Indicator M19: Contribution of initiatives to (i) species translocations and (ii) habitat restoration

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Landcare Research

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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.[1]

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.[2] 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'sBiodiversity Monitoring and Reporting System (DOC BMRS).[3] The monitoring framework covers most categories of essential biodiversity variables[4] 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.

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

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[1] Lee and Allen 2011. Recommended monitoring framework for regional councils assessing biodiversity outcomes in terrestrial ecosystems. Lincoln, Landcare Research.

[2] 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.

[3] Allen et al. 2013. Designing an inventory and monitoring programme for the Department of Conservation's Natural Heritage Management System. Lincoln, Landcare Research.

[4] Pereira et al. 2013. Essential biodiversity variables. Science 339, 277–278.

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.

16 Indicator M19: Contribution of initiatives to (i) species translocations and (ii) habitat restoration

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16.1 Introduction

Indicator M19 has two parts, (i) documenting community-led liberations of native animal (and rarely plant) species to a region, and (ii) documenting community-led habitat restoration. Some aspects of M19 were addressed by the Biodiversity Forum Technical Working Group in November 2011. It was clarified to be (i) deliberate and managed reintroductions of species, and (ii) habitat restoration undertaken by community groups, the latter excluding individual landowner- and council-led initiatives such as retiring land. Successful implementation of M19 and other measures depends on smart standardisation of definitions of key words across measures. The following definitions are derived from those forged collectively between participants in the last 3 years, and are consistent with those used in M20 ('Community contribution to weed and animal pest control and reductions').

Definition of Community: A community is two or more people (i.e. a group) undertaking translocations or habitat restoration to enhance native biodiversity values or sites of environmental importance. A single private landowner implementing either process on their own land is not a 'community' (i.e. is not the purview of M19) unless they are part of a community group as previously defined. Communities must be formally registered with their respective regional council, but need not have legal status.

Habitat is a famously broad concept. A sub-group of the national Regional Council Biodiversity Technical Working Group convened on 24 April 2012 to agree on a definition of 'habitat' for all indicators.

Definition of 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. For M19, vegetation cover is used as a surrogate for habitat, and vegetation cover is classified according to the Land Cover Database (LCDB). This ensures consistency with other regional council measures (e.g. M1 'Land under indigenous vegetation').

Ideally, ecosystem restoration is about intentionally altering a site to establish a defined, indigenous, historic ecosystem (Balaguer et al. 2014) but this is frequently unattainable (Hobbs 2007). A more practical vision is to embark on natural recovery, in which the ecosystem will regain desirable attributes once a pressure (such as pests) is removed, combined with active interventions, such as planting or translocation, if required. Attributes of both natural recovery and active interventions can both be described well using two elements of ecological integrity – increasing indigenous dominance and indigenous species occupancy (Lee et al. 2005). I suggest that for reporting purposes, 'restoration' be considered primarily as a process (being actively restored) rather than requiring some completed predetermined state to be achieved. At present the word appears in no other measures, and it may be better to replace it with 'enhancement', but I do not yet recommend this.

Definition of Restoration: The active process of altering a site towards a defined, indigenous, historic ecosystem.

16.2 Scoping and analysis M19 (i)

Documenting community-led releases of native animal and plant species to a region

Given that this measure is an indicator of protection and restoration, I suggest that it include all translocations undertaken by community groups listed under Conservation Translocation (Figure 16-1). The vast majority will be population reintroductions or reinforcement, and there may rarely be some ecological replacements (e.g. North Island kōkako for South Island kōkako). Assisted colonisation (e.g. translocating to pre-judge climate change distribution shifts) is controversial and will predictably be very uncommon.
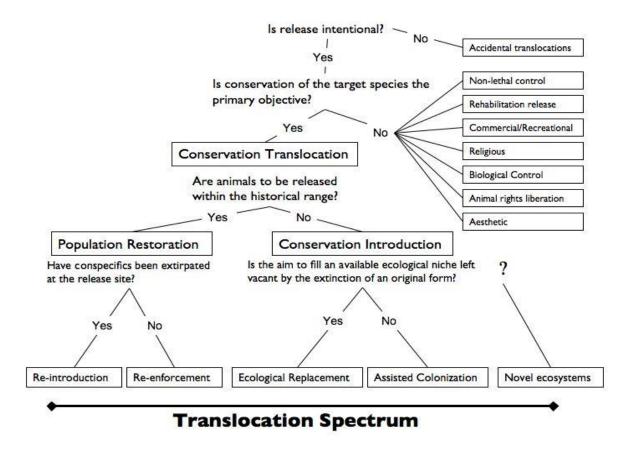

Figure 16-1 A classification of translocation types across a spectrum from reintroduction (i.e. original presence) to novel introduction (taxon never there previously); from Seddon et al. (2012).

