Threatened Environment Classification for the West Coast Region, New Zealand

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Summary

Project and Client

This report was prepared for the West Coast Regional Council as part of an Environmental Small Advice Grant provided by FRST. The report updates the Threatened Environment Classification of Walker et al. (2006; 2008) for indigenous cover within LENZ Level IV environments, for the West Coast Region and its Districts.

Objectives

To identify the status of the LENZ environments of the West Coast Regional Council area in terms of the Threatened Environment Classification, and to quantify the degree of indigenous cover remaining in the West Coast Region; and Buller, Grey and Westland Districts.

Methods

For this analysis we used the 500-level 4 LENZ environments, the 2006 regional and District Council boundaries from the LINZ database (via Statistics New Zealand), and an in-house Protected Areas dataset compiled in July 2008 from Department of Conservation, QEII covenants, and a number of regional parks. The LCDB2 was used to determine Indigenous cover.

Results

The West Coast Region has only 2.3% of its area within LENZ Level IV environments that are classified as one of the five 'threatened environments' (i.e. either Acutely Threatened, Chronically Threatened, At Risk, Critically Underprotected or Underprotected) against a national mean for regions of 45%. Of the 86 LENZ level IV Environments in the West Coast, 11 would be classified as 'threatened environments'. There are no LENZ Environments in the West Coast region in the category with the highest level of threat (Acutely Threatened: < 10% indigenous vegetation left).

Conclusions

Much of the area of the West Coast Region is of LENZ environments classified as "Less Reduced and Better Protected" nationally. This means that relatively high proportions of the LENZ environments in the West Coast Region retain some form or indigenous cover, and most have legal protection across > 20% of their land area. Within the West Coast Region, the Buller District contains all the remaining (identified) indigenous cover of land that falls within environments that are nationally classified as 'threatened environments'. There are similar areas of indigenous cover of At Risk environments in each of the districts.

Recommendations

A number of environments of limited extent or vulnerable nationally may warrant further protection. A spatial investigation of the remaining Indigenous Cover in these LENZ environments may be warranted. Data suitable for such a study have been prepared during this study but fell outside the scope of the project.

Introduction

The West Coast Regional Council, situated on the West Coast of the South Island New Zealand is comprised of three Districts: Buller, Grey and Westland. In total, these districts cover nearly 2.3 M hectares.

We classified the Level IV LENZ environments that occur within the West Coast Regional Council boundaries according to a Threatened Environment Classification of the Land Environments of New Zealand (Leathwick et al. 2003a; hereafter referred to as LENZ). This classification was developed by Walker et al. (2006, 2008), and a guide for users (Walker et al. 2007) is available on the web (http://www.biocommunity.org.nz/detail.php?ar_id=10080). We have used up-to-date information on legal protection status for this analysis.

Background

The West Coast Regional Council is about to review policy 9.2, the Regional Policy Statement. To enable properly informed decisions to be made it is necessary to accurately evaluate the status of the land environment of the West Coast Region.

Nearly a third of the New Zealand landscape is covered by some form of legal protection (DOC 2003; Rutledge et al. 2008). However, there is considerable disparity both among and within LENZ environments in the degree of historic loss and modification of indigenous cover and natural ecosystems, and in the degree of legal protection for natural heritage. Many of the more productive lowland environments, and parts of environments, that are amenable to the many forms of agriculture and development contain severely reduced and poorly protected indigenous biodiversity (Leathwick et al. 2003b).

The Threatened Environment Classification is a source of broad- (i.e. national-) scale background information: specifically, it provides information on how much native (indigenous) cover remains within a land environment; its legal protection status; and how past vegetation loss and legal protection are distributed across New Zealand's landscape. In the Threatened Environment Classification, each of the 500 land environments (the 500 units identified at Level IV of LENZ) is assigned one of six threat categories on the basis of:

a) past loss of indigenous vegetation ('% indigenous vegetation left') as interpreted by indigenous land cover, and
b) current legal protection ('% protected').

LENZ (and hence the Threatened Environment Classification) is a tool suitable for use at broad scales. For example, it can provide an understanding of the average status of a LENZ environment or LENZ environments, and it may be used to make broad comparisons about the degree of past loss and current protection status among regions or districts.

