



View down Akaroa Harbour, from Onawe Peninsula

BANKS ECOLOGICAL REGION

**Survey report for the New Zealand
Protected Natural Areas Programme**

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**CONSERVATION
TE PAPA ATAWHAI**

BANKS ECOLOGICAL REGION

Port Hills, Herbert and Akaroa Ecological Districts

Protected Natural Areas Programme Survey Report No 21

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For the Department of Conservation

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SYMBOLS AND ABBREVIATIONS

*	(before species name); naturalised, not native to Region
aff.	related to
agg.	aggregate species (where several similar species, closely related and hard to distinguish from each other, are grouped under one species name for convenience or for lack of adequate information)
auct.	of some authors
c.	about, approximately, circa
cf.	comparable to
dbh	diameter at breast height
PNA	Protected Natural Area
RAP	Recommended Area for Protection
sp.	species (plural: spp.)
subsp.	subspecies
var.	variety

FOREWORD

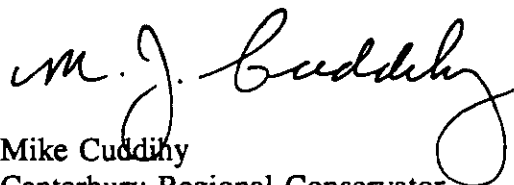
This independent report is one of a series of Protected Natural Areas (PNA) Programme reports describing Recommended Areas for Protection (RAPs) within ecological regions and districts. It has been prepared by Hugh Wilson, a well known ecologist and manager of the Hinewai Nature Reserve on Banks Peninsula, on contract to the Department of Conservation. The report is based on data from an independent Banks Peninsula Botanical Survey undertaken by Hugh Wilson, which was designed to find out as much as possible about the vegetation cover and species distribution patterns on the Peninsula.

Collectively, the RAP's in this report represent the full range of natural ecological diversity in Banks Ecological Region. They form the basis for future discussions with landowners as to how nature conservation values on their land can best be managed and protected. Other parties who may be involved in these discussions include the Department of Conservation, QE II National Trust, private conservation trusts, District/Regional Councils and public conservation organisations. It is recognised that RAP's may be changed during this process as a result of consultations or the consideration of other values.

This report and Hugh Wilson's field cards provide an immense amount of ecological information about Banks Peninsula, which will contribute to more informed land and water use decisions in the context of the Resource Management Act. This Act identifies matters of National Importance (Section 6), including "the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna", which must be recognised and provided for.

The Department of Conservation believes that effective nature conservation involves a partnership between itself, landowners and local communities. This is particularly relevant to Banks Peninsula, where community support is fundamental to achieving protection of the nature conservation values of the Peninsula and its local character. A wide range of mechanisms is available to achieve this, including covenants, management agreements, protected private land agreements, reserves and District Scheme provisions.

This report is an extremely valuable reference work as well as a guide to nature conservation priorities on Banks Peninsula. It represents the tireless enthusiasm and knowledge of one person, without whose efforts this report would be considerably impoverished. It will be of wide interest to landowners, conservation managers and organisations, scientists and the public, particularly given the proximity of a large population nearby and the enjoyment of its natural values by many people.



Mike Cuddihy
Canterbury Regional Conservator
Department of Conservation

January 1993

SUMMARY

Banks Ecological Region was systematically investigated during a detailed botanical survey of Banks Peninsula between 1983 and 1990. Information gathered on the botany, zoology and landscape values of the region was directly relevant to the Protected Natural Areas (PNA) Programme, and was subsequently organised and analysed to form the basis of this report. The three Ecological Districts earlier proposed (Port Hills, Herbert, Akaroa) are retained, and more precisely defined. They cover a unique landform jutting into the Pacific from the eastern edge of the Canterbury Plains; a hilly, island-like, sea-indented, oval-shaped peninsula comprising the eroded lava massif of long-extinct volcanoes. The two largest inlets, Lyttelton and Akaroa Harbours, represent the eroded craters of two major volcanoes, invaded by the sea. The surrounding dissected hill country, valleys, and smaller bays reflect the radial stream pattern established on the outer flanks of the ancient volcanoes, although the pattern is complicated in Herbert Ecological District by a much longer and more complex sequence of volcanic history.