16.2.1   Statistics to report

This measure relates to translocations to private land, or to public land if community-led or partnered, but not to those undertaken entirely by DOC to DOC land.

1.   The number of community groups that have undertaken translocations and the mean number of volunteers per community group. This is requested also for M20, and many of the groups that conduct animal (and plant) species translocations may be the same as those doing weed and pest control, so these data would be shared between measures in each reporting year.

2.   The total number of separate translocations undertaken to private land, or to public land if community-led, for each species in the region in the preceding 2 years, initially classified as: *Reintroduction* (return of species to place where it used to be), *Reinforcement* (supplementing a population that is already present), *Ecological Replacement* (release of a native species outside its historic range to fill an ecological niche left vacant by another locally extinct native species) or *Assisted Colonisation* (translocation of species to favourable habitat beyond its native range to protect it from human-induced threats) per Figure 16-1 (Seddon et al. 2012). Releases of the same taxon from the same source site to the same destination site within 30 days of each other are to be regarded as part of the same translocation.

3.   The total area (hectares) of sites to which translocations have occurred, by species. Note this does not equate to the actual area occupied by translocated species ('critter hectares'). In large, continuous forests, it means the area of habitat managed and suitable for the species (e.g. a pest control area).

16.2.2   Reporting frequency

The reporting frequency should be every 2 years. In the DOC database (all approved translocations 2002–2012), there were on average 31 translocations per DOC Conservancy (range 8–61), and of those, only 39% on average per Conservancy were either conducted by non-DOC staff or jointly with DOC staff. In the period, there were on average 44 translocations nationally per annum. Two years therefore is frequent enough to observe trends without reporting being onerous.

16.2.3   Hierarchies

This measure contributes to ecological integrity through species occupancy (species that used to be there are returned) and perhaps indigenous dominance (if the returned species are dominant in abundance or biomass, or have key ecological roles e.g. pollination, seed dispersal, predation). One approach to measuring species occupancy is to tabulate all species of a group (e.g. birds) that used to be present at a site, and score the percentage now present. This number will rise with each translocation. Dedication of a translocation to a specific GIS site would also enable integration with other contributions to indigenous dominance, such as exotic weed and pest control.

16.3 Spatial and temporal analyses

If collected uniformly and biennially by all regional councils, all of the suggested statistics are comparable regionally and additive nationally and would show clear trends in time. If a translocation could be specified to a particular site by GIS, then it could be one component of data and interventions registered to that site and recalled by computer search.

16.3.1   Relationships with present patterns and other measures

Like M20 ('Community contribution to weed and animal pest control and reductions'), it would be useful to compare community translocation contributions with those from DOC and other agencies to obtain a total picture. This could readily be done using DOC's database. M19 has much in common with M20, which also measures community contributions, and also with M18 ('Area and type of biodiversity protection achieved on private land'), which also measures non-agency contributions.

16.4 Assessment of existing methodologies

There is no methodology in use by regional councils that documents native animal and plant species translocations. However, DOC requires community groups and others to have an approved translocation proposal (in addition to permits) before carrying out some types of translocation, most commonly translocations of indigenous/protected wildlife and threatened land plants (DOCDM-363788 32 'Translocation guide for community groups', last updated May 2011). DOC maintains a translocation spreadsheet, which is an internal document that records basic information on all approved translocation proposals since 2002 (DOCDM 33810 'Translocation spreadsheet', Pam Cromarty, DOC, pers. comm.). It includes data on indigenous land animals (including invertebrates) and some indigenous plants. The Translocation guide for community groups describes which types of species are and are not covered by DOC's translocation process. The Translocation spreadsheet already classifies translocation proposals according to the proposer: DOC, non-DOC or Joint. However, it is an internal document, and only those with access can reach the live document and use the hyperlinks to other internal documents. This means that to implement M19 (i), council staff will need to request the current copy of DOCDM 33810 from local DOC staff.

Note that the spreadsheet lists approved translocation proposals; one proposal can cover multiple translocations, source or release sites, or even species. Transfer and monitoring reports may need to be consulted to verify whether or how a proposal was actually implemented.

The Department of Conservation also encourages community and DOC staff to send summary information about translocations to the NZ Reintroductions Database (http://www.rsg-oceania.squarespace.com/nz/) manager. This database is publically available but inevitably is less complete than the DOC one.

The Department of Conservation's 'Translocation spreadsheet'is likely to be an adequate existing source of data for M19 (i) and it should be readily accessible to regional councils.

