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Indicator M18: Area and type of legal biodiversity protection

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Regional Councils' Biodiversity Monitoring Working Group

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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.

15 Indicator M18: Area and type of legal biodiversity protection

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15.1 Introduction

Biodiversity protection is complex, given that 'protection' encompasses how intent (reason for protection) and implementation (method of protection) combine to produce the outcome (result of protection). Complexity arises because different combinations of intent and implementation produce different outcomes, both expected and unexpected.

Specific areas are designated and delineated with the intent of protecting native/indigenous biodiversity worldwide. The extent of protected areas has increased over time globally (Chape et al. 2005) and within New Zealand (MfE 2010a). Much biodiversity protection occurs via legal mechanisms, such that the places protected become owned and managed by the Crown. A little over one-third of New Zealand's land area (defined as the North, South, Stewart and inshore islands) is public conservation land managed by numerous Crown agencies, principally the Department of Conservation (DOC), but also regional and local councils, for various purposes including biodiversity protection. Biodiversity protection also occurs on privately owned land. This includes lands owned and managed by non-governmental organisations (e.g. Native Forest Restoration Trust, www.nznfrt.org.nz), businesses, or individuals (e.g. forestry companies, iwi, farmers).

Biodiversity protection can also unintentionally result when intent and implementation are lacking. For example, natural succession processes can re-establish on abandoned lands and thereby benefit biodiversity.

15.2 Scoping and analysis

15.2.1 Elements informing Indicator M18

Within New Zealand, biodiversity protection occurs via a number of pathways that vary based on the combination of intent and implementation, leading to various outcomes. Monitoring trends will require knowing the extent to which different kinds of intent and implementation change over time. Therefore, we need the following *elements* to inform the indicator:

1. Area
2. Type of biodiversity protection
    a. Intent
    b. Implementation

3. Land status
    a. Public
    b. Private
        i. Business
        ii. Non-governmental organisation
        iii. Iwi
        iv. Family or individuals.

Below, we consider each of the three elements, including what they represent, how they might be measured, and any issues for discussion.

Area

Presumably, the spatial extent over which a particular type of biodiversity protection applies will be measured in hectares. However, we will need to consider whether or not to include or report on point data (e.g. protection of individual organisms such as a native tree).

We also need to consider the vertical axis, as protection might may or may not include belowground or aboveground aspects. For example, legal protection at the surface may not extend to mineral rights belowground, which could have implications should those mineral rights be exercised in a way that involves substantial ground disturbance.

Type of biodiversity protection

This will probably prove to be the most challenging aspect of the indicator given the various combinations of intent and implementation that currently exist and the outcomes that result. Table 15-1 provides a preliminary set of possible values for intent, implementation, and outcome.

Table 15-2 combines the different values of intent and implementation to produce a matrix of possible types of biodiversity protection (e.g. Primary-Voluntary). For each type, the table provides a basic definition, the timespan of implementation, and real-world examples.

Table 15-1 Possible values for intent, implementation, and outcomes for biodiversity protection

Aspect	Type	Comment
Intent	Primary	Biodiversity protection is the main purpose.
	Secondary	Biodiversity protection is a secondary purpose or one of several purposes.
	None	Biodiversity protection is not the purpose.
Implementation	Legal	Biodiversity protection occurs via formal legal mechanisms, such as laws, statutes, or rules.
	Informal	Biodiversity protection occurs via informal (e.g. voluntary) mechanisms, such as initiatives of landowners or land managers.
	Economic	Biodiversity protection occurs via market-based mechanisms (e.g. carbon markets, nutrient markets).
Outcome	Total	Biodiversity is protected relative to the stated intent.
	Partial	Biodiversity is partially protected relative to stated intent.
	None	Biodiversity is not protected relative to the stated intent.

Table 15-2 Potential types of biodiversity protection based on considerations of intent and implementation

		Implementation		
		Legal	Voluntary	Economic
Intent	Primary	Areas protected via laws, statutes, or rules specifically to protect biodiversity Timespan: varies; in NZ ranges from 25 y (some Ngā Whenua Rāhui kawenata) to indefinite/in perpetuity (national parks, reserves Examples: National parks, reserves, legal covenants, regional parks	Areas where biodiversity is protected as a result of voluntary choices of land owners/managers Timespan: varies according to preferences of land owner Examples: Community restoration projects, landowner fencing of forest fragments, etc.	Areas protected for economic reasons specifically to protect biodiversity Timespan: varies Examples: biodiversity offsets
	Secondary	Areas protected to conserve/manage other assets or values but where biodiversity also benefits as a result Timespan: varies according to rules or plans Examples: Water quality protection in Wellington and Nelson city	Areas where land management results in biodiversity protection as a secondary or multiple outcome Timespan: dependent on continuation of a particular land use management/practices Examples: riparian planting, wetland restoration for water quality	Areas where biodiversity protection results from market-based mechanisms Timespan: varies based on market conditions/rules Examples: Carbon markets (e.g. Permanent Forest Sinks Initiative), nutrient markets (e.g. Lake Taupō)
	None	Areas where biodiversity protection occurs unintentionally as the result of legal mechanisms Timespan: depends on the period of time that the legal mechanism remains in force Example: Consent conditions that inadvertently provide biodiversity benefits	Areas where biodiversity benefits unintentionally from voluntary actions or inaction of the land owner/manager Timespan: depends on the longevity of the action/inaction Example: Neglect leading to restoration of biodiversity	Areas where biodiversity benefits unintentionally from economically motivated decisions Timespan: depends on the longevity of a particular decision Example: land abandonment from agriculture returning to forest

Land status

Land status refers to the owernship and/or management of the land: what organisation or entity controls the activities or use of the land? A simple definition of public land would be ‘any land owned by the Crown.’ Conversely, a simple definition of private land would be ‘any land not owned by the Crown’. Typically, the delineation between public and private land is made by separating the public conservation land managed by DOC from all other lands, usually because that is most practical given the availability of spatial data (i.e. a GIS layer) that delineates public conservation land managed by DOC. However, other government agencies manage public land for various purposes including biodiversity protection, especially several regional councils that manage significant areas of public land as networks of regional parks.

Private land therefore encompasses land owned and/or managed by truly private entities (e.g. businesses, families, iwi). However, it would also encompass a range of 'intermediate' institutions (i.e. those that straddle the concept of public/private to varying degrees). We will need to agree how to classify land owned by those intermediate institutions.

The following is a (non-exhaustive) list of land status types organised along a gradient from public to private.

1. Public
    a. Department of Conservation
    b. Territorial Local Authorities
        i. Regional councils
        ii. Unitary authorities
        iii. City councils
        iv. District councils
    c. Land Information New Zealand (LINZ), with respect to unallocated Crown Land

2. Intermediate
    a. State Owned Enterprises (e.g. Solid Energy, Landcorp)
    b. Crown Research Institutes
    c. Universities
    d. Housing NZ
    e. Council-controlled organisations (e.g. Ports of Auckland)

3. 'Truly' private
    a. Businesses (corporations, companies)
    b. Trusts
    c. Families
    d. Individuals
    e. Iwi

Table 15-3 populates the specific attributes needed for M18 according to the five reporting areas outlined in the document 'Regional council terrestrial biodiversity monitoring framework'.

Table 15-3 Preliminary population of the specifics of M18 against reporting areas

Statistic(s) to report	Area (hectares) of each type of biodiversity protection on private land Number of living specimens preserved on private land outside any other protected area on private land Ratio of area of type of biodiversity protection on private land protected to total area of private land in the region/district Ratio of total area of all types of biodiversity protection on private land to total area of private land in the region
Hierarchies of measures/elements indicating usefulness for reporting defined for each indicator	Not specified at the time pending further discussion of the considerations raised
Spatial and temporal analyses needed to interpret variability	Time-series of spatial data that tracks the temporal development of protected areas including start time and stop time, with the latter being either observed in the case of already expired areas of legal protection or expected future longevity in years
Reporting frequency rate(s)	At least annually; some elements may be updated more frequently, e.g. QEII covenants are updated quarterly
The relationships between each indicator and present patterns (e.g. in relation to management or land cover)	GIS overlay of types of protected areas and land cover Time-series data already exists for some types of biodiversity protection

15.2.2 Revision of M18

Following discussions at a project workshop with regional council representatives held on 25 October in Wellington, the Regional Council Biodiversity Working Group (RCBWG) revised the definition of M18 to include only legal biodiversity protection on private land (Maseyk 2011), as the forum recognised that voluntary or similar types of protection were too variable among regions to be consistently monitored and reported across regional councils. In addition the RCBWG indicated that M18 should clearly define what 'protection' and 'achieved' means. In light of those revisions, the scope of M18 was slightly modified to become 'Area and type of legal biodiversity protection on private land.'

