



## **Indicator M20: Community contribution to weed and animal pest control and reductions**





## **Indicator M20: Community contribution to weed and animal pest control and reductions**

**David Latham and Bruce Warburton**

*Landcare Research*

### **Excerpt from:**

Bellingham PJ, Overton JM, Thomson FJ, MacLeod CJ, Holdaway RJ, Wiser SK, Brown M, Gormley AM, Collins D, Latham DM, Bishop C, Rutledge D, Innes J, Warburton B 2016. Standardised terrestrial biodiversity indicators for use by regional councils. Landcare Research Contract Report LC2109.

*Prepared for:*

### **Regional Councils' Biodiversity Monitoring Working Group**

Auckland Council  
Bledisloe Building, Level 2 South  
24 Wellesly St  
Auckland Central

**August 2016**

*Landcare Research, Gerald Street, PO Box 69040, Lincoln 7640, New Zealand,  
Ph +64 3 321 9999, Fax +64 3 321 9998, [www.landcareresearch.co.nz](http://www.landcareresearch.co.nz)*

---

*Reviewed by:*

Grant Norbury, Landcare Research  
Nancy Willems, Bay of Plenty Regional Council

*Approved for release by:*

Fiona Carswell  
Portfolio Leader – Enhancing Biodiversity Landcare Research

---

**Cite this report as:**

Bellingham PJ, Overton JM, Thomson FJ, MacLeod CJ, Holdaway RJ, Wiser SK, Brown M, Gormley AM, Collins D, Latham DM, Bishop C, Rutledge D, Innes J, Warburton B 2016. Standardised terrestrial biodiversity indicators for use by regional councils. Landcare Research Contract Report LC2109 for the Regional Councils' Biodiversity Monitoring Working Group.

**Disclaimer**

*This report has been prepared by Landcare Research for Regional Councils' Biodiversity Monitoring Working Group. If used by other parties, no warranty or representation is given as to its accuracy and no liability is accepted for loss or damage arising directly or indirectly from reliance on the information in it.*

# Contents

<b>Overview.....</b>	<b>v</b>
1 Indicator M1: Land under indigenous vegetation .....	1
2 Indicator M2: Vegetation structure and composition .....	17
3 Indicator M3: Avian representation .....	39
4 Indicator M5: Vulnerable ecosystems.....	92
5 Indicator M6: Number of new naturalisations.....	117
6 Indicator M7: Distribution and abundance of weeds and animal pests .....	137
7 Indicator M8: Change in area under intensive land use & Indicator M9: Habitat and vegetation loss .....	167
8 Indicator M11: Change in temperature and precipitation.....	185
9 Indicator M12: Change in protection of naturally uncommon ecosystems .....	235
10 Indicator M13: Threatened species habitat: number and status of threatened species impacted by consents .....	243
11 Indicator M14: Vegetation consents compliance .....	287
12 Indicator M15: Indigenous ecosystems released from vertebrate pests .....	301
13 Indicator M16: Change in the abundance of indigenous plants and animals susceptible to introduced herbivores and carnivores .....	309
14 Indicator M17: Extent of indigenous vegetation in water catchment.....	337
15 Indicator M18: Area and type of legal biodiversity protection.....	349
16 Indicator M19: Contribution of initiatives to (i) species translocations and (ii) habitat restoration .....	381
<b>17 Indicator M20: Community contribution to weed and animal pest control and reductions .....</b>	<b>395</b>
<b>17.1 Introduction .....</b>	<b>395</b>
<b>17.2 Scoping and analysis .....</b>	<b>395</b>
<b>17.3 Assessment of existing methodologies.....</b>	<b>399</b>
<b>17.4 Development of a sampling scheme.....</b>	<b>399</b>
<b>17.5 Data management and access requirements .....</b>	<b>399</b>
<b>17.6 Current status of M20 State of knowledge (August 2014) .....</b>	<b>404</b>
<b>17.7 References.....</b>	<b>404</b>

