# Flora and Vegetation of Pouto Peninsula, North Head of Kaipara Harbour, Northland, New Zealand, 26-29 January 2001

### Summary

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The vascular plants of the southern end of Pouto Peninsula, Northland New Zealand, were surveyed in January 2001. Some 358 species were recorded, of which 252 were natives and 106 were introduced. These totals include several previous surveys and existing specimens in AK herbarium, and exclude cultivated plants and putative hybrids.

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|----------------------------|--------|-------------------|---------------------|-----------------|
| Plant group                | Totals | Enid Asquith      | Brian Cumber        | C-J Ralph       |
| Native ferns & fern allies | 45     | Paul Asquith      | Daphne Fielding     | Juliet Richmond |
| Native conifers            | 1      | Bronwyn Beatty    | Georgie Gardner     | John Rowe       |
| Native dicots              | 119    | Steve Benham      | Leslie Haines       | Stella Rowe     |
| Native monocots            | 87     | Daphne Blackshaw  | Graeme Hambly       | Dave Skilton    |
| Adventive ferns            | 2      | Quentin Blackshaw | Alastair Jamieson   | Barbara White   |
| Adventive conifers         | 1      | Ewen Cameron      | Bryn Jones          | Bob White       |
| Adventive dicots           | 58     | Sandy Campbell    | Sandra Jones        | Mike Wilcox     |
| Adventive monocots         | 45     | Lisa Clapperton   | Alistair MacArthur  | Ian Wilson      |
| TOTALS                     | 358    | Helen Cogle       | Helen Preston-Jones | Maureen Young   |
| % native                   | 70     | Steve Cook        | Carol Ralph         |                 |

# Introduction

Pouto was the location for this year's Auckland Bot Soc Anniversary Weekend camp, the objective being to explore the plants of the diverse coastal sand habitats of this remote peninsula. The area had previously been visited only once by the Botanical Society, although the Department of Conservation (DoC) rank it highly as a place of considerable botanical and zoological interest.

This paper records the main botanical features of the various sites visited, and provides a comprehensive list of native and adventive plants of the area. Many of these are recorded for the first time.

### Local people involved

| Logan Forrest            | Farmer, local historian and botanist, Pouto    |
|--------------------------|--|
| Greg and Helen Smith     | Te Uri O Hau connections, South Head and Pouto |
| Bernice and Colin Taurua | Farmers, Te Uri O Hau Waikaretu Marae, Pouto   |
| Keith and Judy Hawkins   | DoC, Whangarei                                 |
| Lisa Forester            | DoC, Whangarei                                 |
| Karen Riddell            | DoC, Whangarei                                 |
| Anthony Taylor           | Taylor Made Tours, Te Kopuru                   |
|                          |  |

# **Geography of Pouto Peninsula**

Pouto Peninsula (Fig.1) is mostly hilly or undulating and runs south of Dargaville for a distance of c. 70 km, the southern point being known as Pouto Point, at the northern entrance of the Kaipara Harbour. It is a district of sand and lakes (Cutten 1934, Schofield 1969). The highest points are Muarangi (214 m), Pinaki (174 m), and Puketapu (187 m). Annual rainfall is 1400 mm, with a distinct winter maximum. Droughts are frequent in summer. Predominant winds are from the west and south-west.

The soils are recent (Holocene) coastal sands, and include the mature stage Te Kopuru Sand, a very infertile, poorly-drained acidic (pH 4.0-5.0) grey or white sand over a peaty subsoil, supporting low gumland vegetation, the intermediate stage Red Hill Sand, which is well-drained, only mildly acidic (pH 6.0-6.2) with numerous lakes and ponds, and the young stage Pinaki Sand, which is a grey to light-brown free

sand, with pH 6.5 (Soil Bureau 1954, Burridge 1964, Cox 1977).

Lignite beds occur frequently on the Pouto Peninsula. They are made up of well-preserved remains of ancient forests buried under sand. Leaves of kauri (*Agathis australis*) are especially common in the lignite; we also saw seeds of miro (*Prumnopitys ferruginea*) and wood of totara (*Podocarpus totara* or *P. hallii*).

From west to east across the peninsula is a series of raw sand dunes; damp sand plains with intermittent ponds; dune lakes, with encroaching raw sand from the seaward side; stabilised sand with pine plantations, kanuka (*Kunzea ericoides* s.lat.) forest, and pasture; and lakes.

The two main kinds of land use of the area are pastoral farming (beef cattle, dairy cattle), and timber plantations of *Pinus radiata* (Farnsworth & Russell



1977, Gadgil et al. 1981). Horticulture is more or less absent. Types of natural vegetation occurring in the area are coastal kanuka forest, coastal mixed forest in protected sand hollows (e.g., Pretty Bush, Tapu Bush), lake margin sedges and rushes and sand flat herbs,

On the way, people had the chance to see on the banks of the Wairoa River at Dargaville the dense stands of Manchurian rice grass (*Zizania latifolia*) and American bulrush (*Schoenoplectus californicus*). Both have been established here for many years. On infertile sandy roadside banks near Te Kopuru (Te Kopuru Sand) there are still a few remnant patches of natural scrub, comprising colonies of *Gleichenia microphylla*, with *Leucopogon fasciculatus*, *Pimelea prostrata* var. *erecta*, *Morelotia affinis*, *Pomaderris prunifolia* var. *edgerleyi*, and exotic species *Erica baccans*, *Hakea gibbosa* and *Hakea sericea*.

### Waikaretu Marae, Te Uri O Hau hapu of Ngati Whatua

Waikaretu Marae was the base for this camp, and accommodation, access to sites for the field programme, and land and water transport were organised with co-operation from the Marae Committee. Our group aimed to meet at the marae car park at 2.30 pm in time for a powhiri with the local people. Despite the temptations to botanise on the way, this appointment was kept pretty well on time. The local iwi warmly welcomed us on to the marae, where we quickly settled in and then headed off on foot for our first field visit, led by our hirsute local guide, Logan Forrest.

# Sheehan's Creek (Tauhara Estuary), Kaipara Harbour (for location see Fig. 1)

There are several remarkable exotic plants at this place, including ancient fruit trees - fig (*Ficus carica*), olive (*Olea europaea*), peach (*Prunus persica*), and a peculiar, erect type of suckering blackberry, *Rubus ostryifolius,* which fruits early. John Sheehan is reputed to have been the first European settler in Pouto, and his house and store there dated to the 1860's. At the old Sheehan homestead site on the side of the estuary (now with a more modern house)

sand dune shrubland, and salt marshes and sand plain communities.

Pouto has a long and rich Maori history, with about 100 pa sites known between Te Kopuru and Pouto Point (Forrest 1984, Scott 1995).

# Day 1: 26 January 2001

are two trees of osage-orange (*Maclura pomifera*). There are individuals or clumps of *Eucalyptus globulus, E. botryoides,* and *E. pilularis, Pinus radiata, P. pinaster,* and *P. ponderosa.* Close by Logan Forrest has many old, heirloom fruit trees, including an ancient, spreading fig, cherimoya (*Annona cherimola*), a 26-year-old tamarillo (*Cyphomandra betacea*), and a grove of *Erythrina* x *sykesii.* Logan's favourite tree in his garden is a large titoki (*Alectryon excelsus*), planted by his grandmother.

The marshes have abundant Juncus acutus (a spiky, robust introduced invader), Juncus pallidus, J. effusus, J. kraussii, J. dichotomus, Cyperus congestus, C. ustulatus, Isolepis nodosa, I. cernua, I. prolifer, Baumea juncea, Cortaderia selloana (very tall and abundant), Apodasmia similis, Alternanthera (freshwater), philoxeroides Paspalum distichum (freshwater), P. vaginatum (saltwater-very abundant over large areas), Lobelia anceps, Selliera radicans, Lilaeopsis novae-zelandiae. Samolus repens. Sarcocornia quinqueflora, Cotula coronopifolia, Typha orientalis (freshwater), Carex virgata (freshwater, under kanuka), Histiopteris incisa (under kanuka), Calvsteqia sepium, Oplismenus hirtellus, Plantago Muehlenbeckia complexa, australis, Calystegia soldanella, Phormium tenax, Apium "white denticles", Plagianthus divaricatus, Kunzea ericoides, Pteridium Microlaena esculentum. stipoides, Phytolacca octandra, Ageratina adenophora, Parapholis strigosa, Olearia solandri, O. furfuracea, and Cotoneaster alaucophyllus. Under kanuka were patches of Veronica plebeia, and Carex 'raotest". Logan Forrest reports that Arthropodium cirratum grows on the headland at the mouth of Tauhara Creek.

Back at camp a late dinner rounded off a busy first afternoon, and the old hands mourned the absence of prune stones from the regulation prunes and custard

# Day 2: 27 January 2001

This was a big day, entailing travel by 4WD Bedford truck ("Bigfoot") and Nissan 4WDs along the beach west of Pouto for 13.5 km to the North Head, and then up the main beach for a further 15 km or so to two lakes at the northern Te Uri O Hau fishing camp. On the way we inspected lignite deposits on the beach. We were joined for the day by DoC staff Lisa Forester and Karen Riddell from Whangarei.

# **Pouto Beach**

We were destined for the sand dunes behind the ocean beach north of the harbour entrance. In order to get there it is necessary to drive along the southern beach of the Pouto Peninsula that is impassable at high tide. Because we had no control over the tides, we had to be ready to leave the marae at 8.30am sharp. This early start gave us time to make a couple of quick stops along the way to the ocean beach. The first was at the base of a very high, not-soconsolidated sand cliff. Sand from ragged protrusions on the face of the cliff was swirling lightly in the wind around a seepage about halfway up. There was enough water filtering out to form a gentle waterfall. A layer of ash (Taupo?), pale in comparison with the sand layers surrounding it, was prominent quite near the top of the cliff, giving a very rough visual benchmark for the ages of other layers. Logan, our local guide, assured us that there is no naturally occurring rock of any sort anywhere on Pouto Peninsula. However, at the base of the sand cliffs, scattered along the beach, were lumps of black lignite fallen from high up on the adjacent sand cliffs. This lignite is reputed to be 35 000 years old, we saw totara wood (identification thanks to Rod Wallace) and kauri leaves, and miro fruit, evidently from a former forest buried by sand.

The scenery was very dramatic as we drove along the sand, but there was little vegetation to catch our eye, apart from pingao (Desmoschoenus spiralis), spinifex (Spinifex sericeus), marram grass (Ammophila arenaria) and coastal toetoe (Cortaderia splendens). Godwits, white-fronted terns and variable oystercatchers kept the bird-watchers, and even some botanists, happy. For the five travelling in the comfort of the Titirangi tractor behind Bigfoot, life momentarily got a bit too exciting as they found themselves too close to the incoming tide and were completely blanketed in saltwater for a number of very long seconds. But it all came out in the wash.

# Fishing Camp

At Fishermen's Camp, west of Round Hill on the distant inland horizon (25 km south of Glinks Gully), we drove a short distance off the beach into the sand dune wilderness. Before we reached the beautiful impounded lakes further inland, we spent quite a bit of time familiarising ourselves with the sedges and other wetland plants in and around small swampy areas among the low dunes. Particular interest was shown in Eleocharis acuta, Lilaeopsis novae-zelandiae and Myriophyllum propinguum, all of which were in flower. Schoenoplectus tabernaemontani, Isolepis prolifer, Carex maorica, Juncus articulatus, J. aff. caespiticius, and J. pallidus were also prominent. Around Fishermen's Camp, it was disappointing to see a number of invasive weed species, including *Cyperus* polystachyos, alligator weed (Alternanthera philoxeroides), African feather grass (Pennisetum *macrourum*), and the ubiquitous kikuyu grass (Pennisetum clandestinum), the seeds of which had possibly been brought in with the fishermen who use the camp site. DoC is committed to try to eliminate the African feather grass from the area and has greatly reduced its population over the last four years. A curious herbaceous plant here with leathery leaves was Argentinean dock (Rumex frutescens). During 1994 Ogle (pers. comm.) collected the exotic rush Juncus fockei (CHR 498073) here.

