Vascular flora of Graham Island, Waikato River

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Introduction

Graham Island (NZMS 260 S14 118751) is a small (0.2 ha) island situated along the stretch of the Waikato River which flows through Hamilton City (Fig. 1). The island is derived from a composite of Pleistocene and Holocene pumiceous alluvium from both Hinurea and Taupo Pumice Formations (McCraw 1967, Froggatt and Lowe 1990). The relief is low, reaching a maximum elevation of 4 m above mean river level, with a flat summit, and margins delineated on the western side by small cliffs, and on the eastern edge by gently sloping banks. Separated on its eastern margin by c.5 m of water, the island formed through the truncation of the lower-most river terrace. Today the separating channel no longer supports the main body of the river and as the river levels are now maintained by hydroelectric dams up river, often partially dries. This allows easy access to the southern end of the island by way of a narrow sandspit and a 2 m stretch of water. Nevertheless despite the control imposed on the summer river levels by the dams, the island is usually flooded over during winter.

As the island is so accessible to the public, little of its original indigenous flora remains. Indeed, the island has gained some local notoriety both as a popular place for planting marijuana (*Cannabis sativa*), and as one of the first places checked for bodies following suspected drownings up river. In the early 1970's, deliberate attempts to plant the island were made by the Parks and Recreation Department of the Hamilton City Council (M. McGintee pers. comm. 1993). These plantings, together with two naturalised wattle species (*Acacia dealbata* and *A. longifolia*) and alder (*Alnus glutinosa*) comprise the major canopy species of the island, whose understorey is now largely given over to an extensive area of raspberry (*Rubus idaeus*) vineland.

As far as we are aware there are no published accounts of the flora of Graham Island. With this in mind we visited the island during February 19th 1993 to describe and record its flora.

Vegetation Types

A vascular flora of 139 species and hybrids was recorded. The majority of the taxa recorded were adventive (58%) and most of these were either annual or short-lived species typical of successional habitats. Fourteen species recorded (5 exotic taxa, 9 indigenous taxa), had been deliberately planted, some of which had subsequently naturalised, e.g. karo (*Pittosporum crassifolium*).

Four vegetation types were distinguished: 1. Pampas grassland, 2. Raspberry vineland, 3. Alder / wattle forest, and 4. Floodline vegetation. These are described as follows:

