

Conservation status of the New Zealand Lepidoptera

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ABSTRACT

The New Zealand moths and butterflies (Lepidoptera), forming New Zealand's third largest Order of Insecta, with c. 1685 species in 35 families, were assessed for species of conservation interest. Of the 17 evaluation criteria devised by Molloy & Davis (M&D, 1994), 10 were chosen as being relevant. Under our modified M&D scaling, their Category A (highest priority threatened species for conservation action) has 42 species, Category B (second priority) has 42, and Category C (third priority) has 20. Previously, two Lepidoptera species, *Asaphodes stinaria* and *Xanthorhoe bulbulata*, were listed as being in Category A by Molloy & Davis (1994). We have added 102 species we regard as being 'at risk'; in addition, we list 10 species that we could not evaluate, as all of these are known certainly only from their Type specimens. Thus, about 80% of the 114 species recognised here to be of conservation significance have extremely high or very high M&D values and deserve priority conservation action. Of the 40 extra species listed as being in our modified M&D Category A, 29 are in urgent need of conservation action. The results show the need for particular emphasis to go on surveying 'natural' shrub/grassland, coastal, and lowland forest areas for the species listed, particularly in Wellington, Canterbury, Marlborough, Southland, and Otago, as these Conservancies have the bulk of 'at risk' species. It is recommended that institutions employing lepidopterists should be encouraged to provide training in surveying for, and field recognition of, these species, and that known populations of threatened species should be monitored using standard methods. As presence of a threatened moth species indicates a high probability of presence of other natural history elements with high conservation values, opportunities to gain protection for land containing populations of these threatened species need to be vigorously pursued.

Keywords: Lepidoptera, moths, butterflies, New Zealand, threatened species, conservation action.

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1. Introduction

Molloy & Davis (1994), drawing on the views of an expert panel of six invertebrate specialists (five from DOC), included two Lepidoptera in their Category A (highest priority for conservation action), and a further 10 in their Category I (little information, but considered threatened).

We regarded this as somewhat of an understatement, and not really consonant with our experience. One of us (BHP), then in DOC (and a panel member), received funding to assess the status of the endemic New Zealand Lepidoptera with JSD, and this report is the outcome.

Knowledge about Lepidoptera taxonomy in New Zealand is quite extensive. The recent catalogue by Dugdale (1988), and the nearly completed electronic update by T.K. Crosby and J.S. Dugdale (largely available on the Web) now enable comparison with authoritative accounts of the Lepidoptera present in other regions (Patrick 1994). In New Zealand, Lepidoptera, with 1685+ endemic species, represents the third largest insect Order after Coleoptera (c. 6700 endemic species) and Diptera (c. 5000 endemic species), although these figures do not take into account the probably huge Hymenoptera fauna in New Zealand (estimates from Emberson 1998). In New Zealand Lepidoptera, less than 12% of the recognised endemic morphospecies thought to be distinct await formal description. Taxonomically, it is possibly the best documented of all the major orders (Coleoptera, Diptera, Hymenoptera, Lepidoptera).

We did this study for three main reasons:

- Given their high degree of endemism, the number of invertebrate groups for which there is relevant conservation information needs to be increased.
- Moths and butterflies are a significant portion of the New Zealand biota, are better known taxonomically and biologically overall than are the other large Orders, and have species characteristic of all biotopes in New Zealand from the supralittoral to the nival zones.
- We wanted to show which conservancies have the greatest numbers of ‘at risk’ endemic species and which therefore might have special or unique conservation needs.

Our study evaluated all Lepidoptera entities known to us, and resulted in 114 species (essentially morphospecies, i.e. those recognised on differences in structure)—or 6.8% of the endemic Lepidoptera—being classed as ‘at risk’.

Both of us have collected extensively in many parts of New Zealand and its off-shore and outlying islands; both have concentrated particularly on finding larval habitats and noting biologies. Our list (Appendix 1) of these moth and butterfly species provides a summary of species encountered rarely, infrequently, or not at all, despite collecting efforts in localities where they were originally found.

2. Construction of the list

Each of us went through the species listed in Dugdale (1988) and the species known to both of us that are as yet undescribed but are known by both to be distinct, specific entities.

We excluded species that are largely confined to the nival, alpine and subalpine zones, and in forests of whatever type that are already part of the conservation estate, or are already protected by other means. Those species that are poorly known or represented in collections are discussed in Section 2.4.

We excluded species known to accommodate to (even flourish in) urban, arable or pastoral agricultural, silvicultural, and horticultural ecosystems.

Records were drawn from the literature, from our own and other extensive New Zealand collections, in New Zealand and elsewhere. Collections dating from the earliest days of European settlement to the present day (approximately 160 years) were examined.

Both of us had to agree on the Molloy & Davis (1994) criteria scores (see below), and therefore on the inclusion of a species.

2.1 THE MODIFIED CRITERIA OF MOLLOY & DAVIS (1994)

Of the total of 17 Molloy & Davis (1994: 8-10) criteria (M&D), grouped as five main factors, only the following 10 were used:

1. Taxonomic distinctiveness: A (taxonomic distinctiveness)
2. Status of the species: A (number of populations)
B (mean population size)
C (largest population [size])
D (geographic distribution)
3. Threats facing the species: A (legal protection of habitat)
B (habitat loss rate)
C (predator/harvest impact)
E (other factors affecting survival)
4. Vulnerability of the species: A (habitat and/or diet specificity)

The criteria and factors defined by Molloy & Davis (1994: 8-9) are mutually exclusive, and most are therefore easy to use. Each criterion has five classes, from 1 to 5, with 5 representing the most 'at risk' condition. A criterion such as 'predator/harvest impact' was generally scored as 2 ('...impact unknown but suspected to be slight'). By and large, the mean and largest population size (criteria 2 B and C) were very crude estimates and given the same score (usually 2 or 3) for a species. In at least one instance (*Notoreas* 'Mason Bay') the score

was 4, based on personal observation of the entire distribution of the hosts of this taxon at Mason Bay (BHP).

Criteria that imply a greater amount of knowledge of population dynamics or ecology than is available were discarded for this exercise. Discarded criteria were:

2. Status: E (condition of largest populations)
F (population decline rate);
3. Threats: D (competition)
4. Vulnerability: B (reproductive and/or behavioural specialisations)
C (cultivation or captive breeding);
5. Values: A (Maori cultural values)
B (Pakeha cultural values).

It is possible that each of the 102 species evaluated would achieve a score of 2 for factor 5, Values (A: minor significance, 1; B: regarded as important by a few people [e.g. BHP, JSD], 1), but such an additional score is essentially meaningless.

Scoring was carried out as described by Molloy & Davis (1994:11) and the modified levels for the categories were set at A: 29+; B: 23–28; C: 18–22. We are mindful of the caution behind the remark of Molloy & Davis (1994), ‘Over time the status of many species is likely to alter.’ While they may mean the population levels and degree of survival, they may also mean the perceived status. One instance of a change in perceived status has been given here (*Thiotricha lindsayi*, Section 3.2). For most of the species listed here, it is highly likely that the perceived status will change as more surveys are done in more areas.

The modified M&D scores were the only yardstick used to rank each species.

2.2 DEFINITIONS OF THE PATRICK & DUGDALE CATEGORIES

We also derived a set of criteria that described the range of, and/or amount of, information about the species. These criteria essentially looked at changes in historical range, the state of the Type locality, the status of the host or niche, and whether or not the species had been collected since the original description was published. The criterion deemed most significant for the species was chosen. For example, the moth *Titanomis sisyrota* fits categories D (uncommon or rare, biology unknown) and I (presumed extinct). The latter category was considered to be more significant, considering that collecting has been done in contiguous areas. Again both of us had to agree on a criterion for a species. The number of species in each criterion is given in Table 3 and in the list (Appendix 1).

Although the Patrick & Dugdale (P&D) categories provide what we consider to be significant background historical and Type locality information, they have not been used in rating the species here.

The P&D criteria are defined as follows:

- A: Uncommonly or rarely encountered but widespread and with no historical evidence of dwindling populations or range contraction, e.g. *Isonomeutis restincta* (Copromorphidae);
- B: As above but with historical evidence of dwindling populations and range contraction, e.g. *Cephalissa siria* (Geometridae);
- C: Known only from the Type locality, e.g. *Kupea electilis* (Crambidae) (includes species for which the Type is lost);
- D: Uncommon or rare, biology unknown, e.g. *Thambotricha vates* (Epermeniidae);
- E: Type locality grossly altered, e.g. *Glyphipterix euastera* (Glyphipterigidae);
- F: Type locality at risk, e.g. *Kiwaia jeanae* (Gelechiidae);
- G: Hostplant/niche at risk, or predator influence seen, in major part of species' range, e.g. *Pseudocoremia cineracia* (Geometridae), hosts at risk; *Dodonidia belmsi* (Nymphalidae), predation by adventive social wasps;
- H: Genetic swamping of the endemic population by self-adventive Australian sister taxon, e.g. *Zizina [labradus] oxleyi* by *Z. [l.] labradus* (Lycaenidae) in 'oxleyi' districts HB, NN, MB, KA, NC within historical times (Gibbs 1981);
- I: No record of capture for >25 years, and now possibly extinct, e.g. *Titanomis sisyrota* (Tineidae in the sense of Hudson 1928).

2.3 LIST FORMAT

Our list (Appendix 1) gives the species' current name or status, the author of the name (parentheses mean the species was originally described in a different genus), date and page of the original published description, family name, Type locality, Ecological District and [Type repository acronym]. Then follows geographic range, usually as a list of 2-letter codes that denote areas where the species is known to occur (defined by Crosby et al. 1976).

