BEFORE THE HEARINGS PANEL
FOR THE QUEENSTOWN LAKES PROPOSED DISTRICT PLAN

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of the Rural Hearing Stream 2 (Indigenous Vegetation and Biodiversity, and Wilding Exotic Tree chapters)

STATEMENT OF EVIDENCE OF GLENN ALISTER DAVIS ON BEHALF OF QUEENSTOWN LAKES DISTRICT COUNCIL

ECOLOGIST

6 APRIL 2016

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Appendix F – Schedule of Sites; and
Appendix G – Discussion Paper regarding criteria.

1. INTRODUCTION

1.1 My full name is Glenn Alister Davis. I am Director and Principal Environmental Scientist of Davis Consulting Group Limited (**DCG**). I have been in this position since 2007. I have 18 years' postgraduate work experience in environmental management. I have a BSc in Ecology and MSc in Geography. I am a member of the New Zealand Plant Conservation Network.

1.2 I have worked as a professional ecologist in the Queenstown Lakes District (**District**) for the last 10 years. During this time, I have worked on a wide range of projects for the agricultural and land development sectors and for Queenstown Lakes District Council (**QLDC**). In addition, I have also held a contract with Land Information New Zealand to support the assessment of discretionary activities on high country pastoral leases under the Crown Pastoral Lease Act. Many of these projects have triggered the Operative District Plan (**ODP**) indigenous vegetation site standard. I therefore have a sound working knowledge of the indigenous vegetation protection measures within the ODP.

1.3 In 2009 I was engaged by QLDC to commence the first stage of the process to identify, assess and include further areas of significant indigenous vegetation and significant habitats of indigenous fauna, as outlined in Appendix 5 of the ODP (**Appendix A** to this evidence). I completed this first stage (initial identification) in collaboration with three Queenstown based ecologists - Neill Simpson, Dawn Palmer and Simon Beale. In conjunction with QLDC I have implemented Stages 2, 3 and 4 of the Assessment Criteria.

1.4 I have now been engaged by QLDC to provide evidence in relation to the Indigenous Vegetation and Biodiversity, and Exotic Wilding Trees chapters of the Proposed District Plan (**PDP**).

1.5 Although this is a Council hearing, I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

1.6 The key documents I have used, or referred to, in forming my view while preparing this brief of evidence are listed in **Appendix B**.

(a) I am also familiar with the Strategic Direction chapter;
(b) Environment Court Decision C76/2001;
(c) Royal Forest and Bird Protection Society Incorporated (RFBPS) v Innes (2014) NZEnvC 201);
(d) The New Zealand Biodiversity Strategy. February 2000.
(e) .

1.7 I have attached to this evidence the following:

(a) **Appendix A** – Appendix 5 of the ODP;
(b) **Appendix B** – references to documents used, or refered to in preparing this evidence;
(c) **Appendix C** – Statement of National Priorities;
(d) **Appendix D** – Letter to Landowners;
(e) **Appendix E -** Project Schedule;
(f) **Appendix F** – Schedule of Sites; and
(g) **Appendix G** – Discussion Paper regarding criteria.

2. SCOPE

2.1 I have structured this evidence in two parts, focusing first on the Indigenous Vegetation and Biodiversity chapter, and second the Wilding Exotic Trees chapter. Within those two parts, my evidence covers the following:

Part A: Chapter 33 – Indigenous Vegetation And Biodiversity

(a) background;
(b) current protection under operative district plan;
(c) significant natural areas + methodology for identification;
(d) response to specific submission points;
(e) site specific submissions on Significant Natural Areas (**SNAs**);
(f) proposed general clearance rule for indigenous vegetation;
(g) list of threatened plants – technical justification for their inclusion on list;
(h) definitions;

(i) wilding trees: risk to indigenous biodiversity; and

(j) types of trees that represent a risk.

3. EXECUTIVE SUMMARY

3.1 The key conclusions in my evidence are that:

(a) Modification of the Districts indigenous vegetation and habitats is highly variable; some areas are largely untouched and highly unlikely to be affected by development activities, while pressure remains in the lowland and montane environments where much of the ecological loss has already occurred;

(b) In order to halt the loss of the ecological values remaining in our lowland and montane environments, it is critical that we have provisions within the PDP to ensure that anything remaining is assessed critically prior to consenting further loss;

(c) The vegetation clearing provisions within the ODP have been problematic to apply in some parts of the District. This has been most prevalent within highly modified ecosystems where the ecological values are less well understood by property owners, land managers, resource management planners and ecologists. This has resulted in landowners clearing rare dryland ecosystems and threatened species even though they understood the cultivation of the land to be a permitted activity.

(d) The vegetation clearance rules under the PDP provide a tiered approach based on the amount of indigenous vegetation cover remaining. Where the vegetation remaining is less 20% of its original extent the rule provides for the removal of up to 500 square metres with this increasing to 5000 square metres where the remaining indigenous cover is greater than 20%. This approach elevates the importance of the lowland environments and should assist with halting the decline of lowland ecosystems and the loss of threatened species within these environments.

(e) Areas of Significant Indigenous Vegetation and Habitats (**SNAs**) have been included into the PDP. The areas identified are the culmination

of six years of work that involved an initial desktop assessment of potentially significant areas undertaken in 2009, consultation with stakeholders and landowners, ground truthing work and subsequent report preparation. A total of 147 sites have been identified that I consider contain ecological values consistent with the assessment criteria. The SNAs are dominated by woodlands and shrublands and the reasons for their importance include:

- They are located in lowland or lower slope environments that have less than 20% indigenous vegetation cover remaining; and/or
- Are the best representative examples of shrublands in the District; and/or
- Contain a diversity of plant species that are important habitat for a diverse indigenous invertebrate fauna (some species of which are host plant specific on species such as tree daisys), insectivorous birds and the 'at risk' eastern New Zealand Falcon; and/or
- Are important with respect to ecological context such as part of an altitudinal sequence from valley floor to alpine environments.

(f) In addition to the low altitude dry shrublands and woodlands, the key other indigenous vegetation and habitats that have been identified include beech forests within drier parts of the District where these forests have a very restricted distribution, broadleaved indigenous hardwood communities situated adjacent to Lakes Wanaka and Wakatipu that provide habitat for invertebrates, lizards and birds, and cushionfields, herbfields and short tussock grassland communities within dryland valley floor environments where there is little indigenous vegetation cover remaining, contain threatened species and provide refuge for invertebrates, lizards and birds.

(g) Of the 147 SNAs recommended to be included into the PDP approximately 25 have been opposed in submissions with some of these areas requesting refinement to boundaries rather than total removal. In some cases I may be able to modify some boundaries in consultation with the submitter, but I oppose the total removal of SNAs as I consider we have completed a thorough process to identify SNAs and all the SNAs have ecological values that are consistent with the assessment criteria; and

(h) I provide evidence on Chapter 34 of the PDP 'Wilding Exotic Trees'. I consider the risks and effects of wilding exotic trees within the District have been well established and it is critical that we have provisions in the PDP that clearly state the species that should not be grown in the District. Prohibiting exotic species that are a high risk of spread is an appropriate approach given the ecological and landscape effects that these species can have within the District.

PART A: CHAPTER 33 - INDIGENOUS VEGETATION AND BIODIVERSITY

4. BACKGROUND

4.1 The District is made up of diverse geographical properties that drive biological diversity. From dry inland basins in the Upper Clutha Valley to alpine environments that border Fiordland and Westland, the District contains many environments that support a wide range of vegetation communities and habitats.

4.2 Broadly the ecological communities within the District include forests, shrublands, tall tussock grasslands, short tussock grasslands, dryland and alpine cushionfields, herbfields, a wide range of wetlands, and lake and river margin communities.

4.3 These communities support a high number of indigenous plants, many of which are endemic to southern New Zealand. To give you some context of the botanical diversity within the District, 438 native species were recorded on a single high country station[1] during a Department of Conservation botanical survey. Approximately 10% of the species recorded in this survey have been identified as either threatened, naturally uncommon or data deficient under the New Zealand threatened species classification system.

4.4 Given the wide range of environments and vegetation communities within the District it follows that the District has a wide range of habitats that support a diverse indigenous fauna of invertebrates, lizards, birds and bats.

4.5 Some of the ecological communities in the District such as beech forests in Mt Aspiring National Park and tall tussock grassland communities above 1100m

1 Crown Pastoral Land Tenure Review. Walter Peak Special Lease file:///C:/Users/Glenn%20Davis/Downloads/walter-peak-crr-pt1.pdf

are highly representative of the communities that would have been present prior to people arriving in the District. Altitudinal sequences of vegetation from valley floors to alpine environments also remain intact. However, at lower elevations in the District (below 1000 metres asl) our indigenous vegetation and habitats have been highly modified as a result of Polynesian fires, and subsequently a long history of agricultural activity. Furthermore, more recent land development activities to support dairy farming, vineyards and subdivision have resulted in ongoing modification to the District's indigenous vegetation and habitats.

4.6 The effect of historical activities on ecosystems and habitats within the District is clearly shown through the Threatened Environment Classification (**TEC**) system that was developed by Landcare Research. The TEC is an extension of the Land Environments of New Zealand (**LENZ**) classification. The LENZ classification groups together areas across New Zealand that have similar environmental conditions that drive biological diversity. The TEC combines the LENZ classification, the Landcover Database and areas across New Zealand under legal protection (i.e. areas administered by DOC, QEII covenants, and conservation covenants on private land for the purpose of protecting natural heritage (including biodiversity)) to assign a threat level based on the percentage of indigenous vegetation cover remaining and the area under formal protection. The Landcover Database maps vegetation cover across New Zealand and is used in the context of the TEC for determining the percentage of indigenous vegetation remaining within an environment defined by LENZ. I note that the Landcover Database version used in the TEC adopted for the SNA process is based on satellite imagery captured in 2001/02. It was updated recently based on imagery captured in 2011/12.

4.7 The TEC is a very useful landscape scale tool to show the areas within the District where ecosystem loss is most prevalent. As is the case for most of New Zealand the low lying dryland environments have lost the largest areas of indigenous vegetation cover with areas such as the Wakatipu Basin and the Upper Clutha Valley having less than 10% of the original vegetation cover. It is logical that the most threatened environments occur in the lowland areas that have been the subject of the most intensive landuse activity.

4.8 Modification of the District's ecosystems is highly variable; some areas are largely untouched and highly unlikely to be affected by development activities, while pressure remains in the lowland and montane environments where much of the ecological loss has already occurred. In order to halt the loss of the ecological values remaining in our lowland and montane environments, it is in my view critical that we have provisions within the PDP to ensure that anything remaining is assessed critically prior to consenting further loss.

4.9 Land Environments New Zealand (**LENZ**) is a national classification of environments mapped across New Zealand's landscape. LENZ environments are mapped on the basis of 15 climate, landform and soil parameters that were chosen for their roles in driving geographic variation in biological diversity (Leathwick *et.al.*, 2003). LENZ has been presented at four levels of detail containing 20, 100, 200 and 500 environments to facilitate use at a range of scales e.g. local, regional and national.

4.10 Because LENZ units are derived from parameters that "drive geographic variation in biological diversity", the LENZ units can be used as a surrogate for the potential full range of terrestrial ecosystems and their associated biodiversity (Walker *et. al.*, 2005). Walker *et al.* (2006) adopted this approach in recent work assessing New Zealand's remaining indigenous cover, recent changes and biodiversity needs.

4.11 To understand New Zealand's biodiversity protection needs Walker *et al.*, (2006) combined the LENZ Level IV database (500 environments) with the New Zealand Landcover Database (LCDB2 – based on 2001/02 imagery; Terralink 2004) and a spatial database of private and public land managed for conservation. This work estimated the percentage of remaining indigenous vegetation cover and the percentage of each unit formally protected. Based on these two criteria five categories of TEC have been established and include:

(a) Acutely threatened – <10% indigenous vegetation cover remaining;
(b) Chronically threatened – 10-20% indigenous vegetation cover remaining;
(c) At risk – 20-30% indigenous vegetation cover remaining;
(d) Critically underprotected – >30% indigenous vegetation cover remaining and less than 10% protected;

(e) Underprotected – >30% indigenous vegetation cover remaining and 10-20% protected; and

(f) No threat – >30% indigenous vegetation cover remaining and >20% protected.

4.12 National Priority One identifies acutely threatened and chronically threatened environments are a national priority for the protection of rare and threatened biodiversity. The acutely and chronically threatened environments within the District are predominantly located on valley floors and lower slopes of mountain ranges.

4.13 The mapping associated with LENZ and LCDB2 have a number of inaccuracies due to the scale of the mapping, the inability of the imagery to differentiate between some vegetation types and because of the temporal nature of vegetation cover i.e. vegetation cover changing over time. Notwithstanding this point, the information is the only district wide ecological information source available and provided it is used cautiously is a very effective tool to assist the identification and assessment of significant vegetation and fauna habitat.

4.14 The LENZ and TEC has been adopted by Environment Canterbury Regional Council in their 2013 Regional Policy Statement – Chapter 9: Ecosystems and Indigenous Biodiversity, in order to prioritise areas for protection including indigenous vegetation in environments that are acutely and chronically threatened. Furthermore, Environment Canterbury's criteria for determining SNA includes "Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent in the Region, or relevant land environment, ecological district, or freshwater environment.

5. CURRENT PROTECTION UNDER OPERATIVE DISTRICT PLAN

5.1 Under the ODP there are two distinct provisions that provide protection for indigenous vegetation. These include Site Standards 5.3.5.1 (v) Significant Indigenous Vegetation and 5.3.5.1 (x) Indigenous Vegetation. In both cases compliance with the site standard is a permitted activity while a breach of the standard is discretionary with QLDC restricting its discretion as follows:

Site Standard 5.3.5.1 (v) Significant Indigenous Vegetation

The Council shall restrict the exercise of its discretion in relation to these matters to their effect on nature conservation values and the natural character of the rural environment.

Site Standard 5.3.5.1 (x) Indigenous Vegetation
The Council shall restrict the exercise of its discretion in relation to this matter to its effect on nature conservation, landscape and visual amenity values and the natural character of the rural environment.

5.2 Site Standard 5.3.5.1 (v) Significant Indigenous Vegetation relates directly to sites already identified and listed under Appendix 5 of the ODP. Appendix 5 was drafted in two parts. The first part provided a list of 17 sites that were considered significant at the time. This list was never intended to be exhaustive, rather it was a collection of sites identified by local ecological practitioners as a starting point. The second part of Appendix 5 set out the process for the identification of other significant indigenous vegetation and habitats across the district.

5.3 Given the limited number of sites identified as significant under Appendix 5, the trigger of Significant Indigenous Vegetation Site Standard 5.3.5.1(v) has been very limited. In fact, I am not aware of any resource consent applications that have requested clearance of listed areas of significance under the ODP.

5.4 Given the lack of sites identified as significant under the ODP the key protection measure has been through the Indigenous Vegetation site standard 5.3.1(x).

5.5 In practice this site standard is triggered where the area of vegetation exceeds 5000m^2 in area, is at an elevation greater than 1070m above sea level, is within 20m of a water body and contains one or more threatened species listed in Appendix 9 of the ODP.

5.6 In my experience the existing vegetation clearance rule has operated effectively in specific circumstances. Most notably is the clearance of bracken fern on high country stations. In this situation the fern invades through pastures effecting the production potential of the properties. These sites have had a long history of disturbance and in most situations consents have been granted (with conditions) to support clearance of the bracken fern. I have

supported QLDC in the review of approximately 30 consent applications and most of these properties have consents for 20 years to give them the flexibility in maintaining pasture over the medium term.

5.7 The Indigenous Vegetation site standard 5.3.5.1 (x) has been more problematic to implement in lowland areas where the vegetation is often highly modified and the ecological values less well understood by property owners, land managers, resource management planners and ecologists. One of the key problems with the application of the indigenous vegetation site standard in low lying areas is associated with the definition of 'indigenous vegetation'. The definition in the ODP is:

> *Means a plant community in which species indigenous to that part of New Zealand are important in terms of coverage, structure and/or species diversity.*

5.8 Ecological communities such as short tussock grassland and cushionfield communities are modified communities and contain exotic herbs and grasses. The dryland vegetation in these areas tends to grade between areas dominated by exotic herbs and grasses to areas dominated by indigenous species. These communities are also found within a mosaic of more developed pasture grassland that can be intensively grazed and has had a long history of pastoral activity.

5.9 The remaining indigenous vegetation in lowland and montane environments within the District consists of kanuka woodland, grey shrubland, short tussock grasslands, cushionfields and wetlands. These communities are often small in area, discontinuous, surrounded in exotic pasture grasslands and in poor condition. Notwithstanding this point, they remain important habitats for maintaining the full range of biodiversity in the District as they provide a refuge for flora and fauna species that can be absent or seldom occur in more remote areas, or they represent populations of species with specific adaptations to particular environments.

5.10 Furthermore, these communities often contain threatened species. It is my opinion that the ODP Indigenous Vegetation site standard does not provide the necessary protection for either of these communities, which has resulted in a reduction in the population of threatened species. In addition it has resulted in

an ongoing loss of ecological communities within environments that have very restricted indigenous vegetation cover.

6. SIGNIFICANT NATURAL AREAS + METHODOLOGY FOR IDENTIFICATION

6.1 In collaboration with a group of local ecologists I was engaged by QLDC to identify areas of significant indigenous vegetation and significant habitats of indigenous fauna (together, SNAs).

STAGE 1

6.2 The first stage of the process was to review the criteria for determining ecological significance. This review was undertaken to assess approaches taken by various district councils in terms of the criteria adopted and how they are applied. It was also completed as a critique of the assessment criteria set out in Appendix 5 of the ODP. I note that this review was specifically directed at the ecological parameters of the assessment criteria set out in Stage 3 of Appendix 5, not the five stage process. The review was undertaken in Stage 1 of the process as we needed to have a clear set of criteria that could be utilised for the identification of potentially significant sites when reviewing ecological reports and databases.

6.3 The review is set out in a discussion paper prepared by Simon Beale from MWH (**Appendix G**). In summary the review found that while the Assessment Criteria within Stage 3 of Appendix 5 was comprehensive the structure was confusing and some criteria duplicated. The criteria were also divided into 'Primary Criteria' and 'Other Criteria' which suggested some weighting should be given but no direction was provided regarding weight. Mr Beale considered the criteria could be condensed into fewer criteria and recommended the rationalisation of the assessment criteria as follows (as set out in Attachment 1 of Appendix G):

(i) Rarity & Distinctiveness

Whether the area supports or is important for:

- *an indigenous species, habitat or community of species which is rare or threatened within the Ecological District or is threatened nationally,*
- *indigenous species at their distribution limit,*
- *endemic species,*

- *indigenous fauna for some part of their life cycle (e.g. breeding, feeding, moulting, roosting), whether on a regular or infrequent basis,*
- *migratory indigenous fauna.*

OR

(ii) Representativeness

Whether the area contains one of the best examples of an indigenous vegetation type, habitat or ecological process which is typical of its Ecological District.

OR

(iii) Diversity and Pattern

The degree of diversity exhibited by an area in terms of vegetation and habitat types, ecotones and sequences along ecological gradients.

OR

(iv) The Ecological Context of the Area

The relationship of the area with its surroundings in terms of maintaining or enhancing connectivity due to its location and connections to a neighbouring area, or as part of a network of areas of fauna habitat, or as part of a corridor or stepping stone for movement/migration of species between or to areas of important habitat, or;

The role the area plays in buffering the ecological values of an adjacent area or site of significant ecological value, or;

Its size and shape in providing for predominantly intact habitats (with evidence of healthy ecosystem functioning) thereby providing for seasonal or "core" habitat for threatened species.

6.4 I note part vii of the ODP criteria (The Future Ecological Value of the Area) was not considered in the desktop review as this aspect needed to be considered during the ground-truthing stage of the project. It is however relevant, and the criteria considered at that stage was:

The Future Ecological Value of the Area

(vii) Long Term Sustainability – the degree to which an area is likely to maintain itself, taking into consideration the:

- *extent to which criteria in paragraphs A and B above are met;*
- *degree of historic modification to the area and its surroundings which affects its future;*
- *degree of resilience of species and habitats present;*
- *the effects of current management on identified ecological values; and*
- *the extent to which the area has achievable potential, with management input, for restoration of ecological values which are significant in the Ecological District.*

6.5 Collectively, the criteria are referred to as the "**Significance Criteria"** in this evidence.

6.6 In addition to the application of the four assessment criteria, Mr Beale recommended QLDC take account of the four national priorities for protecting rare and threatened native biodiversity on private land (MfE & DOC 2007) in determining ecological significance. The national priorities include:

(a) National Priority 1: To protect indigenous vegetation associated with land environments (Level IV) that have 20% or less remaining in indigenous cover;

(b) National Priority 2: To protect indigenous vegetation associated with sand dunes and wetlands; ecosystem types that have become uncommon due to human activity;

(c) National Priority 3: To protect indigenous vegetation associated with “originally rare” terrestrial ecosystem types not already covered by priorities 1 and 2; and

(d) National Priority 4: To protect habitats of acutely and chronically threatened indigenous species.

6.7 I also note the national priorities were subsequently adopted as significance assessment criteria in the proposed National Policy Statement on Indigenous Biodiversity.

6.8 The release of the Statement of National Priorities was significant to the process as it provided context and definition around the significance criteria of

representativeness and *rarity*, which are key drivers in the determination of ecological significance.[2] The Statement of National Priorities was also important in that it adopted work completed by Landcare Research in the development of the LENZ Classification, the TEC, and the Originally Rare Historic Ecosystems Framework which was released in 2007.

6.9 The Significance Criteria were subsequently used to assess possible SNAs, as set out in the following sections. Once we (when I use the word "we", I am referring to myself and the three other ecologist who worked together on Stage 1) had settled on the key drivers for the assessment of significance we needed to understand the scope of the project and identify the areas in the District that may potentially contain areas of vegetation worthy of protection. We were able to achieve this by utilising the Council's GIS to upload databases on vegetation cover, threatened environments and threatened species in order to graphically present areas that may potentially contain areas of vegetation that meet the definitions of *representativeness* and/or *rarity* (as set out above).

6.10 In terms of the *representativeness* definition, the Landcover Database was uploaded into QLDC's GIS. The Landcover Database maps vegetation cover throughout New Zealand with the use of satellite imagery. We used version II, which was the most recent version in 2009 when the desktop assessment was undertaken. A further two versions have been produced since this time. We reviewed the vegetation classes listed in Landcover Database II and identified the following landcover classes that would potentially contain vegetation that may meet the definition of representativeness:

(a) Herbaceous freshwater vegetation;
(b) Landslide;
(c) Low producing grassland (this class was included as we knew that low producing grasslands contain short tussock grassland and cushionfield communities);
(d) Depleted grassland;
(e) Tall tussock grassland;
(f) Manuka and/or Kanuka;
(g) Matagouri;
(h) Broadleaved indigenous hardwoods;

[2] There is no weighting to the criteria. The key relevance of the Statement of National Priorities was that it provided a national perspective on what is rare at an ecosystem and species level.

(i) Mixed Exotic Shrubland (this class was included as we knew that the mixed exotic shrubland contained an indigenous component);

(j) Grey Scrub; and

(k) Indigenous Forest.

6.11 As with using the Landcover Database as a tool to provide a district wide image of remaining indigenous cover that may meet the definition of *representativeness,* we were also able to compile district wide information on *rarity* at an ecosystem and species level. This was achieved by uploading the TEC (see paragraph 4.6 above) and the recorded locations of species listed under the New Zealand Threat Classification System (Townsend et. al., 2007)[3]. These threatened species databases included locations of threatened lizards and skinks, freshwater fish, and plants. We also used the Bird Atlas[4] to identify approximate locations of threatened bird species. The issue of *rarity* was also considered at a local/regional scale with species included that are rare locally but not included on the threatened species list. These species included kowhai, halls totara, mountain toatoa, kahikatea, matai and southern rata. We were not aware of any fauna that would be considered locally significant that was not already listed under the New Zealand threat classification system.

6.12 At an ecosystem level we adopted the TEC and took the view that existing indigenous vegetation present within environments with less than 20% indigenous vegetation cover remaining may be considered significant. The 20% indigenous vegetation cover remaining figure was adopted as species loss has been shown to accelerate when the area of habitat remaining falls below 20% (Statement of National Priorities, 2007 (see Appendix C); Walker *et. al.*, 2015), and I consider this to be an appropriate threshold.

6.13 The TEC is a very useful landscape scale tool to show the areas within the District where ecosystem loss is most prevalent. As is the case for most of New Zealand the low lying dryland environments have lost the largest areas of indigenous vegetation cover with areas such as the Wakatipu Basin and the Upper Clutha Valley having less than 20% of the original vegetation cover. It is logical that the most threatened environments occur in the lowland areas that have been the subject of the most intensive landuse activity. The most

3 Townsend, A.J.; de Lange, P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. 2007: New Zealand Threat Classification System manual. Department of Conservation, Wellington. 35p. [please put full reference]

threatened environments are those with less than 20% remaining and scientific research has shown that species loss accelerates when the area of habitat remaining falls below 20% (Statement of National Priorities, 2007 (see Appendix C); Walker *et. al.*, 2015). The TEC provides a landscape scale map of areas within the district that contain less than 20% indigenous vegetation cover remaining. In my view this provides a reasonable basis for distinguishing between the clearance limits for indigenous vegetation in rules 33.5.3.

6.14 **Figure 1** below presents a plan of the threatened environments identified through the process I have just described within the District. The red and orange colours denote the areas where the percentage of remaining indigenous vegetation cover is estimated to be less than 20% of the original extent. **Figure 2** shows the change in vegetation cover from pre-settlement through until 2002 and clearly shows the loss of woody vegetation cover which the TEC represents. The areas within the District where indigenous vegetation cover is shown to be below 20% is in valley floors and low elevation environments of the Wakatipu Basin, Kawarau Gorge, Cardona Valley and Upper Clutha Basin.

6.15 Once the Landcover Database and TEC had been uploaded into the Council's GIS we were also able to determine the location of areas of representative vegetation that intersected with the threatened environments thereby locating sites of interest which may meet the definition of both *representativeness* and *rarity*. **Figure 3** presents a screenshot from QLDC's GIS showing areas of representative vegetation that intersects with threatened environments where the remaining vegetation cover is less than 20%.

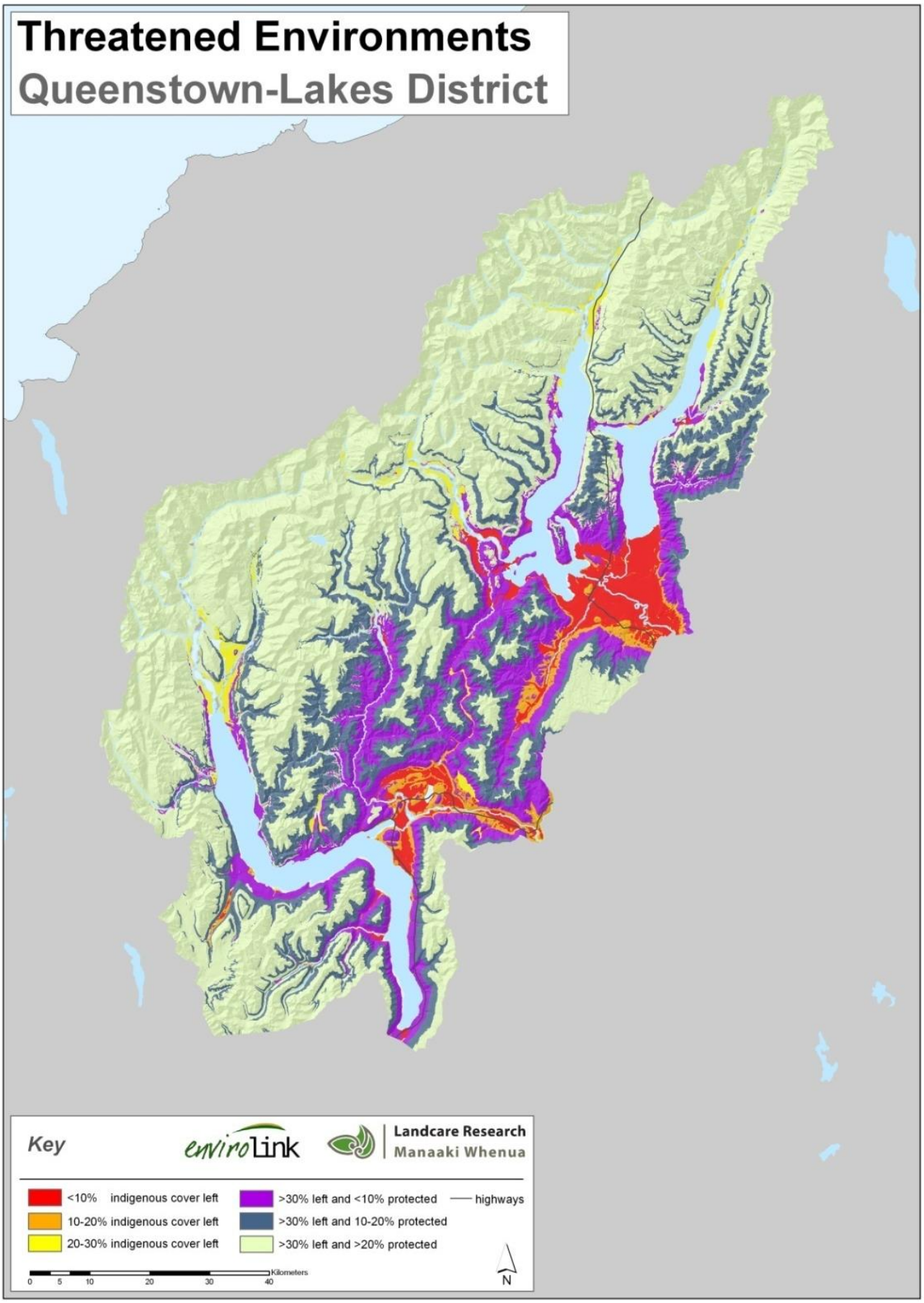

Figure 1: Threatened Environments within the Queenstown Lakes District

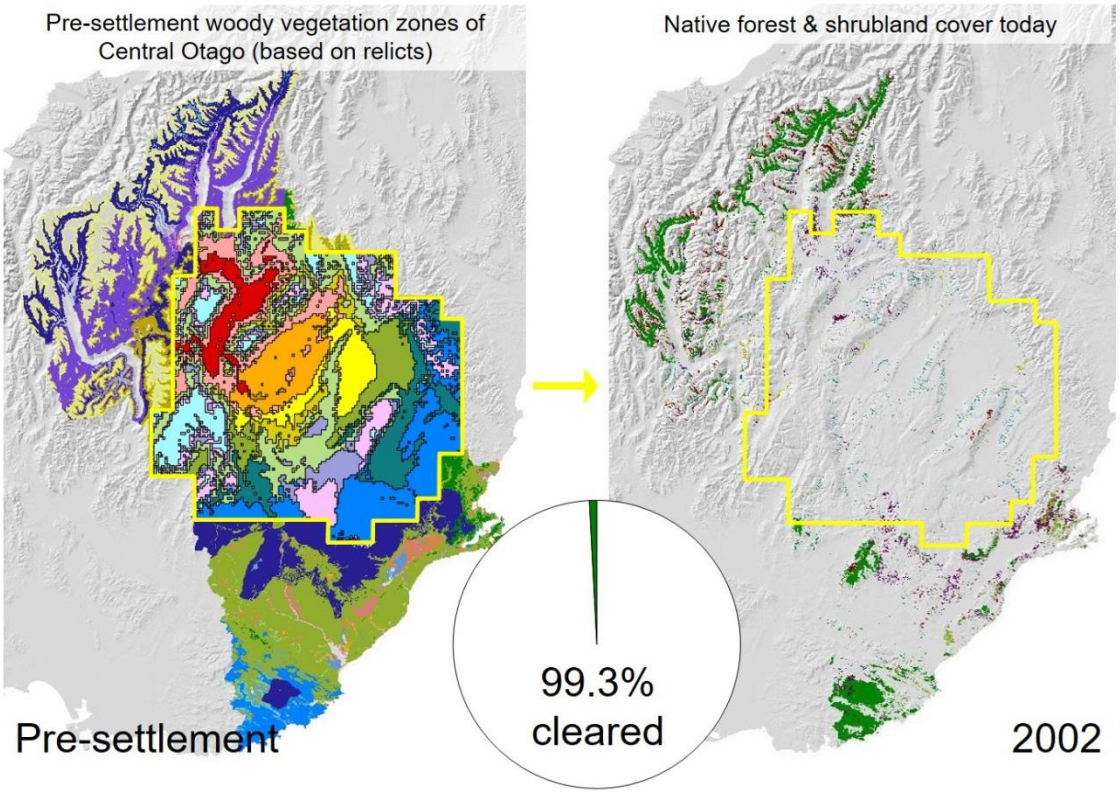

Figure 2: Change in Vegetation Cover – woodland and shrubland. Key: Colour denotes indigenous woody vegetation cover; grey denotes areas that have lost native vegetation cover.