At a subsequent meeting on 20 March 2012, the RCBWG further decided (RCBWG 2012) that

1) M18 should include biodiversity protection across all land (i.e. public and private)

2) M18 should use a NZ-specific framework solely based on the degree of legal protection of biodiversity while developing a parallel approach to categorise protection in the International Union for the Conservation of Nature (IUCN) framework to enable international reporting[17].

[17] The IUCN Protected Area classification system was assessed, but was deemed to be inappropriate for this purpose as it incorporates many drivers for protection other than biodiversity, which confuses the intent of this indicator measure.

By agreement, the revised definition of M18 is 'Area and type of legal biodiversity protection.'

15.3 Assessment of existing methodologies

15.3.1 Biodiversity protection measurement in New Zealand to date

Below is a brief overview of biodiversity protection reporting and measurement in New Zealand. The overview covers the period 1997 to the present summarised into four periods, which are discussed in more detail below:

1. 1997: New Zealand State of Environment Report

2. 2000: Bio-what?

3. 2004–2007: Snapshot of biodiversity protection and subsequent analyses

4. 2007 to current: New Zealand State of Environment Report 2007 and report cards.

Earlier reporting and measurement also occurred but are not summarised in this report.

1997: New Zealand State of Environment report

The 1997 State of Environment Report (MfE 1997) reported on the state of biodiversity protection in New Zealand. It reported a total of 7 976 475 hectares of protected land including 61 670 hectares of private land as reserved under conservation covenants or private agreements (pp. 9–146). Methods used to compile those data were not provided. The report noted that at least another 70 000 hectares of private land were committed for protection as of mid-1996 but were not yet gazetted. The report also categorised New Zealand's protected land, both public and private, into one of six categories according to the system used by the IUCN (Appendix 15 – provides the updated definitions for the current categories used as part of the World Database on Protected Areas (Dudley 2008) administered by the United Nations World Conservation Monitoring Centre in Cambridge, United Kingdom[18], and the associated classification of New Zealand's protected areas).

In 1998 the Ministry for the Environment's (MfE) Environment Performance Indicators Programme published a summary report on biodiversity indicators that included a proposed indicator for percentage/area of each of New Zealand's different environments under legal protection (MfE 1998, p. 14).

2000: Bio-what?

The next assessment to measure and quantify biodiversity protection on private land occurred as part of the *Bio-what?* project undertaken in the late 1990s by the Ministerial Advisory Committee for the Protection of Biodiversity on Private Land (Ministerial Advisory

[18] World Database on Protected Areas website: www.wdpa.org

Committee for the Protection of Biodiversity on Private Land 2000). The committee's report included an appendix listing estimates of indigenous forest occurring outside public conservation land managed by DOC in each region and district/city council. The estimates were based on a separate study (Froude 2000) that combined data on council land area, Māori land title, public conservation land, QEII covenants, and land cover (Land Cover Database Version 1, LCDB1). The committee reported (p. 19) that 205 000 hectares of private land were known to be protected by covenant or other legal protection (QEII, Ngā Whenua Rāhui, DOC covenants and protection via the Nature Heritage Trust). Both reports noted that it was not known what proportion of privately protected land received active and ongoing management such as weed or pest control, hence statistics on the amount of legal protection were to be taken as broad guidelines only.

2004–2007: Snapshot of biodiversity protection and subsequent analyses

The next round of analysis measuring protection of biodiversity on private land occurred in support of a joint 'snapshot' by the MfE, DOC and Local Government New Zealand to assess the status of biodiversity protection on private land (MfE et al. 2004). For that project repeatable methods and tools were developed (Rutledge et al. 2004) that combined data including land cover as a surrogate for ecosystem condition (Table 15-4), extent of legal protection, land environments (Leathwick et al. 2002) and territorial authority boundaries to evaluate representation of ecosystems in New Zealand's protected areas network (Figure 15-1). The analysis produced a database (Protected Areas of New Zealand, PAN-NZ) that identified unique combinations of input data layers (Figure 15-2) linked to their location via a raster (gridded) data layer (Figure 15-3). The database and grid layer can be queried to answer a range of questions. The PAN-NZ spatial layer is available from the 'Our Environment' website hosted by Landcare Research at http://ourenvironment.scinfo.org.nz/home.

For the snapshot project, the analysis determined the amount of remaining indigenous ecosystems (i.e. indigenous or native land cover) that was legally protected or not protected. Protected areas in the analyses included the public conservation land, regional parks (initially Auckland and Wellington, but later including new parks in Bay of Plenty and Whanganui–Manawatū regions), and private covenants (QEII and Ngā Whenua Rāhui covenants). Reporting of results occurred across a range of scales (national, regional, and local), extents (e.g. DOC conservancies, region and district boundaries), and land environments. The resulting database provided statistics on the amount of private land under legal protection for biodiversity benefits, typically reported as simply protected or not protected.

Table 15-4 New Zealand Land Cover Database Land Cover classes considered as native cover for analysis purposes

Alpine Grass/Herbfield	Grey Scrub	Mānuka and/or Kānuka
Alpine Gravel and Rocks	Herbaceous Freshwater Wetland	Matagouri
Broadleaved Indigenous Hardwoods	Herbaceous Saline Vegetation	Permanent Snow and Ice
Coastal Sand and Gravel	Indigenous Forest	River
Depleted Grassland	Lake and Pond	River and Lakeshore Gravel and Rock
Estuarine Open Water	Landslide	Sub-alpine Shrubland
Fernland	Mangrove	Tall Tussock Grassland
Flaxland		

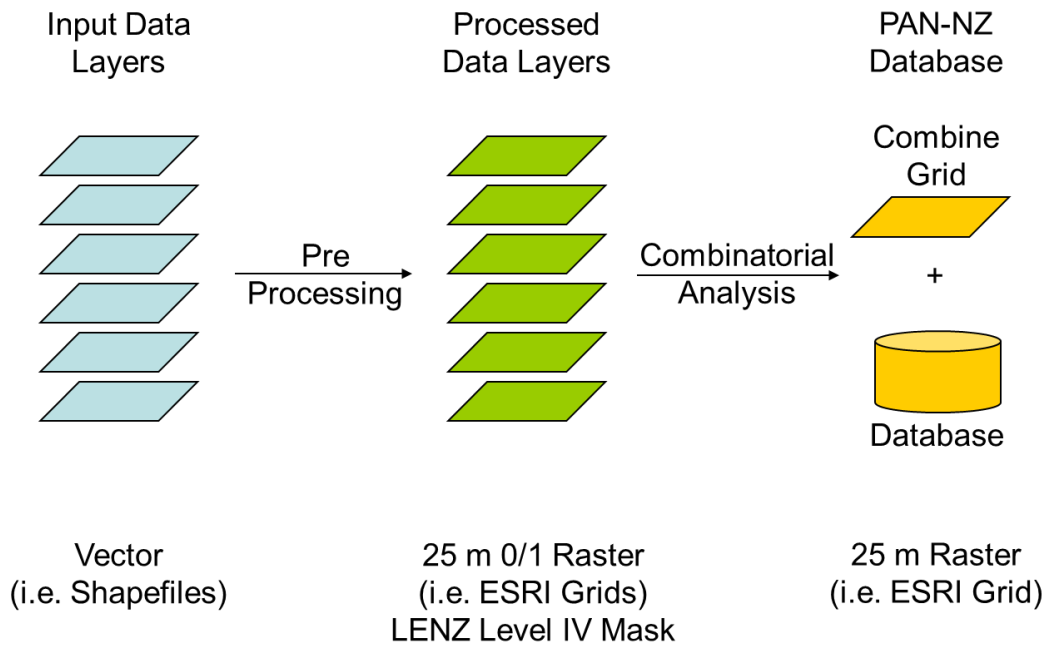

Figure 15-1 Schematic of methodology used to underpin biodiversity representation analyses.

Value	Count	Protected	arcnz_v02	doc_v2	nhf_cov2	qeii_v02	nwr_cov2	gw_cov2
1	127163881	1	0	1	0	0	0	0
2	289443166	0	0	0	0	0	0	0
3	659657	1	0	0	0	1	0	0
4	3361	1	0	1	0	1	0	0
5	1098571	1	0	0	0	0	1	0
6	128610	1	0	1	0	0	1	0
7	599826	1	1	0	0	0	0	0
8	51	1	1	0	0	1	0	0
9	651	1	1	1	0	0	0	0
10	58197	1	0	1	1	0	0	0
11	169259	1	0	0	1	0	0	0
12	105006	1	0	0	0	1	1	0
13	501	1	0	1	0	1	1	0
14	113	1	0	1	1	0	1	0
15	152342	1	0	0	0	0	0	1
16	2037	1	0	1	0	0	0	1
17	3	1	0	0	0	1	0	1
18	2381	1	0	1	1	1	0	0
19	9227	1	0	0	1	1	0	0

Figure 15-2 Example of database output from the combinatorial analysis used in biodiversity representation analyses. The values in column 1 are unique values that correspond to values in the associated raster (gridded) data layer.