Such a finely dissected landscape is not readily divided into 'land systems', and an 'ecological class' approach was found more appropriate. The vegetation classification used in this report is a simplified version of a hierarchical classification based on the 1260 grid-based sample sites of the survey.

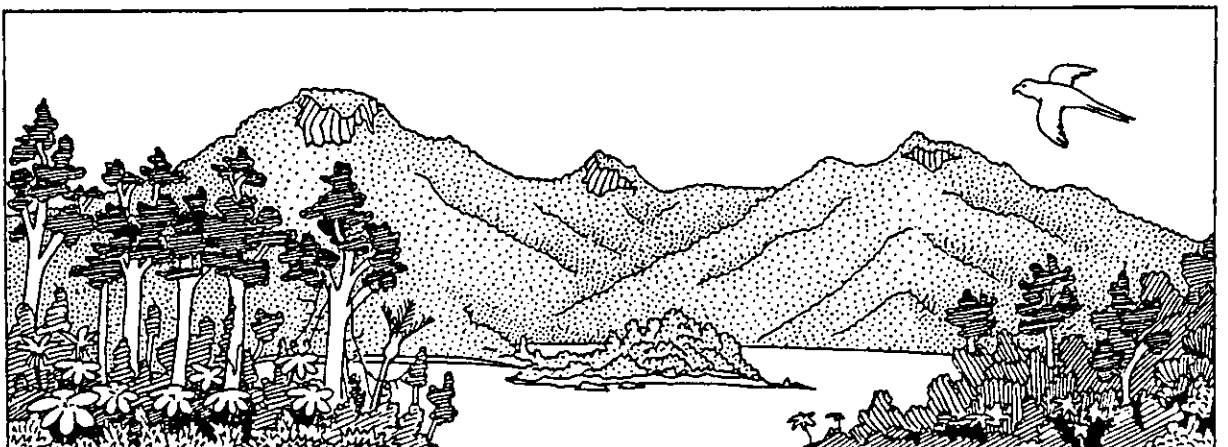
Areas that already have some degree of protection in the Region include Department of Conservation reserves, covenants, Council reserves, farm parks, formal and informal protected private land agreements. In Port Hills District they total about 1500 hectares (ha) which is around 11% of the total area of the district. Herbert District has about 1400 ha under some form of protection, but this represents only about 3.5% of the total area. Akaroa District has many reserves, but nearly all of them are very small and the combined area of protected land (about 666 ha) is only about 1.5% of total area. For the region as a whole, with an area of some 100,500 ha, approximately 3,610 ha are protected in one way or another (3.6% of the total area).

Recommended Areas for Protection (RAPs) have been identified in each district as priorities for conservation. They are the best surviving examples of more or less natural biological communities, and the minimum required to ensure survival of what is left of the biological diversity of Banks Peninsula. These areas are identified primarily on their ecological values; although not ignored, cultural values and management issues were given little weight as criteria for selection. Nor is there any regard for land tenure, although this will become an important issue in any implementation of these recommendations because the vast majority of Banks Peninsula is owned privately by numerous landholders occupying relatively small titles.

85 RAPs have been identified for the whole region. They range in size from about 3 ha to about 600 ha, total about 9,145 ha, and represent about 9.2% of the total land area. Of these, 10 are in Port Hills District (651 ha, 5% of district), 25 are in Herbert District (4,370 ha, 11% of district) and 50 are in Akaroa District (4,145 ha, 9.5% of district).

SECTION ONE

Introduction



SECTION ONE: INTRODUCTION

1.1 The Protected Natural Areas Programme

The PNA Programme aims to identify and to protect examples of the full range of indigenous biological and landscape features of New Zealand and thus maintain the distinctive character and biological diversity which makes this country unique (Park and Kelly 1986). The programme was set up in 1983 in response to this need, expressed in the Reserves Act 1977 (Section 3(1)(b)).

The PNA Programme is as much about protection of biological and landscape features that are common or extensive within an ecological district, as about protection of the district's unique, special, or rare features.

New Zealand has been divided into 268 Ecological Districts, grouped into 85 Ecological Regions (McEwen 1987). An Ecological District is a local part of New Zealand where the features of geology, topography, climate and biology, influenced to a greater or lesser extent by human history and activity, interrelate to produce a characteristic landscape and range of biological communities (Park and Kelly 1986; Myers *et al.* 1987).