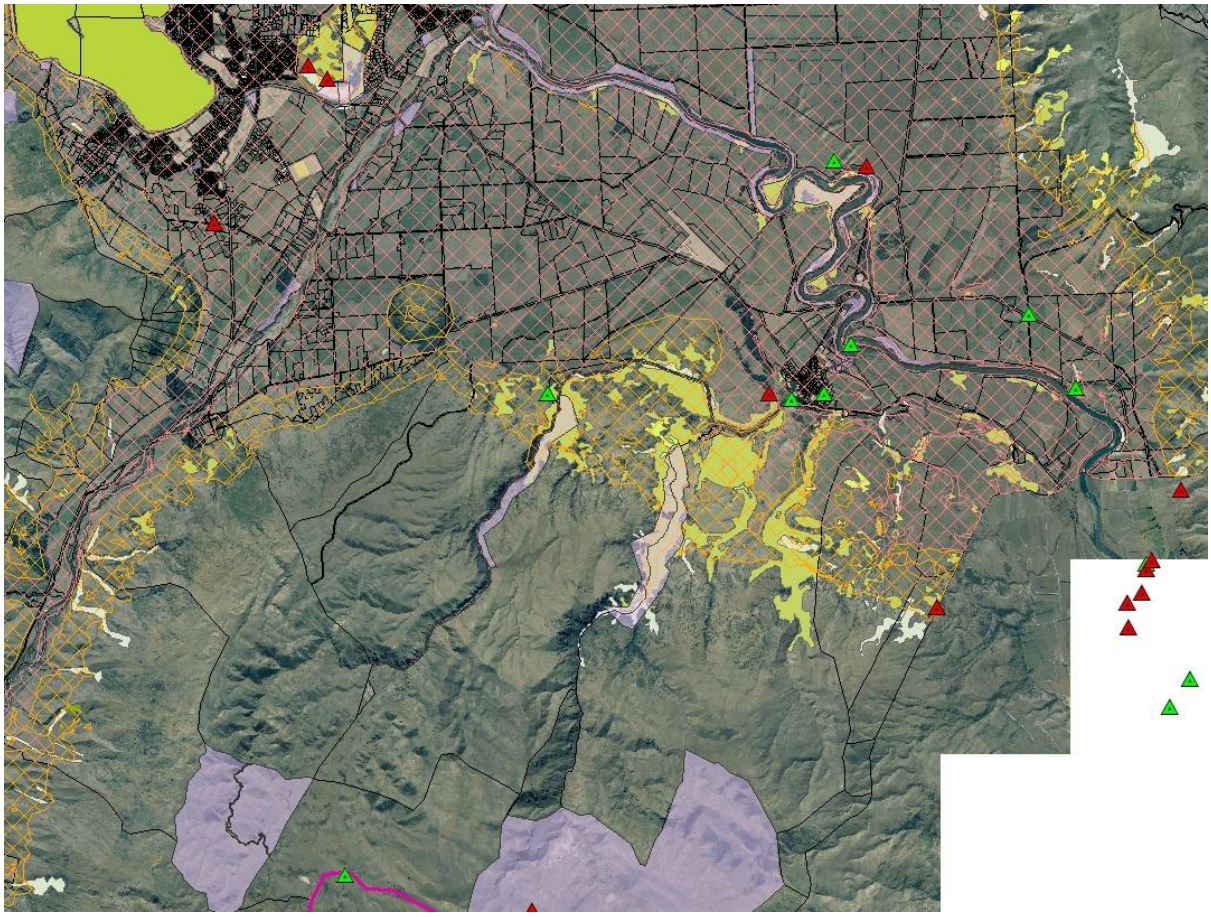

Figure 3: Screenshot from QLDC's GIS showing areas of representative vegetation that intersects with threatened environments where the remaining vegetation cover is less than 20%.

6.16 Once we had established the criteria and tools to support the assessment of significance and had uploaded the Landcover Database, TEC and threatened species databases we undertook an extensive search of ecological information held in a range of reports and databases to provide more detailed site specific reported ecological information. The key sources of the ecological information included Conservation Resources Reports for Tenure Review prepared by the Department of Conservation, ecological reports prepared to support consent applications and reports prepared for the Protected Natural Area Programme sites. These reports are referenced in Desktop Review report by Davis Environmental Services Limited (2009) (See Appendix B). Local knowledge was also used to support this process with Neill Simpson, Barry Lawrence and Brian Fitzpatrick providing information from ecological values that they had encountered in the field over many years working in the District.

6.17 Ecological research was also utilised to inform the assessment process. One of the key studies used to support the assessment of significance in dryland shrubland was a survey of invertebrates in low altitude shrubland in the Rock and Pillar Range in Central Otago (Derraik et al., 2003). This survey recorded 280 invertebrate species in pitfall traps and on *Coprosma propinqua* and *Olearia bullata* plants. Furthermore, this study found that 90% of species identified were endemic, indicating the importance of remnant dryland shrubland for the protection of biodiversity. The importance of dry shrubland to invertebrates was also highlighted in Brian Patrick's research on the Lepidoptera of small-leaved divaricating tree daisys (*Olearia spp*). Patrick (2000) found that the tree daisys have the largest documented moth fauna within the entire New Zealand flora. Furthermore, the research noted that some of the moths are host specific which means they are dependent on the tree daisy for at least part of their lifecycle.

6.18 Some areas of the District that contained high ecological values were excluded from the assessment process. These areas included land administered by the Department of Conservation and held within Queen Elizabeth II conservation covenants. We took the view that indigenous vegetation and habitats administered by DOC and QEII covenant would provide a level of protection commensurate with the significant indigenous vegetation provisions in the ODP. We also excluded subalpine and alpine communities and beech forests in wetter areas of the District. While these communities have a degree of representativeness, we considered the development pressure on these communities was low and they are situated in land environments where the percentage of indigenous vegetation remaining is relatively high. It would be relatively easy to include these areas if there was a desire to do this as the values are well known and the areas easily defined on the Landcover Database.

6.19 At the completion of the desktop assessment we had compiled multiple layers of ecological information that ranged from the broad district wide information associated with the Landcover Database, TEC through to specific local scale ecological information gathered in ecological surveys. I consider the multiple layers of ecological information all uploaded into the Council's GIS provided a sound basis for identifying areas of potential significance, and provided an appropriate tool for moving to the next stage of the process, which was to engage with landowners and undertake onsite ecological assessments.

STAGE 2

6.20 Stage 2 of the process sets out the requirement for consultation with landowners and other stakeholders. I note that consultation was not confined to Stage 2, rather consultation was undertaken at the completion of the desktop review, at the time of arranging access on to properties and following the completion of the assessment reports during Stage 3 of the process.

6.21 In 2009 at the completion of the desktop assessment, a stakeholder reference group was established to facilitate stakeholder input into the process and provide QLDC with the ability to update interested parties on the progress of the project. The reference group included Federated Farmers, members of the farming community, DOC, Forest and Bird, Kai Tahu ki Otago and Te Ao Marama.

6.22 The first stakeholder group meeting was convened on 16 June 2010. At this meeting I presented a summary of the outcomes of the desktop assessment including the findings of the review of the assessment criteria and a summary of the areas that were identified as potentially significant. It was resolved at this first stakeholder reference group meeting to undertake a pilot study of potentially significant areas identified on three properties within differing environments in the District. The three properties selected for the pilot study were Branch Creek, Loch Linnhe and Mt Burke Stations and the pilot studies were completed in late 2010 between September and November.

6.23 A second stakeholder reference group meeting was convened on 8 December 2010 to present the findings of the pilot studies on the three properties.

6.24 At this stage QLDC prepared a tender with the intent of appointing a project team to ground truth the sites identified as potentially significant across the whole district. This tender was awarded to a group of local based ecologists (myself included) to undertake this work. A work program was set up by QLDC and a letter sent to all property owners with sites of potential significance in April 2011. I attach the letter (**Appendix D**) sent to landowners at this time to show the initial engagement undertaken with landowners. The stakeholder reference group was also informed of the work programme.

6.25 For the purposes of planning the fieldwork the sites identified as potentially significant were grouped based on their respective environments. The intent was to undertake site visits in blocks to cover sites within similar environments to maintain consistency in the significance assessments. The project schedule is set out in **Appendix E**. A total of 249 sites had been identified through the desktop process although this was reduced to 220 sites through a process of refinement and reassessment of the information. These sites were located on approximately 55 properties throughout the District.

6.26 Site visits commenced in April 2011 and were completed by May 2013. In all cases the owners of the properties were contacted for permission to undertake the assessment. In many cases the property owners accompanied the project team during the site visits.

6.27 During this period we held a third stakeholder group meeting. This meeting was convened on 26 June 2012 to update the stakeholder group. At this stage most of the site visits had been completed. This was the final stakeholder group meeting to be held for the project.

6.28 By May 2013 the site visits and reports had been completed and in many cases follow up meetings or phone calls with landowners had been completed.

STAGES 3 AND 4

6.29 As discussed previously Stage 3 of Appendix 5 of the ODP sets out the significance assessment criteria. In practice Stage 3 was the fieldwork component of the project to ground truth the information collated in the desktop review that suggested an area may contain ecological values worthy of inclusion. As discussed previously the site visits to ground truth the information commenced in April 2011. At the same time as the site visits the matters for Final Consideration in Stage 4 of Appendix 5 of the ODP were also considered. The time of the site visits was the most appropriate time to consider these matters as the landowner was generally present and could provide helpful information with respect to the degree of modification, the economic effect on the landowner, presence and level of animal pests and weeds, resources required to implement effective protection, and whether or not the identified values are under threat.

6.30 At the completion of the fieldwork and writing of reports we had identified a total of 147 sites that contained ecological values that we considered were consistent with the Significance Criteria. This equates to 67% of the sites that were identified as potentially significant at the completion of the desktop phase of the project. The reasons why some sites were not taken forward fall into four Categories:

(a) sites that had been transferred to DOC administration through Tenure Review;
(b) QEII covenant sites;
(c) wetlands that were included as Regionally Significant; and
(d) sites that did not meet the criteria.

6.31 The site assessment schedule is provided in **Appendix F**. The sites identified are grouped into four key vegetation and habitat classes and can be summarised as follows.

6.32 **Dryland Shrublands and Woodland** – These sites contain stands of kanuka woodland and dry shrubland within land environments with less than 20% indigenous vegetation cover remaining, or large intact stands of kanuka woodland and dry shrubland containing populations of Olearia species (some of which are listed threatened species) and Kowhai within environments with less than 30% indigenous vegetation cover remaining. A total of 105 sites identified as significant contain these ecological values.

6.33 **Broadleaved hardwood stands** - These communities contain a diverse range of indigenous shrubs and trees including Coprosma spp, broadleaf (Griselinia littoralis), *Pseudopanax* spp, marbleleaf (*Carpodetus serratus*), cabbage trees, tutu (*Coriara* spp) and tree daisys (*Olearia* spp.). These communities provide important habitat for a range of indigenous bird species (tui, bellbird, grey warbler, brown creeper, fantail, and tomtit) as well as invertebrates and lizards. These communities are predominantly located adjacent to Lake Wanaka, Lake Wakatipu and Lake Hawea, and can be described as highly representative mid-successional vegetation. A total of 17 sites identified as significant contain these ecological values.

6.34 **Cushionfield, Herbfield and Short Tussock Grassland** – Sites containing these communities have been located in dryland environments of the Upper

Clutha and in land environments with less than 10% indigenous vegetation cover remaining. These sites also include threatened species such as Pimelea pulvinaris, Raoulia beauverdii and provide habitat for nationally vulnerable banded dotterel. A total of 7 sites identified as significant contain these ecological values.

6.35 **Beech forest remnants in drier parts of the district** – These communities are highly representative communities where much of the original late successional vegetation has been removed. These communities often support threatened species such as the threatened mistletoes *Alepis flavida* and *Peraxilla tetrapetala* and can form part of altitudinal sequences from lakeshore to alpine environments. A total of 10 sites identified as significant are beech forest remnants.

6.36 Subsequently, the sites identified as significant were listing in the Schedule of SNAs in 33.8.1 of the PDP.

7. RESPONSE TO SPECIFIC SUBMISSION POINTS

Policies

7.1 Paul Kane (Submitter 701) has requested an amendment to Policy 33.2.1.9 that would have the significance of vegetation assessed based on the indigenous coverage of the surrounding area.

7.2 Policy 33.2.1.9 sets out the criteria that are to be used to assess the nature and scale of the adverse effects of indigenous vegetation clearance on the District's indigenous biodiversity values. These criteria apply where the clearance of indigenous vegetation does not meet the permitted activity standards in (and falls to discretionary):

(a) Table 2 (for clearance not located within a SNA or within Alpine Environments;
(b) Table 3 (for clearance within SNAs identified in Schedule 33.8 and on the planning maps)
(c) Table 4 (for clearance within alpine environments, which is land above 1070m above sea level.

7.3 My understanding of the implications of Mr Kane's request is that if the surrounding area is residential or farmed land and only limited indigenous vegetation remains, then the site in question should not be protected from clearance. In my view, if an area of land has indigenous vegetation that exceeds the criteria within Objective 33.2.1, then the vegetation requires protection in order to protect and maintain the District's indigenous biodiversity, irrespective of the surrounding residential or farming land use.

7.4 Forest and Bird NZ (Submitter 706) has requested the following three amendments to Policy 33.2.1.9:

(a) that the description for the *representativeness* criteria is adjusted to include 'habitat of indigenous fauna', the terms 'typical' and 'characteristic' as well as 'representative', and that reference to 'formerly covered' be adjusted to include indigenous vegetation that may have been modified to some extent;

(b) that the description of the *diversity* criteria be adjusted to include 'pattern', indigenous taxa and ecological changes over gradients; and

(c) insert 'or' between each criteria.

7.5 The assessment criteria *'Representativeness'* as set out in Policy 33.2.1.9 refers directly to indigenous vegetation or habitat that is formerly present within the ecological district. I consider the terms 'typical' and 'characteristic' should not be added to the definition as I do not consider the addition of these terms necessary. I also consider that the term 'habitat' implies the area of interest applies to fauna. Further, I consider it is inherent in the term representativeness that the habitat will have had some degree of modification. Whether the level of modification is significant to the assessment process will be driven by other assessment criteria such as rarity, diversity, distinctiveness or ecological context.

7.6 I support the inclusion of 'pattern', 'indigenous taxa' and 'ecological changes over gradients' as they provide specific examples of the range of diversity that may be present at varying scales. All are important considerations when considering the nature and scale of adverse effects where indigenous vegetation clearing activities are proposed.

7.7 Part 3 of the Forest and Bird submission (the inclusion of 'or' between criterion) should in my view be accepted as any of the criteria could indicate the area is significant.

7.8 Forest and Bird NZ (Submitter 706) has requested an amendment to Policies 33.3.3.2 and 33.3.3.3 that would include reference to both vascular and non-vascular plants. In my view, a change is appropriate to provide greater clarification. However, for greater understanding a change to 'indigenous vascular plants and non-vascular plants (e.g. mosses, liverworts, hornworts, lichens and algae)' would be better. Note that lichens are not strictly plants but are normally included being a symbiosis between fungus and algae.

Standard 33.5.3 and 33.9 – Threatened Environment Classification Maps

7.9 Jeremy Bell Investments Limited (**JBIL**) (Submitter 784), Tim Burdon (Submitter 791) and Lakes Land Care (Submitter 794) have submitted that the use of the LENZ TEC is not appropriate. I refer to my evidence above in paragraphs 4.6 and 4.7 in relation to the use of the TEC. I note that the TEC does need to be used with caution as it has a high level district wide application. Notwithstanding this point it does provide a district wide context and is very useful to identify areas where the remaining indigenous cover is very restricted.

33.3, 33.4, 33.5 Other Provisions and Rules, Standards for Permitted Activities

7.10 Rule 33.3.3.2 provides that Rules 33.5.1 to 33.5.4 apply where indigenous vegetation attains 'structural dominance' and the area of proposed clearance contains more than 20% indigenous vegetation cover of the total area to be cleared or total number of species is 20% or more of the total area to be cleared. "Structural dominance" means "*indigenous species that are in the tallest stratum*" (as explained in 33.3.3.4). Queenstown Park Limited (Submitter 806) has requested that the 20% threshold be reduced in 33.3.3.2 because it is too restrictive. This is not consistent with their reason provided and I understand Queenstown Park Limited mean an increase in the 20% threshold to make the provision less restrictive. In my view, a reduction to the 20% threshold is not appropriate because the indigenous vegetation must also have structural dominance (i.e. be in the tallest stratum) and in lowland

environments these modified semi natural ecosystems can contain threatened plants.

7.11 Jeremy Bell Investments Limited (**JBIL**) (Submitter 784) has requested an exemption for the clearance of indigenous vegetation for the purposes of irrigation for new farm areas. In my view, this change is not appropriate because a blanket exemption for the expansion of irrigation would result in a decline in indigenous biodiversity values (refer to 10.4 for evidence). This view is further supported by the fact that irrigation expansion is likely to occur on land environments where the remaining indigenous vegetation cover is less than 20%.

7.12 Soho Ski Area Limited and Blackmans Creek No.1 LP (Submitter 610) and Treble Cone Investments Limited (Submitter 613) have requested an exemption be added to 33.3.4 'Exemptions' that would allow indigenous vegetation clearance to be undertaken within land managed under the:

(a) Crown Pastoral Lease, Conservation Act in accordance with a Conservation Management Strategy or Concession;
(b) Land Act, in accordance with a Recreation Permit; or
(c) Reserve Act in accordance with a Reserve Management Strategy.

7.13 The Alpine Group (Submitter 315) has also requested an exemption from the Council's indigenous vegetation clearance rules and SNAs, where the land is subject to the Crown Pastoral Act 1998.

7.14 The Land Act and Reserves Act do not have the same detailed consideration towards biodiversity values as under the Resource Management Act 1991. Under the Crown Pastoral Land Act 1998 any advice given by the Department of Conservation to the Commissioner of Crown Lands is not binding and does not have to be heeded or enforced as the Commissioner only has a duty to consult. Additionally, these Acts do not have the same consideration as the legislation under which SNAs are required, specifically Part 2, Section 6c "Matters of National Importance" within the Resource Management Act 1991.

7.15 JBIL (Submitter 784) has requested that the standards relating to indigenous vegetation clearance above a specified altitude be removed. In my view, that change is not appropriate because these environments are fragile, have a high

level of naturalness and are important (e.g. water capture and retention by native tussocks) and any clearance or exotic planting would have a significant negative impact on indigenous biodiversity values.

7.16 Te Ao Marama Inc (**TAMI**) (Submitter 817) has requested an amendment to the alpine limit from 1070m to 800m. In my view, this change is not appropriate given that the alpine zone and (sub alpine zone) is generally above 1000 metres in the District.

7.17 Forest and Bird NZ (Submitter 706) has requested an amendment to Table 2, whereby clearance is not allowed for a set of particular plant species and habitats. In my view, this change is not appropriate because the habitats put forward will be protected under other Objectives and Policies within Chapter 33. For example, tall tussock grassland within the District often occurs above 1070m, where no clearance of indigenous vegetation is allowed (33.4, Table 4); vegetation near water bodies is address within Objective 33.2.3; and diverse shrublands, including bog pine, celery pine, Hall's totara and Mountain totara, if present are likely already within SNAs or will be identified as such through the resource consent process, specifically through Policies 33.2.1.1 and 33.2.1.9.

8. SITE SPECIFIC SUBMISSIONS ON SNAs

8.1 Forest and Bird and DoC support the schedule of SNAs.

8.2 Florence Micoud (Submitter 115) has requested an amendment to the schedule in 33.8.1 that the Bullock Creek spring and stream is included as an SNA. This site was not identified within the desktop assessment and therefore not considered further. Notwithstanding this point, I am not aware of the ecological values of the site that would merit recognition through the SNA process. Some assessment of the wetland vegetation community would need to be undertaken.

8.3 Vaughn Woodfield and Kate Woodfield (Submitters 133, 163 and 198) have requested an amendment to 33.8.1 that would remove SNA E38A_1. We note the previous landowner was aware of the identification of SNAs on this property. Further, I am aware that the previous landowner had applied for

resource consent for a building site in close proximity to the SNA and I was consulted on the potential effects of the application on the SNAs.

8.4 QLDC (Submitter 383) in its corporate submission seek to reduce the SNAs identified on Hillend Station. The landowner provided limited feedback on the site assessments and after notification, it was made aware that some of the SNAs identified within Hillend Station have resource consent to be cleared (RM090630). I had no involved in this resource consent application.

8.5 As set out in Mr Barr's evidence the land is actively farmed and the resource consent does not expire until 2029. Therefore it is reasonable to expect this resource consent to be implemented and I accept Mr Barr's view that it is not fair or reasonable to schedule these areas as an SNA.

8.6 In addition, subdivision consent RM120131 associated with the establishment of residential building platforms and subdivision, has been completed and involves a vegetation management plan that includes 'passive revegetation areas' within areas also identified as an SNA. Therefore, I consider that SNA F21C_1 and 2 should be removed and SNA's F21A, F21B_1 and F21B_3 should be reduced to the exclusion areas identified on the approved plans of RM090630 (as is attached to Mr Barr's section 42A report).

8.7 Lake McKay Station (submitter 439) has requested a number of amendments to the boundaries of 5 of the 7 SNAs identified on the Station. I am prepared to discuss the SNAs with Lake McKay Station in an attempt to refine SNA boundaries. I do however note that the areas identified by Lake McKay to be excluded from the SNAs contain closed canopy stands of kanuka woodland that are significant under the assessment criteria.

8.8 I understand from the submission the exclusion of existing tracks from the SNA is not sufficient to allow for development of farm tracks. Expansion of the tracks may involve large areas of disturbance within areas of significant indigenous vegetation. In my view this expansion should be considered through a consent process rather than providing for unknown future development. With respect to rates remission, I understand there is a rates remission policy and it is up to the landowner to pursue this with QLDC.

8.9 Tim Burdon (Submitter 791) seeks that a SNA is removed where the landowner is not in agreement. In my view Appendix 5 does set out a consultation process but does not provide for Council to remove SNAs based on landowners not wanting them on their property. I consider their inclusion on the merits is more appropriate. If SNAs are excluded landowners may be able to clear up to 5000m^2 of vegetation as a permitted activity. In my view this will not provide adequate protection for ecological values in the District as the areas identified contain threatened plants, fauna and areas of vegetation in areas with less than 20% remaining.

SNAs F32A_1 to 3, F32B - Queenstown Park Limited (QPL) (Submitter 806)

8.10 QPL has requested an amendment to 33.8.1 that would remove the SNAs on QPL's land due to lack of detail in mapping and lack of significance of the SNAs.

8.11 In my view, this change is not appropriate, as the current mapping is considered accurate for the protection of indigenous biodiversity values. The assessment for the relevant SNAs is on pages 285 to 295 of **Appendix F**. I also provide the following detail with respect to the significance criteria that the QPL site meet:

(a) **Rarity and Distinctiveness** - The threatened environment classification identifies that the lower areas of the grey shrubland are located within a TEC with 18.6% indigenous vegetation cover remaining and only 2.3% protected. The higher areas are identified to have 39.92% indigenous vegetation cover remaining, with 5.07% protected. The better grey shrubland communities in the District that were historically abundant at lower elevations now tend to be found at slightly higher elevations in environments that supported beech forest. The grey shrubland will support prey and breeding habitat for the 'at risk' eastern New Zealand Falcon and will support a range of endemic invertebrates associated with both Olearia and Coprosma species that are in abundance within the SNAs. The shrubland is distinctive within the ecological district given the size of the shrubland and the population of Olearia. Many similar shrublands in the district are much smaller in size and often dominated by matagouri and briar.

(b) **Representativeness** – the two SNAs F32A and F32B contain grey shrubland which is characteristic of lower altitude dryland vegetation within the District. The grey shrublands are two of the largest closed canopy stands present and are some of the best examples of this indigenous vegetation and habitat.

(c) **Diversity and Pattern** - The shrubland will contain a diverse range of grey shrubland species and includes both riparian and drier hillside communities

(d) **The Ecological Context of the Area** - The shrublands are part of a relatively uninterrupted sequences of indigenous communities from the valley floor through to the tall tussock and alpine communities situated at higher elevations in the neighbouring DOC administered Rastus Burn Recreation Area and Remarkables Conservation Area.

(e) **Future Ecological Value of the Area** - It is likely that the shrublands have been expanding their distribution in recent years as a result of the current land management regime i.e. limited vegetation clearing activities. Under current management practices the shrublands are sustainable and expected to continue development.

8.12 In summary these shrublands are excellent examples of vegetation and habitat that is highly representative of this environment and has become rare, particularly within the drier areas of the District. It is also important as habitat for a diverse and abundant invertebrate fauna and passerines that are critical for the maintenance of eastern falcon. Given the high level of representativeness and rarity of high quality grey shrubland in the District and the altitudinal sequence of indigenous communities, in my view the areas are Significant Indigenous Vegetation and Fauna Habitat and should remain scheduled in the PDP.

SNAs F26C1 to F26C3 - Run 505 Ltd (Submitter 390)

8.13 Run 505 Ltd states that SNAs F26C1 to F26C3 were viewed aerially rather than on the ground. I can confirm that I flew over this vegetation and that the threatened species *Olearia lineata* was present. I consider that the area will support a diverse and unique invertebrate fauna and the eastern falcon. I do

not consider the removal of the areas are appropriate as sought by the submitter however some refinement to the boundaries of these sites could be made in consultation with the property owner.

SNA E39A - Crosshill Farms Ltd (Submitter 531)

8.14 Crosshill Farms Ltd request the removal of SNA E39A on the grounds that the vegetation does not meet the criteria set out in Appendix 5. I note that the Significance Criteria that was used to assess the SNAs before their inclusion in the PDP is set out at paragraphs 6.3 and 6.4 above (rather than in Appendix 5 of the ODP)

8.15 I provide the following detail with respect to the significance criteria (noting the assessment is set out on pages 209 to 212 of **Appendix F** is also relevant):

(a) **Rarity and Distinctiveness** - The threatened environment classification identifies that the cushionfield and short tussock grassland is located within a TEC with 2.7% indigenous vegetation cover remaining and only 0.8% protected. In addition the lack of indigenous vegetation cover the SNA supports a population of the 'at risk' cushion Pimelea (*Pimelea sericeovillosa* subsp. *pulvinaris*).

(b) **Representativeness** – The pre-European settlement vegetation representative of this environment is understood to have consisted of continuous grasslands with kanuka. The vegetation on the Crosshill property lacks the diversity of the original grassland vegetation, but remains as one of the only modified examples of the original vegetation cover.

(c) **Diversity and Pattern** - The continued disturbance is shown in the lack of diversity of plant species, but the presence of the threatened *Pimelea sericeovillosa* subsp. *pulvinaris* and the areas of short tussock grassland show that the area of interest has the potential to sustain an ecologically important community

(d) **The Ecological Context of the Area** - The short tussock grassland and cushion field is connected to modified indigenous vegetation

communities located adjacent to the upper reaches of the Clutha River.

(e) **Future Ecological Value of the Area** - The short tussock grassland and cushion fields have maintained a moderate degree of ecological integrity despite rabbit grazing. Thus, the area is sustainable even without protection from rabbits; however the ecological integrity and processes would be greater still with decreased pressure from grazing

8.16 In summary, the short tussock grassland and cushion fields lack the diversity of the original vegetation cover along the Clutha River. However, given the size and number of plant species surviving and the refuge the area provides for the threatened cushion Pimelea I consider the area contains ecological values that are consistent with the significance criteria.

SNAs E19A, E19B and E19C - Sam Kane (Submitter 590)

8.17 Sam Kane has requested the removal of E19A, E19B and E19C on the grounds that these areas are not rare, not threatened and DOC had no interest in these sites through the tenure review process.

