

Invertebrate survey of Somes Island (Matiu) and Mokopuna Island, Wellington Harbour, New Zealand

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ABSTRACT

The invertebrate fauna of Somes and Mokopuna Islands was surveyed over a 5 month period using malaise, pitfall and light traps. New locality records are noted in particular for *Hudsona anceps*, *Myerslophia terrestris* (Hemiptera) and a recently-discovered new hymenopteran family. Some of the principal biogeographic relationships

of *Somes/Mokopuna* with the North and South Island are identified for *Dysnocryptus pallidus*, *Hudsona anceps*, *Mimopeus opaculus* and *Philanisus plebius*. The management and conservation implications of the invertebrate fauna are discussed in relation to the operation of the Ministry of Agriculture quarantine station, the potential for a nature reserve and the issue of future public access to *Somes*.

Keywords: Invertebrates, insects, survey, *Somes Island*, New Zealand, biogeography, conservation, management.

INTRODUCTION

Somes and *Mokopuna* Islands are centrally located in the Wellington Harbour and separated from each other by a 90 m wide strait (Fig. 1). The islands are recognised as an important breeding locality in the Wellington Harbour for coastal and marine birds (Parrish 1984) and support populations of the common skink, *Leiopisma nigriplantare maccanni* Hardy, the orange bellied skink, *L. lineocellatum* Dumeril & Dumeril and the coastal gecko, *Hoplodactylus maculatus* Boulenger (Stephenson 1977). The insect fauna has previously attracted little attention and MacGregor (1982) observed that insects collected from the islands were also present elsewhere in the Wellington region.

This survey is the first detailed investigation into the insects of *Mokopuna* and *Somes* Islands and includes records of some other terrestrial invertebrates. The study forms part of the "Natural Resources Study" of the Wellington Harbour for the Wellington Harbour Maritime Planning Authority. *Somes* and *Mokopuna* Islands comprise the *Mokopuna-Somes Island Management Area* of the Wellington Harbour Maritime Planning Scheme 1988 (WHMP). Islands in the Wellington Harbour are recognised as having both ecological and recreational importance. A major management aim for the islands is the maintenance of a "healthy ecology, re-instatement of a healthy ecology and the "protection of wildlife communities from unnatural change". This invertebrate survey of *Somes* and *Mokopuna* Islands contributes to an "Islands Objective" of the WHMP Scheme which aims to conserve the landscape and the ecological, geological and historical resource values of islands in the Wellington Harbour Maritime region. The main aim of the survey was to provide an inventory of the insect fauna as a potential resource affecting harbour management policies. The survey is based on a regular sampling programme over the period November 1987 to the end of March 1988.

Landform/vegetation

Mokopuna and *Somes* Islands may be interpreted as ridge-tops that have largely submerged through downwarping of land to the east of the Wellington fault (Stevens 1974). *Somes* Island covers 25 ha and reaches a height of 76 m above sea level while *Mokopuna* Island is only 0.5 ha in area and no more than 15 m in height (Stephenson 1977). The 2 islands are positioned near the junction of 2 splinter faults across the harbour floor (Fig. 2) that may have been inactive since the inception of the main Wellington fault (Stevens 1974). Both islands feature a steep, rugged topography (Fig. 3) and the presence of 3 prominent terraces on *Somes* Island may be associated with the effects of former sea levels (Stevens 1974). The coastlines are steeply cliffed with small rocky beaches.

Indigenous vegetation covers most of *Mokopuna* Island, but on *Somes* Island it is found mainly on the coastal cliffs and shoreline (Fig. 3). The dominant plants on *Mokopuna* Island include *Coprosma repens*, *C. propinqua* and *Phormium cookianum*. Most of *Somes* Island is covered by pasture, but nearly half of the grassland is now fenced off from grazing and is subject to replanting organised by the Lower Hutt branch of the Royal Forest and Bird Protection Society with cooperation from the quarantine station staff. The cliffs and shoreline support a variety of shrubs, herbs and grasses with *C. repens*, *P. cookianum* and *Muehlenbeckia complexa* being dominant species. A stand of *Meterosideros* and *Corynocarpus* occupies a northeastern gully above the wharves supports (Stephenson 1977; Freegard & Weeber 1986).

Landuse history

Mokopuna Island was declared a sanctuary for native and imported game in 1925, a

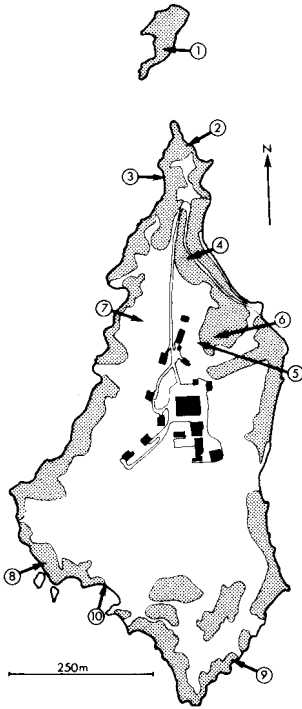


Fig. 1: Generalised outline of shrubland (stippled) on Mokopuna and Somes Islands (after Freegard & Weeber, 1986). Insect trap sites are listed as 1-10.