The third line gives the modified Molloy & Davis (1994) category and score (out of 50) as mM&D: n/50; whether or not it was listed by Molloy & Davis (1994); and the Patrick & Dugdale (as P&D) category (see Section 2.2). Then follow any remarks we feel might be helpful, such as information on hosts/niches, Type locality, or any other distinctive features of the species. Thus:

1. **Acroclita discariana** Philpott, 1930: 248 (Tortricidae). Porter River CANTERBURY: Craigieburn/Torlesse [CMNZ]. Range: MB, NC, MC.
mM&D: A (29/50). Not listed in M&D 1994. P&D: G
Host: *Discaria toumatou*, matagouri (Rhamnaceae); larval webbing very distinctive. As this species (1) is present over only parts of its host's range, and (2) has no legal protection at any known site, it is more vulnerable than most.

It will be seen that there is an emphasis on the Type locality. This is the place at which the Type specimen (or the series of Type specimens) was collected. A Type specimen is the smallest possible sample of the Type population. In the light of the increasingly complex concepts of what is a species, and the currently increasing ability to recognise and adopt genomic and biochemical characters to distinguish between genetically incompatible entities, the Type population in the Type locality is the one from which specimens for any molecular investigation should initially be drawn, to provide a basis for comparison with other, non-Type populations. New Zealand invertebrates provide many examples of allopatric chains of isolated populations, some of which have names and, often only on that basis, are regarded as separate species. Recognising Type populations and using them as a standard in inter-population comparisons is a reproducible way of cutting down on speculation. With the increasing fragmentation of many habitats, some degree of protection of at least the Type locality and therefore the Type population will ensure survival of the basic standard for comparison, whether morphological, molecular, ecological or ethological, pertaining to that species.

There will inevitably be omissions. New information will provoke emendations, and this list has been amended over the last two years. Other species will be discovered, and 'old' species will be re-interpreted. We earnestly hope that all this will lead to the celebratory downgrading of a species' status.

2.4 UNEVALUATED SPECIES

There are 10 species that we did not evaluate because (1) nothing is known save for the Type specimen or information about it, or (2) they have been recently discovered at restricted sites; or (3) the available information is too enigmatic to do a 'Molloy & Davis' evaluation.

Some of these unevaluated species are in taxonomic groups that have been virtually unworked for over 50 years, and all are candidates for further work, in particular on their biologies. None are known or thought to be key species phylogenetically (cf. #106: *Thambotricha vates*). Some belong to groups in which their congeners have successfully withstood 150 years of plant community change.

These species, which are listed below, are comparable to plant taxa in the de Lange & Norton (1998) rarity category 'Insufficiently Known' or possibly their 'watch list', 'Taxonomically indeterminate'. Most of the 10 species are included in Patrick & Dugdale's category C (known only from the Type or Type description).

Chersadaula ochrogaster, *Eudonia linealis*, *Gadira* 'black-brown EGW',
Hierodoris 'tiger stripes RJBH', *Izatha griseata*, *I. psychra*, *I. rigescens*,
Porina mairi, *Schiffermuelleria orthophanes*, *Stigmella maoriella*.

3. Results and discussion

3.1 NUMBERS OF SPECIES 'AT RISK'

Table 1 gives the species considered to be 'at risk' in each DOC Conservancy, with many species shared between Conservancies. While it is tempting to consider that the high numbers of 'at risk' species in Canterbury (49) and Otago (39) are the result of greater collecting effort, an equally plausible explanation is that these areas (and Marlborough and Southland) contain most of the rain-shadow grey shrublands and short-tussock grasslands in New Zealand, with their own distinctive biota, often with chains of allopatric species. These plant communities often are on easily developed land and thus difficult to protect or maintain in the presence of adventive herbivores and weedy plant species. The preponderance of 'at risk' species in the South Island is also a reflection of the more species-rich South Island fauna generally. We consider that this list will alert conservation workers to the problems in their locality. See remarks about Table 3, below.

TABLE 1. NUMBER OF 'AT RISK' SPECIES BY DOC CONSERVANCY.

Canterbury	49	Auckland	12
Nelson/Marlborough	29	Bay of Plenty	8
Otago	39	East Coast/Hawkes Bay	9
Southland	26	Northland	6
West Coast	14	Tongariro/Taupo	17
		Waikato	3
		Wanganui	13
		Wellington	25

Table 2 lists the number of 'at risk' species in each of the Patrick & Dugdale (P&D) categories (defined in Section 2.2). These categories attempt to encapsulate the collecting history and, where relevant, the status of the Type locality, or host or niche of the species. In some ways, this group of categories has a relationship to 'Category I' of Molloy & Davis (1994: 58), namely 'species about which little information exists, but which are considered threatened'. The majority of these species either appear to be known only from the Type locality and/or are those for which there is no biological information. Another significant number are endangered in part of their range, and for several, the Type locality is at risk. Interestingly, only 6 species have their Type locality destroyed.

In Table 3, the numbers of 'at risk' species confined to each of five broad community types are listed. The preponderance of species associated with non-forest communities is striking, and the few areas of such communities that are protected may be a result of a commonly held mind-set, that shrublands are not as 'important' as forests. In fact, in both islands, shrublands or shrub/grasslands

TABLE 2. NUMBERS OF SPECIES IN THE PATRICK & DUGDALE CATEGORIES

A	(uncommon, but no evidence of decline)	2
B	(uncommon, evidence of decline)	6
C	(only known from Type locality)	38
D	(uncommon/rare, biology unknown)	21
E	(Type locality grossly altered)	7
F	(Type locality at risk)	12
G	(major hostplant or predator risks)	26
H	(genetic swamping)	1
I	(presumed extinct)	1
Total		114

support a biota that has no herbivorous Lepidoptera in common with forest communities. If one regards the exposed coastal communities as a part of the shrub/grassland and riverbed/bluff (i.e. non-forest) communities, well over 60% of 'at risk' species would be supported in these plant communities.

The high number of species in the 'non-forest' communities is also a reflection of (1) the lack of specialist lepidopterous herbivores in lowland and northern

(i.e. warm) forests; (2) the great diversity of specialist herbivores, with some represented by suites of species on many plant genera with species characteristic of non-forest sites (Dugdale 1977); (3) land managers still finding that shrubland or shrub/grassland is cheaper to clear (destroy) for pasture or cropping than is forest. In New Zealand, major plant constituents of shrub/grasslands (e.g. *Festuca*, *Carmichaelia*, *Coprosma*, *Dracophyllum*, *Hebe*, *Melicytus* s.l., *Olearia*, *Pimelea*, *Pittosporum*, *Poa*) are rich in monophagous herbivores. Only *Olearia* is known to support many polyphagous herbivores (Patrick 1999, submitted); the rest are characterised by their small or almost non-existent polyphage

fauna (Dugdale 1998). Worldwide, there are more specialist (monophagous) than generalist (polyphagous) herbivores (Jermy 1984), and New Zealand is no exception; this means that in a country where there is continued attrition of its endemic floristic communities, many of our endemic herbivorous species will be at risk.

The number of 'at risk' species we rated to be in our equivalent of the Molloy & Davis (1994) categories A, B, and C (their descending scale of conservation priority ratings, see Section 2.1) is:

Category A: 42; Category B: 42; Category C: 20; and Unevaluated, 10.

There is no difference between the numbers of species in the two higher categories. In our opinion, of the Category A species, there are 29 which seem in urgent need of conservation action. In most instances they are either restricted to 'unprotected' localities suffering ongoing damage, or have not been seen for many years, or appear to be in decline, or their biologies are

TABLE 3. NUMBER OF 'AT RISK' SPECIES BY COMMUNITY TYPE.

Forest	34
Non-alpine shrub/grasslands, riverbeds, bluffs	52
Coastal plant communities	17
Subalpine/alpine plant communities	7
Bogs, flushes, mires	1
Unknown	3
Total	114

unknown (and hence encountering them is governed by chance). These species (listed in Section 4.1) are largely indicative of plant communities that are also worthy of conservation attention.

3.2 HABITATS OF THE LISTED LEPIDOPTERA

Most of the species in this assessment are herbivores; with a very few exceptions, the large assemblage of detritivores characteristic of the New Zealand biota (Dugdale 1996) appear not to be at risk. One reason may be that few species are known from non-forest situations such as exposed coastal and shrub/grassland communities. As most herbivorous Lepidoptera species each have specific hosts (Jermy 1984) many are prone to extinction by degradation or destruction of their host habitat. It is clear from Table 3 that most of the 'at risk' Lepidoptera species in New Zealand are members of shrub/grassland communities. Table 1 shows that conservancies with a major share of such communities (Canterbury, Otago) also have a major share of 'at risk' species.

Those listed species dependent on a single hostplant or a suite of closely related hostplant species, are particularly well represented in the shrub/grassland communities and are absent from forest communities. While some species are found over the whole range of their hosts (e.g. #31 *Ericodesma cuneata* on korokio, *Corokia cotoneaster*, from Manapouri FD/SL north to Pureora TO), others are restricted to a part of that range (e.g. #1 *Acroclita discariana* on matagouri, *Discaria toumatou*). Causes of such geographic restriction are largely unknown.

3.3 NEED FOR INFORMATION

Species in this Order emerge as adults in different months, and inhabit different ecosystems from sea level on the rocky coast to the highest alpine areas. The huge variety of life-histories and seasonalities of each mobile life-form of each species (i.e. larvae, adults) means that capture at a place may well be as much due to luck as to planning or technique. As very little is known about adult seasonality (periodicity) and nothing is known about larval biology for most of these species, further study would greatly enhance their conservation success. To this end, there is a pressing need for entomologists to produce identification guides to many of these species, for training of DOC field staff to recognise both the (often endangered) host and the endangered insect. More collaboration needs to be encouraged between systematists (museums, MAF, Crown Research Institutes) and DOC staff both in Conservancies and at the Science & Research Unit.