Banks Peninsula is regarded as one Ecological Region with sufficient diversity within it to justify the recognition of three Ecological Districts. Although not as modified as the adjacent Canterbury Plains Ecological Region, the landscape has been drastically transformed by human occupation, first by several centuries of Māori settlement, and then dramatically by European settlement which began about 150 years ago. Remnants of 'original' vegetation are very small and fragmented. Induced seral vegetation dominated by native species is more widespread, especially second-growth forest of kānuka or mixed hardwood species such as fuchsia, māhoe, ribbonwood, lacebark, broadleaf, kōwhai, lemonwood, fivefinger, and also tussockland (silver tussock, fescue tussock and snow tussock). However, these vegetation types are often not highly valued by landholders and are subject to continuing modification and clearance. Conversion to exotic pasture is usually the desired goal. Over extensive areas native elements persist in vegetation dominated by introduced species, e.g. native danthonia grasses in pasture, remnant podocarp trees over pasture, scattered hardwood trees regenerated in moderately grazed pasture, or native understoreys of hardwoods and ferns under exotic plantation. Gorse and broom are major problems for pastoral farming, the predominant land use on Banks Peninsula. In some areas they have defeated attempts at control and form extensive seral scrub.

The Banks Peninsula Botanical Survey was designed to find out as much as possible about the vegetation cover of Banks Peninsula, including detailed distribution patterns for every species. As no PNA survey had been undertaken on the Peninsula, and it was obvious that the Region had some pressing conservation needs, and because my own survey had gathered a great deal of information directly relevant to PNA requirements, the Department of Conservation contracted me to write up a PNA report from the survey data.

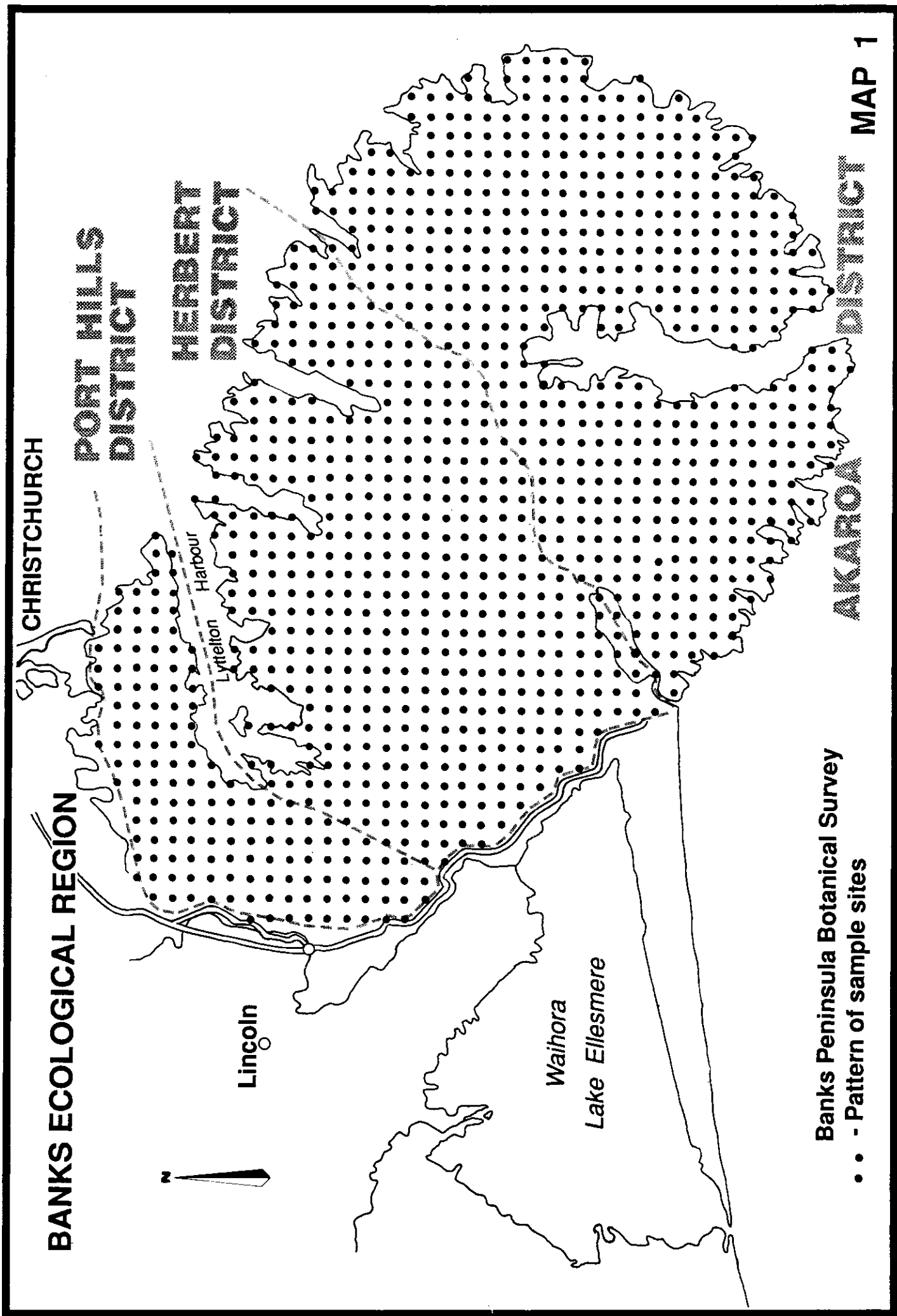
There is a risk that individual landholders will react badly to having parts of their land (in some cases substantial parts) identified as RAPs in this report. Past experience indicates that occupiers of freehold land, as well as people leasing land from the Crown, feel threatened by having their land documented in this way. Some feel that it might lead to bureaucratic interference with their freedom of action on their own land. In drawing up these suggested RAP boundaries I was bound to give full weight to biological and landscape criteria, and to ignore any considerations of land ownership and economic viability. **The report and recommendations have to be looked on simply as suggestions to the Department of Conservation and the local land-owning community. If there is to be any effective implementation of the recommendations the co-operation of local landowners is paramount, and any hint of bureaucratic coercion or restriction would be counterproductive to this.** Nevertheless I am aware that in some cases my RAP boundaries take up large parts of individual farms, and I regret any adverse reaction this may produce from the farmers involved. At best I hope it may be a clear indication to them that important ecological values exist on the land they control, if they were previously unaware of those facts.