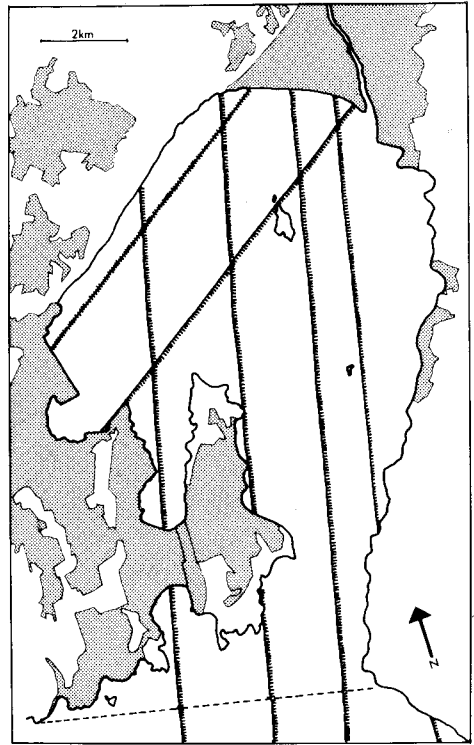


Fig. 2: Geographic location of Mokopuna Island and Somes Island (shaded) in the Wellington harbour. Built-up residential or industrial areas stippled. Approximate position of the Wellington fault indicated by heavy dashed line; inactive splinter faults dotted. Dashed line - boundary of the Wellington Harbour Maritime Planning Area.



Fig. 3: South coast of Somes Island with shrubland of *Phormium cookianum* and *Coprosma repens*.

wildlife refuge in 1957 and a wildlife refuge for "Government Purposes" in 1981 (Gibbs 1986). The Wildlife Service of the Department of Internal Affairs was responsible for administration of the island (Gibbs 1986) until the formation in 1987 of the Department of Conservation. Somes Island was periodically occupied by 4 Maori tribes from the 13th century until about 1835 (Gibbs 1986) and was classified as a public reserve by the colonial government until 1851. A lighthouse was established in 1866. People were quarantined on Somes Island from 1872 to 1920 and animals were quarantined from 1900 (McGill & Tilly 1984). Somes Island was established as a site for quarantine or other "Government uses" in 1873 and is now administered by the Ministry of Agriculture and Fisheries (MAF) as a maximum security quarantine station. Landuse impact of MAF operations is principally through grazing. Sheep are currently on several paddocks, but excluded from areas of revegetation and most of the coast except for the southeast coastal sector. The Wellington Regional Planning Authority controls a small area at the southern end of the island for a lighthouse (Gibbs 1986).

METHODS

Insects were trapped by hand and through continuous pitfall and malaise trapping. Pitfall traps were constructed from a model designed by Moede & Meads (1985). Open plastic containers 75 mm diameter and 200 mm deep containing approximately 200 ml of Gault's solution were placed in a hole lined by a length of plastic tubing. Malaise traps 2 m long by 1 m high were constructed from white cotton mesh (black central dividing wall) and supported by wooden poles. The collecting jar contained Gault's solution. Two 12v fluorescent black lights were used on 4 occasions adjacent to the *Corynocarpus/Meterosideros* forest and on the southern coast. Land snails were collected from dried and sieved plant litter from all major habitats.

The survey focused on 10 sites (Fig. 1) to sample a range of habitats from coastline to hillside shrub and grassland. A malaise trap and up to 5 pitfall traps (total of 45) were placed at each site. The traps were cleared at 2 week intervals and the insect material stored in 70% ethanol. One malaise trap site was established on Mokopuna Island (Site 1). On Somes Island 5 sampling sites were established on the coastline about 1-2 m above high tide level (Sites 2, 3, 8, 9, 10), 2 were placed among shrub/grassland (Sites 4, 7), 1 in a sheltered area of grass and shrubs (Site 5) and 1 within the *Corynocarpus/Meterosideros* stand (Site 6). Grazed pasture was not specifically surveyed except for a single pitfall trap.

RESULTS

Exposure of malaise traps to high winds resulted in dislocation of collecting jars on several occasions, but the traps were successful in providing a broad sample of flying insects, mostly Hymenoptera, Diptera and Lepidoptera, in that order of abundance. Very few of the Diptera could be identified while Lepidoptera were not identified because of damage to wing scales, but some of the common species were also recognised from light trap samples.

About 500 insects species were recorded altogether from Mokopuna and Somes Islands together. A list of identified or partially identified insects is contained in the appendix. None of the species collected is known to be endemic to the islands. The numerically dominant invertebrates from pitfall traps were 2 species of Amphipoda, 1 species of Isopoda and a number of Collembola species. None of these species were identified. Large flightless insects (over 10 mm in length) included 1 burrowing weta, *Hemiandrus similis* Andr. (Stenopelmatidae); the ground-dwelling beetles, *Mimopeus humeralis*, *M. opaculus* (Tenebrionidae), *Mecodema sulcatum* (Sharp) (Carabidae) (Figs. 4a & b), the seashore earwig *Anisolabis littorea* (White) (Labiduridae) and an unidentified phasmid.