However, it is important to note that LENZ (and hence the Threatened Environment Classification) is *not* a tool suitable for use in ecological assessment (or land-use capability assessment) at local or fine scales (Walker et al. 2007). Land environments are not uniform entities, and each land environment contains within it a variety of abiotic conditions, and of

living ecosystems and habitats. Limited by the relatively coarse resolution of its underlying datasets, LENZ has insufficient resolution to distinguish variation within environments which may be important both ecologically and for human land use. Many ecosystems, habitats and community types are poorly discriminated by LENZ (including but not restricted to limestone outcrops (karst), saline habitats, geothermal, coastal habitats influenced by wind and salt spray, lowland forest types, and various freshwater, wetland and floodplain ecosystem types) and may be more or less reduced and protected than the LENZ as a whole. These include originally rare ecosystems (Williams et al. 2007), as well as induced-rare ecosystems (those that have been reduced to rarity in New Zealand since human settlement). Thus, even those environments that are less reduced and better protected on average, may include ecosystem types that are distinctive and/or disproportionately reduced and poorly protected, at national, regional or local scales.

In the West Coast Region, for example, LENZ is unlikely to distinguish fertile, relatively well-drained landforms that are better suited to agricultural development, from less fertile hillslopes and/or poorly drained sites within the same land environment. Fertile well-drained landforms are often the most productive portions of environments, and may naturally support lowland podocarp forest ecosystems dominated by trees of particularly high value for timber. Such ecosystems may be much reduced and poorly protected nationally, regionally and locally, despite a land environment being Less Reduced and Better Protected overall.

The Threatened Environment Classification was designed to identify environments that are threatened and or under-protected. This classification is not designed to, and should not be used to, attempt to identify areas within Environments that are not threatened.

Objectives

The aim of this study is to provide a quantitative assessment of the threatened environment status of LENZ environments within the West Coast Region. This information is to be used to assist Policy decisions by the West Coast Regional in the review of the Regional Policy Statement.

Rather than re-analyse the results of the 2005 study, we have used the most recently available Protected Areas Network data, and updated Regional and Council boundaries. This has added slightly to the cost of undertaking the exercise but provides the most up-to-date information.

Methods

Underlying data

We used a methodology consistent with earlier investigations into remaining indigenous cover (Rutledge et al. 2003; Walker et al. 2006, 2008).

The following datasets underlie the analysis:

1. Land Environments of New Zealand Level IV (LENZ)
2. Land Cover Database version 2 (LCDB2; Thompson et al. 2003; Terralink 2004) was used to determine indigenous cover

3. Protection – a national database of protected lands (this database is held and administered by Landcare Research, with permissions from relevant agencies to use their data for this purpose). This was compiled in July 2008 from the most recent available data
4. Regional and District boundaries derived from LINZ data via the Meshblock database.

LENZ

The Land Environments of New Zealand Level IV (LENZ; Leathwick et al. 2003a,b) classification explicitly identifies the diversity of New Zealand's terrestrial environments, and therefore defines the likely past (i.e. prehuman) extent of different terrestrial ecosystems and their associated biodiversity. The proportions of a land environment remaining in indigenous cover or legally protected provide useful indices of how well the ecosystems, habitats, and biodiversity associated with that environment are depleted and/or protected.

LCDB2

Definitions of indigenous vegetation used in New Zealand vary widely. Consistent with our definition of significance for biodiversity objectives, we suggest indigenous vegetation for survey purposes be defined as *vegetation supporting indigenous species*. This recognises that the physiognomic (structural) or numeric dominance (richness) of indigenous species on the ground is not the critical issue; what determines significance for biodiversity is whether or not the vegetation of an area (whether predominantly native or exotic) contributes to the maintenance of indigenous biodiversity across the landscape. Due to coastline and other discrepancies between datasets, there are small areas of LENZ where no LCDB2 value is given. We have conservatively allocated this as non indigenous cover.

Table 1 Indigenous status of LCDB2 land cover classes used in this report

Indigenous Cover	Non Indigenous Cover
Alpine Grass-/Herbfield	Afforestation (imaged, post LCDB 1)
Alpine Gravel and Rock	Afforestation (not imaged)
Broadleaved Indigenous Hardwoods	Built-up Area
Coastal Sand and Gravel	Deciduous Hardwoods
Depleted Grassland	Dump
Estuarine Open Water	Forest –– Harvested
Fernland	Gorse and or Broom
Flaxland	High Producing Exotic Grassland
Grey Scrub	Low Producing Grassland
Herbaceous Freshwater Vegetation	Major Shelterbelts
Herbaceous Saline Vegetation	Minor Shelterbelts
Indigenous Forest	Mixed Exotic Shrubland
Lake and Pond	Orchard and Other Perennial Crops
Landslide	Other Exotic Forest
Mangrove	Pine Forest – Closed Canopy
Manuka and or Kanuka	Pine Forest – Open Canopy
Matagouri	Short-rotation Cropland
Permanent Snow and Ice	Surface Mine
River	Transport Infrastructure
River and Lakeshore Gravel and Rock	Urban Parkland/Open Space
Sub Alpine Shrubland	Vineyard
Tall Tussock Grassland	Areas with no LCDB cover