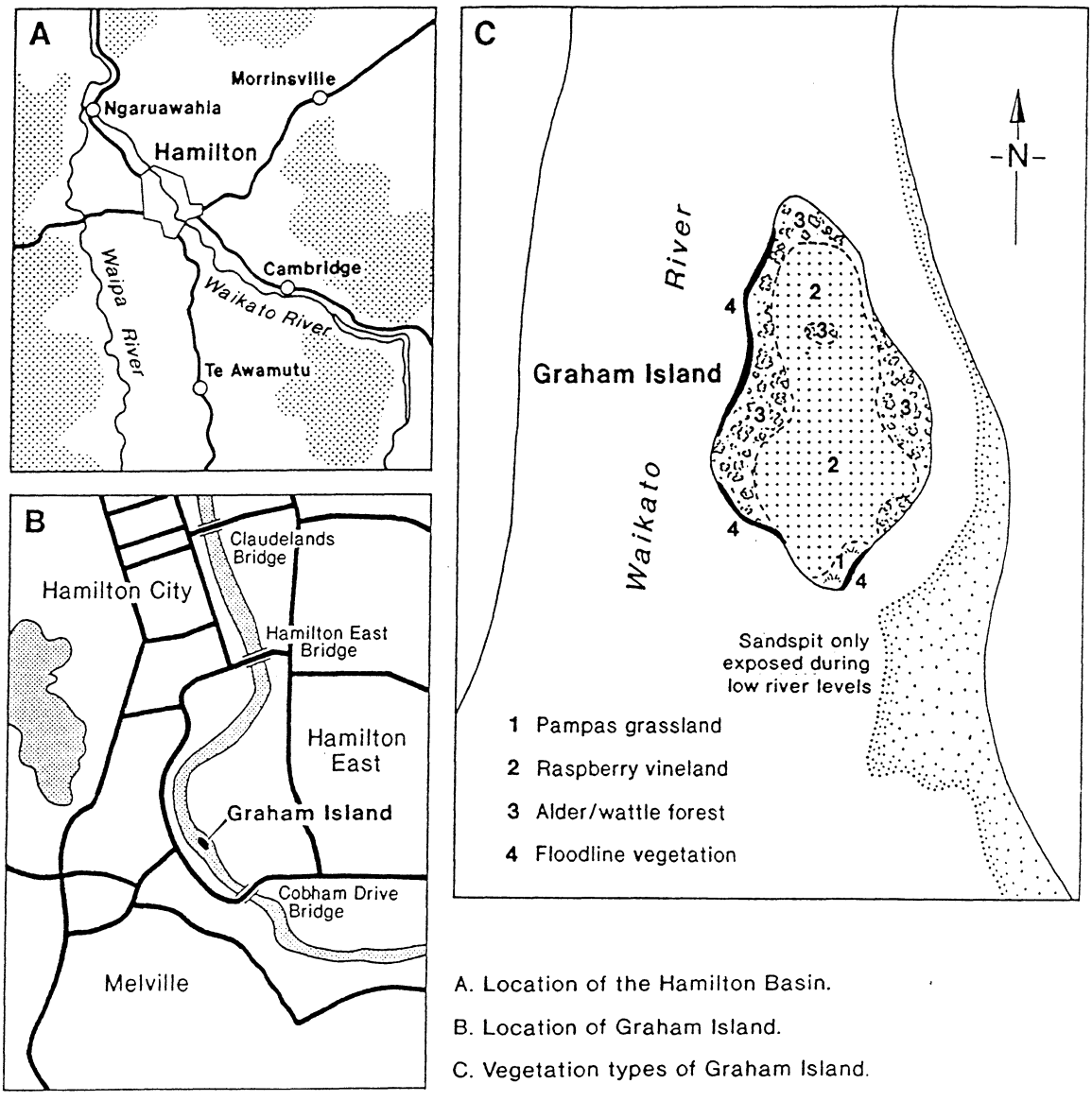
1. Pampas grassland

Dominated by pampas (*Cortaderia jubata*); associated species include butterfly bush (*Buddleja davidii*), woolly nightshade (*Solanum mauritanium*), and occasional specimens of koromiko (*Hebe stricta* var. *stricta*). This vegetation type is confined to a small area at the southern tip of the island, covering an estimated 5 % of the island.

2. Raspberry vineland

Forming almost impenetrable tangles across an estimated 75 % of the island. The dominant species is raspberry (*Rubus idaeus*), with associate species including pohuehue (*Muehlenbeckia australis*), german ivy (*Senecio mikanioides*), and pink bindweed (*Calystegia sepium* agg.). Small amounts of blackberry (*Rubus fruticosus* agg. - probably *R. ulmifolius*), climbing dock

Figure 1. Graham Island showing geographic location and distribution of main vegetation types.



A. Location of the Hamilton Basin.

B. Location of Graham Island.

C. Vegetation types of Graham Island.

(*Rumex saggitatus*), scattered saplings of karo, and planted kanuka (*Kunzea ericoides s.l.*) were also observed.

3. Alder / wattle forest

Occupying 20 % of the island vegetation cover, this vegetation type is rather heterogeneous. The major dominants are alder, Sydney golden wattle (*Acacia longifolia*) and silver wattle (*R. dealbata*). However, the proportion of these varies with aspect and substrate character. Wattles for example, are prevalent on the drier inner soils of the island, while alder, along with lesser amounts of crack willow (*Salix fragilis*), is primarily a species of the wetter floodline zone of the island. Associated species of this vegetation type largely reflect anthropogenic plantings rather than ecological patterns. Prominent species included planted specimens of horse chestnut (*Aesculus hippocastanum*), purple akeake (*Dodonaea viscosa* c.v. 'Purpurea'), kanuka (specimens comprising the small-leaved and upright race of the Central Volcanic Plateau), lowland ribbonwood (*Plagianthus regius*) and tarata (*Pittosporum eugenoides*).

4. Floodline vegetation

As this vegetation type occupied the vertical cliffs of the island margin, an estimate of its cover was not made. The type contains a large number of short-lived or ephemeral species presumably because it is often scoured away during winter floods, which regularly wash over the island. Two main subtypes occurred reflecting both the physiography and aspect of the site: sunny banks and shaded cliff faces.