The three Ecological Districts comprising Banks Ecological Region total approximately 100,500 ha. This report describes each District, identifies the best remaining representative areas in each, and recommends them for protection. Areas not identified as RAPs in these districts should not be assumed to have low natural values.

In practical terms, opportunities to protect natural vegetation, landscapes, and particular species of flora and fauna on Banks Peninsula are increasingly being offered by individual landowners, either for legal protection through covenanting and (if necessary) fencing under the Conservation Act or the National Trust, or for sale to the Department of Conservation or to private conservation Trusts. Unfortunately bureaucratic inertia and bungling have frustrated some genuine and significant offers during the last few years on Banks Peninsula. The natural areas under offer may or may not form part or all of an RAP in this report, but they may well contain significant conservation values. Accordingly, in addition to the report a map showing all areas of significant natural vegetation identified on the survey has been drawn up for the Department (on a 1:50 000 base map), along with a card index which details each area and ranks each for conservation value (see 1.4 for criteria). In terms of likely conservation gains, the map and card index are likely to be as important as this PNA report. Further to facilitate conservation gains, where RAP boundaries include more than one of the discrete areas initially identified and shown on the 1:50 000 map and card index, each area is shown by number on the RAP map. In every case, protection of any of these areas, even if only a small part of an RAP, should be pursued as a worthwhile conservation gain if the opportunity arises.

1.2 Survey Methods

Field work on the Banks Peninsula Botanical Survey began in September 1983. Vegetation was sampled on a systematic grid pattern based on the intersections of the old 1000 yard grid (Map 1). This gave a total of 1260 regularly dispersed sites. At each site a 6m x 6m



sample square was recorded, its centre determined by careful map-reading and precalculated compass bearing and altimeter reading. Altitude, aspect and slope were measured, and the percentage of bare ground estimated; obvious soil characteristics and the general physiognomy of the vegetation were described; all species of visible plantlife were listed, with notation on their physiognomic importance and abundance, their occurrence in different strata, and the stage of their reproductive cycle. Species not present in the quadrat but occurring in the immediate vicinity in closely similar vegetation, were listed separately.

