Supplement to the Lepidoptera of the Mackenzie Country with recommendations on their conservation

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ABSTRACT

Thirty-three species of Lepidoptera in addition to those listed in Patrick (1989b), are recorded from the Mackenzie Country, Canterbury. Sampling was carried out in shrublands, kettle-holes, wetlands, fescue grassland, sandy areas and depleted cushion vegetation. Several species, including *Paranotoreas fulva* (Hudson), a species characteristic of Central Otago salt-pans, were recorded from the Mackenzie Country for the first time. The uncommon grasshopper *Sigaus minutus* Bigelow, was found in a number of sites, many of which have substantial populations of the species. Saline soils and an attendant halophytic flora are recorded for the first time from the Mackenzie Country, from a site between Omarama and Otematata. Key conservation sites for the Lepidoptera of the Mackenzie Country are listed and discussed. Some management objectives are put forward.

Keywords: Lepidoptera, Mackenzie Country, Mackenzie Ecological Region, shrublands, kettle-holes, wetlands, grasslands, cushion vegetation, saline soils, *Sigaus minutus*, key sites for conservation, conservation management.

INTRODUCTION

Intensive light-trapping supplemented by diurnal collections from the environs of Tara Hills Research Station in the Mackenzie Country produced 125 species of Lepidoptera (Patrick 1989b). Subsequent collecting in the Mackenzie Country has produced additional species that are listed here as a first supplement. In contrast to the original survey, these collections emphasised diurnal species. Collecting sites included shrublands, kettle-holes, wetlands, salt-pans, fescue grasslands and depleted cushion vegetation.

The Mackenzie Country is a large intermontane basin of about 2000 km^2 located in the central South Island of New Zealand (Fig. 1). It is predominantly flat but ranges in altitude from 500 m near Omarama in the south to 760 m near Tekapo in the north. The climate is subcontinental in character with typically warm north-westerly winds and rainfall at around 500 mm annually (Espie *et al.* 1984). Commensurate with this relatively low rainfall and a 100 years of burning and grazing the vegetation of the Mackenzie Basin has been transformed to essentially depleted fescue grassland with very limited areas of snow tussock *(Chionochloa rigida)* and red tussock *(C. rubra)* (Conner 1964). Significant native intertussock species in terms of their abundance include the genera *Raoulia, Epilobium, Scleranthus* together with *Geranium* and *Vittadinia* species. Some gullies and terraces support sparse shrublands of *Olearia odorata, Discaria toumatou, Pimelea* species, *Melicytus alpinus* and *Coprosma* species.

Morainic kettle-holes east of Lake Ohau support a diverse short turf of predominantly native plants and distinctive *Cassinia* shrubland (Fig. 2) (Johnson 1980). There are other wetlands on the Grays river south of Tekapo. Exotic species are dominant in many of the communities in the Mackenzie Basin especially those that have been cultivated or otherwise disturbed. *Hieracium, Trifolium, Rosa, Bromus* and *Anthoxanthum* are the most important exotic plant genera present. Williams (1980) described the conspicuous exotic *Vittadinia* and *Rumex* communities around Omarama. Rabbits have been a recurring problem from 1878 to the present, competing with sheep for a decreasing food resource.

Dick (1940) in examining the role of Lepidoptera in causing the degradation of the tussock grasslands of the Mackenzie Country, noted 9 species of moth. One of these was later described by Hudson from Dick's material, as a new species — *Orocrambus fugitivellus*.