## Overview

In 2010, the Technical Group of the Regional Council Biodiversity Forum worked with Landcare Research to develop the Regional Council Terrestrial Biodiversity Monitoring Framework.<sup>1</sup>

This framework is designed as part of ‘a national, standardised, biodiversity monitoring programme, focusing on the assessment of biodiversity outcomes, to meet regional council statutory, planning and operational requirements for sustaining terrestrial indigenous biodiversity’

The terrestrial biodiversity monitoring framework adopts the same approach as the ecological integrity framework designed by Landcare Research for the Department of Conservation (DOC) and consists of three components: (i) indigenous dominance, (ii) species occupancy, and (iii) environmental representation.<sup>2</sup> To inform the framework, there are four broad areas: (i) state and condition, (ii) threats and pressures, (iii) effectiveness of policy and management, and (iv) community engagement.

A standardised monitoring framework ensures that data for each measure are consistent among regional councils, which allows for reliable State of Environment reporting. Furthermore, to enable national reporting across public and private land, it is also desirable that where possible, measures can be integrated with those from DOC’s Biodiversity Monitoring and Reporting System (DOC BMRS).<sup>3</sup> The monitoring framework covers most categories of essential biodiversity variables<sup>4</sup> recommended for reporting internationally, addressing species populations, species traits, community composition, and ecosystem structure adequately, but does not address genetic composition and only in part ecosystem function.

This report contains descriptions of 18 terrestrial biodiversity indicators developed within this framework by scientists who worked with regional council counterparts and representatives from individual regional councils. Each indicator is described in terms of its rationale, current efforts to evaluate the indicator, data requirements, a standardised method for implementation as a minimum requirement for each council, and a reporting template. Recommendations are made for data management for each indicator and, for some, research and development needed before the indicator can be implemented.

---

<sup>1</sup> Lee and Allen 2011. Recommended monitoring framework for regional councils assessing biodiversity outcomes in terrestrial ecosystems. Lincoln, Landcare Research.

<sup>2</sup> Lee et al. 2005. Biodiversity inventory and monitoring: a review of national and international systems and a proposed framework for future biodiversity monitoring by the Department of Conservation. Lincoln, Landcare Research.

<sup>3</sup> Allen et al. 2013. Designing an inventory and monitoring programme for the Department of Conservation’s Natural Heritage Management System. Lincoln, Landcare Research.

<sup>4</sup> Pereira et al. 2013. Essential biodiversity variables. *Science* 339, 277–278.

The terrestrial biodiversity indicators in this report are designed to enable reporting at a whole-region scale. Some of the indicators are also suitable for use at individual sites of interest within regions. Each indicator is described in terms of a minimum standard for all councils. If implemented by all councils, each measure can then be aggregated to allow national-scale reporting (e.g., for State of Environment reports, or for international obligations such as reporting on achievement of Aichi Targets for the Convention on Biodiversity). Individual councils could add additional measurements to supplement the minimum standards recommended.

Three of the 18 terrestrial biodiversity indicators – Measures 1 ‘Land under indigenous vegetation’, 11 ‘Change in temperature and precipitation’, and 18 ‘Area and type of legal biodiversity protection’ – were implemented and reported on for all regional councils in June 2014. An attempt to implement and report two others at that time – Measures 19 ‘Contribution of initiatives to (i) species translocations and (ii) habitat restoration’ and 20 ‘Community contribution to weed and animal pest control and reductions’ – was unsuccessful because the data needed for these indicators was either not readily available or not collected in a consistent way, and investment will be needed to remedy these issues before they can be reported successfully.

## **17 Indicator M20: Community contribution to weed and animal pest control and reductions**

**Author: David Latham and Bruce Warburton, Landcare Research**

### **17.1 Introduction**

Indicator M20 concerns community contribution to weed and animal pest control and reductions. It reports the community contribution in terms of numbers of community groups and participants in those groups, and an estimate of the hours contributed, aggregated across the sites in which the community groups conduct weed and animal pest control. It also reports the number of sites at which the groups work, and the total area in which they work. Repeated measurements should allow tracking of effort by community groups that conduct these activities by each regional council.