On the sand flats, *Carex pumila* was abundant and in seed, and in shallow damp depressions we found

*Myriophyllum votschii* in flower and *Triglochin striata* in seed. Abundant composites on dune slacks were hawkbit (*Leontodon taraxacoides*), native cudweed (*Pseudognaphalium luteoalbum* agg.), and South African cudweed (*Vellereophyton dealbatum*). A pretty adventive wildflower, yellow wort (*Blackstonia perfoliata*), with its 6-9 bright yellow petals was briefly admired, until we came upon a single patch of *Gunnera dentata*, sporting a number of bright orange fleshy drupes. We had been led to expect to find this species if we were lucky, but we hadn't been warned to keep an eye out for the lady's tresses orchid (*Spiranthes novae-zelandiae*). One plant, with only two of its bright pink flowers open, was spotted right beside the *Gunnera* patch.

On the edge of the first small lake we came upon we found a number of plants of the tiny *Eleocharis* neozelandica in seed. Leeches are allegedly found in these dune lakes but nobody volunteered to test this assertion. On a nearby lake, a dabchick adult and chick were spotted. Progressing further inland, we pushed our way into the kanuka scrub. The very hairy Leptostigma setulosum (= Nertera setulosa) formed spreading patches on the ground under the tea tree, and Poa pusilla with its thread-like leaves was found on the edge of a wet depression. A number of Carmichaelia specimens stimulated quite a bit of interest and discussion. To the amateur eye, it was obviously a new species - its form was very lush (for want of a better word) compared with the familiar *Carmichaelia australis*, its unripe capsules were large and green and prominent, and the black ones had to be manually forced open into the typical "seed within a ring" form. But reluctantly we'll just have to accept that it's probably just a form of the regular, widespread species. On the edge of an old scrubcovered dune, somebody found an unusual Doodia australis with bi- and trifurcate fronds (again, sadly, apparently not a species new to science). On the edge of a bit of a pond at the bottom of the dune slope was burr-reed (Sparganium subglobosum) with soft bright green grassy leaves and very attractive round (globose) flower heads.

We arrived back at Fisherman's Camp in time for an early afternoon tea. As we set off on our return home, the Titirangi tractor bravely took the lead, but promptly got bogged in the soft sand. To the great delight of those trapped in Bigfoot while all this was going on, one of the party gave them a running commentary on the succession of rescue attempts.

# Midge Bay

On the way back along the beach inside the harbour, we stopped off at some kanuka forest at Midge Bay, east of the lighthouse. On the top of the sand dune that we breasted on our way to visit a waterfall in the bush behind it, were some very healthy *Coprosma acerosa* shrubs. On the stream bank that we followed to the waterfall, we noted lots of healthy ferns, especially *Deparia petersenii* and *Diplazium australe.* We tried hard to ignore the obvious signs of pig damage and possum scratching and the zillions of mosquitoes. In the vicinity of the waterfall a couple of *Pseudopanax ferox* were found, as well as *Senecio minimus*, narrow leaved maire (*Nestegis montana*), *Adiantum aethiopicum A. hispidulum, A. cunninghamii, Polystichum richardii, Pteris comans* (scarce), *P. macilenta, P. tremula, Doodia australis, Blechnum discolor* (single plant), *Coprosma lucida, C. robusta, C. crassifolia, C. rhamnoides, Pseudopanax arboreus, P. crassifolius, Pseudopanax* hybrids, *Pittosporum* 

We travelled via Ariari Rd through the pine forests of Pouto Forest, the main understorey plants in which were Cortaderia selloana, Muehlenbeckia complexa, Dichelachne crinita (road edge), Cordyline australis, Euchiton sphaericus, Melilotus indicus, Coprosma acerosa (road edges), Paspalum urvillei (roadsides), and Sporobolus africanus. At the trig lookout (ca. 140 m) were abundant Cortaderia splendens, Coprosma Ozothamnus leptophyllus, acerosa, Leptecophylla iuniperina. Lachnagrostis billardierei, Coprosma robusta (looking a bit out of place in raw sand in the open), marram grass, Isolepis nodosa, and Ornithopus pinnatus, the latter forming extensive trailing mats. There were dried-off remains of Aira caryophyllea, Parentucellia viscosa, and onion orchid (probably Microtis unifolia).

# **Pretty Bush**

Pretty Bush was our main target for the morning. This 10 ha forest lies in a protected ancient dune hollow at an altitude of ca.80-100 m, where sufficient moisture can be retained, and there is shelter from strong winds. It is Crown land, managed by DoC with close consultation with Te Uri O Hau.

As Hayward & Hayward (1991) state for Tapu Bush, the ground surface of Pretty Bush also retains the Holocene dune landforms and the soil is thinly developed over the underlying sand. The canopy is 14-17 m, the trees being karaka (Corynocarpus laevigatus), narrow-leaved maire, titoki, kanuka, and totara (Podocarpus totara), with emergent rewarewa (Knightia excelsa). It is an open forest, with a subcanopy of Lophomyrtus obcordata, mahoe (Melicvtus ramiflorus), kohekohe (Dysoxylum spectabile), and with an understorey of kawakawa (Macropiper excelsum), Olearia albida, Carmichaelia australis, Hebe diosmifolia. ferox, hangehange Pseudopanax (Geniostoma rupestre), Myrsine australis, Coprosma aff. macrocarpa, C. crassifolia, C. rhamnoides, Pittosporum tenuifolium, Leucopogon fasciculatus, and

*tenuifolium, Epilobium rotundifolium* (only by waterfall), *Uncinia laxiflora* and *U. uncinata*.

Daphne, our visitor from the UK, listed the highlights for the day as: the dune system, the spinifex, the *Spiranthes* orchid, and "all the little things in the sand". The only let-down followed the anticipation she felt on being called to see the *Sparganium*, only to realise that she had one (of a different species admittedly) growing in her garden pond in Sussex and on the banks of the nearby River Arun.

# Day 3: 28 January 2001

Corokia cotoneaster. Ground cover plants were seedlings of karaka and titoki (on raised mounds), numerous ferns - Adiantum hispidulum, Asplenium flaccidum. Â. gracillimum, А. oblongifolium, Microsorum pustulatum, Polystichum richardii. Hymenophyllum sanquinolentum. Trichomanes reniforme, Doodia australis, Pellaea rotundifolia, and Pteris tremula, and a prominence of monocots -Collospermum hastatum, Astelia solandri, Uncinia laxiflora, U. uncinata, Carex "raotest", Microlaena polynoda, Oplismenus hirtellus, and Gastrodia aff. sesamoides (a single specimen). Epiphytes and climbers were Parsonsia heterophylla (common), and Earina aestivalis in full flower. The absence of calicaris) and mangeao (Litsea pohutukawa (Metrosideros excelsa) was notable.

As other workers have previously noted (Forester 1987, Beever 1991, Ogle 1997), we observed that the mobile sand dunes are encroaching on the western boundary of Pretty Bush and burying the forest. To control this sand movement, which has been accelerated by human interference, Ogle (1997) made several revegetation recommendations to trial (based on field work in February 1994): fertilising the sand-binding species to improve their growth; enhancing the natural establishment of kanuka seedlings; controlling rabbits; and monitoring sand movement. It would be a great loss if this dune forest was allowed to be buried.

Pretty Bush is much smaller in area than the similar dune forest of Tapu Bush, which has been visited previously by the Auckland Botanical Society (Beever 1991, Hayward & Hayward 1991, Wright & Young 1991), and has been the subject of other earlier investigations (Reid 1977, Simpson 1982, Bellingham 1985.

...continued overleaf





Fig. 2: Clockwise from top left; *Spiranthes novae-zelandiae; Cortaderia splendens*; "Bigfoot"; *Gunnera dentata* fruiting; Wharenui, Waikaretu Marae; Logan Forrest beside *Juncus acutus* at Tauhara Estuary.

### Lake Mokeno

By the north-eastern end of Lake Mokeno, we noted some old trial plantings of Virgilia oroboides (abundantly flowering), Allocasuarina verticillata (commonly suckering), stunted Norfolk pine (Araucaria heterophylla), and unhealthy macrocarpa (Cupressus *macrocarpa*). The northern shore of Lake Mokeno had Phormium tenax, Schoenoplectus tabernaemontani, Typha orientalis, Cordyline australis, Cyperus ustulatus, Eleocharis acuta, Carex maorica, Baumea articulata, B. juncea, Juncus pallidus, Cortaderia selloana, and Juncus dichotomus (on road). Tutu (Coriaria arborea) and manuka (Leptospermum scoparium) were sighted on the roadside here and not elsewhere during our visit.

### **The Causeway**

The botany at the Causeway dunes and dune slacks was cause for much excitement. Among the finds were *Gunnera dentata, Spiranthes novae-zelandiae, Eleocharis neozelandica, Triglochin striata, Lobelia anceps, Cortaderia splendens, Cortaderia selloana, Cortaderia jubata* (one plant, coming into fl.), *Schoenus maschalinus, Desmoschoenus spiralis, Schoenoplectus tabernaemontani, Eleocharis acuta, Baumea articulata, B. rubiginosa, B. juncea, Isolepis nodosa, Typha orientalis, Lachnagrostis billardierei,* 

For those who had driven by Lake Humuhumu in the past and had wished they could botanise the island in the middle of the lake, this was the day to satisfy that hankering. The locals had come up trumps again and an outboard boat was made available for our convenience, courtesy of Colin Taurua.

### Lake Humuhumu

Lake Humuhumu is an old, stable freshwater lake. The water is clear, suggesting that it is reasonably oligotrophic, though it has been observed that when the pines have been topdressed, the lake becomes greener in colour. The catchment is farmland and pine plantations. Molluscs observed in the lake shallows were Physastra variabilis and Hyridella menziesii. The dominant submerged plants in the shallows (on fine muddy sand) were charophytes (stoneworts), especially Nitella. For this lake Tanner et al. (1986) record Chara corallina, C. fibrosa var. acanthopitys, C. globularis, Nitella hookeri and N. hylina. They only record one additional charopyhte (*N. pseudoflabellata*) for the seven dune lakes that they surveyed in Pouto area. All these lakes were resurveyed by NIWA in April 2001; their submerged flora will be published in the future (Paul Champion pers. comm.).

Before the short trip to the island, there was the lakeside to explore. The damp sand had good populations of the minute plants we had seen on previous days nearer the coast – *Limosella lineata* and *Lilaeopsis* ? *ruthiana*, but this time there was also

Apodasmia similis, Lilaeopsis novae-zelandiae, Limosella lineata, Carex pumila, Isolepis cernua, Myriophyllum votschii, Plagianthus divaricatus, Kunzea ericoides, Ozothamnus leptophyllus, Juncus aff. caespiticius, Potamogeton cheesemanii, Senecio glomeratus, and Blackstonia perfoliata.

Amongst the moist bases of Apodasmia was the small pulmonate snail, Ophiocardelus costellaris. Small green frogs were also frequent, probably the Australian green bell frog, Litoria aurea. Graeme Hambly observed numerous dragonflies of the selfintroduced (and therefore a NZ native) red perching dragonfly Diplacodes bipunctata (Odonata: Libellulidae). Α lizard briefly captured and photographed on the previous day at the Fishing Camp was the shore skink (Oligosoma smithi).

### Grave site

Before returning to base, we visited the gravesite of a child high up in the kanuka-covered sand hills not far from the lighthouse. Signs of former occupation of this area were abundant periwinkle (*Vinca major*), grapes (*Vitis vinifera*), and some roses. Running water was present and ferns were abundant by the small stream. On the ascent to the grave were interesting limonite concretions littering the sand.