Sunny banks

The gentle relief of the sunny banks were largely dominated by annuals or herbaceous species, particularly the cudweed (*Gnaphalium involucratum*), sea aster (*Aster subulatus*), lotus (*Lotus pedunculatus*), New Zealand windgrass (*Lachnagrostis filiformis s.s*), and *Sagina apetala*. Other prominent associates included *Leucanthemum vulgare*, *Haloragis erecta* subsp. *erecta* and *Verbena bonariense*. This vegetation subtype was restricted to the southern point of the island.

Shaded cliff faces

Shaded cliff faces dominate the island margin reaching their best development along the western margin. This vegetation shows a distinct floodline zonation, with the more frequently flooded basal portion dominated by semi-aquatic species of moss and liverwort. Above this zone *Callitriche petriei* subsp. *petriei*, *Pratia* spp. [1] ., *Lobelia anceps*, *Glossostigma elatinoides*, and *Lachnagrotis striata* are prominent. These turf forming or winter dormant species tend to favour relatively dynamic sites which are still prone to flooding at any time of the year. Along the top of the cliffs a permanent fernland zone dominated by *Blechnum chambersii* is nearly always present. Rare associates of this zone included the ferns *Pteris cretica*, *Dryopteris affinis* and *Lastreopsis glabella* and the sedges *Isolepis inundatus*, and *I. reticularis*. Oddly the sedge *Machaerina sinclairii*, so much a feature of the damp, shaded cliff faces of the Waikato River, was here restricted to a single plant.

Summary

Graham Island has a vegetation which reflects both the dynamic nature of the island's setting and the anthropogenic influence of the surrounding city. Indigenous species are largely relict woody

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[1] *Pratia* recorded from the island included four taxa, *Pratia angulata*, *Pratia perpusilla*, the hybrid *Pratia angulata x P. perpusilla*, and the Lake Whangape form of *Pratia perpusilla* discussed by Murray and Cameron (1990). Of these taxa *Pratia perpusilla* was the most restricted in distribution, while the hybrid was the most abundant. This pattern appears to be typical of the Waikato River within the Hamilton Basin.

shrubs, ferns, or herbaceous taxa, confined to those sites not easily planted, or subject to flooding regimes unsuitable for the types of exotic plantings made on the island.

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Appendix: Vascular Flora of Graham Island, Waikato River (Hamilton Basin)

Abbreviations

* = denotes adventive species
A = Adventive species (80 spp.)
pt = Planted (14 spp.)
(unc) = Uncommon
I = Indigenous species (59 spp.)

Vouchers of some records have been lodged in CHR with duplicates in AK, WAIK and WELT.

Lycopods (1) (A:1 I:0)

**Selaginella krausiana*

Ferns (22) (A:2 I:20)

Adiantum cunninghamii
Blechnum chambersii
B. membranaceum
B. fluviatile
B. minus
B. sp. 'Black Spot'
Cyathea dealbata (unc)
C. medullaris (unc)
Deparia petersenii subsp. *congrua*
Dicksonia squarrosa (unc)
Diplazium australe
Doodia media subsp. *australis*
**Dryopteris affinis* (unc)
Hypolepis ambigua
Lastreopsis ambigua
Paesia scaberula
Pneumatopteris pennigera
Pteridium esculentum
**Pteris cretica* (unc)
P. pendula
P. tremula
Pyrrosia eleagnifolia (unc)

Monocotyledonous Trees (1) (A:0 I:1)

Cordyline australis

Dicotyledonous Trees and Shrubs (28) (A:15 I:13)