### **17.2 Scoping and analysis**

#### **17.2.1 Definitions**

The primary considerations associated with M20 relate to defining ‘communities’ and their ‘contributions’. That is, responses to a questionnaire sent to council experts highlighted the different definitions and approaches that regional councils have adopted with regard to communities and their contribution to weed and animal pest control and reductions. Inconsistencies relating to how terminology in M20 is defined could result in statistics not being comparable between regions. Thus an important first step towards providing a national, standardised method of reporting M20 is defining a ‘community’ and what constitutes a ‘contribution’ from that community. We base this process on responses from council experts to key terminology.

1. *Community* – in general, expert responses suggested the word ‘community’ is used loosely. A ‘community’ is defined strictly as a group of people living in the same locality, under the same government, and often sharing a common cultural or historical heritage. From this larger social group, smaller groups may decide to volunteer to contribute to pest control in the area in which they reside. It is these smaller groups or ‘community groups’ that are of relevance to M20, and thus we recognise that the terms ‘community’, ‘community groups’, and ‘care groups’ can be used interchangeably.

Single volunteers were recognised as a ‘community’ by some authorities; however, more generally a community was defined as two or more people (rarely groups of private landowners), working to protect and enhance native biodiversity or sites of environmental importance to local communities. Council preference was often for community groups with some formal governance, preferably a Trust or Incorporated Society, or formal registration with the council as a recognised community or care group. Most authorities stated that formal/legal status was not mandatory.

*Definition of 'community'* – a community is two or more people (i.e. a group) undertaking weed and/or animal pest control to protect and enhance native biodiversity values or sites of environmental importance. A single private landowner conducting control on their own land is not a 'community' (i.e. is not the purview of M20) unless they are part of a community group of two or more people doing control focused on sustaining terrestrial indigenous biodiversity. Communities must be formally registered with their respective regional council, but need not necessarily have legal status.

2. *Contribution* – the term 'contribution' similarly lacked a clear and unified response from experts, and tended to be used to encompass all parts played by the community in bringing about a result, that is the effort or participation by the community group, input (time, resources, money or in-kind support) from all parties involved, and the contribution of the pest control by the community group to the site that they manage, and its benefits to native biodiversity and environmental values at a regional scale. Expert responses indicated that a contribution to M20 should not be driven by non-native biodiversity outcomes, such as control of rabbits or brushtail possums for production purposes. There was further recognition that council experts needed to exercise judgement in what was considered a contribution.

*Definition of 'contribution'* – the term 'contribution' should be tightened to explicitly cover three aspects: (1) volunteer effort (i.e. time); (2) funding and in-kind expert time supplied by councils to community groups (we exclude all other in-kind support, because other components are more subjective and difficult to report consistently across regions); and (3) the site managed by a community group to enhance the region's native biodiversity (i.e. the site itself is the contribution made by a community group to the total area of conservation in the region). Provided these contributions are made to enhance native biodiversity values, there should be no threshold in terms of the size of the site that is managed, the number (must be >1) of participants within the community group managing that site, or whether the work is 'community driven' or 'community assisted'.

3. *Control and Reduction* – because 'control' and subsequent 'reductions' is what communities do and measure, having clear definitions of these terms will help to make the statistics reported more comparable between regions. Council experts varied in their views as to what constituted control of a pest species. Whilst there was a general recognition that control should be a committed, long-term strategy, experts recognised that some community groups could not sustain committed pest control in all seasons or longer-term, for various reasons. Often, however, these contributions were deemed to have important outcomes for native biodiversity. Similarly, 'one-off control' of a pest species was funded by some regions; however, often for different reasons, such as to encourage community participation, and not necessarily predicated on achieving short-term benefits for native biodiversity.

The terms control and reduction imply that a monitoring programme is in place to assess whether control has reduced or prevented the spread of the target weed or animal population. In principle, council experts agreed that monitoring the outputs of control undertaken by community groups was a necessary component of M20, and council staff often conducted monitoring as a 'council contribution' to the community group effort. However, a lack of available funding was cited as a major reason for a lack of output monitoring, particularly for small, community driven or assisted projects.