8.18 I accept Mr Kane's submission that the risk of the kanuka woodlands identified within the SNA being cleared is very low. Notwithstanding this point I consider the three sites are significant based on the following assessment of significance criteria noting the assessment is set out on pages 156 to 164 of **Appendix F** is also relevant:

(a) **Rarity and Distinctiveness** – The TEC identifies that part of the kanuka woodland intercepts an environment that has 18.6% indigenous vegetation cover remaining, with 2.3% protected. I note that vegetation modelling undertaken by Walker *et. al,* 2003 found that kanuka was an integral component of woodlands throughout the lowland environments of the Upper Clutha and their extent is now greatly reduced. The kanuka woodland communities are expected to support invertebrates, insectivorous birds and the 'at risk' eastern New Zealand Falcon.

(b) **Representativeness** – The kanuka shrubland present is representative of original pre-settlement vegetation cover in the Upper Clutha area.

(c) **Diversity and Pattern** – The kanuka woodland is typical of regenerating stands found on the lower slopes of the Upper Clutha Valley.

(d) **The Ecological Context of the Area** - The assessed area is part of a mosaic of grassland and shrubland across the lower west facing slopes of the Grandview mountain system. It should be viewed as a core contributor to the ecology of the lower slopes of the mountain range that is supported by multiple smaller stands of kanuka and grey shrubland.

(e) **Future Ecological Value of the Area** – Mr Kane states in his submission that there is no economic incentive/benefit for harming or reducing the values of the proposed SNAs. This suggests the sites sustainable under the current management regime.

8.19 In summary, the kanuka woodland within the catchment is a good example of the vegetation representative of the lower slopes of the Grandview mountain system. Further the proposed SNAs are located within an environment with less than 20% indigenous vegetation cover remaining and are expected to support the 'at risk' eastern New Zealand falcon. I consider the area contains ecological values that are consistent with the significance criteria.

New listing: Roger Gardiner (Submitter 260)

8.20 Roger Gardiner (Submitter 260) has requested an amendment to 33.8.1 seeking that the Fish and Game owned 'Wanaka Fish Hatchery, Stone Street' i.e. the spring fed source for Bullock Creek is included as an SNA. This site was not identified within the desktop assessment and therefore not considered further. Notwithstanding this point, I am not aware of the ecological values of the site that would merit recognition through the SNA process. Some assessment of the wetland vegetation community would need to be undertaken.

SNAs B11A, SNA B11C, SNA B11D and SNA B11F - The Alpine Group (Submitter 315)

8.21 The Alpine Group (Submitter 315) has requested an amendment to 33.8.1 that would remove the SNAs on Minaret Station because in their view the SNAs are not significant. In my view and for the reasons that follow, the SNAs on Minaret Station should remain. I provide the following assessment of the proposed SNAs with the assessment criteria.

8.22 SNA B11A noting the assessment is set out on page 42 of **Appendix F** is also relevant):

(a) **Rarity and Distinctiveness** - The TEC identifies the environment the kanuka woodland stand is situated in has less than 3.6% indigenous vegetation cover remaining and 0.8% protected. Indigenous vegetation adjacent to Lake Wanaka is very restricted compared to its original extent and the kanuka woodland is a very distinctive community. Furthermore, kanuka woodland on Minaret Station and the neighbouring Albert Burn is at its western distributional limit.

(b) **Representativeness** – Historically the vegetation on the Estuary Burn alluvial fan and lakeshore is likely to have comprised a beech-podocarp forest on the more stable areas, broadleaved indigenous hardwoods and manuka/kanuka woodland occupying areas that were exposed to more regular disturbance events (mainly floods). The kanuka woodland is considered to be representative of areas prone to regular disturbance events

(c) **Diversity and Pattern** – The Kanuka woodland has a low diversity which is typical of kanuka stands at an early stage of development. However, over time this woodland is expected to provide the conditions for the establishment of podocarps, and indigenous broadleaved species.

(d) **The Ecological Context of the Area** - The woodland is connected to other lakeshore kanuka stands in addition to indigenous broadleaved hardwood stands and beech forest in the Estuary Burn.

(e) **Future Ecological Value of the Area** – The kanuka woodland is of a sufficient size to be self-sustaining and has the potential to develop further with increasing diversity as the canopy opens up over time providing the conditions for podocarps, kowhai and other indigenous broadleaved species to successfully establish.

8.23 In summary, the woodland is a good example of vegetation that is representative of an environment with less than 5% indigenous vegetation cover remaining. Given the rarity of indigenous vegetation cover, the fact that the kanuka is close to its western distribution limit, and the ecological trajectory of the community I consider the area contains ecological values that are consistent with the significance criteria.

8.24 SNA B11C noting the assessment is set out on page 45 of **Appendix F** is also relevant:

(a) **Rarity and Distinctiveness** - The TEC identifies the environment the kanuka woodland stand is located in has approximately 22% indigenous vegetation cover remaining and 8% protected. Indigenous vegetation adjacent to Lake Wanaka is very restricted compared to its original extent and the kanuka woodland is a very distinctive community.

(b) **Representativeness** – Historically the vegetation on the Estuary Burn alluvial fan and lakeshore is likely to have comprised a beech-podocarp forest on the more stable areas, broadleaved indigenous hardwoods and manuka/kanuka woodland occupying areas that were exposed to more regular disturbance events (mainly floods). The kanuka woodland is considered to be representative of areas prone to regular disturbance events.

(c) **Diversity and Pattern** – The Kanuka woodland has a low diversity which is typical of kanuka stands at an early stage of development. However, over time this woodland is expected to provide the conditions for the establishment of podocarps, and indigenous broadleaved species.

(d) **The Ecological Context of the Area** - The woodland is connected to other lakeshore kanuka stands in addition to indigenous broadleaved hardwood stands and beech forest in the Albert Burn and Mt Albert Station.

(e) **Future Ecological Value of the Area** – The kanuka woodland has a closed canopy and is of a sufficient size to be self-sustaining and has the potential to develop further with increasing diversity as the canopy opens up over time providing the conditions for podocarps, kowhai and other indigenous broadleaved species to successfully establish.

8.25 In summary, the kanuka woodland is a good example of representative indigenous vegetation located adjacent to Lake Wanaka. The community is expected to provide the conditions for the establishment of podocarps, kowhai and other hardwood species, therefore the floral and faunal diversity of this community is expected to increase over time.

8.26 SNA B11D consists of three ecological communities including manuka/kanuka woodland, regenerating broadleaved indigenous hardwoods and beech forest. My assessment against the criteria is as follows (noting the assessment is set out on page 49 of **Appendix F** is also relevant):

(a) **Rarity and Distinctiveness** – The TEC identifies the environment the SNA is located within contains 44.68% indigenous vegetation cover remaining and 1.96% formally protected.

(b) **Representativeness** – Historically the vegetation on the lake faces adjacent to Minaret Burn comprised a beech forest. The communities associated with this assessment are regenerating broadleaved indigenous hardwoods and manuka woodland. These communities are both representative of mid successional vegetation development within this environment.

(c) **Diversity and Pattern** – The kanuka woodland has a low diversity which is typical of kanuka stands at an early stage of development. However, over time this woodland is expected to provide the

conditions for the establishment of podocarps, and indigenous broadleaved species.

(d) **The Ecological Context of the Area** - The SNA consists of three vegetation communities including kanuka/manuka woodland and broadleaved indigenous hardwoods and beech forest and is part of a lakeshore to alpine environment sequence of indigenous vegetation.

(e) **Future Ecological Value of the Area** – The site is of a size that is sufficient to provide a permanent habitat for a range of indigenous invertebrates and bird species. Ecological processes such as vegetation development and succession, disturbance events and recruitment will all be viable within this site.

8.27 In summary, while the vegetation in itself is not within an environment that is nearing the 20% threshold where species loss accelerates, it is significant in that it provides for a relatively uninterrupted lake shore to alpine sequence that is rare within the District.

8.28 SNA B11F consists of regenerating broadleaved indigenous hardwoods (noting the assessment is set out on page 54 of **Appendix F** is also relevant):

(a) **Rarity and Distinctiveness** - The TEC identifies the environment the SNA is located within contains 44.68% indigenous vegetation cover remaining and 1.96% formally protected. I consider the site to be highly distinctive given much of the original indigenous cover adjacent to Lake Wanaka has been removed.

(b) **Representativeness** – Historically the vegetation on the lake faces would have comprised a mix of indigenous broadleaved hardwoods and beech forest. The communities associated with this assessment are regenerating and established broadleaved indigenous hardwood communities. This community is highly representative of this lakeside environment.

(c) **Diversity and Pattern** – Indigenous broadleaved hardwood communities contain a diverse range of plants species and provide habitat for invertebrates and birds.

(d) **The Ecological Context of the Area** – The SNA is located adjacent to the Minaret Wetland and will provide habitat for bird species that can move between patches of vegetation along the lakeshore.

(e) **Future Ecological Value of the Area** – The vegetation within the SNA is self-sustaining and will continue to develop providing the site is not affected by inadvertent fires.

8.29 In summary, the broadleaved hardwood forest is representative of the original lakeshore ecosystems. Much of the original lake shore vegetation has been lost and in my opinion the remaining remnant vegetation is important and meets the Significance Criteria.

8.30 The Alpine Group has also requested the removal of the SNAs on Minaret Station for the further following reasons:

(a) The land is administered in accordance with the Land Act 1948 and Crown Pastoral Land Act 1998;
(b) Exotic weeds within the SNA will require on-going management;
(c) The encumbrance or valuation considerations caused by SNAs have not be identified;
(d) The vegetation within SNAs are already protected by the ODP and PDP; and
(e) Some of the SNAs are intensively farmed.

8.31 I provide the following response to the above points:

(a) The Land Act 1948 and Crown Pastoral Land Act 1998 Act do not have the same consideration towards biodiversity values under the Resource Management Act 1991. Under the Crown Pastoral Land Act 1998, any advice received from the Department of Conservation is not binding and does not have to be heeded or enforced; and
(b) No active management of noxious weeds is implied or required in the classification of SNAs.

SNA E18C - Allenby Farms (Submitter 502)

8.32 Allenby Farms (Submitter 502) has requested an adjustment to SNA E18C based on the report 'Evaluation of a Potential Significant Natural Area at Mt Iron, Wanaka' by Wildlands (2015), which suggests northern and southern boundary changes. In my view, the requested change to pull back the current northern boundary of the SNA is not appropriate, however, an extension to the southern boundary of the SNA would be appropriate. This is because the Wildlands (2015) report specifically states that the reduction of the northern boundary is 'at the expense of losing some kanuka scrub and shrubland'. It states that this is acceptable due to kanuka being common in the local area. While kanuka woodland is the most prevalent indigenous community in the local area it remains situated within an environment that has less than 20% indigenous vegetation cover remaining. It is within this context that the assessment of significance should be applied. The report highlights a further extension to the southern boundary as it better captures the ecological gradient present and habit for the 'At Risk' *Pimelea sericeovillosa* subsp. *pulvinaris*. I agree with this latter finding in the Wildlands (2015) report, and a revised boundary is included in Mr Barr's section 42A report.

SNA B16A, B16B_1 to 3 - Glen Dene Ltd and Glen Dene Holdings (Submitter 384)

8.33 Glen Dene Ltd and Glen Dene Holdings has requested an amendment to 33.8.1 that would remove the SNAs on Glen Dene Station. In large part this is because they consider that the SNAs are not significant and the areas could not be cleared under the operative rules.

8.34 I oppose this submission for the following reasons in light of the significance criteria (noting the assessment is set out on pages 67 to 75 of **Appendix F** is also relevant):

(a) **Rarity and Distinctiveness** – The regenerating broadleaved indigenous hardwoods, manuka woodlands and beech forests are located within a TEC with 44.68% indigenous vegetation cover remaining and only 1.96% protected. These SNAs support habitat of the 'at risk' New Zealand eastern falcon.

(b) **Representativeness** – Historically the vegetation within the SNAs would have been dominated by beech forest. This community is present in patches within the areas today, however, the vegetation is now dominated by regenerating broadleaved indigenous hardwoods and manuka woodland. The broadleaved forest and manuka woodland communities are both representative of mid successional vegetation development within this environment.

(c) **Diversity and Pattern** - The areas consist of two vegetation communities (kanuka/manuka woodland and broadleaved indigenous hardwoods), which provide sections for contiguous sequences of indigenous vegetation from shrubland/lakeshore through to the alpine environment.

(d) **The Ecological Context of the Area** - The vegetation is continuous with the tall tussock grassland at higher elevations and, in B16A is continuous with the mature beech forests within the Craig Burn Conservation Covenant area.

(e) **Future Ecological Value of the Area** – The sites are of a size that is sufficient to provide a permanent habitat for a range of indigenous invertebrate and bird species. Ecological processes such as vegetation development and succession, disturbance events, and recruitment, will all be viable within these areas.

8.35 In summary, the regenerating broadleaved indigenous hardwoods, manuka woodlands and beech forests are good, sustainable representations of mid successional vegetation development. The vegetation also provides feeding habitat for the 'at risk' eastern New Zealand falcon. Furthermore, the SNAs provide for sequences of indigenous vegetation over altitudinal sequences. Consequently, I consider the area contains ecological values that are consistent with the Significance Criteria.

SNA A23A - Jed Frost and Adam Smith (Submitter 323)

8.36 I understand the SNA referred to in this submission covers an area of a consented subdivision. The submission does not provide specific changes to

the SNA boundary. This detail would be required to allow an assessment of the implications to the SNA.

F2A, F2B_1, F2B_2, F2C and F2D - Isabella Anderson (Submitter 829)

8.37 Isabella Anderson requests that F2A, F2B_1, F2B_2, F2C and F2D are removed as 'they are still going through the process' and has not wanted their inclusion through all stages of the SNA process. I accept Isabella Anderson's concerns regarding the movement of the proposed SNA sites on Branch Creek through to this stage. However, I note that a letter was sent to all landowners in April 2014 stating that QLDC had progressed the project to Stage 4 of the process and requested further feedback at this time. I understand QLDC received no further information from this submitter.

8.38 I oppose the submission and consider the SNAs identified are significant based on the assessment criteria noting the assessment is set out on pages 222 to 241 of **Appendix F** is also relevant).

Rarity and Distinctiveness

(a) SNA F2A – The shrubland and beech forest within F2A are not within an area that has a high percentage of indigenous vegetation cover loss. However they are rare in that beech forest in the Cardrona Valley is very restricted from its pre-settlement distribution and the shrubland is very distinctive as it contains a diverse assemblage of species (*Dracophyllum longifolium, Dracophyllum uniflorum, Olearia avicennifolia, Olearia arborscens, Olearia nummularifolia, Olearia odorata,* mountain ribbonwood *(Hoheria lyallii),* koromiko *(Hebe salicifolia), Coprosma rugosa, Coprosma propinqua, Carmichaelia petriei, matagouri, Melicytus alpinus, Aristotelia fruiticosa, Phormium cookianum*) that are not commonly found in the Cardrona Valley.

(b) SNAs F2B_1, F2B_2, F2C and F2D contain dry shrubland communities within environments that range between less than 20% remaining in the case of F2C and F2D and less than 40% remaining in F2B_2, F2C. The better grey shrubland communities in the district that were historically abundant at lower elevations now tend to be found at slightly higher elevations in environments that supported

beech forest. The grey shrubland will support prey and breeding habitat for the 'at risk' eastern New Zealand Falcon and will support a range of endemic invertebrates associated with both Olearia and Coprosma species that are in abundance within the SNAs. The shrublands are distinctive within the ecological district given the size of the shrublands and the populations of Olearia. Many similar shrublands in the district are much smaller in size and often dominated by matagouri and briar.

Representativeness

(c) SNA F2A contains beech forest that is highly representative of the environment and would have been the dominant cover in the area prior to settlement. The shrubland community is rare in the context of the Cardrona Valley with the assemblage more consistent with shrublands to the west of the district.

(d) SNAs F2B_1, F2B_2, F2C and F2D are dry shrubland communities that are highly representative of the drier parts of the District. The shrublands within the SNAs are well developed and contain closed canopy stands and include good populations of Olearia species that are often absent from dry shrublands in the District. I therefore conclude that the shrublands are some of the best examples of dry shrubland in the District.

(e) **Diversity and Pattern** - The shrublands will contain a diverse range of grey shrubland species and include both riparian and drier hillside communities

(f) **The Ecological Context of the Area** - The shrublands form patches of indigenous communities in dryland environments and collectively provide important habitat for a range of faunal species.

(g) **Future Ecological Value of the Area** - It is likely that the shrublands have been expanding their distribution in recent years as a result of the current land management regime i.e. limited vegetation clearing activities. Under current management practices the shrublands are sustainable and expected to continue to develop.

8.39 In summary the shrublands are excellent examples of vegetation and habitat that are some of the best examples in the District. It is also important habitat for a diverse and abundant invertebrate fauna and passerines that are critical for the maintenance of eastern falcon. Given the high level of representativeness and rarity of high quality grey shrubland in the District, I consider that the areas are Significant Indigenous Vegetation and Fauna Habitat.

9. LIST OF THREATENED PLANTS

9.1 It is possible that further threatened species are present within the District and if they can be identified and justified, I would consider their inclusion within 33.7.1. The DOC (Submitter 373) has provided a list of additional species they consider should be included in the list. I have reviewed the list and can confirm that there are habitats in the district that could support these threatened plants however I cannot confirm if these species are present. Given the habitats are present I consider it is appropriate to include these species within 33.7.

10. DEFINITIONS

Clearance of Vegetation (Includes Indigenous Vegetation)

10.1 Forest and Bird NZ (Submitter 706) has requested an amendment to the definition of 'Clearance of Vegetation' in Chapter 2 that would include 'soil disturbance including direct drilling' as a method of indigenous vegetation clearance. In my view, this change is appropriate, as direct drilling can crush native vegetation to a degree that constitutes direct clearance of indigenous vegetation.

10.2 The Department of Conservation (Submitter 373) has requested an amendment to the definition of 'Clearance of Vegetation' that would include 'oversowing' as a method of indigenous vegetation clearance. This requested change is similar to the proposal to include irrigation in the definition in that the activity will not have an immediate physical disturbance but it is likely to result in the competitive exclusion of indigenous species in some

environments, notably dryland environments where the indigenous cover is dryland cushionfields.

10.3 Within the District much of the oversowing that has occurred is undertaken following the burning or spraying of predominantly bracken fern dominated vegetation. In this instance I do not think it is reasonable to include oversowing in the definition of clearing. Notwithstanding this point, I am of the opinion that the combination of oversowing and irrigation would have a detrimental effect on dryland communities that would result in the loss of indigenous vegetation cover. Given the spatial nature of this issue in the district I consider the issue of oversowing and irrigation may be better captured in a site standard rather than within the definition of 'Clearance of Vegetation'.

10.4 Federated Farmers of New Zealand (Submitter 600) has requested an amendment to the definition of 'Clearance of Vegetation' that would exclude irrigation as a method of indigenous vegetation clearance. In my view, this change is not appropriate for the following reasons. The variation in amount of water available within an environment can determine the plant species composition. Specifically, indigenous vegetation adapted to naturally drier habitats cannot successfully compete with exotic pasture species that are better adapted to wetter conditions (Walker, Aff. 45; Lee, Aff.18). Accordingly, the application of water via irrigation to a dryland environment provides a competitive advantage to exotic species, which outcompete certain native species and therefore is considered to constitute clearance of indigenous vegetation (Walker, Aff. 45; Lee, Aff. 18). Furthermore, irrigation will be undertaken in tandem with the application of seed and fertiliser, which will further enhance the competitive exclusion process and clearance of indigenous vegetation (Lee, Aff. 17, 21).

10.5 Natural dryland habitats do occur within the District, for example the valley floors of the Upper Clutha basin, where native cushion field communities have adapted to relatively dry conditions and would not successfully compete with exotic species that grow taller and more rapidly in the presence of irrigation.

10.6 The Department of Conservation (Submitter 373) has requested the inclusion of a definition for 'Biodiversity Offset' and 'no net loss' in Chapter 2. In my view, the inclusion of definitions of 'biodiversity offset' and 'no net loss' is helpful as biodiversity offsetting is not well understood. The definitions

presented by the DOC provide a clear statement on what offsetting is and it is consistent with my understanding of the application of biodiversity offsets.

10.7 Biodiversity offsetting is not a form of mitigation and is only considered when all measures of avoidance, minimisation, remediation or mitigation have been exhausted. If biodiversity offsetting is proposed the offset must be a site equivalent to the affected area and must result in a net biodiversity gain. I have not encountered a project within the District that has promoted the use of biodiversity offsets to support a consent application. They are generally associated with large scale disturbance activities such as mining activities and they are difficult to implement given the expectation that an offset will result in 'no net loss' of biodiversity.

PART B: CHAPTER 34 - WILDING EXOTIC TREES

11. WILDING TREES: RISK TO INDIGENOUS BIODIVERSITY

11.1 The detrimental impact of wilding tree species on indigenous ecosystems and species in New Zealand has been well documented (Froude, 2011a and Froude, 2011b), in particular the impact of wilding conifers on low stature indigenous vegetation, alpine ecological communities, South Island drylands, and native forest (Froude 2011a). These impacts are detailed below.

11.2 Some invasive wilding conifer species (e.g. contorta pine, mountain pine and corsican pine) are able to grow at altitudes above the local treeline formed by indigenous forest species such as mountain beech. Conifer infestations above the native treeline cannot be replaced by native species through natural succession processes.

11.3 The indigenous woody flora of the South Island drylands has been severely impacted by human settlement, eliminating many formerly widespread woody species, and restricting others to small isolated remnants. Seed dispersers and indigenous pollinators for these woody species have also been extensively modified. Consequently, the re-establishment of many formerly common woody native species is likely to be slow or non-existent and these drylands are likely to be susceptible to dominance by conifers.

11.4 Douglas fir is able to spread to establish in mature beech forest, particularly where the canopy has thinned because of old age or an environmental stressor. Because Douglas fir saplings grow faster than beech, invasion could lead to eventual replacement of the mountain beech forest by Douglas fir. Modelling referenced in Froude (2011a) indicates that at higher elevations Douglas fir has the potential to spread and significantly alter montane mountain beech forests.

11.5 Wilding conifers grow faster and taller than low-stature indigenous vegetation, resulting in conifers shading out native species. Dense infestations of conifers can lead to riparian and wetland communities becoming dry. Froude (2011a) lists low stature indigenous ecosystems that are at particular risk from wilding conifer invasion. These include: tussock and other indigenous grasslands; alpine ecosystems; subalpine and dryland scrub and shrublands; frost-flats; wetlands; turf communities; geothermal areas; dunelands; ultramafic/serpentine areas; rockfields and herbfields; riparian areas; coastal margins, bluffs and cliffs.

11.6 Without sufficient, effective intervention there is a high risk of major vegetative change from further spread of wilding trees in the South Island high country and a number of other areas with low stature indigenous vegetation. This prediction is expressed in the 'New Zealand Wilding Conifer Management Strategy 2015 – 2030' (MPI, 2014), the 2001 DOC 'South Island Wilding Conifer Strategy', the 'Wakatipu Wilding Conifer Strategy 2013-2017' (Pringle and Willsman, 2013), and Froude (2011a, 2011b).

11.7 Froude (2011a) summarises an assessment of spread for the Mt Dewar high country station near Queenstown. This assessment found that the station had been virtually free of wilding conifers up to the early 1970s, and by 2003 one third of the southern part of the property was affected. A conservative assessment predicted that, without control, all of the station would have a significant wilding cover within 80 years. Furthermore, adjoining protected areas of the Devils Creek Conservation Area would be likely to be occupied by wilding conifers within 40-60 years.

11.8 Within the 2001 'South Island Wilding Conifer Strategy', DOC estimates that lack of wilding conifer control leads to escalation of costs potentially from $2/ha to $1,500/ha in less than 20 years. The 'Wakatipu Wilding Conifer

Control Group Management Strategy for 2013 to 2017' acknowledges that early intervention prevents future budget explosions.

11.9 The DoC 'South Island Wilding Conifer Strategy' states that dense infestations will reduce water yield from stream catchments and Froude (2011a) summarises data from a number of New Zealand catchment studies that show that where pasture has been replaced by radiata pine forest, the reduction in annual surface water yields range from 30-81%, with the upper end of the range being observed in dry South Island sites. The invasion of conifer trees in riparian zones, valley bottoms and hillside depressions has a disproportionate effect on stream flow. This is because these locations are where the greatest volume of water is stored in a catchment.

12. TYPES OF TREES THAT REPRESENT A RISK

12.1 Froude (2011a) describes eleven introduced conifer species as being responsible for most wilding conifers within New Zealand, these species are: Radiata (*Pinus radiata*), Ponderosa (*P. ponderosa*), Lawsons cypress (*C. lawsoniana*), Muricata pine (*P. muricata*), Maritime pine (*P. pinaster*), European Larch (*Larix decidua*), Corsican pine (*P. nigra*), Mountain/dwarf mountain pine (*P. mugo* subsp. *mugo* and P. *mugo* subsp. *uncinata*), Douglas-fir (*Pseudotsuga menziesii*), Scots pine (*P. sylvestris*), Lodgepole/contorta pine (*P. contorta*). These wilding conifer species require active management to control their spread.[5]

12.2 In my view, the planting of ten of these species should remain prohibited in the PDP given the associated wilding risk. However, the planting of *P. radiata* could be a discretionary activity due to a lower risk of spreading vigour. Assessment of applications to establish P. radiata should consider the risk of spread according to The Wilding Spread Risk Calculator (Ledgard, 1999). This assessment tool is comprised of two calculators, one for new plantings (DSS1) and one for the assessment of the risk for a site to be invaded by wilding conifers (DSS2). The current version of the Calculator was released in June 2012. Guidelines have been developed to give users the ability to carry out an additional assessment of wilding spread risk. The Guidelines for the use of the Decision Support System “Calculating Wilding Spread Risk From

[5] Ministry for Primary Industries, 2014

New Plantings" were developed by the New Zealand Forest Research Institute Limited (Paul, 2015).

12.3 The remaining wilding species listed in 34.4.1 (i.e. sycamore, hawthorn and boxthorn) are listed on DOC's Consolidated List of Environmental Weeds in New Zealand (2008)[6] and in my view should remain prohibited within the PDP. DOC's list was developed by consolidating studies and lists of ecological weeds having a significant effect on conservation land within New Zealand. Species included on the list meet at least one of the following criteria:

(a) there is at least one infestation of the species on land administered by DOC, and DOC currently has a weed-led control programme for it;

(b) the species is controlled on at least one site to protect the natural heritage values of the site (e.g. the site may support populations of threatened plant species). This excludes plants controlled only for recreation purposes; or

(c) the species is perceived by staff as having a damaging effect on the natural heritage values of at least one site, but resources are insufficient for the species to be controlled there.

12.4 The species within the list of environmental weeds that have been identified as a risk within the District include: Buddleia *(Buddleja davidii),* Grey Willow *(Salix cinerea),* Crack Willow *(Salix xfragilis),* Cotoneaster *(Cotoneaster simonsii* and *C. glaucophyllus),* Rowan *(Sorbus aucuparia),* Spanish heath *(Erica lusitanica)* and Russell lupin *(Lupinus polyphyllus).* In my experience all of these species are a risk to the indigenous ecosystems within the District and should be included.

13. RESPONSE TO SUBMISSIONS

13.1 I have been asked to consider a submission from Submitters 501 (David Broomfield) and FS1255 (Arcadian Triangle Limited) that seek hawthorn be removed from the prohibited list as there are a number of cultivars that are sterile and they consider it is important to continue the historically relevant appearance of Hawthorn hedging into the future. I understand there is difficulty guaranteeing the sterility of plant species as the concept of sterility is

[6] Howell, 2008.

based on the percentage of plants within a species that are infertile. Internationally some regulators consider sterile plants to have less than 2% of the population to be fertile. I am not aware of the level of sterility of the cultivars suggested in this submission and it likely the research on these cultivars is not available. In my opinion the use of these species could be considered appropriate where they are confirmed to be fully sterile.

Glenn Davis
6 April 2016

Appendix A – Appendix 5 of the ODP

Appendix 5

Areas of Significant Indigenous Vegetation

AREAS OF SIGNIFICANT INDIGENOUS VEGETATION AND HABITAT OF INDIGENOUS FAUNA - PART I				
2A	5	Hunter River Delta	G38 270 557	WERI: A braided river used for fishing and recreational boating activities. An important site for bird breeding.
16A	10	Caspar Flat Bush	E40 669 936	SSWI: An area with mountain beech. Bird species present include yellow breasted tit, rifleman, grey warbler and silvereye. Reasonable canopy but low plant diversity (natural for environment).
17A	10	Left Branch bush	E40 665 925	SSWI: An area of mountain beech, mountain toatoa, small leaf *Coprosmas* and ferns. A very steep south facing habitat. Reasonable canopy but very little plant diversity (natural for environment). Bird species include yellow breasted tit, rifleman, silvereye and grey warbler. Some large slips.
18A	10	Butchers Gully Bush	E40 665 906	SSWI: An area with mountain beech and mountain toatoa. Bird species include grey warbler, rifleman and yellow breasted tit. A steep south facing habitat. Reasonable canopy but little plant diversity. Some slipping.
35A	10	Mount Aurum Remnants	S123 520 930	SSWI: An area with mountain beech, situated in gullies and on southern faces. Reasonable canopy, but low plant diversity. Yellow breasted tit, rifleman and grey warbler present.
38A	12	Moke Lake	S132 470 738	WERI, SSWI: A steep montane lake surrounded by tussock farmland. Brown trout fishery.
40A	12	Lake Isobel	S132 406 807	WERI: A lake with restiad bog and tussock land (*Chionochloa* species).
41A	12	Lake Kirkpatrick	S132 477 704	WERI, SSWI: A sub-alpine lake with *Carex* bog and surrounded by tussock farmland. Common native water-fowl present. More important as trout fishery.
42A	12, 38	Few Creek Bush (includes 127)	S132 440 675	SSWI: A moderate sized plain beech forest (red beech, mountain beech) with common forest birds, including brown creeper, fantail, bellbird, rifleman, grey warbler and yellow breasted tit.
43A	12, 38	Twelve Mile Bush	S132 420 655	SSWI: Reasonable sized bush with more diversity than usual, with red beech, mountain beech, broadleaf shrubbery, bracken and tussock surrounds. Good range of common forest birds, including brown creeper, fantail, bellbird, rifleman, grey warbler and yellow breasted tit. Very good lakeshore diversity.
57A	31	Lake Johnson	F41 735 695	WERI, SSWI: An eutrophied lowland lake, rush and sedge swamp (*Carex* species - Cyperaceae).
69A	13	Shadow Basin Tarn	F41 798 639	Montane lake and montane flush surrounded by steep slopes of snow tussock, cushion vegetation and herb fields.
71A	13	Lake Alta (adjoins 70)	F41 801 632	WERI: A montane lake surrounded by steep snow tussock slopes with extensive cushion vegetation and herb fields.
72A	13	Upper Wye Lakes	F41 812 612	WERI: Four montane lakes surrounded by scree and snow tussock. Cushion vegetation and herb fields.
91A	5	Dingle Lagoon	G39 220 347	WERI SSWI: A lagoon with a sloping edge with good plant communities and populations of paradise shelduck, mallard, grey duck and Canada geese.
114A	6, 9	Mt Earnslaw Forest and Bush Remnants	E40	SSWI: A healthy area of bush with red beech, totara, mountain beech, *Grisilinea,* fuchsia, wineberry, *Coprosma* sp., hard fern. Good numbers of bush birds present, including yellow breasted tit, rifleman, bellbird, grey warbler and silvereye.
126A	32	Gorge Road Wetland	S132 555 720	Significant site of insects and plants *(Carox socta).*

PART II CRITERIA

The purpose of this part of the appendix is to outline a process by which areas of significant indigenous vegetation and significant habitats of indigenous fauna can be identified and included in the District Plan.

