https://doi.org/10.26749/rstpp.107.83

Papers and Proceedings of the Royal Society of Tasmania, Volume 107

NATURAL HISTORY OF THE HOGAN GROUP

3. FLORISTICS AND PLANT COMMUNITIES.

by N.H. Scarlett[1], G.S. Hope[2], D.M. Calder[3]

[1]Botany School, University of Melbourne; [2]School of Pacific Studies A.N.U.;
[3]Botany School, University of Melbourne.

ABSTRACT

A total of 146 vascular species were collected on the Hogan Group in January 1968. The composition of the flora is broadly similar to other islands of Bass Strait, and the coastal areas of Victoria, Tasmania and eastern South Australia.

The vegetation may be classified into six structural forms and ten associations. The most extensive communities are *Poa poiformis* tussock grassland, *Helichrysum paralium* shrubland complex, *Disphyma australe-Carpobrotus rossii* succulent herbfield, and *Lolium perenne* continuous grassland.

Analysis of a fossil pollen profile from Hogan Island indicates that there has been no drastic change in native species composition over the last 150 years, although there is evidence that shrub species of the Compositae have been reduced in importance. Recent evidence shows that burning and grazing have resulted in a reduction in shrubland area, and the modification or removal of *Poa poiformis* tussock grassland.

INTRODUCTION

At present, published accounts of the flora and plant communities of the Bass Strait islands do not provide a complete survey of all the island groups. A great deal of work has been published since Willis's study of Fisher Island (in Guiler *et al.* 1958), notably by Gillham (1960, 1961) and Norman (1966, 1967), but much remains to be done.

The aim of the investigation of the Hogan Group was to compile an adequate census of the flora, and define and map the vegetation types present. Limitations of time made rapid survey methods necessary, and data on ecological factors are purely qualitative.

FLORISTICS

Plant specimens were collected from Hogan, Long and East Islands during the expedition's stay in the Hogan Group. Only five hours were spent on the two smaller islands (Long and East) but they were probably covered as intensively as Hogan Island itself, which is nearly ten times larger. One hundred and forty-five vascular species were collected (see appendix 1). *Lavatera plebeia* and *Apium prostratum* are the only two species recorded for the Hogan Group in the Melbourne Herbarium, both collected by A.E.H. Mattingly in November 1937 (J.H. Willis, pers. comm. 1968). One other species (*Ixiolaena supina*) is recorded for the Hogan Group by Curtis (1963).

The flora of the group is similar to that of the smaller islands of Bass Strait, and the "coastal flora" of Tasmania, Victoria and the east of South Australia (Wood 1937, Willis 1962, Gillham 1961). The important species of the Hogan Group:- herbaceous plants such as *Disphyma australe*, *Carpobrotus rossii*, *Poa poiformis*, *Stipa teretifolia* and *Senecio lautus*, and the shrubs *Alyxia buxifolia*, *Calocephalus brownii*, *Rhagodia baccata*, *Helichrysum paralium*, *Myoporum insulare* and *Leucopogon parviflorus* are important components of these floras. However, some characteristic coastal species,

e.g. *Casuarina stricta*, *Leptospermum laevigatum* and *Acacia longifolia var. sophorae* are absent from the Hogan Group, although they occur in the neighbouring Kent Group, (Mueller 1885; Mullett and Murray-Smith 1967) and on the coast and islands of Wilson's Promontory (Gillham 1960; Parsons and Gill 1968).

There are interesting differences between the species found on different islands of the Hogan Group (see appendix 1). Hogan and Long Island share most of the major shrub species, e.g. *Helichrysum paralium*, *Alyxia buxifolia*, *Leucopogon parviflorus* and *Olearia phlogopappa*, but there some species which are very common on Hogan Island yet absent from Long Island - *Myoporum insulare*, *Bursaria spinosa*, *Cyathodes oxycedrus* and *Calocephalus brownii*. Shrub species restricted to the western slopes and cliff faces of Hogan are also absent from Long Island, e.g. *Melaleuca ericifolia*, *Pultenaea daphnoides*, *Beyeria leschenaultii*, *Pomaderris* spp., *Pimelea* spp. In view of the reduction in the number of shrub species on Long Island, it is surprising that *Banksia integrifolia* is restricted to that island, and that no evidence was found of any former occurrence on Hogan Island.

The native herbaceous flora of Hogan and Long Islands is very similar, but there is a marked difference in the proportion of introduced species. Over one half of the total flora of Hogan is introduced, compared with only one third of the flora of Long Island. This is due to the relatively unmodified state of Long as compared with Hogan, which is used for cattle grazing and is also burnt fairly regularly. It is likely that most of the alien species have been introduced by stock, but one species *(Dactylis glomerata)* was sown on the island after the island was burnt in April 1963 (Stackhouse, pers. comm. 1968).

East Island carried only the restricted flora of exposed maritime habitats e.g. *Disphyma australe*, *Carpobrotus rossii*, *Poa poiformis* and *Apium prostratum*. *Sonchus oleraceus* is the only alien species.

The floristic distribution in the Hogan Group is characterised by decreasing native species-number with decreasing size of island, but if the ratio of the number of native species to island area is used as an index of the "relative abundance" of species (Gillham 1961), Long Island has a markedly higher ratio than the other islands (see table 1). Gillham has shown that, in general, the species number/area ratio of the islands off Wilson's Promontory vary with degree of exposure, high ratios indicating the more sheltered islands (see table 1). The ratios found for Hogan and East Islands are comparable with Gillham's "exposed" islands (Cliffy, Dannevig), while the higher ratio for Long Island suggests that it is rather more sheltered than Hogan or East Island. However, Long Island must be classed as "exposed" when compared to islands such as Doughboy or Bennison.

PLANT COMMUNITIES

The plant communities were classified using the scheme developed by the Australian Committee for Section CT (Conservation) for the International Biological Programme, from the original table given in Wood and Williams (1950). The basis of this classification is vegetation structure, and the scheme was expanded to include some 'structural forms' not specifically defined by the Committee (see table 2).

