

## **Conservation status of five data deficient moth taxa: *Epichorista lindsayi*, “*Cnephasia*” *paterna*, *Stathmopoda endotherma*, *Gymnobathra ambigua* and *Scythris* “stripe”**

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### **Introduction**

The Department of Conservation commissioned Wildland Consultants to investigate and report on the threat classifications of five indigenous moth species currently classified as ‘Data Deficient’ (Stringer *et al.* 2012):

- *Epichorista lindsayi* Philpott, 1928 (Tortricidae).
- “*Cnephasia*” *paterna* Philpott, 1926 (Tortricidae).
- *Stathmopoda endotherma* Meyrick, 1931 (Stathmopodidae).
- *Gymnobathra ambigua* (Philpott, 1926) (Oecophoridae).
- *Scythris* “stripe” (Scythrididae).

The Department maintains listings of all indigenous species considered to be threatened with extinction in some way. Threat rankings are based on consistent criteria, and are updated regularly based on new information the Department receives, generally from specialist groups set up to provide advice. The listings are published regularly (e.g. Lepidoptera: Stringer *et al.* 2012), making them available to conservation staff for input to ongoing management, and to the wider public.

‘Data Deficient’ species are considered - by relevant specialist groups - to be threatened, but for which there is insufficient information to make an informed decision on which category they should be assigned to.

This report provides the results of an investigation of the five moth species listed above, in order to ascertain an appropriate conservation status for each.

## *Epichorista lindsayi*

### **Taxonomy**

In New Zealand, a number of species has been placed into the genus *Epichorista* (Dugdale 1988), however many of these do not fit the description of *Epichorista*, including *Epichorista lindsayi*. Dugdale (1988) noted for this grouping of species that the males lack a costal fold on the forewing. There is no doubt that *Epichorista lindsayi* is a valid species, but its present generic placement is not correct.

In the New Zealand Arthropod Collection (NZAC) held by Landcare Research at Tamaki, Auckland, there are various moths closely resembling *E. lindsayi* that have been found in the Hunua Ranges south of Auckland, and from Taikawakawa, north of Gisborne (Dr Robert Hoare, pers. comm., April 2014). Further work is required to confirm the correct identification of these moths.

### **Discovery**

The small yellow tortricid moth, *Epichorista lindsayi*, was discovered by Stuart Lindsay at Little River on 29 January 1928 and was described later that same year by Alfred Philpott (Plate 1). In one day, Lindsay collected five individuals, indicating that it was locally common where he found it in the Little River area. Over succeeding years, Lindsay went on to find it at other Banks Peninsula sites, including Kaituna (eight individuals 19-20 January 1929) and Prices Valley (three individuals on 14 January 1933 and five on 26 January 1935). In total he collected 21 individuals over five years from three sites over a small compact part of Banks Peninsula.

Hudson (1939) described and illustrated the species but noted no additional records. All of the Lindsay specimens, including the Holotype, are stored in the Canterbury Museum with no other specimens confirmed for the species, there or elsewhere in New Zealand museums.



Plate 1: Adult male *Epichorista lindsayi* collected from forest above Little River on 23 January 2014.

### **Rediscovery**

On 23 January 2014, *Epichorista lindsayi* was rediscovered while undertaking an entomological survey, for Christchurch City Council, of a patch of privately-owned mature podocarp forest - Wairewa Forest<sup>1</sup> - above Little River, between Breitmeyers and Wairewa Roads,. The moth was locally common, flying in the sunshine within grassy forest glades, and was unmistakable. Several adults were kept alive to be photographed, and these adults lived until 5 February 2014.

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<sup>1</sup> Ten surveys were carried out by Wildland Consultants for the Christchurch City Council over the 2013-2014 summer as part of their programme to identify significant natural areas on Banks Peninsula.

Moths were collected and curated, some of which have been deposited in the New Zealand Arthropod Collection.

### **Ecology**

Adults of *Epichorista lindsayi* were observed flying in the sunshine in canopy gaps at Wairewa Forest. All of these canopy openings were dominated by the tall grass *Microlaena polynoda* and the moth appeared to be strongly attracted to it. Initially casual examination of the *Microlaena* did not produce evidence of larval damage but in 13 October 2014 at Prices Valley, Banks Peninsula I found larval damage that I believe to be from the larvae of this moth. It was in the form of a “pinched” leaf blade about halfway up the blade and is quite difficult to see given the thinness of the un-pinched leaves. Under a microscope this pinching is instead a rolling of the leaf with silk and with the larvae living inside this rolled leaf and scouring the green material from within causing a localised browning of the pinched or rolled area.