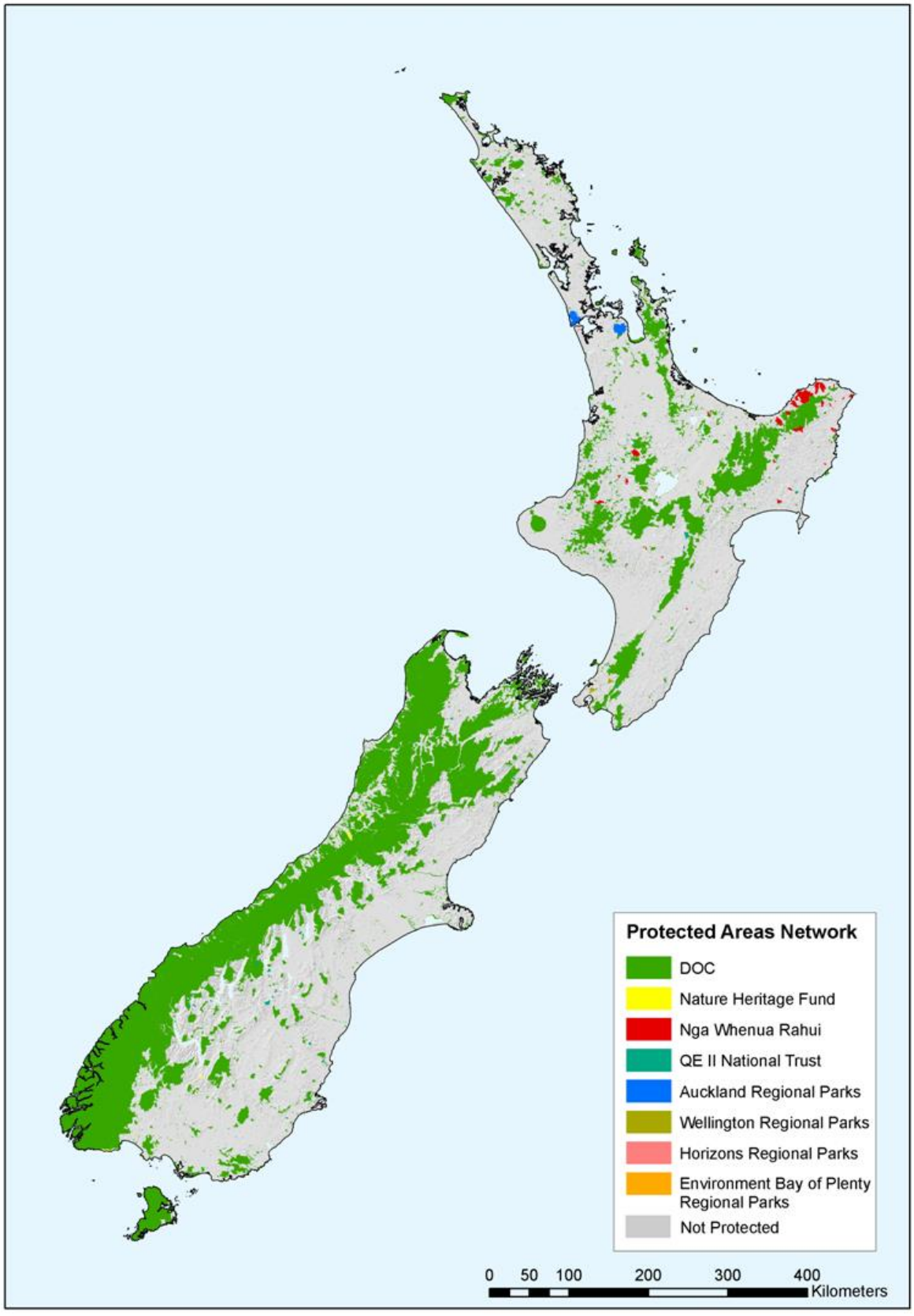

Figure 15-3 Example map showing New Zealand's Protected Areas Network.

The methods developed for the council snapshot report became the foundation for ongoing assessments of biodiversity protection on public and private land and have underpinned a series of analyses and development of guidelines across a range of scales including:

- classification of threatened land environments (Walker et al. 2006, 2007, 2008)
- condition and trends in coastal environments (Rutledge et al. 2007)
- national priorities for biodiversity protection on private land (MfE and DOC 2007)
- West Coast Region threatened environments analysis (Price & Briggs 2008).

2007 to current: New Zealand State of Environment report 2007 and report cards

The MfE produced a second national State of Environment report (MfE 2007) using the Council Snapshot methodologies and the most recent datasets at the time. The report indicated a total of 8 313 446 hectares of native land cover were legally protected, or about 62.41% of all native land cover. The amount reported represents an increase of 336 971 (4.2%) hectares of area protected since the 1997 State of Environment report. The increase represented 1.3% of New Zealand's total area (three main islands plus inshore islands), or an annual rate of protection of 0.13% (c. 3400 hectares per annum).

The MfE is now committed to producing a national state of environment report every five years. In the intervening period, the MfE publishes 'environmental report cards' that provide updated information on the extent of New Zealand's protected areas networks. The MfE produced a protected areas environmental report card in 2010 (MfE 2010a, b). The report card indicated that 8 763 300 ha of native land cover, defined as land under LCDB land cover types considered native or indigenous, were legally protected, of which public conservation land accounted for 8 525 000 ha and private conservation land accounted for 238 300 ha. Overall, legally protected area increased by 449 854 hectares from 2007 to 2010, a gain of c. 4.9%. The report card attributed three-quarters of that gain to results of the High Country Tenure Review process, in which land leased by the Crown primarily for grazing was either transferred to public conservation land or made freehold.

In addition to state of environment reporting, the methods and derived indicators support a number of biodiversity policy initiatives including the proposed National Policy Statement on Biodiversity as well as several regional and city/district council biodiversity monitoring and reporting efforts (e.g. Greater Wellington Regional Council, Kapiti Coast District Council, Whangarei District Council, etc.).

Protected Areas Network survey

In 2008, a survey was undertaken to assess the state of data on protected lands across New Zealand, with a particular focus on estimating protected areas held by city and district councils (Rutledge et al. 2008). Based on the results of a survey, it was estimated that at least 85 000 hectares of legally protected area were not included in the datasets used to undertake the above analyses. Furthermore, that figure was considered an underestimate given that only a portion of councils responded to the survey. Some portion of the missing data will include private land protected under conservation covenants or other conservation agreements and hence would be relevant to M18.

15.3.2 Conclusion

The methodologies to measure, analyse, and report on the area and type of biodiversity protection on private land are well in hand and have been used in an ongoing manner for the past eight years. Landcare Research maintains an unofficial database on New Zealand's protected areas (current at July 2014) that include readily available data sources (public conservation land from DOC, regional parks, QEII covenants, Ngā Whenua Rāhui covenants). With the release of the cadastral database, we now also have access to parcel information that includes previously unavailable data on local parks and reserves that could be included in future analyses. Furthermore, future analyses can be enhanced by including procedures to reclassify New Zealand protected areas into the international system used by the UN World Conservation Monitoring Centre for the World Database on Protected Areas (i.e. IUCN system) to facilitate international monitoring, reporting and data sharing.

The main challenge to calculating and reporting M18 will be obtaining the outstanding data to complete the protected area network dataset, particularly data from city and district councils. This will include information on extent of protection (i.e. spatial boundaries) and purpose of protection. Some regions and districts have compiled spatial datasets delineating protected areas, although as the results of the recent survey indicated, the availability, quality and currency of the data varies widely.

15.4 Methodology and reporting format

15.4.1 13.3.1 Introduction

In New Zealand legal protection for biodiversity occurs via several mechanisms, ranging from national legislation with the direct purpose of protecting biodiversity to indirect protection of biodiversity via a range of other legal mechanisms including plans, consents, and memorandums of understanding. Direct protection results when actions are taken under legislation in which biodiversity protection is the main or one of the main purposes. Indirect protection results when actions are taken to satisfy legal requirements (e.g. erosion control) in which biodiversity protection is not the primary or even the intended purpose but is nonetheless an outcome of the action.

15.4.2 Legal mechanisms for protection for biodiversity

In New Zealand legal mechanisms for biodiversity protection ultimately derive from national legislation. The pathway can be direct in that legislation can specifically target biodiversity protection as a main purpose, either individually or in combination with other purposes. The pathway can be indirect in that legislation targeting other goals or purposes also leads to beneficial biodiversity outcomes. Table 15-5 below summarises the nationally relevant legislation that provides for biodiversity protection, either directly or indirectly.