Observations concerning fauna, including feeding sign, faeces, tracks, calls, and actual sightings, were detailed at each site for farm animals, wild birds, mammals, lizards, insects, spiders, etc.

Time spent per sample varied from about 20 minutes to 2 hours.

Observations were also made between sites, so that any area of interesting-looking vegetation or habitat not hit by the sampling grid was also investigated, and species were plotted for detailed distribution mapping. The Canterbury Face Rescue Team enabled me to study the vegetation of otherwise inaccessible cliffs by lowering me down them with their rescue equipment (and also by hauling me back up!). The last grid site was recorded in May 1988, but since then I continue to make detailed observations on Banks Peninsula from my home base on Hinewai Reserve.

Data were entered on to two card indices, one containing the recorded characteristics of each site, the other showing the occurrence or absence at all sites of each taxon. This summary was the basis for constructing a hierarchical classification of vegetation communities. Using the site characteristics, vegetation classification, and species distributions, it has been possible to reconstruct the likely patterns of vegetation on Banks Peninsula before human disturbance began about 1000 years ago.

1.3 Organisation of data for PNA report

Using the information from the plot cards, species cards, distribution maps and field notebooks, a third card index was compiled, summarising all available information for each discrete area of more or less natural vegetation. Each of these areas was plotted on to a 1:50 000 topographical map. They range in size from less than a hectare to several hundred hectares. Each area was then assigned a rank of conservation value according to criteria listed in Section 1.4. Those areas ranked A or B were subjected to further scrutiny, and the best examples of each vegetation type were sorted out. These form the basis for the final selection of areas recommended for protection. Boundaries were more carefully drawn in black on to a new topographical base map. They defined the RAPs which are the central matter of this report. Areas already under some form of protection, whatever their assigned rank, were drawn in in red on the same map.

1.4 Ranking categories and criteria for RAP selection

The following criteria were considered in the ranking of natural areas:

- 1 How near is the area to an assumed pre-human arrival condition?
- 2 How large and diverse is it?
- 3 How representative is it of the original vegetation and landscape?
- 4 Does it include the best remaining example of one or more vegetation types?
- 5 To what degree is it damaged or modified by introduced mammals?
- 6 Does it embrace attractive, interesting, dramatic, or scientifically important landforms?
- 7 Are rare plants present? Are these locally, nationally, or globally rare?
- 8 To what degree are naturalised plants present?
- 9 Are there significant populations of native birds?
- 10 Are there significant populations of naturalised birds?
- 11 Are there known populations of other fauna?
- 12 Are rare fauna present? Are these locally, nationally, or globally rare?
- 13 Is the area close to or adjoining other significant conservation areas?
- 14 Are there any historical or cultural values associated with the area?
- 15 How much human intrusion is there - e.g. roads, vehicle tracks, vehicle traffic, buildings, fences, drainage channels, farm animals, planted trees, frequency of aircraft overhead, foot traffic?
- 16 How much difficulty would there be in managing the area as a protected natural area?
- 17 Does the area have a current high public profile, e.g. is it very visible and attractive from a much-used track or road?
- 18 Is the regeneration potential high on portions of the area lacking already established mature native vegetation?

Each mapped and carded area was bestowed one of the following ranking categories on the basis of answers to the questions listed above:

- A Outstanding, in good condition, best example in district, of highest priority.
- B⁺ Of high priority, sufficient to be included in 'RAPs'; factors which somewhat diminish highest priority status are reversible with full protection.
- B High priority, but value diminished for reasons such as damaged condition, small size, human intrusions, not as close as A to 'original' condition.
- C Well worthy of protection; of lower priority than B but worth substantial effort to achieve protection. (Some areas ranked C are included within RAP boundaries if they adjoin areas of higher ranking).
- D Worthy of protection, but not worth undue effort to achieve this at expense of higher categories.
- E Noted as having natural values but area not of high conservation significance.