# Day 4: 29 January 2001

Glossostigma elatinoides, and people were soon busy tickling the irritable stigmas on the tiny flowers. An intensive search failed to locate Hydatella inconspicua, which has been reported from here. Potamogeton cheesemanii and Myriophyllum propinguum growing in the muddy sand had different forms from those usually seen when growing in water. Eleocharis sphacelata, not seen in any of the other sites during the trip, was plentiful. Other plants of these wetlands were Juncus pallidus, Juncus gregiflorus (damp pasture), Juncus dichotomus, Juncus articulatus, Schoenoplectus tabernaemontani (dense stands), Eleocharis acuta, Cyperus ustulatus, Isolepis prolifer, I. cernua, Alternanthera philoxeroides, Calystegia sepium, Aster subulatus, Ludwigia palustris, Lotus pedunculatus, L. suaveolens, Paspalum distichum, Bidens frondosa, Rumex conglomeratus, Polygonum salicifolium, and Mentha pulegium. Mike Wilcox made the find of the day - a submerged native monocot, *Lepilaena bilocularis*, which is in the rather primitive family Zannichelliaceae. Although Moore & Edgar (1970) record its distribution as North, South and Chatham Islands, this is the first North Island collection for the AK herbarium. After the L. bilocularis specimen was mounted in the herbarium, Peter de Lange identified a small specimen of the lake Lilaeopsis ruthiana, included on the sheet. (Note - in the species list we have used *L. novae-zelandiae* s.lat. because of the difficulties recognising the 2 NZ species). An adjacent scrub-covered bank contained

several shrubs of *Coprosma parviflora* s.str., near to its southern limit. Surprisingly, a couple of fruiting bushes had translucent white fruits instead of the more commonly seen blackish-purple fruit.

Three trips in the boat got all the party across to the island, which could quite aptly be named Mosquito Island. A low embankment and a swampy ledge surrounded the island, as if the water level had once been higher. Pampas (Cortaderia selloana) and brush wattle (Paraserianthes lophantha) had unfortunately invaded this margin, which also supported flax (Phormium tenax), cabbage tree (Cordyline australis), swamp millet (Isachne globosa), Hydrocotyle pterocarpa, Carex maorica, C. fascicularis, and Cyperus ustulatus, and graded into Eleocharis sphacelata in the lake itself. The canopy was mainly tall kanuka, with kohekohe, and karaka, with very little ground cover apart from some ferns such as Doodia australis and Adiantum hispidulum, and several sedges, including Uncinia laxiflora, which is also found in Woodhill Forest. Whau (Entelea arborescens) was present, but there was no sign of nikau (Rhopalostylis sapida) or suppleiack (Ripogonum scandens), and the only tree ferns seen were a few juvenile mamaku (Cyathea medullaris). Pseudopanax crassifolius and P. lessonii had together spawned a variety of hybrid offspring. Sharp eyes spotted the odd plant of (Brachyglottis rangiora repanda) and turepo (Rhabdothamnus solandri). At the southern end of the island was an impressive pa with earthworks in pristine condition, and more mature trees, including a huge kohekohe.

Our understanding from the local people and DoC staff was that there were no possums on the island.

Unfortunately ripe karaka fruit on the ground had been badly chewed by possums. Confirmed by Ian McFadden from faecal pellets sent to him, and the presence of possum hair on the island. The foliage on the kohekohe trees on the island lacked signs of possum browse, suggesting that the arrival of possums here is recent. Because this was probably the only possum-free bush on the Pouto Peninsula it is important that they are eradicated

A most interesting discovery in the lake was the freshwater jellyfish, *Craspedacusta sowerbyi* (Fish 1971, 1975). Another feature of the lake is that it supports a good population of the rare native fish, the dwarf inanga, *Galaxias gracilis* (Rowe & Chisnall 1997); in 1986 this fish was successfully introduced to Lake Ototoa, at the South Kaipara Head. A leech was also "caught" and released.

All too soon it was time to leave the island and return to camp to clean up.

#### A note on birds observed at Pouto

We had a strong and enthusiastic "bird group" amongst our numbers, comprising Paul Asquith, C-J Ralph, Carol Ralph, David Skilton, and Bronwyn Beatty. Pouto Point offers a wide variety of bird habitats (McKenzie 1980), from coastal margins, wetlands, pine plantations, native bush, farmland, and open dunes. The whole area has a surprising number of coastal lakes and swamps, many of which were visited through the good driving of Logan Forrest and his trusty Nissan.

The opportunity was taken to complete records for four 10 km grid squares for the update of the Ornithological



Atlas of New Zealand. A total of 55 species was recorded, with those worthy of particular note being bittern, NZ dabchick, NZ dotterel, NZ pipit, banded rail, NZ scaup, grey teal, NZ shoveler. and Arctic skua. On the drive along the ocean beach numerous flocks were encountered of whitefronted and Caspian terns, and numbers of bar-tailed godwit.

> Species list next page

Fig. 3. Pretty Bush forest in Holocene dune hollow with a rough-barked Nestegis montana and Brian Cumber. 28 Jan 2001.

# <u>Pouto Peninsula</u> <u>Vascular Plant Species List</u>

This list is based on what we saw during the January 2001 trip, previous records (referenced), a search of the AK herbarium database, and a few specific requests to CHR, WAIK and WELT herbaria. A herbarium voucher supports some 40% of the records. Many of the existing Pouto herbarium specimens in AK were collected by R.C. Cooper, A.E. Wright and L.J. Forester.

Boundaries are: south of  $36^{\circ}$  15' S (= the part of the peninsula on 260 series maps P09 & Q09).

- <u>Key</u>
- \*= adventive species
- a = abundant
- c = common o = occasional
- $\mathbf{i} = \mathbf{i}$
- s = scarce (< 5 plants seen), actual number of individuals may be given in brackets
- + = present (no abundance rating)
- Ad = adjacent to area
- CO = Colin Ogle (pers. comm.) seen/collected during his February 1994 survey
- JR = from J. Reid (1977) for Tapu Bush; not seen by us or Wright & Young (1991)
- M = herbarium specimen collected by H.B. Matthews in 1920; not seen by us
- OI = from Ogle (1997) based on his 1994 survey; not seen by us
- **PS** = from P. Simpson (1982) for Tapu Bush; not seen by us
- T = from Tanner et al. (1996)
- WY = from Wright & Young (1991) for Tapu Bush; not seen by us
- # = most probable re-determination (also see Rejected taxa below)

#### Symbols for column headings

- TE = Tauhara Estuary and immediate surroundings
- FC = fishing camp, and inland to 3 freshwater dune lakes
- MB = Midge Bay, bush up to waterfall and loop back on east side (nearly 3 km east of disused lighthouse)
- Tr = trig (ca.140 m), and east down to Pretty Bush (excluding Pretty Bush)
- **TC** = north end of Lake Mokeno, to the causeway, to the west coast beach
- CG = child's grave area, with running water under kanuka (ca.1 km west of disused lighthouse)
- LH = Lake Humuhumu: + = lakeshore (excluding the island shore); ++ = island; or no symbol = on both lakeshore & island. Ogle's (1997: 2) earlier shore list could not be located.
- **PB** = Pretty Bush
- **TB** = Tapu Bush
- Voucher = herbarium voucher specimens in AK herbarium (most AK numbers starting with 252 were collected during the ABS January 2001 visit); other herbaria: AKU = Auckland University; CHR = Landcare Research; WAIK = Waikato University; WELT = Te Papa Museum.
- T = from Tanner et al. (1986), based on 7 dune lakes surveyed in 1984-85 (includes previous records); the number after the "T" is the number of lakes they recorded it present.

### **Rejected taxa**

- Astelia banksii Reid (1977) for Tapu Bush . We agree with Ogle (1997: 23) that this record is probably *A. solandri* because Reid records it as "perching", and he doesn't record *A.* solandri.
- Carex testacea Wright & Young (1991) for Tapu Bush, and Ogle in 1994 collected one specimen in the stabilised dune grassland determined as this species (CHR 498068). The