Table 15-5 National legislation providing for biodiversity protection and associated pathways

Legislation	Pathway to Protection
Conservation Act 1987	Direct
Land Transfer Act 1952	Direct
Local Government Act 2002	Indirect
National Parks Act 1980	Direct
Marine Reserves Act 1971	Direct
Public Reserves Act 1881	Direct
Queen Elizabeth II National Trust Act 1977	Direct
Reserves Act 1977	Direct
Resource Management Act 1991	Direct and Indirect
River Boards Act 1908	Indirect
Soil Conservation and Rivers Control Act 1951	Indirect
Te Ture Whenua Māori Act 1993	Direct
Waitangi Endowment Act 1932-33	Indirect
Wildlife Act 1953	Direct

Legislation may also have one or more mechanisms for biodiversity protection. For example, the National Parks Act provides for biodiversity protection singly through designation of areas as national parks, whereas the Reserves Act includes several different types and pathways for biodiversity protection on both public and private land.

The legal mechanism establishes the potential for biodiversity protection as well as the duration of protection. Most direct forms of legal protection are for an indefinite time period. In some cases the word ‘perpetuity’ is used.

As well as the nationally relevant legislation, there are also several Acts that enable the protection of biodiversity values at a local or regional scale. The mechanisms that they enable should also be classified accordingly based on the degree of protection that they provide for biodiversity as provided for below. Examples of local or regionally relevant legislation are: Waitangi Endowment Act, Waitakere Ranges Heritage Area Act, Wellington Regional Water Board Act 1972, Wellington (City) Town Belt Reserves Act 1908, and the City of Dunedin Lands Vesting Act 1906.

15.4.3 Classification of areas legally protected for biodiversity for reporting purposes

A six-level (0–5) ranked classification scheme was developed to report on legal protection for biodiversity protection, in consultation with council representatives (Table 15-6). A recommended scheme is provided for ranking specific types of legal protection for biodiversity (e.g. wildlife sanctuaries, Ngā Whenua Rāhui kawenata) within the classification. The ranks span a range from ‘high’, in which biodiversity protection is the

main or one of the main goals, to 'low', in which some degree of biodiversity protection may occur indirectly or unintentionally. Overall, areas with higher rankings tend to be more effective at retaining habitat, primarily by placing more stringent restrictions on human activities. The highest rank (5) represents areas where biodiversity protection is the main purpose or is ranked equally with a limited number of other compatible purposes. The lowest rank or protection (1) represents areas where some legal protection of biodiversity occurs fortuitously and is not the main purpose. A rank of zero (0) indicates legal protection is absent. The ranking also reflects the duration of protection. Higher ranked areas tend to have longer durations of protection, including many that have indefinite (i.e. 'in perpetuity') protection. In contrast, lower ranked areas tend to have shorter durations of protection or/and a lower level of security.

Table 15-6 Classification for areas legally protected for biodiversity

Rank	Description	Example
5	High degree of biodiversity protection; protection is the main purpose or is ranked equally with a limited number of other compatible purposes	Wildlife Sanctuary
4	Moderately high degree of biodiversity protection; protection is a main purpose but is shared with other, less compatible purposes (i.e. recreation)	Conservation Park
3	Moderate degree of biodiversity protection; protection is a desired purpose but subject to compatibility with a different main purpose or may be less comprehensive (i.e. only some aspects of biodiversity protection are targeted)	Ecological Area
2	Moderately low degree of biodiversity protection; some biodiversity protection is achieved but it is of secondary importance	Recreation Reserve
1	Low degree of biodiversity protection; protection results indirectly and fortuitously as a result of other activities	Road Reserve
0	No legal protection for biodiversity	c. 65% of New Zealand

Table 15-7 provides guidance for the classification of specific types of biodiversity protection as shown in Table 15-6. The majority of the types listed appear directly in legislation (Table 15-5) targeting biodiversity protection to some degree. The remainder include types of biodiversity protection that arise indirectly from other activities.

Table 15-7 Classification of areas legally protected for biodiversity purposes

Class	Designation	Legal Mechanism
5	**National Park**	**National Parks Act 1980**
	Purpose: s 4 Preserving areas in perpetuity as national parks, for their intrinsic worth and for the benefit, use, and enjoyment of the public, areas that contain scenery of such distinctive quality, ecological systems, ornate natural features so beautiful, unique, or scientifically important that their preservation is in the national interest; including that they shall be preserved as far as possible in their natural state and native plants and animals shall as far as possible be preserved and the introduced plants and animals shall as far as possible be exterminated	
5	**Nature Reserve**	**Reserves Act 1977**
	Purpose: s 20 (1) Protect and preserve in perpetuity indigenous flora or fauna or natural features that are of such rarity, scientific interest or importance, or so unique that their protection and preservation are in the public interest.	
5	**Sanctuary Area**	**Conservation Act 1987**
	Purpose: s 22 Preserve areas in their natural state indigenous plants and animals in it, and for scientific and other similar purposes shall be preserved as far as possible in its natural state.	
5	**Scientific Reserve**	**Reserves Act 1977**
	Purpose: s 21 (1) Protect and preserve in perpetuity for scientific study, research, education, and the benefit of the country, ecological associations, plant or animal communities, types of soil, geomorphological phenomena, and like matters of special interest; (2) (a) indigenous flora and fauna shall as far as possible be preserved and the exotic flora and fauna shall as far as possible be exterminated; (c) where scenic, historic, archaeological, biological, or natural features are present those features shall be managed and protected to the extent compatible with the principal or primary purpose of the reserve; (d) to the extent possible compatible with the principal or primary purpose, maintain value as a soil, water, and forest conservation area; (e) with consent, manipulate for experimental purposes or to gain further scientific knowledge.	
5	**Water Conservation Order**	**Resource Management Act 1991**
	Purpose: s 199 (1) The purpose of a water conservation order is to recognise and sustain – (a) outstanding amenity or intrinsic values which are afforded by waters in their natural state: (b) where waters are no longer in their natural state, the amenity or intrinsic values of those waters which in themselves warrant protection because they are considered outstanding. (2) A water conservation order may provide for any of the following: (a)the preservation as far as possible in its natural state of any water body that is considered to be outstanding: (b) the protection of characteristics which any water body has or contributes to, and which are considered to be outstanding, – (i) as a habitat for terrestrial or aquatic organisms: (ii) as a fishery: (iii) for its wild, scenic, or other natural characteristics: (iv) for scientific and ecological values: (v) for recreational, historical, spiritual, or cultural purposes.	
5	**Wilderness Area**	**Conservation Act 1987**
	Purpose: s 20 Preserve areas for their indigenous natural resources and exclude machinery, buildings, livestock, vehicles, motorised vessels, roads, tracks and trails.	
5	**Wildlife Management Area**	**Conservation Act 1987**
	Purpose: s 23B Protect areas for their wildlife and wildlife habitat values (including the capacity for the movement of wildlife, genetic material of indigenous plants, and genetic material of wildlife)	
5	**Wildlife Sanctuary**	**Wildlife Act 1953**
	Purpose: (s 10) Preserve areas where all wildlife shall be absolutely protected; s 9 (2) prohibit or restrict (a) right of entry, (b) hunting or killing, capturing, disturbing, harrying, molesting, or worrying, taking eggs or spawn of any creature, taking for any purpose of or interference with vegetation of any	

Class	Designation	Legal Mechanism
	description, or introduction or liberation of any living creature or the eggs or spawn of any living creature, or introduction or planting of any vegetation of any description or the spores or seeds of any vegetation of any description, (c) burning or clearing by any means whatsoever of any trees, shrubs, grasses, or other plant life, (d) camping or any other specified form of sport or relaxation, (e) lighting of fires or the doing of anything likely to cause a fire, (f) use of boats and vehicles, (g) wilful disturbance of wildlife in the sanctuary by flying aircraft over the sanctuary or by noise in the vicinity, (h) use of firearms or explosives, (i) taking or keeping of domestic animals or domestic birds into or in the sanctuary, (j) depositing of rubbish and the leaving of litter, (m) cutting, construction, or maintenance of private roads, tracks, tramways, or other means of access or communication, (n) pollution of any by means of rubbish, sewage, industrial waste, mining debris, saw mill refuse, or any other means, (o) other matters as may be considered necessary for the control of the sanctuary or for the protection and wellbeing of any wildlife or vegetation therein.	
4	**Amenity Areas**	**Conservation Act 1987**
	Purpose: s 23A Protect areas for their indigenous natural and historic resources, facilitate people's appreciation of them, and foster recreational activities.	
4	**Conservation Covenant**	**Reserves Act 1977**
	Purpose: s 77 Any private land or any Crown land held under Crown lease that should be managed so as to preserve the natural environment, or landscape amenity, or wildlife or freshwater-life or marine-life habitat, or historical value, and that the particular purpose or purposes can be achieved without acquiring the ownership of the land, or, as the case may be, of the lessee's interest in the land, for a reserve, may treat and agree with the owner or lessee for a covenant to provide for the management of that land in a manner that will achieve the particular purpose or purposes of conservation.	
4	**Conservation Park**	**Conservation Act 1987**
	Purpose: s 19 Protect natural resources while facilitating public recreation and enjoyment.	
4	**Māori Reservation (Wetland or Scenic Reserve)**	**Tu Ture Whenua Māori Act 1993**
	The chief executive may, by notice in the Gazette issued on the recommendation of the court, set apart as Māori reservation any Māori freehold land or any General land—(a) for the purposes of a village site, marae, meeting place, recreation ground, sports ground, bathing place, church site, building site, burial ground, landing place, fishing ground, spring, well, timber reserve, catchment area or other source of water supply, or place of cultural, historical, or scenic interest, or for any other specified purpose; or (b) that is a wāhi tapu, being a place of special significance according to tikanga Māori.	
4	**QEII Open Space Covenant**	**Queen Elizabeth II National Trust Act 1977**
	Purpose: s. 2 Preserve any area of land or body of water that serves to preserve or to facilitate the preservation of any landscape of aesthetic, cultural, recreational, scenic, scientific, or social interest or value. (These are usually in perpetuity.)	
4	**Protected Private Land**	**Reserves Act 1977**
	Purpose: s 76 Land possessing such qualities of natural, scientific, scenic, historic, cultural, archaeological, geological, or other interest that its protection is desirable in the public interest, or that rare species of indigenous flora or fauna are on the land, and the preservation of such flora and fauna is in the public interest, and that the land is sufficiently fenced or is otherwise protected from damage by stock.	
4	**Scenic Reserve**	**Reserves Act 1977**
	Purpose: s 19 (1) (a) protecting and preserving in perpetuity for their intrinsic worth and for the benefit, enjoyment, and use of the public, suitable areas possessing such qualities of scenic interest, beauty, or natural features or landscape that their protection and preservation are desirable in the public interest; (b) providing, in appropriate circumstances, suitable areas which by development and	