The Mackenzie Country includes the Omarama, Pukaki and part of the Tekapo and

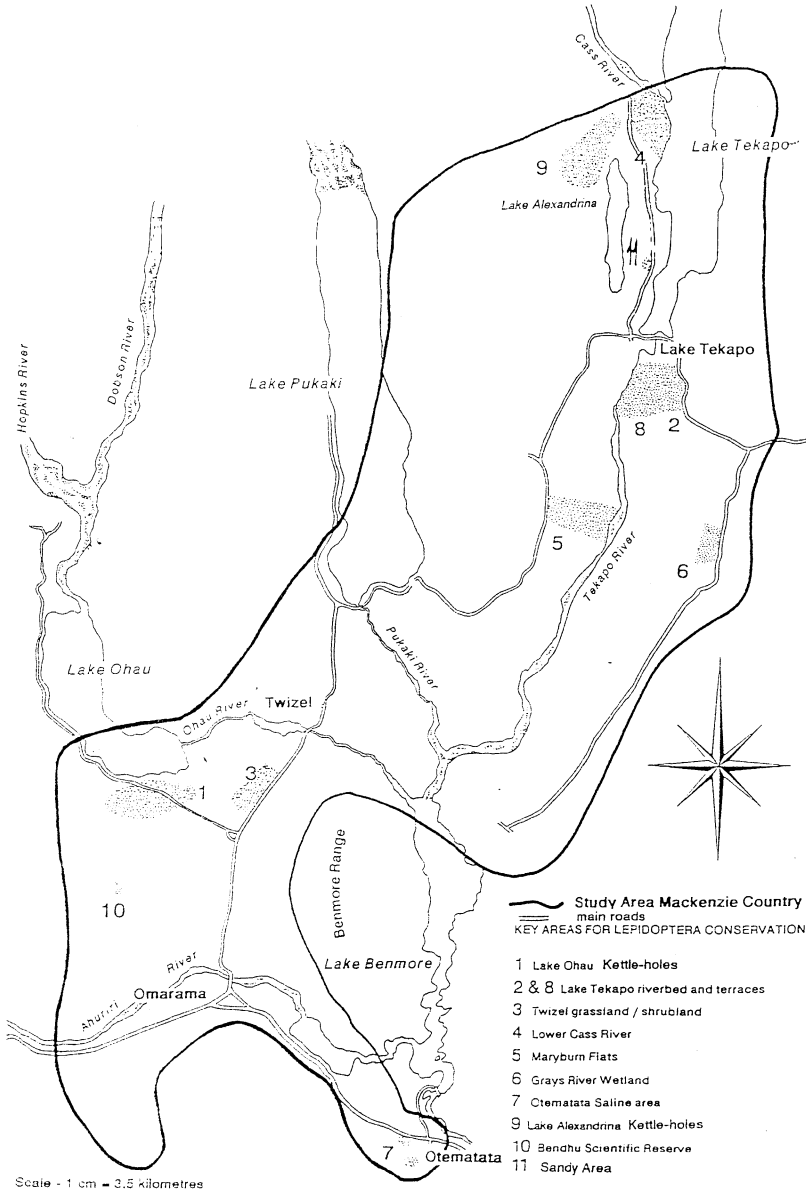

Fig. 1: Map of the Mackenzie Country showing the key sites proposed for the conservation of species of Lepidoptera.

Benmore Ecological Districts which are within the Mackenzie Ecological Region (McEwen 1987). This region has been surveyed as part of the Protected Natural Areas Programme (Espie *et al.* 1984). That paper includes some useful information concerning Lepidoptera detected during the survey and includes several recommended areas for protection in which the various moth species occur. This report aims to present a more comprehensive set of protected areas that would more fully protect the characteristic invertebrate fauna of the Mackenzie Country. The aim is that this set of protected areas would contain and maintain the key natural processes of the Mackenzie Country of which insects are an important part.