*Requirement* – community involvement and long-term, committed strategies to pest control and reductions are both important considerations for M20. Where possible, however, communities should participate in projects that have committed, long-term objectives to pest control, and that have output monitoring for reporting control and reduction as a project requirement. Council staff should, if necessary, assist community groups in designing simple output monitoring programmes aimed at quantifying reductions in target pest populations. Alternatively, monitoring could be done by council staff or their sub-contractors. Both of these options are often already provided to assist some community groups with monitoring outputs. It should be noted that community outputs must work towards linking into regional outcomes that relate to enhancing or sustaining terrestrial indigenous biodiversity.

Because there might be inadequate resources to assist all community groups interested in contributing to pest control, councils should prioritise projects based on (1) the potential benefits to protecting and enhancing native biodiversity and environmental values (i.e. regional outcomes), and (2) the quality of the work-plan provided by the community group to council, describing long-term objectives for proposed pest control and monitoring outputs. Where insufficient funding exists for all proposed projects, individuals or groups should be encouraged to contribute to established projects.

4. *Habitat* – fine- and even broad-scale habitat characteristics will differ between many regions. Experts suggested that for national reporting purposes, ‘basic’ or ‘broad’ habitat categories are most appropriate. In addition, broad-scale habitat characteristics for M20 should align with those identified from other relevant indicators (i.e. M20 should use LCDB classes and units). Regional councils can further stratify habitat classes in sites where community contributions occur for intra-regional purposes if deemed necessary. This could include reporting within naturally uncommon ecosystems and wetlands (M12).

#### **17.2.2 Statistics to report**

1. The number of communities (that are registered with councils), and the mean number of volunteers per community group that are contributing to weed and animal pest control and reductions. If a community group contributes to pest control on more than one site, then details on the number of ‘site’ contributions made per group.
2. Summary information should be divided further into the total number of contributions to weed pest control and animal pest control.
3. The total amount of time (plus mean and range) in person hours that community groups contribute to pest control.
4. The total amount of money (plus mean and range) and the total amount of in-kind time (plus mean and range) in person hours that councils provide to community groups that contribute to pest control.

5. The total area (hectares; plus mean and range) within a region in which community groups are conducting pest control and reductions. Information on this statistic needs to be available in a digital format. Some community groups are unlikely to have the technical skills with GPS or GIS they need to delineate the sites where they conduct pest control. In these instances, council staff should assist with the delineation of boundaries using GPS units, or alternatively identifying the sites where control is conducted within cadastral maps, if these are available and boundaries match pre-existing delineated land parcels.

National reporting for M20 should move towards routinely including habitat and information about where specific weed and/or animal pest species are being controlled, rather than simply reporting the number of contributions and area.

### **17.2.3 Reporting frequency**

Regional councils should update statistics relating to M20 annually, and these should be made available to the public in regional reports. These reports can then be aggregated nationally, combining information across council reports.

### **17.2.4 Hierarchies**

Reporting for M20 should be at the level of pest plant or pest animal species. However, where pest control includes multiple species that are difficult to identify to the level of species (e.g. some groups of invasive weeds), and assistance from expert taxonomists is unavailable, reporting may need to be at a higher level.

### **17.2.5 Spatial and temporal analyses**

The time-series of the number of community contributions to weed and animal pest control should be presented by habitat type. Similarly, time-series of spatial data delineating the extent of community contributions to weed and animal pest control should be colour-coded to showcase different habitat types where the control occurs.

### **17.2.6 Relationships with present patterns and other measures**

It would be useful to compare GIS overlay of sites with community contributions to weed and animal pest control with sites where control is being undertaken by regional councils, DOC or other agencies. This would show the full spatial extent of the area within each region where pest control is being undertaken to sustain and enhance terrestrial indigenous biodiversity, albeit with possible differences in methodology, intensity, and rigour. In addition, overlaying GIS layers derived from M20 with other indicators (e.g. M7 and M15), would be useful to assess the spatial pattern of community contributions with respect to pest distribution and abundance. This type of analysis might help elucidate how community contributions align with regional outcomes.

