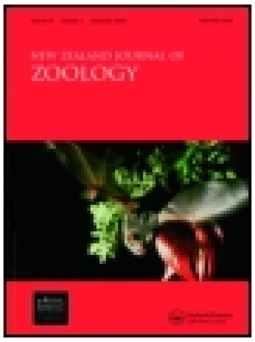

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Distribution and conservation requirements of Notoreas sp., an unnamed Geometrid moth on the Taranaki coast, North Island, New Zealand

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Distribution and conservation requirements of *Notoreas* sp., an unnamed Geometrid moth on the Taranaki coast, North Island, New Zealand

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Abstract Concern over a decline in habitat of an unnamed, endemic species of *Notoreas* (Geometridae) moth from the Taranaki coast stimulated this study on its distribution and conservation requirements. The caterpillars mine leaves of *Pimelea* (cf.) *urvilleana*, a prostrate shrub that can be found among other pioneer plants on coastal cliffs. Forty-seven patches of habitat were located along 50 km of coastal cliffs adjacent to farmland. Patches were clumped in distribution, and ¾ of the patches were "small", containing fewer than 15 host plants. Moths were detected in half the patches. Occupied patches were usually large (>25 plants), or if small, were usually within 200 m of another occupied patch. Recommendations for habitat management include weed control and reduction in damage from humans and stock. Ongoing advocacy with land owners and the community is important.

Keywords Lepidoptera; Geometridae; *Notoreas*; *Pimelea*; host plant; distribution; conservation; conservation grazing; patch occupation; coastal turfs

INTRODUCTION

Notoreas (Geometridae) is an endemic genus of brightly coloured, day flying moths. Dr Ken Fox first collected the Taranaki variety in the 1970s from areas along the South Taranaki coast, and in 1996 the same moth was also discovered in north-west Nelson (South Island) by Brian Patrick. It is one of the many unnamed varieties within the *Notoreas perornata* complex that are awaiting description (B. Patrick pers. comm.). (Hereafter, the Taranaki variety is referred to as *Notoreas*.)

Notoreas caterpillars are active at night and feed on leaves of a native daphne *Pimelea prostrata* var. *urvilleana* (Thymelaeaceae). In Taranaki, this plant can be found among early-succession and turf-forming species on coastal cliffs adjacent to farmland (Rogers 1999). Caterpillars are leaf miners until their first moult, and thereafter are external leaf feeders (Patrick 1998). During the day they can be found hiding under trailing branchlets. They pupate in leaf litter under the food plant. Coastal species tend to have two emergence periods from September to November then again from March to April.

The Department of Conservation has ranked this variety of *Notoreas* in the category of "serious decline" in the draft of the New Zealand Threat Classification System (R. Hitchmough pers. comm). A species in serious decline is defined as numbering fewer than 5000 mature individuals, or predicted to be at risk of a decline of 5–30% in the next 10 years due to existing threats. Patrick & Dugdale (2000) recommended that (1) management of the Taranaki populations is critical since the type locality is at risk, and (2) that this variety of *Notoreas* is important for understanding the evolution and radiation within this group.

Historically, *Notoreas* moths were collected from private land in several places along the Taranaki coast (F. Chambers pers. comm) and in 1986 the Conservation Authority recommended that two of the collection sites become protected (Bayfield & Benson 1986). At that time, both the Oeo and Puketapu Recommended Areas for Protection (RAPs) contained good populations of *Notoreas* and were considered prime examples of coastal herbfield. Regular monitoring of the RAPs began in 1992, but by then both sites had been affected by stock and weed encroachment (Wildland Consultants Ltd 1996 unpubl. survey sheets).