Protected Areas

While no formal National Protected database exists for New Zealand (Rutledge et al. 2008), Landcare Research has maintained a PAN-NZ database for use in research projects. This has been compiled using datasets including Department of Conservation lands, QEII National Trust covenants, Nga Whenua Rahui convenants, and regional parks. For this project we used the most recent version, compiled in July 2008.

Regional and District Boundaries

We have used the District Boundaries derived from the 2006 Statistics New Zealand Census database, being the most recent boundaries readily available for analysis.

Threat Classification

We have used the threat classification of Walker et al. (2005a, 2005), and included a Restricted Extent category within the Less Reduced and Better Protected Category to indicate that while percentage Indigenous and Protected may be above thresholds, the environment itself is less than 1000 ha (within Area of Interest, Nationally or Regionally).

Table 2 Definitions of Threat Classification categories

Category	Criteria	Name
1	< 10% indigenous vegetation left	Acutely Threatened
2	10–20% indigenous vegetation left	Chronically Threatened
3	20–30% indigenous vegetation left	At Risk
4	> 30% left and < 10% protected	Critically Underprotected
5	> 30% left and 10–20% protected	Underprotected
6	> 30% left and > 20% protected	Less Reduced and Better Protected
6	*< 1000 hectares total extent, but not classified as 1–5*	*Restricted Extent*

Analysis

All data sets have been prepared as 25-m Raster data layers in the ESRI Raster format. To remain consistent with previous analysis datasets were prepared using the New Zealand Map Grid projection.

The Raster datasets were analysed to produce an aspatial database by a technique known as Combinatorial Analysis using software developed in C++ by Landcare Research. SQL queries were developed to summarise the data in the database, and the results were exported to Excel spreadsheets using Visual Basic. A summary spreadsheet was created manually for release to the client.

As a consequence of the methodology, a spatial dataset (raster or grid layer) exists that can be used for more explicit spatial analyses, and mapping.

5 Results

The results of this Analysis are presented in an XLS Workbook that accompanies this report.

A summary of the results in the workbook are presented below. Three maps have been appended to this report to show the distribution of the categories of the Threatened Environment Classification within the Buller, Grey and Westland Districts.

Total land areas for this analysis for the national (whole of New Zealand), regional (West Coast Region) and District areas are listed in Table 3. Figures are rounded from analysis precision of 1/16 of a hectare.

Table 3 Total reportable land area within categories of the Threatened Environment Classification (in ha).

Threat Category	National (ha)	West Coast Region (ha)	Buller District (ha)	Grey District (ha)	Westland District (ha)
1. Acutely Threatened	5 501 592				
2. Chronically Threatened	2 661 654	1671	1,671		
3. At Risk	2 723 146	51 306	18 034	11 578	21 544
4. Critically Underprotected	246 765				
5. Underprotected	686 049	40	40		
6. Less Reduced and Better Protected	14 401 896	2 244 428	769 747	330 953	1 142 473
6. Restricted Extent[1]	3697	282	282		
Total Area Threatened	11 819 205	53 017	19 745	11 578	21 544
Total Area	**26 224 798**	**2 297 727**	**789 774**	**342 531**	**1 164 018**
% Total Area Threatened	45.07%	2.31%	2.50%	3.38%	1.85%

The West Coast region has 86 LENZ units at level IV, of which 13 are classified as Threatened or At Risk or Underprotected at a National level. Maps (see Apendix) show the distribution of the Threatened Environments.

Table 4 Number of LENZ Level IV Environments within categories of the Threatened Environment Classification (in ha). Results for National and Regional level calculations.

	National		West Coast			
Threat Category	National	West Coast	Region	Buller District	Grey District	Westland District
1. Acutely Threatened	142	0	1	1	0	0
2. Chronically Threatened	80	3	1	1	0	0
3. At Risk	54	6	2	4	2	1
4. Critically Underprotected	18	3	23	22	11	13
5. Underprotected	19	1	0	0	0	0
6. Less Reduced and Better Protected	0	0	0	0	0	0
6. Restricted Extent	3	0	12	12	12	9
Total	501	86	86	69	41	48

[1] Restricted Extent is not part of the original threat classification but has been included here as a way of highlighting environments whose limited total area may make them especially vulnerable. (see Table 2)

There are no LENZ IV Environments nationally classified as Acutely Threatened within the West Coast Region.