Class	Designation	Legal Mechanism
	the introduction of flora, whether indigenous or exotic, will become of such scenic interest or beauty that their development, protection, and preservation are desirable in the public interest; (2) (a) the indigenous flora and fauna, ecological associations, and natural environment and beauty shall as far as possible be preserved, and for this purpose, except where determined otherwise, exotic flora and fauna shall as far as possible be exterminated; (b) the public shall have freedom of entry and access to the reserve; (c) to the extent compatible open portions of the reserve may be developed for amenities and facilities where these are necessary to enable the public to obtain benefit and enjoyment.	
4	**Watercourse Area**	**Conservation Act 1987 § 23**
	Purpose: s 23 Protect the wild, scenic, and other natural or recreational characteristics present when considered with the associated river, lake, or stream concerned.	
4	**Wildlife Refuge**	**Wildlife Act 1953**
	Purpose: s 14 (3) Areas where it is unlawful for any person to hunt or kill for any purpose, or molest, capture, disturb, harry, or worry any wildlife in the wildlife refuge, or to take, destroy, or disturb the nests, eggs, or spawn of any such wildlife, or for any person to bring onto the wildlife refuge or have in his possession or discharge in the wildlife refuge any firearm or explosive, or have in his possession or control in the wildlife refuge any dog or cat, or to do anything likely to cause any wildlife to leave the wildlife refuge; (1)(f) prohibit or restrict the pollution by means of rubbish, sewage, industrial waste, mining debris, saw mill refuse, or any other means, (1A) prohibit or restrict the use of boats; (2) authorised persons may keep or bring domestic animals; keep or bring firearms or explosives; discharge firearms or explosives; destroy any animals specified, perform any other acts necessary for the carrying on of the normal use of the land, subject to any specified conditions.	
3	**Ecological Area**	**Conservation Act 1987**
	Purpose: s 21 Managed to protect the values for which it is held	
3	**Government Purpose Reserve (Ecological or Wildlife)**	**Reserves Act 1977**
	Purpose: s 22 (1) providing and retaining areas for such Government purpose or purposes as are specified in any classification of the reserve; (2) may be classified for wildlife management or for other specified wildlife purposes; (4) (a) where scenic, historic, archaeological, biological, cultural, scientific, or natural features or wildlife are present on the reserve, those features or wildlife shall be managed and protected to the extent compatible with the principal or primary purpose of the reserve; (b) to the extent compatible with the principal or primary purpose, value as a soil, water and forest conservation area shall be maintained; (5) may prohibit access to the whole or part of the reserve, or, as the case may be, the whole or any specified part of that part of the reserve, and no person shall be entitled to enter the reserve or, as the case may be, the part specified in the notice, except under the authority of a permit	
3	**Māori Reservation (Conservation or Conservation of Native Bush)**	**Tu Ture Whenua Māori Act 1993**
	The chief executive may, by notice in the Gazette issued on the recommendation of the court, set apart as Māori reservation any Māori freehold land or any General land—(a) for the purposes of a village site, marae, meeting place, recreation ground, sports ground, bathing place, church site, building site, burial ground, landing place, fishing ground, spring, well, timber reserve, catchment area or other source of water supply, or place of cultural, historical, or scenic interest, or for any other specified purpose; or (b) that is a wāhi tapu, being a place of special significance according to tikanga Māori.	
3	**Ngā Whenua Rāhui Kawenata**	**Reserves Act 1977**
	Purpose: s 77A (1) (a) Māori land or Crown land held under a Crown lease by Māori managed to preserve and protect – (i) the natural environment, landscape amenity, wildlife or freshwater-life or marine-life habitat, or historical value of the land; or (ii) the spiritual and cultural values which Māori associate with the land, (b) a Ngā Whenua Rāhui kawenata under this section may be in perpetuity or	

Class	Designation	Legal Mechanism
	for any specific term or may be in perpetuity subject to a condition that at agreed intervals of not less than 25 years, and usually for a term renewable after a 25 year period.	
3	**Local Purpose Reserve (Ecological)**	**Reserves Act 1977**
	Purpose: s 23 (1) providing and retaining areas for such local purpose or purposes as are specified in any classification of the reserve; (2) (a) where scenic, historic, archaeological, biological, cultural, scientific, or natural features or wildlife are present on the reserve, those features or wildlife shall be managed and protected to the extent compatible with the principal or primary purpose of the reserve; (b) to the extent compatible with the principal or primary purpose, value as a soil, water and forest conservation area shall be maintained; (3) where vested in a local authority or where the administering body is a local authority, may prohibit access to the whole or any specified part of the reserve, and in that case no person shall enter the reserve or, as the case may be, that part, except under the authority of a permit issued by the local authority; (4) may prohibit access to the whole or any specified part of the reserve, and in that case no person shall enter the reserve or, as the case may be, that part, except under authority of a permit	
3	**Stewardship Area**	**Conservation Act 1987**
	Purpose: s 25 Managed so that natural and historic resources are protected.	
3	**Wildlife Management Reserve**	**Wildlife Act 1953**
	Purpose: s 14 (3) Impose conditions in relation to all or any of the matters specified in s 9(2) (see Wildlife Sanctuary above)	
2	**Esplanade Reserve or Strip**	**Resource Management Act 1991**
	Purpose: s 229 An esplanade reserve or an esplanade strip has 1 or more of the following purposes: (a) to contribute to the protection of conservation values by, in particular – (i) maintaining or enhancing the natural functioning of the adjacent sea, river, or lake; or (ii) maintaining or enhancing water quality; or (iii) maintaining or enhancing aquatic habitats; or (iv)protecting the natural values associated with the esplanade reserve or an esplanade strip or (v) mitigating natural hazards; or (b) to enable public access to or along any sea, river, or lake; or (c) to enable public recreational use of the esplanade reserve or esplanade strip and adjacent sea, river, or lake, where the use is compatible with conservation values. s 230 An esplanade reserve 20 metres in width shall be set aside… along the mark of mean high water springs of the sea, and along the bank of any river or along the margin of any lake.	
2	**Historic Reserve**	**Reserves Act 1977**
	Purpose: s 18 (1) protecting and preserving in perpetuity such places, objects, and natural features, and such things there on or therein contained as are of historic, archaeological, cultural, educational, and other special interest; (2) (c) where scenic, archaeological, geological, biological, or other scientific features, or indigenous flora or fauna, or wildlife are present on the reserve, those features or that flora or fauna or wildlife shall be managed and protected to the extent compatible with the principal or primary purpose; (d) to the extent compatible with the principal or primary purpose of the reserve, its value as a soil, water, and forest conservation area shall be maintained; (e) except where otherwise determined, the indigenous flora and fauna and natural environment shall as far as possible be preserved	
2	**Local Purpose Reserve (Other – various)**	**Reserves Act 1977**
	Purpose: s 23 (1) for the purpose of providing and retaining areas for such local purpose or purposes as are specified in any classification of the reserve. (2) Every local purpose reserve shall be so administered and maintained under the appropriate provisions of this Act that – (a) where scenic, historic, archaeological, biological, or natural features are present on the reserve, those features shall be managed and protected to the extent compatible with the principal or primary purpose of the reserve.	