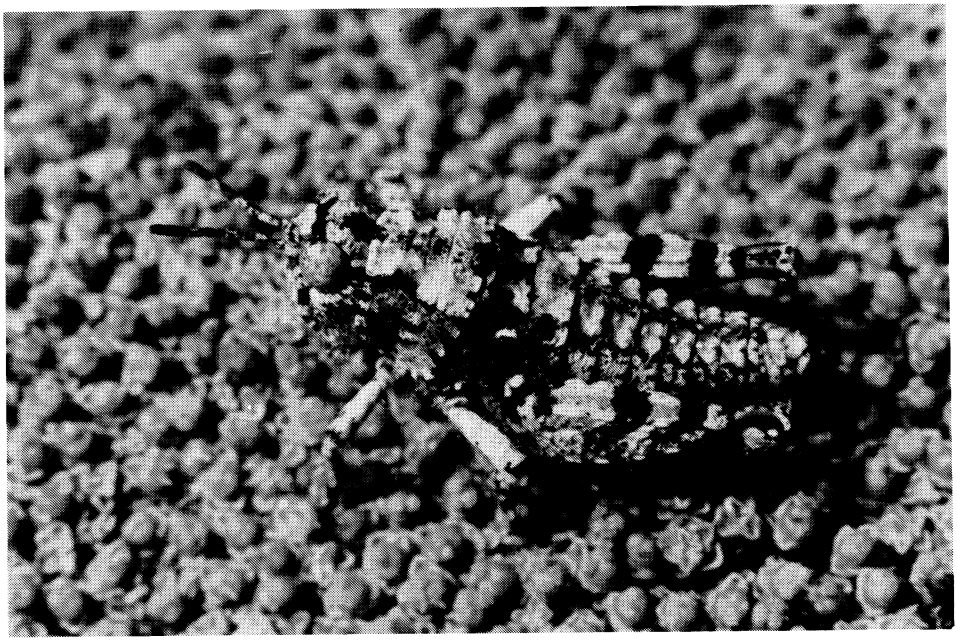

Fig. 2: The adult female of *Sigaus minutus* on a *Raoulia australis* cushion near Omarama.

Fig. 3: Looking west to the morainic kettle-holes near Lake Ohau. The area of water in the middle left is a kettle-hole surrounded by short turf. *Cassinia* shrubland is between the road and kettle-hole.

Fig. 4: The male *Orocrambus fugitivellus*. The species is confined to a small area of seasonally wet grassland on the Grays River south of Tekapo.

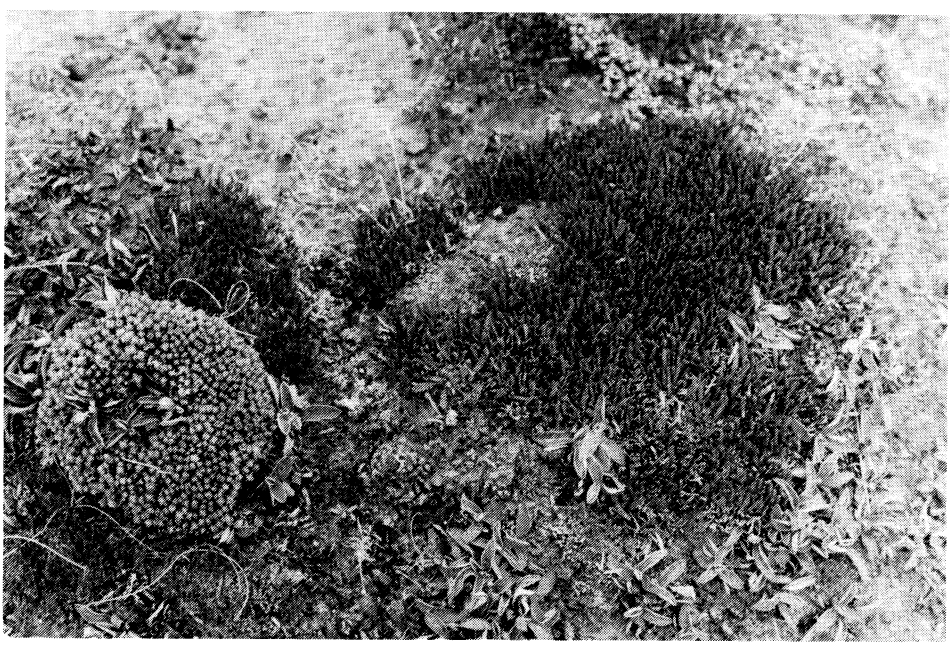

Fig. 5: The river terraces south of Tekapo support important residual native communities of high conservation value. Here the exotic *Hieracium* is present with a round cushion of *Pimelea pulvinaris* and a diminutive shrub of *Carmichaelia enysii*.

METHODS

Between October 1988 and August 1989 seven visits to sample for Lepidoptera species were made to various sites in the Mackenzie Country. Diurnal species were netted at all sites sampled; while nocturnal species were collected only at the kettle-holes near Lake Ohau (December) and cushionfield south of Tekapo (October and March).

A larval collection obtained by Dr Barbara Barratt by pitfall trapping between the months of August and December at the Tara Hills Research Station was also examined. Lepidoptera specimens are stored in the B. H. Patrick private collection.

RESULTS

Species located and sites where they were found are shown in Table 1.

Table 1: Species of Lepidoptera found in the Mackenzie Country.