The Council will adopt a five stage process which is to commence within 18 months of the District Plan becoming operative, as follows:

Stage 1 – Initial Identification

Initial identification of significant areas will involve:

(a) Review of existing environmental databases and information on the Districts biodiversity to identify potentially significant sites.

(b) Identification of information and data gaps on the district's biodiversity and those parts of the district where potentially significant sites may exist but which have not yet been studied or assessed.

Stage 2 – Consultation Process

Before commencing an assessment under Stage 3 the Council will:

(a) Initiate personal consultation with the affected landowner and occupier.

(b) Consult with the Department of Conservation and other interested parties regarding suitable ecological experts.

(c) Arrange in conjunction with the landowner and occupier for a professional ecological assessment of the site to be carried out.

(d) Discuss with the landowner and occupier, the Department of Conservation and other interested parties the scope and nature of the brief used to undertake the assessment and the sharing of information.

Having completed an assessment under Stage 3 the Council will:

(a) Discuss the results of any assessment with the landowner and occupier and where necessary, appropriate methods of management or protection.

(b) Make the outcomes of any ecological assessment part of the public record.

Stage 3 – Assessment

In determining whether an area is significant in terms of section 6(c) of the Resource Management Act 1991 the Council will use the following ecological criteria as the basis for determining ecological significance:

Primary Criteria

A The Ecological Values of the Area – the values of the place itself

(i) Representativeness – Whether the area contains one of the best examples of an indigenous vegetation type, habitat or ecological process which is typical of its Ecological District.

(ii) Rarity – Whether the area supports or is important for the recovery of, an indigenous species, habitat or community of species which is rare or threatened within the Ecological District or is threatened nationally.

(iii) Diversity and Pattern – the degree of diversity exhibited by the area in:

- vegetation,
- habitat types,
- ecotones,
- species,
- ecological processes.

(iv) Distinctiveness/Special ecological character – the type and range of unusual features of the area itself and the role of the

area in relationship to other areas locally, regionally and nationally, including:

- presence of indigenous species at their distribution limit,
- levels of endemism, eg the presence of endemic species,
- supporting protected indigenous fauna for some part of their life cycle (eg breeding, feeding, moulting, roosting), whether on a regular or infrequent basis,
- Playing a role in the life cycle of migratory indigenous fauna,
- containing one of the best examples of an intact sequence, or substantial part of an intact sequence of ecological features or gradients,
- supporting predominantly intact habitats with evidence of healthy natural ecosystem functioning

Other Criteria

B The Ecological Context of the Area including its relationship with its surroundings

(v) Size and Shape – the degree to which the size and shape of an existing area is conducive to it being, or becoming ecologically self sustaining.

(vi) Connectivity – the extent to which the area has ecological value due to its location and functioning in relation to its surroundings. An area may be ecologically significant because of its connections to a neighbouring area, or as part of a network of areas of fauna habitat. For example an area may act as a corridor or stepping stone for movement/migration of species between or to areas of important habitat.

C The Future Ecological Value of the Area

(vii) Long Term Sustainability – the degree to which an area is likely to maintain itself, taking into consideration:

- extent to which criteria in paragraphs A and B above are met
- degree of historic modification to the area and its surroundings which affects its future
- degree of resilience of species and habitats present
- the effects of current management on identified ecological values
- the extent to which the area has achievable potential, with management input, for restoration of ecological values which are significant in the Ecological District.

The fact that a particular area satisfies one or more of the above criteria does not necessarily mean the area is significant.

The Council will give particular consideration to the ecological criteria in paragraphs (i) to (vii) along with any other relevant considerations in deciding whether or not an area should be included in Part I of the Appendix.

Stage 4 – Final Consideration

Before deciding whether or not to adopt any area identified in Stage 3 as being significant into the District Plan the Council will have regard to the following matters:

(a) existing land use and the degree of modification associated with the site

(b) the economic effect on the landowner including development costs and lost potential (If these are relevant under section 7(b) of the Act)

(c) consideration of non regulatory and regulatory methods which ensure the identified values and their needs are recognised and protected

(d) presence and level of animal pests and weeds

(e) resources required to implement effective protection

(f) whether or not identified values are under threat

(g) the extent to which values are or are not protected elsewhere

(h) any other relevant factor.

Stage 5 – Adoption into the District Plan

This process will include a Plan Change to the District Plan. That process is outlined in Part 1.6 Introduction of the District Plan.

Glossary of Terms:

Endemic: Refers to species of plants and animals which are unique to an area or animals which may migrate but only to breed in the area.

Ecological District: One of the major levels used for the ecological classification of land. New Zealand has been divided up into 85 ecological regions and 269 ecological districts according to geological, topographical, climatic and biological features and processes. This reflects the small scale variability of New Zealand's ecological patterns. An ecological district is a land where topographical, climatic, soils and biological features and broad cultural patterns produce a characteristic landscape of biological communities. An ecological region compromises adjacent ecological districts with closely related characteristics, or may only include one ecological district with very distinct features.

Habitat: The environment in which a particular species or group of species live. It includes the physical and biotic characteristics that are relevant to the species concerned. For example, the habitat of whio/blue duck consists of swift water with an abundance of freshwater insects.

Ecotone: A transitional zone between two habitats, which has distinct species or ecological characteristics of its own.

Resilience: The ability of a community or species to recover quickly (return to its original state) from perturbation, disturbance or displacement.

Community: The species that occur together in the same place at the same time.

Population: A group of individuals of one species in an area.

Ecosystem: A biological system comprising a community of living organisms and its associated non-living environment (such as sunlight, air, water, minerals and nutrients), interacting as an ecological unit.

Rare: Species with small world populations that are not at present endangered or vulnerable but are at risk of extinction. The species are usually localised within restricted geographical areas or habitats, or thinly scattered over a more extensive range.

Endangered: Species in danger of extinction and whose survival is unlikely if the factors causing their decline continue to operate.

Vulnerable: Species likely to move into the endangered category in the near future if the factors causing their decline continue to operate.

Threatened species: A species or community that Is vulnerable or endangered.

Biological diversity: The variability among living organisms from all sources, this includes diversity within species, between species and ecosystems. Components include genetic diversity, species diversity and ecosystem diversity.

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Appendix C – Statement of National Priorities

Ministry for the Environment
Manatū Mō Te Taiao

Department of Conservation
Te Papa Atawhai

Protecting our Places

Information about the Statement of National Priorities for Protecting Rare and Threatened Biodiversity on Private Land

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Message from the Ministers

Private landowners have a crucial role to play in saving New Zealand's at-risk native plants and animals. Some of our most rare and threatened ecosystems and species are now found only on private land; their long term survival will depend largely on the stewardship (kaitiakitanga) of landowners.

We are fortunate in New Zealand because many of our landowners are already showing a growing interest in, and commitment to, conservation. To build on this, and stimulate new thinking, the government has been exploring ways of supporting and encouraging private landowners in their endeavours.

We have already established a fund to provide financial assistance for conservation work on private land, and over $10 million has been given in grants. Another $40.6 million has also been provided through agencies like the the QE II Trust and Ngā Whenua Rahui, to help people covenant private land.

Nevertheless, there remains a need to provide a better framework for decision-making about biodiversity on private land, particularly for regional and district councils who work directly with landowners in local areas.

To this end, we have developed a statement of national priorities to focus conservation efforts on private land where the need is greatest. We have sought to do so while providing the flexibility for local decision-making.

Our expectation is that the priorities in this statement will be used to support and inform councils' biodiversity responsibilities under the Resource Management Act. We believe this can be best achieved within a co-perative rather than a legislative framework.

It is important to remember that many of the species and environments encompassed in this statement are crucial to our national identity. They are part of what makes our country such a spectacular place to live, and they play a larger part than just scenery.

Our biodiversity provides important resources and services, such as clean air and water, fertile soils, pollution and flood control. As we adapt to the fluctuations and disturbances of climate change, we must remember that biodiversity helps provide stability and resilience, allowing ecosystems and species to cope with and adapt to change.

This statement of national priorities for protecting rare and threatened species on private land recognises these needs, and seeks to help landowners, councils, central government, the public and others play their part in preserving our heritage for us all.

Chris Carter
Minister of Conservation

David Benson-Pope
Minister for the Environment

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1 Introduction to the Statement of National Priorities

On 26 April 2007, the Minister of Conservation and the Minister for the Environment issued a Statement of National Priorities for the protection of rare and threatened biodiversity on private land. Section 1 introduces the four national priorities. These are listed in Table 1.

The statement is part of a wider work programme by the Ministry for the Environment and the Department of Conservation to strengthen biodiversity work on private land. The progress of this work programme, including this statement, will be monitored over the coming five years, and the whole programme will be re-evaluated at the end of this period.

This document provides technical information about each of the national priorities, and is particularly aimed at supporting staff in local authorities.

Section 2 provides the policy context, and background to why the statement of national priorities is needed to help achieve objectives in the New Zealand Biodiversity Strategy (2000).

Sections 3–6 describe each of the priorities in turn, specifically:

- the scientific basis for each of them
- important tools and references for each.

Section 7 summarises New Zealand's legislative provisions for protecting native biodiversity, which provide the statutory context for the national priorities.

Sections 8 and 9 contain a glossary of terms used, and a list of references.

1.1 New and emerging information

The information provided in this document reflects our current knowledge of the state of biodiversity in New Zealand. As we learn more, this information, along with the tools used to support the national priorities, is likely to be refined and improved, and the terminology updated.

Any relevant new information or research will be available electronically on the New Zealand Biodiversity Strategy website: www.biodiversity.govt.nz – it will pay to check for updates from time to time.

Links to any new information will also be available on:

- the Department of Conservation website: www.doc.govt.nz
- the Ministry for the Environment website: www.mfe.govt.nz.

Note that a brochure is also available that provides a summary overview of the national priorities and their general policy context. Called *Protecting our Places – Introducing the National Priorities for Protecting Rare and Threatened Native Biodiversity on Private Land*, it

is available from local government offices and at www.biodiversity.govt.nz or by emailing publications@mfe.govt.nz.

Table 1: The four priorities in the Statement of National Priorities for Protecting Rare and Threatened Indigenous Biodiversity on Private Land

Statement of National Priorities for Protecting Rare and Threatened Indigenous biodiversity on private land

National Priority 1:
To protect indigenous vegetation associated with land environments (defined by Land Environments of New Zealand at Level IV), that have 20% or less remaining in indigenous cover.

National Priority 2:
To protect indigenous vegetation associated with sand dunes and wetlands; ecosystem types that have become uncommon due to human activity.

National Priority 3:
To protect indigenous vegetation associated with 'originally rare' terrestrial ecosystem types not already covered by priorities 1 and 2.

National Priority 4:
To protect habitats of acutely and chronically threatened indigenous species.

2 Context for the Statement of National Priorities

2.1 Why we need to protect biodiversity on private land

New Zealand's unique indigenous biodiversity has been shaped by more than 80 million years of isolation, followed by comparatively recent human settlement. Many of our species of plants and animals are endemic, but human impacts mean many have already been lost. Recent estimates suggest that in the past 700-800 years, human activity has caused the extinction of one-third of indigenous land and freshwater birds, 18% of sea birds, three of seven frog species, at least 12 invertebrates (such as snails and insects), one fish, one bat, perhaps three reptiles and possibly 11 plants.

The degree of human impacts and the loss or removal of indigenous biodiversity varies greatly across the country. For example, environments in alpine and upper montane zones are generally still dominated by native cover, while more intensive land use in the warmer lower montane and lowland zones means they now contain only traces of their original communities.

Although New Zealand's public conservation lands cover 30% of our total land area, most is in higher (and usually less productive) country. Productive and biodiversity-rich lowland areas are poorly represented, and lowland forests, sand dunes, streams, wetlands and sub-alpine tussock grasslands are all under-represented on public lands (Ministry for the Environment, 1997). Most are in private management.

Because so much of our remaining native biodiversity is in the stewardship of private landholders (including rare and threatened ecosystems and habitats), its survival depends on their day-to-day management decisions.

2.2 Why a national perspective is important

The statement of national priorities for protecting biodiversity on private land identifies rare and threatened environments and ecosystems at a national level – that is, it looks at the full range of our remaining natural habitats and ecosystems and pinpoints which are the most vulnerable across the whole of New Zealand.

If you are working in regional and local government, this national perspective will expand your view beyond looking at representativeness from a purely regional and/or local focus. This is important, as the significance of the native biodiversity present in your region or district may not be apparent until it is considered against the full range of New Zealand's biodiversity.

However, it is also important to recognise that focusing entirely at a national level may not identify indigenous biodiversity that should be protected at a regional or local scale because it is locally or regionally rare, threatened or valued by that community.

For these reasons, the statement of national priorities does not aim to identify all native biodiversity that is to be maintained by councils under sections 30 and 31 or identified as significant under section 6(c) of the Resource Management Act. (Note that the role of the Resource Management Act in protecting native biodiversity is further discussed in Section 7.1: Legislation.)

2.3 Achieving the goals of the New Zealand Biodiversity Strategy

The New Zealand Biodiversity Strategy released in 2000 sets out the visionary goal of halting the decline in New Zealand's indigenous biodiversity by 2020 which is expressed in the following way:

> *Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified ecosystems in production and urban environments and do what else is necessary to maintain and restore viable populations of all indigenous species and subspecies across their natural range and maintain their genetic diversity.* (Department of Conservation and Ministry for the Environment, 2000, p.18)

In 2005, the five-year review of the New Zealand Biodiversity Strategy (Green and Clarkson, 2005) identified progress in a number of areas, including the restoration of offshore and mainland islands, and pest eradication. The review also identified significant challenges that still need to be addressed, including (page 2):

- *Ongoing loss of rare and threatened biodiversity from private lands*
- *Dominance of economic drivers that favour the degradation of ecosystems (such as wetlands), rather than their active maintenance*
- *Adverse impacts of animal pests on threatened species and forest ecosystems*
- *Serious declines in the status of many acutely or chronically threatened species.*

The review can be found at http://www.doc.govt.nz/upload/documents/conservation/nzbs-report.pdf.

Green and Clarkson (2005) also highlighted the priorities for future protection as, to continue:

> *... to identify and protect representative habitats and ecosystems that are poorly represented in the present network of protected areas. This approach will require a focus on coastal, lowland and montane habitats. Most of the threatened plant species are also at lower elevations and will therefore benefit from this approach to habitat protection.* (Green and Clarkson, 2005, p 20)

The statement of national priorities for protecting rare and threatened biodiversity on private land is an important part of the government's response to the review's findings. By identifying specific vulnerable ecosystems and habitats, and providing this information to regional and local government, this statement is an important tool to help deliver the New Zealand Biodiversity Strategy goal – 'to halt the decline in New Zealand's indigenous biodiversity'.

3 National Priority One

National Priority One:

To protect indigenous vegetation associated with land environments (defined by Land Environments of New Zealand at Level IV), that have 20% or less remaining in indigenous cover.

3.1 Scientific basis for National Priority One

3.1.1 Introducing the databases

National Priority One uses Land Environments of New Zealand (LENZ), a national environment-based classification of ecosystems mapped across New Zealand's landscape. LENZ uses information likely to influence the distribution of species and ecosystems (including climate, landform and soils) to classify and map areas that have similar environmental or ecosystem character. These are called 'land environments'. LENZ is a surrogate for the likely past (prehuman) pattern of terrestrial ecosystems and their associated biodiversity. It is discussed in greater detail in section 3.2.1.

Changes over time in the indigenous vegetation cover of different land environments (between prehuman and today) can be estimated by using LENZ in conjunction with another spatial database – the Land Cover Database. The Land Cover Database uses satellite imagery to classify and map New Zealand's land cover (such as, urban areas, mines, wetlands and native forest). It is more fully described in section 3.2.3.

When LENZ is combined with the Land Cover Database and a national database of the protective status of land we can identify what type of vegetation occurs in each land environment and the broad pattern of protection. The Threatened Environment Classification tool integrates all three national databases. This tool allows us to identify environments in which remaining native cover is substantially reduced or poorly protected. The Threatened Environment Classification tool is described in section 3.2.5.

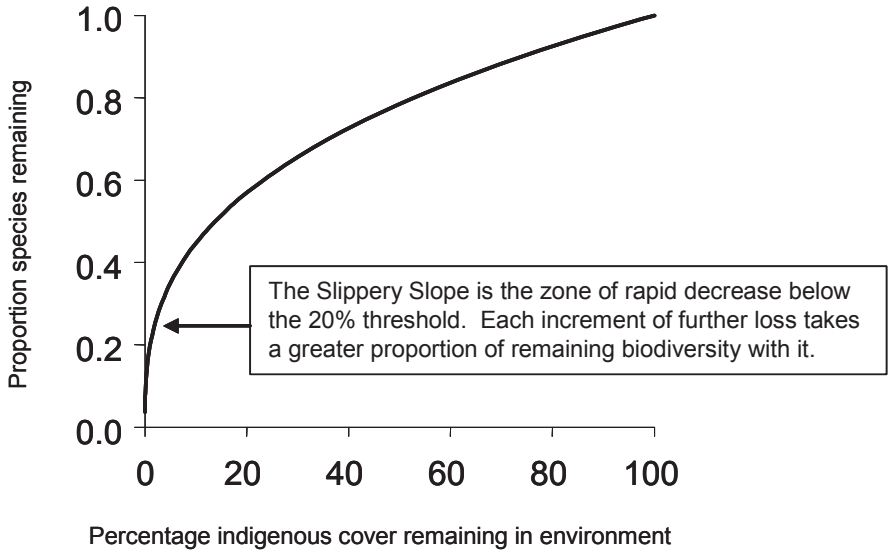
3.1.2 The case for the 20% threshold

Ecological theory helps us estimate the risk of loss to remaining indigenous biodiversity, which can be assessed by looking at species-area relationships. The generalised species-area curve describes the relationship between area and species number (Rosenweig, 1995). Figure 1 shows that as the amount of habitat reduces, the susceptibility to loss of species increases exponentially.

With initial decreases in area (upper right curve in Figure 1), the rate of loss of species is relatively small. The first to go are the most vulnerable species, typically the large-bodied, space demanding, host-dependent, narrow-range and/or habitat-specialist biota.

As habitat area is progressively reduced, the rate of species loss increases and biota in smaller size ranges, as well as more generalist species, also become affected. The rate of biodiversity loss increases dramatically when the amount of available habitat drops below 20% of its original extent.

Figure 1: The 'slippery slope'



Source: Adapted from Rosenweig (1995).

3.1.3 Recent changes in indigenous vegetation cover

A paper by Walker et al (2006) uses the Threatened Environments Classification tool to summarise recent changes in New Zealand's indigenous vegetation cover. More detailed analysis of recent change will be published in late 2007 on the Department of Conservation website.

The research focused on changes in vegetation cover between 1996/97–2001/02. It showed that, over this five-year period, almost half of New Zealand's land environments (46%) had only 20% or less remaining in indigenous vegetation cover (Table 2). This amounts to just 565,751 hectares of indigenous vegetation remaining in these land environments – and 83% of it is not formally protected.

Table 2: New Zealand's at-risk land environments, based on classification at Level IV of Land Environments of New Zealand (LENZ)

	LENZ level	Total	Land environments with 0–20% of total area remaining in indigenous vegetation
Number of land environments			
Number of land environments	IV	500	232 or 46%
Full extent of land environments			
Area (ha)	IV	26,000,680	8,211,366
Indigenous cover remaining in land environments			
Area (ha)	IV	12,632,214	565,751
Indigenous cover not protected in land environments			
Area (ha)	IV	4,795,569	474,019

Source: Walker, Price et al (2006).

The maps in Figure 2 show the distribution of New Zealand land environments under the threat categories used in the Threatened Environments Classification tool (see section 3.2.5). Most land environments with 20% or less indigenous vegetation remaining (acutely and chronically threatened) occur in lowland and coastal areas, with the most extensive occurring in Northern Otago and Canterbury (South Island) and the lower west coast and east coast of the North Island (Map 2A).

Note that this national priority focuses on the red acutely (<10% remaining in indigenous vegetation) and orange chronically threatened (10%–20% indigenous vegetation remaining) land environments.

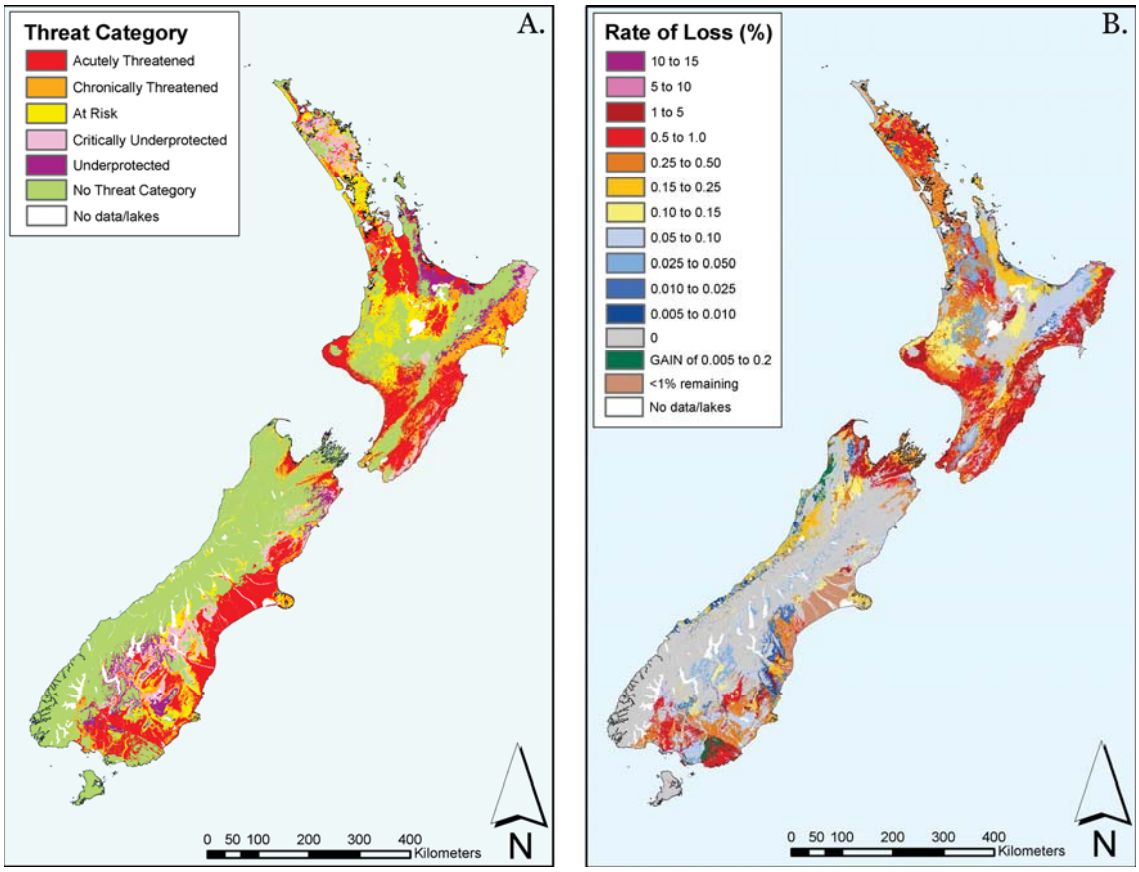
The highest rates of net loss in indigenous vegetation over the five year time of this study also occurred in these lowland and coastal land environments (Map 2B). Walker et al (2006), noted that these lowland and coastal zones are more accessible and have higher value for agriculture and settlement, and this has resulted in the considerable loss of their native vegetation.

The net loss of indigenous cover from 1996/97 to 2001/02 is estimated to be 17,204 hectares, of which 3656 hectares was from land environments with less than 20% indigenous cover left. We do not have accurate information about the quality of the indigenous biodiversity that has been lost. Most of the loss pre-dates the implementation of the New Zealand Biodiversity Strategy and the announcement of the Biodiversity Package in December 2000. However, anecdotal evidence suggests that clearance of indigenous biodiversity is still occurring in some districts.

Figure 2: LENZ maps

Map 2A: Environment threat categories based on % loss and % protection in May 2005

Map 2B: The rate of recent net loss (% loss of indigenous cover in the five year period 1996/97 to 2001/02), across New Zealand's 500 Level IV land environments



Source: Taken from Walker et al (2006).

Manuka and/or kanuka (1525 hectares), broad-leaved indigenous hardwoods (1187 hectares), tall-tussock grassland (509 hectares) and indigenous forest (394 hectares) experienced the biggest losses between 1996/97 and 2001/02 for the land environments with less than 20% of indigenous vegetation cover remaining (Table 3). However, the extent of conversion to non-indigenous cover is likely to be higher because the figures do not include drainage, conversion of wetlands or conversion of short-tussock grasslands.

Walker et al (2006), noted that in New Zealand the clearance of indigenous cover was historically largely in areas of highest agricultural value. This study has indicated that recent indigenous vegetation clearance has extended to more "marginal land".

Table 3: Indigenous cover loss (1996/97–2001/02) for land environment with less than 20% indigenous cover remaining

Cover class	Change from indigenous cover to non-indigenous cover (ha)	
	Total	Land environments with 20% or less of total area remaining in indigenous vegetation
Rock	234	1
Fernland	90	0
Tall-tussock grassland	2,482	509
Wetland/water	105	52
Manuka and/or kanuka	5,609	1,525
Matagouri	6	6
Broad-leaved indigenous hardwoods	6,745	1,187
Subalpine shrubland	46	9*
Indigenous forest	2,232	394
Total change	**17,550**	**3,682**
	Change from non-indigenous cover to indigenous cover (ha)	
All non-indigenous cover classes	346	28
	Net loss of indigenous cover from 1996/97 to 2000/01 (ha)	
Net loss of indigenous cover	17,204	3,656
Net loss of indigenous cover that is not protected	16,271	3,609

Source: Walker, Price, et al (2006).

Table 4 presents unpublished data from the same research reported in Walker et al 2006 which shows considerable variability between the 73 district councils in the amount of indigenous vegetation cover that is not formally protected, in land environments with 20% or less remaining vegetation at the national level. The figures are from 2001/02. 'Not formally protected' generally means areas not held as public conservation land or in Queen Elizabeth II National Trust covenants. Land protected through other means, such as regional and local council initiatives, and later than 2001/02, is not included.

The same analysis, to show the amount of indigenous vegetation cover that is not formally protected, in land environments with 20% or less remaining vegetation, can also be done within regional and district/city council boundaries. This analysis would indicate representativeness at these finer scales, and is likely to show a different pattern than at a national level. Comparing the patterns of similarity and difference at national, regional and local levels provides us with information about representativeness within the full range of New Zealand's biodiversity.

Table 4: National level analysis of land environments with less than 20% indigenous cover remaining that is not formally protected, determined at Level IV LENZ in 2001/02 and split into the 73 district council areas

Council (district or city)	< 20% indigenous vegetation remaining
Ashburton	2,736
Auckland	926
Banks Peninsula	7,704
Buller	711
Carterton	3,896
Central Hawke's Bay	10,719
Central Otago	33,288
Christchurch	638
Clutha	15,010
Dunedin	10,984
Far North	12,204
Franklin	10,337
Gisborne	51,416
Gore	826
Grey	0
Hamilton	292
Hastings	20,558
Hauraki	1,782
Horowhenua	2,722
Hurunui	17,815
Invercargill	400
Kaikoura	2,764
Kaipara	6,072
Kapiti Coast	1,570
Kawerau	136
Lower Hutt	906
Mackenzie	11,274
Manawatu	10,005
Manukau	566
Marlborough	12,363
Masterton	9,429
Matamata–Piako	1,506
Napier	216
Nelson	611
New Plymouth	4,107
North Shore	114
Opotiki	3,324

Council (district or city)	< 20% indigenous vegetation remaining
Otorohanga	1,517
Palmerston North	1,502
Papakura	118
Porirua	630
Queenstown Lakes	4,384
Rangitikei	16,057
Rodney	3,117
Rotorua	2,809
Ruapehu	3,452
Selwyn	2,686
South Taranaki	6,149
South Waikato	1,013
South Wairarapa	12,171
Southland	21,278
Stratford	1,222
Tararua	19,426
Tasman	9,059
Taupo	3,999
Tauranga	629
Thames–Coromandel	2,641
Timaru	3,395
Upper Hutt	1,033
Waikato	11,045
Waimakariri	1,966
Waimate	5,033
Waipa	2,723
Wairoa	21,257
Waitakere	461
Waitaki	18,890
Waitomo	1,629
Wanganui	4,609
Wellington	461
Western Bay of Plenty	2,194
Westland	0
Whakatane	4,023
Whangarei	4,926
Total	**467,989**

Source: Walker, Price et al (unpublished report).

Note that a more detailed report on this analysis will be published in late 2007 by the Department of Conservation.