16.5 Sampling scheme development

Indicator M19 (i) should be a complete listing of all translocations in a region and so no sampling will be required. Acquiring the relevant information is a desk exercise. In addition to the information provided by DOC's 'Translocation spreadsheet', the additional key data needed are the identity and structure of registered care groups/community groups, and availability of GIS files of release sites. Assuming all of these data are readily available, it should take one person less than a week to complete the task.

16.6 Data management and access requirements

If the measure recommended here is accepted by councils, a formal agreement of access to DOC's 'Translocation spreadsheet' for the foreseeable future should be sought from DOC (arranged through the regional councils' Biomanagers' group on behalf of all regional councils).

16.6.1 Reporting indices and formats

Indicator M19 is to document community-led releases of animals or plants to private or public land, evaluated every 2 years for the purpose of obtaining a national account of translocation activity by community groups. A group should report all translocations that they or someone representing them led in the 2-year period. All translocations of threatened species require DOC approval and should eventually be described in DOC's 'Translocation spreadsheet' (Troy Makan, DOC, Wellington, pers. comm.). Most community-led releases should therefore also appear in DOC's 'Translocation spreadsheet', but obtaining the data independently from community groups will provide an up-to-date biennial picture of national activity on council-administered land that complements the DOC view. Data to be compiled for reporting are listed in Table 16-1.

Group name: Name of community group (e.g. Puketapu Landcare Group. It is important that the same group name be retained across separate measures if reporting the same community group in M18, M19, and M20).

Number of volunteers: Number of people who have participated at least once in the group's activities in the last year (with these data checked to be consistent across M19 and M20).

Translocation type: *Reintro* = Reintroduction (i.e. return of a species to a place where it used to be); *Reinforce* = Reinforcement (i.e. supplementing a population that is already present); *Ecol replace* = Ecological replacement (i.e. release of a species outside its historic range to fill an ecological niche left vacant by a native species); *Assist colonis* = Assisted colonisation (i.e. translocation of species to favourable habitat beyond their native range to protect them from human induced threats) (Figure 16-1; Seddon et al. 2012).

Species translocated: Common name of species (e.g. North Island kōkako, forest gecko, kākā beak) and the scientific name, especially if ambiguity is possible.

Source location: e.g. Tiritiri Mātangi Island.

Release location: e.g. Cape Sanctuary.

Release land ownership: Private, DOC, other public land.

Release date: e.g. March 2013. If there were several releases over a period of time, give time span (e.g. March 2013 to May 2014).

Number released: If there were several releases over a period of time, give the total number released.

Area managed for the translocated species: Area in hectares.

Proposal writer and organisation: Name of person who wrote or led the translocation proposal, and which organisation they represented at the time. (e.g. Bill Smith, Hamilton Zoological Society).

In a previous draft, we planned to classify all translocations as *new* or *previously noted*, and at each reporting time councils would check on all previous translocations and note their success, in terms of *known survival of released animals*, *known breeding by released animals*, *population establishment*, *translocation failed*, or *unknown*. This would enable each council and the nation to report on translocation success, but would require ongoing tracking of individual translocations, which would in turn demand that a unique number be given to each translocation. The Department of Conservation does not routinely gather this information. Individual councils could consider reporting these additional data for this measure.

   Items to report nationally on Indicator M19 (i)

1.   Total number of community groups that have made translocations

2.   Mean number of volunteers per group

3.   Total number of translocations made

   a)   Reintroductions

   b)   Reinforcements

   c)   Ecological replacements

   d)   Assisted colonisations

4.   Total area managed for the translocated species (ha)

Table 16-1. Example recording of the data needed to report M19 (i)

a) For each council

Group name	Financial year	No. of volunteers[1]	Translocation type[2]	Species translocated	Source site	Release site	Release land ownership	Release date	No. released	Managed area (ha)	Proposal writer and organisation
KDF	2014	37	Reintro	North Island kōkako	Hauturu	Whakatane Kiwi Sanctuary	100% private	March 2014	27	867 ha	Wayne Smith, Acme Consultants

[1] Number of people who have participated at least once in the group's activities during the period of reporting.

[2] Reintro = return of species to where it used to be; Reinforce = supplement a population that is already present; Ecol replace = release outside historic range to fill vacant niche; Assist colonis = place species beyond native range to protect them from threats (Figure 16-1)

b) Nationally

Total no. groups	Mean no. volunteers/group	Total Reintroductions[1]	Total Reinforcements[1]	Total Ecological replacements[1]	Total assisted colonisations[1]	Total managed area[2] (ha)

[1] Defined as per Figure 16-1

[2] Area of release site managed for the species, not the area to which the species spreads subsequently.