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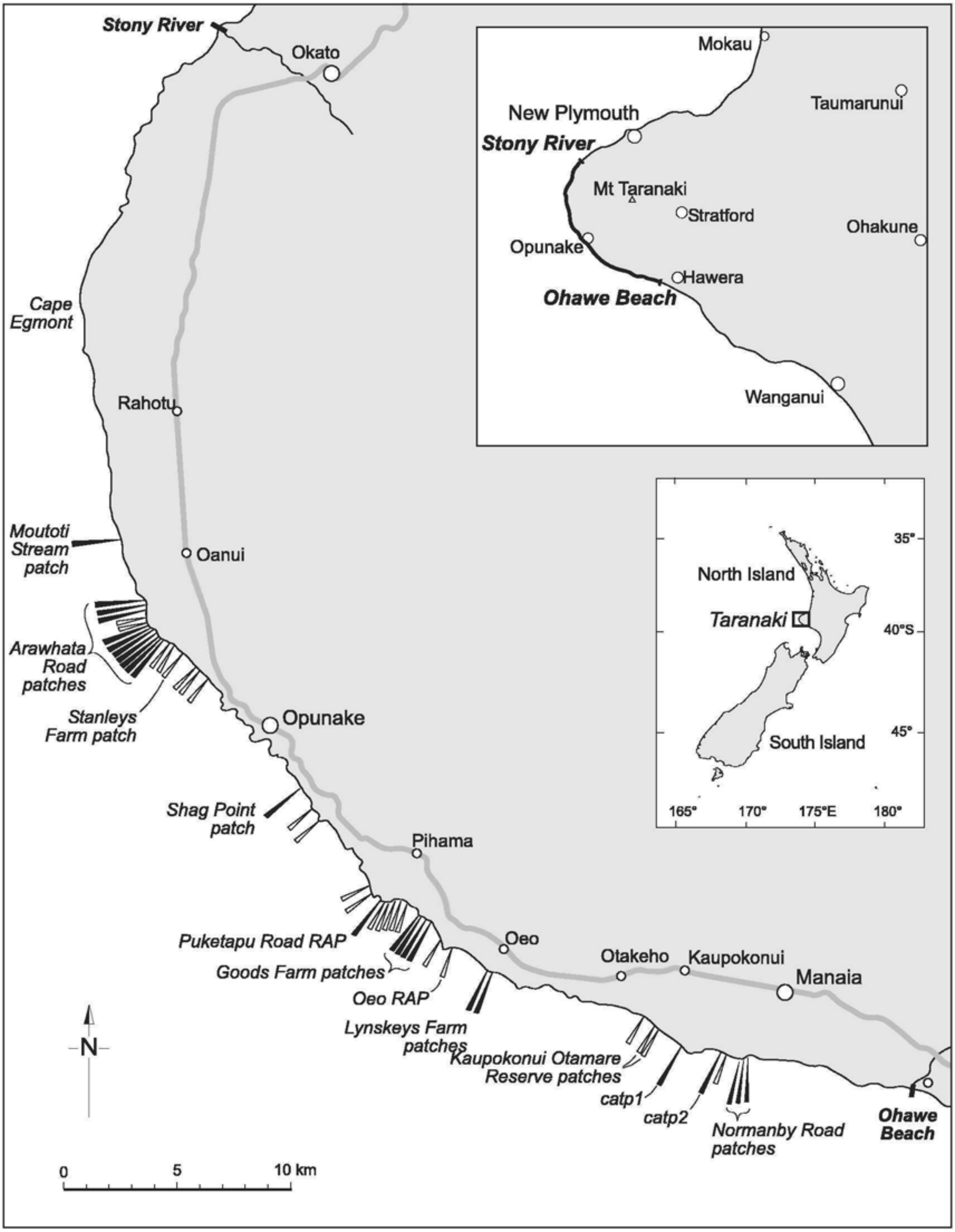


Fig. 1 Distribution of the 47 habitat patches of the *Notoreas* moth along the Taranaki coast. Moths were found in 22 patches, and caterpillars but not moths in a further two patches (catp 1, catp 2). Long black arrows indicate moths were detected, short open arrows indicate they were not detected. Inset: area searched for *Notoreas* (Stony River to Ohawe Beach, Taranaki coast, North Island, New Zealand).

There has been little research on the Taranaki variety of *Notoreas*. Until this study, the distribution of its habitat, occupation of habitat patches, and the threats to habitat survival were unpublished or unknown. Literature on the moth primarily concerned its classification (Craw 1986), its identification (Dugdale 1988), and general biology (Patrick 1998). Studies on the habitat are limited. Basic information on ecology and conservation of coastal herbfields was included in Sinclair et al. (1998) and Rogers (1999). There is also unpublished material on file recording the Taranaki vegetation, suggestions for land management and threat amelioration, and basic recommendations for conservation of the moth and its habitat (DOC file [INS 0005 (Insects, *Notoreas*)] held at Stratford Area Office).

This study was undertaken to map the distribution of the host plant and the moth, and assess the threats to the habitat. Recommendations are made about their conservation requirements, extending those made in the unpublished literature.

METHODS

The coastline from Ohawe Beach north to Stony River (Fig. 1 inset) was searched on foot between March 1996 and March 1997 to locate previous collection sites and additional patches of herbfield that contained the host plant *Pimelea* (cf.) *urvilleana*. Adjacent patches were objectively separated if there was a "significant amount" (usually 20 m or more) of non-herbfield vegetation between them, and the likelihood of genetic exchange between patches was low. The locations of these habitat patches were marked on aerial photographs in the field, and later transferred to NZMS 260 topographical maps. Land ownership included private farms, Maori trusts, and the Taranaki District Council. Permission was gained before accessing properties.

The habitat patches were visited between March 1996 and November 2000 to locate *Notoreas* and assess threats to patch survival. Twenty-four patches had easy access and were visited between 16 and 24 times encompassing 5 years worth of their flight season. From mid November 1998 to late April 1999, the easily accessed patches were visited approximately fortnightly. The remaining 23 patches were visited between 2 and 6 times. Patches that were visited frequently were referred to in groups based on their access road or local names (Fig. 1): Arawhata Rd, Normanby Rd, Goods Farm, Lynskeys Farm, Stanleys Farm, Kaupokonui/Otamare Reserve, Shag Point. The RAPs are referred to as Puketapu RAP and Oeo RAP. Plants at Arawhata Rd end seemed large and vigorous and could be a different species, but for the purpose of this paper they are considered to be *Pimelea* (cf.) *urvilleana*. For each patch the nature of the substrate was noted as weathered bedrock or sand over bedrock. The distance between each patch was estimated from their positions on the NZMS 260 maps. Patch size was estimated from the approximate number of host plants within each patch, the assumption being that each plant was comparable in its habitat value.