This list supplements that presented in Patrick (1989b).
Nomenclature follows Dugdale (1988).
*Indicates species collected during daytime only.

Family and Species	Seasonality	Sites
Elachistidae		
**Cosmiotes ochroleuca* (Meyrick)	Oct-March	Ohau kettle-holes and grassland near Twizel
**Elachista gerasmia* Meyrick	Nov	Ohau kettle-holes
Tortricidae		
**Harmologa* sp.		Twizel-Lake Ohau; larvae on *Cassinia* sp. Adults bred only.
**Parienia mochlophorana* (Meyrick)	Oct-Dec	Ohau kettle-holes
Tineidae		
Niditinea fuscella (L)	March	near Tekapo
Monopis crocicapitella (Clemens)	Jan-Apr	near Omarama
Scythridae		
**Scythris triatma* Meyrick	Dec	Ohau kettle-holes
**S. epistrota* (Meyrick)	Nov	grasslands south of Twizel
Gelechiidae		
**Kiwaia schematica* (Meyrick)	Nov	Ohau kettle-holes
**K. thyraula* (Meyrick)	Nov	Omarama cushionfield
**K. pharetria* (Meyrick)	Nov	Twizel grassland, larvae probably on *Carmichaelia petrei*.
**Kiwaia* sp.		Brachypterous in both sexes on Tekapo terraces.
Pterophoridae		
**Stenoptilia celidota* (Meyrick)	Feb	Omarama area larvae in *Vittadinia gracilis* flowers
Glyphipterigidae		
**Glyphipterix acrothecta* Meyrick	Feb	near Omarama, river terrace
Oecophoridae		
**Hierodoris frigida* Philpott	Feb	rocky areas near Omarama also salt-pan near Otematata
**Hierodoris* species	Dec	Ohau kettle-holes
**Phaeosaces apocrypta* Meyrick	Jan	Tekapo Flats, larvae on lichens on shrubs
Leptocroca asphaltis (Meyrick)	Dec	Tekapo Flats, Twizel and Omarama areas
Pyralidae		
Homoeosoma anaspila Meyrick	Oct-Nov	Omarama area larvae in *Vittadinia gracilis* flowers

Crambidae		
**Eudonia gyrotoma* (Meyrick)	Dec	Tekapo Flats (type locality)
E. philerga (Meyrick)	March	Lower Cass river terrace
**E. trivirgata* (Felder & Rogen)	Nov-Dec	Ohau kettle-holes
**Orocrambus aethonellus* (Meyrick)	Nov	Ohau kettle-holes
O. callirrhous (Meyrick)	Jan-Feb	Tekapo Flats
**O. fugitivellus* (Hudson)	Jan-Feb	Grays River (type locality)
O. ordishi Gaskin	Jan	Tekapo south area
O. paraxenus (Meyrick)	Jan	Tekapo south-Twizel area
O. xanthogrammus (Meyrick)	Jan-Feb	Tekapo Flats
**Scoparia contexta* Philpott	March	Lower Cass River terrace
Geometridae		
**Paranotoreas fulva* (Hudson)	Jan	Tekapo Flats, rare, larvae possibly feeding on various hawksbeard and hawkweed species.
**Dichromodes* sp.	Oct	Otematata saline area.
Noctuidae		
Agrotis infusa (Boisduval)	Jan	Tekapo Flats
Andesia pessota (Meyrick)	Jan	Tekapo Flats