Three environments classified Nationally as Chronically Threatened LENZ IV are found in the West Coast Region and, as is detailed in Table 5, are restricted to the Buller District within the West Coast Region.

Table 5 Total Area of LENZ Level IV Environments classified as Chronically Threatened

	Extent of Environment (ha):				
Chronically Threatened **(LENZ IV)**	National	West Coast Region	Buller Districtr	Grey District	Westland District
C1.1a	8208	1431	1431	0	0
F3.3b	14 533	0	0	0	0
F5.1b	19 998	241	241	0	0

Six LENZ IV Environments within the West Coast District are considered At Risk nationally. These are:

Table 6 Total Area of LENZ Level IV Environments classified as At Risk

	Extent of Environment (ha):				
At Risk **(LENZ IV)**	National	West Coast Region	Buller District	Grey District	Westland District
F5.1a	11 229	2741	2630	0	0
H1.1a	11 044	2620	2618	0	0
K1.1e	6014	22	22	0	0
M2.1a	45 005	43 839	10 673	11 578	21 544
M2.2a	6173	2097	2097	0	0
M2.2b	10 171	4	4	0	0
Total Area	89 636	4958	4956	0	0

Three LENZ Level IV Environments found within the West Coast District are classified as Threatened Nationally. The total Area of each of these Environments is tabulated in Table 7

Table 7. Total Area of LENZ Lvl IV Environments in the West Coast Region classified nationally as Critically Underprotected

	Extent of Environment (ha):				
Critically Underprotected **(LENZ IV)**	National	West Coast Region	Buller District	Grey District	Westland District
Q1.1c	261 255	443	443	0	0
Q1.2a	195 531	4	4	0	0
Q3.3c	118 472	1	1	0	0
Total Area	605 975	474	474	0	0

Only one LENX IV Environment found within the West Coast region is classified as Underprotected nationally:

Table 8. Total Area of LENZ Level IV Environments classified as Underprotected

	Extent of Environment (ha):				
Underprotected (LENZ IV)	National	West Coast Region	Buller District	Grey District	Westland District
I1.1a	1167	40	40	0	0

There is some capacity within the Buller District of the West Coast Region to increase the protection of the LENZ Level IV Environments with threat classifications. Table 9 shows the area of Indigenous Not Protected. Environment M2.1a, for example, has nearly all its remaining indigenous cover that is not protected in the West Coast Region.

Table 9 Area of Indigenous Cover Not Protected (INP) for LENZ Level IV Environments that are classified as 'threatened environments' nationally.

		Area of INP Within West Coast (ha):				
LENZ IV	Threat Classification	National	West Coast Region	Buller District	Grey District	Westland District
C1.1a	2. Chronically Threatened	641	302	302	0	0
F3.3b	2. Chronically Threatened	1862	0	0	0	0
F5.1a	3. At Risk	1728	669	606	0	0
F5.1b	2. Chronically Threatened	1961	56	56	0	0
H1.1a	3. At Risk	1383	354	352	0	0
I1.1a	5. Underprotected	444	21	21	0	0
K1.1e	3. At Risk	1238	0	0	0	0
M2.1a	3. At Risk	5934	5915	1674	2015	2183
M2.2a	3. At Risk	739	164	164	0	0
M2.2b	3. At Risk	1606	0	0	0	0
Q1.1c	4. Critically Underprotected	161 396	0	0	0	0
Q1.2a	4. Critically Underprotected	110 900	0	0	0	0
Q3.3c	4. Critically Underprotected	79 787	0	0	0	0

Conclusions

Compared with the National average, the West Coast Region has a relatively small extent of its LENZ Level IV environments within those Environments identified as either Threatened, At Risk, or Underprotected.

- There is scope to increase the Legal protection for 7 of the 13 LENZ environments nationally classified as Threatened, At Risk, or Underprotected.
- The Buller District contains a number of LENZ Level IV Environments that are either threatened or under-protected nationally, and that have extent Indigenous Not Protected Lands.
- Environments **C1.1a (**Chronically Threatened) and **M2.1a** (At Risk) have remaining Indigenous Not Protected cover almost entirely restricted to the West Coast Region.
- Environments that are Less Reduced and Better Protected on average may contain ecosystems or habitat and community types that are distinctive and/or disproportionately reduced and poorly protected at national, regional or local scales.