3.2 Important tools and references

3.2.1 Land Environments of New Zealand (LENZ) classification system

LENZ is a national environment-based classification of ecosystems mapped across New Zealand's landscape. LENZ uses 15 climate, landform and soil variables likely to influence the distribution of species to classify and map areas that have similar environmental or ecosystem character. The classification is used to identify areas that are similar regardless of where they occur – sites not necessarily the same in all respects, but likely to have similar groups of species and similar biological interactions and processes (that is, similar ecosystems). For example, swampy areas on poorly drained recent soils on coastal plains and in river valleys in eastern New Zealand occur from Gisborne to mid-Canterbury. Although geographically separated from each other, these areas are environmentally similar and form one type of LENZ environment (Environment I: Central poorly drained recent soils).

LENZ can be used at four national levels of detail:

- Level I (20 land environments nationally, A to T)
- Level II (100 land environments nationally, A1 to T1)
- Level III (200 land environments nationally, A1.1 to T.1.1)
- Level IV (500 land environments nationally, A1.1a to T1.1a).

Working up from level IV, each level is nested within higher levels.

The different levels of LENZ simply reflect greater detail and hence an increase in the number of land environments. Which level is appropriate to use depends on how much detail is needed to address a particular question. Level II is considered appropriate for national- to regional-scale assessments. LENZ Levels III and IV would be appropriate for local-scale assessments. Level IV distinguishes environmental variation down to about a 1:50,000 scale.

3.2.2 Limitations associated with LENZ

LENZ was not designed to identify uncommon ecosystems with limited distributions, such as those listed as 'originally rare' in National Priority Three. These ecosystems may be linked to particular localised geological or physical conditions, and often support high levels of indigenous biodiversity of which the majority are rare or threatened.

LENZ does not depict current land cover; rather it indicates the likely past (prehuman) pattern of terrestrial ecosystems and their associated biodiversity. Therefore, it will not identify some ecosystem types that occur across large numbers of land environments, which have significantly reduced in their extent. Examples include riparian floodplain vegetation (forest and shrubland), wetlands and dunelands.

With any classification system, the underlying data are critical. The original scale, level of generalisation and possible imperfections in the underlying data can result in some classification error. This possibility should be considered and ground checks made before decisions are taken.

3.2.3 Land cover database (LCDB)

The Land Cover Database 1 (LCDB1) is a digital theme-based map of land cover for mainland New Zealand. The first database was completed in June 2000, and based on satellite images taken over the summer of 1996/97 by the Spot II satellite. The second database (LCDB2) was released in July 2004, based on satellite imagery gathered between September 2001 and March 2002.

Sixteen land cover classes are used for most regions, with a 17th class (riparian willows) added in some regions. The land cover classes address cultural landscapes (modified by people) and natural landscapes (such as, indigenous forest). The 17 classes were classified manually by superimposing boundaries onto satellite images, and then field checked. The satellite images have a 20-metre spatial resolution. The overall classification accuracy was independently assessed at 93% at ±25 metres. The minimum mapping unit used was one hectare, and the data is suitable for application at the 1:50,000 mapping scale, or coarser.

To identify areas of indigenous vegetation, eight land cover classes from the Land Cover Database are combined into one indigenous vegetation class. They are: indigenous forest, inland water, coastal wetlands, inland wetlands, coastal sands, scrub, tussock and bare ground.

Overlaying information from the Land Cover Database with areas of public conservation land and private land, shows that about 14,033,769 hectares of indigenous vegetation remain in New Zealand, with about 8,210,570 hectares legally protected.

Of the balance – about 5,823,199 hectares – some will be protected by council covenant schemes on private land or in council reserves. Some remnants in plantation forests will be protected under the Forest Accord, a scheme run with the Forest Stewardship Council (the Ministry of Agriculture and Forestry estimate there is about 1,000,000 hectares of indigenous vegetation scattered through production forests). Some areas will be managed outside legal protection schemes for conservation and, although not legally protected, will still contribute to indigenous biodiversity outcomes. For example, community or non-government organisation (NGO) pest and weed control activities and restoration programmes may be carried out.

3.2.4 Limitations of the LCDB

Both LCDB 1 and 2 were the first nationally comprehensive vegetation monitoring programmes undertaken in New Zealand. Limitations to be aware of when using the LCDB are:

1. They provide only a coarse assessment of changes in indigenous habitats and ecosystems.
2. Incremental losses of habitat and gradual trends, such as succession and habitat deterioration, are unable to be detected.
3. There are errors around the mapping and classification of some habitats and ecosystem types, particularly grassland types.

In the context of making decisions about discrete areas, the classification of very small or fragmented remnants should be verified using independent field survey information to check the accuracy of the LCDB land cover classification.

3.2.5 Integration tool: Threatened Environment Classification

The Threatened Environments Classification tool integrates LENZ, LCDB and data about land protection status to overcome the complexity of trying to juggle 500 Level IV land environments, 64 land cover classes and several types of land protection status.

The classification tool enables us to focus on the land environments where remaining biodiversity is in most need of protection and conservation. You can access it as a digital map, or as a query tool for use in an ESRI GIS platform. The latter is more up-to-date, as it updates of underlying databases are immediately reflected.

The two highest threat categories (Acutely Threatened and Chronically Threatened) correspond to the Level IV land environments included in National Priority One.

3.2.6 Key references

Walker S, Price R, Rutledge D, Stephens TTR, Lee WG. 2006. Recent loss of indigenous cover in New Zealand. *New Zealand Journal of Ecology* 30(2): 169–177.

LENZ references

Landcare Research website: http://www.landcareresearch.co.nz/databases/lenz/

Leathwick J, Wilson G, Rutledge D, Wardle P, Morgan F, Johnston K, McLeod M, Kirkpatrick R. 2003. *Land Environments of New Zealand.* Auckland: David Bateman Ltd.

Leathwick J, Morgan F, Wilson G, Rutledge D, McLeod M, Johnston K. 2002. *Land Environments of New Zealand: Technical Guide*. Wellington: Ministry for the Environment.

Land cover database references

Ministry for the Environment website:
http://www.mfe.govt.nz/issues/land/land-cover-dbase/

Terralink website:
www.terralink.co.nz
http://www.terralink.co.nz/products_services/satellite/land_cover_database_of_new_zealand/index.htm

4 National Priority Two

National Priority Two:

To protect indigenous vegetation associated with sand dunes and wetlands; ecosystem types that have become uncommon due to human activity.

4.1 Scientific basis for National Priority Two

The statement of national priorities gives specific reference to the importance of protecting native vegetation associated with sand dunes and wetlands, as these ecosystems have become uncommon due to human activities. They are also a specific priority because our ability to assess changes in these ecosystems using LENZ and the landcover database is poor, which means not all of these systems will be identified under Priority One.

4.1.1 Sand dunes

Sand dunes occur where sea and land meet, and are formed from sand derived from both terrestrial and marine sources. The formation of dune systems is influenced by a number of factors, including the shape of the coastline and beach, currents and the ocean swell, prevailing wind, frequency of storms and the sand's particle size.

Sand dune systems are widespread around the New Zealand coast, with the largest areas occurring along the Manawatu, Auckland and Northland coasts (Hilton et al (2000)). Their paper also reports significant impacts on the natural character of our dunelands since humans arrived in New Zealand.

Recent estimates suggest 21,300 hectares of sand dunes remain (Leathwick et al, unpublished report) – just 11.6% of the original extent. Widespread disturbance of sand dunes to varying degrees by fire, grazing and the introduction of exotic species (particularly marram grass *Ammophila arenaria*), has also impacted on our sand dune systems (Hilton et al (2000)).

These systems are identified by the New Zealand Coastal Policy Statement as a national priority ecosystem, which recognises that sand dunes are an integral part of the natural character of our coasts.

4.1.2 Wetlands

Wetlands are areas where water is the primary factor controlling the environment and associated plant and animal life. They occur where the water table is at, or near, the land's surface, or where the land is covered by water, either permanently or temporarily. There are numerous definitions for wetlands, but the two most common definitions we use in the New Zealand context are:

1. The Resource Management Act 1991 – this defines wetlands as: 'includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions'.
2. The RAMSAR Convention on Wetlands – this provides a broader definition: 'For the purpose of this convention, wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres'.

Wetlands represent some of our most diverse ecosystems and have many different guises, including swamps, bogs, lagoons, estuaries, mudflats and flood plains. These areas are known for their high biodiversity values, including specially adapted plants and animals which rely upon the wetland's existence to survive.

However, it is estimated that there are just 45,600 hectares of indigenous wetlands remaining (Leathwick et al, unpublished report), which represents only 9.4% of their original extent. The exact proportion in private ownership is not known, but we assume that most wetlands in lowland environments are in private hands.

Many of New Zealand's remaining wetland areas have become degraded to varying degrees by factors such as stock access, weed invasions, changes to hydrological regimes and barriers to fish migration (Department of Conservation and Ministry for the Environment, 2000). However, some are internationally recognised for their significant biodiversity values, as reflected in the Convention on Wetlands.

The **Convention** (known as the RAMSAR Convention because it was signed at Ramsar, Iran) is an intergovernmental treaty adopted on 2 February 1971, and New Zealand is a signatory. Its scope encompasses wetland conservation and wise use, and recognises wetland ecosystems are extremely important for biodiversity conservation in general, and for the well being of human communities (www.ramsar.org/).

Steps are being taken towards furthering our understanding of New Zealand's wetland systems. Two opportunities are:

- *Wetland types of New Zealand* (Johnson and Gerbaux, 2004), which sets out a national classification framework
- a GIS database being prepared by the Department of Conservation to identify and classify wetlands (and other waterbodies). This information will be combined with a range of pressure variables to identify and prioritise the most representative and distinctive wetlands. This project is expected to be completed in the second half of 2007.

4.2 Important tools and references

4.2.1 Inventories of sand dune systems in New Zealand

Two major surveys have been carried out of active and stabilised dune systems, both in 1992. *The sand dune and beach inventory of New Zealand* (Johnson, 1992 – South Island and Stewart Island; Partridge, 1992 – North Island) provides the most consistent nationwide assessment of the conservation status of sand dunes, although there are some limitations with the methodology used.

A more recent inventory by Hilton et al (2000), provides an analysis of regional trends in the rate of loss of active duneland.

4.2.2 Key references for sand dunes

Hilton, et al. 2000. Inventory of New Zealand's active dunelands. *Science for Conservation* 157. Wellington: Department of Conservation.

Johnson P. 1992. *The Sand Dune and Beach Vegetation Inventory of New Zealand. II. South Island and Stewart Island*. DSIR Land Resources Scientific Report Number 16. Christchurch: DSIR Land Resources.

Partridge T. 1992. *The Sand Dune and Beach Vegetation Inventory of New Zealand. II. North Island*. DSIR Land Resources Scientific Report Number 16. Christchurch: DSIR Land Resources.

Hesp P. 2000. *Coastal Sand Dunes: Form and function*. Rotorua: Coastal Dune Vegetation Network, Forest Research.

4.2.3 Key references for wetlands

Johnson PJ, Gerbeaux P. 2004. *Wetland Types in New Zealand*. Wellington: Department of Conservation.

Department of Conservation and Ministry for the Environment. 2000. *New Zealand Biodiversity Strategy*. Wellington: Department of Conservation and Ministry for the Environment.

Ministry for the Environment. 1997. *The State of New Zealand's Environment*. Wellington: Ministry for the Environment.

Cromarty P. 1996. *A Directory of Wetlands in New Zealand*. Scott DA (ed). Wellington: Department of Conservation.

New Zealand Hydrological Society and New Zealand Limnological Society. 2004. *Freshwaters of New Zealand*. Harding J, Mosley P, Pearson C, Sorrell B (eds). Wellington: New Zealand Hydrological Society, New Zealand Limnological Society.

5 National Priority Three

National Priority Three:

To protect indigenous vegetation associated with 'originally rare' terrestrial ecosystem types not already covered by priorities 1 and 2.

5.1 Scientific basis for National Priority Three

National Priority Three recognises the importance of protecting indigenous vegetation associated with ecosystems that were rare before Māori arrived in New Zealand, and still exist today. Landcare Research is undertaking new research into these 'originally rare' ecosystems. As further information becomes available, you can access it via a link on the New Zealand Biodiversity Strategy website – www.biodiversity.govt.nz.

5.1.1 What are originally rare terrestrial ecosystems?

The list of originally rare terrestrial ecosystems contained in the statement of national priorities is based on the list contained in Williams et al (2006). They define 'originally rare' as follows:

> *"Originally we take to mean the ecosystem type was present when Māori arrived and still exists today (although we acknowledge our ignorance of pre-Māori ecosystems).*
>
> *Rare can encompass ecosystem types that are small in size (for example. 25 m^2 to 100s of hectares), but geographically widespread (for example, dune deflation hollows along the New Zealand coast) to those that are larger (for example, 1000s of hectares), but geographically restricted (such as, frost flats on the volcanic plateau) (cf. Rabinowitz, 1981). Total extent would be <0.5% (that is, <134,000 hectares) of New Zealand's total area (of 268,680 km^2)."*

Note that the statement excludes originally rare ecosystems identified in Williams et al (2006) where rarity at a national scale may be questionable (indicated with an asterisk * in their original paper). The statement also excludes non-terrestrial ecosystems and those that don't support indigenous vegetation. Geothermal systems have been generalised into one category, and wetlands have been excluded because they are covered in Priority Two. Some of the 'common names' originally suggested for the ecosystems by Williams et al have also been changed in the list contained in the statement.

5.1.2 Why are originally rare terrestrial ecosystems important?

In New Zealand, indigenous biodiversity is concentrated in rare ecosystems, such as, ephemeral wetlands, bluffs, kaarst and geothermal vents, and coastal turfs. Collectively, naturally rare plant community types hold about half of our nationally threatened plant species (PA Williams, unpublished, based on data of de Lange et al (2004)), which is vastly disproportionate to their total area. This increases both their intrinsic interest and their importance for biodiversity conservation initiatives.

5.2 Important tools and references

5.2.1 List of originally rare ecosystems

The following list has been compiled from scientific research being undertaken by Landcare Research, and our knowledge of these ecosystems will evolve as the research progresses. The ecosystem types listed are not necessarily found in all regions or districts, and some will be protected on public conservation land.

Coastal systems	**Inland and alpine systems with raw or recent soils**
Dune deflation hollows	Volcanic dunes
Shell barrier beaches (= “Chenier plain”)	Calcareous screes
Coastal turf	Ultramafic screes
Stony beach ridges	Young tephra (<500 years) plains and hillslopes
Shingle beaches	Recent lava flows (<1000 years)
Coastal rock stacks	Old tephra (>500 years) plains (= “frost flats”)
Coastal cliffs on silicic bedrock	Frost hollows
Coastal cliffs on silicic-intermediate rock	Boulderfields of silicic-rocks
Mafic coastal cliffs	Boulderfields of silicic-intermediate rocks (non-volcanic)
Calcareous coastal cliffs	Volcanic boulderfields
Ultramafic sea cliffs	Debris flow or lahar
Marine mammal influenced sites	Boulderfields of calcareous rocks
Other inland systems	Ultramafic boulderfields
Inland saline (= “salt pans”)	Cliffs, scarps and tors of silicic rocks
Strongly leached terraces and plains (= “Wilderness” vegetation)	Mafic cliffs, scarps and tors
Cloud forest	Calcareous cliffs, scarps and tors
Geothermal systems	Ultramafic cliffs, scarps and tors
Semi-subterranean	Ultramafic hills
Sinkholes	Inland sand dunes
Cave entrances	Inland outwash gravels
	Braided riverbeds
	Granitic sand plains
	Granitic gravel fields
	Sandstone erosion pavements
	Limestone erosion pavements

Terminology

The terminology used for bedrock types is taken from Table 1 in Williams et al.

a) *Silicic bedrock* = rhyolite, granite and related gneiss, quartzose sandstone.

b) *Silicic-intermediate bedrock* = ignimbrite, andesite, greywacke, sedimentary rocks not otherwise specified, schist.

c) *Mafic bedrock* = basalt, meta-basalt, gneiss, gabbro.

d) *Calcareous bedrock* = limestone, marble, dolomite, calcareous mudstone.

Table 5 on the following page has been adapted from Williams et al (2006). It describes the physical environments and vegetation structure of the originally rare ecosystems that are identified as national priorities. Williams et al explain the columns as follows:

- The 'common name' and 'definition' describe the environment of the ecosystem type.
- 'Vegetation structure' lists the main vegetation units across all occurrences of that ecosystem, and use the categories adapted from Atkinson (1985) – forest, treeland, scrub, shrubland, tussockland, fernland, grassland, sedgeland, rushland, reedland, cushionfield, herbfield, mossfield, lichenfield and open land (this includes, rockland, boulderfield, stonefield/gravelfield, sandfield and loamfield/peatfield).
- Information in parentheses is not part of the formal description, but is important to further characterise the ecosystem type.

5.2.2 Key references

Williams PA, Wiser S, Clarkson B, Stanley M. *A physical and physiognomic framework for defining and naming originally rare terrestrial ecosystems: First approximation*. Landcare Research Internal Report: LC0506/185:
http://www.landcareresearch.co.nz/research/biocons/rare_ecosystems/documents/framework_rare_ecosystemspdf.pdf#search="originally rare"

Landcare research website for up-to-date information: www.landcareresearch.co.nz
http://www.landcareresearch.co.nz/research/obi.asp?Proj_Collab_ID=2

Table 5: Physical environments and vegetation structure of New Zealand's originally rare ecosystems

Tentative 'common' name	Definition (ie, diagnostic classifiers) and notes	Vegetation structure	Example locality
Coastal systems			
Dune deflation hollow	Raw/sand/depression/excessive drainage/coastal	Open land	Kaitorete Spit, Canterbury
Shell barrier beaches	Raw/shells/plain/coastal	Grassland, herbfield	Miranda Chenier Plain, Firth of Thames
Coastal turf	Raw/atmospheric salinity/coastal, extreme exposure	Open land, herbfield	Westhaven Inlet, northwest Nelson
Stony beach ridges	Raw-recent/gravel-cobbles/beach ridge/coastal	Scrub, shrubland, open land	Rarangi, Marlborough
Shingle beaches	Raw-recent/gravel-cobbles/beach/ coastal	Open land	Rarangi, Marlborough
Coastal rock stacks	Raw/silicic-intermediate and mafic bedrock/tor/coastal	Open land, herbfield, lichenfield, shrubland	Cape Kidnappers, Hawke's Bay
Coastal cliffs on silicic bedrock	Raw/silicic/cliffs/coastal	Open land, lichenfield, herbfield, scrub, shrubland tussockland	Along Fiordland Coast
Coastal cliffs on silicic-intermediate rock	Raw/silicic-intermediate/cliffs/coastal	Open land, lichenfield, herbfield, scrub, shrubland tussockland	Cape Turnagain, Wairarapa
Coastal cliffs on mafic rock	Raw/mafic/cliffs/coastal	Open land, lichenfield, herbfield, scrub, shrubland tussockland	Coastal areas of Banks Peninsula
Coastal cliffs on calcareous rock	Raw/calcareous rock/cliffs/coastal	Open land, lichenfield, herbfield, scrub, shrubland tussockland	Punakaiki, North Westland
Ultramafic sea cliffs	Raw/ultramafic/cliffs/coastal	Scrub, herbfield, lichenfield, open land	Western cliffs, D'Urville Island; Surville cliffs, Northland
Marine mammal influenced sites	Seabirds and marine mammals-trampling and grazing/coastal	Open land – forest	Seal colonies, Westport
Inland and alpine systems with raw or recent soils			
Volcanic dunes	Raw/silicic-intermediate, volcanics/ sand/dune	Open land	Rangipo Desert, Central North Island
Screes of calcareous rock	Raw/calcareous/gravel-cobbles/talus/ (excessive drainage–near permanently saturated; inland-alpine)	Open land	Mt Arthur, Nelson
Screes of ultramafic rock	Raw/ultamafics/gravel-cobbles/talus/ (excessive drainage–near permanently saturated)	Open land, lichenfield, shrubland	Olivine Range, Southland
Young tephra (<500 years) plains and hillslopes	Raw/silic-intermediate (volcanic)/ sand-gravel/plains and hillslope	Open land	Mt Tarawera, Rotorua
Recent lava flows (<1000 years)	Raw/silicic-intermediate (volcanic)/ boulders-bedrock (numerous landforms)	Scrub, shrubland, treeland, forest, herbfield, mossfield,open land	Rangitoto Island, Auckland
Old tephra (>500 years) plains (= frost flats)	Silicic-intermediate (volcanic)/ depression/seasonally fluctuating water table/inland, >200 frost days year	Shrubland, scrub, tussockland	Kaingaroa, Central North Island
Frost hollows	Terrace/>200 frosts per annum	Shrubland, scrub	Buller River, Nelson
Boulderfields of silicic-rocks	Raw/silicic/boulders/talus	Open land, lichenfield, shrubland	Glasgow Range, North Westland
Boulderfields of silicic-intermediate rocks (non-volcanic)	Raw/silicic-intermediate (non-volcanic)/boulders/talus	Open land, lichenfield, shrubland	Iron Hill, Western Nelson

Tentative 'common' name	Definition (ie, diagnostic classifiers) and notes	Vegetation structure	Example locality
Volcanic boulderfields	Recent/silicic-intermediate (volcanic)/ boulders/talus/ excessive drainage	Forest, scrub	Mt Eden, Auckland
Debris flow or lahar	Recent/silicic-intermediate (volcanic)/ silt-cobbles	Forest, scrub, mossfield	Maeroa debris flow, Mt Taranaki
Boulderfields of calcareous rocks	Raw/calcareous/boulders/talus	Open land, lichenfield, shrubland	Iron Hill, Western Nelson
Ultramafic boulderfields	Raw/ultramafic/boulders/talus	Open land, lichenfield, shrubland	Red Hills, Southland
Cliffs, scarps and tors of silicic rocks	Raw/silicic/bedrock/cliff, scarp and tor/ inland-alpine	Open land, herbfield, tussockland, shrubland	West Cape District, Fiordland
Cliffs, scarps and tors of mafic rock	Raw/mafic/cliff, scarp and tor/inland-alpine	Open land, herbfield, tussockland, shrubland	Mt Herbert, Banks Peninsula, Canterbury
Calcareous cliffs, scarps and tors	Raw/calcareous/cliff, scarp and tor/ inland-alpine	Open land, herbfield, tussockland, shrubland	Mt Owen, Nelson
Ultramafic cliffs, scarps and tors	Raw/ultramafic/cliff, scarp and tor/ coastal-alpine	Open land, herbfield, tussockland, shrubland	Olivine Range, Southland
Ultramafic hills	Ultramafic/hillslope, hillcrest/(raw-mature)	Open land, herbfield scrub, shrubland, tussockland, forest (very limited extent)	Red Hills, Marlborough
Inland sand dunes	Raw-recent/sand/dune/inland	Open land, scrub, tussockland, herbfield	Clutha Valley, Otago
Inland outwash gravels	Raw-recent/silicic/sand-boulders/ plain/inland	Open land, herbfield, treeland	Pisa Flats, Clutha Valley
Braided riverbeds	Raw-recent/ sand-boulders/plain/ periodically flooded (see Johnson and Gerbeaux, 2004, p.56)	Open land, herbfield	Waimakariri River
Granitic sand plains	Raw/granite/sand-gravel/hillslope, hillcrest	Open land	Lookout Range, Nelson
Granitic gravel fields	Raw/granite/gravel/hillslope, hillcrest	Open land	Mt Titiroa, Manapouri
Sandstone erosion pavement	Raw/quartzose sandstone/bedrock/ hillslope, hillcrest	Open land	Mt Augustus, WestCoast
Limestone erosion pavements	Raw/limestone/bedrock/hillslope, hillcrest/(alpine)	Open land	Matiri Tops, Western Nelson
Other inland systems			
Inland saline (salt pans)	Groundwater salinity/semi arid/ depression (see also Johnson and Gerbeaux, 2004, pp.20, 22)	Herbfield, grassland	Maniototo Valley, Central Otago
Leached terraces	Overmature/sand-gravel/terrace-plain/inland	Open land, herbfield, shrubland	Wilderness, Southland
Cloud forest	High cloud cover (<1500 sunshine hours and >200 rain days per annum)/inland	Forest	Mt Manuoha, Urewera National Park; Waima Forest, western Northland
Geothermal systems			
Heated ground (dry)	Geothermal-excessive heat	Open land, mossfield, shrubland, scrub	Whakarewarewa, Rotorua
Hydrothermally altered ground (now cool)	Geothermal-acid soils, toxic elements	Open land, shrubland, scrub	Whakarewarewa, Rotorua
Acid rain systems	Geothermal-acid rain	Open land, scrub, treeland, forest	White Island, Bay of Plenty
Fumeroles	Geothermal-superheated steam/acid rain/depression	Open land, shrubland	Waimangu, Rotorua
Geothermal streamsides	Geothermal-excessive heat/near permanently saturated (but water table not high)		Waimangu, Rotorua

Tentative 'common' name	Definition (ie, diagnostic classifiers) and notes	Vegetation structure	Example locality
Subterranean or semi-subterranean			
Sinkholes	Raw/limestone, marble, dolomite/ doline	Open land, shrubland, tussockland, flaxland	Thousand Acre Plateau, Western Nelson
Cave entrances	Raw/limestone, marble, dolomite/ cave entrance	Open land, herbfield	Mangapu cave

6 National Priority Four

National Priority Four:

To protect habitats of acutely and chronically threatened indigenous species.

6.1 Scientific basis for National Priority Four

Much of New Zealand's native flora and fauna, particularly our endemic species, are under threat from a range of factors that include habitat depletion, human exploitation and disturbance, isolation or fragmentation of populations, predation, competition and hybridisation.

To date, about 2,788 of our native species are identified as threatened and, according to the latest threatened species classification lists (2005), 668 are acutely threatened and 257 chronically threatened.

The Department of Conservation has the direct responsibility for the protection of threatened species and carries out habitat protection work on public conservation land. But many threatened species exist on private land as well as public conservation lands, and some occur exclusively on private land. Protecting the habitats of species on private land will help towards protecting the species themselves.

6.1.1 How do species qualify as acutely or chronically threatened?

The terms 'acutely' and 'chronically' threatened species used in this statement are derived from the New Zealand Threat Classification system developed by the Department of Conservation (Molloy et al (2002)).

This classification system lists species according to the level of threat they face, and is useful for a range of different users, including the department, government, universities, local authorities and non-government organisations.

Acutely threatened

The 'acutely threatened' division has three sub-categories – 'nationally critical', 'nationally endangered' and 'nationally vulnerable'. (These equal the IUCN categories of 'critically endangered', 'endangered' and 'vulnerable'). Taxa listed as 'acutely threatened' face a very high risk of extinction in the wild and are defined by criteria that quantify:

- total population size
- area of occupancy
- fragmentation of populations

- declines in total population
- declines in habitat area
- predicted declines due to existing threats.

Chronically threatened

There are two sub-categories for 'chronically threatened' taxa – 'serious decline' and 'gradual decline'. Taxa listed in either sub-category also face extinction, but are buffered slightly by either a large total population or a slow decline rate.

6.2 Important tools and references

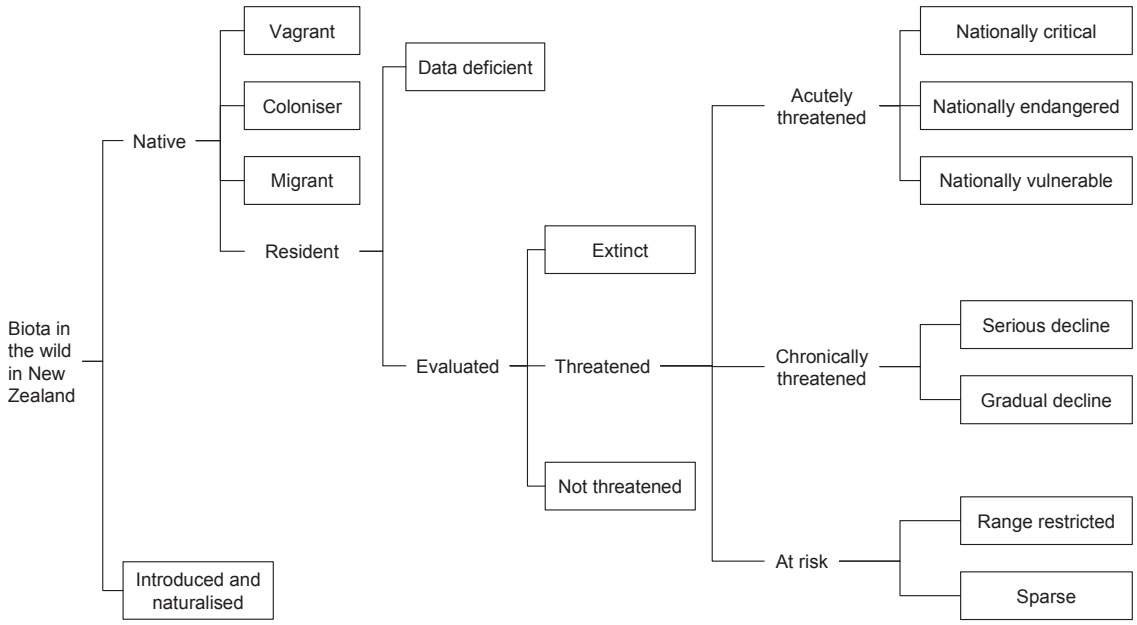
6.2.1 The New Zealand Threat Classification System

As discussed in section 6.1, the New Zealand Threat Classification System places taxa in particular categories that indicate their level of threat of extinction. Figure 3 shows the classification system's structure. It was designed to assess any taxon found in New Zealand, and applies to marine, terrestrial and freshwater biota.

A series of assessment criteria are used to assign taxa to their relevant threat category. Details of the classification process are outlined in detail in Molloy et al (2002).

The outcome of the classification process is a series of lists which outline the threat status of our native taxa. These lists are now reviewed every three years, and any major changes in the risk of extinction are recorded as they occur. The classification system is also reviewed from time to time, so, for the most up-to-date information on our Threat Classification System, refer to the Department of Conservation website – www.doc.govt.nz.

Figure 3: The classification categories used in the 'New Zealand Threat Classification System lists – 2002 and 2005'



Source: Molloy et al (2002).

Note: Box denotes a category.

The lists provided in Tables 6 and 7 (below) are the 2005 threatened species lists, published in January 2007.

Note that not all of these species occur exclusively on private land. In fact, some only occur on public conservation land. Compiling lists that just cover private land is difficult because there is no full distributional data for these species.