Moths were detected primarily by sighting of adults flying during the day. At least half an hour was spent looking over each patch and moving slowly through while disturbing likely roost spots, and looking for adults. Caterpillars were noted if found while lifting branchlets trailing over the ground, although this method was used infrequently since it disturbed the litter layer beneath the host plants. Feeding damage made by *Notoreas* and other caterpillars was observed on branchlets taken from the field, to see whether feeding sign was distinctive enough to detect *Notoreas* in the absence of adult sightings. Other Lepidopteran caterpillars that were found feeding on the host plant were sent to B. Patrick (Otago Museum) for identification.

Records were kept of relative abundance of *Notoreas* moths and caterpillars, as well as instances when oviposition was observed. Qualitative observations of the threats to the habitat were made. Threats were considered to be factors that significantly damaged the host plants and had the potential to reduce, or had already reduced, patch size.

To investigate if there was a relationship between patch size and presence of *Notoreas*, the patches were divided into size categories. Patch size was summarised into 1–5, 6–15, 16–25, 26–50, and >50 plants. Presence of *Notoreas* within patches of each size category was recorded.

To investigate if there was a relationship between presence of *Notoreas* and the distance to a neighbouring patch, the patches were divided into categories based on the distance to their nearest neighbour. Distance was grouped into four categories: patches <100 m to a neighbouring patch, patches 101–200 m apart, patches 201–1000 m apart, and patches more than 1000 m apart. Presence of *Notoreas* in patches within each distance category was recorded.

To see if the pattern of emergence was similar to that noted by Patrick (1998), all the sightings of

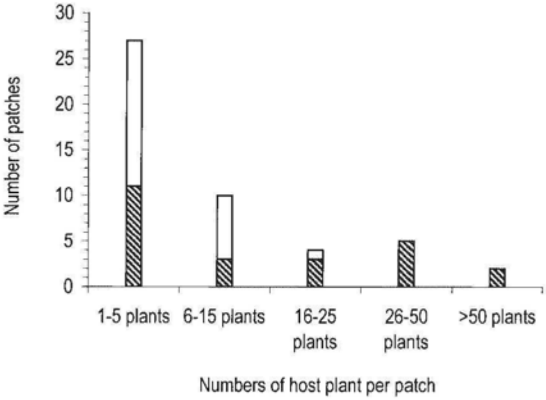


Fig. 2 Patch size, based on the number of host plants, grouped into five size categories. Total bar height represents the number of patches in each size category. Shaded portion represents the number of patches in each category that were inhabited by *Notoreas*.

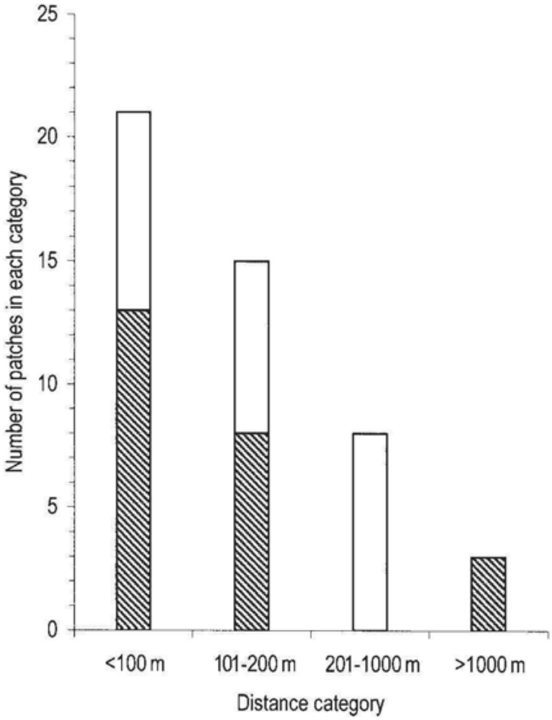


Fig. 3 Distance of the habitat patches to their nearest neighbouring patch, represented in four distance categories. Total bar height represents the number of patches in each distance category, and the shaded portion is the number of these patches where *Notoreas* were found.

moths were summarised for each month. Sightings were summarised into "few" (<5 moths seen) and "abundant" (>5 moths seen).

To investigate the presence of *Notoreas* in conjunction with patch size, distance to nearest occupied patch, and the number of times a patch was visited, the information was displayed on a ternary graph (see Taylor & Pohlen 1970 for a traditional application of this technique). To construct the graph, the scores of patch size, distance to nearest occupied patch, and the number of times a patch was visited were summed then expressed as a percentage of the sum. These percentages were then used to plot the position of each patch on a triangular graph, the sides of the triangle being the axes for each factor, in percentage units. Presence or absence of *Notoreas* in each patch was then plotted. An example of the calculations follows: if a patch consists of 25 plants, is 600 m from the nearest source of moths, and was visited 10 times, the sum would be 635. The percentage of the total for each factor is c. 2, 94, and 4% for plants, distance, and visits, respectively. To spread the points more usefully across the graph, the data are scaled or transformed. For the above example, if distance is divided by 10, and number of visits multiplied by 5, the total becomes 135 (plants still = 25, distance 600/10 = 60, visits $10 \times 5 = 50$). Adjusted percentages are therefore 37, 44, and 19%, respectively.