1.5 Guidelines used to define RAP boundaries

In addition to the criteria listed under 1.4 the following criteria were used in drawing the RAP boundaries shown in this report:

- 1 Boundaries are drawn to include several of the high-ranking natural areas initially identified if they are contiguous or close by. This often means that small areas of low value lying between may be included. Any one of the initially identified areas forming part of an RAP may be regarded as worthy of protection in its own right.
- 2 Boundaries are drawn to follow catchment boundaries where appropriate, or to embrace more than one catchment if adjacent catchments contain high-ranking natural areas. Again, small areas of low value lying in between may be included. In all cases, each single catchment forming part of an RAP may be regarded as worthy of protection in its own right.
- 3 Boundaries may be influenced by existing fence lines if they more or less correspond with the boundaries of high-ranking areas.
- 4 Areas of lower conservation value are often added to the more natural part of an RAP in order to increase the diversity of an area or to allow for expansion of forest by regeneration into appropriate marginal land.

- 5 Representation of the same ecological unit in more than one RAP is an insurance against future loss. This is particularly important on Banks Peninsula where surviving fragments are often very small, vulnerable, and surrounded by land use practices which may easily damage or destroy the natural area.
- 6 Care was taken to represent all aspects, not just the more species-rich, resilient, and denser vegetation communities typical of south-facing slopes.
- 7 Boundaries are sometimes drawn allowing for a generous buffer zone around high-value remnant natural vegetation.

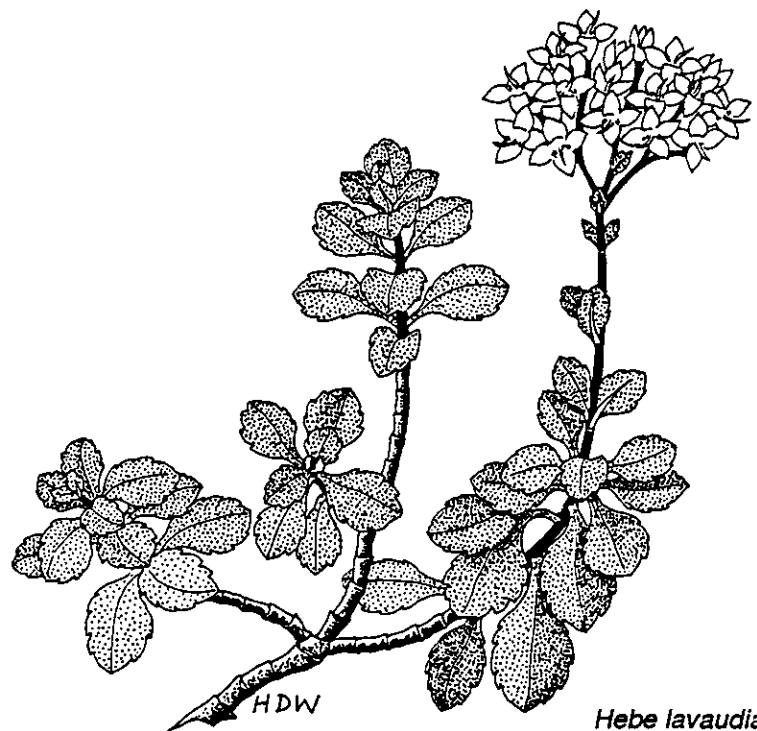
1.6 Categories of Threat

Categories used in this report for plants are from Wilson and Given (1989), Given (1990a) and Given (1990b). They are based on those used by the International Union for Conservation of Nature and Natural Resources (IUCN).

Categories used for fauna are from Bell (1986).

SECTION TWO

Banks Ecological Region



Hebe laudiana

SECTION TWO: BANKS ECOLOGICAL REGION

2.1 Descriptive summary

Banks Ecological Region comprises the whole of Banks Peninsula. Its boundaries are more or less defined by where its volcanic rocks dip under the sea at low tide, or under the alluvium of the Canterbury Plains, although small areas of alluvium are contained within the region's boundaries in bay heads and on valley floors, including those contiguous with the plains but lying between the ends of hill spurs.

Banks Peninsula is an island-like, oval-shaped block of dissected and sea-embayed hill country of volcanic origin, jutting into the Pacific from the eastern edge of the Canterbury Plains. It is about 50 km long by 30 km wide. The Peninsula is quite unique in Canterbury and forms a very distinctive, discrete, well-defined ecological region (see map 2).

Altitude ranges from sea level to 920 m on Mount Herbert. Eight other main summits exceed 800 m, and innumerable summits exceed 500 m.