Table 6: Acutely threatened species list 2005

Common name	Taxanomic name	Threat category
Bat		
Southern North Island southern short-tailed bat	*Mystacina tuberculata tuberculata* (southern North Island)	NC
Long-tailed bat (South Island)	*Chalinolobus tuberculata* (South Island)	NE
Northern short-tailed bat	*Mystacina tuberculata aupourica*	NE
South Island southern short-tailed bat	*Mystacina tuberculata tuberculata* (South Island)	NE
Long-tailed bat (North Island)	*Chalinolobus tuberculata* (North Island)	NV
Bird		
Campbell Island teal	*Anas nesiotis*	NC
Okarito brown kiwi	*Apteryx rowi*	NC
Orange-fronted parakeet	*Cyanoramphus malherbi*	NC
Chatham Island oystercatcher	*Haematopus chathamensis*	NC
Chatham Island pigeon, Parea	*Hemiphaga chathamensis*	NC
Black stilt	*Himantopus novaezelandiae*	NC
Bounty Island shag	*Leucocarbo ranfurlyi*	NC
Black robin	*Petroica traversi*	NC
Takahe	*Porphyrio hochstetteri*	NC
Taiko	*Pterodroma magentae*	NC
Kakapo	*Strigops habroptilus*	NC

Common name	Taxanomic name	Threat category
New Zealand shore plover, tuturuatu	*Thinornis novaeseelandiae*	NC
Southern New Zealand dotterel	*Charadrius obscurus obscurus*	NC
White heron	*Egretta alba modesta*	NC
White tern	*Gygus alba royana*	NC
Kermadec white-faced storm petrel	*Pelagodroma marina albiclunis*	NC
New Zealand fairy tern	*Sterna nereis davisae*	NC
Haast tokoeka	*Apteryx* (Haast)	NC
Campbell Island snipe	*Coenocorypha* “Campbell”	NC
South Island brown teal	*Anas chlorotis* “South Island”	NC
Codfish Island South Georgian diving petrel	*Pelecanoides georgicus* “Codfish Island”	NC
Fiordland crested penguin	*Eudyptes pachyrhynchus*	NE
Chatham Island shag	*Leucocarbo onslowi*	NE
Stitchbird, hihi	*Notiomystis cincta*	NE
Black-fronted tern	*Sterna albostriata*	NE
Grey-headed mollymawk	*Thalassarche chrysostoma*	NE
Eastern rockhopper penguin	*Eudyptes chrysocome filholi*	NE
Crested grebe	*Podiceps cristatus australis*	NE
Australasian bittern	*Botaurus poiciloptilus*	NE
Forbes’ parakeet	*Cyanoramphus forbesi*	NE
Erect-crested penguin	*Eudyptes sclateri*	NE
Blue duck, whio	*Hymenolaimus malachorhynchos*	NE
Yellowhead, mohua	*Mohoua ochrocephala*	NE
Kea	*Nestor notabilis*	NE
Chatham petrel	*Pterodroma axillaris*	NE
Kermadec petrel	*Pterodroma neglecta*	NE
Hutton’s shearwater	*Puffinus huttoni*	NE
Grey Duck	*Anas superciliosa superciliosa*	NE
Stewart Island fernbird, Matata	*Bowdleria punctata stewartiana*	NE
North Island kokako	*Callaeas cinerea wilsoni*	NE
North Island weka	*Gallirallus australis greyi*	NE
Stewart Island weka	*Gallirallus australis scotti*	NE
South Island kaka	*Nestor meridionalis meridionalis*	NE
North Island kaka	*Nestor meridionalis septentrionalis*	NE
Stewart Island robin	*Petroica australis rakiura*	NE
Chatham Island tit	*Petroica macrocephala chathamensis*	NE
South Island saddleback, tieke	*Philesturnus carunculatus carunculatus*	NE
Chatham Island tui	*Prosthemadera novaeseelandiae chathamensis*	NE
Brown teal	*Anas chlorotis* “North Island”	NE
Southern falcon	*Falco novaeseelandiae* “southern”	NE
Wrybill, ngutu-pare	*Anarhynchus frontalis*	NV
Northern royal albatross, toroa	*Diomedia sanfordi*	NV
Stewart Island shag	*Leucocarbo chalconotus*	NV
Yellow-eyed penguin	*Megadyptes antipodes*	NV
Caspian tern	*Sterna caspia*	NV
Pitt Island shag	*Stictocarbo featherstoni*	NV
Salvin’s mollymawk	*Thalassarche salvini*	NV
Rock wren	*Xenicus gilviventris*	NV
Northern New Zealand dotterel	*Charadrius obscurus aquilonius*	NV
Reef heron	*Egretta sacra sacra*	NV
White-flippered penguin	*Eudyptula minor albosignata*	NV
Bush falcon	*Falco novaeseelandiae* “bush”	NV

Common name	Taxanomic name	Threat category
Bryophyte		
Liverwort	*Acromastigum brachyphyllum*	NC
Liverwort	*Acromastigum verticale*	NC
Liverwort	*Allisoniella recurva*	NC
Liverwort	*Allisoniella scottii*	NC
Liverwort	*Anastrophyllum papillosum*	NC
Liverwort	*Andrewsianthus hodgsonae*	NC
Liverwort	*Austroscyphus nitidissimus*	NC
Moss	*Bartramia alaris* (Dixon and Sainsbury)	NC
Liverwort	*Bragginsella anomala*	NC
Moss	*Bryum tenuidens* (Dixon and Sainsbury)	NC
Moss	*Calliergidium austro-stramineum* (Mull Hal) EB Bartram	NC
Liverwort	*Cheilolejeunea tenella*	NC
Liverwort	*Cololejeunea cardiocarpa*	NC
Liverwort	*Cololejeunea ellipsoidea*	NC
Liverwort	*Cololejeunea falcidentata*	NC
Liverwort	*Cololejeunea pulchella var stylifera*	NC
Moss	*Crossidium davidai Catcheside*	NC
Moss	*Crossidium geheebii* (Broth) Broth	NC
Moss	*Cyclodictyon blumeanum* (Mull Hal) O Kuntze	NC
Moss	*Dicranoweisia spenceri* (Dixon and Sainsbury)	NC
Moss	*Didymodon calycinus* (Dixon)	NC
Moss	*Ditrichum brachycarpum* (Hampe)	NC
Moss	*Ditrichum rufo-aureum* (Hampe) Willis	NC
Liverwort	*Dumortiera hirsuta*	NC
Moss	*Epipterygium opararense* (Fife and AJ Shaw)	NC
Moss	*Erpodium glaucum* (Wilson) IG Stone	NC
Moss	*Goniomitrium acuminatum* Hook and Wilson	NC
Moss	*Grimmia plagiopoda*	NC
Moss	*Hampeella pallens* (Sande Lac) M Fleisch	NC
Liverwort	*Herzobryum atrocapillum*	NC
Liverwort	*Herzogobryum filiforme*	NC
Liverwort	*Herzogobryum vermiculare*	NC
Liverwort	*Isolembidium anomalum var anomalum*	NC
Liverwort	*Isotachis westlandica*	NC
Liverwort	*Leiomitra julacea*	NC
Liverwort	*Lejeunea cyanophora*	NC
Moss	*Lindbergia maritima Lewinsky*	NC
Liverwort	*Lophozia autoica*	NC
Liverwort	*Lophozia nivicola*	NC
Liverwort	*Lophozia pumicola*	NC
Liverwort	*Lophozia subalpina*	NC
Moss	*Macromitrium angulatum Mitt*	NC
Liverwort	*Nephelolejeunea talinayi* (S Arnell) Grolle	NC
Liverwort	*Pachyschistochila papillifera*	NC
Liverwort	*Paracromastigum fiordlandiae*	NC
Liverwort	*Petalophyllum hodgsoniae*	NC
Liverwort	*Phaeoceros hirticalyx*	NC
Moss	*Physcomitrella patens subsp readeri* (Mull Hal) BC Tan	NC
Moss	*Physcomitrium pusillum* Hook F and Wilson	NC
Liverwort	*Plagiochila baylisii*	NC
Liverwort	*Plagiochila fragmentisima*	NC

Common name	Taxanomic name	Threat category
Moss	*Plagiopus oederiana* (Sw) HA Crum and LE Anderson	NC
Liverwort	*Ptychanthus stephensoniana*	NC
Liverwort	*Riccardia intercellula*	NC
Liverwort	*Riccardia pseudodendroceros*	NC
Liverwort	*Riccardia umida*	NC
Liverwort	*Schistochila pellucida*	NC
Liverwort	*Schistochila pluriciliata*	NC
Moss	*Scorpiurium cucullatum* (Mitt) Hedenäs	NC
Liverwort	*Seppeltia succuba*	NC
Liverwort	*Telaranea plumulosa*	NC
Liverwort	*Temnoma angustifolium*	NC
Liverwort	*Xenothallus vulcanicus*	NC
Liverwort	*Brevianthus sp*	NC
Liverwort	*Frullania* “Radar Bush”	NC
Liverwort	*Plagiochila hatcheri*	NC
Liverwort	*Plagiochila kermadecensis*	NC
Liverwort	*Riccardia aff pallidevirens*	NC
Liverwort	*Telaranea exigua*	NC
Moss	*Archidium elatum* Dixon and Sainsbury	NE
Liverwort	*Brevianthus flavus*	NE
Liverwort	*Cephalolobus squarrosus*	NE
Liverwort	*Chaetophyllopsis whiteleggei*	NE
Moss	*Chorisodontium aciphyllum* (Hook F and Wilson) Broth	NE
Moss	*Fissidens berteroi* (Mont) Mull Hal	NE
Moss	*Fissidens integerrimus* Mitt	NE
Moss	*Fissidens strictus* Hook F and Wilson	NE
Liverwort	*Goebelobryum unguiculatum*	NE
Liverwort	*Neogrollea notabilis*	NE
Liverwort	*Petalophyllum australe*	NE
Liverwort	*Petalophyllum preissei*	NE
Liverwort	*Radula papulosa*	NE
Liverwort	*Ricciocarpos natans*	NE
Moss	*Seligeria diminuta* (R Br bis) Dixon	NE
Liverwort	*Stenolejeunea acuminata*	NE
Liverwort	*Cololejeunea* sp 1	NE
Liverwort	*Siphonolejeunea* “rock”	NE
Liverwort	*Zoopsis nitida*	NV
Freshwater fish		
Lowland longjaw galaxias	*Galaxias cobitinis*=	NC
Canterbury mudfish	*Neochanna burrowsius*	NE
Northland mudfish	*Neochanna heleios*	NE
Possible new non-diadromous galaxias	*Galaxias* “Teviot”	NV
Eldon’s galaxias	*Galaxias eldoni*	NV
Dune lakes galaxias	*Galaxias* sp	NV
Freshwater Invertebrate		
Snail	*Lymnaea tomentosa* Pfeiffer, 1855	NC
Caddisfly	*Oeconesus angustus* Ward, 1997	NC
Caddisfly	*Pseudoeconesus haasti* Ward, 1997	NC
Caddisfly	*Psilochorema spiniharpax* Ward, 1996	NC
Diving beetle	*Rhantus plantaris* Sharp	NC
Diving beetle	*Rhantus schauinslandi* Ordish, 1989	NC

Common name	Taxanomic name	Threat category
Caddisfly	*Tiphobiosis hinewai* Ward, 1995	NC
Caddisfly	*Tiphobiosis kuscheli* Wise, 1972	NC
Caddisfly	*Tiphobiosis quadrifurca* Ward, 1997	NC
Caddisfly	*Tiphobiosis schmidi* Ward, 1998	NC
Caddisfly	*Tiphobiosis trifurca* McFarlane, 1981	NC
Caddisfly	*Edpercivalia banksiensis* McFarlane, 1939	NE
Caddisfly	*Hydrobiosis styx* McFarlane, 1951	NE
Caddisfly	*Kokiria miharo* McFarlane, 1964	NV
Frog		
Archey's frog	*Leiopelma archeyi*	NC
Hamilton's frog	*Leiopelma hamiltoni*	NC
Maud Island frog	*Leiopelma pakeka*	NE
Fungus		
	Austrogaster novaezelandiae	NC
	Berggrenia cyclospora	NC
	Cantharellus elsae	NC
	Chalciporus aurantiacus	NC
	Chlorovibrissea bicolor	NC
	Chlorovibrissea melanochlora	NC
	Chlorovibrissea tasmanica	NC
Fischer's egg	*Claustula fischeri* KM Curtis 1926	NC
	Colpoma nothofagi	NC
	Cordierites acanthophora	NC
	Dichomitus newhookii	NC
Pukatea bracket	*Ganoderma* sp. "Awaroa"	NC
	Gomphus dingleyae	NC
	Gomphus novaezelandiae	NC
	Gyroporus castaneus	NC
	Hysterangium youngii	NC
	Inonotus chondromyelus	NC
	Lactarius maruiaensis	NC
	Phallobata alba	NC
	Phanerochaete citrina	NC
	Phanerochaete corymbata	NC
	Phanerochaete luteoaurantiaca	NC
Septate-spored polypore	*Polyporus septosporus* PK Buchanan and Ryvarden 1998	NC
Chatham Island sow thistle rust	*Puccinia embergeriae* McKenzie and PR Johnst ined	NC
	Puccinia freycinetiae	NC
	Ramaria aureorhiza	NC
	Ramaria avellaneovertex	NC
	Ramaria basirobusta	NC
	Ramaria junquilleovertex	NC
	Ramaria piedmontiana	NC
	Ramariopsis avellanea	NC
	Ramariopsis avellaneoinversa	NC
	Ramariopsis tortuosa	NC
	Russula inquinata	NC
	Russula littoralis	NC
	Russula miniata	NC
	Russula papakaiensis	NC

Common name	Taxanomic name	Threat category
	Russula pleurogena	NC
	Russula solitaria	NC
Russula	*Russula vivida* McNabb 1973	NC
	Sarcosoma orientale	NC
	Squamanita squarrulosa	NC
	Thaxterogaster cartilagineus	NC
	Undescribed genus *(Trichocomaceae)*	NC
	Uredo chathamica	NC
	Uredo salicorniae	NC
	Volvariella surrecta	NC
	Xylaria wellingtonensis	NC
	Xylaria zealandica	NC
Reptile		
Coromandel striped gecko	*Hoplodactylus stephensi* Coromandel populations	NC
Grand skink	*Oligosoma grande*	NC
Open Bay Islands gecko	*Hoplodactylus* sp “Open Bay Islands gecko”	NC
Open Bay Island skink	*Oligosoma* “Open Bay Island skink”	NC
Otago skink	*Oligosoma otagense*	NC
Southern North Island speckled skink	*Oligosoma* aff *infrapunctatum* “Southern North Island”	NE
Spotted skink “Central Canterbury”	*Oligosoma* aff *lineoocellatum* “Central Canterbury”	NE
Chevron skink	*Oligosoma homalonotum*	NE
Brothers Island tuatara	*Sphenodon guntheri*	NE
Whitaker’s skink	*Cyclodina whitakeri*	NV
Terrestrial invertebrate		
Moth	*Aletia cyanopetra* (Meyrick, 1927)	NC
Snail	*Alsolemia cresswelli* (Climo, 1978)	NC
Nemertine worm	*Antiponemertes allisonae* (Moore, 1973)	NC
Aphid	*Aphis coprosmae* Laing ex Tilyard	NC
Bird louse	*Apterygon okarito* Palma and Price, 2004	NC
Moth	*Archyala culta* Philpott, 1931	NC
Moth	*Archyala opulenta* Philpott, 1926	NC
Moth	*Arctesthes* sp “Von”	NC
Moth	*Asaphodes imperfecta* (Philpott, 1905)	NC
Moth	*Asaphodes obarata* F and R, 1875	NC
Stick insect	*Asteliaphasma naomi* (Salmon)	NC
Leaf-vein slug	Athoracophorid “Mt Hikurangi”	NC
Slug	*Athoracophorus* sp 3 (NMNZ M 151429) “Waiare”	NC
Moth	*Australothis volatilis* Matthews and Patrick, 1998	NC
Moth	*Bityla pallida* (Hudson, 1905)	NC
Snail	*Cavellia* “Kohaihai” (NMNZ M 36649)	NC
Snail	Charopidae sp 164 (NMNZ M 88458)	NC
Snail	Charopidae sp 46 (NMNZ M 87828)	NC
Snail	*Chaureopa roscoei* Climo, 1985	NC
Moth	*Chersadaula ochrogaster* Meyrick, 1923	NC
Snail	*Climocella pukanui* Goulstone and Brook, 1999	NC
Bird louse	*Coloceras harrisoni* (Tendeiro, 1972)	NC
Moth	*Coridomorpha stella* Meyrick, 1914	NC
A pleasing fungus beetle	*Cryptodacne* sp “Chathams”	NC
Snail	*Cytora hirsutissima* (Powell, 1951)	NC
Snail	*Cytora* sp 11 (NMNZ M 87893)	NC
Snail	*Delos* sp 1 (NMNZ M 29346)	NC

Common name	Taxanomic name	Threat category
Snail	Delos sp 13 (NMNZ M 29345)	NC
Snail	*Delouagapia tasmani*	NC
Snail	*Egestula* “broomfieldi” (NMNZ M 78965)	NC
Moth	*Elachista eurychora* (Meyrick, 1919)	NC
Moth	*Erechthias lychnopa* Meyrick, 1927	NC
Moth	*Euxoa cerapachodes* Guenée, 1868	NC
Snail	*Fectola melchior* Goustone and Brook, 1999	NC
Snail	*Flammoconcha* “marstoni” (NMNZ M 22464)	NC
Snail	*Flammoconcha cumberi* (Powell, 1941)	NC
Mokohinau stag beetle	*Geodorcus ithaginis* (Broun, 1893)	NC
Stag beetle	*Geodorcus* sp “Sisters”	NC
Moth	Gracillariidae n sp “Teucridium”	NC
Spider – Cyatholipidae	*Hanea paturau* Forster, 1988	NC
Ground weta	*Hemiandrus* “Cape Campbell”	NC
Moth	*Heterocrossa maculata (*Philpott, 1927)	NC
Open Bay Island leech	*Hirudobdella antipodum* (Benham 1904)	NC
Ground beetle	*Holcaspis abdita* Johns, 2004	NC
Ground beetle	*Holcaspis bidentella* Johns, 2004	NC
Ground beetle	*Holcaspis brevicula* Butcher, 1984	NC
Ground beetle	*Holcaspis* n sp	NC
Moth	*Izatha psychra* (Meyrick, 1883)	NC
Moth	*Izatha rigescens* Meyrick, 1929	NC
Moth	*Kiwaia* sp “Cloudy Bay”	NC
Native bee	*Leioproctus* “nunui”	NC
Nematode	*Longidorus waikouaitii* Yeates, Boag and Brown, 1997	NC
Bird louse	*Longimenopon* sp	NC
Weevil	*Lyperobius nesidiotes* Kuschel	NC
Ida Valley carabid	*Mecodema laeviceps* Broun, 1904	NC
Ground beetle	*Mecodema* sp “Te Paki”	NC
Ground beetle	*Megadromus* sp 8 “Omeo Hut”	NC
Darkling beetle	*Menimus sinuatus* Broun, 1886	NC
Moth	*Meterana* “Foveaux Strait”	NC
Mercury Islands tusked weta	*Motuweta isolata* Johns, 1997	NC
Moth	*Notoreas* “Castlepoint”	NC
Moth	*Notoreas* “Cape Turnagain”	NC
Moth	*Notoreas* “Mason Bay”	NC
Moth	*Notoreas* “Rahu Saddle”	NC
Moth	*Notoreas* “South Shag River”	NC
Moth	*Notoreas* “Waiho Flats”	NC
Moth	*Orocrambus fugitivellus* (Hudson, 1950)	NC
Moth	*Orthoclydon pseudostinaria* (Hudson, 1918)	NC
Aphid	*Paradoxaphis aristoteliae* Sunde, 1987	NC
Bird louse	*Penenirmus* sp	NC
Snail	*Phrixgnathus* “wallacei” (NMNZ M 88229)	NC
Snail	*Phrixgnathus transitans* Suter, 1892	NC
King Island turrett snail	*Placostylus (Basileostylus) bollonsi* “West”	NC
King Island turrett snail	*Placostylus* (*Basileostylus*) *bollonsi caperatus* Powell, 1948	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus “*Haupatoto”	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus* “Kauaetewhakapeke Stream”	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus “*Poroiki”	NC

Common name	Taxanomic name	Threat category
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus "*Rangiora"	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus "*Tapotupotu"	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus "*Te Paki"	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus "*Tirikawa Coast"	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus "*Tirikawa Trig"	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus ambagiosus* Suter, 1906	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus consobrinus* Powell, 1938	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus keenorum* Powell, 1947	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus pandora* Powell, 1951	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus watti* Powell, 1947	NC
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus whareana* Powell, 1951	NC
Large land snail	*Powelliphanta* "Anatoki Range"	NC
Large land snail	*Powelliphanta* "Baton"	NC
Large land snail	*Powelliphanta* "Mt Augustus"	NC
Large land snail	*Powelliphanta gagei* (Powell, 1938)	NC
Large land snail	*Powelliphanta gilliesi* "Haidinger"	NC
Large land snail	*Powelliphanta gilliesi brunnea* (Powell, 1938)	NC
Large land snail	*Powelliphanta lignaria* "millertoni"	NC
Large land snail	*Powelliphanta traversi otakia* (Powell, 1946)	NC
Harvestman	*Prasmiola unica* Forster, 1954	NC
Slug	*Pseudaneitea ramsayi* Climo, 1973	NC
Darkling beetle	*Pseudhelops antipodensis*	NC
Snail	*Punctidae* sp 226 (NMNZ M 154908)	NC
Snail	*Punctidae* sp 27 (NMNZ M 79798)	NC
Snail	*Punctidae* sp 6 (NMNZ M 151458)	NC
Bird louse	*Quadraceps dominella* Timmermann, 1953	NC
Bird louse	*Quadraceps novaeseelandiae* Timmermann, 1953	NC
Nematode	*Radopholus cavenessi* Egunjobi, 1968	NC
Bird louse	*Rallicola (Aptericola) roderickі* Palma, 1991	NC
Bird louse	*Rallicola (Rallicola) takahe* Holloway, 1956	NC
Snail	*Rhytida oconnori* Powell, 1946	NC
Snail	*Rhytidarex buddlei* (Powell, 1948)	NC
Moth	*Sabatinca* sp "Secretary Island"	NC
Bird louse	*Saemundssonia (Puffinoecus)* sp	NC
Bird louse	*Saemundssonia (Saemundssonia) chathamensis* Timmermann, 1977	NC
Paua slug	*Schizoglossa gigantea* Powell, 1930	NC
Moth	*Scythris* sp "stripe"	NC
Alpine grasshopper	*Sigaus homerensis* Morris, 2003	NC
Moth	*Stathmopoda campylocha* Meyrick, 1889	NC
Moth	*Stigmella* sp "Olearia"	NC
Moth	*Titanomis sisyrota* Meyrick, 1888	NC
Moth	*Trachypepla roseata* Philpott, 1923	NC
Snail	*Wainuia* "Mount Tuhua"	NC
Moth	*Xanthorhoe bulbulata* (Guenée, 1868)	NC
Pitt Island longhorn	*Xylotoles costatus* Pascoe, 1875	NC
Spider – Miturgidae	*Zealoctenus cardronaensis* Forster and Wilton, 1974	NC
Back Beach beetle	*Zecillenus tillyardi* (Brookes, 1927)	NC

Common name	Taxanomic name	Threat category
Pimelea bug	*Pimeleocoris viridis* Eyles and Schuh, 2003	NC
Bird louse	*Acidoproctus gottwaldhirschi* (Eichler, 1958)	NE
Snail	*Allodiscus fallax* Powell, 1952	NE
Cook Strait click beetle	*Amychus granulatus* (Broun, 1886)	NE
Stephens Island weevil	*Anagotus stephenensis* Kuschel, 1982	NE
Bird louse	*Anaticola* sp	NE
Aphid	*Aphis healyi* Cottier, 1953	NE
Moth	*Asaphodes frivola* (Meyrick, 1913)	NE
Moth	*Asaphodes stinaria* (Guenee, 1868)	NE
Bird louse	*Austrogoniodes strutheus* Harrison, 1915	NE
Grasshopper	*Brachaspis* “lowland”	NE
Robust grasshopper	*Brachaspis robustus* Bigelow, 1967 ss	NE
Bird louse	*Brueelia* sp (kokako)	NE
Bird louse	*Brueelia* sp (SI saddleback)	NE
Moth	*Cephalissa siria* Meyrick, 1884	NE
Snail	Charopidae sp 165 (NMNZ M 99147)	NE
Snail	Charopidae sp 166 (NMNZ M 79360)	NE
Snail	Charopidae sp 27 (NMNZ M 58110)	NE
Bird louse	*Colpocephalum pilgrimi* Price, 1967	NE
Snail	*Cytora* sp 14 (NMNZ M 151437)	NE
Moth	*Declana* sp “grey toreuta”	NE
Herekopare weta	*Deinacrida carinata* Salmon, 1950	NE
Little Barrier giant weta	*Deinacrida heteracantha* White, 1842	NE
Mahoenui giant weta	*Deinacrida mahoenui* Gibbs, 1999	NE
Moth	*Dichromodes* “Cloudy Bay”	NE
Spider – Pisauridae	*Dolomedes schauinslandi* Simon, 1899	NE
Moth	*Ericodesma aerodana* (Meyrick, 1881)	NE
Snail	*Flammulina tepakiensis* Gardner, 1977	NE
Bird louse	*Forficuloecus meinertzhageni* Guimarães, 1974	NE
Bird louse	*Forficuloecus pilgrimi* Guimarães, 1985	NE
Moth	*Gingidiobora subobscurata* (Walker, 1862) species complex “eastern Otago”	NE
Moth	*Graphania* cf *tetrachroa* “Olearia”	NE
Canterbury knobbled weevil	*Hadramphus tuberculatus* (Pascoe, 1877)	NE
Bird louse	*Heteromenopon (Keamenopon) kea* (Kellogg, 1907)	NE
Moth	*Kiwaia* “plains jumper”	NE
Moth	*Kiwaia jeanae* Philpott, 1930	NE
Moth	*Kupea electilis* Philpott, 1930	NE
Carabid	*Loxomerus* sp “Bollons Island”	NE
Moth	*Maoritenes* sp “Olearia”	NE
Stephens Island ground beetle	*Mecodema costellum costellum* Broun, 1903	NE
Ground beetle	*Megadromus* “Omarama”	NE
Metallic green ground beetle	*Megadromus antarcticus* subsp 1	NE
Darkling beetle	*Mimopeus parallelus* Watt, 1988	NE
Bird louse	*Neopsittaconirmus kea* (Kellogg, 1907)	NE
Moth	*Notoreas* “Cape Campbell”	NE
Moth	*Notoreas* “northern”	NE
Moth	*Orocrambus* “Mackenzie Basin”	NE
Moth	*Orocrambus jansoni* Gaskin, 1975	NE
Moth	*Orocrambus sophistes* (Meyrick, 1905)	NE
Moth	*Pasiphila* sp “Olearia”	NE
Bird louse	*Philopterus novaezealandiae* Palma and Price, 2000	NE

Common name	Taxanomic name	Threat category
Snail	*Phrixgnathus murdochi* Suter, 1894	NE
King Island turrett snail	*Placostylus (Basileostylus) bollonsi arbutus* Powell, 1948	NE
King Island turrett snail	*Placostylus* (*Basileostylus) bollonsi bollonsi* Suter, 1908	NE
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus* “Ngaupoko”	NE
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus annectens* Powell, 1938	NE
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus michiei* Powell, 1951	NE
Flax snail (Pupuharakeke)	*Placostylus (Maoristylus) ambagiosus paraspiritus* Powell, 1951	NE
Large land snail	*Powelliphanta* “Buller River”	NE
Large land snail	*Powelliphanta* “Gunner River”	NE
Large land snail	*Powelliphanta* “Maungaharuru”	NE
Large land snail	*Powelliphanta* “Owen”	NE
Large land snail	*Powelliphanta* “Parapara”	NE
Large land snail	*Powelliphanta* “patrickensis*”* (*sensu* Powell, 1949)	NE
Large land snail	*Powelliphanta gilliesi* “Heaphy”	NE
Large land snail	*Powelliphanta gilliesi aurea* (Powell, 1946)	NE
Large land snail	*Powelliphanta gilliesi gilliesi* (Smith, 1880)	NE
Large land snail	*Powelliphanta gilliesi jamesoni* (Powell, 1936)	NE
Large land snail	*Powelliphanta gilliesi kahurangica* (Powell, 1936)	NE
Large land snail	*Powelliphanta gilliesi montana* (Powell, 1936)	NE
Large land snail	*Powelliphanta hochstetteri anatokiensis* (Powell, 1938) red form	NE
Large land snail	*Powelliphanta hochstetteri anatokiensis* (Powell, 1938) yellow form	NE
Large land snail	*Powelliphanta lignaria johnstoni* (Powell, 1946)	NE
Large land snail	*Powelliphanta lignaria rotella* (Powell, 1938)	NE
Large land snail	*Powelliphanta lignaria ruforadiata* (Powell, 1949)	NE
Large land snail	*Powelliphanta rossiana rossiana* (Powell, 1930)	NE
Large land snail	*Powelliphanta superba* “Gouland Range”	NE
Large land snail	*Powelliphanta superba harveyi* (Powell, 1946)	NE
Large land snail	*Powelliphanta superba mouatae* (Powell, 1946)	NE
Large land snail	*Powelliphanta superba prouseorum* (Powell, 1946)	NE
Large land snail	*Powelliphanta superba richardsoni* (Powell, 1946)	NE
Large land snail	*Powelliphanta traversi florida* (Powell, 1946)	NE
Large land snail	*Powelliphanta traversi koputaroa* (Powell, 1946)	NE
Large land snail	*Powelliphanta traversi latizona* (Powell, 1949)	NE
Large land snail	*Powelliphanta traversi tararuaensis* (Powell, 1938)	NE
Large land snail	*Powelliphanta traversi traversi* (Powell, 1930)	NE
Scarab/chafer Beetle	*Prodontria bicolorata* Given, 1964	NE
Cromwell chafer beetle	*Prodontria lewisii* Broun, 1904	NE
Moth	*Protosynaema* sp “olearia”	NE
Darkling beetle	*Pseudhelops clandestinus* Watt, 1971	NE
Moth	*Pseudocoremia* sp “knobby”	NE
Snail	*Punctidae* sp 12 (NMNZ M 87990)	NE
Snail	*Punctidae* sp 20 (NMNZ M 116650), “Microlaoma” “unicolorata”)	NE
Snail	*Punctidae* sp 64 (NMNZ M 68410)	NE
Moth	*Schiffermuelleria orthophanes* (Meyrick, 1905)	NE
Alpine grasshopper	*Sigaus childi* Jamieson, 1999	NE
Moth	*Stathmopoda albimaculata* Philpott, 1931	NE
Weevil	*Stephanorhynchus insolitus* Broun, 1893	NE