**Acacia dealbata*
**A. longifolia*
**Aesculus hippocastanum* pt
**Alnus glutinosa*
**Buddleja davidii*
Coprosma robusta
**Cytisus scoparia*
Dodonaea viscosa c.v. 'Purpurea' pt
**Eriobotrya japonica* (unc)
**Feijoa sellowana* (unc) pt
**Fraxinus ?excelsoir* (unc) pt - a sapling 1.5 m tall
Hebe stricta var. *stricta* (unc)
Hoheria populnea var. *lanceolata* pt
Hoheria populnea var. *populnea* pt
**Juglans regia* pt
Kunzea ericoides s.l. pt
**Ligustrum lucidum* (unc)
**L. sinense* (unc)
Lophomyrtus bullata x *L. obcordata* (unc) pt
Melicytus ramiflorus subsp. *ramiflorus*
Pittosporum crassifolium pt
P. eugenoides pt
P. tenuifolium subsp. 'tenuifolium' pt
P. tenuifolium subsp. 'colensoi' pt
Plagianthus regius pt
**Salix fragilis*
**Solanum mauritianum*
**Ulex europaeus*

Dicotyledonous Lianes (6) (A:4 I:2)

Calystegia sepium agg.
**Loniceria japonica* (unc)
Muehlenbeckia australis
**Rubus idaeus*
**R. fruticosus* agg. (unc)
**Rumex sagittatus*

Grasses (19) (A:15 I:4)

**Agrostis capillaris*
**A. stolonifera*
**Aira caryophylla*
**A. praecox* (unc)
**Alopecurus geniculatus*
**Bromus fonkii* (unc)
**B. willdenowii*
**Cortaderia jubata*
**Dactylis glomeratus*
**Digitaria sanguinalis*
**Eleusine indica* (unc)
**Elagrostis brownii* (unc)
**Holcus lanatus*
Lachnagrostis filiformis s.s (unc)
L. striata
**Lolium perenne*
Microlaena stipoides
Poa anceps var. *anceps*

Rushes (2) (A:2 I:0)

**Juncus bufonius* var. *bufonius*
**J. tenuis* var. *tenuis*

Sedges (11) (A:3 I:8)

**Carex divulsa*
C. solandri (unc)
C.virgata (unc)
C. sp. *geminata* agg. (unc)
**Cyperus eragrostis*
C. ustulatus
Isolepis inundatus
I. reticularis
**I. sepulcralis*
Machaerina sinclairii (unc)

Monocotyledonous Herbs (other than Grasses, Rushes and Sedges) (5) (A:4 I:1)

**Crocosmia* x *crocosmiiflora*
**Egeria densa*
Dianella nigra (unc)
**Potamogeton crispus*
**Tradescantia fluminensis*

Dicotyledonous Composite Herbs (16) (A:15 I:1)

**Artemisia verlotiorum*
**Aster subulatus*
**Bidens frondosa*
**Calendula officinalis* (unc)
**Cirsium arvense*
**C. vulgaris*
**Conyza albida*
**Crepis capillaris*
Gnaphalium involucratum
**G. simplicicaule* (unc)
**Lactuca virosa*
**Leucanthemum vulgare*
**Senecio bipinnasectus*
**S. jacobaea* (unc)
**S. mikanoides*
**Taraxacum officinale* (unc)

Dicotyledonous Herbs (other than Composites) (28) (A:19 I:9)

**Aphanes inexspectata*
Calltitriche petriei var. *petriei*
**C. stagnalis*
**Centaurium erythraea*
**Ceratophyllum demersum*
**Galium aparine*
Glossostigma elatinoides
Haloragis erecta subsp. *erecta*
Hydrocotyle moschata s.s
Lobelia anceps
**Lotus angustissimus*
**L. pedunculatus*
**Myosotis sylvatica*
**Physalis peruviana* (unc)
**Plantago lanceolata*
**P. major*
**Polygonum hydropiper*
Pratia angulata
P. perpusilla (unc)
Pratia angulata x *P. perpusilla*
P. perpusilla "Lake Whangape form" [2]
**Ranunculus repens*
**Sagina apetala*
**Solanum chenopodioides*
**S. nigrum*
**Stachyus sylvatica*
**Stellaria media*
**Verbena bonariense*

Total Taxa: 139

New Zealand Herbarium Resources 1993

Anthony Wright

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[2] Differing from *P. perpusilla s.s* in having wider and conspicuously less hairy leaves, with the flowers borne on short peduncles. From *P. angulata* it differs in having hairy leaves and much shorter peduncles. For a discussion of the cytological relationship of this taxon to *P. angulata* and *P. perpusilla s.s.* see Murray and Cameron (1990) and Murray et al., (1992).