Two introduced snails were recorded, including the common garden snail *Helix aspersa* Muller which was found in the sheltered grassed area of Site 5. The native snails were small, less than about 5 mm in diameter and litter inhabitants except for the nocturnal arboreal species *Lamellidea novoseelandica* (Pfr.) found on leaves, stems and branches of trees and shrubs. Arachnids were not assessed in this study, but the large funnel-web *Porrothele antipodiana* was found in several pitfall traps. A few specimens of

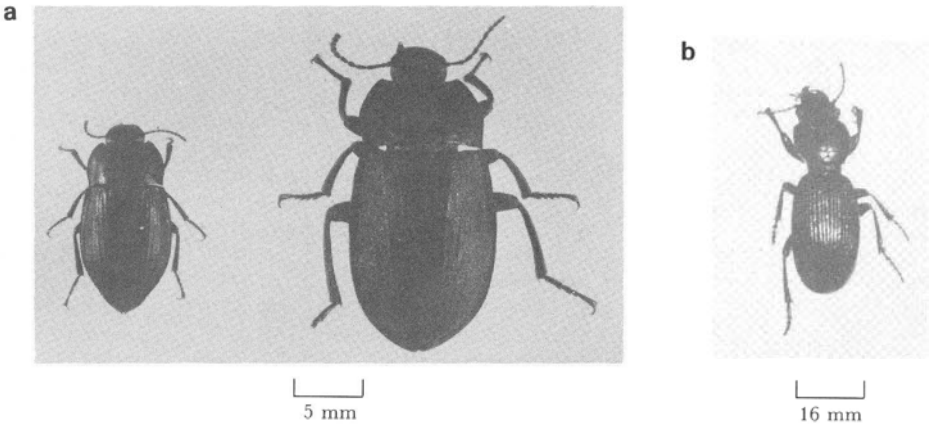


Fig. 4: a. *Mimopeus humeralis*, *M. opaculus* (Coleoptera: Tenebrionidae) and b. *M. sulcatus* (Coleoptera: Carabidae). Scale line 16 mm.

false scorpion (Chelonethi) were collected at all sites and several specimens of the bird tick *Ixodes eudyptidis* Maskell were collected from some pitfall traps. This species is a common bird tick and includes penguins, gulls and shags among its hosts (Smit 1979). A previous study by A. C. G. Heath (Wallaceville Animal Research Centre) also recorded the tick *Ornithodoros capensis* from the spotted shag colony (*Stictocarbo punctatus* [Sparman]) at the south end of Somes Island.

The Somes Island record of 2 hemipteran species are of local distributional interest; *Myerslophia terrestris* Knight is a south Wellington endemic while *Hudsona anceps* is recorded in the North Island for the first time. The distinctive weevil *Rhadinosomus acuminatus* Schonherr was collected at site 7 from a pitfall trap positioned below the shrub *Haloragis erecta*, which Hudson (1934) describes as locally abundant on dry hills and the sea coast and is the only known host-plant of this beetle. Specimens of the rat flea, *Nosopsyllus fasciatus* were collected from several pitfalls and are presumed to be from the ship rat *Rattus rattus* which is known to inhabit the islands (Smit 1979). The saltwater mosquito *Opifex fuscus* Hutton is common in rock pools above high tide and the coastal greenfly, *Chrysoma mobile* is abundant in some of the shoreline sites (e.g. 3, 9). Trichoptera collected in this survey are associated with stream and river habitats not found on the island, with the exception of the marine caddis, *Philanisis Plebieus*. It breeds in rock pools just above high tide (Henderson 1985), but nymphal stages were not confirmed for Somes Island rock pools.

Some of the Lepidoptera recorded in this survey are not commonly collected (B. H. Patrick pers. comm.) and may, therefore, be locally abundant on the islands. Three species have a "Wellington" type locality, but precise locality information is not available. Several species have host-plant relationships with coastal plants common on the islands (e. g. *Muehlenbeckia*, *Coprosma*, *Haloragis*) and several others feed on the abundant litter or dead wood.

Pitfall collections included 3 morphologically distinctive litter inhabiting parasitic wasps. One species (Fig. 5a) was previously known (and recently discovered) only from the Chetwode Islands and Banks Peninsula in the South Island. It is currently being described and is to be assigned a new genus and family. The Somes Island specimens will be designated paratypes (J. W. Early pers. comm.). An unidentified species in the Diapriidae has reduced, feather-like wings with the superficial appearance of an ant (Fig. 5b) while the female of *Baeus* sp. (Scelionidae) is nearly spherical in shape, and superficially resembles a beetle (Fig. 5c). Members of the latter genus are known to be egg parasites of spiders (Reik 1970; Austin 1988). The spider hunter *Sphictostethus nitidus* (F.) was sometimes found in pitfall traps also containing host spiders. The introduced German wasp *Vespa germanica* (F.) is established on the island and a nest was destroyed during this study by members