DISCUSSION

The 33 species listed in Table 1 bring the total of Lepidoptera now recorded from montane areas of the Mackenzie Country to 158 species. Two more species whose type locality is in the Mackenzie Country (Patrick 1989) were not found. These are *Scoparia parachalca* Meyrick and *Kiwaia lenis* (Philpott). However, *K. lenis* was found in the course of this survey; it was common in predominantly native short turf near Kurow, in the Waitaki Valley east of the Mackenzie Country (Patrick & Chisholm 1989). This record extends the known range of the species; previously it was thought to be a Mackenzie Country endemic (Philpott 1929). The distinctive crambid species *Orocrambus fugitivellus* was found to be extremely commonly over a limited area of seasonally damp grassland adjacent to the Grays River, south of Tekapo. Gaskin (1987) and the original discoverer of the species, Mr R. D. Dick, also found the species only at this site (the late R. D. Dick pers. comm.) and it is therefore possible that it is endemic to this small area of the north-eastern Mackenzie Country. The female of *O. fugitivellus* has yet to be found and therefore is possibly brachypterous. *Eudonia gyrotoma*, an elegantly patterned crambid, was also first described from specimens found in the Mackenzie Country, in this case near Lake Tekapo. During this survey it was found to be rather common on depleted terrace vegetation immediately south of Tekapo. I have also collected the species in the Upper Clutha and Waitaki Valleys. Another significant discovery was the finding of diurnal geometrid, *Paranotoreas fulva* on glacial outwash terraces immediately south of Tekapo. The species was rediscovered and associated with saline areas in Central Otago by Patrick (1989a). Its range (Patrick 1990) is now extended to the flats near Tekapo where it was found to be rare, in contrast to Central Otago saline areas. In Central Otago saline areas the larval food plants are *Atriplex buchananii* and *Plantago coronopus*, although other food plants must be used as the species was found in sites where neither of these occurred (Patrick 1989a). Larvae from Mackenzie Country adults have been fed successfully in captivity on various hawksbeard and hawkweed species (*Crepis* spp. and *Hieracium* spp.) so it is probable that these and related species of the dandelion group are the present foodplants of *P. fulva* in the Mackenzie Country. Another rare diurnal species found was the undescribed species of *Loxostege* that was first discovered at Red Flat near Tara Hills (Patrick 1989b). In this survey it was recorded from rocky areas on Grays Hills and on saline soils near Otematata. Patrick (1989a) found it to be a characteristic species of Central Otago saline areas. The grey and white oecophorid *Tingena honesta* is endemic to the Mackenzie Country. During this survey it was found emerging from brown top *(Agrostis capillaris)* near Twizel. The larvae probably feeds on the leaf litter or roots of browntop.

The discovery of saline soils near Otematata (Patrick 1989a) and at the Otematapaio River is significant because previously such soils were known only in various parts of

Central Otago (Raeside 1949). One particular site found close to Otematata contained halophytes including the first record of *Atriplex buchananii* from the Mackenzie Country. Lepidoptera at this site included a new species in the genus *Dichromodes* which is only known elsewhere from a site near Kurow (Patrick & Chisholm 1989), and a new species in the genus *Loxostege*.

This study also led to the discovery of the host of the small diurnal Oceophorid, *Oxythecta austrina*. Cocoons containing pupae were found under stones amongst *Leucopogon fraseri*. From their positioning it was obvious that the larvae feed on the stems and litter associated with the plant in such positions. This has been substantiated by recent observations in the Upper Clutha Valley, Kaitorete Spit and Ida Range.

Examination of larvae collected by Dr Barbara Barratt using pitfall traps at Tara Hills Research Station, showed the importance of the native noctuid species *Rictonis comma* in numerical terms, at this site. It was by far the most commonly trapped larval species between the months of August to December. It feeds on a wide variety of both native and exotic grasses and herbs (Patrick unpub.), as well as on *Pinus* seedlings (J. S. Dugdale pers. comm.), so is possibly having some impact on the farming operation at the Research Station.

Sigaus minutus (Fig. 2) is an uncommon New Zealand grasshopper and is considered by Bigelow (1967) to be rare. It was discovered in the Tekapo area of the Mackenzie Country (Bigelow 1967) and has a small disjunct population east of Alexandra (Patrick 1989c). During this survey it was recorded from many sites in the Mackenzie Country in addition to those recorded by Espie *et al.* (1984). Several of these sites are included amongst those I have recommended for protection. At several of the recommended sites *S. minutus* appeared to have quite large populations (eg, Tekapo River Terrace).

INSECT CONSERVATION

Espie *et al.* (1984) surveyed the natural values of the entire Mackenzie Ecological Region and recommended various representative areas be conserved. Although their survey emphasised the conservation of plant communities, it did to a very limited degree sample and list some invertebrates from these recommended areas, among them Lepidoptera. Additional information on Lepidoptera obtained during my survey is listed below for some of the areas recommended for protection. Several more areas are proposed for conservation as a result of finding the Lepidoptera recorded during my survey. With over 1760 species the order Lepidoptera in New Zealand is a very useful indicator group for ecosystem conservation as it is the third largest insect group and its members occupy all biotypes except caves in New Zealand (Dugdale 1988). Species are usually restricted to certain biotypes and their presence or absence give strong indications to the presence and quality of that biotype.