| Plant groups   | T<br>E   | F<br>C   | M<br>B   | Tr     | т<br>С   | C<br>G  | LH        | PB         | тв       | Voucher<br>and T |  |  |  |
|--|----------|----------|----------|--------|----------|---------|-----------|------------|----------|------------------|--|--|--|
| Ferns and fern allies (45 + 2) (= native + naturalised totals) |          |          |          |        |          |         |           |            |          |                  |  |  |  |
| Adiantum aethiopicum   | ,        |          | 1        | ]      | 1        | 1       | 1         | 1          | JR       | AK 252590        |  |  |  |
| A. cunninohamii  | [        |          | 1        | 1      | 1        | 0       | 0++       | 201        | IR       |                  |  |  |  |
| A. hispidulum  |          | 1        | 0        | 1      | 1        |         | 0++       | +          | WY       | AK 205261        |  |  |  |
| Asplenium flaccidum  |          | 1        |          | 1      | †        | 1       | 0++       | +          | WY       | AK 205249        |  |  |  |
| A  |          |          |          |        |          | 1       |           |            |          | AK 205267        |  |  |  |
| A. gracillimum   |          |          |          |        |          |         |           | 0          | WY       | AK 252449        |  |  |  |
| A. hookerianum   |          |          |          | 1      | 1        | 1       | 1         | 1          | WY       | AK 205258        |  |  |  |
| A. oblongifolium   |          | 1        | [        |        |          |         | 0++       | 0          | WY       | AK 205248        |  |  |  |
| A. polyodon  |          | 1        |          | 1      | 1        |         | 0++       | 01         | WY       | AK 205260        |  |  |  |
| Azolla pinnata*  |          | lc       |          | 1      | 1        |         | lc+       | 1          | A        | K 52723.T2       |  |  |  |
| Blechum discolor   | [        |          | s        |        | T        | 1       |           | 1          | 1        | AK 252726        |  |  |  |
| B. filiforme   |          |          |          |        |          | 1       | 1         | 1          | WY       | AK 205270        |  |  |  |
| B. fluviatile  |          |          | [        | 1      |          | 1       | s++       | 1          | 1        | AK 252702        |  |  |  |
| B. novae-zelandiae   |          | 1        | 0        |        | 1        | lc      | 0++       | 1          | 1        |                  |  |  |  |
| Cyathea dealbata   | 1        |          |          | 1      | 1        |         | s++       |            | WY       | AK 205266        |  |  |  |
| C. medullaris  |          |          | s        | 1      | 1        |         | s++       | OI         | WY       | AK 205272        |  |  |  |
| Deparia petersenii   |          |          | Ic       | 1      | Ť        |         | lc++      | †          | 1        |                  |  |  |  |
| Dicksonia squarrosa  | 1        | 1        | 1        |        | 1        | 0       | 1         | 1          |          |                  |  |  |  |
| Diplazium australe   |          |          | 0        |        | 1        | 1       | S++       |            |          | ÷                |  |  |  |
| Doodia australis   | 1        | 1        | 0        | 1      | 1        | 1       | 0++       | 0          | WY       | AK 205247        |  |  |  |
| Grammitis ciliata  |          |          |          | 1      | 1        | 1       | 1         |            | WY       | AK 205263        |  |  |  |
| Histiopteris incisa  | I        | 1        | 1        |        | 1        |         | 0++       | 1          | +        |                  |  |  |  |
| Huperzia varia   | 1        |          | 1        |        | 1        | 1       |           | †          | WY       | AK 205253        |  |  |  |
| Hymenophyllum dilata   | tun      | n        | 1        | 1      |          |         |           | OI         | WY       | AK 205259        |  |  |  |
| H. flexuosum   |          |          |          |        | 1        |         | 1         | 1          | WY       | AK 205271        |  |  |  |
| H. revolutum   | 1        |          | 1        | 1      |          | -       | 1         | 1          | WY       | AK 205264        |  |  |  |
| H. sanquinolentum  | 1        |          | 1        | 1      | -        |         | 1         | 1          | WY       | AK 205252        |  |  |  |
| H. scabrum   | 1        | ·        | 1        | 1      | 1        |         | 1         | 1          | WY       | AK 205250        |  |  |  |
| Hypolepis ambigua  | <u>.</u> |          | 1        | 1      | 1        |         | 1         | ·····      |          | AK 252376        |  |  |  |
| Lastreopsis glabella   |          |          | 1        | 1      | †        |         | 1         | 1          | ·        |                  |  |  |  |
| Lycoopodiella cernua   |          |          | 1        | 1      |          | -       |           |            | A        | K 119996-97      |  |  |  |
| Lycopodium deuterod  | ens      | um       |          | 1      |          |         |           |            |          | AK 119997        |  |  |  |
| Microsorum pustulatu   | m        | s        | 1        | 1      |          | 1       | 0++       | 0          | WY       | AK 205256        |  |  |  |
| M. scandens  | 1        |          |          |        | 1        | 1       | 1         |            | WY       | AK 205269        |  |  |  |
| Osmunda reoalis*   | ÷        |          |          | 1      | <u>†</u> | 1       | 1         | ·          | A        | K 252245-46      |  |  |  |
| Paesia scaberula   | <b>†</b> |          | 1        | 1      | †        | 1       | +         | OI         | †        |                  |  |  |  |
| Pellaea rotundifolia   |          |          | 1        | 1      | ·        | 1       | +         | 1          | WY       | AK 205246        |  |  |  |
| Pneumatopteris penni   | aer      | a        | s        | 1      |          |         |           |            |          |                  |  |  |  |
| <b>.</b>   |          | 1        | 1        | 1      |          | 1       | 1         |            |          | AK 203112        |  |  |  |
| Polystichum richardii  |          |          | 0        |        |          | 0       |           | +          | WY       | AK 205257        |  |  |  |
| Psilotum nudum   | ÷        | <u> </u> | 1        |        | 1        | 1       | 1         | +          | 1        | AK 228957        |  |  |  |
| Pteridium  | <u>.</u> | t        | 1        |        | 1.       | 1       | 1         | <u> </u>   |          |                  |  |  |  |
| esculentum   | 1        | 11       | IC       |        | IC       |         |           | 0          | WY       | AK 205273        |  |  |  |
| Pteris comans  | †        |          | s        |        | †        | 1       | †         | †          | <u> </u> | AK 252732        |  |  |  |
| P. macilenta   | 1        |          | 0        |        | 1        | 1       | 1         | †          | †        | 1                |  |  |  |
|  |          |          | <u> </u> |        | ·†       | +       | 1         | ·          |          | AK 205245        |  |  |  |
| P. tremula   | 0        | 1        | 0        |        |          |         | 0++       | 0          | WY       | AK 252453        |  |  |  |
|  |          |          |          | 1      |          |         |           |            |          | AK 205242-       |  |  |  |
| Pyrrosia eleagnifolia  |          | 1        |          |        |          | +       | 0++       | c          | WY       | 43               |  |  |  |
|  | ÷        | ·        | <u> </u> |        | †        |         | +         | ·}         | +        | AK 202660        |  |  |  |
| Thelypteris confluens  |          |          |          |        |          |         |           |            |          | AK 2202000       |  |  |  |
| Tmesipteris lanceolata   |          |          |          |        | 1        | 1       | +         | •          |          | 711 220331       |  |  |  |
| Trichomanes reniform   | i        |          |          |        | †        | ·†····· | †         | 0          | WY       | AK 205251        |  |  |  |
|  |          | •••••    |          |        |          |         |           |            | 1        |                  |  |  |  |
| Gymnosperms (1 +   | 1)       |          | ſ        | 7      | 1        | 1       | T         | 1          | 1        | T                |  |  |  |
| Pinus sp.*   | <i></i>  | ľ        | †        |        | ·        | 1       |           | <u> </u>   |          | ΔK 119927        |  |  |  |
| Podocarnus totara  | †        |          | tr       |        | †        | +       | 1         | 0          | WY       | AK 252451        |  |  |  |
|  |          | ·····    | <i></i>  |        | ******   |         |           |            | <b>!</b> |                  |  |  |  |
| Dicotyledon (119 +   | 58       | )        | 1        | 1      | Ĩ        | 7       | T         | [          | [<br>[   | <b>.</b>         |  |  |  |
| Acacia mearnsii*   |          | <b></b>  | 1        |        | 1        | 1       | 1         | †          | <b> </b> |                  |  |  |  |
| Ageratina adenonhora   | <br>*∩   | ·        | †        | •      |          | 1       | · [       | <b> </b>   | ·····    |                  |  |  |  |
| Alectroon excelsus   |          |          | †        |        | ·        | 1       | +         | 0          | wr       | AK 257452        |  |  |  |
| Alternanthera  | †        |          | †        |        | +        | +       | +         | - <u>-</u> |          | <u> </u>         |  |  |  |
| nhiloveroidec*   | lc       | Ic       |          |        |          |         |           |            |          |                  |  |  |  |
| Ananallis anvencies  | r *      | l        | <b> </b> |        | ÷        |         | <u>+</u>  | ł          | <u> </u> |                  |  |  |  |
| Anium "white   | -        | [        | †        | ······ | +        | +       | +         | +          | <u> </u> |                  |  |  |  |
| denticles"   | 0        |          |          |        |          |         |           |            |          |                  |  |  |  |
| Aster subulatue*   | <u>+</u> |          | ¦        | -+     |          |         | 0         | <u>+</u>   | <u> </u> | <u></u>          |  |  |  |
| Avicennia marina   | 12       | <u></u>  | <u> </u> | -+     | ·        | +       | <u>ام</u> | <u> </u>   |          | <u> </u>         |  |  |  |
| Atternia maria   | i ia     | J        | .t       |        | .i       |         | J         | 1          | J        | L                |  |  |  |

Ogle specimen better placed in *C*. "raotest" (has double folded leaves), and the Tapu Bush record is better placed in the same taxon because field observations and herbarium specimens don't confirm *C. testacea* s.str. as present at Pouto.

- Carmichaelia williamsii collected and identified by W.R.B. Oliver (WELT 26353) from Lake Kahuparere in [Feb] 1921; redetermined by Jeff Fox on Feb 2001 as juvenile *C. australis* (J. Fox pers. comm.).
- Collospermum microspermum Wright & Young (1992) for Tapu Bush is based on a collection by Anthony Wright in 1991 (AK 205254). This has been re-determined by Rhys Gardner as Astelia ?solandri.
- Coproma lucida x C. macrocarpa Forester & Beachman (1987/90) for Pretty Bush. We agree with Ogle (1997:23) that this record is probably C. aff. macrocarpa x C. robusta?
- Cortaderia fulvida Miller (1992) for Tapu Bush. We agree with Ogle (1997:24) that this record is probably *C. splendens*?
- *Earina mucronata* Wright & Young (1992) for Tapu Bush, Ogle (1997) for Tapu & Pretty Bush. We were present in Pretty Bush at the end of January when an *Earina* (AK 252450) was in full flower (main flowering for *E. mucronata* is Sept- Dec); these plants were also more erect and sparse than *E. mucronata*. This taxon is not fully accepted yet, but we felt all the ones that we saw were *E. aestivalis*, rather than *E. mucronata*.
- Isachne globosa ("small bush grass") Miller (1992) for Tapu Bush. This is the wrong habitat for this species, probably Microlaena or Oplismenus?
- Parsonsia capsularis Ógle (1997) for Tapu & Pretty Bush. Wright & Young (1991) list Parsonsia sp. for Tapu Bush. Ogle (1997) notes that most Parsonsia records for Northland do not identify the species, and he argues that *P. capsularis* is locally common in Northland and therefore records only that species for Pouto. In Pretty Bush we saw Parsonsia in flower (out of reach) but with binoculars it clearly had large flowers with the stamens included within the corolla. Therefore we have only listed *P. heterophylla*.
- Prumnopitys ferruginea this species wrongly slipped from the Pakipaki column to the Pretty Bush column in Ogle's 1997 report (appendix 2, p.18) (C. Ogle pers. comm., January 2001).
- Pseudopanax ferox x P. lessonii Ogle (1997) for Pretty Bush. This putative hybrid was based on a 1.5 m sapling with single and trifoliate leaves (CHR 498071!) which looked markedly different from other Pseudopanax hybrids present. We believe the leaf teeth of this specimen are not reminiscent of P. ferox. Therefore until someone actually carries out these Pseudopanax crosses it is more prudent at this stage to treat this specimen as P. crassifolius x P. lessonii, which is locally common in the area.
- Uncinia ? rubra/scabra Wright (1991) for Pretty Bush . We agree with Ogle (1997) that this is most likely *U. distans*. But we saw neither *U. distans* nor *U. zotovii*. However, we did record *U. laxiflora* in three Pouto bush areas – it is absent from all previous Pouto lists. It would be good if future botanists could confirm the presence of *U. distans* and *U. zotovii* by a herbarium voucher.

### **Comparisons with Woodhill Forest natural areas**

The following articles cover most of the natural areas at Woodhill: Mackinder (1984), Cameron & Bellingham (1986), Cameron (1987, 1988, 1994, 1998) and Smale et al. (1995). There are several forested areas on the sand dunes at Woodhill Forest and pine plantations now surround most of these. There are many similarities and differences in the floras of Pouto and Woodhill natural areas.

#### **Similarities**

They are both on "young" (Holocene) sand dunes with little soil formation, bordering the exposed west coast and the Kaipara Harbour. Both have a similar flora composition and most of the forest canopies are dominated by kanuka.