To determine the number of visits required to detect moths in a patch, a ratio of distance over patch size was generated and graphed on a log scale against the number of times each patch was visited.

RESULTS

Forty-seven patches of the host plant *Pimelea* (cf.) *urvilleana* were located along c. 50 km of coast (Fig. 1). Patches were primarily on weathered bedrock on sea cliffs, although some were on rocky outcrops up to 50 m inland. A few patches were found on cliffs with a sand layer covering bedrock. Patches that were small (with <15 host plants) accounted for 77% of the habitat while the remaining 23% had between 16 and 150 host plants (Fig. 2). The most extensive patches were found at Arawhata Rd, but the patch with the most host plants was Shag Point, south of Opunake. Only two host plants were found at the Oeo RAP.

Patch distribution was clumped, 77% being within 200 m of a neighbouring patch (Fig. 3). Three patches were >1 km from their nearest neighbour,

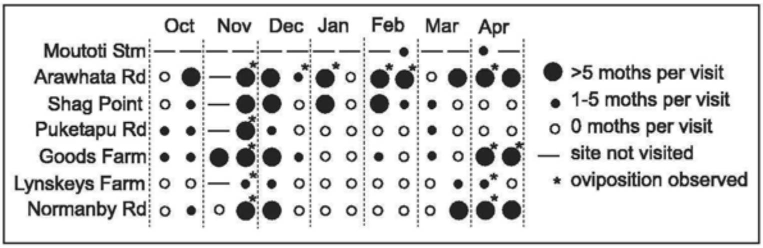


Fig. 4 Presence of the *Notoreas* moth from October to April in seven groups of habitat patches. Columns represent the months of the year broken into fortnightly observations. In most patches where moths were present there were two distinct periods when adults were abundant.

and there were gaps in distribution around the township of Opunake, and from Oeo to Otakeho.

The occupancy of habitat patches by *Notoreas* varied throughout the study. Fifty-one percent of the patches were occupied although *Notoreas* was not consistently detected in all occupied patches during each field visit. Moths were primarily seen in large patches (>15 plants) but also in a few patches with five or fewer plants. In addition, some patches were never occupied despite their apparent "suitability" (e.g., Kaupokonui/Otamare Reserve patches). Moths were seen in 22 habitat patches including the Puketapu RAP. Caterpillars but not moths were found in two patches (catp 1 and catp 2; Fig.1). Moths were seen from October to April, with peaks of abundance and oviposition in late spring to early summer (mid October–early January) and late summer–late autumn (February–April) (Fig. 4). There was no sign of herbfield at Kina Beach, (Oaonui) a previous collection site for the moth in the 1970s. Neither moths nor caterpillars were found at the Oeo RAP.

Young *Notoreas* caterpillars produced distinctive leaf mining damage, but older caterpillars did not (Fig. 5). The "mined" portion (from 1st instar larvae) of the leaf was darker green than the surrounding leaf, as was the hole in the leaf base (Fig. 5A). Damaged leaves were easily shaken from the plant so unless damage was recent, feeding sign was not obvious. Feeding sign left by older *Notoreas* caterpillars was not consistently different from that made by caterpillars of two other Lepidoptera *Merophyas leucaniana* and *Ericodesma* (cf.) *aerodana* (Fig. 5B) although that made by *Ericodesma* (cf.) *aerodana* caterpillars was more distinctive (Fig. 5C) especially in early autumn when the browsed, silk-bound stems had turned brown.

The relationship between detection of *Notoreas*, the number of times a patch was visited, the distance to the nearest occupied patch, and the number of host plants in each patch is shown in Fig. 6. Patches where all three factors exert a similar influence appear near the centre of the graph. Patches where one factor exerts a "stronger" influence are skewed towards the axes. Patches that were close to their neighbours, and visited frequently are towards the right-hand corner. Patches that were a long way from a source of *Notoreas*, and had a small number of plants, are found at the top corner. There were no large, infrequently visited patches, but these would have fallen near the left corner. Fig. 6 therefore indicates that *Notoreas* was detected in large, frequently visited patches, and in smaller, frequently visited patches that were close (<200 m) to an occupied patch. Exceptions were the Moutoti Stream patch, Shag Point, the Puketapu RAP and patches with caterpillars only (catp 1 and 2). These patches were occupied despite their small size and/or isolation. Moths were more likely to be detected if patches were visited frequently (at least 15 times during the study). Of the 24 frequently visited patches, 21 had moths, while moths were detected in 3 of the infrequently visited patches (Fig. 7), (see Appendix for data).

Threats to the habitat were varied. Cattle trampling had modified several patches by creating islands of herbfield vegetation that included host plants, isolated within a network of compressed soil and stock routes. Trampling also broke host plant branches, and on sandy substrates, dislodged entire plants at their roots. On a few occasions, individual plants were entirely covered by cattle manure. Cattle manure and dumped cattle carcasses also brought in seeds of weedy species such as pasture grasses, rosette forming herbs, marram grass *Ammophila arenaria*, boxthorn *Lycium ferocissimum*, gorse *Ulex europaeus*, and lupin *Lupinus arboreus*. Weeds had the potential to smother the herbfield remnants, especially vegetation islands.