Grazed pasture is currently the most extensive vegetation in the region, but it forms a mosaic with fragments of old-growth forest, second growth forest and treeland, native scrub, exotic plantation, shrublands, fernland, short tussockland, tall tussockland, rock outcrops, coastal cliffs, tidal inlets, saltmarsh, exotic scrub of gorse and broom, and one sizeable, slightly brackish, freshwater lake. There are small areas of wetland, dunes, and beaches of sand, stones and boulders. In pre-human times podocarp/hardwood forest covered nearly all of the region, except locally in the SE sector where beech forest was quite extensive.

Many warm-temperate species of tree, shrub, vine and fern meet their southern limit of distribution in the coastal and lowland forests. A much smaller number of southern species meet their northern limit on the Peninsula. Six species of higher plants are endemic to the region. Above about 500 m there is a rather abrupt transition from lowland forest dominated by lowland tōtara, kahikatea and mataī, to montane forest dominated by thin-bark tōtara with abundant broadleaf, mountain fivefinger and pepperwood. Remnants of all these forest types survive. Small areas of montane forest are still widespread, but the lowland old-growth forest has been massacred almost to extinction. Native tussocklands chiefly occupy land that was deforested during Māori times; they spread from the very limited sites they must have occupied originally, such as on steep banks, cliffs and outcrops where the forest cover was discontinuous. European settlers sowed exotic pasture grasses after their huge conflagrations and largely pre-empted the further spread of tussock. Almost all the vegetation cover of the region now has a significant component of exotic species, but there are exceptions.

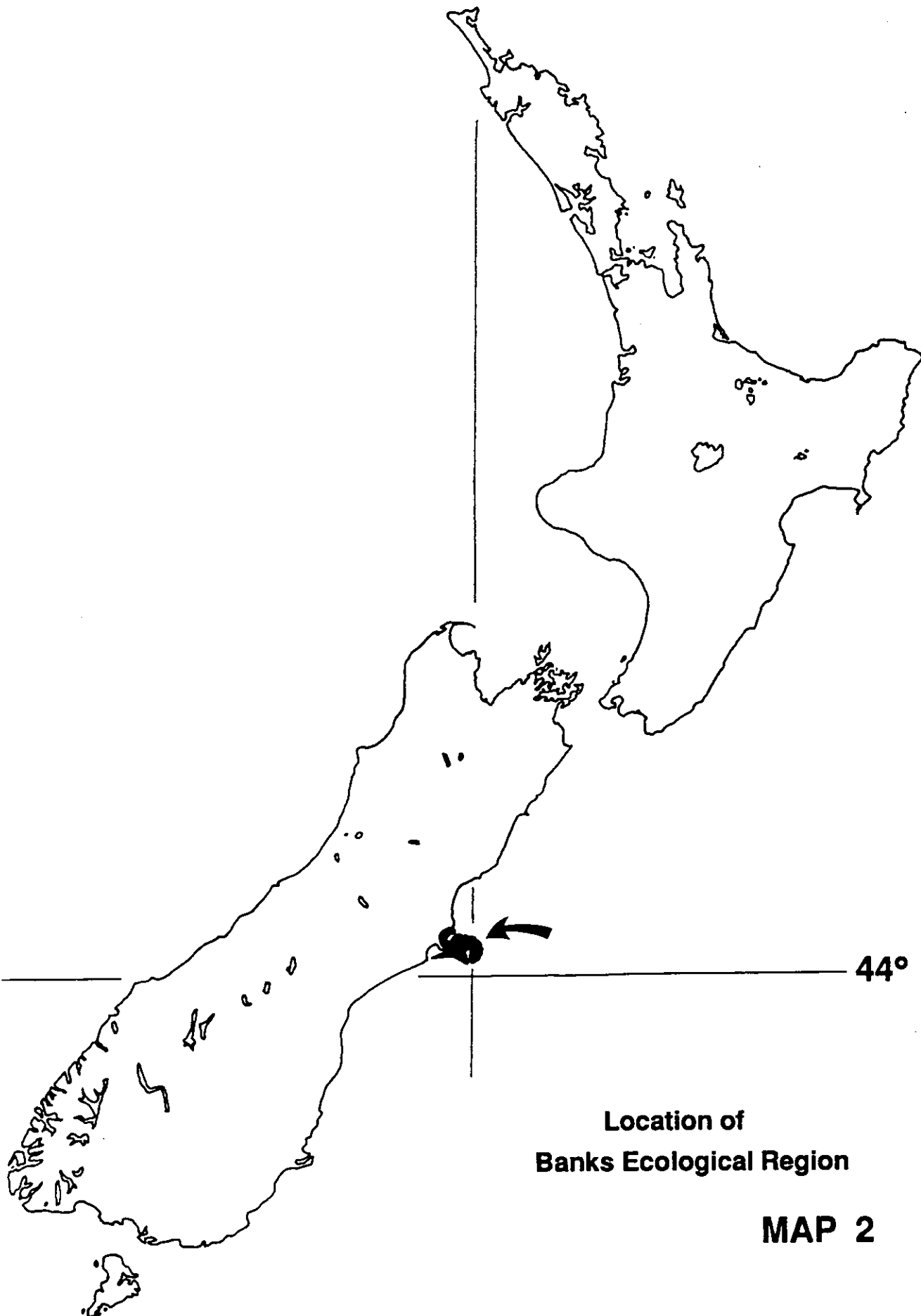
Soils are derived from both the igneous bedrock and from a variably thick mantle of loess. In many places the parent material is a mixture of loess and basalt. The soil pattern is complex, reflecting the variable topography, the thinning or removal of loess from steeper slopes and ridge crests, and the surprisingly steep rainfall gradients. The soils are mostly of medium to high natural fertility, and more or less free-draining. Some soils occupying higher altitudes on southerly aspects are relatively low in natural fertility. There are minor areas of deep, fine-textured, locally derived alluvial soils, imperfectly drained in places.