| Plant groups                          | T<br>E     | F<br>C   | M<br>B     | Tr       | T<br>C   | C<br>G   | LH        | ΡВ       | тв         | Voucher<br>and T       |
|---------------------------------------|------------|----------|------------|----------|----------|----------|-----------|----------|------------|------------------------|
| Beilschmiedia tarairi                 |            |          |            |          |          |          |           |          | WY         |                        |
| B. tawa                               |            |          |            |          | 1        |          |           |          | JR         |                        |
| Bidens frondosa*                      |            |          |            |          | 1        |          | +         |          |            |                        |
| Blackstonia perfoliata*               | k          | lc       |            |          | <u> </u> |          |           |          |            | AK 252642              |
| Brachyglottis repanda                 |            |          |            |          |          |          | s++       |          | WY         |                        |
| Calystegia sepium                     | ١          | ١        |            |          |          |          | lc        |          |            |                        |
| C. soldanella                         | lc         |          | [          |          |          |          |           |          |            |                        |
| Carmichaelia aff.                     |            | 1        |            |          |          |          |           | 0        | <b>W</b>   | AK 252650              |
| australis                             |            |          | <u> </u>   | <u> </u> | ļ        |          |           | 0        |            | AK 232030              |
| Carpobrotus edulis*                   |            | 1        |            |          | ļ        |          | ļ         | ļ        | ļ          |                        |
| Carpodetus serratus                   |            |          |            |          | ļ        |          |           |          | JR         |                        |
| Cassytha paniculata                   |            |          | ļ          | ļ        | ļ        |          |           |          |            | AK 225853              |
| Centaurium erythraea                  | *          | 0        | ļ          | ļ        | ļ        |          |           |          |            |                        |
| Centella uniflora                     | L          | S        |            |          | <b>.</b> |          | ļ         | ļ        | ļ          |                        |
| Cerastium glomeratun                  | 7 <b>*</b> |          | <b> </b>   | ļ        |          |          | 0++       |          |            |                        |
|                                       | 1010       | es       |            |          | ÷        |          |           |          |            | AK 235014              |
| Clomatia augare*                      |            | 0        | <b> </b>   |          | ÷        |          | 0++       |          | VV Y       |                        |
|                                       | ·          |          |            |          |          |          |           |          |            |                        |
| CUTYZA diDiUa"                        |            | <u> </u> |            |          | ·        |          | 0++       | 0        | VV T       | AK 252700              |
| C pan/a*                              |            | 0        | ·····      | ÷        |          |          | 577       | <u> </u> |            | AK 202220              |
| Conrosma acerosa                      |            | 0        | 0          | Ic       | ÷        |          |           | ٨d       | WN         | AK 252736              |
| C areolata                            |            | ·        |            | 10       | ÷        | ·        | +         | Au       | קר         | AR 232/30              |
| C. areolata                           |            |          | 0          |          | +        |          | 0++       | 0        |            | AK 180266              |
| C grandifolia                         |            |          | <u>  .</u> | <u>}</u> |          |          |           | 0        | WY         | AK 180233              |
| c. grananona                          |            |          |            |          |          |          |           | <u></u>  |            | AK 120037-             |
| C. lucida                             |            |          | 0          |          |          |          |           | 0        | WY         | 38                     |
|                                       |            |          | <u> </u>   | †        |          |          |           |          |            | AK 180234              |
| C. aff. macrocarpa                    |            |          |            |          |          | 0        | 0++       | 0        | WY         | AK 180269              |
|                                       | ·          | }        |            |          | †        |          |           |          |            | AK 202652              |
| <i>C. parviflora</i> s.str.           |            |          |            |          |          |          | 1+        |          | WY         | AK 252711              |
| C. rhamnoides                         | 0          | 1        | 0          | 1        | 1        |          | 0++       | 0        | WY         | AK 252367              |
| C. rigida                             | [          | [        |            |          | Τ        |          |           | ?OI      | JR         |                        |
| C. robusta                            |            |          | 0          | 0        |          |          | ++        | OI       | WY         | AK 235013              |
| C. spathulata                         |            |          |            |          |          |          |           |          | JR, P      | S                      |
| C. aff. macrocarpa x C                | . rc       | bu:      | sta        | ļ        | ļ        |          |           | OI       |            |                        |
| C. propinqua x C. robi                | ısta       | 7        |            | <u> </u> | ļ        |          | s++       |          |            | AK 252703              |
| Coriaria arborea                      | ļ          |          |            |          | s        | <u> </u> | ļ         | ļ        | A          | <b>&lt; 12</b> 0047-48 |
| Corokia cotoneaster                   |            |          | s          |          |          |          |           | 0        | wy         | AK 205024              |
|                                       |            | ļ        |            | ļ        |          |          |           |          |            | AK 205262              |
| Corynocarpus                          | 1          |          | o          |          |          |          | c++       | с        | wy         |                        |
| laevigatus                            |            |          |            | <b> </b> |          |          |           |          |            |                        |
| Cotoneaster                           | о          |          |            |          |          |          |           |          |            |                        |
| Gatula corononifolia                  |            | <u> </u> |            |          | ÷        |          |           |          |            |                        |
| Create canillaric*                    | U          |          |            | -        | ÷        |          | +         |          | W/V        |                        |
| Dichondra renens                      | <u>}</u>   | <u>}</u> |            | 0        | ÷        | ÷        |           | <u> </u> |            |                        |
| Dodonaea viscosa                      |            | ¦        |            |          | +        | ÷        |           | 0        | WY         | CHR 98072              |
| Dvsoxvlum snectahile                  |            |          |            |          |          |          | c++       | s        | WY         | 0111( 50072            |
| Elaeocarous dentatus                  |            |          |            | 1        |          |          |           |          | WY         |                        |
| Elatine oratioloides                  |            |          |            | <u>.</u> |          |          |           |          |            | T1                     |
| Entelea arborescens                   |            | ·        |            |          | †        | 1        | S++       |          |            |                        |
| Epilobium billardieran                | um         | 0        |            |          | ţ        | 1        | 1         | 1        |            | AK 252737              |
| Epilobium rotundifoliu                | т          | 1        | 1          |          | T        | 1        |           | 1        |            | AK 252727              |
| E. tetragonum*                        |            | 1        |            |          | 1        |          |           | 1        |            | AK 252672              |
| Euchiton sphaericus                   |            | 1        |            | 1        | Ad       | 1        | 1         | 1        |            |                        |
| Gamochaeta                            |            |          | _          | ]        |          |          |           |          |            |                        |
| simplicicaulis*                       |            | 0        | 0          |          |          |          | 1++       |          |            |                        |
| Geniostoma rupestre                   |            |          | 0          |          | 1        |          | C++       | _        | <b>W</b> 2 |                        |
| subsp. <i>ligustrifolium</i>          |            |          | <u> </u>   |          |          | LTT      | 0         | VV 1     |            |                        |
| Glossostigma elatinoid                | les        | ···      |            |          |          |          | lc, T     |          | A          | K 252701,T6            |
| G. submersum                          | İ          | l        | l          | ļ        | <u> </u> | ļ        |           | T        |            | T5                     |
| Gonocarpus incanus                    |            | ļ        |            | ļ        | ļ        | ļ        | <b> </b>  | ļ        | WY         |                        |
| Gunnera dentata                       | ļ          | 1        | <b>.</b>   | ļ        | lc       | ļ        | ļ         |          | ļ          | AK 248040              |
| G. prorepens                          | ļ          | ļ        | ļ          | ļ        | ļ        | ļ        | ļ         | ļ        |            | AK 248035              |
| Hakea sericea*                        | <u> </u>   | ļ        |            | Ļ        | ļ        | ļ        | <u> </u>  | ļ        | WY         |                        |
| Haloragis erecta s.str.               |            | ļ        | ļ          | ļ        | ļ        | ļ        | ++        | l        |            |                        |
| Hebe diosmifolia                      | ļ          | ļ        |            | Ļ        | ļ        | ļ        | <u> .</u> | 0        | WY         | AK 180253              |
| <i>H. stricta</i> var. <i>stricta</i> | ļ          | ļ        |            | ļ        | Ļ        |          | ++        | OI       | OI         | AK 180252              |
| Hedycarya arborea                     | l          | l        |            | ļ        | ļ        | <b>.</b> |           | ļ        | ļ          |                        |
| Hydrocotyle pterocarp                 | a          |          | <u>.</u>   |          | <u>.</u> | <u>.</u> | IC++      | <u> </u> | l          | AK 252704              |

Both areas have in common several plant species that have a limited distribution elsewhere in the Auckland region. Excluding the divaricating species mentioned below, this would include: *Carex* "raotest", *Conyza parva\*, Earina aestivalis, Juncus* aff. *caespiticius, Gastrodia* aff. *sesamoides, Hebe diosmifolia, Lagenifera stipitata, Olearia albida, Pseudopanax ferox, Thelypteris confluens* and *Uncinia laxiflora*. Kanuka is the main tree species at both localities. (\* = naturalised sp.).

#### **Differences**

Although the species composition is rather similar, one of the obvious differences is the abundance of divaricating plants at Woodhill: *Coprosma crassifolia, C. rhamnoides, Corokia cotoneaster, Lophomyrtus obcordata, Myrsine divaricata* and *Streblus heterophyllus.* Also the prickly-leaved *Leptecophylla juniperina* and *Leucopogon fascicularis* could be included in this group. All these species are present at Pouto, but never reach the abundance that they do at Woodhill. The main reason for this difference is that fallow deer were released at Woodhill in 1900 (Davidson & Nugent 1990) and have been widespread and feral there for many decades. Smale et al. (1995) document the impact of deer on the Woodhill kanuka stands.

There are two streams at Pouto (Midge Bay & the Child's grave areas); Bot Soc visited both in January 2001. Both these kanukaforested streams (one even had a 2 m waterfall) are associated with many fern species (see notes above). Presumably the water reaching a lignite layer in the dunes that it cannot penetrate forms these streams. No such streams exist in the Woodhill kanuka areas.

There are several species that have so far been recorded at one area and not the other (excluding the rock outcrops at southern Woodhill). A few examples follow. Present at Pouto and apparently absent at Woodhill: *Blackstonia perfoliata\*, Coprosma parviflora* s.str., *E. neozelandica, Gunnera dentata, Gunnera prorepens, Hydatella inconspicua, Leptostigma setulosum, Myriophyllum robustum* (now extinct?), *Nestegis montana, Osmunda regalis\*, Pimelea arenaria* (now extinct?), *Sparganium subglobosum* and *Spiranthes novae-zelandiae.* Present at Woodhill and apparently absent at Pouto: *Cyclosorus interruptus, Epilobium pallidiflorum, Mazus novaezeelandiae, Mentha cunninghamii, Metrosideros excelsa, Myoporum laetum, Pimelea tomentosa, Pratia* "Woodhill", *Prumnopitys taxifolia* and *Rytidosperma clavatum.* 

### Notes on selected taxa (\* = naturalised sp.)

- Carex "raotest" (cf. C. raoulii, C. testacea) Ogle (1997: 22) discusses this taxon with double-folded leaves (similar to those of C. raoulii) and, like C. testacea has glabrous (not hispid) utricles, and male spikes lack female flowers at their distal ends (like C. testacea and unlike C. raoulii). It was a locally common widespread taxon at Pouto.
- Dicksonia fibrosa Peter Anderson photographed one plant on the edge of lower Lake Rototuna in the early 1990s (L. Forester pers. comm.). We didn't have time to check this locality, but it would be a 3 minute extension to the current northern geographic limit of the Dome Forest at 36° 19' (AK 229349). There is a single specimen of this species known at Woodhill (AK 218751).
- *Eleocharis neozelandica* Pouto is a stronghold for this nationally threatened species based on fieldwork and observations from the air (L.J. forester pers. comm.).
- Gunnera prorepens known only from several patches totalling ca.10 square m by Stick Lake, where Wendy Parr discovered it in 2000 (AK 248035). Only the Bot Soc "bird group" visited this area during our January trip. This appears to be a new northern geographical limit for the species.
- Hydatella inconspicua it has been recorded in Lake Humuhumu,
  L. Rotokawau, L. Rotootuauru (= Swan Lake) and L.
  Waingata (Tanner et al. 1986), but it hasn't been seen in
  L. Rotootuauru since 1988 and L. Waingata since 1995 (Paul Champion pers. comm.).
- Myriophyllum robustum there is a collection by W.R.B. Oliver in Oct 1928 from Lake Kahuparere that is cited by Orchard