Weed encroachment and trampling had nearly destroyed the Oeo RAP; only two host plants remained straggling out from under extensive growth

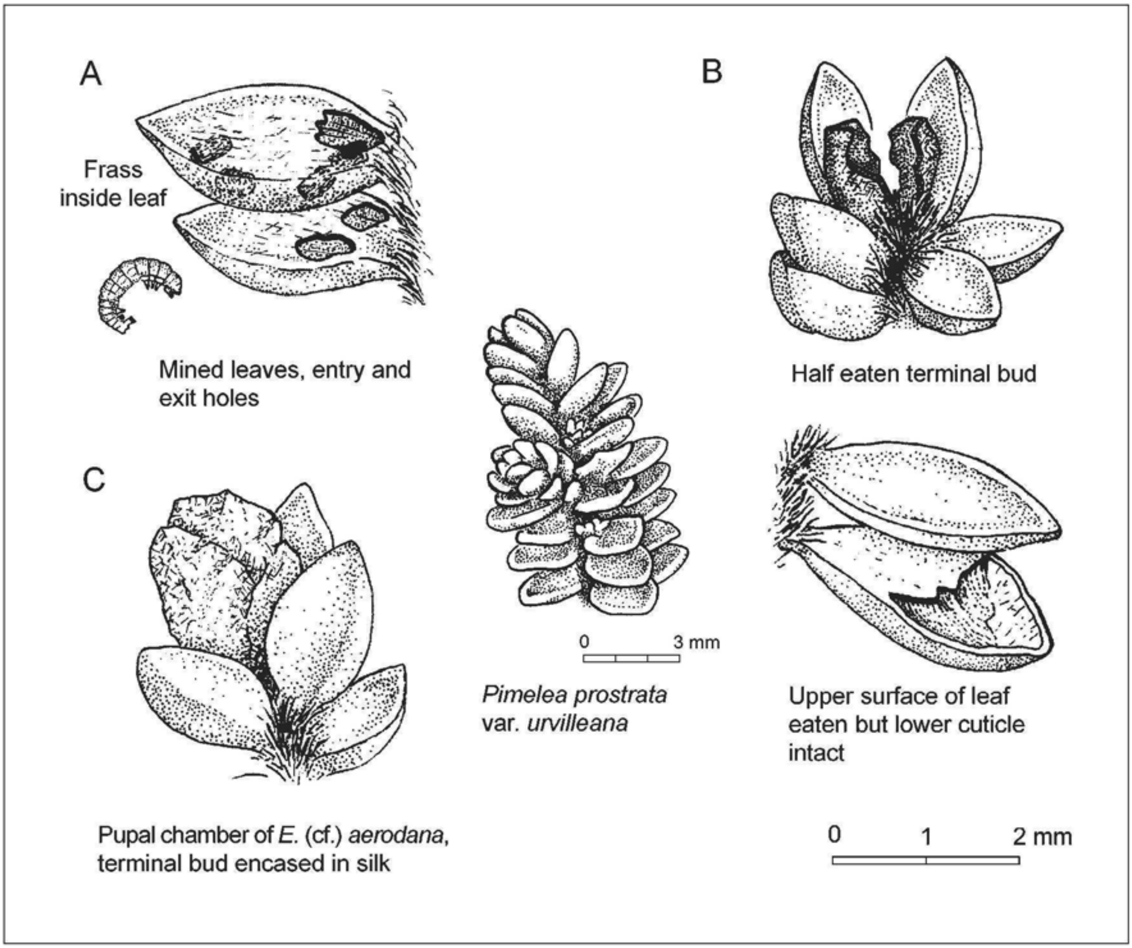


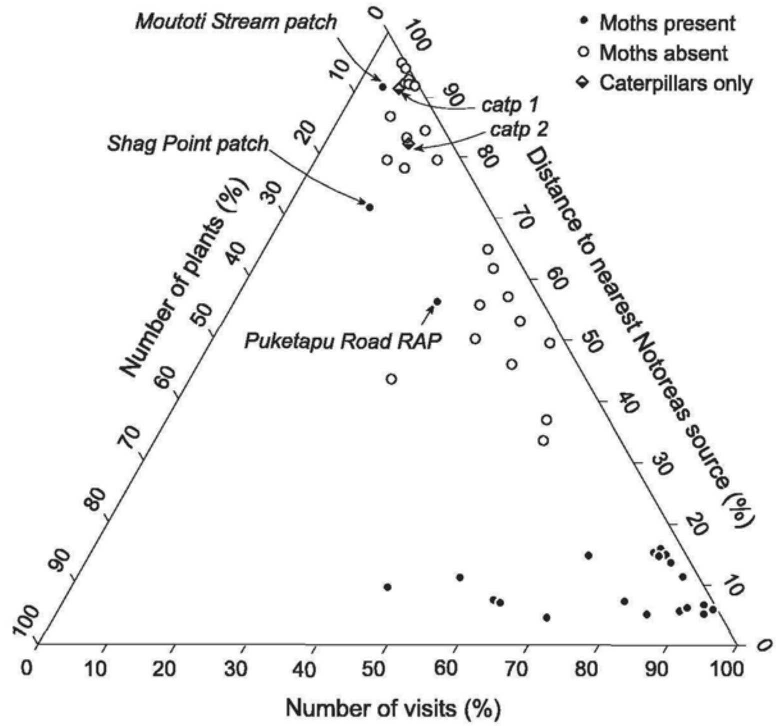
Fig. 5 Leaf and bud damage on *Pimelea* (cf.) *urvilleana* by *Notoreas* caterpillars, and two other species of Lepidoptera. **A**, 1st instar *Notoreas* caterpillars produced leaf mining damage. The darker mined portion and the entry/exit holes in the leaves were distinctive; **B**, older *Notoreas* caterpillars and *Merophyas leucaniana* caterpillars produced feeding sign that was not easily distinguished. Often half the terminal bud was consumed, and also the leaf tip and surface; **C**, *Ericodesma* (cf.) *aerodana* feeding sign was more distinctive in autumn when the webbed stems containing their pupal chambers had turned brown.