Tussock Grassland

Poa poiformis Association. The *Poa poiformis* association is composed of tussocks of *Poa* in dense to moderately-dense spacing, associated with other grasses, sedges and dicotyledonous herbs. It is the most widespread community in the Hogan Group (see fig. 1), but the species composition differs between islands.

On Hogan Island the grasses *Dichelachne sciurea*, *D. crinita*, *Danthonia pilosa* and the herbs *Dichondra repens*, *Acaena anserinifolia*, *Medicago lupulina* and *Hypochoeris radicata* are common in the gaps between the tussocks, with *Apium prostratum* (small form), *Scirpus nodosus* and *Stipa compacta* as more scattered associates. In a small

TABLE 1

SPECIES NUMBER-AREA RATIOS FROM HOGAN GROUP AND OTHER ISLANDS

	HOGAN	LONG	EAST	CLIFFY*	DANNEVIG*	BENNISON*	DOUGHBOY*
Native species	87	41	7	22	19	49	74
Introduced Species	58	13	1	18	1	10	24
Total Species	145	54	8	40	20	59	98
Approx. Acreage	525	45	25	100	80	49	10
Native Spp/Acreage	1:4	1:1	1:4	1:5	1:4	7:1	5:1

*Calculated from the data of Gillham (1961).

TABLE 2

STRUCTURAL FORMS REPRESENTED ON THE HOGAN GROUP*

Height of Dominant Stratum	Density of Tallest Stratum: Very Dense (1 x diam. canopy)	Dense (2 x diam. canopy)	Open (2-5 x diam. canopy)
2 - 8 metres		Scrub	Shrubland
0 - 2 metres	Closed-heath	Open-heath	Low Shrubland
G (herbs, incl. mosses and ferns)	Continuous Grassland	Tussock Grassland	
	Closed Herbfield	Herbfield	Open Herbfield
	Succulent Herbfield		

* Adapted from the scheme developed by Australian Committee for Section CT, International Biological Programme.

area on the east coast of Hogan, *Pteridium esculentum* is found associated with *Poa*. On Long Island, *Hypochoeris radicata* and *Medicago lupulina* (both introductions) are absent from the association and a robust form of *Pelargonium australe* is prominent in some areas. The *Poa* association on East Island is a pure stand of the dominant, except in sites grading to *Senecio lautus* herbfield (q.v.).

Poa poiformis tussock grassland occurs on level to moderately steep areas in the Hogan group, except where the water-table is high. However, its relationship to other communities is complex, and there is evidence that burning and grazing are particularly important factors in the ecology of this community.

Stipa teretifolia Association. This association is similar in structure to the *Poa* association, and there is a marked gradational relationship between the two communities. The change in dominants is generally clear-cut, but associated species change less abruptly. In general, the major associates of *Poa: Acaena anserinifolia, Dichondra repens* and *Medicago lupulina* are absent or infrequent in *Stipa* grassland, but the associates of *Stipa* vary widely. Where *Stipa* grassland occurs in local depressions in areas of shallow soils *Apium prostratum, Brachycome diversifolia var. maritima* and

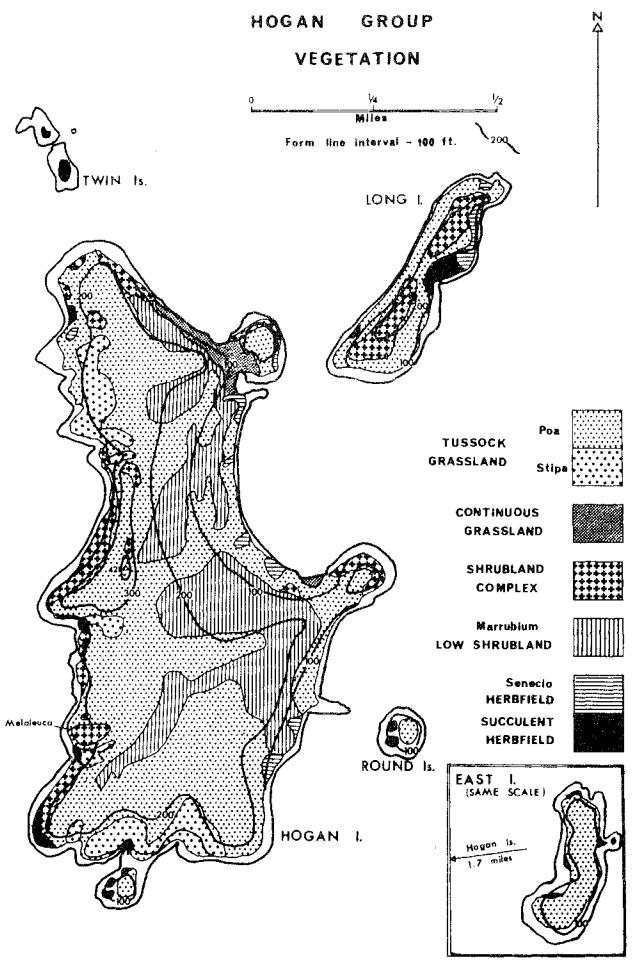

FIG. 1 - Vegetation Map of Hogan Island.

Disphyma australe are prominent, but in areas surrounding soaks *Stipa* is associated with 'salt-marsh' species: e.g. *Salicornia quinqueflora, Cotula coronopifolia* and *Polypogon monspeliensis*. The latter group of associates suggest that *Stipa* grassland is developed on sites with a high water-table. The occurrence of a rather similar community in the most exposed zone at Pillar Point, Wilson's Promontory is considered by Parsons and Gill (1968) to be correlated with both large amounts of salt spray and high levels of soluble soil salts. The restriction of *Stipa* grassland to depressions and soaks on the exposed western coast of Hogan Island may be due to similar causes; its absence from sites with a high water-table on the east coast certainly suggests that salt accumulation in the soil is important.

Shrubland Complex

The term "shrubland complex" is used to cover a range of structural forms varying continuously between Scrub and Closed Heath (see table 2). Low Shrubland, domin-

ated exclusively by *Marrubium vulgare*, is excluded from the complex; its structure is uniform and it is quite separate from the communities described below. Two associations are distinguished; *Helichrysum paralium* Association and *Melaleuca ericifolia* Association.