Table 16-2: Example template for reporting M19 (i)

BAY OF PLENTY REGION	
M19 (i) Contribution of community initiatives to species translocations	July 2015
Overview and current status From July 2012 to June 2014, volunteer-led community groups involving XX volunteers undertook XX translocations of XX animal species to XX sites in the Bay of Plenty region. These consisted of XX Reintroductions, XX Reinforcements, XX Ecological replacements and XX Assisted colonisations. The total habitat area managed to support the translocations was XX ha. This is the first year for which data have been taken; trends can be collated from taking the same data biennially into the future.	
Map 1: Bay of Plenty sites that received translocations in 2012–2014 <Insert map here>	
Number of translocations by community groups through time <Insert bar graph with time on the X-axis and the four translocation types having different shading on each column>	

16.6.2   Status of indicator M19 (i) in July 2015

Most of the data needed for the template (Table 16-2) are supposed to be collated continuously on DOC's 'Translocation spreadsheet', which council staff can ask to access. Additional data will need to be obtained directly from community groups. However, there will be few translocations in each region, and this job should be small.

Each council needs **to have a list of the community groups in their region and the numbers of volunteers in each**; this is required also for M19 (ii) and M20. They will also **need access to DOC's 'Translocation spreadsheet'**, which at December 2014 was actively used by DOC and available upon request. Indicator M19 (i) may be unusual in reporting biennially and up to one year retrospectively; this is to give time for projects to be entered in the DOC 'Translocation spreadsheet'. There are likely to be so few translocations there should be no other barriers to M19 (i) being reported.

16.7 Scoping and analysis M19 (ii)

Habitat area restored by community groups

Indicator M19 (ii) applies to revegetation undertaken primarily by community groups or jointly between councils and the groups. This outline avoids the expression 'council-led' (i.e. it does not declare whether it is council or the community group that is leading a project). Rather the measure is of community group *participation* in habitat restoration.

Based on clarification from the Biodiversity Forum technical working group (November 2011 and earlier meetings), this measure excludes land retirement (fencing) by community groups, and it excludes habitat restoration conducted by councils and by individual landowners (e.g. individual dairy farmers conducting riparian planting of native species). It also excludes revegetation comprised of exotic vegetation (e.g. willows, poplars, and lupins).

16.7.1   Statistics to report

1.   The number of community groups that are undertaking habitat restoration and the mean number of volunteers per community group. This statistic is the same as for M19 (i) and M20.

2.   The mean size and total area (square metres, aggregating to ha) of habitat being restored by community groups, classified separately by habitat (LCDB classes) and environment (LENZ Level IV). The LCDB class selected should be what the site is intended to become after restoration (e.g. 'Other native vegetation' or 'Indigenous forest').

As for M19 (i) and M20, national reporting of M19 (ii) should include where the habitat restoration is occurring, in a GIS framework, rather than just the number and hectare measures above. This will identify actual restoration sites as managed by the owner or user.

16.7.2   Reporting frequency

Indicator M19 (ii) should be reported annually. If projects are documented in a spreadsheet through the year, end-of-year reporting could be primarily a rapid desktop job.

16.7.3   Hierarchies

This measure contributes to ecological integrity through species occupancy (species that used to be there are returned, e.g. by planting) and indigenous dominance (e.g. nutrient cycling, dune formation, litter production and other processes will be dominated by indigenous rather than exotic species).

16.8 Spatial and temporal analyses

If collected uniformly and annually by all councils, all the suggested statistics are additive regionally and nationally and would show clear trends in time. As noted above, if restoration could be specified to a particular site by GIS, it could be one component of data and interventions registered to a site, which could be recalled by a computer search.

16.9 Relationships with present patterns and other measures

Using LCDB cover classes as habitat surrogates and adding a LENZ environment classification confers direct links with M1 ('Indigenous land cover'). In time, links with M8 ('Change in area under intensive land use'), M9 ('Habitat and vegetation loss'), M12 ('Change in extent and protection of indigenous cover or habitats or naturally rare ecosystems') and perhaps M18 ('Area and type of biodiversity protection on private land') may be possible.

16.10 Assessment of existing methodologies

At present, areas of habitat being restored or enhanced by community groups are not methodically collated by councils, although areas associated with some groups with whom councils work jointly are known.

16.11 Sampling scheme development

Indicator M19 (ii) should be a complete listing of all areas being restored by community groups and so no sampling will be required.