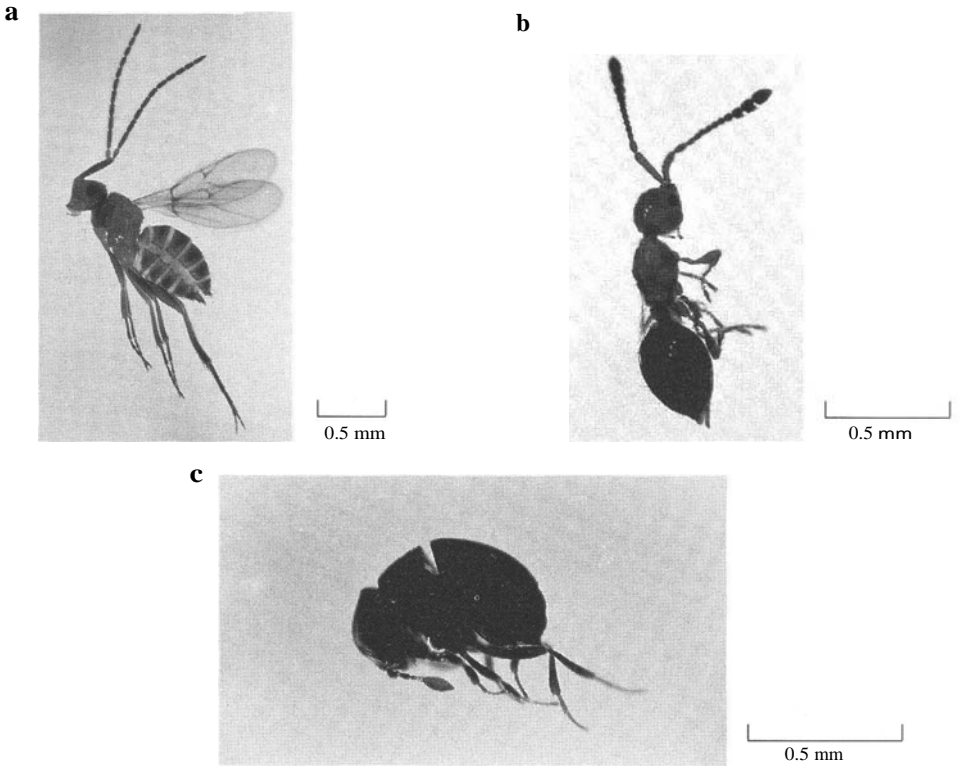


Fig. 5: Some Hymenoptera from coastal pitfall traps on Mokopuna and Somes Islands. a. New family and new locality record; b. Female of *Trichopria* sp. (Diapriidae); c. Female of *Baeus* sp. (Scelionidae).

of the Royal Forest and Bird Society. One hive of honey bees is maintained by a member of the quarantine staff and 4 species of native solitary bees are also present. Two of the native species are unnamed, but are currently the subject of systematic study (B. J. Donovan pers. comm.).

DISCUSSION

Biological significance

Many insects and other invertebrates notably absent from the islands are those usually associated with forest habitats. Some may have been formerly present, but became extinct with the loss of forest cover through human activities. Records of vegetation history on the islands are fragmentary, but suggest that any "forest" cover was destroyed except for remnants surviving on coastal cliff faces. No native slugs were recorded during this study, but 2 specimens had been collected in the past by Somes Island residents and sent to an institution (identity now unknown) where they were identified as native species (R. Sutherland pers. comm.). The possibility of overlooking the presence of large invertebrates species is illustrated by the recent history of vertebrate records involving the island's gecko population. The lizard *H. maculatus*, known to the Somes Island staff (R. Sutherland pers. comm.), was not located in a recent survey by Ainsworth (1985), but later collected by J. Lambie (a former Somes Island resident) in December 1987. Its identity was confirmed by C. H. Daugherty (Victoria University of Wellington) and D. Towns (Department of Conservation).

Two biological patterns widely used as criteria for assessing the scientific importance

of a locality are endemism and relationship. Endemism focuses on isolation or the unique aspect of a locality, while relationship is concerned with the shared elements of evolutionary history between different places. There is relatively little published information on the distributional extent and significance of New Zealand's invertebrate fauna and it is not possible, therefore, to confirm whether or not all insects from Somes and Mokopuna Islands are also present elsewhere in the Wellington geopolitical region. A variety of historical and political factors in New Zealand has given prominence to endemism at the expense of shared presence (Grehan 1990). The delineation of an area without reference to biological distributions can be both misleading and inappropriate for scientific investigation. The view developed here for Somes and Mokopuna Islands is that while the criterion of endemism is not applicable, the biological relationships of the biota may still be taken into consideration when evaluating future management options.

The concept of relationship is fundamental to biology (Nelson & Platnick 1981). In terms of biological distribution, relationships are the subject of biogeography (Craw 1983). The level of biogeographic resolution for the invertebrate fauna of Somes and Mokopuna Islands is constrained by the limited identification of taxa and lack of distributional information. However, some important biogeographic relationships between the North and South Island were identified for some of the Somes/Mokopuna invertebrates. This pattern is illustrated here using a panbiogeographic method (Croizat 1952, 1958) where distributions are summarised as line graphs or tracks that connect localities together in the order that gives the shortest overall line length (Craw 1985; Page 1987; Craw & Page 1988).