Recommendations

- This report and accompanying spreadsheet detail the LENZ environments within the West Coast Region. Further analyses of these data, possibly spatial, may be of value in enhancing policy development, or providing more explicit information to future questions in relation to policy development or resource management.
- West Coast Regional Council seeks, perhaps through an Envirolink Medium Advice grant, to develop tools such as quantitative datasets and analysis techniques for suitable finer resolution classifications, and vegetation and protection maps at regional and local scales. These would supplement the Threatened Environment Classification for ecological assessment, to determine the degree of loss and the protection status of ecosystems, habitats and communities.

Acknowledgements

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Williams PA, SK Wiser, B Clarkson, M Stanley 2007. New Zealand's historically rare terrestrial ecoosystems set in a physical and physiognomic framework. New Zealand Journal of Ecology 31: 119–128.Appendix 1 Maps of the Threatened Environment extents for the three regions within the West Coast Region.

Appendix 1

Fig. 1 Map of the distribution of threatened environments within the Buller District

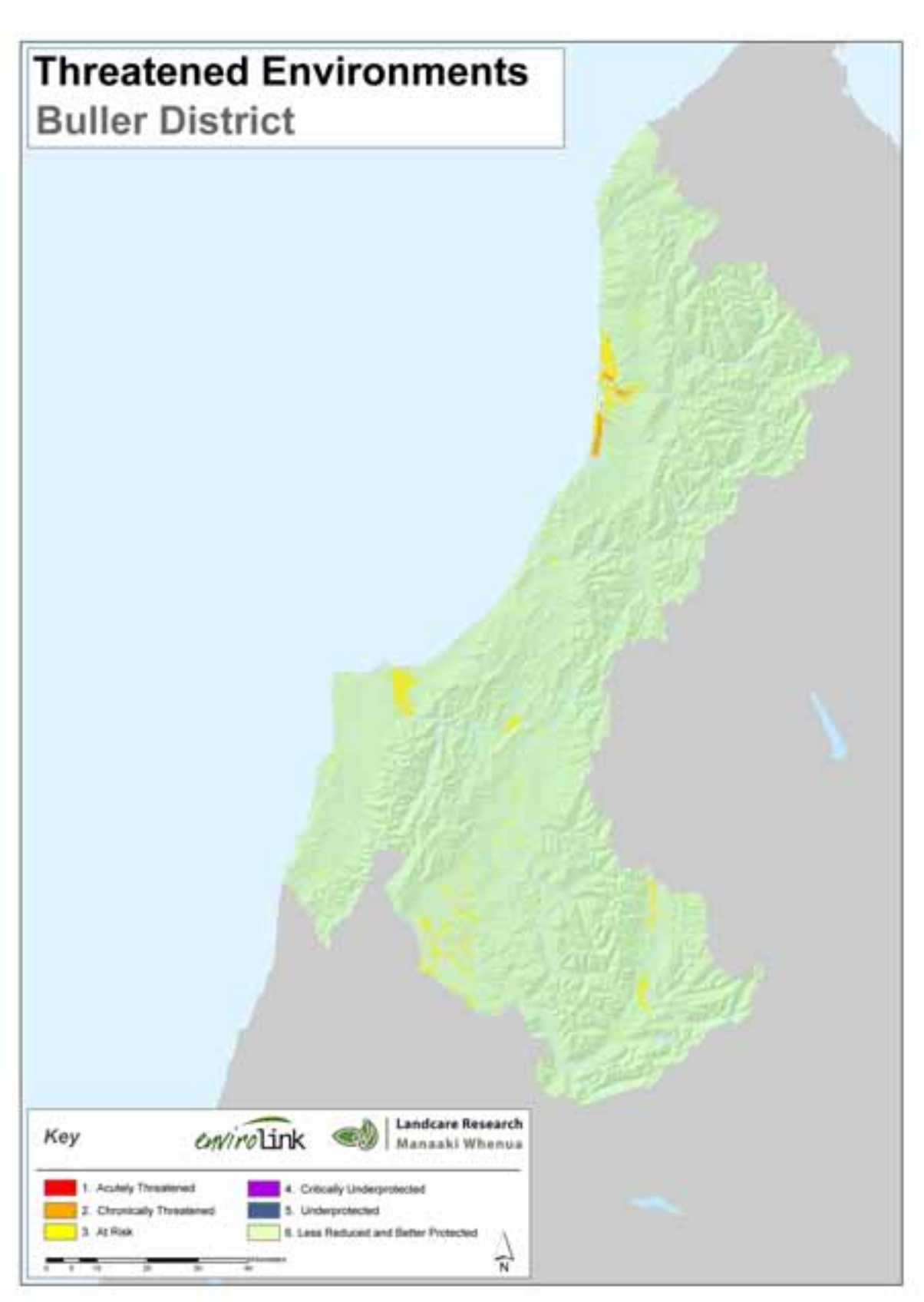

Fig. 2 Map of the distribution of threatened environments within the Grey District