| Plant groups           | T<br>E     | F<br>C     | M<br>B   | Tr         | T<br>C                                  | C<br>G                                  | LH      | PB       | тв       | Voucher<br>and T    |
|------------------------|------------|------------|----------|------------|---|---|---------|----------|----------|---------------------|
| Hypochoeris glabra*    |            |            |          |            | <b></b>                                 | ÷                                       | +       |          | 1404     | AK 252728           |
| H. Fadicata*           |            | 0          |          | 0          | ÷                                       |   | 0++     |          | WY       |                     |
| Kunzez ericoides       |            |            |          |            | +                                       |   | +       | 0        |          |                     |
| s lat                  | lc         | lc         | а        | 0          | Ic                                      | а                                       | l-a     | а        | WY       | AK 252276           |
| l agenifera stipitata  | i          |            | 1        | +          |   |   |         |          | +        | AK 252734           |
| Laurelia novae-zelano  | liae       |            |          | +          | 1                                       | 1                                       | +       | <u> </u> | JR       | /                   |
| Leontodon              |            |            |          | 1          |   |   | -       |          | 1        |                     |
| taraxacoides*          |            | с          |          |            |   |   |         |          |          |                     |
| Leptecophylla juniper  | ina        |            |          | o          | Ĵ                                       |   |         | 0        | WY       |                     |
| Leptospermum scopa     | riun       | 1          |          |            | 1                                       |   |         | OI       | WY       |                     |
| Leptostigma setulosul  | m          | 1          |          |            |   |   |         |          |          | AK 252651           |
| Leucopogon fascicula   | tus        |            |          | 0          |   |   | 0++     | 0        | WY       | AK 120005           |
| L. fraseri             |            |            |          |            |   |   |         |          | ļ        |                     |
| Lilaeopsis novae -     | 1          | lc         |          |            | Ic                                      |   | I+, T   |          |          | AK 252682,          |
| zelandiae s.lat.       |            |            |          |            |   |   |         |          |          | 253608,15           |
| Limosella lineata      | ÷          |            |          |            | IC                                      |   | IC+     |          | <b>.</b> | AK 252/21           |
| Linum Dienne*          | ÷          | <u> </u>   |          |            | +                                       |   | 0+      |          |          |                     |
| Litsea calicaris       |            |            |          | . <b>+</b> |   |   |         |          | VVY      |                     |
| Lophomyrtus bullata    | ÷          | 10         |          |            |   |   |         | ·        | 14/2     |                     |
| Lopionyitus Dullata    |            |            |          | ·          |   |   |         | -        | DC       | AK 180267           |
| L bullata V L obcord   | i<br>ata   |            | <u> </u> | +          | ÷                                       | ·                                       |         | -0<br>-c | +        | AK 252505           |
| L. Dullata X L. ODCOTU | ala        | 0          | <u> </u> | +          | +                                       | • | ·+      | <u> </u> | +        | AN 232303           |
| Lotus pedunculatus     | γ          | 0          | 0        | -          | ·                                       | •                                       |         | +        | <u>+</u> |                     |
| Ludwinia nalustris*    | +          | <u>  .</u> | <u> </u> |            |   |   | 10+     | +        | +        | <b>T</b> 3          |
| Luninus arhoreus*      | ·          | 0          |          | -          |   |   | 0.1     |          | WY       | 1.5                 |
| I vthrum hyssopifolia* |            | <u>  .</u> |          |            |   |   | 0+      |          |          | •                   |
| l vcium fero-          |            | <u> </u>   |          |            |   | ·                                       | + • • • | +        |          | +                   |
| cissimum*              | 0          |            |          |            |   |   |         |          |          | AK 119995           |
| Macropiper excelsum    | s.st       | <br>r.     | s        | +          | • |   | 0++     | 0        | WY       |                     |
| Melicope ternata       | 1          | ſ          | ÷        |            | · † · · · ·                             | 1                                       |         | 1        | JR       |                     |
| Melicytus micranthus   |            | 1          | <u>.</u> | 1          |   | -                                       |         |          | JR, I    | Ś                   |
| M. ramiflorus          | 1          | 1          | 0        |            |   |   | 0++     | +        | WY       | 1                   |
| Melilotus indicus*     |            |            |          |            |   |   |         |          |          | [                   |
| Mentha pulegium*       |            |            |          |            |   |   | +       |          |          |                     |
| Metrosideros diffusa   |            |            |          |            |   |   |         | WP       | JR       |                     |
| M. perforata           |            | ļ          |          |            |   |   |         | <u> </u> | JR       |                     |
| M. robusta             | <u> </u>   | <b> </b>   | <u>.</u> |            |   |   |         |          | JR       |                     |
| Modiola caroliniana*   |            | 0          |          |            |   |   |         |          |          | Ļ                   |
| Muehlenbeckia          | Ic         | 0          | 0        |            |   |   |         | +        | WY       |                     |
| complexa               |            | ļ          | ļ        |            |   |   |         |          |          |                     |
| Myriophyllum           |            |            |          |            |   |   |         |          |          | T2                  |
| pedunculatum           | <b>.</b>   |            |          | ·          |   |   | -       |          |          |                     |
| M. robustum            |            |            |          |            |   |   | 10+     |          | 1        | : 13<br>ELT 4409E T |
| M triphyllum           | +          | +          | +        |            | ·+                                      |   | +       |          | ••••     | ELI 44905,1         |
| M. votechii            | ·          |            |          | -+         | 10                                      |   |         | +        | <u>-</u> | 15<br>K 2526/1 T    |
| Myrsine australis      | ·          |            |          |            |   | -                                       |         | ·        |          | T 252071, T         |
| M divaricata           | ·          |            | 0        |            |   |   | 0++     |          |          |                     |
| Nestenis lanceolata    | +          | +          | <u>+</u> |            | -+                                      |   |         |          |          |                     |
| N montana              | ÷          | +          | c        |            | +                                       |   | -+      |          | WY       | AK 180237           |
| Oenanthe nimni-        | 1.         | <u> </u>   | 1        |            | +                                       |   |         |          |          | 10023/              |
| nelloides*             | 1          |            |          |            |   |   |         |          |          |                     |
| Olearia albida         | 1          | +          | 1        |            |   |   |         | s        | WY       | AK 180238           |
| O. furfuracea          | 0          |            | 0        |            |   |   |         | OI       | WY       |                     |
| O. rani                | 1          |            |          |            | 1                                       | 1                                       |         | · ·      | JR       | <u>.</u>            |
| O. solandri            | 1          | 1          | 1        |            | -                                       |   |         | -        | 1        | AK 252693           |
| Ornithopus pinnatus*   |            | 1          | 1        | lc         | 1                                       |   |         | •        | •        | AK 252739           |
| O. sativus*            | T          | 1          | Ī        | s          | Ť                                       |   |         |          |          | AK 252448           |
| Orobanche minor*       |            | ]          |          | lc         |   |   |         |          |          |                     |
| Oxalis exilis          |            |            | 0        |            |   |   |         |          | ]        |                     |
| O. rubens              |            | 0          |          |            |   |   |         |          |          |                     |
| Ozothamnus             |            |            | 1        |            |   |   |         | 74       | WN       |                     |
| leptophyllus           |            | Ľ          |          | U          |   |   |         | AU       | VVT      |                     |
| Paraserianthes lophal  | ntha       | *          |          |            |   |   | 1++     |          |          | AK 120021           |
| Parentucellia viscosa* |            | 0          |          | 0          |   |   |         |          | WY       |                     |
| Parsonsia heterophyll  | a          | ļ          | 0        |            |   |   | 0++     | c        | WY       |                     |
| Passiflora caerulea*   |            | ļ          |          |            |   |   |         |          |          | AK 205949-5         |
| Phytolacca octandra*   | 0          | ļ          | Ļ        |            |   |   |         |          |          |                     |
| Pimelea arenaria       | . <u>.</u> | l          | <u>.</u> |            |   |   | M       |          |          | AK 101198-9         |

(1979) and Tanner et al. (1986); also Moar (1950) recorded it from Lake Rotootuauru. There have been no recent observations of it in any of the Pouto lakes (Paul Champion pers. comm.).

- Nestegis montana for Tapu Bush Wright & Young (1991) recorded it as locally dominant as very large mature trees. We observed it as a locally common canopy species in Pretty Bush (Fig. 3) and a couple of trees amongst the kanuka near the waterfall at Midge Bay. It is unusual to see this species in the dune forests because it is more commonly at higher altitudes at this latitude. It is also absent from Woodhill dune forests.
- Osmunda regalis\* it occurs locally around Lake Whakaneke (AK 252345-46, *L.J Forester*, 2000) and DoC has it on their list for an annual control programme (L. Forester pers. comm.). We didn't visit this lake. A collection by Peter Anderson in 1996 (AK 227719) from a peat bog northwest of Dargaville, and one by Gillian Rutherford in 1997 (AK 232105) on Great Barrier Island appear to be only wild New Zealand collections of *Osmunda* north of Pouto.
- Pimelea arenaria based on a single collection by H.B. Matthews in August 1920 at [Lake] Humhumu. Karen Riddell searched for this species recently by resurveying the natural area west of lake and the shrubland on wetland margin, but without success.
- Pseudopanax ferox it is recorded for Tapu Bush in apparently low numbers; and we saw ca.5 plants in Pretty Bush (mainly saplings), and a 2.2 m sapling (AK 252746) adjacent to a 6 m adult above the waterfall at Midge Bay. Locally common on private land by Lake Kahuparere in 1991 (MEY pers. ob.). These are very small populations compared with over 300 plants at Woodhill (EKC pers. ob.).
- Spiranthes novae-zelandiae we saw a total of ca.15 plants all in similar habitats (see notes under Fishing Camp and The Causeway) and all with bright-pink coloured flowers (see Fig. 2). This appears to be a new record for the Pouto area.
- Thelypteris confluens this species is locally abundant in the extensive peaty, dune marshes from close to Lake Karaka south to Lake Whakaneke. We must have been right next to it at the north end of Lake Mokeno where it has been collected in the past (AK 202660). Pouto is the New Zealand stronghold for this threatened species. (L.J. Forester pers. comm.). It has been seen at Woodhill only once (AKU 15136, *B.R. Burns*, 1983).

#### **Nationally Threatened and Uncommon plants of Pouto**

The rankings follow de Lange et al. (1999): <u>Threatened: Vulnerable</u> *Thelypteris confuens* - locally abundant, NZ stronghold

#### Threatened: Declining

*Eleocharis neozeland*ica - locally abundant *Hydatella inconspicua* – locally common in two lakes *Myriophyllum robustum* - locally extinct? *Pimelea arenaria* - locally extinct?

Recovering: Conservation dependent Desmoschoenus spiralis – occasional over a large area

#### Naturally Uncommon: Sparse

Lepilaena bilocularis - local, but possibly more common than known.

*Pseudopanax ferox* – locally common (one place) to sparse in kanuka stands.