Helichrysum paralium Association. In the Shrubland phase of the complex on Hogan Island, *Helichrysum paralium* and *Alyxia buxifolia* are usually co-dominant, but associated shrubs vary in frequency and importance. *Bursaria spinosa*, *Olearia phloggopappa* and *Leucopogon parviflorus* are usually present and may be locally co-dominant with *Helichrysum*, while *Myoporum insulare* is scattered on the west of Hogan. Smaller shrubs, such as *Rhagodia baccata*, *Calocephalus brownii*, *Correa alba* and *Cyathodes oxycedrus* are also found in the Shrubland phase, but increase in importance as Shrubland grades into Heath and Low Shrubland. This gradation is especially marked on the western cliffs where *Calocephalus* and *Rhagodia* are dominant in Heath-Low Shrubland, and the taller shrubs are confined to sheltered positions. Most of the rare shrub species of Hogan Island are found in the Heath-Low Shrubland gradations of these cliffs e.g. *Beyeria leschenaultii*, *Pomaderris spp.*, *Pimelea spp.*

On Long Island some shrubs which are frequent on Hogan Island are absent from the association (see *Floristics*), and *Olearia phloggopappa* is the usual co-dominant with *Helichrysum*. There is a tendency for closed canopies to develop in some areas (Scrub) and the gradations to Heath-Open Shrubland are less common than on Hogan Island. A small area of fire damaged *Banksia integrifolia-Helichrysum paralium* shrubland is found on the northern end of the island.

A ground stratum of variable density and composition is present in the *Helichrysum* association of both islands. In areas of relatively deep soils this stratum is well developed, and is composed of *Poa poiformis* and many of the grassland herbs, but on rocky soil the stratum is sparse, and herbs such as *Disphyma australe*, *Pelargonium australe*, *Ixiolaena supina*, and *Senecio lautus* are frequent. On the steep sliffs of the sheltered east coast of Hogan Island, the ferns *Asplenium obtusatum* and *Microsorium diversifolium* are found in rock crevices, in association with scattered shrubs. In the Heath-Low Shrubland gradations, associated herbs are sparse, the main species being *Carpobrotus rossii*, *Disphyma australe*, and *Senecio lautus*.

Melaleuca ericifolia Association. This association is present only on the south coast of Hogan Island (see fig. 1). Most of the *Melaleuca* community has been burnt, and an Open Heath has developed, in which low *Melaleuca* shrubs are associated with *Pultenaea daphnoides*, *Correa alba* and *Calocephalus brownii*. Lower on the cliffs in this area an unburnt Closed Heath of *Melaleuca* is found. In the Open Heath phase of the association, *Poa poiformis* is prominent in the ground stratum, but herbaceous species are absent in the Closed Heath.

The shrubland complex in the Hogan Group shows abundant signs of a dynamic relationship with *Poa poiformis* tussock grassland, and this relationship is strongly influenced by human interference - burning and grazing. This feature of the vegetation of the group is of great interest and a more detailed discussion is presented below.

Herbfield

Herbfield on Hogan Group is dominated by *Senecio lautus*. These herbfield communities are found in two different types of habitat.

(a) On many of the rookery areas of the islands, *Senecio* forms an open herbfield. The main associates of *Senecio* in the rookeries on Hogan are *Urtica urens*, *U. incisa*, and occasional *Poa poiformis*. On Long Island *Pelargonium australe* replaces the *Urtica* species, while on East Island only *Senecio* and *Poa* are present in the rookeries.

(b) In the soaks and wet areas on the east coasts of Hogan and Long Islands, a robust form of *Senecio*, associated with *Pelargonium australe* and *Apium prostratum*

(large form, Gillham 1961) forms closed herbfields. Soaks frequented by cattle (Hogan Island only) have a more open vegetation, with a great variety of herbs associated with *Senecio;* these include *Rumex spp, Urtica spp., Carduus tenuiflorus, Scirpus nodosus* and *Cotula coronopifolia.* In the wettest sites, near the junction of calcarenite and granite, associated species are different:- *Juncus spp., Triglochin striata, Scirpus cernuus* and rarely *Phragmites communis. Senecio* is also found with *Lavatera plebeia* in the soaks of rocky granite slopes.

Succulent Herbfield

This structural form is composed of herbs with succulent leaves or stems, proliferating by prostrate runners. These herbs tend to form a low, dense mat of vegetation, quite distinct in physiognomy from other types of herbfield. This form is therefore treated separately from the more normal herbfields described above. J.H. Willis called this structural form "succulent mat-growth" in his description of the vegetation of Fisher Island (Guiler *et al.* 1958).

Disphyma australe - Carpobrotus rossii Association. Large areas of exposed cliffs and rock faces are occupied by this association. There is a tendency for *Disphyma* to dominate the lower, more exposed zones, with *Carpobrotus* on the higher parts, but the two species may also grow together. On steep areas associated species are rare, but in flatter sites where some soil has accumulated *Bulbine semibarbata, Lobelia alata, Crassula sieberiana* and *Sonchus oleraceus* are common associates. There was evidence that ephemeral grasses, especially *Vulpia bromoides,* may be important in winter and spring. A small area of succulent herbfield dominated by *Zygophyllum billardieri, Gasoul crystallinum* and *Tetragonia implexicoma* is found on the calcarenite of the northern headland.

Salicornia quinqueflorus Association. This association is rather restricted, and occurs on rock platforms and soaks exposed to salt spray (west coast of Hogan Island). Associated species include *Samolus repens, Sporobolus virginicus* and *Polypogon monspeliensis.* As mentioned above, this association has a close relationship to the *Stipa teretifolia* association of the soak areas.