### **17.3 Assessment of existing methodologies**

Based on the questionnaire that was sent to participating regional councils, we collated information on how regional councils determine which community groups are funded and supported towards weed and animal pest control projects. We found that there were considerable differences in the definitions and approaches that regional councils have adopted so far. For the purpose of providing a national, standardised method of reporting M20, we provide standard definitions for the main components of M20 (see section 17.1.1). These definitions could be applied to historical data relevant to M20 and held by councils to determine the progress of community projects contributing to pest control.

### **17.4 Development of a sampling scheme**

There is no sampling scheme associated with M20.

We acknowledge that the statistics that will be reported (e.g. total area in which community groups are conducting pest control) may have been derived from data collected by untrained community members, and therefore prone to error. However, because the rationale behind M20 is to provide a measure of community engagement, we believe the lack of accuracy is not of concern and will not affect the overall utility and importance of this indicator.

### **17.5 Data management and access requirements**

Consideration will need to be given to data management and access, and the resulting recommendations will likely need to be aligned with other indicators.

#### **17.5.1 Reporting indices and formats**

Collate data in formats as in Table 17-1 and Table 17-2, and report in example templates (section 17.5.2), updated annually.

**Table 17-1** Schematic panel to report on M20

1. Communities contributing to weed and animal pest control and reductions:
  - Total number of community groups –
  - Mean number of volunteers per group –
  - Mean number of 'site' contributions per groups –
2. Total number of contributions to:
  - both weed and animal pest control –
  - weed pest control –
  - animal pest control –
3. Person hours contributed to pest control by community groups:
  - Total (plus mean and range) –
4. Council contributions to community groups involved in pest control:
  - Total cash (plus mean and range) –
  - Total in-kind person hours (plus mean and range) –
5. Total area within a region to which communities are contributing to pest control:
  - Total area (ha) –
6. Mean size of project sites managed by community groups:
  - Mean size (ha) –
7. Range in size of sites managed by community groups:
  - Range (ha) –

**Table 17-2** Example table for recording the data needed to report on M20

Group name	Financial year	No. of volunteers <sup>1</sup>	Site name/s	Area of site (ha)	Area covered by group (ha) <sup>2</sup>	Contribution type (pest plant/ pest animal/ both)	Community contribution (person hrs)	Council contribution (financial) <sup>3</sup>	Council contribution (in-kind person hrs) <sup>4</sup>	Species targeted <sup>5</sup>	Spatial information file <sup>6</sup>	Comments/ follow-up
------------	----------------	--------------------------------	-------------	-------------------	---	---	-------------------------------------	---	--	-------------------------------	---------------------------------------	---------------------

<sup>1</sup> Number of people who have participated at least once in the group's activities during the period of reporting. GIVE NUMBER NOT RANGE.

<sup>2</sup> This should be less than or equal to the area of the site.

<sup>3</sup> Ideally, this should only include direct financial contribution (in NZ\$) from the council to the weed and plant animal control activities at the site. In-kind staff hours, converted to dollars, should **not** be included here.

<sup>4</sup> Ideally, this should only include in-kind council staff hours spent doing activities related to the weed and animal pest control at the site.

<sup>5</sup> This can either be one species (e.g. 'pampas grass') or 'multi-species'. This will not be included for national reporting but might be useful or interesting for regional reporting.