I had previously visited Prices Valley in March 2014 to see if habitat similar to Wairewa Forest is present there, although March is too late in the season to observe the moth. This is also where the moth was found by Lindsay in 1933 and 1935. The forest is a mix of old-growth podocarps, dense ungrazed understorey, sprayed secondary growth forest, and scattered trees in exotic pasture. The best potential habitat for the moth was found within a Queen Elizabeth II covenant, where *Microlaena polynoda* was present, mostly on roadside areas and some small glades similar to those at Wairewa Forest.

It should be noted that the similar-looking Hunua moths were also collected from a *Microlaena* species.

### **Conservation**

This new information on *Epichorista lindsayi* was taken to a recent meeting of the Department of Conservation’s Lepidoptera Panel on 28-29 April 2014 in Auckland. Based on its rediscovery at a single site, occurrence at only one site despite past searching of potentially suitable habitats nearby, and observations on its ecology, the species was moved to the **Threatened-Nationally Endangered** category.

## **Further Work**

The following actions are suggested for *Epichorista lindsayi*:

- That Wairewa Forest is protected with a covenant, with support from the Banks Peninsula Conservation Trust and Department of Conservation, to ensure that the only currently-known population is protected.
- The genus that this species (and its related species) has been assigned to needs to be clarified, including close examination of the possible con-specific status of the Hunua Ranges and north of Gisborne populations based on the New Zealand Arthropod Collection specimens (John Dugdale is a suitable person to undertake this work as he is a specialist in this group).
- Further survey should be carried out at Prices Valley, Kaituna, and other likely Banks Peninsula sites, in January 2015, to attempt to locate additional populations. This would include undertaking surveys of other sites where *Microlaena polynoda* is known to occur.
- Investigate the life history, starting with *Microlaena polynoda*. Examine this possible host in early spring when larvae should be present in stems, litter, or on the foliage.
- Reassess the Nationally Endangered threat status of *Epichorista lindsayi*, based on any new evidence found.

## ***“Cnephasia” paterna***

### **Taxonomy**

*“Cnephasia” paterna* (Plate 2) is part of a group of late autumn-early winter emerging species that inhabit damp swards, often on the margins of upland wetlands where taller grasses occur with a rich understorey of herbs. Upland wetlands dominated by *Schoenus pauciflorus* are a favoured habitat.

At present this group of moths does not have a valid generic name but they have been placed in *Cnephasia* and *Eurythecta* by various authors. "*Cnephasia*" *paterna* was included in a list of species for which their correct genus is undescribed, and had been placed incorrectly in *Cnephasia* by various authors (Dugdale 1988). There are seven known species of this new genus in New Zealand including two other named species: "*Cnephasia*" *ochnosema* Meyrick, 1936 and "*Eurythecta*" *leucothrinca* Meyrick, 1931.

This species assemblage appears to be confined to the South Island and contains at least seven species. All the species appear to have short-winged and flightless females, thereby severely limiting their dispersal ability. Additionally, all the known species can be abundant in the right place at the right time of year on a suitable warm sunny day, even if there is a partial cover of fresh snow. The adult males fly by day, searching for the female which crawls on the ground.



Plate 2: Holotype male of "*Cnephasia*" *paterna* stored in the Canterbury Museum. Image courtesy of Landcare Research Ltd. Note the scale in millimetres along the top of the image.

### **Discovery**

The tortricid moth “*Cnephasia paterna*”, was discovered by Stuart Lindsay on 31 March 1923 and was described by Alfred Philpott in 1926. The unique male was recorded as being from Little River, but there is evidence that this location is misleading and may not be correct, and probably contributed to the species being “lost” for so long. Hudson (1928) noted the species and gave an accurate illustration of the male found by Lindsay.

There were no more records of the species until I rediscovered it on Saddle Hill, Banks Peninsula on 28 May 2012 while carrying out a botanical survey for Christchurch City Council<sup>2</sup>. The moth was locally common in chest-high snow tussock (*Chionochloa rigida*), flying quite fast over the snow tussock on a warm but overcast day at an altitude of 750-800m. Eleven males were collected, two of which were deposited in the New Zealand Arthropod Collection. The forewing pattern of the male has variable colour and pattern, but does not significantly differ from the Holotype (Plate 2).