Class	Designation	Legal Mechanism
2	**Māori Reservation (Various purposes related to Recreation, Camping, Water Supply, Meeting Places, Historic Significance, etc.)**	**Tu Ture Whenua Māori Act 1993**
	The chief executive may, by notice in the Gazette issued on the recommendation of the court, set apart as Māori reservation any Māori freehold land or any General land—(a) for the purposes of a village site, marae, meeting place, recreation ground, sports ground, bathing place, church site, building site, burial ground, landing place, fishing ground, spring, well, timber reserve, catchment area or other source of water supply, or place of cultural, historical, or scenic interest, or for any other specified purpose; or (b) that is a wāhi tapu, being a place of special significance according to tikanga Māori.	
2	**Marginal Strip**	**Conservation Act 1987**
	Purpose: Part 4A s 24 (1) Any strip of land 20 metres wide extending along and abutting the landward margin of (a) any foreshore; or (b) the normal level of the bed of any lake not subject to control by artificial means; or (c) the bed of any river or any stream (not being a canal under the control of a State enterprise within the meaning of section 2 of the State-Owned Enterprises Act 1986 and used by the State enterprise for, or as part of any scheme for, the generation of electricity), being a bed that has an average width of 3 metres or more; (2) any land extending along and abutting the landward margin of any lake controlled by artificial means a strip of land that – (a) is 20 metres wide; or (b) has a width extending from the maximum operating water level to the maximum flood level of the lake – whichever is greater	
2	**Consent Notice**	**Resource Management Act 1991**
	Purpose: s 221 (1) Where a subdivision consent is granted subject to a condition to be complied with on a continuing basis by the subdividing owner and subsequent owners… the territorial authority shall… issue a consent notice specifying any such condition. (4) Every consent notice shall be deemed – (b) to be a covenant running with the land when registered under the Land Transfer Act 1952, and shall… bind all subsequent owners of the land.	
2	**Recreation Reserve**	**Reserves Act 1977**
	Purpose: s 17 (1) providing areas for the recreation and sporting activities and the physical welfare and enjoyment of the public, and for the protection of the natural environment and beauty of the countryside, with emphasis on the retention of open spaces and on outdoor recreational activities, including recreational tracks in the countryside; (2) (b) where scenic, historic, archaeological, biological, geological, or other scientific features or indigenous flora or fauna or wildlife are present, those features or that flora or fauna or wildlife shall be managed and protected to the extent compatible with the principal or primary purpose of the reserve; (c) those qualities of the reserve which contribute to the pleasantness, harmony, and cohesion of the natural environment and to the better use and enjoyment of the reserve shall be conserved; (d) to the extent compatible with the principal or primary purpose, its value as a soil, water, and forest conservation area shall be maintained	
2	**Regional Parks**	**Local Government Act 2002**
	Purpose: s 139 (1) (a) means land – (i) owned by regional councils; and (ii) acquired or used principally for community, recreational, environmental, cultural, or spiritual purposes; and (b) includes land within the meaning of paragraph (a) that is – (i) reserve within meaning 2(1) of the Reserves Act 1977; or (ii) otherwise held or administered under the Reserves Act 1977 or any earlier corresponding enactment	
1	**Māori Reservation (Various purposes related to Marae, Pā Sites, Papakāinga, Urupā, Wāhi Tapu, etc.)**	**Tu Ture Whenua Māori Act 1993**

Class	Designation	Legal Mechanism
	The chief executive may, by notice in the Gazette issued on the recommendation of the court, set apart as Māori reservation any Māori freehold land or any General land—(a) for the purposes of a village site, marae, meeting place, recreation ground, sports ground, bathing place, church site, building site, burial ground, landing place, fishing ground, spring, well, timber reserve, catchment area or other source of water supply, or place of cultural, historical, or scenic interest, or for any other specified purpose; or (b) that is a wāhi tapu, being a place of special significance according to tikanga Māori.	
1	**River Bed**	**River Boards Act 1908**
	Purpose: 73 (1) All rivers, streams, and watercourses within any river district constituted under this Act, whether or not the same are navigable or are altered by the ebb and flow of the tide, shall be to all intents and purposes within and subject to the jurisdiction of the Board, so far as may be requisite for the construction or maintenance of any works necessary to prevent or lessen any damage which may be occasioned by the overflow or the breaking of the banks of the same.	
1	**Road Reserve**	**Reserves Act 1977**
	Purpose: s 111 (1) Where any land is vested in the Crown or in any local authority for the purposes of a road reserve and the land is required for the purposes of a road, the land may be dedicated as a road by notice under the hand of the Minister or, as the case may be, by resolution of the local authority, and lodged with the District Land Registrar. (2) For the purposes of this section the term road includes any road, street, access way, or service lane; and the expression road reserve has a corresponding meaning.	
0	**No legal protection**	

15.5 Data management and access requirements

Data management and access consists of four interrelated considerations: sampling, analysis, reporting, and curation, which together comprise the work flow needed to inform M18 (Figure 15-4 and Figure 15-5).

- Sampling – acquiring and compiling the data required to inform M18
- Analysis – the calculation of M18 following agreed methods and protocols
- Reporting – communication of the results of the analyses
- Curation – the long-term (permanent) storage of the fundamental data, methods, results of analyses, and/or resulting indicators and associated reports.

Historically, management and access for data on areas legally protected for biodiversity occurred primarily in a federated fashion. To varying degrees, different organisations have acquired data for areas legally protected for biodiversity for which they have responsibility. Periodically different organisations, including regional councils, have then compiled and analysed available data on areas legally-protected for biodiversity to support various policy and planning, monitoring and reporting requirements.

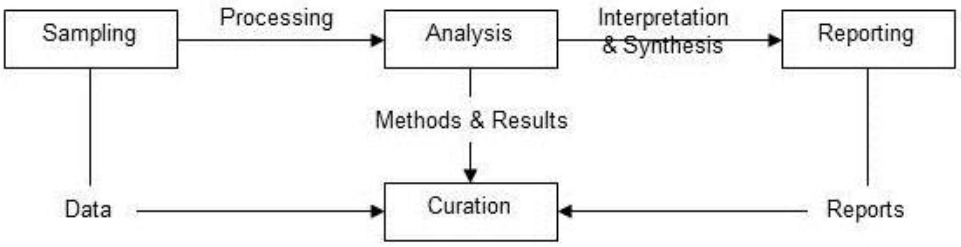

Figure 15-4 Overview of work flow for Indicator M18.

Of the four elements, data acquisition is currently and will continue to remain for the foreseeable future the responsibility of each organisation that administers or manages areas legally protected for biodiversity. Those organisations principally include DOC, the Queen Elizabeth II National Trust, Ngā Whenua Rāhui, regional councils, unitary authorities, and city and district councils.

15.5.1 Current Data Management

Currently all four elements occur in a federated manner, in the sense that regional councils (and other organisations) independently sample (acquire and compile), analyse, report and curate information on the status of areas legally protected for biodiversity within their own jurisdiction. As result, data are replicated and curated across regional councils, and analysis and reporting varies across councils as well (Figure 15-5).

For national analyses, MfE and Landcare Research, working independently or together, have carried out similar processes to analyse areas legally protected for biodiversity. The main difference from regional council efforts is that both MfE and Landcare Research efforts resulting centralised storage of data for legally-protected areas for biodiversity. In particular, Landcare Research methods produced a comprehensive, spatially-referenced database (PAN-NZ) that can be queried and augmented to address a range of questions across a range of scales (see section 15.3.1 for more details on the methodology).