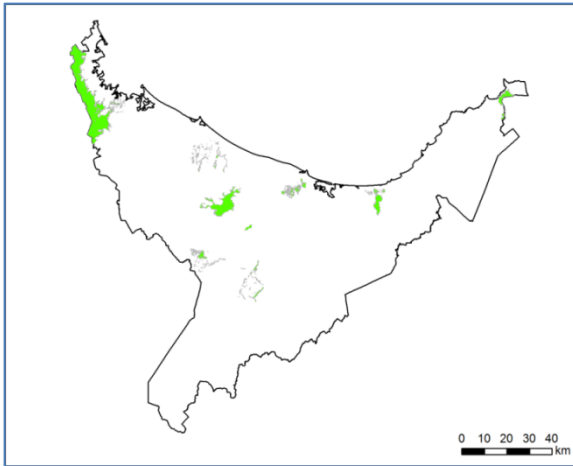
<sup>6</sup> Polygon delineating the area that is being controlled for weeds and animal pests, not the area of the site (which might include areas not being controlled).

Additional points to consider when recording this data:

- Where a community group works across several sites, some information needs to be separated out to the site level.
  - Area of the site and area covered by the group should be reported for each site separately. If they are not, then the reported mean (and range) size of sites managed will be meaningless.
  - Community contributions (person hrs) and council contributions (financial and in-kind person hrs) do not need to be separate to the site level; rather, the community group level is sufficient. In these instances, the statistics reported will be for the community/care group level rather than at the site level.

Site-level reporting of some community groups' work may straddle council borders; reporting will require liaison between councils.

### 17.5.2 Example template for reporting M20

BAY OF PLENTY REGION																																																			
M20 – Community contribution to weed and animal pest control and reductions			July 2015																																																
<p><b>Overview and current status</b></p> <p>Within each regional council, volunteer-led community groups contribute to the control of weed and animal pests, in an effort to help conserve local biodiversity. As of July 2015, the Bay of Plenty region has XX hectares distributed across XX sites where community groups are undertaking weed and/or animal pest control (Table 1). These activities involved a total of XX volunteers representing XX community groups. On average, each community group worked for XX hours in weed and animal pest control activities. Further, the BOP RC contributed a total of XX NZ\$ and XX person hours to support weed and animal pest control activities conducted by community groups within the region.</p>																																																			
<p><b>Map 1: Sites where community groups conducted weed and animal pest control activities during 2015</b></p> 																																																			
<p><b>Table 1</b> Summary of community contributions to weed and animal pest control and reductions in the BOP RC</p> <table border="1"> <thead> <tr> <th></th> <th>Total</th> <th>Mean (per group)</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>Number of site contributions to:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    – both weed and animal pest control</td> <td>XX</td> <td>–</td> <td>–</td> </tr> <tr> <td>    – only weed pest control</td> <td>XX</td> <td>–</td> <td>–</td> </tr> <tr> <td>    – only animal pest control</td> <td>XX</td> <td>–</td> <td>–</td> </tr> <tr> <td>Number of community groups</td> <td>XX</td> <td>–</td> <td>–</td> </tr> <tr> <td>Site contributions per community group</td> <td>–</td> <td>XX</td> <td>XX – XX</td> </tr> <tr> <td>Number of volunteers</td> <td>XX</td> <td>XX</td> <td>XX – XX</td> </tr> <tr> <td>Person hours contributed to pest control</td> <td>XX</td> <td>XX</td> <td>XX – XX</td> </tr> <tr> <td>Council contributions to community groups (NZ\$)</td> <td>XX</td> <td>XX</td> <td>XX – XX</td> </tr> <tr> <td>Council contributions to community groups (in-kind)</td> <td>XX</td> <td>XX</td> <td>XX – XX</td> </tr> <tr> <td>Area (ha) of sites managed by community groups</td> <td>XX</td> <td>XX</td> <td>XX – XX</td> </tr> </tbody> </table>					Total	Mean (per group)	Range	Number of site contributions to:				– both weed and animal pest control	XX	–	–	– only weed pest control	XX	–	–	– only animal pest control	XX	–	–	Number of community groups	XX	–	–	Site contributions per community group	–	XX	XX – XX	Number of volunteers	XX	XX	XX – XX	Person hours contributed to pest control	XX	XX	XX – XX	Council contributions to community groups (NZ\$)	XX	XX	XX – XX	Council contributions to community groups (in-kind)	XX	XX	XX – XX	Area (ha) of sites managed by community groups	XX	XX	XX – XX
	Total	Mean (per group)	Range																																																
Number of site contributions to:																																																			
– both weed and animal pest control	XX	–	–																																																
– only weed pest control	XX	–	–																																																
– only animal pest control	XX	–	–																																																
Number of community groups	XX	–	–																																																
Site contributions per community group	–	XX	XX – XX																																																
Number of volunteers	XX	XX	XX – XX																																																
Person hours contributed to pest control	XX	XX	XX – XX																																																
Council contributions to community groups (NZ\$)	XX	XX	XX – XX																																																
Council contributions to community groups (in-kind)	XX	XX	XX – XX																																																
Area (ha) of sites managed by community groups	XX	XX	XX – XX																																																