### **Survey**

Other upland snow tussock areas on Banks Peninsula were searched for additional populations of “*Cnephasia paterna*”, but without success. The snow tussock community on Saddle Hill is considered to be the best and most natural remaining on Banks Peninsula, but there are other fragments of this community high above Akaroa and Little River, mainly on roadsides. Over the late autumn of 2013 and 2014, the following locations were searched, with no success:

- Cloud Farm and Ellangowan, above Akaroa;
  - Mount Herbert 750-850 m.
- Saddle Hill was also revisited on 14 April 2013, and the moth was found flying there, as before.

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<sup>2</sup> Botanical surveys were carried out by Wildland Consultants for Christchurch City Councils significant natural areas programme on Banks Peninsula during the summer of 2011 - 2012.

## **Biology**

Little is known of the biology of this group of moths and they have never been reared. It is likely that the larvae feed in silken tunnels in damp herb-rich swards in these wetland communities, and have an annual life-cycle.

## **Conservation**

The diurnal tortricid "*Cnephasia paterna*" is only known from one site on Banks Peninsula despite searching at other apparently suitable sites. Saddle Hill has been recognised recently as a significant site for conservation for a range of ecosystems and species, and has been purchased by the Nature Conservation Fund of the Department of Conservation with financial assistance from the Rod Donald Trust, and will be protected for nature conservation in perpetuity. Unfortunately the snow tussock area belongs to a different landowner so was not part of this purchase. Currently I am pursuing options with other funders to purchase and protect the snow tussock site.

This new information on "*Cnephasia paterna*" was taken to a recent meeting of the Department of Conservation's Lepidoptera Panel on 28-29 April 2014 in Auckland. Based on its rediscovery at a single site despite much searching at a range of suitable sites nearby, and observations on its ecology, the species was moved to **Threatened-Nationally Endangered**.

## **Further Work**

The following actions are suggested for "*Cnephasia paterna*" management:

- The generic placement of this species and its related species are clarified (John Dugdale is a suitable person to undertake this work as he is a specialist in this group).
- Further survey should be carried out in the late autumn period on the higher peaks of Banks Peninsula, particularly those that hold populations of *Chionochloa rigida*, to attempt to locate further populations of this species.

- The life history of “*Cnephasia*” *paterna* should be investigated by searching for larvae over the summer months amongst the leaf litter - herb layer underneath the snow tussock canopy on Saddle Hill.
- Reassess the Nationally Endangered threat status of “*Cnephasia*” *paterna* based on any new evidence found.

### ***Stathmopoda endotherma***

#### **Discovery and taxonomy**

One specimen of *Stathmopoda endotherma* (Stathmopodidae) was discovered by Stuart Lindsay on 28 January 1928 at Little River, Banks Peninsula. Subsequently it was described by Edward Meyrick in 1931 based on this unique female, with the Holotype being lodged in the Canterbury Museum (Plate 3). Other specimens stored in the Canterbury Museum show that Lindsay found five more specimens, including the first male, at Akaroa, between 11-16 November, over the years 1938-1941.

Hudson (1939) lists and illustrates this distinct species but has no further records. No recent revision of this family has been carried out so some caution is needed when identifying specimens without dissection. Our current concept of this species is conservative, being based on external characters and the type locality.

#### **Recent Records**

The following definite records of this species have been found in the collections of the Otago Museum, Lincoln University, Canterbury Museum and Brian Patrick’s personal collection:

- Riccarton Bush, Christchurch - 11 January 1977 B H Patrick (Otago Museum).
- Dunsdale Scenic Reserve, Southland - 13 December 1980 B H Patrick (Otago Museum).
- Klondyke Corner, Arthurs Pass National Park - 7 December 1982 C Muir (Lincoln University).
- Riccarton Bush, Christchurch - 25 January 1983 C Muir (Lincoln University).

- Riccarton Bush, Christchurch - 25 November 1983 C Muir (Lincoln University).
- Riccarton Bush, Christchurch - 15 January 1988 C Muir (Lincoln University).
- Prices Valley, Banks Peninsula - 27 October 1988 C Muir (Lincoln University).
- Prices Valley, Banks Peninsula - 7 November 1988 (two specimens) C Muir (Lincoln University).
- McQuilkans Creek, Swampy Summit near Dunedin - 28 December 1994 B H Patrick (Otago Museum).
- Prices Valley, Banks Peninsula - 9 December 2013 B H Patrick (Private Collection).
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The above records of *S. endotherma* collected by Carol Muir in Riccarton Bush were published by Muir *et al.* (1995).