of gorse. The patch has subsequently been downgraded to a Special Site of Biological Interest (SSBI) where active protection is not pursued.

During this study, the threat to the survival of some patches from cattle trampling and weed encroachment was considered so severe that fences were erected and weed control trials initiated (results not reported in this paper). The impact of rabbits on the herbfield was localised. Rabbit scratching had significant impacts on individual plants through ring barking of stems, digging up of branches and exposing their roots. A few patches were affected by human activity. At the Puketapu RAP, more than 40 cars were parked on the patch on a fine day by people using the beach.

Erosion and drought also affected some herbfield remnants. Heavy rain in 1998 caused slips on farmland up to 8 m from the cliff edge and was followed by saltwind burnoff of remaining plants. Drought had probably caused dieback of host plants in two patches, but regrowth was seen the following spring, along with weed encroachment into areas previously covered by the host plant. Natural succession—change from herbfield to seral coastal

Fig. 6 Ternary graph showing visual representation of presence of *Notoreas* moths in relation to the number of times the patch was visited, patch size, and the distance to the nearest patch with moths. Axes have been scaled to represent the % explained by each factor (see Methods for explanation). Moths were more likely to be detected in patches that were large, close to a source of moths, and visited frequently, although there were some exceptions.



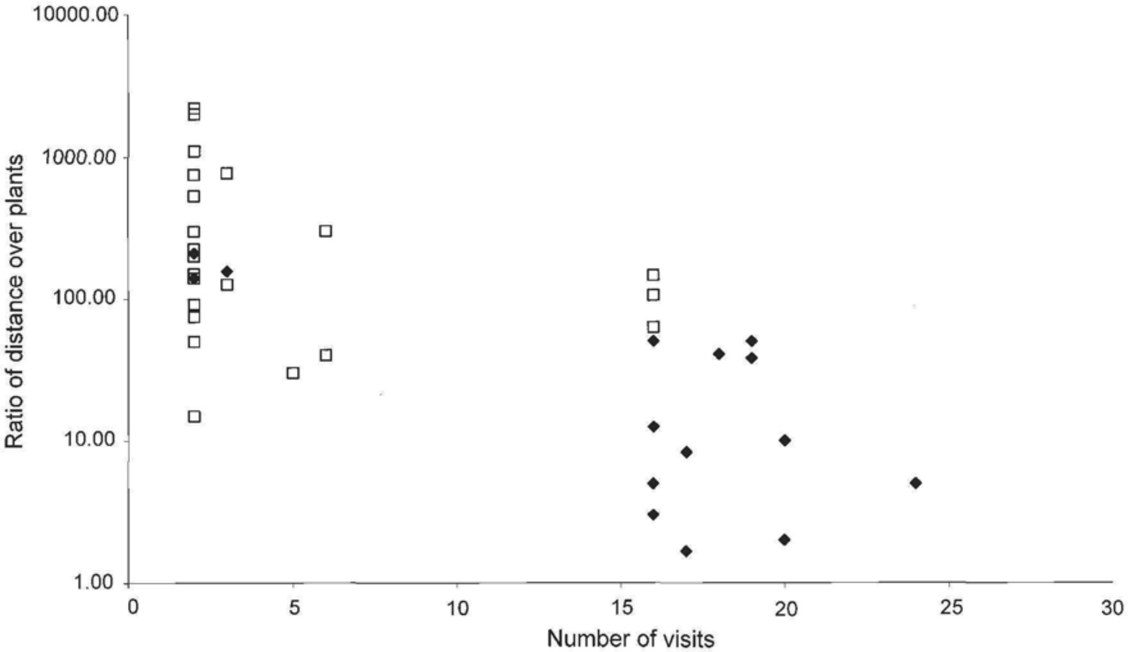


Fig. 7 Presence of *Notoreas* in patches in relation to the number of times the patches were visited versus the ratio of distance to nearest *Notoreas* over the number of plants in the patch. Filled points indicate where *Notoreas* was recorded, empty points where they were not.

species such as flax (*Phormium* sp.)—had the potential to affect some patches in the long term.