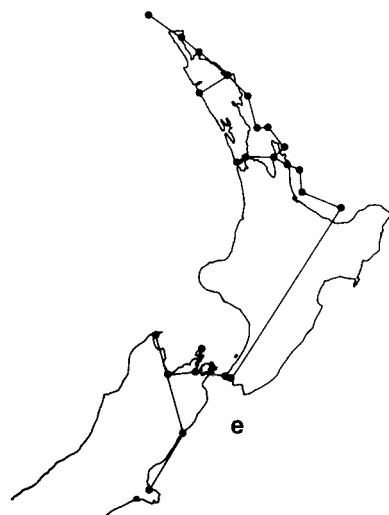
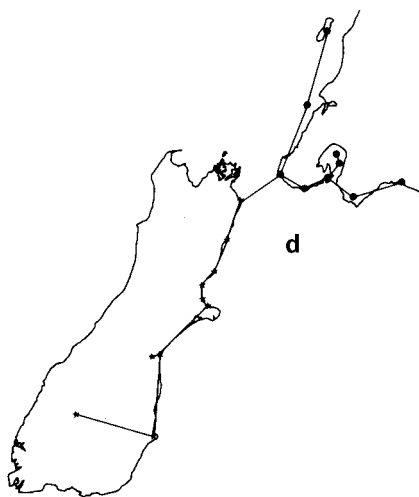
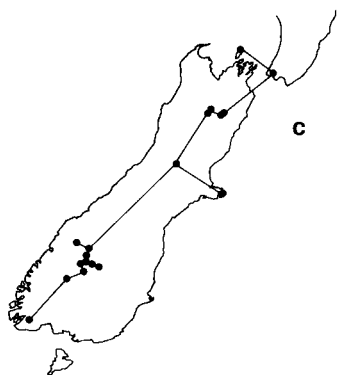
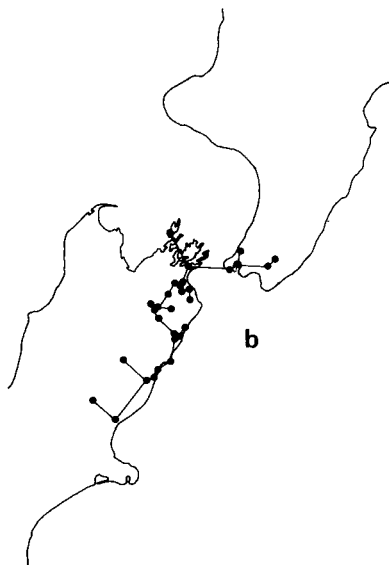
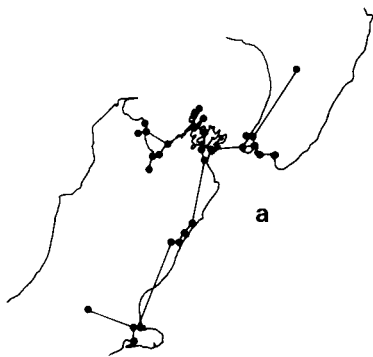
A track involving the lower North Island and the predominantly eastern part of the South Island was observed for 2 beetles (Figs. 6a, b) and 1 hemipteran (Fig. 6c). A local "Wellington" endemic found on Somes and Mokopuna Islands, *Mimopeus humeralis* (Coleoptera: Tenebrionidae) is also involved with the eastern South Island through a closely related species (Fig. 6d). A southern North Island-South Island track is known for at least 60 plant and animal species and is a major feature of the biological evolution of the Cook Strait region (Craw 1988). The invertebrate distributions connect coastal and insular localities with inland or upland (sub-alpine, alpine) habitats that reflect major processes of tectonic uplift and associated alterations in ecological amplitude of organisms (Heads 1990; Patrick 1990). Another major biogeographic pattern involving Somes/Mokopuna is represented by the marine caddis-fly *Philanisus plebius* (Trichoptera: Chathamiidae) (Henderson 1985) (Fig. 6e) connecting Somes/Wellington Northland to the Chatham Islands (Craw 1989). The integration of Somes/Mokopuna distributions into major New Zealand tracks suggests that there is a close historical interrelationship between the origins of the Somes/Mokopuna biota and the geological formation of the Wellington region (c.f. Craw 1989; Heads 1990). Somes and Mokopuna may be geographically young islands with an old fauna that may be interpreted as being derived from preceding landscapes associated with the tectonic history of the Wellington region.