Plate 3: Holotype female stored in the Canterbury Museum. Image courtesy of Landcare Research Ltd. Scale along the top is in millimetres.

### **Distribution and Ecology**

*Stathmopoda endotherma* is a small shiny dark brown moth with a fairly distinctive wing pattern and appears to have a wide distribution across the South Island, but is never common. Based on the museum records, it occurs in indigenous forest between late October and January. It is quite likely that, in common with some other *Stathmopoda* spp., the larvae of *S. endotherma* feed on scale insects (John Dugdale, pers. comm., April 2014), and this predatory behaviour might explain their apparent rarity.

### **Conservation**

This new information on *Stathmopoda endotherma* was taken to a recent meeting of the Department of Conservation's Lepidoptera Panel on 28-29 April 2014 in Auckland. Based on the collation of specimen records, its distinctiveness and a better understanding of its likely biology, the panel moved *Stathmopoda endotherma* to **At Risk-Naturally Uncommon**.

### **Further Work**

None is suggested at this stage.

## ***Gymnobathra ambigua***

### **Taxonomy**

Hudson (1928) included and illustrated *Gymnobathra ambigua* and *G. thetodes* separately in his large volume on New Zealand butterflies and moths. *Gymnobathra ambigua* was listed as *Barea ambigua*. *Gymnobathra thetodes* also has the Port Hills listed as a locality. At first glance, his illustrations of each appear to be markedly different species, but on close examination and reconciliation of the wing markings, wing shape, size, and overall appearance, they bear a close resemblance to each other.

Other experts believe that *Gymnobathra ambigua* is a synonym of *Gymnobathra thetodes*, and that the latter was wrongly synonymised under *Gymnobathra dinocosma* by Dugdale (1988) (Dr Robert Hoare, Landcare Research Ltd., pers. comm.2013).

This is not the forum to address that synonymy, but this report will nevertheless treat *G. thetodes* as the valid name for this taxon.

### **Discovery**

The small distinctively-marked moth *Gymnobathra thetodes* (Oecophoridae) was discovered by Richard Fereday at Akaroa on 16 January 1872 and described by Edward Meyrick in 1901. Fereday found one male, which is stored in the British Museum of Natural History (Plate 5).

Another Fereday specimen, collected a few days later on 19 January 1872, presumably from the same locality, is in the Canterbury Museum. Interestingly it has a note on the label stating “Akaroa under hanging trees and dead branch”. A further Fereday specimen is undated, and simply states “Oakley window”. Oakley Station, near Southbridge, north of the Rakaia River close to its mouth, is where Fereday lived with his brother when he first moved to New Zealand in the early 1860s (Johns 1993).

William Heighway and Stuart Lindsay collected adult *Gymnobathra thetodes* (as *Gymnobathra ambigua*) from various localities in or close to Christchurch, including Burwood, Dean’s Bush (now Riccarton Bush), Brooklands, Prices Valley (Banks Peninsula), Puke Atua (Port Hills), Hoon Hay Bush, Spreydon, and Mount Grey, northwest of the city, between 1922 and 1924. In 1926, Alfred Philpott described *Gymnobathra ambigua* from the collections above, and designated the earliest specimen, a male, collected by William Heighway at Horseshoe Lake on 9 November 1922 as the Holotype. Subsequently Stuart Lindsay and other unknown collectors found it at other Canterbury sites, including the Conway River and Claverley in North Canterbury and at Puhi Puhi, Kaikoura, and Pleasant Point, South Canterbury, between November and February, over the years 1931-1938. The *Gymnobathra ambigua* Holotype and the other 18 specimens are stored in the Canterbury Museum (Plate 4).

### **Recent Collections**

Based on the literature and museum specimens, this moth was once fairly widespread across Canterbury and north to Kaikoura, but has been collected much less frequently in recent times. The Otago Museum collection contains two specimens:

- Fyffe Scenic Reserve, Kaikoura - 6 February 1991, John Ward.
- Riccarton Bush, Christchurch - 21-31 January 1995, in a Malaise trap run by Pat Quinn.

Dr Robert Hoare has specimens collected over the past decade from Kaikoura, and Ship Cove, in the Marlborough Sounds, that match *Gymnobathra thetodes* (Robert Hoare, Landcare Research, pers. comm., September 2013). Additionally, he has a possible record, or more likely a new species related to *G. thetodes*, from the Stratford Plateau, Taranaki, based on five specimens that he reared from dead wood of *Brachyglottis elaeagnifolia*. Frank Chambers also found this entity at Opunake, in Taranaki, in the 1970s.