Common name	Taxanomic name	Threat category
Moth	*Theoxena scissaria* (Guenée, 1868)	NE
Bird louse	*Trabeculus flemingi* Timmermann, 1959	NE
Snail	*Wainuia clarki* Powell, 1936	NE
Moth	*Xanthorhoe frigida* Howes, 1946	NE
Snail	*Amborhytida tarangensis* (Powell, 1930)	NV
Bird louse	*Austrogoniodes vanalphenae* Banks and Palma, 2003	NV
Coxella weevil	*Hadramphus spinipennis* Broun, 1911	NV
Large land snail	*Powelliphanta fiordlandica* (Climo, 1971)	NV
Large land snail	*Powelliphanta gilliesi compta* (Powell, 1930)	NV
Large land snail	*Powelliphanta lignaria lignaria* (Hutton, 1888)	NV
Large land snail	*Powelliphanta lignaria lusca* (Powell, 1949)	NV
Large land snail	*Powelliphanta lignaria oconnori* (Powell, 1938)	NV
Large land snail	*Powelliphanta lignaria unicolorata* (Powell, 1930)	NV
Moth	*Pyrgotis* sp "olearia"	NV
Snail	*Rhytida greenwoodi webbi* Powell, 1949	NV
Vascular plants		
	Acaena rorida BH Macmill	NC
	Alectryon excelsus subsp grandis (Cheeseman) de Lange et EK Cameron	NC
	Anzybas carsei (Cheeseman) DL Jones et MA Clem	NC
	Atriplex hollowayi de Lange et DA Norton	NC
	Botrychium aff *lunaria* (CHR 289336; NW Nelson)	NC
	Brachyscome pinnata Hook F	NC
	Calochilus aff *herbaceus* (CHR 65825; Kaimaumau)	NC
	Cardamine (a) (CHR 500569; Awahokomo)	NC
	Cardamine (c) (CHR 65058; Reporoa Bog)	NC
	Carex dolomitica Heenan et de Lange	NC
	Carmichaelia hollowayi G Simpson	NC
	Carmichaelia muritai (AW Purdie) Heenan	NC
	Celmisia aff *gracilenta* (b) (CHR 469722; Mangaweka)	NC
	Celmisia macmahonii Kirk var *macmahonii*	NC
	Centipeda minima (L) A Braun et Asch subsp *minima*	NC
	Ceratocephala pungens Garn Jones	NC
	Christella dentata (Forssk) Brownsey et Jermy sens str	NC
	Clianthus puniceus (G Don) Sol ex Lindl	NC
	Coprosma spathulata subsp *hikuruana* de Lange et Heenan	NC
	Cortaderia turbaria Connor	NC
	Craspedia (a) (CHR 511522; Clutha River)	NC
	Craspedia (b) (CHR 516324; Leatham)	NC
	Craspedia (i) (CHR 395643; Fyfe River)	NC
	Craspedia (j) (CHR 516302; Lake Heron)	NC
	Crassula hunua AP Druce	NC
	Davallia tasmanii subsp *cristata* von Konrat, Braggins et de Lange	NC
	Euphrasia (a) (CHR 471903; "white")	NC
	Festuca aff *novae-zelandiae* (AK 252541; Awahokomo)	NC
	Gentiana aff *astonii* (a) (CHR 529112; Mt Brown)	NC
	Gentiana aff *astonii* (b) (CHR 529111; Pareora River)	NC
	Gentiana aff *astonii* (e) (CHR 542276; Manahune)	NC
	Gentiana aff *saxosa* (AK 7316; Charleston)	NC
	Gunnera hamiltonii Kirk	NC

Common name	Taxanomic name	Threat category
	Hebe aff *bishopiana* (AK 202263; Hikurangi Swamp)	NC
	Hebe breviracemosa (WRB Oliv) Cockayne et Allan	NC
	Hebe societatis Bayly et Kellow	NC
	Hypsela aff *rivalis* (CHR 369981; Burgoo Stream)	NC
	Isoetes aff *kirkii* (CHR 247118A; Lake Omapere)	NC
	Koeleria aff *novozelandica* (AK 252546; Awahokomo)	NC
	Lepidium aff *oleraceum* (a) (AK 230459; Chatham Islands)	NC
	Lepidium aff *oleraceum* (d) (AK 255607; Mangere)	NC
	Lepidium banksii Kirk	NC
	Lepidium sisymbrioides subsp *matau* (Petrie) Thell	NC
	Leptinella (a) (CHR 515297; Clutha River)	NC
	Leptinella filiformis (Hook F) DG Lloyd et C Webb	NC
	Limosella (b) (CHR 515038; Manutahi)	NC
	Linguella puberula Hook F	NC
	Linum monogynum var *chathamicum* Cockayne (CHR 417633)	NC
	Mazus novaezeelandiae subsp *impolitus* f *hirta* Heenan	NC
	Melicytus aff *obovatus* (b) (AK 235617; Mt Burnett)	NC
	Metrosideros bartlettii JW Dawson	NC
	Microtis aff *unifolia* (CHR 532775; Fox)	NC
	Myosotis (b) (CHR 386966; Mt Tapuae-O-Uenuku)	NC
	Myosotis albosericea Hook F	NC
	Myosotis angustata Cheeseman	NC
	Myosotis australis var *lytteltonensis* Laing et A Wall	NC
	Myosotis cheesemanii Petrie	NC
	Myosotos petiolata Hook F var *petiolata*	NC
	Neopaxia drucei Heenan	NC
	Olearia aff *odorata* (CHR 386084; Canterbury Plains)	NC
	Olearia gardneri Heads	NC
	Pachycladon aff *fastigiata* (CHR 279206; Chalk Range)	NC
	Pachycladon exilis (Heenan) Heenan et A Mitch	NC
	Pennantia baylisiana (WRB Oliv) GTS Baylis	NC
	Pimelea (a) (CHR 495025; Turakina)	NC
	Pimelea aff *aridula* (a) (CHR 282959; Te Mata Peak)	NC
	Pittosporum turneri Petrie	NC
	Poa spania Edgar et Molloy	NC
	Poa sudicola Edgar	NC
	Pomaderris apetala subsp *maritima* NG Walsh et F Coates	NC
	Pratia aff *angulata* (AK 212143; Woodhill)	NC
	Pterostylis micromega Hook F	NC
	Puccinellia raroflorens Edgar	NC
	Puccinellia walkeri subsp *chathamica* (Cheeseman) Edgar	NC
	Ranunculus (a) (AKU 19876; Hope)	NC
	Ranunculus aff *royi* (CHR 513327; Waihao)	NC
	Sebaea ovata (Labill) R Br	NC
	Sicyos australis Endl	NC
	Tecomanthe speciosa WRB Oliv	NC
	Thelymitra (a) (WELT 79140; Ahipara)	NC
	Thelymitra sanscilia Hatch	NC
	Tmesipteris aff *tannensis* (CHR 496779; Banks Peninsula)	NC
	Trichomanes (AK 252983; Kerikeri)	NC

Common name	Taxanomic name	Threat category
	Trisetum aff *lepidum* (AK 251835; Awahokomo)	NC
	Uncinia perplexa Heenan et de Lange	NC
	Wahlenbergia pygmaea subsp *tararua* JA Petterson	NC
	Aciphylla traversii (F Muell) Hook F	NE
	Ackama nubicola de Lange	NE
	Amphibromus fluitans Kirk	NE
	Asplenium pauperequitum Brownsey et P Jackson	NE
	Astelia chathamica (Skottsb) LB Moore	NE
	Australopyrum calcis Connor et Molloy subsp *calcis*	NE
	Boehmeria australis var *dealbata* (Cheeseman) Sykes	NE
	Brachyglottis huntii (F Muell) B Nord	NE
	Brachyscome (a) (WELT 10278; Ward)	NE
	Cardamine (b) (CHR 312947; “tarn”)	NE
	Cardamine (d) (CHR 511706; Pisa Range)	NE
	Carex inopinata Cook	NE
	Carmichaelia curta Petrie	NE
	Carmichaelia juncea Hook F	NE
	Carmichaelia kirkii Hook F	NE
	Carmichaelia williamsii Kirk	NE
	Clianthus maximus Colenso	NE
	Coprosma waima AP Druce	NE
	Craspedia (e) (CHR 514391; “tarn”)	NE
	Crassula peduncularis (Smith) F Meigen	NE
	Embergeria grandifolia (Kirk) Boulos	NE
	Epacris sinclairii Hook F	NE
	Gingidia aff *montana* (a) (CHR 510570; Mt Burnett)	NE
	Hebe aff *albicans* (AK 252966; Mt Burnett)	NE
	Hebe armstrongii (JB Armstr) Cockayne et Allan	NE
	Hebe salicornioides (Hook F) Cockayne et Allan	NE
	Hebe speciosa (A Cunn) Cockayne et Allan	NE
	Helichrysum dimorphum Cockayne	NE
	Heliohebe raoulii subsp *maccaskillii* (Allan) Garn Jones	NE
	Hibiscus aff *trionum* (AK 218967; North Island)	NE
	Juncus holoschoenus R Br var *holoschoenus*	NE
	Lepidium aff *oleraceum* (b) (AK 208579; Antipodes)	NE
	Lepidium aff *oleraceum* (c) (CANU 5995; Snares)	NE
	Lepidium kirkii Petrie	NE
	Lepidium oleraceum Sparrman sens str	NE
	Lepidium sisymbrioides subsp *kawarau* (Petrie) Thell	NE
	Leptinella nana (DG Lloyd) DG Lloyd et C Webb	NE
	Melicytus (a) (CHR 355077; Matiri Range)	NE
	Myosotidium hortensia (Decne) Baill	NE
	Myosotis aff *pygmaea* (CHR 244566; Volcanic Plateau)	NE
	Myosotis colensoi (Kirk) Macbride	NE
	Myosotis petiolata var *pansa* LB Moore	NE
	Myosotis pygmaea var *glauca* G Simpson et JS Thomson	NE
	Myosurus minimus subsp *novae-zelandiae* (WRB Oliv) Garn Jones	NE
	Myrsine argentea Heenan et de Lange	NE
	Olearia crebra EK Cameron et Heenan	NE
	Olearia pachyphylla Cheeseman	NE
	Olearia polita HD Wilson et Garn Jones	NE

Common name	Taxanomic name	Threat category
	Ophioglossum petiolatum Hook	NE
	Oreomyrrhis colensoi var *delicatula* Allan	NE
	Phylloglossum drummondii Kunze	NE
	Picris burbidgei S Holzapfel	NE
	Pimelea aff *aridula* (b) (AK 230900; Cook Strait)	NE
	Pittosporum obcordatum Raoul	NE
	Pittosporum patulum Hook F	NE
	Pittosporum serpentinum (de Lange) de Lange	NE
	Pomaderris phylicifolia Lodd	NE
	Ranunculus aff *stylosus* (CHR 515131; Manuhune)	NE
	Rhopalostylis aff *sapida* (AK 227148; Chatham Islands)	NE
	Rorippa divaricata (Hook F) Garn Jones et Jonsell	NE
	Senecio kermadecensis Belcher	NE
	Senecio scaberulus (Hook F) DG Drury	NE
	Simplicia laxa Kirk	NE
	Todea barbara (L) Moore	NE
	Triglochin palustris L	NE
	Uncinia strictissima Petrie	NE
	Bulbinella modesta LB Moore	NE
	Aciphylla dieffenbachii Kirk	NV
	Australopyrum calcis subsp *optatum* Connor et Molloy	NV
	Carmichaelia carmichaeliae (Hook F) Heenan	NV
	Dracophyllum longifolium var *septentrionale* WRB Oliv	NV
	Dracophyllum urvilleanum A Rich	NV
	Hebe barkeri (Cockyane) Cockayne	NV
	Hebe bishopiana (Petrie) Hatch	NV
	Hebe cupressoides (Hook F) Cockayne et Allan	NV
	Hebe perbella de Lange	NV
	Hebe scopulorum Bayly, de Lange et Garn Jones	NV
	Hibiscus diversifolius Jacq	NV
	Kunzea aff *ericoides* (a) (AK 255350; Thornton)	NV
	Lepidium flexicaule Kirk	NV
	Leptinella featherstonii F Muell	NV
	Leptinella rotundata (Cheeseman) DG Lloyd et C Webb	NV
	Lycopodiella serpentina (Kunze) B Øllg	NV
	Muehlenbeckia astonii Petrie	NV
	Myosotis pygmaea var *minutiflora* G.Simpson et JS Thomson	NV
	Olearia hectorii Hook F	NV
	Pittosporum dallii Cheeseman	NV
	Prasophyllum aff *patens* (AK 236408; New Zealand)	NV
	Ranunculus ternatifolius Kirk	NV
	Scutellaria novae-zelandiae Hook F	NV

Source: Extract from the New Zealand Threat Classification Lists for 2005. Department of Conservation, published January 2007.

Key: NE = nationally endangered, NC = nationally critical, NV = nationally vulnerable.

Table 7: Chronically threatened species 2005

Common name	Taxanomic name	Threat category
Bird		
North Island brown kiwi	*Apteryx mantelli*	SD
Chatham Island mollymawk	*Thalassarche eremita*	SD
Western weka	*Gallirallus australis australis*	SD
Black-billed gull	*Larus bulleri*	SD
Great spotted kiwi	*Apteryx "haastii"*	GD
Southern tokoeka	*Apteryx australis*	GD
Yellow-crowned kakariki	*Cyanoramphus auriceps*	GD
Long-tailed cuckoo	*Eudynamys taitensis*	GD
New Zealand pigeon, kereru, kukupa	*Hemiphaga novaeseelandiae*	GD
Antarctic prion	*Pachyptila desolata*	GD
Light-mantled sooty albatross	*Phoebetria palpebrata*	GD
Grey petrel	*Procellaria cinerea*	GD
Flesh-footed shearwater	*Puffinus carneipes*	GD
Sooty shearwater	*Puffinus griseus*	GD
South Island rifleman	*Acanthisitta chloris chloris*	GD
North Island rifleman	*Acanthisitta chloris granti*	GD
Banded dotterel	*Charadrius bicinctus bicinctus*	GD
Northern little blue penguin	*Eudyptula minor iredalei*	GD
Southern little blue penguin	*Eudyptula minor minor*	GD
Red-billed gull	*Larus novaehollandiae scopulinus*	GD
New Zealand sooty tern	*Sterna fuscata kermadeci*	GD
Southern white-fronted tern	*Sterna striata aucklandorna*	GD
White-fronted tern	*Sterna striata striata*	GD
Eastern falcon	*Falco novaeseelandiae* "eastern"	GD
Cook's petrel, titi	*Pterodroma cookii*	GD
Freshwater fish		
Dwarf inanga	*Galaxias gracilis*	SD
Longfin eel	*Anguilla dieffenbachii*	GD
Possible new non-diadromous galaxias	*Galaxias* "Southern sp."	GD
Roundhead galaxias	*Galaxias anomalus*	GD
Giant kokopu	*Galaxias argenteus*	GD
Flathead galaxias	*Galaxias depressiceps*	GD
Dwarf galaxias	*Galaxias divergens*	GD
Gollum galaxias	*Galaxias gollumoides*	GD
Bignose galaxias	*Galaxias macronasus*	GD
Upland longjaw galaxias	*Galaxias prognathus*	GD
Dusky galaxias	*Galaxias pullus*	GD
Possible new non-diadromous galaxias	*Galaxias* sp D	GD
Brown mudfish	*Neochanna apoda*	GD
Black mudfish	*Neochanna diversus*	GD
Freshwater invertebrate		
Freshwater mussel	*Hyridella menziesii* (Gray, 1843)	GD
Koura	*Paranephrops planifrons* White	GD
Koura	*Paranephrops zealandicus* White	GD

Common name	Taxanomic name	Threat category
Fungus		
	Melampsora novaezelandiae	SD
	Diaporthe sp 1	GD
	Diaporthe sp 2	GD
	Glonium sp	GD
	Leucostoma sp 1	GD
	Leucostoma sp 2	GD
	Pestalotiopsis sp	GD
	Phomopsis sp	GD
	Propolis desmoschoeni	GD
	Seimatosporium sp	GD
	Truncatella sp	GD
Reptile		
Small-scaled skink	*Oligosoma microlepis*	SD
Ornate skink	*Cyclodina ornata*	GD
Canterbury gecko	*Hoplodactylus* “Canterbury”	GD
Matapia gecko	*Hoplodactylus* “Matapia Island”	GD
Large Otago gecko	*Hoplodactylus* “Otago large”	GD
Southern forest gecko	*Hoplodactylus* “Southern forest gecko”	GD
Goldstripe gecko	*Hoplodactylus chrysosireticus*	GD
Pacific gecko	*Hoplodactylus pacificus*	GD
Harlequin gecko	*Hoplodactylus rakiurae*	GD
Auckland green gecko	*Naultinus e elegans*	GD
Wellington green gecko	*Naultinus e punctatus*	GD
Jewelled gecko	*Naultinus gemmeus*	GD
Northland green gecko	*Naultinus grayii*	GD
Rough gecko	*Naultinus rudis*	GD
Nelson green gecko	*Naultinus stellatus*	GD
Green skink “West Otago”	*Oligosoma* aff *chloronoton* “West Otago”	GD
Spotted skink “Mackenzie Basin”	*Oligosoma* aff *lineoocellatum* “Mackenzie Basin”	GD
Spotted skink “South Marlborough”	*Oligosoma* aff *lineoocellatum* “South Marlborough”	GD
Green skink	*Oligosoma chloronoton*	GD
Cryptic skink	*Oligosoma inconspicuum*	GD
Speckled skink	*Oligosoma infrapunctatum*	GD
Spotted skink	*Oligosoma lineoocellatum*	GD
Scree skink	*Oligosoma waimatense*	GD
Terrestrial invertebrate		
Bird louse	*Apterygon mirum* Clay, 1961	SD
Forest ringlet	*Dodonidia helmsii*	SD
Spider – Theridiidae – black katipo spider	*Latrodectus atritus* Urquhart, 1890	SD
Spider – Theridiidae – red katipo	*Latrodectus katipo* Powell, 1871	SD
Ground beetle	*Mecodema costellum obesum* Townsend, 1965	SD
Moth	*Notoreas* “Taranaki Coast”	SD
Moth	*Notoreas* “Wellington”	SD
Large land snail	*Powelliphanta* “Urewera”	SD
Large land snail	*Powelliphanta annectens* (Powell, 1936)	SD
Large land snail	*Powelliphanta marchanti* (Powell, 1932)	SD
Large land snail	*Powelliphanta spedeni spedeni* (Powell, 1932)	SD
Large land snail	*Powelliphanta superba superba* (Powell, 1930)	SD
Alpine grasshopper	*Sigaus* sp A	SD
Snail	*Succinea archeyi* Powell, 1933	SD

Common name	Taxanomic name	Threat category
Moth	"Pseudocoremia" *cineracia* (Howes, 1942)	GD
Snail	*Amborhytida* aff *Forsythi* (NMNZ M 173834)	GD
Snail	*Amborhytida dunniae* (Gray, 1840)	GD
Snail	*Amborhytida duplicata* (Suter, 1904)	GD
Snail	*Amborhytida forsythi* (Powell, 1952)	GD
Bird louse	*Apterygon dumosum* Tandan, 1972	GD
Bird louse	*Apterygon hintoni* Clay, 1966	GD
Slug	*Athoracophorus* sp 4 (NMNZ M 151430) "northern NZ"	GD
Kaikoura giant weta	*Deinacrida parva* Buller, 1895	GD
Moth	*Gingidiobora nebulosa* (Philpott, 1917)	GD
Moth	*Gingidiobora subobscurata* (Walker, 1862) species complex	GD
Sphagnum porina	*Heloxycanus patricki* Dugdale, 1994	GD
Karikari tree weta	*Hemideina thoracica* 2n=23,24	GD
Moth	*Hydriomena canescens* Philpott, 1918	GD
Moth	*Hydriomena clarkei* (Howes, 1917)	GD
Moth	*Loxostege* sp "salt pan"	GD
Ground beetle	*Mecodema howitti* Castelnau, 1867	GD
Moth	*Meterana exquisita* (Philpott, 1903)	GD
Moth	*Meterana grandiosa* (Philpott, 1903)	GD
Moth	*Paranotoreas fulva* (Hudson, 1905)	GD
Kauri snail, pupurangi	*Paryphanta busbyi busbyi* (Gray, 1840)	GD
Kauri snail, pupurangi	*Paryphanta busbyi watti* Powell, 1946	GD
Large land snail	*Powelliphanta* "Haast"	GD
Large land snail	*Powelliphanta gilliesi fallax* (Powell, 1930)	GD
Large land snail	*Powelliphanta gilliesi subfusca* (Powell, 1930)	GD
Large land snail	*Powelliphanta hochstetteri anatokiensis* (Powell, 1938)	GD
Large land snail	*Powelliphanta hochstetteri bicolor* (Powell, 1930)	GD
Large land snail	*Powelliphanta hochstetteri consobrina* (Powell, 1936)	GD
Large land snail	*Powelliphanta hochstetteri hochstetteri* (Pfeiffer, 1862) brown based	GD
Large land snail	*Powelliphanta hochstetteri hochstetteri* (Pfeiffer, 1862) yellow based	GD
Large land snail	*Powelliphanta hochstetteri obscura* (Beutler, 1901)	GD
Bird louse	*Rallicola (Aptericola) gadowi* Harrison, 1915	GD
Bird louse	*Rallicola (Aptericola) gracilentus* Clay, 1953	GD
Snail	*Rhytida stephenensis* Powell, 1930	GD
Alpine grasshopper	*Sigaus minutus* Bigelow, 1967	GD
Moth	*Stathmopoda* sp "Olearia"	GD
Snail	*Wainuia* "Mount Oxford"	GD
Snail	*Wainuia edwardi* (Suter, 1899)	GD
Snail	*Wainuia urnula nasuta* Powell, 1946	GD
Vascular plants		
	Brachyglottis kirkii (Kirk) C.Webb var *kirkii*	SD
	Carex litorosa Bailey	SD
	Dactylanthus taylorii Hook F	SD
	Daucus glochidiatus (Labill) Fisch, CA Mey and Avé-Lall	SD
	Drymoanthus flavus St George et Molloy	SD
	Euphorbia glauca G Forst	SD
	Heliohebe acuta Garn Jones	SD
	Heliohebe lavaudiana (Raoul) Garn Jones	SD
	Hydatella inconspicua (Cheeseman) Cheeseman	SD

Common name	Taxanomic name	Threat category
	Hypericum aff *japonicum* (a) (CHR 165889; Volcanic Plateau)	SD
	Isolepis basilaris Hook F	SD
	Kunzea ericoides var *linearis* (Kirk) W Harris	SD
	Leucogenes tarahaoa Molloy	SD
	Luzula celata Edgar	SD
	Marattia salicina Smith	SD
	Mazus novaezeelandiae subsp *impolitus* Heenan f *impolitus*	SD
	Mazus novaezeelandiae WR Barker subsp *novaezeelandiae*	SD
	Myosotis pygmaea Colenso var *pygmaea*	SD
	Olearia fimbriata Heads	SD
	Pachycladon stellata (Allan) Heenan et A Mitch	SD
	Pimelea aff *arenaria* (AK 216133; southern New Zealand)	SD
	Pimelea tomentosa (JR Forst et G Forst) Druce sens str	SD
	Pittosporum aff *crassifolium* (AK 253259; Raoul Island)	SD
	Pittosporum kirkii Hook F	SD
	Plagianthus chathamicus Cockayne	SD
	Plumatochilos tasmanicum (DL Jones) DL Szlachetko	SD
	Pterostylis paludosa DL Jones, Molloy et MA Clem	SD
	Sicyos aff *australis* (AK 252822; New Zealand)	SD
	Tetrachondra hamiltonii D Oliver	SD
	Acaena buchananii Hook F	GD
	Alepis flavida (Hook F) Tiegh	GD
	Anogramma leptophylla (L) Link	GD
	Austrofestuca littoralis (Labill) EB Alexev	GD
	Brachyglottis perdicioides (Hook F) B Nord	GD
	Brachyglottis sciadophila (Raoul) B Nord	GD
	Carex astonii Hamlin	GD
	Carex cirrhosa Bergg	GD
	Carmichaelia crassicaule Hook F	GD
	Carmichaelia stevensonii (Cheeseman) Heenan	GD
	Carmichaelia vexillata Heenan	GD
	Celmisia major Cheeseman var *major*	GD
	Christella aff *dentata* (b) (AK 126902; “thermal”)	GD
	Clematis marmoraria Sneddon	GD
	Colensoa physaloides (A Cunn) Hook F	GD
	Coprosma obconica Kirk	GD
	Coprosma pedicellata Molloy, de Lange et BD Clarkson	GD
	Coprosma wallii Petrie	GD
	Craspedia (n) (CHR 369978; Henderson)	GD
	Crassula kirkii (Allan) AP Druce et DR Given	GD
	Crassula manaia AP Druce et Sykes	GD
	Cyclosorus interruptus (Willd) H Itô	GD
	Deschampsia cespitosa (L) Beauv	GD
	Desmoschoenus spiralis (A Rich) Hook F	GD
	Doodia squarrosa Colenso	GD
	Drosera pygmaea DC	GD
	Eleocharis neozelandica Kirk	GD
	Epilobium chionanthum Hauss	GD
	Eryngium aff *vesiculosum* (AK 232583; New Zealand)	GD
	Gratiola nana Benth	GD

Common name	Taxanomic name	Threat category
	Gunnera arenaria Cheeseman	GD
	Hebe pimeleoides subsp *faucicola* Kellow et Bayly	GD
	Hoheria aff *sexstylosa* (AK 234306; Tararua Ranges)	GD
	Iphigenia novae-zelandiae (Hook F) Baker	GD
	Isolepis fluitans (L) R Br	GD
	Jovellana sinclairii (Hook F) Kranzl	GD
	Lepidium sisymbrioides Hook F subsp *sisymbrioides*	GD
	Lepidium tenuicaule Kirk	GD
	Leptinella dioica subsp *monoica* (AK 200874)	GD
	Leptinella serrulata (DG Lloyd) DG Lloyd et C Webb	GD
	Libertia peregrinans Cockayne et Allan	GD
	Mazus arenarius Heenan, PN Johnson et C Webb	GD
	Melicytus aff *alpinus* (f) (CHR 541566; Waipapa)	GD
	Melicytus flexuosus Molloy et AP Druce	GD
	Mida salicifolia A Cunn	GD
	Montigena novae-zelandiae (Hook F) Heenan	GD
	Myosotis brockiei LB Moore et MJA Simpson	GD
	Myriophyllum robustum Hook F	GD
	Olearia cheesemanii Cockayne et Allan	GD
	Ourisia modesta Diels	GD
	Pachycladon cheesemanii Heenan et A Mitch	GD
	Pachycladon enysii (Cheeseman) Heenan et A Mitch	GD
	Pachycladon fastigiata (Hook F) Heenan et A Mitch	GD
	Paspalum orbiculare G Forst	GD
	Pellaea falcata (R Br) Fée	GD
	Peraxilla colensoi (Hook F) Tiegh	GD
	Peraxilla tetrapetala Tiegh	GD
	Pimelea arenaria A.Cunn sens str	GD
	Pimelea lyallii Hook F	GD
	Potamogeton pectinatus L	GD
	Pseudopanax laetus (Kirk) Philipson	GD
	Ranunculus (b) (CHR 324466; Burgoo Stream)	GD
	Ranunculus limosella Kirk	GD
	Ranunculus macropus Hook F	GD
	Ranunculus recens Kirk var *recens*	GD
	Raoulia aff *hookeri* (AK 239529; “coast”)	GD
	Raoulia monroi Hook F	GD
	Raukaua edgerleyi (Hook F) Seem	GD
	Schoenus carsei Cheeseman	GD
	Selliera rotundifolia Heenan	GD
	Sonchus kirkii Hamlin	GD
	Sophora fulvida (Allan) Heenan et de Lange	GD
	Teucridium parvifolium Hook F	GD
	Thelypteris confluens (Thunb) C Morton	GD
	Trisetum antarcticum (G Forst) Trin	GD
	Tupeia antarctica (G Forst) Cham et Schlecht	GD
	Urtica linearifolia (Hook F) Cockayne	GD
	Utricularia australis R Br	GD
	Utricularia delicatula Cheeseman	GD

Source: Extract from the New Zealand Threat Classification Lists for 2005. Department of Conservation, published January 2007.

Key: SD = serious decline and GD = gradual decline.

6.2.3 Threatened plant lists for local authorities – New Zealand Plant Conservation Network

The New Zealand Plant Conservation Network has compiled threatened plant lists for local authorities in the North and South islands. These lists are available for download off its website – www.nzpcn.org.nz.

6.2.4 Key references

New Zealand Threat Classification references

Department of Conservation. 2007. *New Zealand Threat Classification Lists for 2005*. Wellington: Department of Conservation.

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Department of Conservation website (www.doc.govt.nz) for access to:

- Current New Zealand threatened species classification lists – http://www.doc.govt.nz/templates/MultiPageDocumentTOC.aspx?id=42704
- Threatened species management recovery plans – http://www.doc.govt.nz/templates/page.aspx?id=39162
- General information on threatened species – http://www.doc.govt.nz/templates/defaultlanding.aspx?id=32841

New Zealand Plant Conservation Network

www.nzpcn.org.nz

7 Legislative Provisions for Protecting Indigenous Biodiversity

7.1 Legislation

7.1.1 Resource Management Act 1991

The Resource Management Act 1991 is the principal legislation governing the use of New Zealand's land, air, water, ecosystems and built environment. Under the Act, local government has a major part to play in the sustainable management of the environment.

The Resource Management Act has a key role in managing our biological diversity. Almost all forms of resource use affect indigenous biodiversity, and biodiversity is recognised in the Act in many ways.