Management

1 Quarantine Island

The present status of Somes Island as a MAF quarantine station may be compatible with the continued conservation of the islands' invertebrate fauna. Fencing off the lower slopes would be desirable to encourage regrowth of plants and the accumulation of plant litter which is important for the survival and abundance of many invertebrates. Freegard & Weeber (1986) suggested fencing off a stand of *Olearia paniculata*. This procedure may result in establishment of invertebrates under the vegetation canopy, but it is not known if this will involve insects not found elsewhere on the island. During the autumn of 1989 the quarantine station staff removed sheep from the shoreline paddocks and part of the

Opposite – Fig. 6: Distribution tracks for some Mokopuna/Somes Island insects; a. *Dysnocryptus pallidus* (Holloway 1982); b. *Mecodema sulcatum* (I. Townsend pers. comm.); c. *Hudsona anceps* (R. C. Craw pers. comm.); d. *Mimopeus opaculus* (R. C. Craw & J. C. Watt pers. comm.); e. *Philanisus plebius* (Henderson 1987).



southern pasture and the Lower Hutt Branch of the Royal Forest and Bird Protection Society will carry out plantings of trees and shrubs. Somes Island is being extensively replanted in native trees by the Society and this programme should include scope for leaving "open" areas of shrub/grassland suitable for coastal animals and plants which may not survive under forest conditions.

A major factor affecting the islands' ecology is the presence of *Rattus rattus*. Entry of the rat has been attributed to MAF operations (Freegard & Weeber 1986), but it is probable that rats were established from very early colonial times. Their presence is implied in a 1965 Health department report (65/2/29) in which control of rats is listed as one of the caretaker's duties. Regular control is currently maintained through the use of poison baits, and an attempt to eliminate the population was funded by MAF in October 1988. This effort could greatly enhance the populations of some of the island's invertebrates and the programme should include Mokopuna and associated rock stacks on both islands. The field mouse *Mus musculus* was once established on Somes Island (Agriculture and Health Department report 10 October, 1931), but none are known from the islands at present. The establishment of mice could potentially have a major influence on the composition and diversity of the invertebrate fauna and vegetation. A study by Pickard (1984) on Mana Island recorded invertebrates as a major dietary component of mice. The potential importation of mice in animal feed (hay) is recognised by MAF staff and practical steps are taken to reduce the risk (R. Sutherland pers. comm.).

2 Nature reserve

Mokopuna Island already has the status of a Nature Reserve although, unlike Somes Island, it has free public access. Somes has the greater potential as a nature reserve because of its size and relative diversity of habitat. This survey shows that the islands, even with a highly modified habitat, have the potential for future records of biogeographic, systematic and ecological interest. The absence of mice and (in the future) rats could result in the islands being important locations for establishment of animal and plant species that do not survive well in the Wellington region. The potential for species establishment may be ecologically limited, but highly significant for maintaining local organic diversity in the Wellington region. These operations would probably not interfere with the quarantine operations which are primarily limited to the quarantine buildings and fenced paddocks. The main ecological concern of animal introductions is their potential impact on the island's invertebrate population and diversity. In the past, release programmes for vertebrates in New Zealand have given a low or non-existent priority to the impact on existing invertebrate communities.

3 Recreational access

The recreational potential of islands in the Wellington Harbour Maritime Planning Area was investigated by Gibbs (1986) mainly through surveys of island visitors. Public access to Somes Island is limited to public open days organised by the Wellington Regional Council in conjunction with MAF. Public movements are restricted to marked tracks and to the beach around the wharf on the northeast coast (Gibbs 1986). These activities are compatible with the protection and conservation of the islands invertebrates. Increased public access is a potential management option (Gibbs 1986). Levels of public usage that are compatible with the conservation of the coastal vegetation are probably also appropriate for the continued survival and health of the islands' invertebrates. Greater public access may, however, increase the likelihood of accidental noxious animal introduction.

CONCLUSIONS

1. The insect biota may be neither unique or endangered, but is of intrinsic scientific interest in relation to the taxonomy and biogeography of some species.
2. Many of the insects are probably coastal species and are closely associated with vegetation of the coastal environment.
3. Protection and conservation policies for the vegetation of Somes and Mokopuna Islands need to be compatible with the survival of associated invertebrates.
4. Elimination of rats and the fencing of sheep from coastal margins will contribute to conservation of the insect fauna requiring shrubland habitat.

5. Increased public access is probably compatible with the conservation of invertebrates if visitor numbers and access are maintained at a level that can be supported by the vegetation and topography.
6. Any release programme for the introduction of animals and plants should consider and assess the potential impact on the islands' invertebrate biota as well as established vertebrates.

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APPENDIX

List of invertebrates identified from Mokopuna/Somes Islands, November 1987-March 1988
 []—locality information, known host-plant or animal associations. ?—identification uncertain.

MOLLUSCA

- Tornatellinidae
Lamellidea novoseelandica (Pfr.)
 Punctidae
Paralaoma caputspinulae (Reeve)
 Tutuilanidae
Suterilla neozelandica (Murdoch)
 Charopidae
Charopa coma (Gray)
Therasia decidua (Pfeiffer)
Helicella caperata (Montagu) (European species)
 Helicidae
Helix aspersa Muller (European species)

CRUSTACEA

- Amphipoda
 2 spp.
 Isopoda
 1 sp.

ARACHNIDA

- Chelonethi
 1 sp.
 Opiliones
Nuncia sp.

ACARI

- Ixodidae
Ixodes eudyptidis Maskell
 Argasidae
Ornithodoros capensis Neumann

INSECTA

ARCHAEOGNATHA

- Machilidae
Nesomachilis maoricus Tillyard

EPHEMEROPTERA

1 sp.