Additional information on Lepidoptera for areas recommended by Espie *et al.* (1984):

Lake Ohau Kettle-holes (Shelton Downs)

The seasonally flooded kettle-holes east of Lake Ohau support a very diverse flora of turf plants around their edges (Johnson 1980, 1990). Between the kettle-holes a predominantly native grassland-shrubland exists containing conspicuous shrubs of a *Cassinia* species. Lepidoptera characteristic of the turf margins of the kettle-holes are *Orocrambus aethonellus, Eudonia trivirgata, E. leptalea, Arctesthes catapyrrha, Notoreas perornata, Parienia mochlophorana, Cosmiotes ochroleuca, Elachista gerasmia, Eurythecta zelaea, Pterophorus innotatalis* and *Diasemia grammalis*. The shrublands support undescribed species of *Harmologa* on *Cassinia*, and *Hierodoris* on leaf litter while *Oxythecta austrina, Scythris triatma, Kiwaia schematica* and *Sporophylla oenospora* are species of note associated with cushionfield and herbfield. Overall the assemblage of both nocturnal and diurnal Lepidoptera species is distinct from any other area of the Mackenzie Country. The recommendations of Johnson (1990) are supported to increase the size of the recommended area to better represent the kettle-hole Lepidoptera east of Lake Ohau. The grasshopper species *Sigaus australis* was also found at this site, which was listed by Jarman (1987) as being outstanding for wildlife values. A new and as yet undescribed species of flightless chafer beetle in the

genus *Prodontria* has recently been found in this area (B. Barratt pers. comm.). It is known only from one other site, near Twizel.

Tekapo River Terraces (Edwards Stream)

Extesive outwash terraces immediately south of Tekapo township to Edwards Stream contain hollows and crests supporting a remnant native flora of cushion plants, miniature shrubs, herbs and grasses including the herb *Lepidium sisymbrioides*, the cushion *Pimelea pulvinaris* and the miniature shrub *Carmichaelia enysii* (Fig. 4). Otherwise the flora is dominated by various exotic herb species, mainly in the genus *Hieracium*. It occurs characteristically in large uniform mats. Many seasonally wet tarns dot the area and contain a diverse native turf flora which is formed into well marked bands which show the different water level tolerances of the species involved. Rabbits are present in large numbers in this area and must have some impact on palatable native species such as *Poa maniototo*. Other native plants such as *Pimelea* species, *Leucopogon fraseri* and *Raoulia* species, which are important invertebrate hosts, appear to be unpalatable to rabbits (and sheep) and suffer only a little disturbance. Invertebrates in communities such as on the Tekapo River terrace, prefer low, open vegetation. So the presence of much bare ground, low rocky areas, lichens and mosses is advantageous to most species. Some species use the lichens and mosses as a host, others as a habitat (eg, many species live under rocks and diurnal Lepidoptera sunbathe on the bare areas). I found invertebrates, particularly Lepidoptera, to be abundant, especially in the areas of residual natives, rocks and bare ground, both in terms of diversity and numbers, perhaps highlighting their resilience in such highly disturbed environments. Lepidoptera present on the terrace include *Eudonia gyrotoma, E. atmogramma, E. cataxesta, Kiwaia lithodes, Diasemia grammalis, Arctesthes catapyrrha, Paranotoreas fulva, Dichromodes sp., Lycaena boldenarum, Aletia sistens,* and *Harmologa* species. Moth species found in the wetlands include *Orocrambus aethonellus, O. corruptus, Oxythecta austrina, Eurythecta zelaea, Pterophorus innotatalis* and *Sporophylla oenospora*. The uncommon grasshopper *Sigaus minutus* is locally common at this site. The diurnal moth *P. fulva* is found outside of Central Otago only here, where it has apparently only a small population. The rare grey and white *Harmologa* species which is found here has been bred from *Melicytus alpinus* (Patrick 1989b). The uniform, predominantly exotic vegetation but with important remnant native plant species and large size of this area (around 1200 ha) would make it an ideal protected natural area providing some degree of internal buffering. The presence of a diverse Lepidopteran fauna containing representative common species and several rare species as well as an uncommon grasshopper supports the protection of this site. The boundaries have been changed to more fully protect the sites of importance for invertebrates (Fig. 1).

