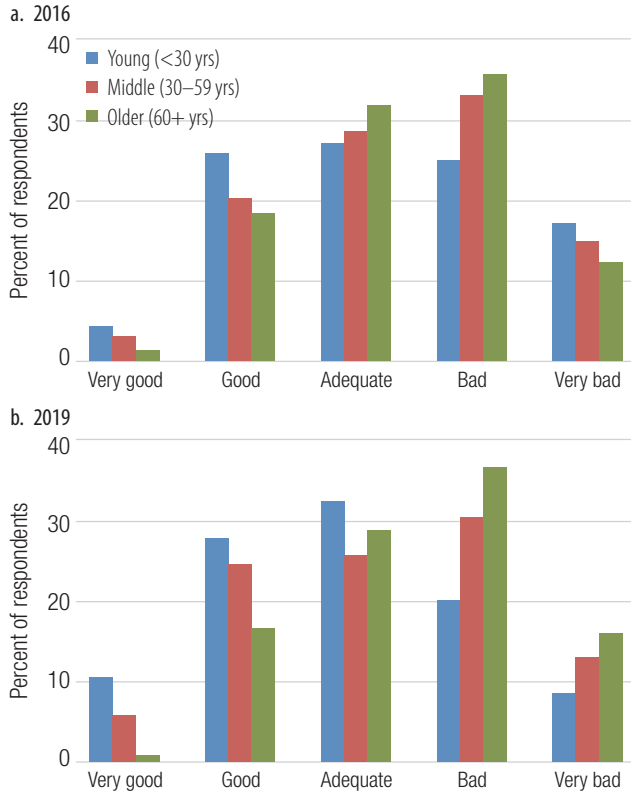

Figure 5(a, b). Perceived state (condition) of rivers and lakes, by age group – 2016 and 2019.

Examples of these differences follows:

- Figures 5a and 5b show 2016 and 2019 responses by age group for the perceived condition of rivers and lakes. Within years there are significant differences for both ($p<0.05$ for 2016 and $p<0.001$ for 2019) with younger respondents in both surveys being more positive, but much more so in 2019 (see also Figure 3.6a).
- Figures 6a and 6b show 2016 and 2019 responses by age group for perceived quality of management of rivers and lakes. Again, within years there are significant differences for both ($p<0.05$ for 2016 and $p<0.001$ for 2019) with younger respondents in both surveys being more positive, but much more so in 2019 (see also Figure 3.12a).
- Figures 7a and 7b show 2016 and 2019 responses by age group for perceived quality of management of New Zealand's natural environment compared with other developed countries. There was no significant within year difference for 2016 ($p=0.323$) but for 2019 it was highly significant ($p<0.001$). Younger respondents in 2019 were far more positive than others, and much more positive than younger respondents in 2016—why this is the case is unknown.

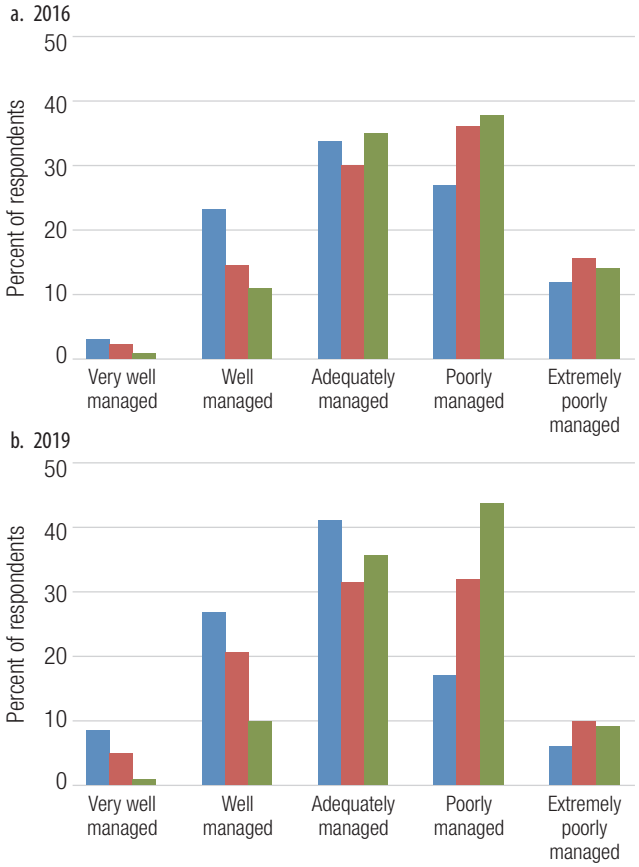

Figure 6(a, b). Perceived quality of management of rivers and lakes, by age group – 2016 and 2019.

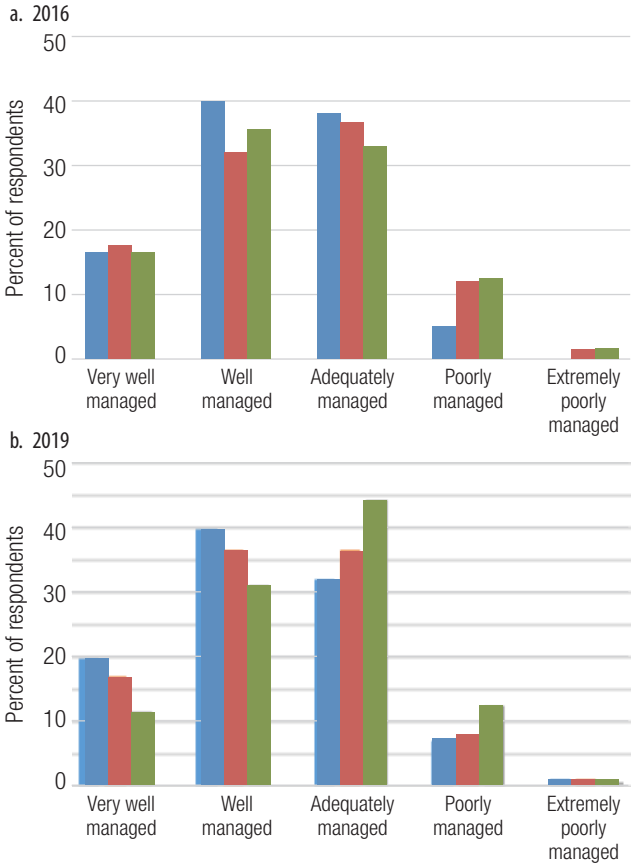

Figure 7(a, b). Perceived quality of management of the natural environment in New Zealand compared to other developed countries, by age group – 2016 and 2019.

3. Conclusions

Respondents under 30 years of age comprise 20% of 2019 survey respondents, but were only 6% of 2016 survey respondents and likely much less than 20% in earlier surveys. Comparing them to other age groups in 2019 these younger respondents are typically much more positive about the state of resources and management responses. However, they also acknowledge they have less knowledge about the environment. We postulate the higher level of younger age response is because of the relatively user-friendly mobile platforms now available—phones and the like, but potentially also because of an increasing interest in the natural environment linked to global issues such as climate change. Deeper analysis of the data as well as additional research would be required to shed light on the explanations for the stronger response rate of younger people.

There are implications from these differences for the survey findings overall. Data analysis in the report proper indicates a general improvement in perceptions of state and response, driven by these younger respondents. The middle age group and older respondents are consistent over time. Overall though the patterns and general levels of responses remain fairly similar over time.