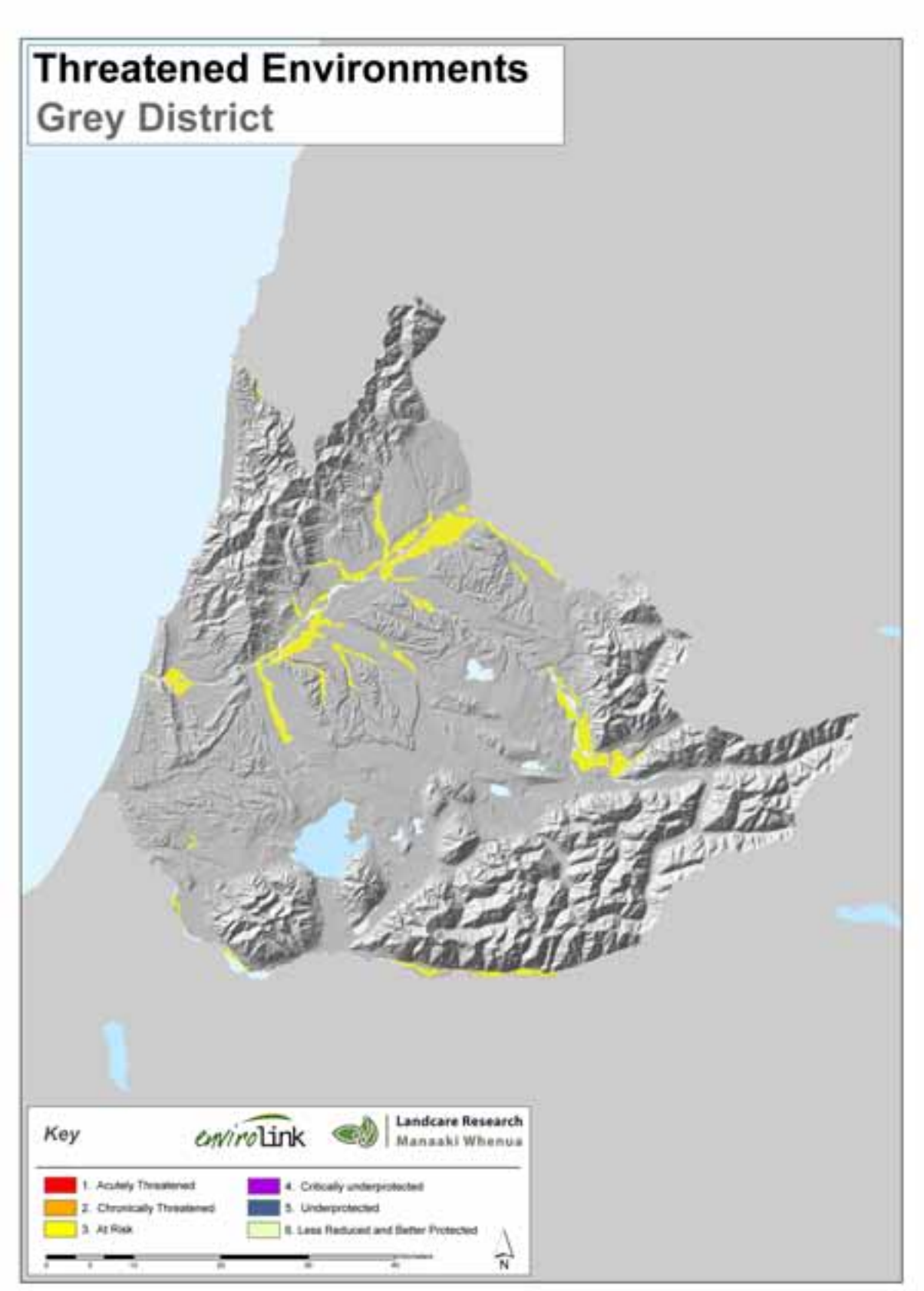

Fig. 3 Map of the distribution of threatened environments within the Westland District