Twizel Grassland-Shrubland (Spring Creek)

An extensive area south of Twizel to the Ohau turn-off has a predominantly native fescue grassland interspersed with shrubs of *Cassinia* species, *Carmichaelia petrei, Pimelea* species and *Melicytus alpinus*. Browntop *(Agrostis capillaris)*, an exotic grass, is common in this area and the Mackenzie Country endemic moth, *Tingena honesta*, was observed emerging from large patches of the grass at night. Larvae of *T. honesta* probably have adapted to feed on the dry leaf litter or roots of browntop. Other moths present include many widespread species characteristic of grasslands and the less common *Sporophylla oenospora, Tingena maranta, Kiwaia pharetria, Cosmiotes ochroleuca, Eudonia atmogramma, Scoparia chalara* and *Oxythecta austrina*, while the gaily coloured *Arctesthes catapyrrha* occurs also. Moth species associated with shrubland include *Notoreas perornata* and *Scythris epistrota*. To be fully effective I believe the boundaries of the protected area need to be extended to enclose a much larger area (around 500 ha). It will then more fully represent the plant and insect associations present and provide its own buffering to outside influences (Fig. 1).

Lower Cass River

A large sparse shrubland of *Discaria toumatou* dominates this riverflat site, whose stony ground covered with a cushionfield of *Raoulia* species and other herbs. Lepidoptera include common but characteristic species of riverbed such as the Boulder Butterfly *(Lycaena*

boldenarum), Eudonia cataxesta and *Capua semiferana*. Less common species found are *Eudonia gyrotoma* and *Scoparia contexta*. The grasshopper *Sigaus minutus* is common at this site. I endorse the existing boundary of this proposed protected area.

Maryburn Flats

This is fescue grassland/herbfield area dotted with rock tors; it has gravelly areas in addition to some bare ground, which is essential to some invertebrate species. This area has a good representation of many characteristic Mackenzie Country moth species including *Oxythecta austrina, Arctesthes catapyrrha* and *Kiwaia lithodes*. No rare species are known to exist here but the commoner ones are well represented.

Additional areas recommended for protection, mainly on the basis of their supporting invertebrate species are:

Grays River Wetlands

Grassland dominated, seasonally damp area that is adjacent of the Grays River. This area is the only known locality for the endemic diurnal crambid moth; *Orocrambus fugitivellus* (Fig. 4). The native and exotic grassland supports 7 other *Orocrambus* species and an uncommon species, *Sporophylla oenospora*, apart from a range of more widespread moth species. Because this is the only known site of *O. fugitivellus* this site warrants protection (Fig. 1). Jarman (1987) lists 2 parts of the Grays River wetlands as of high value for conservation of wildlife and their habitat.

Otematata Saline Area

Two relatively large, mainly bare saline areas occupy slopes 1 km west of Otematata on Otematata Station. Smaller bare areas exist nearby but do not contain the floristic diversity of these sites. The sites are littered with rocks and contain a mainly exotic flora, but significantly they do have native holophytes including *Atriplex buchananii, Chenopodium detestans* and *Lepidium sisymbrioides*. This is a significant extension to *A. buchananii's* distribution, as it has never before been recorded from the Mackenzie Country. Lepidoptera found include *Hierodoris frigida, Sporophylla oenospora, Loxostege* sp., *Eudonia atmogramma*, and a new species of *Dichromodes* (Patrick & Chisholm 1989). The site also contains the commoner moth species characteristic of grassland in this part of the Mackenzie Country and is the only area outside of Central Otago of inland saline soils associated with a saline flora (Patrick 1989a). The site lies close to the border between the St Marys Ecological District and the Benmore Ecological District which are included in different ecological regions. McIntosh *et al.* (1990) analysed the soils from this site and considered it of high importance in terms of the geology and soils present. Latterly it has been put forward as a soil site of at least national importance (P. D. McIntosh pers. comm.).