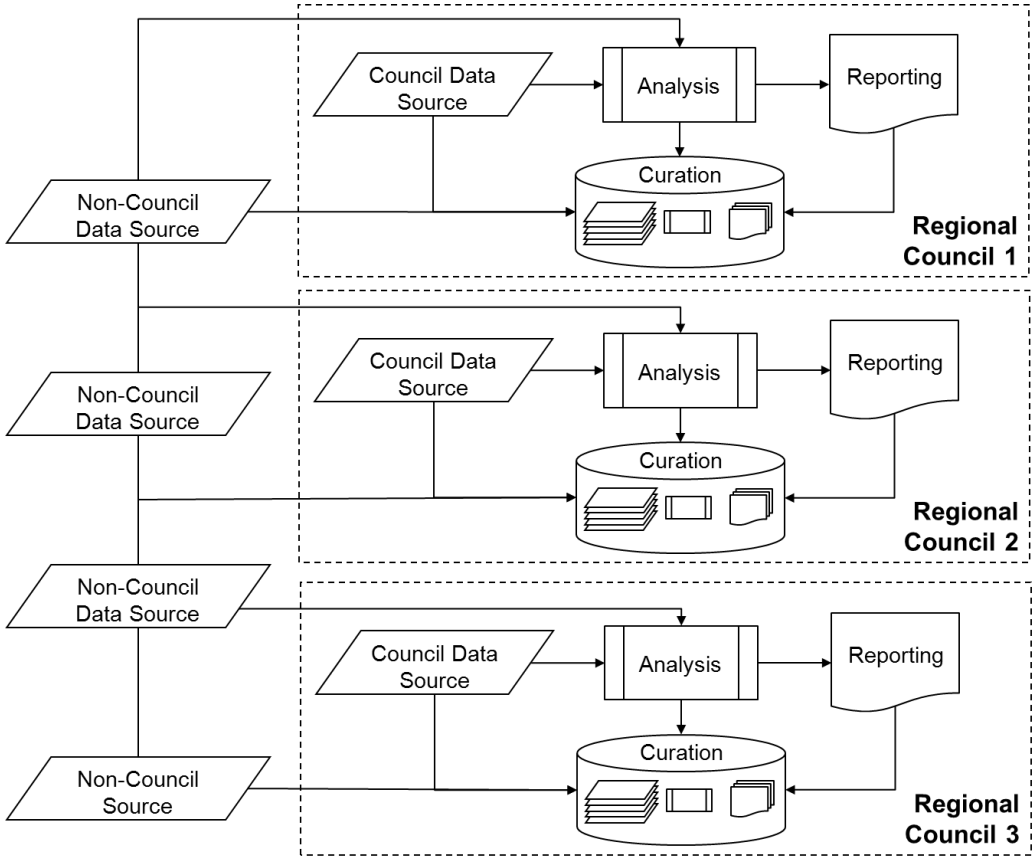

Figure 15-5 Conceptual illustration of the current approach to analysis and reporting of areas legally protected for biodiversity by regional councils. Only three regional councils are shown for simplicity.

During the project participants discussed sharing of data and results to support broader (i.e. national) analyses. While council representatives broadly supported the idea during development of M18, they agreed to postpone its further consideration.

Note that data compiled for M18 are needed to inform M12 ('Change in extent and protection of indigenous cover or habitats or naturally rare ecosystems'). Data compiled for M18 also inform M13 ('Extent of legal protection of threatened species habitat').

15.5.2 Data Management: A Proposed Short-term Solution

The fundamental data, methods, and results of analysis should be properly curated to support longitudinal analyses and evaluation of trends in areas legally protected for biodiversity over time. Proper curation will help ensure that as new data becomes available we can accurately assess and partition how the protected areas network changes because of a) real additions or subtractions from the network or b) new data becoming available that identifies previously unidentified protected areas. In the latter case, a revision of previous estimates would be required to avoid spurious changes in extent of protection or at least to attribute the changes to the appropriate point in time. As highlighted above, the current approach results in duplication of effort as well as proliferation of datasets across regional councils. This can lead to issues of consistency, accuracy, reliability, and longevity.

In the long term, several initiatives show promise for developing a more coordinated, repeatable and robust process for analysing and reporting on the areas legally protected for

biodiversity by regional councils. The most relevant initiatives include the proposed national environment reporting initiatives, the Land Resources Support System and the Integrated Biodiversity Management System.

However, those initiatives will not come to fruition in time to support the current project. An interim, simple, short-term solution to facilitate data management for M18 will meet the immediate needs of the regional councils while also supporting a long-term transition to a more coordinated system.

In the interim, all key non-council data consisting of public conservation estate data (managed by DOC), Ngā Whenua Rāhui kawenata data (obtained directly rather than as part of the public conservation estate dataset, and QE II covenant data (obtained via regular QEII updates), analysis methods, and reporting formats are stored in a centralised location (Figure 15-6). Some data on protected areas managed by entities (e.g. public trusts) that may not be funded or otherwise able to provide data will not be included at this point and indeed may be extremely difficult to source at all in the future.

Each regional council accesses non-council data, methods and reporting standards from the centralised location using secure downloading facilities. Each council then undertakes its own analysis using available in-house capabilities or with tools provided by Landcare Research. After completing the analysis and generating reports following agreed standard formats, each council uploads its own data, analysis results, and reports. A council may also choose to curate data, methods, and results in-house.

The interim solution aims to streamline access to data and to promote consistency of analysis and reporting until such time as more sophisticated methods become available (e.g. semi-automated data sharing or web-enabled work flows).

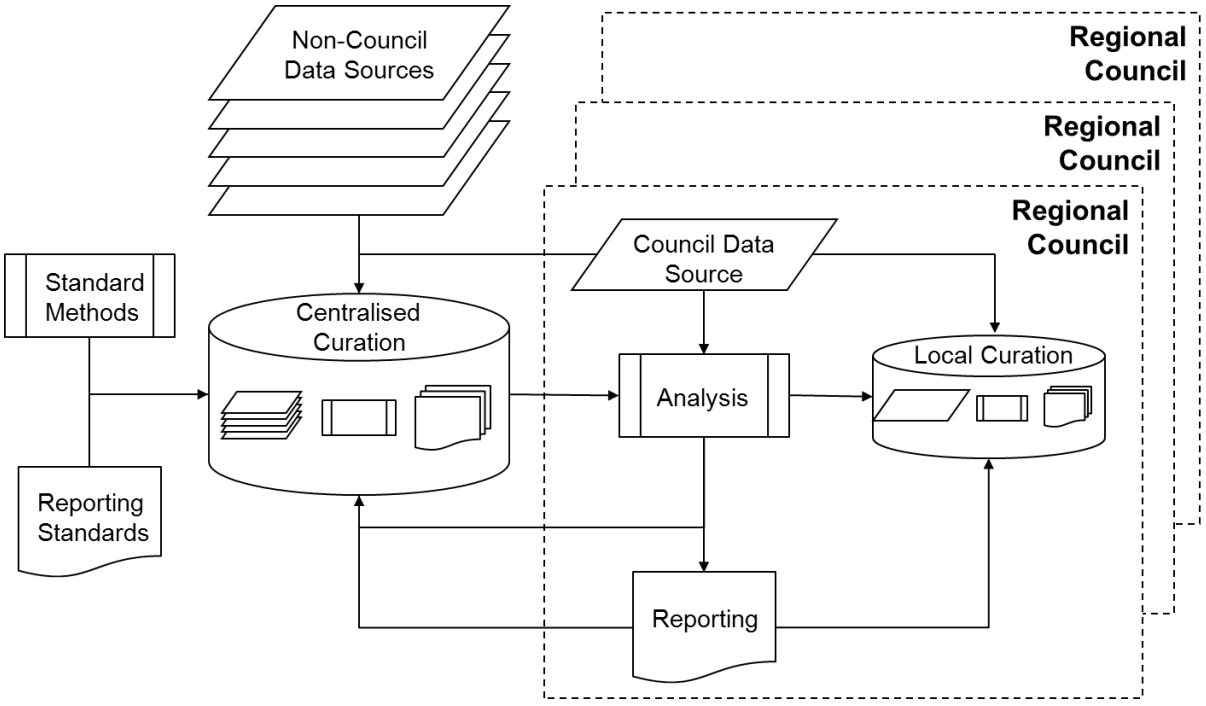

Figure 15-6 Proposed short-term interim solution for data management for M18.

15.5.3 Conclusion

Regional councils need to **formulate, agree and implement a more formal approach to ensure consistency, credibility and accountability**. This will require decisions regarding how much or how little data management and access should eventually be centralised versus federated, and development of relevant standards and protocols. In the long term, emerging approaches and methods in informatics and data interoperability coupled with various initiatives at the national and regional level may partly or wholly address data management and access issues by establishing a relatively seamless process and rendering moot the choice between centralisation and federation.

The interim solution that allowed reporting of M18 in July 2014 was that Landcare Research collected and curated all available data on areas legally protected for biodiversity in a centralised repository and made that data available, subject to any limitations stipulated by the data owners, to all regional councils via a simple secure download facility. This interim solution could be repeated in future, with regional councils in turn analysing and reporting on M18, using the centrally stored datasets as the basis for analysis. Reporting will follow agreed content and format as outlined in section 15.7. Regional councils will then upload their reports to the secure facility for further use by other councils or agencies. The interim solution would require that Landcare Research curates the data, methods and reports until a more permanent system is available.

15.6 Methodology for calculating M18

The methods for classifying and calculating the status of areas legally protected for biodiversity in a region are outlined in Table 15-8.

For the initial generation and reporting of M18, councils could choose to use existing applications available from Landcare Research: LANDCLASS (LANDscape CLassification and Analysis Support System) and a combinatorial analysis software programme (Figure 15-7). The LANDCLASS tool will assist with reclassifying input data into the six-category legal protection classification following consistent classification rules. The combinatorial analysis uses the reclassified data as input and produces a database showing all unique combinations of input data and an associated spatial data layer (raster or grid layer). The database and spatial data layer can be queried as needed to generate desired indices and produce a variety of associated supporting reports and maps.

Regional councils are free to use their own analytical procedures, provided they are consistent. However, LANDCLASS provides the advantage that all councils can develop, share, and work from a single set of methods, thus avoiding any questions of inconsistency.