- Section 5 is relevant because all plants and animals come within the definition of natural resources. Section 5(1)(b) refers to safeguarding ecosystems.
- Section 6(c) is the section most identified with the maintenance of biodiversity because it refers to the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna. However, this section represents just one dimension of managing indigenous biodiversity.
- Section 7(d) refers to the intrinsic values of ecosystems. The definition of 'intrinsic values' includes values derived from biological and genetic diversity.
- Section 30(1)(c)(iiia) provides that it is a function of regional councils to control the use of land for the purpose of maintaining and enhancing ecosystems in water bodies and coastal waters.
- Section 30(1)(ga) provides that it is a function of regional councils to establish, implement and review objectives, policies and methods for maintaining indigenous biodiversity.
- Section 31(b)(iii) provides that it is a function of territorial councils to control the effects of the use of land on the maintenance of indigenous biological diversity.

Amendments to the Act in 2003 clarified that:

- regional councils and territorial authorities both have responsibilities for managing indigenous biodiversity
- local authorities must consider the consequences of all effects on indigenous biodiversity, not simply the significance of the species or habitat.

7.1.2 Biosecurity Act 1993

This Act provides for the exclusion, eradication and effective management of pests and unwanted organisms. Under this Act the Minister is able to notify a national pest management strategyt and individual local authorities are able to prepare regional pest management strategies. Section 76(4) of the Biosecurity Act requires that these strategies not be inconsistent with any regional policy statement or regional plan prepared under the Resource Management Act.

7.1.3 Conservation Act 1987

The Conservation Act 1987 promotes the conservation of New Zealand's natural and historical resources. The Act provides the mandate for the activities of the Department of Conservation. Functions include management of the conservation estate, conservancy advocacy and education, and fostering the use of resources for recreation and tourism. The main policy documents include a conservation management strategy prepared by each of 13 regional conservancies, and management plans for sites of particular importance (such as national parks). Conservation management strategies provide for the integrated management of all areas administered by the Department of Conservation.

7.1.4 Forests Act 1949, Forests Amendment Act 1993

The Forests Act 1949 was amended in 1993 to bring an end to unsustainable harvesting and clear-felling of indigenous forest. Under the Forests Amendment Act 1993, indigenous timber can only be produced from forests that are managed in a way that maintains continuous forest cover and ecological balance.

7.1.5 National Parks Act 1980

The purpose of the National Parks Act 1980 is to preserve in perpetuity, for their intrinsic worth and for the benefit, use and enjoyment of the public, national parks – areas of New Zealand that contain scenery of such distinctive quality, and ecological systems, or natural features so beautiful, unique, or scientifically important, that their preservation is in the national interest.

The Department of Conservation administers this Act. Under section 4 of the Resource Management Act, the Crown is not bound by section 9(1) of the Resource Management Act for any work or activity of the Crown within the boundaries of any area of land held or managed under the Conservation Act or other acts specified in the First Schedule to that Act. The First Schedule of the Conservation Act includes the National Parks Act.

7.1.6 Reserves Act 1977

The Department of Conservation administers this Act. Section 3(1)(b) of the Reserves Act identifies the need for the establishment of an ecologically representative, protected natural areas system in New Zealand. An objective of this legislation is:

> *Ensuring as far as possible, the survival of all indigenous species of flora and fauna, both rare and commonplace, in their natural communities and habitats, and the preservation of representative samples of all classes of natural ecosystems and landscapes which in their aggregate originally gave New Zealand its own recognisable character.* (Section 3(1)(b), Reserves Act 1977)

7.1.7 Wildlife Act 1953

This Act is administered by the Department of Conservation and provides for the protection of certain species of wildlife, including the establishment of wildlife reserves.

7.2 Biodiversity Convention and Strategy

7.2.1 Convention on Biological Diversity

In 1992, the nations of the world met in Rio de Janeiro, Brazil, for the United Nations Conference on Environment and Development. The New Zealand government joined others in signing the Convention on Biological Diversity (ratified April 2003, see http://www.biodiv.org) designed to address declining indigenous biodiversity worldwide, and to promote the sustainable use of biological diversity. The convention gained widespread acceptance. More than 150 governments signed the document at the Rio conference, and since then, more than 175 countries have ratified the agreement.

The convention has three main goals:

- the conservation of biodiversity
- sustainable use of the components of biodiversity
- sharing the benefits arising from the commercial (and other) utilisation of genetic resources in a fair and equitable way.

Under the convention, governments are required to develop national biodiversity strategies and action plans, and to integrate these into broader national plans for the environment and development. The convention is largely descriptive: specific policy actions for achieving its goals rest with the countries themselves.

New Zealand's 1993 ratification of the convention confirmed our ongoing obligation to the international effort to conserve and sustainably use global biodiversity.

7.2.2 New Zealand Biodiversity Strategy

The New Zealand Biodiversity Strategy (Department of Conservation and Ministry for the Environment, 2000) reflects New Zealand's commitment to the Convention on Biological Diversity. The strategy sets out in broad terms the government's response to declining indigenous biodiversity. It sets out national goals and principles for managing New Zealand's biodiversity, and action plans for achieving the goals.

8 Glossary of Terms

Acutely and chronically threatened indigenous species: Species that meet the specific criteria to be listed in one of the acutely threatened or chronically threatened categories in the 'New Zealand Threat Classification System Lists' (refer to DOC website for up-to-date lists – www.doc.govt.nz).

Ecosystem: An interacting system of living and non-living parts, including sunlight, air, water, minerals and nutrients. Ecosystems can be small and short-lived, for example, water-filled tree holes or logs rotting on a forest floor; or they can be large and long-lived, such as forests and lakes.

Biodiversity (biological diversity): This describes the variety of all biological life – plants, animals, fungi and micro-organisms – the genes they contain, and the ecosystems on land or in water where they live. It is the diversity of life on Earth and includes diversity within species, between species, and of ecosystems.

Habitat: The place or type of area in which a living thing naturally occurs.

Indigenous (native) vegetation: A plant community containing naturally occurring native species. It includes vegetation that has regenerated with human help following disturbance, but does not include plantations or vegetation established for commercial and/or aesthetic purposes.

Land cover database: 'New Zealand Land Cover Database (LCDB2)' Terralink, 2004.

Land environment: Describes an area whose boundaries encompass similar environmental characteristics caused by non-living variables, such as climate, landform and soil.

Land Environments of New Zealand: A classification of environments mapped across New Zealand's landscape, derived from a comprehensive set of climate, landform and soil variables known to influence the distribution of species. See 'Land Environments of New Zealand', Leathwick et al, 2003.

Originally rare terrestrial ecosystem: An ecosystem type that was present, and rare, when Māori arrived, and still exists today (Williams et al, 2006).

Taxon (Taxa): A named biological classification unit assigned to individuals or sets of species, for example species, sub-species, genus or order.

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Appendix D – Letter to Landowners

5 April 2016

QUEENSTOWN LAKES DISTRICT COUNCIL

«AddressBlock»

Identification of Significant Indigenous Vegetation in the Queenstown Lakes District

The Queenstown Lakes District Council is currently undertaking a process to identify areas of significant indigenous vegetation and significant habitats of indigenous fauna in the Queenstown Lakes District. The Council has been directed to undertake this process by a decision of the Environment Court and is now at the stage of needing to undertake ground assessments of sites of potential significance.

The Council has undertaken a district wide desktop review of sites of potential significance and your property has been identified as containing one or more sites that merit a more detailed level of investigation to determine if they would be considered 'significant'. The attached information sheet discusses what is meant by the term 'significant' and the process the Environment Court requires the Council to follow.

The Council has formed a stakeholder reference group of local interest groups to help guide us through this process and to provide a forum for consultation and discussion on further issues. This reference group includes representatives of Federated Farmers, local landcare groups, DoC, Forest and Bird, Iwi and local councillors.

The Council is pleased to have been able to engage locally based ecologists Glenn Davis, Simon Beale, Dawn Palmer, Neill Simpson and Adam Forbes to undertake site assessments of areas of potential significance.

A member of this group will contact you in the next two weeks to discuss the sites that have been identified as of potential significance on your property and to arrange a suitable time to undertake a site visit. You are welcome to accompany the ecologist to visit these sites and we will endeavour to arrange a time that will suit you. If you have any issue with the ecologist identified to undertake the assessment of your property you may request that one of the other members of the team undertake your assessment.

Once the ecologists have completed their site visit they will write up an assessment of the sites significance and will arrange a time to discuss the findings with you. Your views as landowner and practical considerations of identifying these areas as significant are key matters for consideration in the final assessment as to whether any area should be identified as 'significant'.

Note this process is about identifying areas that are of such significance to be considered of 'national importance'. Consequently the bar for identifying sites as significant is quite high. The presence of indigenous vegetation, even high quality indigenous vegetation, may not be sufficient to meet the test of significance.

The information on sites of significance will not be released to the general public[1] until the last stage of the process, which may involve the notification of a plan change identifying any sites that are considered significant for inclusion in the District Plan.

[1] Barring requests for this information under the Official Information Act.

We will endeavour to survey properties in particular locations in a similar period and will be arranging meetings with local landcare groups to explain this process in greater detail and to answer any questions you may have. However, if you have any questions regarding this process please contact Senior Policy Analyst Ralph Henderson at either ralphh@qldc.govt.nz or (03) 441 0491.

Yours sincerely

Ralph Henderson

SENIOR POLICY ANALYST

Appendix E - Project Schedule

From: Glenn Davis
To: rebecca@davisconsultinggroup.co.nz
Subject: FW: Update on the Queenstown Lakes District Council Significant Indigenous Vegetation Project
Date: 4 April, 2016 11:00:41 AM
Attachments: image002.png
image004.png
SIV Info sheet.docx
Landowners letter.doc

From: Ralph Henderson [mailto:Ralph.Henderson@qldc.govt.nz]
Sent: Friday, 15 April 2011 12:28 PM
To: 'JLTurnbull@xtra.co.nz; blawrence@doc.govt.nz ; janice.coldicott@orc.govt.nz; jsaspinall@xtra.co.nz; burdonrg@xtra.co.nz ; mharcombe@fedfarm.org.nz ; chris@ktkoltd.co.nz ; tami@woosh.co.nz; dean@teaomarama.maori.nz; scotts@reesvalley.co.nz; Leigh.Overton@q' <JLTurnbull@xtra.co.nz>; blawrence@doc.govt.nz; janice.coldicott@orc.govt.nz; jsaspinall@xtra.co.nz; burdonrg@xtra.co.nz; mharcombe@fedfarm.org.nz; chris@ktkoltd.co.nz; tami@woosh.co.nz; dean@teaomarama.maori.nz; scotts@reesvalley.co.nz; Leigh.Overton@q
Cc: 'glenn_davis@xtra.co.nz' <glenn_davis@xtra.co.nz>
Subject: Update on the Queenstown Lakes District Council Significant Indigenous Vegetation Project

Dear All,

this is a quick (ok not quite quick) email to update you on progress on the project to identify areas of significant indigenous vegetation and significant habitat of indigenous fauna..

Tender awarded

Council has completed the tender process to engage consultants to undertake site assessments of sites of significance across the District and we pleased to be able to announce that we have awarded the tender to a consortium of local ecologists that has been formed to undertake this project. This group includes:

- Glenn Davis (Davis Environmental Services),
- Simon Beale and Adam Forbes (MWH),
- Dawn Palmer (Natural Solutions for Nature) and
- Neill Simpson.

We feel that being able to retain people with a high level of local knowledge and expertise to undertake this process will greatly increase the benefits we can bring to local property owners and the district as a whole.

Project Plan

Due to the size of the project and the logistical issues of actually undertaking the work on the ground it is anticipated that the project will take the next two years to complete. As suggested at the last meeting of the Stakeholder Reference Group, it is proposed to undertaken the survey in discrete geographical areas. To achieve this we subjected the desktop review to a rigorous examination to refine the number of sites that may need investigation and have matched those against specific properties that may need to be visited. The following table groups properties that need to be visited into geographical areas. The numbers in brackets reflect the number of sites on those properties to be visited.

Group A	Group B	Group C	Group D	Group E	Group F	Group G
Earnslaw (4)	Mt Aspiring (1)	Jacks Point and Jardine Park (3)	Loch Linnhe (5)	Lake Hawea (12)	Hillend and Spotts Creek (28)	Ben Lomond (10)
Rees Valley (2)	West Wanaka (1)	Arrowtown Basin (10)	Allandale (1)	Mt Grand (3)	Branch Creek (5)	The Branches (8)
Mt Creighton (17)	Minaret (3)		Halfway Bay (2)	Glenfoyle, Sandy Point and Long Gully (36)	Avalon and The Larches (16)	Coronet Peak (5)
Closeburn (1)	Mt Albert (2)		Cecil Peak (2)	Queensberry Hills (22)	Heartland (1)	Glencoe (2)
	Glen Dene (4)		Walter Peak (2)		Waiorau (4)	Alphaburn (8)
	Mt Burke (8)		Mt Nicholas (3)		Eastburn and Waitiri Station (12)	
					Cone Peak (1)	
					Mt Rosa (4)	
PLUS				PLUS	Roaring Meg (1)	
Freehold properties e.g. Routeburn, Elfin Bay, Greenstone				Freehold properties (owners to be identified)		

General timeframe for surveys of different areas

Ideally surveying of these different groups will occur in the following time periods. Naturally this will be dependent on a number of factors such as weather, access issues, farming activities, etc and some properties may need to be completed in the following survey period.

March – May 2011	November 2011 - April 2012	November 2012 – April 2013
Group A (24)	Group E 85	Group G (33)
Group B (19)	Group F 72	
Group C (13)		
Group D (15)		

As there will be extended period between the start of the project and actual survey of some sites we feel it is most appropriate that we focus our consultation around these groups also.

The process we proposed to consult with landowners was to send out letters to landowners of properties that may contain sites of potential significance, arrange meetings with any local landowner organisations to discuss the project, and make direct contact with the landowners themselves to discuss the project and its relevance to them, invite them to accompany the survey if they are interested, and meet them after the relevant reports have been completed to discuss the results.

Meeting with Glenorchy Landcare Group

At the invitation of Iris Scott we attended a meeting with members of the Glenorchy Landcare group to trial this approach and a number of the property owners in this group have indicated that they are agreeable to having surveys undertaken at the outset.

Consultation letters and material

We trialled a letter of introduction for landowners to gauge its usefulness in explaining the project for people who have no prior knowledge of it but also felt we needed to include an information sheet outlining key background information in greater depth.

As this process will run over a couple of years we recognise that consultation material may need to evolve through this period to reflect the interests of different areas and changes in the level of understanding about the project as it proceeds. I have attached copies of the letter and information sheet and would welcome you comments/ suggestions. One suggestion we received was that we expand the information sheet to explain the process more fully and explain possible benefits, sources of funding for conservation projects, etc. Again we would welcome any comment on your views regarding the usefulness of this suggestion. While we can see the benefits of providing some additional background we do think it needs to be very concise so that people will actually read it. Another suggestion from Matt Harcombe that we intent to take up was that once people have become involved in the process we should keep them informed of progress periodically with updates to avoid the situation where people feel they are left in the dark after having been visited.

Two for the price of One

For the initial few properties to be visited the surveys will be undertaken by two ecologists at the same time to enable them to develop a consistent approach and methodology. We are fortunate that a number of landowners in groups A and G have previously expressed an interest in participating in this process have been agreeable for us to start scheduling surveys of actual properties.

Next Steps

We are currently seeking a date for a meeting with the Wanaka Landcare group to make people aware of this process and would be interested in surveying some additional properties in advance of that meeting so people who have practically experienced the process can provide feedback to other landowners.

Feedback Welcome

I have attached copies of the letter to landowners and information sheet and would welcome comment on these. As noted earlier we will put together a draft booklet to accompany subsequent letters and will circulate this at a later date.

Please let me know if you have any comments on the documents or process outlined. The purpose of the Stakeholder Reference Group is to put forward different perspectives so please feel free to comment, all input is greatly appreciated.

Kind regards

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Appendix F – Schedule of Sites

Appendix G – Discussion Paper regarding criteria

Queenstown-Lakes District Council

Review of Appendix 5 Assessment Criteria

A Discussion Paper

March 2009

Quality Assurance Statement	
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Revision Schedule					
Rev No	Date	Description	Prepared By	Reviewed By	Approved By

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Attachment 1 – Suggested Alternative Set of Appendix 5 Assessment Criteria

1 Introduction

This review has been prepared in conjunction with desktop review, identifying potential significant natural areas (SNA) within the Queenstown-Lakes District.

The purpose of the discussion paper is to present the outcome of literature reviews on assessment criteria, particularly in context to the sustainable provisions of the RMA, the approaches taken by various District Councils in terms of the criteria adopted and how they are applied and most importantly a critique of the assessment criteria set out in Appendix 5 of the Queenstown-Lakes District Council's District Plan. This critique also examines the criteria in the context of the step by step process that is set out in the Appendix in identifying significant natural areas.

2 Background and Review of Recent New Zealand Literature

Historically the identification of sites for protection within reserve systems has largely been ad hoc. Up until 1991, significance assessments in New Zealand were primarily made under the Reserves Act 1977, National Parks Act 1980 or Conservation Act 1987 (Norton, Roper-Lindsay 2004).

In response to a visible and rapid disappearance of indigenous landscapes, habitats and communities, New Zealand's Protected Natural Areas Programme (PNAP) was commenced in the 1980's. The goal of the PNAP, as derived from the Reserves Act 1977, was to ensure as far as possible, the survival of all indigenous species of fauna and flora, both rare and commonplace in their natural communities and habitats (Kelly & Park 1980). Seven criteria were used in the PNAP to identify these indigenous landscapes, habitats and communities in the field. Those criteria were:

- representativeness;
- diversity and pattern;
- rarity and special features;
- naturalness;
- long term ecological viability;
- size and shape; buffering;
- surrounding landscapes and boundaries

With the introduction of the Resource Management Act 1991 (RMA) there was a mandate for local authorities to consider indigenous biodiversity on private land. In particular Section 6(c) of the RMA required Council's to provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

Reviews of the criteria used to assess significance of indigenous vegetation and habitats under the RMA framework have been undertaken by Whaley et al (1995), Shaw and Beadel (1998) and Norton and Roper-Lindsay (1999). These reviews were initiated by certain Councils and the Ministry for the Environment (MfE).

In their review, on behalf of Environment Waikato, Whaley et al (1995) suggest the application of criteria that encompasses and expand on the PNAP criteria, with the notable inclusion of fragility and threat, and management input thereby tailoring them towards RMA requirements. Whaley et al (1995) also recommended the use of a multiple criteria ranking, including the wildlife ranking criteria to cover the full range of values

present at a site. The latter criteria accounts for the mobile and cryptic nature of many species (Whaley at el 1995).

Norton and Roper-Lindsay (2004) proposed the use of only four criteria for significance assessment: rarity and distinctiveness; representativeness; ecological context and sustainability. The selection of these criteria stemmed from a discussion paper prepared for the MfE, seeking a more ecologically sound and consistent approach to significance assessment. Norton and Roper-Lindsay note that many Councils have (and still are) using a range of systems and criteria for determining ecological significance which have been met with varying degrees of success. They consider the rationale for selecting a more refined set of criteria stems from the considerable redundancy among the PNAP criteria, objectivity issues and the different focus under the RMA. Norton and Roper-Lindsay state that the strength of these criteria is the focus on three key levels of biological organisation (namely landscape, ecosystem and species) with a strong reliance on the objective criteria of rarity/distinctiveness and representativeness. These criteria, they note provide a structured assessment that can be used as a basis for subsequent decision making about management, including protection. They add that significance assessment is a relatively objective process, whereas deciding on the options that will best protect these values involves both ecological and social considerations.

However the Norton and Roper-Lindsay paper has attracted negative reaction from other sections of the ecological community, particularly with respect to the narrow definition of significance and perception that the criteria will identify and protect only high quality sites. These views are encapsulated in the paper prepared by Walker et al (2008). The authors of this report consider such an approach, as advocated by Norton and Roper-Lindsay, will serve the interests of developers and local authorities to the detriment of the wider community (non vested interests). Among their chief concerns is the focus on sustainable management, the inevitable trade-offs between ecological and economic concerns and the lack of consideration to the long term maintenance of ecosystems. The authors make the important point that the maintenance of a high proportion of New Zealand's indigenous biodiversity and particularly its threatened species, often depends on the maintenance of highly modified (and usually more imminently threatened) ecosystems and habitats in landscapes where there is little or no trace of primary ecosystem character.

This debate would appear to be ongoing.

3 Review of Other Council Assessment Criteria

A review of the assessment criteria employed by six other territorial local authorities (TLAs)[1] shows a significant variation in the assessment criteria utilised and how these are applied to identifying significant sites. Three of the TLA districts were selected as they border the Queenstown-Lakes District while the other three districts were selected as they contain a diverse range of ecosystem types.

The relevant policies in these plans refer to some form of commitment to identifying areas of significant ecological value or significant natural areas (SNAs). The plans, apart from the Wairoa District, contain schedules of SNA's, although none of these could be considered comprehensive. The majority of the sites tend to occur in the conservation estate or are under some form of legal protection.

[1] Southland, Central Otago, Waitaki, Selwyn, Wairoa and Waikato District Councils.

With the exception of the Central Otago District Plan, assessment criteria were either included in the relevant policy and rules sections or as part of a separate appendix. The assessment criteria adopted by each Council contained at least some of the criteria adopted for use in the PNAP, as compiled Kelly and Park (1986).

In the case of the Southland District Council plan, the assessment criteria are used to assess a resource consent application with respect to effects of the proposed activity on areas of significant values, to gauge the representativeness of the affected vegetation, to assess effects on habitats important to regionally or nationally threatened species and whether the area has been identified through the PNAP. Determination of significance rests with the applicant. Wairoa District Council takes a similar approach but specify a greater suite of criteria (eleven) to determine the significance of indigenous vegetation and habitats of indigenous fauna as part of the resource consent assessment matters and in determining activity status.

The Waitaki, Selwyn and Waikato District Plans contain policies that place the onus on the Council to identify and protect significant indigenous vegetation and habitats of indigenous fauna, utilising the comprehensive suite of assessment criteria contained in each of the plans. Assessment criteria are contained in separate appendices in the latter two plans.

The Waitaki District Council (Policy 16.9.3(3)) contains the criteria representativeness, rarity and distinctiveness, diversity and pattern and ecological context, size and shape in identifying areas of significant indigenous vegetation. This policy is one of a number of policies supporting an objective seeking protection of areas assessed as having significant indigenous flora and significant habitats of indigenous fauna. The Selwyn District Council categorises the assessment criteria: representativeness, diversity and pattern, rarity, naturalness and ecological context as primary criteria, and size and shape, and fragility, threat and buffering as secondary criteria. However the assessment process promoted by the Selwyn District Council appears to be more rigorous than Waitaki's with each potential site ranked high, medium or low with respect to each criterion.

Both the Waitaki and Waikato District Plans state that an area is significant if it meets one or more of the assessment criteria. The Selwyn District Plan (Appendix 12) by comparison, states that a site with one or more 'high' rankings, or five or more 'medium' rankings among the primary criteria will be considered for protection.

The Waikato District is considered to have the most comprehensive assessment criteria (Appendix Oc) of the plans reviewed, reflecting the Council's "lead by example" approach to fulfilling its functions in implementing the NZ Biodiversity Strategy at a local level. A number of the criteria are derived from Whaley et al (1995) and include specific criterion for wetland habitat and aquatic habitat along with those adopted by the other Councils such as representativeness, rarity, size, and connectivity and buffering, albeit in a more expansive fashion.

4 Cross Boundary Issues

Cross boundary issues can arise where there are different Council approaches and priorities to the identification of significant indigenous vegetation.

A lack of consistency in this approach and number and extent of SNA's ultimately identified and included in the respective District Plans could lend itself to more vegetation clearance occurring on one side of a District boundary as opposed to the other. This could result in edge effects (where, for example, forest clearance occurs along a boundary without regard to the ecology of the adjoining forest within another District), an interruption of a vegetation sequence across an environmental gradient or dislocation of an important wildlife

corridor. The latter effect may arise from clearance of forest along a common waterway or removal of forest fragments that form a "corridor" between larger tracts of forests or shrubland on either side of the boundary.

Specifically the looser definition of assessment criteria in the Southland District Plan and absence of assessment criteria on the Central Otago District Plan potentially poses an issue in terms of buffering of potential SNA's in the Queenstown-Lakes District that border private land within the Southland and Central Otago District's. Notwithstanding the attitudes of any affected landowners, the underlying assumption here is that a less comprehensive approach to SNA identification within these district's may result in a greater degree of modification of areas of indigenous vegetation along the common boundaries. This issue is not considered to be as pervasive with regard to the Waitaki District due to the limited extent of the shared boundary and the general alignment in terms of the significance assessment criteria contained in both Plans. Cross boundary issues are not considered to be relevant in the case of Westland District as Mt Aspiring National Park encompasses much of the western and northern perimeter of the District.

5 Critique of the Appendix 5 Assessment Criteria

It is apparent that the material contained in Appendix 5 is comprehensive but is structured in a fashion that is somewhat confusing to the reader, particularly a landowner who is trying to understand the processes and terminologies.

The title on the front page to the Appendix needs to be amended to read "Part I Areas of Significant Indigenous Vegetation."

We consider the criteria needs to be condensed into fewer criteria along the lines promoted by Norton and Roper-Lindsay (2004), as discussed in Section 2.

The splitting of the criteria into primary and "other" criteria is considered unnecessary and somewhat confusing and should be referred to simply as the assessment criteria. The segregation of these criteria implies that the "other criteria' are of lesser importance in the determination process.

The criteria as listed are not defined in terms of spatial scales such as the hierarchy of levels promoted by Norton and Roper-Lindsay (2004), as illustrated below.

Organisation Levels	**Assessment Criteria**
Landscape	Ecological context
Ecosystem	Representativeness
Species	Rarity & distinctiveness

We consider a structuring of the criteria in a spatial fashion would provide for a greater degree of clarity and understanding of the relationship between each of the criteria.

We believe the 'Distinctiveness/Special Ecological Character' criterion is unnecessary as it refers to ecological features at a species and landscape level, and in our opinion creates a degree of duplication and confusion. We therefore recommend that the species related features are incorporated into the Rarity criterion which should be renamed "Rarity & Distinctiveness" and the landscape related features incorporated into the "Diversity and Pattern" criterion.

We have suggested structural changes to the assessment criteria as currently set out in Appendix 5 in order to improve readership while being more technically robust and objective. This is set out in Attachment 1 to this paper.

While the purpose of this paper is to critique the assessment criteria, based on recent legislative changes and debates within the ecological community, we consider it is appropriate to comment at this stage on the timing of the application of the criteria in the identification process.

The application of the assessment criteria (defined as Stage 3) is in reality being applied as part of Stage 1, i.e. the initial (desktop) exercise to identify potentially significant areas.

It is our understanding, from the project deliverables set out in the RFP that consultation with affected parties such as landowners and key stakeholder groups would occur after this initial identification stage. In terms of the steps set out in Stage 2 we would suggest that Stage 2(d) should ideally (at least to some extent) be undertaken at the conclusion of Stage 1, to ensure the stakeholders including the farming community are informed at an early stage in the overall process.

The application of the criterion defined in Appendix 5 as "The Future Ecological Value of the Area", in our opinion should not form part of the assessment of significance (set out in Stage 3 of Appendix 5). Determination of the long term sustainability of the potentially significant sites should be undertaken in the company of the affected landowner, as part of the ground-truthing exercise. The landowners knowledge of the history of the area and current and future management expectations form an essential part of the determination process. We consider that Stages 2 and 4 are one of the same and may be ongoing processes before decisions are reached in determining which areas or sites are included in Part I of the Appendix.

6 Conclusions

This review has highlighted the divergence of opinion within the ecological community as to the definition of significance and the sets of criteria used for the assessment of significance. This is reflected in the current debates by way of forum articles within the NZ Journal of Ecology which demonstrate the philosophical divide that exists and the difficulties in defining significance under the RMA. This is manifest to a degree in the varying approaches undertaken by Councils, as is demonstrated in the District Plans reviewed during the preparation of this paper.

The three site criteria promoted by Norton and Roper-Lindsay (rarity and distinctiveness, representativeness and ecological context) form the basis of our suggested alternative set of assessment criteria (Attachment 1), along with diversity and pattern. We consider diversity and pattern, which is also part of the suite of PNAP criteria to be an important site criterion in its own right.

The future assessment of the future ecological value and sustainability of potentially significant sites (being Other Criteria "C" in Appendix 5) should be undertaken in the field with the affected landowners and stakeholders rather than as a desktop exercise. This approach provides the opportunity to increase the level of understanding as to the needs of all participating parties.

7 References

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Attachment 1 – Suggested Alternative Set of Appendix 5 Assessment Criteria

In determining whether an area is significant in terms of Section 6(c) of the Resource Management Act 1991, the Council will use the following ecological criteria as the basis for determining ecological significance:

(i) Rarity & Distinctiveness

Whether the area supports or is important for:

- an indigenous species, habitat or community of species which is rare or threatened within the Ecological District or is threatened nationally,
- indigenous species at their distribution limit,
- endemic species,
- indigenous fauna for some part of their life cycle (e.g. breeding, feeding, moulting, roosting), whether on a regular or infrequent basis,
- migratory indigenous fauna.

OR

(ii) Representativeness

Whether the area contains one of the best examples of an indigenous vegetation type, habitat or ecological process which is typical of its Ecological District.

OR

(iii) Diversity and Pattern

The degree of diversity exhibited by an area in terms of vegetation and habitat types, ecotones and sequences along ecological gradients.

OR

(iv) The Ecological Context of the Area

The relationship of the area with its surroundings in terms of maintaining or enhancing connectivity due to its location and connections to a neighbouring area, or as part of a network of areas of fauna habitat, or as part of a corridor or stepping stone for movement/migration of species between or to areas of important habitat, or;

The role the area plays in buffering the ecological values of an adjacent area or site of significant ecological value, or;

Its size and shape in providing for predominantly intact habitats (with evidence of healthy ecosystem functioning) thereby providing for seasonal or "core" habitat for threatened species.

In addition to the application of the above assessment criteria, the Council will also take account of the following four national priorities for protecting rare and threatened native biodiversity on private land (MfE & DOC 2007) in determining ecological significance:

National Priority 1: To protect indigenous vegetation associated with land environments (Level IV) that have 20 % or less remaining in indigenous cover;
National Priority 2: To protect indigenous vegetation associated with sand dunes and wetlands; ecosystem types that have become uncommon due to human activity;
National Priority 3: To protect indigenous vegetation associated with "originally rare" terrestrial ecosystem types not already covered by priorities 1 and 2;
National Priority 4: To protect habitats of acutely and chronically threatened indigenous species.