16.12 Data management and access requirements

Data should be collated in one MS Excel spreadsheet per council with columns for regional council name, year (1 July–30 June), care group name, number of volunteers, GIS site reference, area planted (square metres or hectares), and an LCDB classification of what the site is intended to become. If GIS data are recorded for each site, all sites can be placed into a LENZ classification at any LENZ level, depending on the particular query. Consideration will need to be given to data management and access.

16.13 Reporting indices and formats

The following derived statistics should be collated annually for national reporting (Table 16-3):

- the number of community groups undertaking habitat restoration, and the mean number of volunteers per community group (also required for M19 (i) and M20)

- the mean size and total area (square metres, aggregating to hectares) of habitat being restored by community groups, classified separately by habitat (LCDB classes) and environment (LENZ Level IV).

Table 16-3: Example recording of the data needed to report M19 (ii)

a) For each council

Group name	Financial year	No. of volunteers[1]	Planted site name	Site GPS	Area restored in this year (m^2)[2]	LCDB cover class[3]	LENZ environment	Site type[4]	Planting site ownership[5]	Planting date[6]	Project leader
KDF	2013	67	true left Wehi River below Te Hapo marae		330	Broadleaved indigenous hardwoods		Riparian	Private	March 2013	Will Scarlett

[1]Number of people who have participated at least once in the group's activities (as in M19 (i) and M20)

[2]Record only plantings larger than 0.5 ha (5000 m^2), and with plants at maximum 2-m spacings. If plantings occur over several years, report when the planted area reaches 1000 m^2.

[3]Vegetation that the site will become

[4]Record as Riparian, Wetland or Non-wetland

[5]Private, DOC, Non-DOC public land.

[6]If planting occurs over several months, give time span e.g. March–May 2013

b) Nationally

Total no. groups	Mean no. volunteers/group	Total number restoration sites	Total area 'Indigenous forest' restored in this year	Total area 'Other native vegetation' restored in this year	Total area restored, both habitat types

Table 16-4 Example template for reporting M19 (ii)

BAY OF PLENTY REGION	
M19 (ii) Habitat area restored by community groups	July 2015
Overview and current status From July 2014 to June 2015, volunteer-led community groups involving XX volunteers undertook restoration planting totalling XX ha at XX sites in the Bay of Plenty region. These consisted of XX m^2 of future Indigenous forest, and XX m^2 of other native vegetation. Of the total planted area, XX% was on riparian sites, XX% on wetland sites and XX% on non-riparian, non-wetland sites. This is the first year for which these data have been reported; trends can be determined by collecting the same data biennially into the future.	
Map 1: Bay of Plenty sites that received restoration planting in 2014–15 <Insert map here>	

Figure 1: Total number of sites at which restoration planting occurred in Bay of Plenty region <Simple line graph inserted here to show trend with time>	Figure 2: Total area of restoration planting undertaken by Community groups <Simple line graph inserted here to show trend with time>

16.13.1 Status of indicator M19 (ii): July 2015

Indicator M19 (ii) cannot be implemented at present. Barriers to its implementation are that the data required for Table 16-4 **do not readily exist** and will need to be derived by direct enquiry of the groups doing the planting. Each councils needs **to have a listing of the community groups in their region and their number of volunteers**; this is required also for M19 (i) and M20. Pan-council agreement is needed to **determine data standards** and then an active approach across councils is needed to **collate and curate data** in a way that allows repeated reporting. Nature Space (www.naturespace.org.nz) could may be a suitable repository for data to report on M19 (ii). If so, councils **need a plan to engage and negotiate** with its designers and organisers for access to suitable data, and to assess how much additional data councils would need to collect to report successfully on M19 (ii).

16.14 References

Balaguer L, Escudero A, Martín-Duque JF, Mola I, Aronson J 2014. The historical reference in restoration ecology: redefining a cornerstone concept. Biological Conservation 176: 12–20.

Hobbs RJ 2007. Setting effective and realistic restoration goals: key directions for research. Restoration Ecology 15: 354–357.

Lee W, McGlone M, Wright E compilers 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. Landcare Research Contract Report LC0405/122 to the Department of Conservation, Wellington. 216 p.

Miskelly CM, Powlesland RG 2013. Conservation translocations of New Zealand birds, 1863–2012. Notornis 60: 3–28

Seddon PJ 1999. Persistence without intervention: assessing success in wildlife re-introductions. Trends in Ecology & Evolution 14(12): 503.

Seddon PJ, Strauss WM, Innes J 2012. Animal translocations: what are they and why do we do them? In: Ewen JG, Armstrong DP, Parker KA, Seddon PJ eds. Reintroduction biology: integrating science and management. Oxford, UK, Wiley-Blackwell. Pp. 1–32.

16.15 Acknowledgements