BAY OF PLENTY REGION	
M20 – Community contribution to weed and animal pest control and reductions	July 2015
<p><b>Recent trends</b></p> <p>From 2014 to 2015, the total area in which communities contributed to weed and animal pest control increased from XXX to XXX hectares. Further, the number of community groups conducting these activities increased from XX to XX, and the mean number of individuals involved per community group increased from XX to XX. The mean number of person hours volunteered by each community group increased from XX to XX. The total financial and in-kind contribution by the BOP RC towards weed and animal pest control activities conducted by community groups increased from XX to XX and from XX to XX, respectively.</p>	
<p><b>Map 2: Gains/losses for the period 2014–2015</b></p> <p>&lt;Simple map goes here showing gains, no changes, and losses over the most two recent time steps&gt;</p>	
<p><b>Figure 1</b> Number of community contributions to weed and animal pest control as a function of time</p> <p>&lt;Simple line graph inserted here to show the temporal trend, which could be separated by habitat type if this information was available&gt;</p>	<p><b>Figure 2</b> Area (ha) of community contributions to weed and animal pest control as a function of time</p> <p>&lt;Simple line graph inserted here to show the temporal trend, which could be separated by habitat type if this information was available&gt;</p>

## 17.6 Current status of M20 State of knowledge (August 2014)

The regional councils' Biodiversity Working Group requested a spreadsheet that could be used as a template for councils to record data and summarise agreed statistics for national reporting of M20 ('Community contribution to weed and animal pest control and reductions'). This template has been completed by Dave Latham and Cecilia Arienti-Latham (Landcare Research) in collaboration with Nancy Willems (Bay of Plenty Regional Council). During that process, however, it became apparent that there are currently insufficient data to populate the template prepared for M20 and thus, councils were unable to meet a 15 July 2014 deadline for reporting on this measure. The regional councils' Biodiversity Working Group met on 30 June 2014 and accepted this, but they were keen to see councils produce a report for M20 by July 2015.

### 17.6.1 Requirements for implementing M20

- It is unclear what data councils have available for reporting agreed statistics for M20. **An assessment is needed of the current state of data available** within each council for reporting M20 using the example template. This assessment needs to address the comprehensiveness of data within each council and issues of data quality for each variable reported.
- There has been discussion about using Nature Space (<http://www.naturespace.org.nz/>) as a repository for data relating to M20. This option requires **critical assessment** by the regional councils' Biodiversity Working Group. If it is a preferred option, then a pathway for implementing data storage and retrieval from Nature Space will be needed.
- It is possible that not all required data will have been collected to report all agreed summary statistics for M20; however, we suggest that councils **begin to collect all necessary data now** for the template (section 17.5.2), recognising that there will be inadequate data for some summary statistics. The aim should be to work towards reporting all summary statistics in future (i.e. implementing reporting for M20 may be incremental, but needs to start now with available data).

## 17.7 References

- Allredge MW, Pacifici K, Simons TR, Pollock KH 2008. A novel field evaluation of the effectiveness of distance and independent observer sampling to estimate aural avian detection probabilities. *Journal of Applied Ecology* 45: 1349–1356.
- Rosenstock SS, Anderson DR, Giesen KM, Leukering T, Carter MF 2002. Landbird counting techniques: current practices and an alternative. *The Auk* 119: 46–53.