We stress that this study is preliminary, and a snapshot in time. It will be affected by new information, and by new events or new methods of detection of the presence of Lepidoptera species. As an example of the former, a previous draft of this list included the case-bearer *Thiotricha lindsayi* Philpott (Gelechiidae). This species is now known to have caused massive but temporary defoliation of beech species at the head of Lake Rotoiti (Nelson

Conservancy) in spring 1997. Before this, *T. lindsayi* was known only from the holotype male collected at Glen Tui, Mt Thomas Forest Park (Canterbury Conservancy). Previous collecting in Nelson Lakes had yielded only the widespread and well-known sister species, *T. tetraphala* Meyrick. It is hard to argue conservation priority for a species that produces epidemic populations over a large area and largely on the conservational estate.

There is a dearth of the sort of well-ordered, organised surveys providing statistically robust information being done in the Mackenzie Basin by Dr E.G. White. While such work is expensive and labour-intensive, it yields insights not otherwise available to biologists and conservation managers. Dr White has found that some species listed here (e.g. #107: *Theoxena scissaria*) can be seen to be quite abundant provided that you are there at the right time. Information such as this has made us downgrade this species and remove it from those judged to be in urgent need of conservation action (see Section 4.1).

Speciation patterns as in, for example, #69-#77 *Notoreas*, may be indicators of similar patterns in other insect Orders, particularly if the other insect shares the same host. Similarly, presence of an unusual species, or one known to be associated with another animal or plant may be an indicator of the presence of that previously undetected animal or plant, e.g. the moths associated with mistletoes (Patrick & Dugdale 1997), or #5 *Archyala opulenta* and the bat *Mystacina*, on the guano of which the caterpillar feeds (NZAC records).

This study will be of relevance should similar analyses be done for the other major Orders. One such could be done for some sections of Coleoptera for which good databases and collections exist, e.g. superfamilies Chrysomeloidea (leaf-beetles, longhorns) and Curculionioidea (weevils), or the largely predatory superfamily Caraboidea. For Diptera, the current catalogue (Evenhuis 1989) relies in large part on Miller (1950), and too many families, including the largest, lack adequate modern treatment.

The results of a study, separately funded by DOC, of the two Category A threatened moth species have been submitted for publication (Patrick, in press). Both *Asaphodes stinaria* and *Xanthorhoe bulbulata* remain threatened, with further research needed to detect their natural hostplants.

4. Conclusions

Of the c. 1685 endemic species in 35 families (out of a total of 1800+ naturally occurring species in 40 families) in New Zealand, 114 (6.8%) in 22 families were assessed (in our experience) as having conservation significance, with the following attributes:

- Widespread but rarely encountered, no evidence of historical range contraction (2 species);
- Once widespread, with historical range contraction (6 species);
- Known only from the original specimen or collecting locality (38 species);
- Widespread but uncommon or rare and biology unknown (21 species);
- Type (original collecting) locality destroyed or grossly altered (7 species)
- Type locality at risk (12 species)
- Hostplant at risk through land development, or populations lowered by adventive predators (26 species);
- New Zealand populations genetically swamped by self-adventive Australian sister-taxon (1 species);
- No records or sightings in the last 25 years, and therefore presumed extinct (1 species).

More species in shrub/grasslands (52 species) are considered at risk than in forest (34 species). Coastal biotopes shelter 17 species. This distribution is reflected in the numbers of species relevant to each DOC conservancy, with Canterbury, Otago and Southland combined including over 50% of the species listed here. While it could be argued that this may reflect collecting effort, it can also be argued that it reflects the greater number of species in shrub/grassland communities in the eastern South Island than elsewhere.

Of the 42 species judged here to be in Category A, 29 (listed below) are considered to be in urgent need of conservation action. Only two were listed in Molloy & Davis (1994). These taxa, which merit listing in any revised DOC list, are given in Section 4.1. For all, either the localities have been modified or are at risk through small size or inappropriate use, or the species has not been seen for >25 years. Brief notes are given in Appendix 1 with each of these species.

4.1 SPECIES IN URGENT NEED OF CONSERVATION ACTION

Species in **bold** were listed in Molloy & Davis (1994), p. 24, 25 [M&D Category A]; those underlined were amongst those listed on p. 59 [M&D Category X] and p. 61 [M&D Category I]:

Acroclita discariana; *Asaphodes frivola*; *Asaphodes imperfecta*; ***Asaphodes stinaria***; *Australothbis volatilis*; *Epichorista lindsayi*; *Euxoa cerapachoides*; *Gadira petraula*; *Gingidiobora nebulosa*; *Graphania omicron*; *Heterocrossa maculata*; *Hierodoris* ‘clear wings’; *Kiwaia pumila*; *Kiwaia* ‘plains jumper’; *Kupea electilis*; *Meterana Foveaux Strait*; *Notoreas* ‘Castlepoint’; *N.* ‘Cape Campbell’, *N.* ‘South Shag River’, *N.* ‘Mason Bay’; *Orocrambus fugitivellus*; *O. sophronellus*; *O.* ‘MacKenzie’; *Orthoclydon pseudostinaria*; *Pseudocoremia* ‘Knobby’; *Scythris* ‘stripe’; *Titanomis sisyrota*; ***Xanthorhoe bulbulata***; *X. lophogramma*.

5. Recommendations

1. Particular emphasis should go on surveys of natural shrub/grassland, coastal areas, and lowland forest areas for the species listed, particularly in Wellington, Marlborough, Canterbury, Southland, and Otago. Such surveys are needed as these conservancies hold the most ‘at risk’ species. The surveys would aim to establish presence/absence, biological aspects such as hosts/preferred habitats, some estimates of population size, and population threats, on which to base strategies for conservation.
2. Institutions employing lepidopterists should be encouraged to provide training in surveying for, and field recognition of the species relevant to DOC Conservancies and Districts.
3. Known populations of at least high-scoring Category A threatened species listed here should be monitored using standard methodologies as outlined by Green (1996). Priority would be given to those species for which the Type locality or the habitat are under threat by land development activities.
4. Gaining protection for land containing populations of species in Recommendation 3 should be vigorously pursued as there is a high probability that presence of a threatened Lepidoptera species indicates presence of other natural history elements of high conservation interest.
5. Of the 42 species judged here to be in Category A, 29 (listed in Section 4.1) are considered to be in urgent need of conservation action.

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8. Appendix 1

List of Lepidoptera species considered to be at risk

Species in need of action marked *

Unless otherwise indicated, species were not listed by Molloy & Davis (1994).

- *1. ***Acroclita discariana*** Philpott, 1930: 248 (Tortricidae). Porter River CANTERBURY: Craigieburn/Torlesse[CMNZ]. Range: MB, NC, MC.
mM&D score: A (29/50). Not listed in M&D 1994. P&D category: G
Host: *Discaria toumatou*, matagouri (Rhamnaceae); larval webbing very distinctive. As this species (1) is present over only parts of its host's range and (2) has no legal protection at any known site, it is more vulnerable than most.
2. ***Aletia cyanopetra*** Meyrick, 1927: 313 (Noctuidae). Waiho Gorge WEST COAST:Waiho [NMNZ]. Range: WD.
mM&D score: B (24/50). P&D category: C
Host(s) unknown; area surrounding site (Waiho riverbed) legally protected.
3. ***Archyala culta*** Philpott, 1931: 35 (Tineidae). Opoho, Dunedin OTAGO: Dunedin [AMNZ]. Range: DN.
mM&D score: C (22/50). P&D category: C
Known only from the Type specimen and locality. Larva almost certainly to be subcortical in dead wood.
4. ***Archyala lindsayi*** (Philpott, 1927: 708) (Tineidae). Mt Grey CANTERBURY Oxford [CMNZ]. Range: NC.
mM&D score: B (23/50). P&D category: C
Known only from the Type specimen and locality. Larva almost certainly to be subcortical in dead wood.
5. ***Archyala opulenta*** Philpott, 1926: 398 (Tineidae). Upper Maitai NELSON/MARLBOROUGH Bryant [NZAC]. Range: ND, NN.
mM&D score: B (23/50). P&D category: G
Host/niche: detritivore on guano of short-tailed bat, *Mystacina tuberculata* in ND. May indicate presence of short-tailed bat.
6. ***Asaphodes chlorocapna*** (Meyrick, 1925: 271) (Geometridae). Mangere I. WELLINGTON: Chathams [NZAC]. Range: CH Mangere, Pitt, Rangatira.
mM&D score: B (24/50). P&D category: B
Host: Fallen leaves of *Muehlenbeckia* (Polygonaceae). Not seen on Chatham, abundant on Rangatira.
7. ***Asaphodes frivola*** (Meyrick, 1913: 26) (Geometridae). Invercargill SOUTHLAND: Southland Plains [BMNH]. Range: SL.
mM&D score: A (30/50). P&D category: F
Host(s): unknown in wild, *Plantago* (Plantaginaceae) in captivity. Now rare in Type locality coastal sites around Invercargill, sites at risk from fragmentation and modification.