Continuous Grassland

Continuous grassland, dominated by introduced plants, is only found on Hogan Island. Two communities are present, one dominated by *Lolium perenne,* the other by *Bromus sterilis.*

Lolium perenne Association. The *Lolium perenne* association is composed of densely spaced *Lolium* plants, associated with grasses -*Bromus mollis* and *Cynodon dactylon,* and many dicotyledonous herbs, including *Medicago lupulina, Trifolium subterraneum, Melilotus indica, Erodium cicutarium* and *Cirsium vulgare.*

Lolium grassland is found on the eastern side of Hogan, on gently sloping areas subject to intense grazing pressure. This grassland is obviously extending into areas where severe grazing and burning have resulted in the degeneration of *Poa poiformis* tussock grassland.

Bromus sterilis Association. This type of continuous grassland is composed of annual grasses and dicotyledonous herbs and in its summer aspect, the vegetation is a dense mat of dead leaves and culms. The species composition of the sward was difficult to determine, but *Bromus sterilis* was predominant. The most important of the minor species are:- *Hordeum leporinum, Arctotheca calendula, Cotula australis* and *Silene spp.* Perennials, such as *Erodium cicutarium* and *Medicago lupulina* are scattered through the community. The *Bromus* community occupies the steeper slopes above the *Lolium* community, and grades into *Marrubium* low shrubland.

Low Shrubland

Marrubium vulgare Association. This community is composed of shrubs of *Marrubium vulgare* from 0.3 to 0.6 m high in open to very open spacing. A variety of annual

grasses occur in the ground stratum, e.g. *Bromus spp.*, *Parapholis incurva*, *Vulpia bromoides*, *Aira caryophyllea* and *Catapodium rigidum*. Some annual herbs are also present.

Marrubium low shrubland is restricted to the eastern and southern slopes of Hogan Island, on deep soils formed on calcarenite. Mutton bird rookeries are found in parts of the community, and it is likely that a combination of firing, grazing and rookery disturbance have played a part in establishing *Marrubium*. Scattered tussocks of *Poa poiformis* among the *Marrubium* suggest that Tussock Grassland was formerly dominant on these slopes.

POLLEN ANALYSIS

Pollen analysis was used in an attempt to find out something of the vegetational history of the island. Samples for analysis were obtained from a pit which was dug in a swampy part of the *Senecio lautus* herbfield. This pit was located on the southern end of Stackhouse Bay about 1.5 m above spring high water. The samples were collected, prepared and examined by the methods used by Hope (1968). The stratigraphy of the deposit and the pollen diagram are shown in figure 2. The graphs show the percentages of total pollen (excluding spores, which were counted separately). In some cases, certain components which make up the pollen percentage of a particular taxon have been distinguished; for example, the percentage for Poaceae at 50 cm is 33%, and this is made up of 4% Poaceae I, 21% II, 6% III and 2% IV.

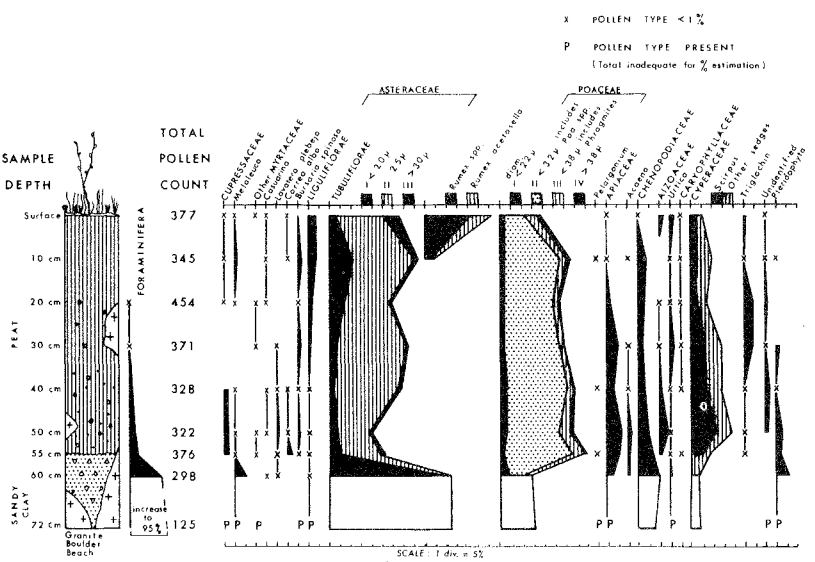

FIG. 2 - Pollen diagram obtained from a peat section on the eastern bay of Hogan Island. Pollen percentages based on all pollen excepting Cyperaceae and *Triglochin*.

The rounded rocks underlying the deposit are probably part of an old boulder beach which eventually escaped effective wave action, permitting soil to accumulate by hillwash. There are similar old boulder beaches, up to 1.8 m above the present high water level, at several places along the eastern shore and soil and vegetation have developed on these. The build up of soil and vegetation disrupted the drainage at the edge of the calcarenite sheet and this led to swampy conditions and the develop-

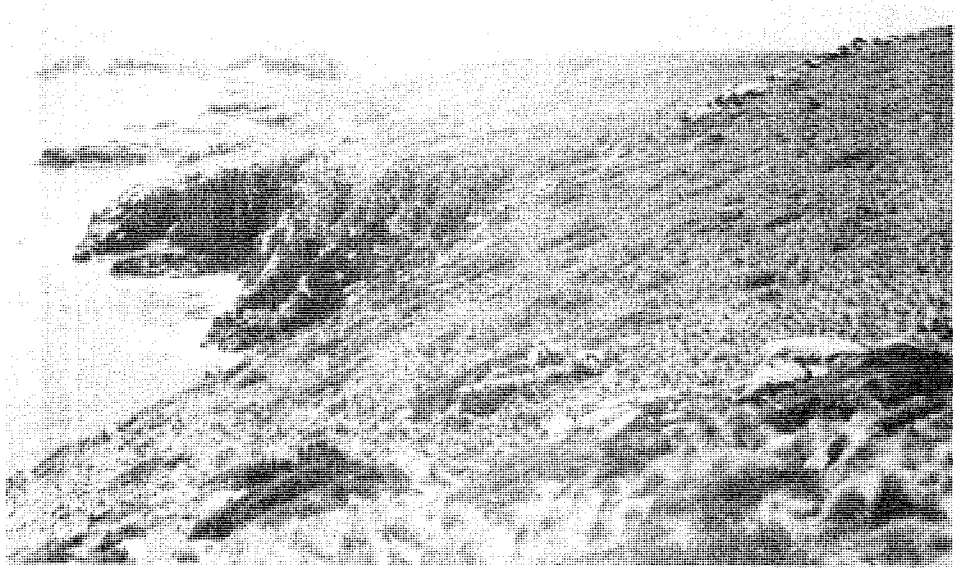

PLATE 1 - View of part of the west coast of Hogan Island, looking north. *Poa* tussock grassland with scattered *Bursaria spinosa*, grading to Low Shrubland on the steeper slopes.