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| Plant groups                                   | T           | F          | M<br>P     | Tr         | T        | C        | LH             | РВ                       | тв       | Voucher     |
|--|-------------|------------|------------|------------|----------|----------|----------------|--------------------------|----------|-------------|
| Pittosporum tenuifoliu                         | <b>Б</b>    | <u> </u>   | 0          |            | <u> </u> | 0        | 0++            | 0                        | ŴŶ       |             |
| Plagianthus divaricatus                        | 0           | +          | ×          |            |          | <u> </u> | 0.7            | <u> </u>                 |          |             |
| Plantago australis*                            | +           |            |            |            |          |          | +              | <b>}</b>                 | •        |             |
| Polygonum punctatum                            | *           | †          |            |            |          |          | S++            | 1                        |          | AK 252716   |
| P. salicifolium                                |             | lc         |            |            |          |          |                |                          |          |             |
| Pomaderris kumeraho                            |             |            |            |            |          |          |                |                          |          | AK 119975   |
| P. phylicifolia var. eric                      | ifoli       | a          |            |            |          |          |                |                          | WY       | AK 119931   |
| Prunus persica*                                |             |            | s          |            | ļ        | ļ        |                | ļ                        | <b>.</b> |             |
| Pseudognaphalium                               |             |            | lc         |            |          |          | s++            | 0                        |          |             |
| Iuteoalbum agg.                                |             |            |            |            | <u> </u> | <u> </u> | ·              | 0                        | 1        |             |
| rseuuopanax arboreus                           | ,           |            | 5<br>c     |            |          |          | 64.1           |                          |          |             |
| P ferox  |             |            | 3<br>5     |            |          |          | 1 <b>3 T T</b> | 0                        |          | AK 252746   |
| P. lessonii                                    |             |            | 0          |            |          |          | <u> </u>       | 0                        | 1.21     | AK 203114   |
| P. crassifolius x P. less                      | oni         | 7          | c          |            |          | <u>+</u> | 0++            | 0                        | A        | K 252724-25 |
| Ranunculus amphitrici                          | hus         |            |            |            | <u>.</u> |          | ++             |                          | 1        |             |
| R. sardous*                                    |             |            |            |            | s        | ]        | ļ              | [                        | [        |             |
| Rhabdothamnus solar                            | dri         |            |            |            |          |          |                |                          |          | AK 252707   |
| Rosa cv. *                                     |             |            |            | ļ          | ļ        | s        |                | ļ                        |          |             |
| Rubus cissoides                                |             |            |            |            | ļ        |          | S++            | <b> </b>                 | WY       |             |
| K. fruitcosus agg.                             | lc          |            |            |            |          |          |                |                          |          | AK 252696   |
| Rumey acetocella*                              |             |            |            | In         | <u> </u> |          | ·              | ł                        | +        |             |
| Rumex conclomerative                           | *           |            |            |            | <u> </u> | +        | 0              | +                        | +        |             |
| R. frutescens*                                 |             | lc         |            |            | +        |          | † <b>-</b>     | +                        | +        | AK 252670   |
| Sagina subulata*                               |             |            |            |            |          | 1        | •              | 1                        | 1        | AK 252371   |
| Samolus repens                                 | lc          |            |            |            |          | 1        | 1              | 1                        | 1        |             |
| Sarcocornia                                    | ~           |            |            | 1          |          |          |                |                          | 1        |             |
| quinqueflora                                   | U           | ļ)         |            |            | ļ        |          |                | ļ                        |          |             |
| Schefflera digitata                            |             | ļ          |            | ļ          | ļ        |          |                | OI                       |          |             |
| Selliera radicans                              | lc          |            |            |            | ÷        |          |                | +                        |          |             |
| Senecio bipinnatisectu                         | <i>IS</i> * |            | 0          | <u> </u>   |          |          | 0++            | S                        |          | AK 252250   |
| S. IIISPIOUIUS<br>S. alomeratur                |             |            | U          |            | -<br>c   | +        |                | 0                        | VV T     | AN 252559   |
| S minimus                                      |             |            |            | <u> </u>   | 3        |          |                | · <del> </del> · · · · · | WY       | AN 2320/3   |
| Silene gallica*                                | +           |            |            | 0          | ÷        | +        |                |                          |          |             |
| Solanum americanum                             |             |            |            |            | 1        |          | ++             | OI                       | WY       | AK 119955   |
| Sonchus asper*                                 |             |            |            |            | <u> </u> |          |                | <u> </u>                 |          | AK 252358   |
| Sophora microphyllas                           | .lat        | ••••••     |            |            |          |          |                | 0                        | WY       |             |
| Stellaria parviflora                           | <u>.</u>    | ļ          |            | ļ          |          |          |                |                          | WY       | <b>.</b>    |
| Streblus heterophyllu                          | 5           | ļ          |            |            | ļ        |          |                |                          | WY       |             |
| Syzygium maire                                 | l           | ļ          |            |            |          |          |                |                          |          | AK 202651   |
| I etragonia implexicor                         | na          | 0          |            |            |          |          |                | ·                        |          | +           |
| Infolium repens*                               | -           | 0          |            |            |          |          |                |                          |          | +           |
| Veronica pleheia                               | 1           | <b> </b>   |            | ·          |          |          | ··             | ·                        |          | +           |
| Vellereonhyton                                 | <u>.</u>    |            | \          | ·          |          |          |                | •                        |          |             |
| dealbatum*                                     |             | lc         |            |            |          |          | CO+            |                          |          | AK 252356   |
| Vinca major*                                   | I           | 1          | 1          |            | 1        | la       |                | 1                        |          | AK 119922   |
| Vitis vinifera*                                | 1           |            |            |            |          | 1        |                |                          |          |             |
| Vitex lucens                                   | <u> </u>    | [          |            |            | Ţ        |          |                |                          | WY       |             |
| Wahlenbergia littorali                         | s           |            | 0          |            |          |          |                |                          |          |             |
| subsp. vernicosa                               |             | l          | L <b>.</b> | . <u>.</u> |          |          |                |                          |          | .l          |
| Managha (07 : 45)                              | · · · · ·   |            | ·····      | ·          |          |          |                | · · · · · · ·            |          |             |
| Acianthus circlainii                           | ÷           |            | ·          |            | ÷        |          |                | 0                        | 1400     |             |
| Acidiiciius Sinciairii<br>Aarostis capillarie* | +           | ····       | ·          |            |          |          | lc+            |                          | VV T     |             |
| A. stolonifera*                                | 0           | 1          |            |            | ·†····   |          |                |                          |          | AK 252695   |
| Aira carvonhvllea s.sti                        | *           | † <b>'</b> |            | 0          |          |          |                | +                        |          |             |
| Ammophila arenaria*                            | Ic          | Ic         | 1          | lc         |          |          |                |                          | WY       |             |
| Anthoxanthum                                   |             | 1-         | 1          |            |          |          |                | 1                        | 11.0     |             |
| odoratum*                                      | +           |            |            |            |          |          | 0++            |                          | VVY      |             |
| Apodasmia similis                              | la          | la         |            |            |          |          | Ic++           | T                        | WY       | T2          |
| Aristea ecklonii*                              | 1           | ļ          |            |            | 1        |          |                |                          |          |             |
| Arthropodium                                   | +           |            |            |            |          |          |                |                          |          |             |
| cirratum                                       | ļ           | ļ          |            |            |          |          |                | . <b>.</b>               |          |             |
| Astelia solandri                               |             | ļ          |            | . <b>.</b> |          |          |                | s                        | WY       |             |
| A. trinervia                                   | . <b> </b>  |            |            |            |          |          |                |                          | JR       |             |
| AXONOPUS TISSITOIIUS*                          | ·           | <b>.</b>   | ÷          |            |          |          |                | ·                        |          | та          |
| baumea arthrophylla                            | i           | .l         | .i         |            |          |          |                | l                        | l        |             |

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| Plant groups            | T<br>E       | F<br>C      | M<br>B   | Tr         | T<br>C     | C<br>G     | LH          | PB       | тв         | Voucher<br>and T       |
|-------------------------|--------------|-------------|----------|------------|------------|------------|-------------|----------|------------|------------------------|
| B. articulata           | 0            |             |          |            |            |            | lc++        |          |            | Т3                     |
| B. juncea               | 1            |             | +        |            |            | ]          | lc++        |          |            | T1                     |
| B. rubiginosa           |              |             |          |            | 1          |            | ++          |          | A          | K 252706 T1            |
| Briza maxima*           |              | lc          |          | o          |            |            |             |          |            |                        |
| Bromus willdenowii*     |              |             |          | ļ          |            | <u> </u>   | 0+          |          |            |                        |
| Bulbophyllum pygmae     | um           |             |          | ļ          | ļ          |            |             |          | WY         |                        |
| Carex dissita           |              |             |          | <u> </u>   | ļ          | ļ          | ļ           | ļ        | ļ          | AK 252709              |
| C. fascicularis         | ļ            |             |          |            | Ļ          | Ļ          | <u>  ++</u> | ļ        | ļ          | AK 252705              |
| C. lambertiana          | ļ            |             |          | ļ          | Ļ          | ļ          | <b>.</b>    | ļ        | ļ          | AK 252710              |
| C. longii*              |              | 0           |          | Ļ          | ļ          |            |             |          |            | AK 252674              |
| C. maorica              |              | 0           |          | Ļ          |            |            | ++          |          |            |                        |
| C. pumila               |              | la          |          | ļ          | IC         | ļ          |             |          |            |                        |
| C. "raotest"            | o            |             | о        |            |            |            | 0++         | с        | WY<br>#    | AK 252647<br>CHR 83986 |
| C. secta                | 1            | 1           |          |            | 1          |            | 0++         |          |            | AK 257722              |
| C. spinirostris         | 1            |             |          |            | 1          | 1          | C++         | ¦        | <b>†</b>   | AK 252708              |
| C. virgata              | 1            |             |          | 1          | 1          |            | 1           | <u>}</u> | ·····      |                        |
| Collospermum hastatu    | ım           |             |          |            | Ť          | 1          | 1           | 1        | WY         |                        |
| Cordyline australis     |              | o           | o        |            | 0          |            | 0++         | o        | WY         | AK 202654              |
| C. australis x C. pumil | lio          | s           |          |            |            |            |             |          |            | 50                     |
| Cortaderia jubata*      |              |             |          |            | 1          |            |             |          | WY         |                        |
| C. selloana*            | lc           | lc          |          | lc         | o          | с          | 0++         | 0        | ļ          |                        |
| C. splendens            |              | lc          | 0        | с          | Ļ          |            |             | Ad       | WY         |                        |
| Corybas trilobus agg.   | ,            | ,           |          |            |            |            |             | 0        | WY         |                        |
| Cynodon dactylon*       | lc           | la          | ļ        | ļ          |            |            |             |          |            |                        |
| Cyperus congestus*      | <u> </u>     |             | ļ        | <u> </u>   |            |            |             |          |            | AK 252735              |
| C. polystachyos*        | ļ            | la          |          |            | Ļ          |            |             |          | ļ          | AK 252692              |
| C. ustulatus            | 0            | 0           |          | <u> </u>   |            |            | s++         | ļ        | ļ          |                        |
| Desmoschoenus spira     | lis          | 0           |          |            | <u> </u>   |            |             | ļ        | ļ          | AK 119920              |
| Dianella nigra          | <u> </u>     | <b>_</b>    | 0        | ļ          |            | <u> </u>   | 0++         | 0        | WY         |                        |
| Dichelachne crinita     | <u> </u>     | <b>.</b>    |          | o          |            | <u> </u>   |             | L        | <u> </u>   | AK 252368              |
| Dracunculus vulgare*    |              |             |          |            | <u> </u>   | ļ          |             | <u> </u> |            | AK 207127              |
| Drymoanthus adversu     | Ş            | ļ           |          | <u> </u>   | <u> </u>   |            |             | ļ        | WY         |                        |
| Earina aestivalis       | ļ            | ļ           |          |            |            |            |             | 0        | WY         | AK 252450              |
| E. autumnalis           |              |             |          | <u> </u>   |            |            |             | 01       | WY         |                        |
| Eleocharis acuta        | <u> </u>     | IC          |          |            | Ic         | <u> </u>   | lc          | ļ        | L          |                        |
| E. neozelandica         | <u> </u>     | Ic          | ļ        |            | lc         |            |             | ļ        |            | AK 252643              |
| E. sphacelata           | ļ            | ļ           | ļ        |            |            |            | lc+,T       | ļ        | ļ          | T6                     |
| Elodea canadensis*      | ļ            | ļ           |          |            | .Ļ         | . <b>.</b> |             |          |            | Τ1                     |
| Freycinetia banksii     | Ļ            | <b> </b>    |          |            |            |            |             | <b>.</b> | ļ          |                        |
| Gahnia lacera           | ļ            | ļ           |          |            |            |            | 0++         | ļ        | ļ          |                        |
| G. setifolia            | ļ            | ļ           | ļ        |            |            |            |             |          | JR         |                        |
| G. xanthocarpa          | <u>.</u>     | <u> </u>    | ļ        |            |            |            |             |          | JR         |                        |
| Gastrodia aff. sesamo   | ide          | ş           |          |            | . <b> </b> |            |             | X1       |            |                        |
| Holcus lanatus*         |              | 0           | ļ        | 0          | 0          |            | o-lc        | ļ        | WY         |                        |
| Hydatella inconspicua   | .,           | ļ           | ļ        |            |            |            | <u>.</u> Τ  |          | W,         | AIK 10481 T            |
| Isachne globosa         | ļ            | lc          | ļ        |            | 0          |            | lc++        | ļ        | ļ          |                        |
| Isolepis cernua         | IC           | <u>IC</u>   | ļ        |            | 0          |            |             | ļ        |            | AK 252370              |
| I. nodosa               | 0            | 0           | 0        | 0          | 0          |            |             | Ad       | WY         | AK 119917              |
| I. prolifer             | <u>.   .</u> | ļ. <u>I</u> | ļ        |            |            |            | 0+          |          | ļ          |                        |
| 1. reticularis          | ļ            | <b> </b>    | <b>}</b> |            |            |            | ++          | 10!      | ļ          | AK 252713              |
| 1. sepulcralis*         | ÷            |             | <b> </b> |            | . <u>.</u> |            |             | <b>.</b> |            | AK252715               |
| Juncus acutus*          | IC           |             | ļ        |            | . <b>.</b> |            |             | <b>.</b> | <b>.</b>   | AK 252697              |
| J. articulatus*         | ÷            |             |          |            | . <u>.</u> |            | IC+         | <b>.</b> |            |                        |
| J. australis            |              | <u> </u>    | <u> </u> |            |            |            | +           |          | <b> </b>   | AK 252500              |
| J. att. caespiticius*   | ļ            | IC          | <u> </u> |            |            |            | 0+          |          | <b> </b>   | AK 252738              |
| J. alcnotomus*          | 1            | <b> </b>    | <b>.</b> |            | <u> </u>   |            |             |          | <b>.</b>   | AK 252644              |
| J. effusus*             | 0            |             | <u>.</u> |            |            |            | 0           |          | . <b> </b> | CUD 400070             |
|                         | <u> </u>     | 100         | <b>,</b> |            | . <b>.</b> |            |             | <b></b>  |            | CHR498073              |
| J. ( gerarall*          | <b></b>      | ·           | <b> </b> |            |            |            |             | <b>.</b> | <b>.</b>   | CHK 980//              |
| J. greginorus           |              | <b> </b>    |          | . <b>.</b> |            |            | <b>   +</b> |          |            | AK 252/14              |
| J. Kraussii var.        | Ic           |             |          | 1          |            |            |             |          |            |                        |
| australiensis           |              | <b> </b>    |          |            |            |            |             |          | <b> </b>   |                        |
| J. microcephalus*       | <u></u>      | ļ           | <b>.</b> |            |            |            |             |          | ļ          | AK 252717              |
| J. pallidus             | <u> </u>     | 0           | <b> </b> |            | . <b>.</b> |            | 0+          | <b>.</b> | <b>.</b>   | 12                     |
| J. planitolius          | <u> </u>     | ł           | ļ        |            |            |            |             | <b>.</b> | <b>.</b>   |                        |
| Lacnnagrostis billardio | erei         | IC          | <b> </b> | IC         |            |            |             | <b>.</b> | <b>.</b>   | AK 252637              |
| Lagurus ovatus*         |              | 0           | <b> </b> | IC IC      |            |            |             | ·        | +          | <u> </u>               |
|                         |              |             |          |            |            |            |             |          | <b>.</b>   | AK 202052              |
| Lepidosperma austral    | e            | Í           | .l       | .)         |            |            |             | .j       | J          | AK 202653              |