- *8. *Asaphodes imperfecta* (Philpott, 1905: 330) (Geometridae). West Plains SOUTHLAND: Southland Plains [NZAC]. Range: OL, FD (Hudson 1939), SL.
mM&D score: A (33/50). P&D category: G
Host(s) unknown, probably herbs in forest ecosystems. This species has not been collected recently, and we need to ascertain if it is still extant.
9. *Asaphodes obarata* (Felder & Rogenhofer, 1875) (Geometridae). Nelson NELSON/MARLBOROUGH: Bryant [BMNH]. Range: TO, NN, WD, MC, OL, DN, SL.
mM&D score: C (20/50). P&D category: B
Host(s) unknown. Historical contraction of range in DN and SL (no longer found in Dunedin, Invercargill).
- *10. *Asaphodes stinaria* (Guenée, 1868: 92) (Geometridae). 'Canterbury' ?Christchurch CANTERBURY ?Low Plains or ?Craigieburn. [BMNH]. Range: TO*, HB*, NC*, MC*, SC*, WD, DN*, CO/OL, FD*, SL [*= not located recently].
mM&D score: A (32/50). Listed in Molloy & Davis 1994, category A. P&D category: B
Host(s): possibly *Ranunculus* spp. (Ranunculaceae). This species shows considerable range contraction, and is possibly now extinct in eastern areas. Once the host-range has been ascertained, this species is a possible candidate for rehabilitation.
- *11. *Australotbis volatilis* Matthews & Patrick, 1998: 263 (Noctuidae). Conroy's Road OTAGO: Old Man [NZAC]. Range: CO.
mM&D score: A (30/50). P&D category: G
Host: *Vittadinia* spp. (Asteraceae), flowerheads; pupae can diapause for up to 2 years. As (1) both host and habitat are at risk from pasture development, (2) only one of the four sites has a substantial population, and (3) this species is our only endemic member of its subfamily, conservation action is necessary.
12. *Austrocidaria lithurga* (Meyrick, 1911: 71) (Geometridae). Makara WELLINGTON: Wellington [BMNH]. Range: WN, MC
mM&D score: B (26/50). P&D category: D
Host(s): divaricating small-leaved *Coprosma* spp. (Rubiaceae) are probable hosts. A member of the open shrubland community, rarely collected.
13. *Bityla sericea* Butler, 1877: 387 (Noctuidae). ?mid-Canterbury. CANTERBURY: Low Plains [BMNH]. Range: WN, MB/NC, MC, CO, OL (Hudson, 1928).
mM&D score: B (27/50). P&D category: D
Host(s): unknown but possibly *Muehlenbeckia* (Polygonaceae); never collected in large numbers, and usually in association with *B. defigurata* (Walker).
14. *Bityla pallida* (Hudson, 1905: 355) (Noctuidae). Napier EAST COAST/HAWKES BAY: Heretaunga. [MONZ]. Range: HB
mM&D score: A (30/50). P&D category: C.
Host unknown, possibly as above. Known only from Type locality, no legally protected site.
15. *Cadmogenes literata* Meyrick, 1923: 168 (Plutellidae of authors). Kauri Gully (Birkenhead) AUCKLAND: Tamaki [BMNH]. Range: ND, AK, TO, TK.
mM&D score: C (20/50). P&D category: F.
Hosts: *Caldcluvia*, *Weinmannia* (Cunoniaceae) flowers. Type locality, though legally protected, now with very few host trees remaining.
16. *Cephalissa siria* Meyrick, 1884: 93 (Geometridae). Dunedin OTAGO: Dunedin [BMNH]. Range: DN, CO/SL, SL (Hudson 1928, 1939).
mM&D score: B (28/50). P&D category: B
Host: *Fuchsia perscandens* (Onagraceae); no longer found in Dunedin, nor around Invercargill. Latest sightings at one coastal and several upland sites in eastern Otago, and in Beaumont Forest, Rongahere Gorge SL.

17. *Chersadaula ocbrogaster* Meyrick, 1923:165. (Oecophoridae s.s.). Breaker Bay, WELLINGTON: Wellington [BMNH].
mM&D score: Unevaluated. P&D category: C
This coastal species has not been re-collected to our knowledge. The larva is detritivorous in coastal rocky sites.
18. *Circoxena ditrocha* Meyrick, 1916:419 (Cosmopterigidae of authors). Wainuiomata WELLINGTON: Tararua [BMNH]. Range: AK,WN, NN, MC, DN,FD (Hudson 1928, 1939).
mM&D score: C (21/50). P&D category: D.
Host/niche unknown; possibly a seed-borer. Specimens rarely collected, not commonly encountered.
19. *Coridomorpba stella* Meyrick, 1914: 111 (Oecophoridae). Kauri Gully (Birkenhead) AUCKLAND: Tamaki [BMNH]. Range: AK, BP, WN (Hudson 1928, 1939).
mM&D score: B (23/50). P&D category: D
Host/niche unknown. Collected on three occasions only since 1914. Not known from the South Island.
20. *Coridomorpba* 'long palpi' undescribed (Oecophoridae). Woodlands, Titirangi AUCKLAND: Waitakere [NZAC]. Range: AK.
mM&D score: B (28/50). P&D category: C.
Host/niche unknown. Known only from one locality, near to an extensive, legally protected, forest area.
21. *Ctenarchbis cramboides* Dugdale, 1995: 214 (Carposinidae). Titirangi AUCKLAND: Waitakere.[NZAC]. Range: ND, AK
mM&D score: A (30/50). P&D category: D.
Hosts unknown. Uncommonly encountered, taxonomically distinct within family, combining characters of both families in the superfamily Copromorphoidea (Dugdale 1995).
22. *Dasyuris enysii* (Butler, 1877: 391) (Geometridae). Castle Hill CANTERBURY: Craigieburn [BMNH]. Range: MB, KA, MC.
mM&D score: A (29/50). P&D category: D
Host(s) unknown but likely to be Apiaceae. Uncommonly collected, member of a poorly understood complex.
23. *Declana griseata* Hudson, 1898: 98 (Geometridae). Lake Wakatipu (?head) OTAGO ?Richardson/?Shotover [MONZ]. Range: BP*-TO* - SL [*= not recorded recently].
mM&D score:C (20/50). P&D category: G
Hosts: leafy Loranthaceae; still abundant NN-SL but in North Island endangered or possibly extinct in some districts; possibly extinct in TO. Survival dependent on host survival (Patrick & Dugdale 1997).
24. *Dichromodes* 'Cloudy Bay' undescribed (Geometridae). Rarangi foreshore, N of Wairau Diversion mouth NELSON/ MARLBOROUGH. Range: SD/MB.
mM&D score: B (25/50). P&D category: C
Host presumably crustose lichens on stable, exposed shingle pavements. Other *Dichromodes* spp. are characteristic of rock outcrops, bluffs, and exposed boulders in stable river terrace faces. This population which lacks the yellow scales of populations of *D. sphaeriata* was found to be abundant at Cloudy Bay during the course of a DOC survey.
25. *Dodonidia belmsi* Butler, 1884:172 (Nymphalidae). Paparoa range (south end) WEST COAST: Blackball [CMNZ]. Range: AK, CL, TO, TK, WN, NN, BR.
mM&D score: B (23/50). P&D category: G
Hosts: *Gabnia* spp., Cyperaceae; forest-dwelling *Chionochloa* spp., Poaceae. At risk in northern part of range to predation by adventive social wasps (*Polistes* and *Vespula*) and in NN, BR, by *Vespula*.

26. *Elachista eurycbora* (Meyrick, 1919: 352) (Elachistidae). Paekakariki WELLINGTON: Cook Strait/Foxton [BMNH]. Range: WN.
mM&D score: C (22/50). P&D category: E
Host: almost certainly a grass (Poaceae), but the Type locality (dunes, Paekakariki) is now greatly modified.
27. *Elachista belonoma* (Meyrick, 1889: 178) (Elachistidae). Port Hills, Banks Peninsula CANTERBURY: Port Hills [BMNH]. Range: MC, MK.
mM&D score: C (21/50). Not listed in M&D 1994. P&D category: E
Hosts possibly *Poa cita* (Poaceae) with which adults are usually associated. The Type locality is now largely modified. A member of a poorly understood complex (with *exaula* Meyrick, *ocbroleuca* Meyrick) characteristic of short tussock grasslands
- *28. *'Epichorista' lindsayi* Philpott, 1928: 181 (Tortricidae). Little River CANTERBURY: Ellesmere/Akaroa [CMNZ]. Range: MC.
mM&D score: A (31/50). P&D category: C
Host(s) unknown but probably herbs in shrubland. This species is known only from the Type locality, and is distinctive within genus. Until we know more of its biology and site preferences, in view of the Type of development along the shrubland areas between Little River and Birdlings Flat, this species is, at the very least, threatened.
29. *Erebthbias lychnopa* Meyrick, 1927: 702 (Tineidae). Sinclair Head, in forest WELLINGTON: Cook Strait [BMNH]. Range: WN.
mM&D score: B (26/50). P&D category: C.
Niche: most likely dead wood. Although distinctive in appearance, this species has not been encountered elsewhere.
30. *Ericodesma aerodana* (Meyrick, 1881: 520) (Tortricidae). Hamilton WAIKATO: Hamilton [BMNH]. Range: WO, BP, TO, TK, WI, WN; SD/MB, KA, MC.
mM&D score: B (28/50). P&D category: G
Host: mat-forming *Pimelea* spp. (Thymeleaceae). Survival dependent on host survival. In central North Island, 'frost flat' communities, which are easy to turn into farmland are particularly at risk. The two eastern South Island populations may be specifically distinct from (northern) *aerodana* as they lack orange scaling on the forewing.
31. *Ericodesma cuneata* (Clarke, 1926: 419) (Tortricidae). Hope Arm, Lake Manapouri SOUTHLAND: Te Anau [AMNZ]. Range: TO, OL, FD.
mM&D score: C (19/50). P&D category: G
Host: korokio, *Corokia cotoneaster*, Escalloniaceae. Rarely encountered and dependent on host success; so far known only from natural korokio communities, not urban plantings.
32. *Ericodesma* sp. 'mingimingi' (Tortricidae). Whakarewarewa thermal reserve BAY OF PLENTY: Whakarewarewa [undescribed sp., NZAC]. Range: BP.
mM&D score: A (29/50). P&D category: C
Host: mingimingi, *Cyatbodes (Styphelia) fasciculatus*, Epacridaceae, communities in open sites. So far known only from a geothermally active site.
33. *Eudonia linealis* (Walker, 1866: 1503) (Crambidae). Nelson NELSON/MARLBOROUGH: Bryant [BMNH]. TYPE LOST.
mM&D score: Unevaluated . P&D category: C.
The Type specimen is missing, and the species has remained unrecognised since its original description.