Tekapo Riverbed

The broad stony riverbed of the Tekapo River below the dam near Tekapo township supports several populations of the relatively large grasshopper *Brachaspis robustus*. This species was thought by Bigelow (1967) to be rare and is now considered to be the most endangered of our endemic grasshoppers (Bell 1986). Plant communities include a large population of the shrub *Helichrysum depressum* interspersed with mats of *Raoulia haastii* and *Epilobium melanocaulan*. Moth species present include the diurnal *Paranotoreas brephosata* and *Eudonia cataxesta*. The site is fully representative of such riverbeds in the Mackenzie Country as it contains not only rare grasshopper species but also the characteristic common species of Lepidoptera. Ideally this protected area would be continuous with the Tekapo River terrace protected area (Fig. 1).

Other Recommended Areas

Areas in the Mackenzie Country that have not been fully surveyed for Lepidoptera but appear from a cursory study to support representative moth species are Bendhu Scientific Reserve, Lake Alexandrina kettle-holes (Glenmore Tarns) and a small sandy roadside area between Lakes Alexandrina and Tekapo.

Because of the large number of species of Lepidoptera associated with rocky areas in both the Mackenzie Country and Central Otago (see Patrick 1989c) it may be advisable to promote the conservation of additional such areas in the Omarama-Otematata, Tekapo-Mary Burn, and Grays Hills areas. All 3 areas have an abundance of rocks and tors of many sizes and support not only a characteristic moth fauna but other biotic values such as herbs and shrublands.

Future Management of these Proposed Protected Areas

The management objective of all the proposed protected areas must be to nurture the natural processes, habitats and species present in each area identified. Since many of the areas which I have just proposed for some sort of protection for their natural values are the result of gross disturbance over the last 140 years, they may only have residual native communities left. Therefore it is important that appropriate monitoring be implemented. This can be done on a minimum number of sites and could produce a great amount of information relevant to similar sites. Such traditional management techniques as burning grasslands and oversowing would be inappropriate on any of these protected areas, since these techniques promote weediness and lower the natural species diversity (Kirkpatrick & Dickinson 1984). Grazing by sheep may be acceptable on areas with significant exotic grasses and herbs, with the level of grazing being determined by ongoing detailed vegetation monitoring.

ACKNOWLEDGEMENTS

Firstly I thank my family for accompanying me on many holidays to the Mackenzie Country while I roamed far and wide in search for insects and plants. Secondly to Brian Rance, Mark Davis and Ken Hughey for company on one such expedition each. To Mark Davis for useful conversations about grasshoppers in the Mackenzie Country. To John Dugdale (DSIR), Mark Davis, Don Newman, Mary Cresswell and Richard Sadlier at the Department of Conservation for useful comments on the manuscript I am grateful. To John McMecking, Philippa O'Neill and Joy Taite I owe many thanks for the drafting and typing duties. To the many landowners, especially to Mr Hugh Cameron of Otematata Station, who freely gave permission to sample, I am thankful.

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Armoured scale insects (Hemiptera: Diaspididae) on unsprayed kiwifruit vines in the Waikato

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ABSTRACT

Two generations of greedy scale (*Hemiberlesia rapax*) and oleander scale (*Aspidiotus nerii*) were found between December and May on unsprayed kiwifruit vines in the Waikato. Few first generation scale insects of either species infested fruit with second-generation scale infesting fruit from late January onwards. The relative abundance of the 2 species on leaves and fruit differed with oleander scale infesting leaves to a lesser degree. A greater proportion of oleander scale settled on the ventral surface of leaves and they were found in more protected sites on wood than greedy scale.

Keywords: greedy scale, *Hemiberlesia rapax*, oleander scale, *Aspidiotus nerii*, distribution, kiwifruit, *Actinidia deliciosa*, Waikato

INTRODUCTION

Armoured scale insects are key pests of kiwifruit grown in New Zealand (Berry 1983) and other parts of the world (Gonzalez 1986; Beede & Hasey 1988). Greedy scale (*Hemiberlesia rapax* Comstock) became a significant pest of kiwifruit in the late 1960's (Sale 1980). More recently, surveys of scale insect infestation of fruit harvested from commercial orchards in kiwifruit growing regions throughout New Zealand have shown latania scale (*Hemiberlesia lataniae* Signoret) and oleander scale (*Aspidiotus nerii* Bouché), Berry *et al.* 1989;