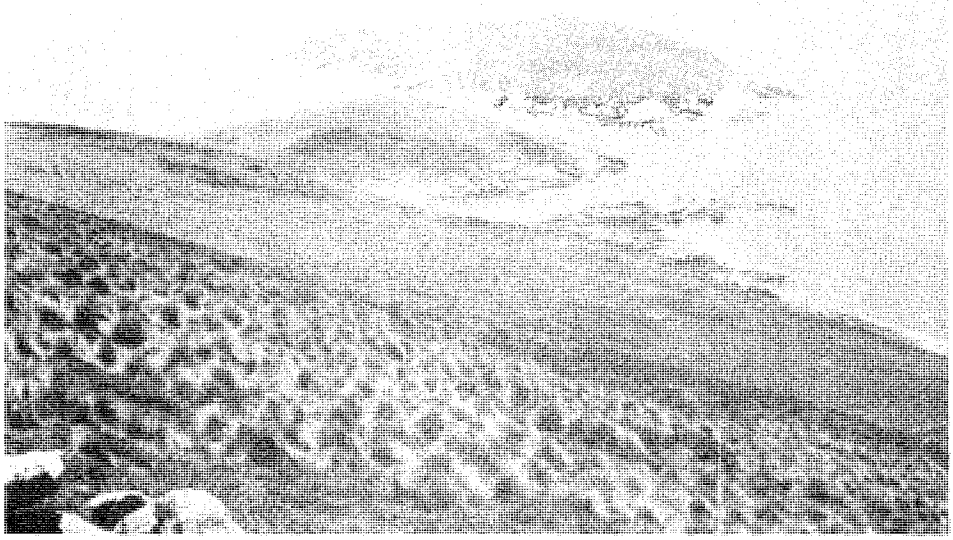

PLATE 2 - View from Hogan Island showing Long Island. *Poa* tussock grassland in foreground, *Marrubium* shrubland (darker tone) extends down the slopes.

ment of peat.

The soil above the rocks contains numerous foraminiferal tests, which are nearly as abundant as pollen grains at the base of the soil, but decrease towards the top. Mr. D. Taylor (Geology School, University of Melbourne) kindly identified one of these tests as *Elphidium advenum*, an open sea dweller. He also noted scales and bones of fish and fragments of crustaceans in the soil. While a little of this material may have been carried by the wind or birds, some of it probably arrived when waves inundated the soil during its formation.

It is difficult to compare the pollen at the base of the soil (72 cm) with that of the rest of the deposit, as it is sparse and some may have been washed into the area. However, the pollen is similar to that of the other soil horizon sampled (60 cm), showing large amounts of Tubuliflorae I (which may include or be made up of *Senecio lautus*), relatively high values for Apiaceae and Chenopodiaceae and relatively low values for Poaceae. These low values do not necessarily indicate a substantially lower grass cover than in subsequent stages, as the Poaceae figures may have been depressed as a result of the presence of large numbers of shrub or herbaceous composites. A consideration of these pollen figures and present day vegetation on comparable sites suggests that the plants colonising the soil and persisting at least until the beginning of peat formation include *Senecio lautus* and moderate amounts of *Salicornia quinqueflora*, *Lavatera plebeia*, *Apium prostratum* and *Correa alba*.

The percentages for *Melaleuca* and *Bursaria* are low throughout the peat and *Leucopogon* is not recorded. This indicates that shrubs such as *Melaleuca ericifolia*, *Bursaria spinosa* and *Leucopogon parviflorus* were no more common on the island in the immediate past than they are today. The complete lack of *Banksia* pollen suggests that *Banksia integrifolia* has not grown near the site recently and underlines the isolation of the present shrubs on Long Island. Pollen from *Eucalyptus*, *Leptospermum* (both included in the diagram as *Myrtaceae*), *Casuarina* and *Cupressaceae* and spores of *Dicksonia* (included in the diagram under *Pteridophytes*) occur sporadically in the peat, but these were probably blown to the island from nearby land.

Introduced weeds dominate the surface of the bog at the present day, and the pollen of such plants is a feature of the peat. The pollen of Cynareae (Tubuliflorae III) occurs throughout the peat and almost certainly represents introduced plants. Pollen of the Liguliflorae was found in the soil as well as the peat. All members of this subfamily recorded for the island at the present day are introduced, but a native species, *Microseris scapigera* may have occurred in the past. The increase in Liguliflorae pollen above 35 cm is attributed to an increase in the introduced *Hypochoeris*. The sharp rise of *Rumex* pollen above 15 cm shows that this species was introduced fairly recently.

Apart from the increase in the weed flora and the possibility that shrub composites were once more widespread and *Poa* less so, there is no evidence of any marked change in the vegetation at or near the bog site during the period represented by the pollen diagram. The decrease in *Poa* values in the top sample is probably due to the increase in *Rumex* pollen rather than to a change in grass cover around the site. A slight maximum for bog plants, such as *Triglochin striata* and the Cyperaceae, about halfway through the peat suggests that the site was formerly wetter then than it is today. The general decrease in the frequency of foraminiferal tests and in Apiaceae, Chenopodiaceae and *Lavatera* pollen through the profile shows that salty conditions, with occasional inundation, declined as the peat built up.