34. *Eurythecta robusta* (Butler, 1877: 403) (Tortricidae). Canterbury Plains CANTERBURY: Low Plains [BMNH]. Range: NC, MC, SC.
mM&D score: C (22/50) P&D category: G
Hosts: low mat-forming herbs and turf plants; characteristic of open stony ground. Type locality probably along the Old West Coast Road (Yaldhurst?, West Melton?). Original communities and land surface probably now annihilated by subdivision and life-style block conversions.
- *35. *Euxoa cerapachodes* Guenée, 1868: 39 (Noctuidae). 'Mid-Canterbury' CANTERBURY: Low Plains [BMNH]. Range: MC.
mM&D score: A (31/50). P&D category: C
Host unknown. Known only from the (rather general) Type locality; see remarks under *Eurythecta robusta*. This large moth has not been recognised recently; the only remaining possible habitat may be at the old Defence Department 'rifle range' between West Melton and the Waimakariri River, where JSD has seen extensive areas of indigenous plant communities.
- *36. *Gadira petraula* (Meyrick, 1883: 9) Crambidae). Lyttelton (hills) CANTERBURY: Port Hills [BMNH]. Range: MC.
mM&D score: A (30/50). Not listed in Molloy & Davis 1994. P&D category: F
Host niche: moss/?lichens on rock faces; habitat and Type locality at risk. A poorly understood taxon, sympatric with *G. leucopthalma* on Banks Peninsula. There is some overlap in colour pattern in females of *petraula* and *leucopthalma*; species status of a population on the Seaward Kaikoura Range (KA) needs elucidating. The Stephens I. record is based on misidentified scopariines, and the record from Australia (Nielsen et al. 1996) is based on a specimen in the Raynor Collection (R.J.B. Hoare, from M. Shaffer, pers. comm.), most likely given to Raynor by his companion collector, Edward Meyrick, from that collector's New Zealand collection.
37. *Gadira* 'black brown EGW' (Crambidae). CANTERBURY: ?Pukaki
mM&D score: Unevaluated. P&D category: C.
Known from 2 degraded sites in the Mackenzie Basin MK (E.G. White, pers. comm.). If experience with other species is relevant, this distinctive species will be a moss-feeder, and probably with a high chance of survival.
- *38. *Gingidiobora nebulosa* (Philpott, 1917:241) (Geometridae). Coverham NELSON/MARLBOROUGH: George [MONZ]. Range: MB, DN.
mM&D score: A (30/50). **Listed in Molloy & Davis 1994**: 61, Category I. P&D category: G
Hosts: *Gingidia montana* (Apiaceae) on rock-faces. Known from a few scattered localities, no legally protected sites, all areas prone to modification (herbicides, ungulate browse). Two species may be confused under this name. The related *G. subobscurata* is more widely encountered in higher-rainfall South island upland and montane sites.
39. *Glyphipterix euastera* Meyrick, 1880: 236 (Glyphipterigidae). Port Hills CANTERBURY: Port Hills [BMNH]. Range: MC, CO, OL.
mM&D score: C (21/50). P&D category: F.
Host unknown, a sedge or a grass. Type locality (probably the Bridle Track, or the Rapaki Track above Dry Bush) now greatly modified from original short tussock grassland. An uncommonly encountered species, and although known from sea level to 1280 m, lowland and upland sites are likely to be increasingly modified.
40. *Glyphipterix necopina* Philpott, 1927: 88 (Glyphipterigidae). Golden Downs NELSON/MARLBOROUGH: Bryant. Range: NN.
mM&D score: B (25/50). P&D category: C
Host unknown, either a sedge or a grass. Known only from the Type locality, needs surveying for in other areas, and relation to *G. achlyoessa* (Meyrick) needs assessing. Type locality now largely an exotic pine forest, with virtually no sites in original condition.

- *41. *Graphania omicron* (Hudson, 1898: 22) (Noctuidae). Karori WELLINGTON:Wellington [TYPE NOT FOUND IN MONZ]. WN.
mM&D score: A (29/50). P&D category: C
Hosts not known and known only from Type locality. As well, the Type is missing. Re-discovery at the largely grossly altered Type locality (Karori), and an assessment of this species' relationship to the '*Aletia*' *inconstans* group are needed.
42. *Helastia angusta* Craw, 1987: 290. (Geometridae). Moke Lake OTAGO: Richardson [NZAC]. Range: OL, MK.
mM&D score: B (25/50). P&D category: D
Hosts unknown, possibly a shrub. Forms a distinctive subgroup with *H. expolita*, *H. tripbragma* and *H. siris*.
43. *Helastia clandestina* (Philpott, 1921: 338) (Geometridae). Arthur's Pass CANTERBURY: Arthur's Pass [CMNZ]. Range: NC/WD, MC.
mM&D score: B (27/50). P&D category: D
Hosts unknown; known from stony riverbed ecosystems.
44. *Helastia expolita* (Philpott, 1917: 240) (Geometridae). Broken River CANTERBURY: Craigieburn [NZAC]. Range: MC (Craw 1987).
mM&D score: A (30/50). P&D category: D
Hosts and biology of this distinctive species are unknown.
45. *Helastia siris* Hawthorne, 1897: 283 (Geometridae). Cape Terawhiti WELLINGTON: Wellington [MONZ]. Range: WN (Craw 1987).
mM&D score: B (27/50). Not listed in Molloy & Davis 1994. P&D category: D
Hosts and biology unknown. With *H. expolita* and *H. tripbragma*, forms a distinctive group characteristic of eastern dry/coastal shrub/grasslands.
46. *Heloxycamus patricki* Dugdale, 1994: 60 (Hepialidae). Danseys Pass OTAGO: Dansey [NZAC]. Range: DN, CO, OL, FD, SL, SI.
mM&D score: B (25/50). **Listed in Molloy & Davis 1994:** 61, Category I. P&D category: G.
Host/niche: mosses, especially *Sphagnum* in and at margins of bogs and seepages, semiaquatic. Lowland populations in sphagnum bogs at risk from moss harvesting, particularly in otherwise legally protected areas.
- *47. *Heterocrossa maculata* (Philpott, 1927: 705) (Carposinidae). Cooper's Knob CANTERBURY: Port Hills [CMNZ]. Range: MC.
mM&D score: A (32/50). Not listed in Molloy & Davis 1994. P&D category: C
Host: possibly *Hoberia angustifolia* or *Plagianthus regius* (Malvaceae) as it belongs to a small, distinctive group within *Heterocrossa* restricted to these genera. Known only from the Type locality, it needs surveying to determine if present in other sites where hosts occur.
- *48. *Hierodoris* 'clear wing', undescribed (Oecophoridae). Esk Forest EAST COAST/HAWKES BAY: Maungaharuru [NZAC]. Range: HB.
mM&D score: A (29+/50). Not listed in Molloy & Davis 1994. P&D category: C
Host niche: woody 'galls' on kowhai (*Sophora tetraptera*) tree. Despite a search at the original locality in September 1999, this species is known only from one specimen and is a distinctive element within the genus, itself a characteristically New Zealand endemic group.
49. *Hierodoris* 'silver banded', undescribed (Oecophoridae). Beaumont OTAGO: Lawrence [NZAC]. Range: CO, DN (Macrae's Flat, BPNZ).
mM&D score: B (26/50). P&D category: G
Host niche: accumulated detritus in mosses on rock faces and bluffs; adult diurnal. At risk from habitat destruction, in DN by opencast mining, in CO potentially by hydro-electricity dam construction.

50. *Hierodoris* 'tiger-stripes RJBH' (Oecophoridae s.l.). AUCKLAND: Waitakere.
mM&D score: Unevaluated. P&D category: C.
Known from a few specimens collected at Titirangi, Waitakere Ranges AK; hostplant unknown, but possibly a conifer (R.J.B. Hoare, pers. comm.).
51. *Hydriomena canescens* Philpott, 1918: 125 (Geometridae) Queenstown OTAGO: Shotover [SMNZ, Pasco Collection, not located]. Range: OL, CO.
mM&D score: B (28/50). P&D category: D.
Host and biology unknown.
52. *Hydriomena clarkei* (Howes, 1917: 274) (Geometridae). Flagstaff Hill OTAGO: Dunedin [AMNZ]. Range: DN, CO, OL.
mM&D score: B (28/50). P&D category: D
Host and biology unknown, reared in captivity on *Geranium*. Known now from two areas, but not observed in large numbers at either. Considered **extinct** at Type locality.
53. *Hydriomena iolanthe* Hudson, 1939: 407 (Geometridae). Lake Harris OTAGO: Dart [F.S. Oliver Collection, lost]. Range: OL/FD border.
mM&D score: A (35/50). P&D category: C
Host possibly a *Coprosma* (Rubiaceae) as the illustration of this species resembles an *Austrocidaria* species. As the Type and only specimen is lost, surveying the Type locality for specimens that agree with that portrayed by Hudson (1939: plate 62, fig. 18) is needed.
54. *Isonomeutis restincta* Meyrick, 1923: 166 (Coproformidae of authors). Kaeo NORTH-LAND: Eastern Northland and Islands [BMNH]. Range: ND, AK, TO.
mM&D score: A (29/50). P&D category: A
Host/niche unknown; the related *I. amauropa* larva feeds on bark-inhabiting margarodids (false mealy bugs).
55. *Izatha griseata* Hudson, 1939: 448 (Oecophoridae s.l.). Mataitai, AUCKLAND. [TYPE NOT LOCATED]
mM&D score: Unevaluated. P&D category: C
The Type specimen is missing, and the species has not been recognised in subsequent collecting. The larva is likely to feed in dead wood.
56. *Izatha psychra* (Meyrick, [1883: 523] 1884: 21) (Oecophoridae). Porters Pass CANTERBURY: Craigieburn [BMNH].
mM&D score: Unevaluated. P&D category: C
Only known from the very worn Type specimen. The larva is likely to feed in dead wood.
57. *Izatha rigescens* Meyrick, 1929:490 (Oecophoridae s.l.). Wellington WELLINGTON [BMNH]
mM&D score: Unevaluated. P&D category: C.
Only known from the Type specimen. The larva is likely to feed in dead wood.
58. *Kiwaia jeanae* Philpott, 1930: 249 (Gelechiidae). Birdlings Flat CANTERBURY: Ellesmere [CMNZ]. Range: MC, MC/NC (Leithfield Beach, Hudson 1939).
mM&D score: B (28/50). P&D category: F
Host niche: *Raoulia* mats (Asteraceae) on sandy/stony storm beaches; larva possibly detritivorous within mats. Part of the Type locality is at risk through stock trampling and commercial shingle removal. Status at the other known site, Leithfield Beach, needs checking.