| Scott, B. 1995: Old Man Kaipara. New Zealand Geographic 26:<br>20-46.          | Plant groups                 | TF         | F          | M        | Tr  | ТС              | C   | ' LH      | РВ    | тв                   | Voucher<br>and T |
|--|------------------------------|------------|------------|----------|-----|-----------------|-----|-----------|-------|----------------------|------------------|
| Smale, M.C., Hall, G.M.J. & Gardner, R.O. 1995: Dynamics of                    | L laterale                   | •          | , C        |          |     | C               | 0   |           | •     | WY                   |                  |
| kanuka (Kunzea ericoides) forest on South Kaipara spit,                        | Lenilaena bilocularis        |            |            | •        |     | ر               |     | 1+        | L     |                      | AK 252681        |
| New Zealand, and the impact of fallow deer (Dama                               | Lolium perenne*              |            | L          |          |     |                 | ,   | o+        | L     | ł                    |                  |
| dama). New Zealand Journal of Ecology 19(2): 131-141.                          | Microlaena polynoda          |            | r          | •        |     | ~               | -   | ,         | ĺΙ    | ίwγ                  | AK 252691        |
| Simpson, P. 1982: Observations on Tapu Bush, North Kaipara                     | M. stipoides                 | +          | ้อ         | о        | 1   |                 |     | `lc++     | `0I   | `WY                  | -                |
| Barrier. Unpublished report for the Commission for the                         | Microtis ? unifolia          |            |            | 5        | ्०  |                 |     |           |       |                      | <i>c</i>         |
| Environment. /p.   | Morelotia affinis            |            |            |          |     | ~               |     |           |       | WY                   |                  |
| New Zealand N Z Soil Bureau Wellington 286 p                                   | Oplismenus hirtellus         | +          | ł          |          |     |                 |     | c++       | o     | WY                   |                  |
| Tanner, C.C., Clavton, J.S. & Harper, L.M. 1986: Observations on               | subsp. <i>imbecillis</i>     | •          | ۰.<br>۲    |          |     |                 |     | *         | ι.    | ι.                   |                  |
| aquatic macrophytes in 26 northern New Zealand lakes.                          | Otellia ovalifolia*          |            | r          |          |     |                 |     | Ţ         | r     | ł                    | 14               |
| N.Z. Journal of Botany 24: 539-551.  | Parapholis strigosa*         | IC         | _          |          |     |                 |     | - 1       |       | •                    | AK 252694        |
| Wright, A.E. 1991: Plant list, Pretty Bush (unpublished). In: Sites            | Paspalum dilatatum           | 1-         | 0          |          |     |                 |     | 0+        |       |                      |                  |
| of Special Biological Interest database. Department of                         |                              | IC         | I          | ł        |     |                 |     |           |       |                      |                  |
| Conservation, Whangarei.   | P. Urvillel*                 | 15         | ۰.         |          |     | ~               |     | •         | L     | •                    |                  |
| Wright, A.E. & Young, M.E. 1991: Vascular plants of Tapu Bush,                 | P. VayinaLuni"<br>Poppicetum | Id         | ł          |          |     |                 |     | ł         | ł     | ł                    |                  |
| North Kaipara Barrier. Auckland Botanical Society Journal                      | clandestinum*                |            | lo         |          |     |                 |     | c+        |       |                      |                  |
| <i>46(2)</i> : 70-72.  | P macrourum*                 |            | 1          |          |     |                 | ·   | ł         | ł     | ł                    | AK 252712        |
|  | Phormum tenax                | +          | ່.         | -İc      | 2   | 0               |     | `0++      | οľ    | IR                   | ,                |
| Acknowledgements   | Poa ancens s str.            |            | , 0        |          |     | Ŭ               |     | 0++       | ίο.   | wy                   |                  |
| We are grateful to   | P. pusilla                   |            | ់ត្រ       |          |     |                 |     |           | •••   | 'wy                  |                  |
| Bernice Taurua and other members of the Waikaretu Marae                        | Polypogon fugax*             | о          |            | · ·      | •   |                 |     | 1         | 1     |                      | · · · ·          |
| Committee for the spacious accommodation.                                      | P. monspeliensis*            | -          | ်၀         |          |     |                 | ,   | ł         | +     | ۱                    |                  |
| Logan Forrest for helping with the transport arrangements and for              | Potamogeton                  |            | 1          | _        |     | ſ               | `   | ,<br>     | +     | ,                    | -                |
| information about local plants and guidance in the field,                      | cheesemanıı                  |            | IC         |          |     |                 |     | 110+1     | _     |                      | 10               |
| Greg and Helen Smith and Anthony Taylor for guidance in the                    | P. ochreatus                 |            | 1          |          | ,   |                 | •   | Ìт        | 1     | 2                    | 77               |
| field,   | P. pectinatus                |            |            |          |     |                 |     | •         |       |                      | T1               |
| Keith Hawkins, Lisa Forester, and Karen Riddell (DoC) for plant                | Pterostylis alobula          |            |            |          |     |                 |     |           | ଼ଠା   | ` MJ                 |                  |
| records and for accompanying us in the field,                                  | Rhopalostylis sapida         |            | ٢          |          |     |                 | ,   | ŀ         | ł     | ` MX                 |                  |
| Lisa Forester and Colin Ogle for comments on an earlier draft of               | <i>Ruppia</i> sp.            |            | ŀ          |          |     |                 | •   | Ţ         | r     | ł                    | Т3               |
| this article,<br>Dayl Champion (NIWA) for surrent information on specific dura | Rytidosperma biannu          | ılare      | ?,         |          |     | -               | -   |           | r     | ·                    |                  |
| lake plants  | <i>R. gracile</i>            |            | ٦          |          |     |                 |     | •         | •     | ͺ₩Y                  | ۰ .              |
| Mei Nee Lee and Doug Rogan for extracting records from the AK                  | ; R. penicillatum*           |            |            | ۲        |     |                 |     |           |       |                      |                  |
| herbarium database.  | , R. racemosum*              |            |            |          |     |                 |     | 0++       |       |                      | AK 252592        |
| CHR, WAIK and WELT herbarium staff for specimen label                          | R. Unarede                   |            | ·          |          |     | -               | -   | 0++       | ·     | •                    | AK 252502        |
| information.   | scriedonorus<br>phoeniv*     | 0          | C          | )        |     |                 |     |           |       |                      |                  |
| Our special thanks to David Skilton for preparing the map, and to              | Schoenus maschalini          | 115        | ٢          |          |     |                 |     | r         | ł     | r                    | AK 252583        |
| Alistair MacArthur for his photographs of Spiranthes novae-                    | S tendo                      | <i>u</i> 3 | ٢          |          |     |                 |     |           | r     | WY                   |                  |
| zelandiae, Cortaderia splendens, and Nestegis montana                          | Schoenoplectus               |            | ۰.         |          |     |                 |     |           |       | ,                    | `                |
| taken during our visit.  | tabernaemontan               | /          | 1          | C .      |     | 10              |     | 0         |       |                      | 13               |
|  | Sparganium                   |            | ł          | ,        |     |                 |     |           |       |                      | AK 252720        |
| \ <b>0</b> /   | subglobosum                  |            |            | ,        | ,   |                 |     |           |       |                      | AR 252/20        |
|  | Spinifex sericeus            | lo         | ុំ         | С        |     |                 |     | F         | ł     | ŀ                    |                  |
| -  | Spiranthes novae-            |            | ¢          | 5        |     | 0               |     |           |       |                      | AK 252671        |
|  | zelandiae                    |            | ,          | -        |     | -               | 'n  | ł         | ł     | ł                    |                  |
|  | Spirodela punctata*          |            | Ļ          |          | -   | ~               | -   | r         | r     | -                    | .11              |
|  | Sporobolus africanus         | 5*         | _          | L        | ्रव | )               |     | :         | :     |                      | 414 252629       |
|  | Inelymitra longifolia        | a ag       | ġ۰         | <u>,</u> | ्ऽ  | i<br>1.         |     | •         | 4     | •                    | AR 252030        |
|  | Trigiochin striata           | <br> -     | ا .<br>ا   | с<br>с   |     | 10<br>1-        |     |           | •     | •                    | AR 2323/3        |
|  | I ypila Ul Hildils           | ູເ         | <b>۔</b> ا | ۲,       |     | ~ <sup>10</sup> | , s | ГСТ-1     | . `າ∩ | ۰<br>۱<br>۱          | ΔK 252718        |
|  | II distans                   | •          | ۶          |          |     | r               | r   | 1077      | '∩    | , , <b>, , , , ,</b> | AN 202/10        |
|  |                              | r          | ٢          | •        |     | ~               | ٦   |           | , 01  | ,<br>, , , , , ,     | AK 252733        |
|  | U. laxiflora                 |            | ,          | Ć        | •   |                 |     | اc++<br>, | - 0   | WY                   | AK 252719        |
|  | U. uncinata                  |            |            | , c      | Υ,  |                 |     | 0++       | · o   | WY                   | -                |
|  | U. zotovii                   |            |            | r        |     |                 |     |           | 1     | . WY                 |                  |
|  | Watsonia meria               | С          | )          |          |     |                 |     |           |       |                      |                  |
|  | Subsp. Duibillirera*         | ,,         | ł          |          |     |                 | ر   | ŀ         | ł     | <sup>+</sup> \^~     |                  |
|  |                              | v          | ٢          |          |     |                 |     |           | ÷     | , vv 1               | AK 205951        |
|  | 20ysia paucitiora            |            |            | •••••    |     |                 |     |           |       |                      | AIX 200001       |