The distribution of the pollen of the Cynareae indicates that the peat has been built up since Europeans settled Australia, probably since 1830, when Gippsland was settled. Wind dispersal of seeds may have led to the occurrence of some weeds on the island before they were transported there by European visitors. If 55 cm of peat has built up in 140 years then the rise in *Hypochoeris*, *Rumex* and Cynareae at about 20 -

30 cm shows the start of intensive grazing after 1900, this not only introduced new species but led to disturbance of the swamps allowing weeds to become established. The extensive areas of *Marrubium* are much more recent, as the pollen of this genus was only found in the surface sample. In a coastal swamp on Wilson's Promontory an analagous situation has been found (Hope 1968). Here weed pollen appears in trace amounts at 90 cm and increases to important levels at about 30 cm depth, presumably reflecting the increased grazing which started after 1885 (Hardy 1906).

DISCUSSION

The most interesting aspect of the ecology of the Hogan Group is the marked effect of human interference on the plant communities. As mentioned previously, a great number of plant species has been introduced, and both the nature and distribution of the plant communities have been altered. It is fortunate that Long Island has remained comparatively untouched, as a comparison between Long and Hogan Islands may be used to gauge the extent of the changes. Shrubland communities extend over the whole central spine of Long Island, but on Hogan Island they are confined largely to the rocky peaks, cliffs and headlands (see fig. 1). Although Long Island is comparatively sheltered, the differing Shrubland distribution is unlikely to be due to different levels of exposure, as well-developed Shrubland is present on the steep exposed western cliffs of Hogan Island. It is considered that both burning and grazing are the most important factors affecting the present distribution of the shrubland communities.

Fire-damaged shrubs and burnt stumps are present on both islands, but the unburnt condition of *Poa* tussocks on Long Island suggests that burning is infrequent there. Hogan Island is burnt every five years, (Stackhouse, pers. comm. 1968), and there is abundant evidence that most of the island is affected by firing. Shrub regeneration on Hogan appears to be rare, in contrast to Long Island where many areas of young shrubs were seen. Firing is not the only factor responsible for the difference, as some unburnt shrubland on Hogan Island (e.g. the southern headland) also shows no signs of regeneration. Severe grazing damage was evident on the shrubs and the lack of regeneration in this case may be ascribed to the grazing factor. The successful regeneration of shrubs on Long Island can be understood in terms of the lower fire frequency, and the complete lack of grazing. It should be noted that rabbits are absent from all the islands of the Hogan Group.

It is apparent that the combination of high fire frequency and grazing has resulted in the restriction of Shrubland to inaccessible, rocky sites on Hogan Island. However, the strong development of *Poa poiformis* tussock grassland on the lower slopes of Long Island suggests that shrubland did not dominate the whole of Hogan Island in the past. The evidence of the fossil pollen profile from Hogan also supports this conclusion. Norman's reconstruction of the former vegetation of Rabbit Island (Norman 1967) is remarkably similar to the pattern observed on Long Island at present: a coastal fringe of *Poa poiformis* tussock grassland surrounding a central area of shrubland. The factors involved in this vegetational pattern are unknown, but it must be emphasised that the rigid distinction between shrubland and grassland is, to a certain extent, a botanical abstraction. As mentioned in the description of the shrublands of the Hogan Group, species of the *Poa poiformis* tussock grassland often form a ground stratum in shrubland areas. This means that herbaceous species may remain important components of the vegetation and affect its dynamics, even in the presence of shrub species. Thus an increase in the area of shrubland would not necessarily result in a corresponding decrease in abundance of *Poa poiformis* and its associates.

Disturbance on Hogan Island has not only resulted in a reduction in the shrubland communities, but has also changed the herbaceous communities. Introduced species are prominent in all areas, and are often the dominant plants. The natural vegetation has been removed from large areas of the east coast, especially on soils formed on calcarenite. On the deep, sandy calcareous soils, fire, grazing and rookery disturbance have resulted in the establishment of a *Marrubium* dominated community. On the

shallower calcareous soils continuous grassland, dominated by introduced grasses, is replacing *Poa* tussock, which has been damaged by burning and severe grazing. The west coast of Hogan appears more lightly grazed, and the changes have not been as extensive, although some of the burnt *Stipa* grassland is showing signs of accelerated erosion.

ACKNOWLEDGEMENTS

The authors wish to thank Mr. E.J. Sonnenberg, who determined many of the plant specimens, Mr. R. Filson who determined the collection of lichens, Mr. J.H. Willis who determined many difficult plants, checked the entire plant collection and provided much useful information and Dr. S.L. Duigan and Dr. D.H. Ashton for their useful criticisms of the manuscript.

BIBLIOGRAPHY

Curtis, W.M., 1963: *The Student's Flora of Tasmania* Pt. 2, Govt. Printer, Tasmania.

_____, 1967: *The Student's Flora of Tasmania* Pt. 3, Govt. Printer, Tasmania.

Gillham, M.E., 1960: Destruction of indigenous heath vegetation in Victorian sea-bird colonies. *Aust. J. Bot.*, 8, 277-317.

_____, 1961: Plants and sea-birds of granite islands of south-east Victoria. *Proc. R. Soc. Vict.*, 74, 21-36.

Guiler, E.R., Serventy, D.L. and Willis, J.H., 1958: The Fisher Island Field Station. *Pap. Proc. R. Soc. Tasm.*, 92, 165-183.

Hardy, A.D., 1906: An Excursion to Wilson's Promontory. *Vict. Nat.*, 22, 191-223.

Hope, J.H. and Hope, G.S., 1968: *A field guide to the Kent Group, Bass Strait.* Mimeographed, Monash University.

Mueller, F. von., 1885: A complete census of the flora of Deal Island Field Station. *Pap. Proc. R. Soc. Tasm.*, 1884, 282-283.

Mullett, J.H. and Murray-Smith, S., 1967: First footing on a Bass Strait Island: an investigation of Dover Island in the Kent Group. *Vict. Nat.*, 84, 239-250.

Norman, F.I., 1966: A note in the vegetation of Big Green Island, Furneaux Group, Tasmania. *Vict. Nat.*, 83, 294-299.