59. *Kiwaia* sp. 'Cloudy Bay', undescribed (Gelechiidae). Cloudy Bay, foreshore NELSON/MARLBOROUGH Blenheim [NZAC]. Range: SD.
mM&D score: A (31/50). P&D category: C
Like *K. jeanae*, restricted to storm-beach *Raoulia* mats (Asteraceae) and adults present only in late summer (late February–early April). All adults seen on scabweed communities within 100 m of HWS and on land disturbed by 4WD vehicle tracks. Not found south of the Wairau Diversion mouth.
- *60. *Kiwaia pumila* (Philpott, 1928: 182) (Gelechiidae). Yaldhurst CANTERBURY: Low Plains [CMNZ]. Range: MB, MC, MK
mM&D score: A (30/50). P&D category: E
Host/niche is unknown for this and other members of *Kiwaia*. *K. pumila* is a member of the *K. brontophora* group, a poorly understood complex best distinguished on genitalia. The genus is biogeographically important, as it is known only from New Zealand and Nepal.
- *61. *Kiwaia* 'plains jumper' [*Kiwaia* n.sp. nr *glaucoterma*', Patrick 1994], undescribed (Gelechiidae). Near MacLeans Island CANTERBURY: Low Plains [NZAC]. Range: MC [near MacLeans Island, Birdlings Flat], MK [near Tekapo] .
mM&D score: A (32/50). P&D category: F
Host/niche unknown; the adult is diurnal, brachypterous, jumping, and found only on consolidated shingly ground (old foredunes or riverbed relics) with *Raoulia*, matplants, mosses, sorrel. These environments are at risk from development by irrigation and pasture establishment, or real estate schemes. Both the plant community and the associated insects are a distinctive, and now greatly diminished, element in the Plains fauna.
- *62. *Kupea electilis* Philpott, 1930: 247 (Crambidae). Birdlings Flat CANTERBURY: Ellesmere. [CMNZ]. Range: MC.
mM&D score: A (30/50). P&D category: C
Host: *Raoulia* (Asteraceae). The Type locality of this species is prone to two major threats: stock trampling, and obliteration by housing development. Despite many years of searching similar habitats neither of us has found this species in any other locality. Females have never been collected, and are presumed to be flightless. All these factors indicate the vulnerability of this species.
63. *Maoricrambus oncobolus* (Meyrick, 1885: 138) (Crambidae) Castle Hill CANTERBURY: Craigieburn [BMNH]. Range: MC, SL.
mM&D score: B (25/50). P&D category: D
Hosts and biology unknown; associated with riverside grasslands (SL) or braided riverbeds (MC). Taxonomically distinct, and the only member of its genus (Gaskin 1975).
64. *Meterana exquisita* (Philpott, 1903: 246) (Noctuidae) West Plains SOUTHLAND: Southland Plains [NZAC]. Range: AK*, WO, TO, WI, WA; NN, SC, MK, CO, OL, SL (no longer found in areas marked *) (Hudson 1928, 1939).
mM&D score: C (20/50). P&D category: G
Hosts: small-leaved, usually deciduous *Olearia* spp., including *O. bectorii*, *O. odorata* (Asteraceae). Communities in AK and Southland Plains either entirely (West Plains) or largely (AK) obliterated; other currently large communities at risk from land development. Southeastern limit may be Tahakopa Ecological District. See *M. grandiosa*, *Pyrgotis* 'olearia', *Protosynaema* 'olearia'.
65. *Meterana grandiosa* (Philpott, 1903: 246) (Noctuidae). West Plains SOUTHLAND: Southland Plains [NZAC]. Range: WA; CO, OL, DN (but not re-collected since the 1960s), SL (Hokonui Hills, but not Type locality).
mM&D score: C (21/50). P&D category: G
Hosts and threats as for *M. exquisita*. Adults emerge in autumn, and so may have been missed in some localities; larvae shelter under bark during the day and are difficult to detect. A highly distinctive member of the biota and needs surveying for presence in many areas, particularly frost-flat areas in WO and TO.

66. *Meterana pansicolor* (Howes, 1912: 204) (Noctuidae). Dunedin OTAGO: Dunedin [MONZ].
Range: DN.
mM&D score: C (18/50). P&D category: D
Neither host nor biology known; not commonly encountered and possibly overlooked.
67. *Meterana pictula* (White in Taylor, 1855: plate 1, fig. 3) (Noctuidae). 'North Island' [specimen not located]. Range: BP, TO, WN, NN [BPNZ], FD [BPNZ].
mM&D score: C (19/50). **Listed in Molloy & Davis 1994**: 61, Category I. P&D category: G
Hosts: *Pimelea* spp. (Thymeleaceae), both mat-forming and shrubby species. Lowland sites at risk in BP and possibly NN, FD and elsewhere; legal protection for few frost-flat sites in TO. This species has a western disjunct distribution in the South Island, an important biogeographical feature. Molloy & Davis note that the coastal populations are at risk.
- *68. *Meterana* 'Foveaux Strait' undescribed (Noctuidae). SOUTHLAND: Tahakopa; Foveaux; Mt Allen [BPNZ]. Range: SL (Tautuku Beach; Three Sisters Dunes); SI (Mason Bay, Stewart Island; Codfish Island).
mM&D score: A (30/50). **Listed in Molloy & Davis 1994**: 61, as *Meterana* n. sp., Category I. P&D category: G
Hosts: coastal *Pimelea* spp. (Thymeleaceae). Host communities of this distinctive species are at risk from erosion or in sites not legally protected from development. The distinctiveness of this species, clearly a member of the *pictula* group, is evidence of a long period of isolation.
- 69-76. The *Notoreas perornata* group. This group of eight recently recognised but undescribed (Patrick 1999) entities all feed as larvae on coastal mat-forming *Pimelea* spp. (Thymeleaceae) and are therefore dependent on the health of those communities. This recently recognised complex affords a feasible opportunity for experimental studies of speciation through time. Some populations are more vulnerable than others. They are listed here from north to south.
69. *Notoreas* 'Northern' (Geometridae). Kawerua Beach, Waipoua NORTHLAND: Tutamoe [NZAC, BPNZ]. Range: ND, AK [BPNZ].
mM&D score: B (26/50). P&D category: F
Host a coastal mat-forming *Pimelea* sp. (Thymeleaceae). Four populations are known, all coastal, in Tutamoe Ecological District (2) and along Auckland's West Coast (2). Two further populations, at Scott Point, Te Pahi, and Surville Cliffs in the far north, have been discovered in November 1999, and are probably of this species.
70. *Notoreas* 'Taranaki Coast' (Geometridae). Oeo Cliffs WANGANUI: Egmont; Cape Farewell NELSON: West Whanganui [BPNZ].
mM&D score: A (36/50) for North I. **Listed in Molloy & Davis 1994**: 61, Category I. P&D category: F
Host: *Pimelea prostrata* (Thymeleaceae); the four populations at Oeo are at risk, and are critical in evolutionary studies of the radiation of this group. Two species may be included here. Taxonomic studies incomplete at this stage.
- *71. *Notoreas* 'Castlepoint' (Geometridae). Castlepoint WELLINGTON: Eastern Wairarapa [BPNZ]. Range: WA.
mM&D score: A (32/50). **Listed in Molloy & Davis 1994**: 61, Category I. P&D category: F
Host: *Pimelea prostrata* (Thymeleaceae). This population is regarded as distinctive, and being found only within the legally protected area at Castlepoint, is considered to be at risk as the host plants have no large source of recruitment.
72. *Notoreas* 'Wellington' (Geometridae). Titahi Bay WELLINGTON: Wellington [BPNZ; NZAC]. Range: WA, WN.
mM&D score: B (27/50). **Listed in Molloy & Davis 1994**: 61, as *Notoreas* n.sp. 2. P&D category: G
Host: *Pimelea 'urvilleana'* (Thymeleaceae). Specimens were collected by G.V. Hudson and R.M. Sunley, two pioneer lepidopterists.