Plate 4: Holotype of *Gymnobathra ambigua* in the Canterbury Museum. Image courtesy of Landcare Research Ltd. Scale at top is in millimetres.

### Conservation

*Gymnobathra thetodes* has undergone a major reduction in range and population size since European settlement. This is especially so for the now much expanded Christchurch City where most of the early records of Lindsay and Heighway were made. Despite much search effort by the report author over the past three years, and searches by others such as Carol Muir over the period 1980-1988 (Muir *et al.* 1995) and Denise Ford (2013), both of Lincoln University, no further specimens have been found in the greater Christchurch City area. The only recent Christchurch City record is from Pat Quinn's Malaise trap in Riccarton Bush in 1995.



Plate 5: Lectotype male of *Gymnobathra thetodes* is stored in the British Museum of Natural History. Image courtesy of Landcare Research Ltd. Scale at top is in millimetres.

Riccarton Bush (8 ha), now within Christchurch City, is a major protected area on the Canterbury Plains and the largest remaining podocarp forest remnant on the low plains. *Gymnobathra thetodes* may still exist here, but is rare, as despite 49 collecting expeditions over the years 1982-1988 it was not found by Carol Muir and colleagues (Muir *et al.* 1995). There are several recent records for the species in the Kaikoura region north to the Marlborough Sounds, but this is a large and relatively under-collected region, so little can be said of the moth's status there.

This new information on *Gymnobathra thetodes* was taken to a recent meeting of the Department of Conservation's Lepidoptera Panel on 28-29 April 2014 in Auckland. Based on the collation of specimen records both old and recent, and the probably synonymy of *Gymnobathra thetodes* and *G. ambigua* the panel moved *Gymnobathra thetodes* to **AtRisk-Relict**.

### **Further Work**

The following actions are suggested for *Gymnobathra thetodes*:

- Survey for the species in the Kaikoura area over the months November-December, to ascertain the conservation status of the species there.
- Formally make the synonymy discussed above to clarify the nomenclature of *Gymnobathra thetodes* and *G. ambigua* (Dr Robert Hoare is a suitable person to undertake this work as he is a specialist in this group).
- Ascertain the identity of the *Gymnobathra* species noted from the Stratford Plateau and Opunake and check its relationship to *Gymnobathra thetodes* and *G. ambigua*.
- Confirm or reassess the At Risk-Relict status of *Gymnobathra thetodes*, based on any new evidence found.

### ***Scythris* “stripe”**

#### **Taxonomy and Biology**

In New Zealand, the family Scythrididae is a relatively species-poor family of tiny but elegant moths, with at least nine known species in collections.

There has been no recent revision of the group in New Zealand, but there are five named species.

Ecologically, they inhabit a range of ecosystems - from coastal shrubland, through to riverbeds, lower slopes of hills, low alpine wetlands and shrubland to alpine scree and herbfield - with each species having a defined habitat. As adults they are active by day and are not attracted to light.

For some species, the larval host plant is well known, with hosts including shrubs such as *Hebe odora*, *H. epacridea*, *H. pauciramosa*, and *Carmichaelia* species; herbs such as *Raoulia subulata* and various specialist scree herbs. It is likely that other *Raoulia* species are also larval hosts, judging by the riverbed habitats of some species.

It is much easier to obtain adults of *Scythris* species by rearing rather than by searching in the field. They are difficult to find in the field as they are small and do not come to light traps, probably because of their diurnal behaviour. It may therefore be easier to relocate this species by rearing anything that looks like the *Scythris* larval stage.

### **Discovery**

John Dugdale found one male specimen of a very attractive and new species of *Scythris* (Scythrididae) at Birdlings Flat, Kaitorete Spit in daylight on 31 October 1987 (Plate 6). Despite much search effort by the original discoverer, Dr Robert Hoare, Brian Lyford, and Brian Patrick, no further specimens have ever been seen there or elsewhere. Dugdale recalls exactly where he found this single specimen and details about the particular vegetation community. The site where he found it is behind the township in what is now a covenanted tract of low shrubland dominated by *Coprosma propinqua* and open stonefield. Approximately 23 species of indigenous woody plants, including lianes, occur here, along with a few indigenous herbs and grasses, with lichens on the ground and on patches of wave-smoothed exposed stones.