Trampling by cattle and human activity was not always detrimental to host plants. In some patches it had maintained the herbfield processes and arrested succession to coastal scrub and pasture. On Lynskeys Farm, remnant herbfield was confined to vegetation islands but the patches had been fenced more than 10 years previously. Large host plants sprawled over the edge of vegetation islands and there were multiple seedlings in the hoof hardened clay. On Goods Farm, a stock route through a patch of host plants had filled with seedlings. Extensive patches of habitat were found at Arawhata Rd in the shallow trench created 15 years previously, during the formation of windrows to shelter pasture inland. At the Puketapu RAP the bedrock exposed by quarry activity was being colonised by pioneer herbs.

DISCUSSION

Distribution

While sighting of adults was the easiest method for detecting *Notoreas*, failure to see moths may not necessarily indicate an unoccupied patch. Infrequent visits could miss the flight period, especially if adult emergence is synchronous or fleeting (Sutcliffe et al. 1996). Since small caterpillars produced distinctive feeding damage, supplementing the search for *Notoreas* by looking for caterpillars or feeding sign is recommended. Alternatively, presence of adults in a patch may not necessarily indicate a sustainable population. Highly mobile organisms such as moths and butterflies may visit patches without using them as breeding habitat (Pollard & Yates 1993; Thomas 1995). It should also be noted that unmated *Notoreas* females oviposit (B. Patrick pers. comm.), so that use of oviposition behaviour to indicate "self-sustaining populations" could be unreliable. However, until a more practical indicator can be defined for this species, the presence of moths or caterpillars is considered adequate.

In 5 years duration of this study, c. ½ the habitat patches surveyed were never occupied by *Notoreas*. Extinction or severe reduction of the host plant is likely to account for the absence of moths at the Oeo RAP (reduced to two host plants) and the collection site at Kina Beach (no host plants found). Dwindling patch size is frequently used to explain local extinction in butterfly populations (Hanski & Thomas 1994). Surveys in the United Kingdom suggest that if butterflies are absent from a patch for more than 5 consecutive years, the population is likely to be locally extinct (JCCBI 1986). Regular monitoring (e.g., every year) of the habitat patches is therefore advised, preferably several times during the flight season since moths may not be found in all patches on each field visit. Patrick's (1998) observation of two emergence periods is confirmed. The main flight season is likely to be between late September and late December, and March–early May although in suites of patches (e.g., Arawhata Rd) the flight period may be extended. Although patch size is usually expressed in hectares, patch size expressed in terms of host plant abundance seems to be a good indicator of patch suitability for *Notoreas*, especially when used in conjunction with distance to the nearest occupied patch.

The clumped nature of inhabited patches is not unusual in Lepidoptera (Thomas et al. 1992; Hill et al. 1996). *Notoreas* was more likely to be detected in patches within 200 m of an occupied patch, especially if the observed or surrounding patches were large. Some isolated patches were also inhabited, but without knowledge of adult dispersal it is impossible to determine whether these populations were closed and self-sustaining, or part of a metapopulation. Metapopulation theory suggests that isolated patches that are inhabited are not likely to be re-colonised following a local extinction event (Hanski & Thomas 1994; Thomas 1995). However, some species may disperse long distances when faced with dire consequences such as starvation (Schöps 1998) so their dispersal ability differs from dispersal tendency. Given the conservation status of the Taranaki population of *Notoreas*, it is wise to consider a metapopulation approach for their conservation until they are out of risk of extinction, since this allows for conservation of isolated inhabited patches and also latent patches.

Management recommendations

(1) Habitat patches should be managed if they are inhabited (especially if large) or within 200 m of an occupied patch. Conserving large amounts of connected patches is recommended since larger patches often "seed" networks of smaller patches (Thomas 1995). Also, large populations in large, high quality habitat are much less likely to become extinct from natural events such as drought than small populations in small patches. For example, in Britain, butterfly extinction on reserved land was due

to insufficient habitat or shortage of food plants (Thomas 1984; Pollard & Eversham 1995). Because the best breeding habitat cannot be guaranteed to remain in the same place (Thomas 1995), managing the habitat to accommodate a shifting pattern of patch use is also recommended.

(2) Management should avoid expending resources on isolated and unoccupied patches unless they are large or their connectivity to inhabited patches can be increased. Patches should be restored to enhance the use of existing patches and their connectivity. For a relatively sedentary species like *Notoreas*, patch restoration should concentrate on patches adjacent to or within 200 m of an occupied patch (e.g., Huxel & Hastings 1999). A knowledge of *Notoreas* dispersal ability and tendency would be useful here. Increasing patch size and connectivity could bolster *Notoreas* populations so long as there are no other factors limiting population expansion (Merriam & Saunders 1993).

(3) If patch creation and improved connectivity is successful, then managers could reasonably expect large areas of habitat to be colonised within 5–10 years (Shreeve 1995; Thomas 1995) given that the donor patches are healthy (e.g., Arawhata Rd patches). Introducing the target species (i.e., translocation) into new or restored habitat will greatly increase the efficacy of the recovery effort (Huxel & Hastings 1999), and translocating them into groups of contiguous patches increases the chance of success (Ehrlich & Murphy 1987). Potential release sites must be several times larger than the minimal area required to sustain a local population (Thomas 1995).