- *73. *Notoreas* 'Cape Campbell' (Geometridae). Cape Campbell MARLBOROUGH/NELSON: Blenheim [BPNZ, NZAC]. Range: SD, MB, [NC: EXTINCT].
mM&D score: A (31/50). Not known to Molloy & Davis 1994. P&D category: G
Host: *Pimelea 'urvilleana'* (Thymeleaceae) at Cloudy Bay SD. The hostplant there is at risk from damage by 'recreational' off-road vehicle drivers or from other inappropriate uses. The Cloudy Bay population was discovered during a DOC survey in 1998/99. See also ##24, 30, and 59. Note that although originally known from three populations, the one at Gore Bay NC discovered in 1994 is now, with its hostplant, extinct. The hostplant/herbivore association here seems intolerant of some forms of disturbance (cf. #59 *Kiwaia/Raoulia*).
74. *Notoreas* 'Rahu Saddle' (Geometridae). Rahu Saddle, WEST COAST: Reefton; Waiho River WEST COAST: Waiho [BPNZ] Range: WD
mM&D score: A (32/50). P&D category: F
Host at Waiho a *Pimelea* sp. (Thymeleaceae). BHP has reared a good series of this population in 1999.
- *75. *Notoreas* 'South Shag River' (Geometridae). Coast south of Shag River, OTAGO: Waikouaiti [BPNZ]. Range: DN, coastal.
mM&D score: A (32/50). Listed in Molloy & Davis 1994, p.61, Category I. P&D category: G
Hostplant *Pimelea 'urvilleana'* (Thymeleaceae). There is only one population known, on a coastal cliff slip-face 50 m wide. The area is vulnerable to storm damage, and other populations of this *Notoreas* entity and the *Pimelea* need to be sought should rehabilitation be considered.
- *76. *Notoreas* 'Mason Bay' (Geometridae). Mason Bay, SOUTHLAND: Mt Allen [BPNZ]. Range: SI.
mM&D score: A (34/50). P&D category: F
Host *Pimelea lyallii* (Thymeleaceae); known from three specimens from one population among sand dunes. The same remarks as for #68 are relevant here.
- *77. *Orocrambus fugitivellus* (Hudson, 1950: 99) (Crambidae). 'Mackenzie Country' CANTERBURY: Pukaki [MONZ]. Range: MK.
mM&D score: A (35/50). Listed in Molloy & Davis 1994:61, Category I. P&D category: C
Host and biology unknown. This species is known only from the Type locality and from both diurnal males and flightless, short-winged females. As many pastoral areas of the Mackenzie Basin have become significantly changed, there is a need to discover more populations of this species, another example of speciation in the dry eastern shrub/grasslands.
78. *Orocrambus jansonii* Gaskin, 1975: 322 (Crambidae). Waiouru TONGARIRO/TAUPO: Tongariro [NZAC]. Range: TO.
mM&D score: B (26/50). P&D category: C
Hosts unknown but adults present in adventive roadside grasslands by Desert Road north of Waiouru.
79. *Orocrambus ornatus* (Philpott, 1927: 82) (Crambidae). Golden Downs NELSON/MARLBOROUGH: Bryant [NZAC]. Range: NN.
mM&D score: B (26/50). P&D category: E
Recent specimens have been found associated with *Uncinia* (Cyperaceae) in forest. The Type locality has been a production exotic pine forest since the early 1930s.
80. *Orocrambus punctellus* (Hudson, 1950: 99) (Crambidae). Portobello OTAGO:Dunedin [MONZ]. Range: DN.
mM&D score: B (26/50). P&D category: C
Hosts and biology unknown. It is known only from specimens collected by George Howes at the Type locality.

- 81-83. *Orocrambus sophronellus* (Crambidae) complex. Recognition of species in this group was hampered by an earlier misinterpretation of Meyrick's description. The three entities (## 82-84) are possibly conspecific and form a distinctive group within *Orocrambus*. All are uncommon or rare, and apart from one host record and their adult emergence data, nothing is known of their biology.
81. *Orocrambus sophronellus* (Meyrick, 1885: 138) (Crambidae). 'Christchurch' [more likely Castle Hill Basin CANTERBURY: Craigieburn] [BMNH]. Range: MC.
mM&D score: C (20/50). **Listed in Molloy & Davis 1994:** 61, Category I. P&D category: D
Biology and hosts unknown.
- *82. *Orocrambus sophistes* (Meyrick, 1905: 226). Ida Valley OTAGO: Maniototo [BMNH]. Range: MK, CO, OL.
mM&D score: A (30/50). P&D category: D.
Hostplant *Festuca novaezealandiae* (Poaceae); reared by BHP. The female is flightless, stenopterous (thin-winged brachypterous condition). This species is possibly extinct at the Type locality (Ida Valley). Distribution contraction appears coincident with that of endemic short tussock grasslands south of the Mackenzie Basin. This contraction may also be a product of female flightlessness, i.e. low dispersal ability.
83. *Orocrambus lindsayi* Gaskin, 1975: 324 (Crambidae). Mt Ida OTAGO: Hawkdun [AMNZ]. Range: CO.
mM&D score: A (30/50). P&D category: D
Host and biology unknown; males unknown.
- *84. *Orocrambus* 'Mackenzie Basin', undescribed (Crambidae). Mackenzie Basin CANTERBURY: Pukaki [BPNZ; LUNZ]. Range: MK.
mM&D score: A (32/50). **Listed in Molloy & Davis 1994:** 61, category I. P&D category: D
Hostplant unknown. Adults of this species emerge in late summer-early autumn; the female is flightless, brachypterous (broad-winged brachypterous condition). The species appears to be localised within the Mackenzie Basin; information on host(s) and distribution are urgently needed.
- *85. *Orthoclydon pseudostinaria* (Hudson, 1918: 61) (Geometridae). Otira Gorge WEST COAST: Whitcombe-Arthur's Pass [MONZ]. Range: TO [NZAC]; NN, WD, NC, FD (Hudson 1928, 1939).
mM&D score: A (33/50). P&D category: C
Host and biology unknown. This conspicuous creamy white species with a red-brown stripe on each wing is an unusual element in *Orthoclydon* and is rarely encountered. Although there is a wide spread of localities where it has been found, it appears infrequently, as though its host is also uncommon. This is a little-known, elegant and brightly coloured species; its taxonomic position has not been checked since its re-description in 1928.
86. *Petasactis technica* Meyrick, 1888: 92 (Tineidae). Whangarei Heads NORTHLAND: Eastern Northland and Islands [BMNH]. Range: ND.
mM&D score: B (25/50). P&D category: C
Host niche and biology unknown; larva possibly in dead leaves of large monocots or in dead wood. Species known only from the Holotype and Type locality.
87. *Platyptilia bokowbitualis* Hudson, 1939: 430 (Pterophoridae). Hokowhitu, Palmerston North WANGANUI: Manawatu Plains [MONZ]. Range: WN/WI, WI, TK.
mM&D score: B (26/50). P&D category: E
Reared from a shrubby *Euphrasia* (Scrophulariaceae), Meremere Bush, TK. The Type locality is now a suburb of Palmerston North.

88. *Porina mairi* Buller, 1873: 279 (Hepialidae). Ruahine Range EAST COAST/HAWKES BAY: Ruahine TYPE LOST.
mM&D score: Unevaluated. P&D category: C
The Type specimen of this species is missing or destroyed, and the species has remained unrecognised since its original description. Meads (1990: 52-53) gives details of the history of this specimen.
89. *Proditrix chionochloae* Dugdale, 1987: 106 (Plutellidae). Pouakai Range WANGANUI: Egmont [NZAC]. Range: TO, TK.
mM&D score: B (24/50) . Not listed in Molloy & Davis 1994. P&D category: G
Host red tussock, *Chionochloa rubra* (Poaceae), which is becoming invaded by heather in TO localities such as Mangahuia Camp.
90. *Protosynaema* sp. 'olearia' Undescribed sp. (Plutellidae). Many localities in OTAGO: Tahakopa, Old Man, Shotover, Eyre. Range: OL, CO, SL.
mM&D score:A (29/50). P&D category: G
Hostplant *Olearia Hectorii*, *O. odorata* (Asteraceae). Communities of these shrubs are usually sparse, and at risk from farm development. Few sites are protected and populations are at low densities. Presence of stable overwintering sites for adults may be a necessity, and the species is unique in its genus as it feeds on a dicot, rather than monocots, as the other species do (Patrick, 1999 submitted).
91. *Pseudocoremia alba fasciata* (Philpott, 1915: 196) (Geometridae). Taihape WANGANUI: Rangitikei [MONZ]. Range: RI.
mM&D score: C (22/50). P&D category: C
Host and biology unknown; this species known only from one specimen, the Type. Future study comparing this entity with *Ps. lactiflua* (Meyrick) (hosts: *Hoberia* spp., Malvaceae) is needed.
92. *Pseudocoremia cineracia* (Howes, 1942: 277) (Geometridae). Ben Mohr, Moke Lake OTAGO: Shotover [MONZ]. Range: MK, CO, OL.
mM&D score: B (28/50). P&D category: G
Hostplant *Olearia odorata* (Asteraceae). See remarks under #82, *Protosynaema* sp. 'olearia'.
93. *Pseudocoremia fluminea* (Philpott, 1926: 389) (Geometridae). Flora Hut NELSON/MARLBOROUGH: Arthur [NZAC]. Range: NN.
mM&D score: B (26/50). P&D category: C
Hostplants unknown; this species is still known only from the Type locality.
94. *Pseudocoremia lutea* (Philpott, 1914: 119) (Geometridae). Bold Peak OTAGO: Dart [MONZ]. Range: OL.
mM&D score: B (28/50). P&D category: C
Hostplants and biology unknown; this species is a distinctive element in the genus, but is still known only from the Type locality.
- *95. *Pseudocoremia* sp. 'Knobby' undescribed (Geometridae). Knobby Range OTAGO: Manorburn [BPNZ]. Range: WD, CO.
mM&D score: A (30/50). P&D category: C
Hostplant *Olearia odorata*, *O. laxiflora* (Asteraceae). This species is known only from females from two localities, and is the only *Pseudocoremia* species with an almost totally wingless female. Fully winged males which may or may not be of this species have been collected from sites in MC, MK, OL, FD (Patrick 1999, submitted).