DICTYOPTERA

- Blattidae
Celatoblatta undulivitta (Walker)
C. vulgaris (Walker)
Parallepsidion latipennis (Walker)

MANTODEA

- Mantidae
Orthodera ministralia F.

DERMAPTERA

- Labiduridae
Anisolabis littorea (White)
 Forficulidae
Forficula auricularia L. (European species)

ORTHOPTERA

Stenopelmatidae

Hemiandrus similis Ander

Tettigoniidae

Caedicia simplex (Walker)*Conocephalus semivittatus* (Walker)

Acrididae

Phaulacridium marginale (Walker)

PHASMATODEA

1 sp.

HEMIPTERA

Homoptera

Delphacidae

Ugyops pelorus Fennah

Ricaniidae

Scolypopa australis (Walker)

Flatidae

Siphanta acuta (Walker)*Sephana cinerea* Kirkaldy

Aphrophoridae

Carystoterpa fingsens (Walker)

Tibicinidae

Kikihia muta (F.)*Amphisalta* sp.

Cicadellidae

Eupteryx melissae Curtis*Myerslophia terrestris* Knight

Aphididae

At least 2 spp. Not assessed.

Pseudococcidae

1 sp.

Heteroptera

Miridae

Chinamis sp.*Stenotus binotatus* (F.)*Lygus* sp.

Lygaeidae

Hudsona anceps (White)

Berytidae

Neides sp.

NEUROPTERA

Hemerobiidae

Micromus tasmaniae (Walker)*Drepanacra binocula* Newman

COLEOPTERA

Adephaga

Carabidae

Anomotarsus illawarrae (Australian sp.)*Ctenognathus actochares* Broun*Demitrida nasuta* White*Mecodema sulcatum* (Sharp)

Cicindellidae

Cicindella sp.

Polyphaga

Histeridae

2 spp.

Ptiliidae

1 sp.

Leiodidae (Anisotomidae)

Mesocolon possibly *crenatellum* (Broun)*Paracatops* sp.

Staphylinidae

10 spp.

Scarabaeidae

Costelytra zealandica (White)*Odontria smithii* Broun*Odontria* sp.

Elateridae

Conoderus exsul

Anobiidae

Anobium sp.

Ptinidae

1 sp.

Nitidulidae

1 sp.

Languriidae?

1 sp.

Corylophidae

Holopsis sp.

Coccinellidae

2 spp.

Coccinella septempunctata L.

Lathridiidae

Lathostygnus sp.

"Lathostygnus" group

Mycetophagidae

Corticaria sp.

Colydiidae

1 sp.

Enarsus bakewelli Pascoe*Pristodoros* sp.?*Pyncnmerus* sp.

Tenebrionidae

Mimopeus opaculus (Bates)*M. humeralis* (Bates)*Artystona wakefeldi* Bates*Lorelus tarsalis* (Broun)

Oedemeridae

Thelyphassa lineata (F.)*Baculipalpus strigipennis* (White)

Cerambycidae

Oemona hirta (F.)*Stenellipsis pulchella**S. "aegrota"* group*Xylutes griseus*

Chrysomelidae

Eucolaspis brunnea (F.)

Anthribidae

Dysnocryptus pallidus Broun

Curculionidae

10 spp. (mostly litter inhabitants).

Rhadinosomus acuminatus Schonherr

DIPTERA

Nematocera

Tipulidae

5 spp. unidentified

Culicidae

Opifex fuscus Hutton

Brachycera

Stratiomyidae

Neoexaireta spinigera (Weidemann)*Benhamyia* sp.

Therevidae

2 spp. unidentified.

Dolichopodidae

Chrysoma mobile

Syrphidae

Austrosyrphus novaezealandiae (Macquart)*Megangyna novaezealandiae* Macquart*Paragus* sp.*Platycheirus* sp.*Melanostoma* sp.

Tephritidae (Trypetidae)

Trypanea sp.*Procecidochares* sp.*P. utilis* (Stone)

Lauxaniidae

Poecilobetaerella sp.

Pallopteridae

Neomaorina sp.

Anthomyiidae

Helemyia sp.

Muscidae

4 spp. unidentified

Fanniinae 3 spp.

Muscinae 1 sp.

Musca 2 spp.

Calliphoridae

Calliphora quadrimaculata (Swederus)*Lucilia sericata* (Meigen)*Xenocalliphora neozelandica* (Murray)

Tachinidae

5 spp. unidentified.

Protohystricia alcis (Walker)*Huttonobesseria verecunda* (Hutton)*Plagiomyia* (?) sp.*Wattia* (?) sp.