Table 15-8 Methodology for calculating M18

1	Develop a database of spatially referenced information for all protected areas in the region.	Information on some protected areas may already exist (e.g. public conservation land layer maintained by DOC). Based on previous research on protected areas, information on other protected areas may not exist yet in a spatially referenced form and may require investment to develop.
2	Reclassify areas of legally protected areas into the six-level classification scheme in Table 15-6.	Within a geographic information system, this would involve creating an additional field as an integer variable of the attribute table (e.g. of an ESRI shapefile) and coding the field for each record with the appropriate classification number from Table 15-6.
3	Overlay the reclassified regional protected areas spatial data layer with a regional boundary spatial data layer.	Exact overlay procedures vary depending on the analysis package used and whether analysis is done in a vector or raster environment. Landcare Research recommends use of a Union analysis to retain all information from both sets of input data to enable identification of spatial mismatches, e.g. areas where protected areas boundaries may fall outside regional boundaries due to differences in representation of the coastline. District boundaries could also be included to generate statistics at the district level.
4	Calculate the total area of each class of protected area occurring in each region for use in reporting.	Exact calculation procedures vary depending on the analysis package. Most packages include facilities for performing summary statistics that report total area for a selected field for either all records or a selected subset of records.

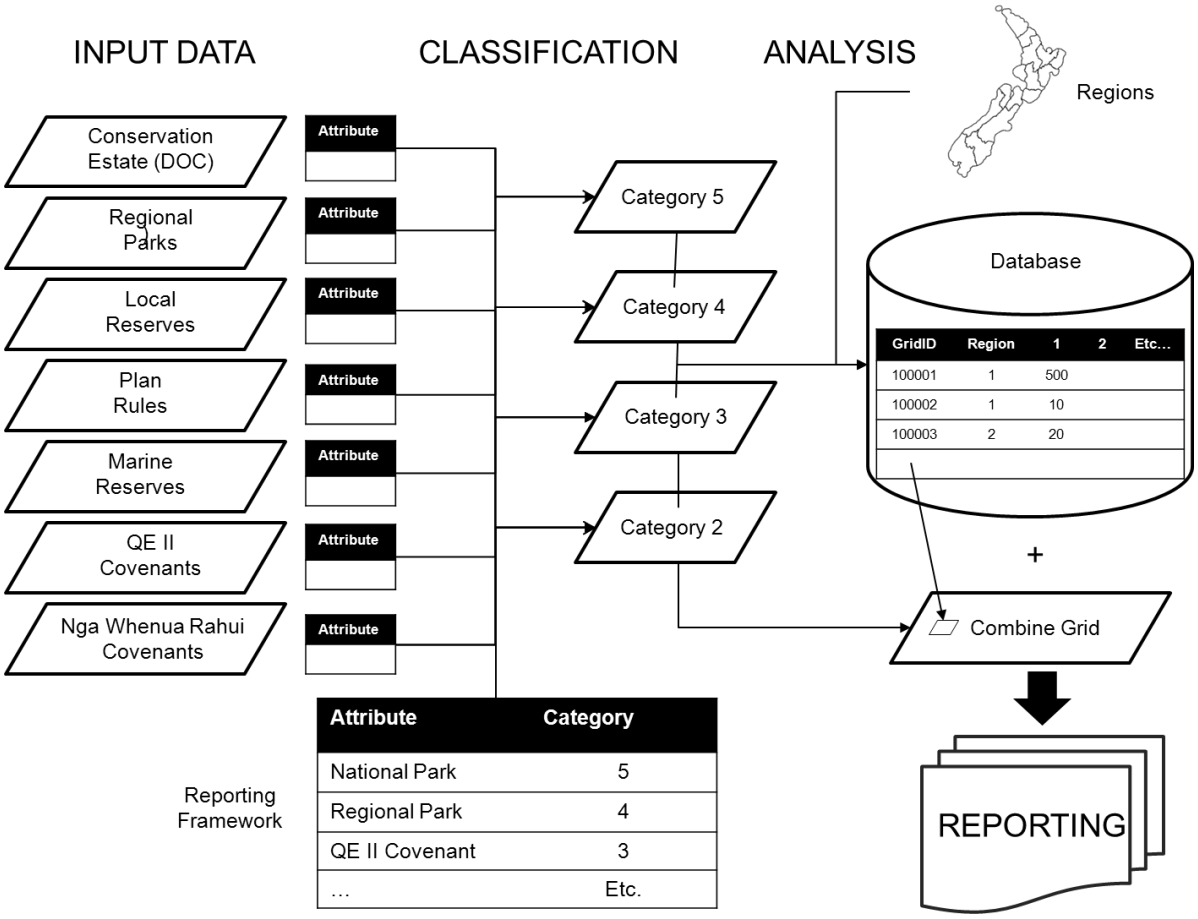

Figure 15-7 Schematic representation of the work flow for generating and reporting M18.

15.7 Reporting format

For reporting M18, we recommend following a similar format to that used by the MfE in their 'Snapshot Reports' prepared as part of national state of the environment reporting[19]. The report would be structured as follows:

1. Key points
2. Brief introduction
    a. Overview of legal protection classification
3. Current status of areas legally protected for biodiversity
    a. Short explanatory paragraph
    b. Map of current location of legal protection by the six-level classification

[19] http://www.mfe.govt.nz/environmental-reporting/report-cards/biodiversity/2010/index.html

c. Table summarising current statistics, i.e. total area for each legal protection class within the region. Note that the combinatorial analysis programme mentioned earlier would also facilitate reporting at the district level

4. Trends

   a. Short explanatory paragraph
   b. Map showing gains, losses and unchanged areas of legal protection since the last report
   c. Transition matrix showing changes from/to different classes (or notable changes in types) of legal protection
   d. Graph showing trends in legal protection both overall and for each category of protection. The graph should show all available historical data. Over time the graph should show an increasingly longer time span. The map and transition matrix will summarise the changes between the current time and the previous report

5. Overview of methods (or perhaps as an appendix)

6. References

15.8 Relationship to other biodiversity indicators

The information on legally protected areas compiled for M18 is relevant to other biodiversity indicators already completed or under development for the project.

Indicator M12 ('Change in extent and protection of indigenous cover or habitats or naturally rare ecosystems') will also need protected areas data to determine the extent to which indigenous land cover and naturally rare ecosystems are legally protected within a region. Indicators M12 and M18 could be linked to produce a matrix that facilitates reporting of extent and protection of indigenous land cover and naturally rare ecosystems by the six-level legal protection classification (see Table 15-9 for an example).

Other indicators involving assessment of areal extent of different biodiversity components such as M13 ('Threatened species habitat') will benefit from analysis with protected area data to help gauge the security of those components depending on the degree of legal protection currently afforded and used to identify future conservation targets.

Table 15-9 Example reporting format linking Indicators M12 and M18

Indigenous cover class or naturally rare ecosystem	Extent in region (hectares)	Area protected by legal protection class (hectares)						Total area protected (hectares)	% Area protected
		0	1	2	3	4	5		
Class 1									
Class 2									
Class 3									
Etc…									
…									
…									

15.9 References

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Appendix 15 – IUCN Protected Area management categories

Code	Name	Description	New Zealand Protected Areas*	
Ia	Strict Nature Preserve	Category Ia protected areas are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring	National Parks Act of 1980	Specially protected areas
			Conservation Act 1987	Ecological areas Sanctuary areas
			Reserves Act 1977	Nature reserves Scientific reserves
			Wildlife Act 1987	Wildlife sanctuaries
			Marine Reserves Act 1971	Marine reserves
			Marine Mammal Protection Act 1978	Marine mammal sanctuaries
			Fisheries Act 1983 & Harbours Act 1950	Marine parks
			Sugar Loaf Islands Marine Protected Area Act 1991	Marine protected areas
Ib	Wilderness Area	Category Ib protected areas are usually large, unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.	National Parks Act of 1980	Wilderness areas
			Conservation Act 1987	Wilderness areas
II	National Park	Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.	National Parks Act of 1980	National parks (balance)
			Conservation Act 1987	Conservation parks
			Reserves Act 1977	National reserves
III	National Monument or Feature	Category III protected areas are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.	Reserves Act 1977	Historic reserves Scenic reserves Wildlife purpose reserves

Code	Name	Description	New Zealand Protected Areas*	
IV	Habitat/Species Management Areas	Category IV protected areas aim to protect particular species or habitats and management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.	Conservation Act 1987	Stewardship areas Private land reserved under conservation covenants or private agreements
			Wildlife Act 1987	Wildlife refuges and management areas
			Reserves Act 1977	Private land reserved under conservation covenants or private agreements
V	Protected Landscape/ Seascape	Category V protected areas are where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.	Reserves Act 1977	Recreation and other reserves
VI	Protected area with sustainable use of natural resources	Category VI protected areas conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level, non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.		

* Refer to New Zealand State of the Environment Report 1997, Tables 9–38, Pages 9–146.