(4) Further research is required to ascertain the processes that ultimately perpetuate the herbfield. In some patches, disturbance through human activity and stock has maintained bare ground for germination where succession and weed infestation would otherwise counteract it. Use of stock for their trampling effect may provide a solution to herbfield management if correctly applied. Bullock et al. (1994) found that grazing by sheep in low diversity grasslands created gaps for establishment of rare species. However, the use of stock should be carefully monitored and only part of the habitat should be treated until its efficacy can be demonstrated. The most common failing of conservation grazing is the use of inappropriate stock and poor grazing regimes (Duffey et al. 1974), and stock may permanently alter patches through altering soil structure and chemistry which renders them more susceptible to weed invasion (Scougall et al. 1993).

(5) Advocacy must continue if *Notoreas* and its habitat are to flourish. Clearly, just giving a site a label of protection does not ensure its protection (e.g., New 1997). Merriam & Saunders (1993, p. 85) wrote "Involvement of the human community should be encouraged in reconstruction of damaged landscapes to reinforce their role as stakeholders". Discussion with land owners should continue, and will ultimately benefit other rare species in the herbfield environment. In these instances, advocacy becomes as much an important tool as mechanical interventions like fencing or weeding.

If all five recommendations are followed, then *Notoreas* and its habitat should survive.

SUMMARY

(1) The host plant *Pimelea* (cf.) *urvilleana* of *Notoreas* was located in 47 coastal herbfield patches along the south Taranaki coast. Patches were found predominantly on sea cliffs.

(2) Small patches (up to 15 host plants) accounted for c. ¾ of the habitat. Patches were clumped in distribution.

(3) Moths were detected most readily by sighting of the day flying adults from late September until late April, with two peaks in activity in late November–December, and April. Their activity varied in different patches.

(4) Small caterpillars were leaf miners and produced distinctive feeding damage, but older caterpillars did not.

(5) Not all patches were inhabited by moths. Moths were more likely to be found in patches that were visited frequently, and were close to other occupied patches. Large isolated patches were more likely to contain moths than small isolated patches.

(6) Patches of host plant were modified by cattle trampling, human activity, weed encroachment, and natural processes including erosion and drought. Both the RAPs were significantly degraded. Loss of other known collection sites suggests that there has been a general decline in the Taranaki populations, but regular monitoring in the medium term is required to confirm this. In contrast, a few patches were created or maintained through disturbance.

(7) Conservation requires the active management of large patches of occupied herbfield, nearby patches that may or may not be inhabited, and groups of

small neighbouring patches especially if some are inhabited. Isolated and uninhabited patches should be avoided unless their size and connectivity to inhabited patches can be increased.
(8) Active management should include investigation into patch creation and maintenance using stock and other disturbances; research into cultivating and replanting new areas, and translocating the moth; as well as advocacy to involve the human community in reconstruction of damaged landscapes and reinforce their role as stakeholders.

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APPENDIX (*over page*)

APPENDIX
Raw data for each patch of habitat, shown in order as in Fig. 1, from North to South.

Patch group	Plant number	Distance to nearest *Notoreas*	Visits in season	Visits with moths
Moutoti Stm	23	3600	3	2
Arawhata Rd 17b	10	50	16	2
Arawhata Rd 17a	1	50	16	2
Arawhata Rd 17	4	50	16	1
Arawhata Rd 16	1	300	6	0
Arawhata Rd 15	5	200	6	0
Arawhata Rd 14a	3	150	16	9
Arawhata Rd 14	3	150	16	9
Arawhata Rd 13a	1	50	16	2
Arawhata Rd 13	1	50	16	2
Arawhata Rd 12b	3	150	16	10
Arawhata Rd 12a	3	150	16	10
Arawhata Rd 12	50	150	16	1
Patch 11	5	150	5	0
Patch 10	10	400	6	0
Stanleys Farm 8	10	1050	16	0
Patch 6	15	1900	3	0
Patch 5	1	2000	2	0
Patch 3	3	2300	3	0
Shag Point C	150	6100	18	7
Patch D	1	1100	2	0
Patch E	3	1600	2	0
Patch G	2	600	2	0
Patch H	10	150	2	0
Puketapu RAP	50	1900	19	6
Patch J1	2	100	2	0
Patch J2	1	150	2	0
Patch K1	2	450	2	0
Patch K2	6	550	2	0
Patch L	5	700	2	0
Goods Farm Q2	50	100	20	9
Goods Farm Q	50	100	20	8
Goods Farm Qint	20	200	20	5
Goods Farm R3	100	200	20	7
Patch T	10	750	2	0
Oeo RAP	2	1500	2	0
Lynskeys Farm W1	6	50	17	3
Lynskeys Farm W2	30	50	17	3
Patch Y	1	2200	2	0
Kaupokonui/Otamare res AA	10	1450	16	0
Kaupokonui/Otamare res Z	20	1250	16	0
Catp 1 AD	10	2100	2	1
Catp 2 AC	5	700	2	1
Patch AB	1	200	2	0
Normanby Rd AE	3	150	19	7
Normanby Rd AF1	20	100	24	9
Normanby Rd AF2	2	100	16	3