_____, 1967: The interactions of plants and animals on Rabbit Island, Wilson's Promontory, Victoria. *Proc. R. Soc. Vict.*, 80, 193-200.

Parsons, R.H., 1966: The soils and vegetation at Tidal River, Wilson's Promontory. *Proc. R. Soc. Vict.*, 79, 319-354.

_____ and Gill, A.M., 1968: The effects of salt spray on coastal vegetation at Wilson's Promontory, Victoria, Australia. *Proc. R. Soc. Vict.*, 81, 1-10.

Willis, J.H., 1948: Plants of Rodondo Island. *Vict. Nat.*, 64, 21-24.

Wood, J.G., 1937: *The Vegetation of South Australia.* Govt. Printer, Adelaide.

_____ and Williams, R.J., 1950: 'Vegetation' *In The Australian Environment*, 2nd ed., C.S.I.R.O. and Melbourne University Press.

APPENDIX 1

VASCULAR FLORA OF THE HOGAN GROUP OF ISLANDS

* Introduced species

	Hogan	Long	East
PTERIDOPHYTA			
FILICINEAE			
Dennstaedtiaceae			
Pteridium esculentum (Forst. f.) Nakai	x	x	
Histopteris incisa (Thunb.) J.Sm.	x		
Aspleniaceae			
Asplenium obtusatum Forst. f.	x	x	x
Polypodiaceae			
Microsorium diversifolium (Willd.) Copeland	x		
ANGIOSPERMAE			
MONOCOTYLEDONEAE			
Juncaginaceae			
Triglochin striata Ruiz. & Pav.	x		
Gramineae (Poaceae)			
* *Briza maxima* L.	x		
* *Dactylis glomerata* L.	x		
* *Catapodium rigidum* (L.) C.E. Hubbard	x	x	
Poa poiformis (Labill.) Druce	x	x	x
* *Poa pratensis* L.	x		
* *Poa annua* L.	x		
* *Vulpia bromoides* (L.) S.F. Gray	x	x	
* *Lolium perenne* L.	x		
* *Bromus unioloides* (Willd.) Humb. et al	x		
* *Bromus mollis* L.	x	x	
* *Bromus sterilis* L.	x	x	
* *Hordeum leporinum* Link.	x	x	
* *Monerma cylindrica* (Willd.) Coss & Durieu	x		
* *Parapholis incurva* (L.) C.E. Hubbard	x	x	
* *Aira caryophyllea* L.	x	x	
Dichelachne crinita (L. f.) Hook. f.	x	(x)sp.	
Dichelachne sciurea (R.Br.) Hook. f.	x	(x)sp.	
Agrostis avenacea J.F. Gmel.	x	x	
Agrostis billardieri R.Br.	x	x	
* *Polypogon monspeliensis* (L.) Desf.	x		
* *Lagurus ovatus* L.	x		
Cynodon dactylon (L.) Pers.	x		
* *Sporobolus virginicus* (L.) Kunth.	x		
Phragmites communis Trin.	x		
Danthonia pilosa R.Br.	x		
Stipa teretifolia Steud.	x	x	
Stipa compacta D.K. Hughes	x		
* *Pennisetum clandestinum* Hochst. ex Choiv.	x		
Cyperaceae			
Scirpus nodosus Rottb.	x	x	
Scirpus cernuus Vahl.	x	x	
Lepidosperma gladiatum Labill.	x		
Centrolepidaceae			
Centrolepis strigosa (R.Br) Roem. & Schult.	x		
Juncaceae			
Juncus pallidus R. Br.	x		
Juncus bufonius L.	x		

	Hogan	Long	East
Liliaceae			
Bulbine semibarbata (R.Br.) Haw.	x	x	
Dianella revoluta R.Br.	x	x	
DICOTYLEDONAE			
Urticaceae			
Urtica incisa Poir.	x		
* *Urtica urens* L.	x		
Proteaceae			
Banksia integrifolia L.f.		x	
Polygonaceae			
* *Rumex pulcher* L.	x		
* *Rumex conglomeratus* Murray	x		
* *Rumex acetosella* L.	x		
Muehlenbeckia adpressa (Labill.) Meisn.	x	x	
Chenopodiaceae			
Atriplex cinerea Poir.	x		
* *Atriplex hastata* L.	x		
Rhagodia baccata (Labill.) Moq.	x	x	
Chenopodium pumilio R.br.	x		
Chenopodium glaucum L.	x	x	
* *C. album* L.	x		
Salsola kali L.	x		
Suaeda australis (R.Br.) Moq.	x	x	
Salicornia quinqueflora Bunge ex Ung.-Sternb.	x	x	
Aizoaceae			
* *Gasoul crystallinum* (L.) Rothm.	x		
Carpobrotus rossii (Haw.) Schwantes	x	x	x
Disphyma australe (Ait.) N.E. Br.	x	x	x
Tetragonia implexicoma (Miq.) Hook.f.	x		
Portulacaceae			
Calandrinia calyptrata Hook. f.	x		
Caryophyllaceae			
* *Stellaria media* L.	x		
* *Cerastium glomeratum* Thuill.	x	x	
Sagina apetala L.	x		
Spergularia media (L.) Presl.	x		
Polycarpon tetraphyllum (L.) L.	x		
* *Silene nocturna* L.	x		
* *Silene gallica* L.	x		
Ranunculaceae			
Clematis microphylla DC.	x		
Lauraceae			
Cassytha pubescens R.Br.	x		
Brassicaceae			
Lepidium foliosum Desv.	x	x	
L. hyssopifolium Desv.	x	x	
* *Cakile edentula* (Bigelow) Hook.	x		
Crassulaceae			
Crassula sieberiana (Schultes) Druce	x	x	x
Pittosporaceae			
Bursaria spinosa Cav.	x		
Rosaceae			
Acaena anserinifolia (Forst.& Forst.f.) Druce	x	x	
Mimosaceae			
* *Albizia lophantha* (Wild.) Benth.	x		
Fabaceae			
Pultenaea daphnoides Wendl.	x		
* *Trifolium cernuum* Brot.	x	x	