SIPHONAPTERA

Rhopalopsyllidae

Parapsyllus longicornis (Enderlein)*Nosopsyllus fasciatus* (Bosc)

TRICHOPTERA

Hydropsychidae

Aoteapsyche catherinae McFarlane

Conoesuchidae

Pycnocentrodus aeris Wise

Chathamiidae

Philanisus plebieus

Hydrobiosidae

Hydrobiosis clavigera McFarlane*H. parumbripennis* McFarlane*H. umbripennis* McLachlan

LEPIDOPTERA

Hepialidae

Wiseana signata (Walker) [grasses, herbs]

Tortricidae

Bactra noteraula Walsingham*Capua semiferana* (Walker) [litter feeder]*Cnephasia jactatana* (Walker)*Crociosema plebejana* (Zeller)*Gtenopseustis obliquana* (Walker)*Epiphyas postvittana* (Walker)*Harmologa sisyrana* (Meyrick) [herbs]*Merophyas leucaniana* (Walker) [herbs]*Planotortrix excessana* (Walker)*Sperchia intractana* Walker [litter feeder]

Psychidae

Liothula omnivorus (Fereday)*Scoriodyla conisalia* Meyrick*Rhatamictis* sp.

Tineidae

Echatotypa derogatella (Walker)*Erechthias hemiclistra* (Meyrick) [wood feeder]*E. terminella* (Walker) [wood feeder]*Monopis ethelella* (Newman) [wool]*Opogona omoscopa* (Meyrick)

Glyphipterigidae

Circia achlyoessa (Meyrick) [type locality Wellington, grass stem-borer]*C. dichorda* (Meyrick) [type locality Wellington, *Muehlenbeckia*]

Coleophoridae

Batrachedra sp.*B. psithyra* Meyrick

Elachistidae

Elachista archaeonoma Meyrick [grass miner]

Stathmopodidae

Stathmopoda holochra Meyrick [*Phormium* seed heads]

Oecophoridae

Hofmannophila pseudospretella (Stainton)*Paracystola axroxantha* (Meyrick) [Tasmanian species]*Leptocroca scholaea* (Meyrick)*Eutorna symmorpha* (Meyrick)*Tingena armigerella* (Walker)*T. plagiata* (Walker)*T. siderideta* (Meyrick) [shrubland litter]*Trachypepla anastrella* Meyrick*T. euryleucota* Meyrick [bird nest debris]*Izatha prasophyta* Meyrick*Endrosis sarcitrella* (Linnaeus)

Momphidae

Zapyrastra calliphana (Meyrick) [*Muehlenbeckia* miner]

Gelechiidae

Phthorimaea operculella (Zeller)

Pyralidae

Orocrambus ramosellus (Doubleday)*O. flexuosicellus* (Doubleday)*O. vulgaris* (Butler)*Patagoniodes farinaria* (Turner)

Eudonia philerga (Meyrick) [rock-face mosses]
E. cataxesta (Meyrick)
E. steropaea (Meyrick)
E. axena (Meyrick)
E. minimalis (Walker)
Mnesictena flavidalis (Doubleday) [*Muehlenbeckia*]
M. marmorata (Meyrick)
Scoparia halopis (Meyrick)
 Pterophoridae
Platyptilia falcatalis (Meyrick)
 Pieridae
Pieris rapae (L.)
 Nymphylidae
Bassaris gonerilla (F.)
B. itea (F.)
 Lycaenidae
Lycanea salustius (F.)
 Geometridae
Austrocidaria gobiata (Felder & Rogenhofer) [small
 leaved *Coprosma*]
A. similata (Walker) [*Coprosma*]
Chloroclystis filata (Guenee) [*Hebe*, *Senecio* flowers]
Declana floccosa Walker
Epyaxa venipunctata (Walker) [Chenopods]
Epicyme rubropunctata (Doubleday) [*Haloragis*]
Homodotis megapilata (Walker)
Orthoclydon praefectata (Walker) [*Phormium*]
Pasiphila plinthina Meyrick [type locality
 Wellington, not common]
P. sandycias (Meyrick)
Phrissogonus laticostatus (Walker)
P. testulatus (Guenee)
Pseudocoremia suavis Butler
P. leucelaea (Meyrick)
 Noctuidae
Agrotis ipsilon aneituma (Walker)
Bityla defigurata (Walker) [*Muehlenbeckia*]
Graphania infensa Walker
G. lignana (Walker)
G. mutans (Walker)
Homohadena fortis (Butler) [*Hymenanthera*]
Rictonis comma (Walker)
 HYMENOPTERA

Scelionidae
 Scelioninae
Baeus 3 spp.
Idris sp.
Odontacolus sp.
 Telenominae
Telenomus sp.
Trissolcus sp.
 Platygasteridae
 1 or 2 spp.
 Diapriidae
 Belytinae
Styloclista 2 spp.
 Diapriinae
Spilomicrus 5 spp.
Pentapria sp.
Basalys 2 spp.
Trichopria 2 spp.
 Proctotrupidae
 3 spp.
 Ceraphronidae
 3 spp.
 Megaspilidae
 1 sp.
 Eulophidae
 1 sp.
 Mymaridae
 3 spp.
 Encyrtidae
 2 spp.
 Elasmidae
 1 sp.
 Pteromalidae
 2 spp.
 Ichneumonidae
 Phygadenontinae
Xanthocryptus novozealandicus (Dalla Torre)
 Pimplinae
Ectromorpha intricatoria (F.)
 Tryphoninae
Netelia producta (Brulle)