### **Conservation**

This distinct new species of *Scythris* has only been found on a single occasion, and in relatively recent times. Despite much further search effort up to October 2014, it has not been recollected at its original location or elsewhere. It remains a mystery.

It is possible that the original site has been degraded in some way since 1987, as it was formerly farmed quite intensively with different farm animals and the land management included some shrubland clearance. The site is now protected with a covenant, the vegetation appears to be stable, stock is excluded, and periodic weed control is carried out.

Interestingly, Kaitorete Spit has two other *Scythris* species, one of which, *Scythris niphozela*, is endemic to the gravel barrier. This species and the much more widespread *S. epistrotta* have larvae that feed on the local endemic broom *Carmichaelia appressa* (Patrick 1994). Both *S. epistrotta* and *S. niphozela* emerge as adults over October-December, but while the former is common, the latter is rare. It is possible that the new *Scythris* is an even rarer inhabitant of these prostrate and extensive *Carmichaelia appressa* shrublands.

Another possible host for *Scythris* “stripe” is the sprawling *Muehlenbeckia ephedroides*. This plant has one of its largest populations nationally on Kaitorete Spit, and is particularly abundant at the eastern end of the Spit, close to where the moth was discovered.

This new information on *Scythris* new species was taken to a recent meeting of the Department of Conservation’s Lepidoptera Panel on 28-29 April 2014 in Auckland. Based on the search effort that has gone into attempting to re-locate the species, the threat to these sorts of indigenous plant communities and the moth’s agreed distinctiveness, the group moved the species to **Threatened-Nationally Critical**.

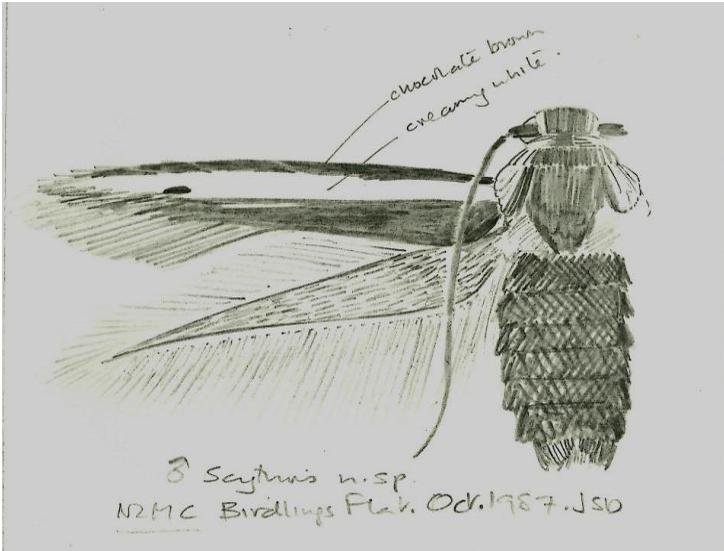


Plate 6. Drawing of *Scythris* 'stripe' by John Dugdale. Wingspan about 12 mm. Used with the artist's permission

### Further Work

- Continue to survey opportunistically for this species, particularly on Kaitorete Spit over the period October-November, paying special attention to the *Carmichaelia appressa* and *Muehlenbeckia ephedroides* shrublands.
- Experienced entomologists should search for larvae or larval damage and attempt to rear adults to deduce the host plant, ecology, population size, and possible threats.
- Confirm the Threatened-Nationally Critical conservation status of the species, based on any new evidence found.

### **Conclusions**

Based on recent new field surveys, examination of collections, re-evaluation of relevant literature and discussions with colleagues, which included a meeting of the Lepidoptera Panel of the Department of Conservation, the five formerly Data Deficient moth species have all been re-assessed and moved to a more appropriate threat rankings, as follows:

- *Epichorista lindsayi* is now Nationally Endangered.
- “*Cnephasia paterna*” is now Nationally Endangered.
- *Stathmopoda endotherma* is now Naturally Uncommon.
- *Gymnobathra ambigua* (as *G. thetodes*) is now At Risk-Relict.
- *Scythris* new species “stripe” is now Nationally Critical.

These re-assessments will be published by the Department of Conservation in a stand-alone publication for all New Zealand Threatened Lepidoptera in 2014.

### **Acknowledgements**

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Liz Garson and Paul Devlin of Christchurch City Council gave permission to use data collected while undertaking insect and plant surveys on Banks Peninsula.

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