96. ***Pyrgotis* sp.** 'olearia' undescribed (Tortricidae). OTAGO: various grey scrub sites in Dunstan, Manorburn, Old Man, Pisa, Shotover, Umbrella [BPNZ]; MK [NZAC]. Range: MK, CO, OL.
mM&D score: B (25/50). P&D category: G
Hostplants *Olearia odorata*, *O. fimbriata*, *O. bullata* (Geometridae). As with ## 80, 82, 85, present only over a fraction of the geographic range of the hosts, and at risk from destruction of host communities (Patrick 1999, submitted).
97. ***Pyrgotis pyramidias*** Meyrick, 1901: 571 [**sensu stricto**] (Tortricidae). 'Invercargill' SOUTHLAND: Southland Plains [BMNH]. Range: BP - SL.
mM&D score: C (20/50). P&D category: F
Hostplant of Type population (around Awarua Bog and Tiwai Point SL) is *Cyatbodes fasciculatus* (Epacridaceae); a population with similar drab adults has been found on the same host at Whakarewarewa Thermal Area, Rotorua BP. These two populations are considered to be *P. pyramidias* sensu stricto, and this taxon is doubtfully conspecific with the entity with more brightly coloured and patterned adults and larvae confined to silver beech, *Nothofagus menziesii* (Fagaceae), which is absent from Invercargill and its surrounding area. At both localities, mingimingi survival is crucial for this species.
98. ***Pyrgotis transfixa*** (Meyrick, 1924: 203) (Tortricidae). Karori WELLINGTON: Wellington [BMNH]. Range: WN.
mM&D score: C (22/50). Not listed in Molloy & Davis 1994. P&D category: D
Hostplant and biology unknown. This species is known from two localities around Wellington City; it was regularly but uncommonly caught to light in the (bush-clad) Orongorongo Valley by M.J. Meads in recent years.
99. ***Pyroderces* sp.** 'yellow' undescribed (Cosmopterigidae). Esk Forest EAST COAST/HAWKES BAY: Maungaharuru [NZAC]. Range: HB.
mM&D score: B (25/50). P&D category: C
Host niche probably dry rather than moist dead branches; this species is still only known from the Type locality.
100. ***Samana acutata*** Butler, 1877: 401 (Geometridae). Christchurch CANTERBURY: Low Plains [BMNH]. Range: MC, CO.
mM&D score: B (23/50). P&D category: G
Hostplants *Carmichaelia* spp. (Fabaceae); many host communities are at risk from farming development in eastern South Island and the Type locality is now part of urban Christchurch; nearest native broom stands are on shady faces east of Motukarara MC on Banks Peninsula. The larger-winged North Island species *S. falcatella* faces similar threats but there are flourishing populations on Mt Taranaki.
101. ***Schiffermuelleria orthophanes*** (Meyrick, 1905: 243) (Oecophoridae s.s.). Nelson NELSON: Bryant [BMNH].
mM&D score: Unevaluated. P&D category: B.
This enigmatic species has been collected only once in the past 25 years, but earlier records show it to have been much more often encountered, often in modified (and suburban) localities (R.J.B. Hoare, pers. comm.).
- *102. ***Scythris* sp.** 'stripe' undescribed (Scythridae). Birdlings Flat CANTERBURY: Ellesmere [NZAC]. Range: MC.
mM&D score: B (26/50). P&D category: C
Hostplant unknown, possibly a *Carmichaelia* sp. (Fabaceae). Yet another species in our fauna that is known from a unique specimen; this species' strikingly contrasting colour pattern (a chocolate stripe on a cream background) sets it apart from the other, more monochrome New Zealand scythrids. The Birdlings Flat site where the only specimen was found has recently (1996) been grossly modified as a pig farm. Allowing this type of land use on areas of unusual plant/animal/quaternary history values is an example of the 'second-

rate' status many affix to our non-forest biota, largely through an unvalidated perception that shrub/grassland communities are less biotically important than forest communities.

103. *Stigmella maoriella* (Walker, 1864: 1008) (Nepticulidae). Auckland AUCKLAND: ?? [BMNH].

mM&D score: Unevaluated. P&D category: C.

Only known from the Type specimen; not recognised as a species known from recent extensive investigations into the New Zealand nepticulid fauna (Donner & Wilkinson 1989).

104. *Tatosoma agrionata* (Walker, 1862: 1417) (Geometridae). TONGARIRO or EAST COAST/HAWKES BAY no precise site [BMNH]. Range: BP-WN, NN-SI.

mM&D score: C (18/50). P&D category: G

Hostplants: all leafy Loranthaceae. Survival of this species in North Island appears doubtful (see #23, *Declana griseata*). Possibly extinct in the area where William Colenso took it, probably during one of his forays into the central North Island (Patrick & Dugdale 1997).

105. *Tbambotricha vates* Meyrick, 1922: 270 (Epermeniidae). Wellington WELLINGTON: Wellington [BMNH]. Range: ND, TK, WN, NN.

mM&D score: B (24/50). P&D category: D

Hostplant and biology unknown. This species is rarely encountered and never in large numbers. It is New Zealand's only epermeniid, and is thought by some specialists to be the sister-taxon of all other epermeniids.

106. *Thectophila acmotypa* Meyrick, 1927: 701 (Cosmopterigidae). Arthur's Pass CANTERBURY: Arthur's Pass [BMNH]. Range: NC/WD.

mM&D score: B (28/50). P&D category: C

Host niche unknown; the genus is monotypic. This is another example of a species known only from its Type locality.

- *107. *Tbeoxena scissaria* (Guenée, 1868: 94) (Geometridae). Christchurch CANTERBURY: Low Plains [BMNH]. Range: NC, MC, SC, MK, CO, OL.

mM&D score: A (29/50). P&D category: E

Hostplant unknown; biology appearing to include a generation emerging in winter (or early spring, E.G. White), as adults are recorded as emerging in winter (CO), early spring (MK) and elsewhere in January (Hudson 1928). The area that includes the Type locality is now part of suburban Christchurch and it is now possibly extinct on the Canterbury Plains (although localities such as West Melton are worth surveying). Another species in this remarkable endemic genus has recently been found in higher altitude (and less modified?) areas of the Mackenzie Basin (E.G. White, pers. comm.). Noted by E.G. White as being abundant in early spring in Mackenzie Basin, September 1999, suggesting that the mM&D score is exaggerated.

- *108. *Titanomis sisyrota* Meyrick, 1888: 104 (Family unknown). Nelson NELSON/MARLBOROUGH: Bryant [BMNH]. Range: WO (lost), TO, WN; NN, MB, WD, SL.

mM&D score: A (30/50). **Listed in Molloy & Davis 1994**, Category X. P&D category: I

Host niche and biology unknown. Adults (usually female) have been rarely encountered, the last in 1959 at Waipapa WO (since lost). Relationships of this monotypic genus are unknown (Meyrick put it in Tineidae, but it lacks apomorphies of both this family and its superfamily). Characters of this species are enigmatic. The species has not been collected for 40 years, and is possibly extinct, although the most recent specimen (1959) was collected at a site dominated by tall *Kunzea* forest. Species of which only (or mainly) females come to light tend to be those feeding on widely scattered resources (e.g. *Galleria melonella* on honeybeehives). This is especially true of some wetland species straying from breeding grounds (R.J.B. Hoare, pers. comm.).

109. *Tmetolophota blenheimensis* (Fereday, 1883: 196) (Noctuidae). Blenheim NELSON/MARLBOROUGH: Blenheim [CMNZ]. Range: HB; MB, DN, OL, SL, SI.

mM&D score: B (23/50). P&D category: E

Hostplant thought to be pingao, *Desmoschoenus* (Cyperaceae), a coastal sand-binding sedge now absent from the foreshores at the Type locality.

- *110. *Xanthorhoe bulbulata* (Guenée, 1868: 94) (Geometridae). Christchurch CANTERBURY: Low Plains [BMNH] Range: WN, TK, WD, MB, MC, MK, DN, CO, OL, SL (only in CO, OL in recent years [BPNZ]).

mM&D score: A (41/50). P&D category: B

Hostplant is unknown but may be *Ischnocarpus* (Brassicaceae). This species is now absent from the Type locality and some other sites where it had been collected last century and it may have declined with its host. Only 2 specimens have been reported in the last 50 years, and there is a need for surveying for this geometrid with distinctive yellow-orange hindwings.

111. *Xanthorhoe frigida* Howes, 1946: 145 (Geometridae). Homer SOUTHLAND: Darran [MONZ]. Range: MK, CO, OL, FD.

mM&D score: A (31/50). P&D category: D

Hostplant *Cbeesmania wallii* (Brassicaceae); both host and moth species uncommon. This subalpine-alpine species is large, distinctive, and rarely encountered; only 8 specimens are known from 5 localities.

- *112. *Xanthorhoe lophogramma* Meyrick, 1897: 386 (Geometridae). Castle Hill Basin CANTERBURY: Craigieburn [BMNH]. Range: MB, NC, MC, MK(E.G.White), CO.

mM&D score: A (32/50). P&D category: A

Hostplants probably low herbs, but as lowland sites are now greatly modified by adventive plants, it is possible that this species has become even rarer. This species was, and still is, rarely encountered, but there is no evidence of historical range contraction. While it closely resembles *X. semifissata*, it is easily distinguished on hindwing colour, making it a feasible species to survey for in Central Otago and the drier eastern foothills of Canterbury and Marlborough.

113. *Zelleria sphenota* Meyrick, 1889: 162 (Yponomeutidae). Riccarton Bush CANTERBURY: Low Plains [BMNH]. Range: TO; NN, SD, MC, SL.

mM&D score: B (25/50). P&D category: G

Hostplants: leafy Loranthaceae; most South Island populations are not threatened as yet, but North Island populations probably extinct, as mistletoes were depleted by possum browse as for ## 23 and 104. Status of the Riccarton Bush (Type) population needs assessing (Patrick & Dugdale 1997).

114. *Zizina oxleyi* (Felder & Felder, 1865: 280) (Lycaenidae). Nelson NELSON/MARLBOROUGH: Bryant [BMNH] Range: TO*, HB*, NN*, MB*, NC - CO, OL; extinct in * areas.

mM&D score: C (19/50). P&D category: H

Hostplants low-growing Fabaceae including *Carmichaelia*, and introduced clovers, medics and *Lotus*. Populations in HB, TO, NN, MB are now extinct through invasion and genetic replacement by the Australian *Zizina labradus*, which was enabled to establish by the proliferation and development of weed Fabaceae in European times. This butterfly is rare in DN and is possibly naturally absent from SL.