	Hogan	Long	East
* *T. glomeratum* L.	x		
* *T. subterraneum* L.	x		
* *Medicago minima* (L.) L.	x		
* *M. arabica* (L.) Huds.	x		
* *M. polymorpha* (var) L.	x		
* *M. lupulina* L.	x		
* *Melilotus indica* (L.) All.	x		
Kennedia prostrata R.Br. ex Ait.	x		
Geraniaceae			
Pelargonium australe Willd.	x	x	
* *Geranium molle* L.	x		
* *Erodium cicutarium* (L.) L'Her. ex Ait.	x		
Oxalidaceae			
Oxalis corniculata L.	x		
Zygophyllaceae			
Zygophyllum billardieri DC.	x		
Rutaceae			
Correa alba Andr.	x	x	
Euphorbiaceae			
Beyeria leschenaultii (DC) Baill.	x		
Stackhousiaceae			
Stackhousia monogyna Labill.	x		
Rhamnaceae			
Pomaderris apetala Labill.	x		
P. oraria F. Muell. ex Reiss	x		
Malvaceae			
Lavatera plebeia Sims.	x	x	
* *Malva parviflora* L.	x		
Thymelaeaceae			
Pimelea linifolia Sm.	x		
P. serpyllifolia R. Br.	x		
Myrtaceae			
Melaleuca ericifolia Sm.	x		
Onagraceae			
Epilobium billardierianum Ser.	x		
E. cinereum Forst.f. ex Spreng	x	x	
Apiaceae (Umbelliferae)			
Apium prostratum Labill. ex Vent. Large form	x	x	x
Apium prostratum Labill. ex Vent. Small form	x	x	
Epacridaceae			
Leucopogon parviflorus (Andr.) Lindl.	x	x	
Cyathodes oxycedrus (Labill.) R. Br.	x		
Primulaceae			
* *Anagallis arvensis* L.	x		
Samolus repens (Forst.) Pers.	x		
Gentianaceae			
* *Centaurium pulchellum* (Sw.) Druce	x		
* *C. erythraea* Rafn.	x	x	
Apocynaceae			
Alyxia buxifolia R. Br.	x	x	
Convolvulaceae			
Dichondra repens Forst. & Forst. f.	x	x	
Lamiaceae			
* *Marrubium vulgare* L.	x		
Solanaceae			
Solanum nigrum L.	x		
Myoporaceae			
Myoporum insulare R. Br.	x		

	Hogan	Long	East
Plantaginaceae			
* *Plantago coronopus* L.	x		
Rubiaceae			
Galium australe DC.	x		
Campanulaceae			
Wahlenbergia communis Carolin	x	x(sp)	
W. tadgelli N. Lothian	x		
Lobelia alata Labill.	x		
Asteraceae (Compositae)			
Brachycome diversifolia (Grah. in Hook.) Fisch & Mey. var. *maritima* Benth.	x	x	
Olearia ramulosa (Labill.) Benth	x	x	
O. phlogopappa (Labill.) DC.	x	x	
Cotula coronopifolia L.	x		
C. australis (Sieb. ex Spreng.) Hook f.	x		
Senecio lautus aff. Forst.f. ex Willd.	x	x	x
* *Arctotheca calendula* (L.) Levyns	x		
* *Gnaphalium candidissimum* Lam.	x		
G. japonicum Thunb.	x	x	
G. luteo-album L.	x	x	
G. indutum Hook.f.	x		
Ixiolaena supina F. Muell.	x		
Helichrysum paralium (N.T. Burbidge) Curtis	x	x	
H. bracteatum (Vent.) Andrews var. *albidum* D.C. (=*H. pappillosum* Labill)	x		
Calocephalus brownii (Cass.) F. Muell	x		
* *Cirsium vulgare* (Savi) Ten.	x		
* *Carduus tenuiflorus* Curt.	x		
* *Silybum marianum* (L.) Gaertn.	x		
* *Hypochoeris radicata* L.	x	x	
* *H. glabra* L	x	x	
* *Taraxacum officinale* Weber ex Wiggers	x		
* *Sonchus oleraceus* L.	x	x	x
* *S. asper* (L.) Hill	x		
* *Aster subulatus* Michx.	x		

APPENDIX 11

Lichen Flora of the Hogan Group determined by R. Filson (Nat. Herb. Melbourne)

Anaptychia pseudospeciosa var. *tremulans* (Mull. Arg.) Kurok	MEL. 29481
Buellia alboatra (Hoffm.) Branth. & Rostr.	MEL. 29488
Caloplaca holocarpa (Hoffm.) Wade	MEL. 29487
Caloplaca murorum (Ach.) Th.Fr. (forma)	MEL. 29489
Caloplaca sp.	MEL. 29485
Diploica canescens (Dicks.) Mass.	MEL. 29486
Lecanora atra (Huds.) Ach.	MEL. 29502
Lecanora (Aspicilia) calcarea (L.) Somm.	MEL. 29498
Lecanora sp.	MEL. 29501
Microthelia aterrima (Anzi) Zahlbr.	MEL. 29495
Pannaria rubiginosa (Thunb) Del.	MEL. 29494
Parmelia borreri (Sm.) Turn.	MEL. 29493
Parmelia harrisii Kurok.	MEL. 29503
Parmelia pulla (Nech.) Ach.	MEL. 29562
Parmelia reticulata Tayl.	MEL. 29504
Parmelia rutidota Hook. f. & Tayl.	MEL. 29499
Parmelia sp.	MEL. 29496

Ramalina sp.	MEL. 29490
Ramalina sp.	MEL. 29491
Ramalina sp.	MEL. 29492
Rhizocarpon sp.	MEL. 29488
Rinodina thiometra (Nyl.) Mull. Arg.	MEL. 29497
Rinodina sp.	MEL. 29480
Teloschistes spinosus (Hook.f. & Tayl.) J. Murray	MEL. 29484
Xanthoria ectanea (Ach.) Ras. ex R. Filson	MEL. 29483