173°

44°

Location of
Banks Ecological Region

MAP 2



Permanently flowing streams descend all the main valleys, although smaller valleys, including most valleys on the Port Hills, have intermittent flows in summer. The steady, reliable flow of water from innumerable springs, some of them remarkably near the summits, has given rise to a widespread local belief that the water is ultimately derived from the Southern Alps. The only springs where this is probably true lie along the western edge of the Port Hills where the rock abuts the water-bearing strata of the Canterbury Plains. Elsewhere spring-flows certainly rely on local rainfall, although the release of the water from rain-charged aquifers in the volcanic strata is impressively even and steady.

The steep rainfall gradients make the hydrology of Banks Peninsula's springs and streams more understandable. Rainfall may double over a distance of a few kilometres from drought-prone headland to permanently moist valley head. The range of average annual rainfall from driest to wettest site within the region is from about 600 mm to about 2000 mm. Unlike the rest of Canterbury, which has rainfall evenly if somewhat erratically distributed throughout the year, Banks Peninsula has a marked winter maximum. Rain-bearing winds come especially from the south and south-east. Easterlies predominate but are variably rain-bearing. Snow quite often lies for several days above about 5 or 600 m in winter, but very rarely falls at sea level. However since 1860 there have been about 20 "big snows" sufficiently deep to cause significant damage to forest; the latest such event occurred in 1992 as this report went to print. Frost incidence varies greatly from place to place; over much of the area winter night ground frosts of minus several degrees Celsius are common, but some slopes near the sea appear to be almost frost-free. The characteristically warm dry föhn wind from the north-west which is a well-noted feature of Canterbury's climate, certainly affects Banks Peninsula and can greatly exacerbate the effects of periodic summer droughts.

Banks Ecological Region is bounded by the sea to the north, east and south. To the west lies the dramatically different Canterbury Plains Ecological Region; Banks Peninsula adjoins both the Ellesmere Ecological District with its huge slightly brackish lagoon separated from the sea by a 27 km long sand-capped stony boulder bank called Kaitorete Spit, and the Low Plains Ecological District which is intensively settled and farmed. Some 50 km to the north the Motunau Ecological District of Lowry Ecological Region has some similarities with Banks Peninsula, but also many differences.

2.2 Geological History

(largely based on Weaver, Sewell and Dorsey 1985)

Banks Peninsula is made up mainly of lava flows and other volcanic products of two large, Miocene-age volcanoes, Lyttelton and Akaroa. But these volcanoes built up over much older terrain, parts of which are now exposed in the Gebbies Pass area.

The oldest of these earlier rocks are Triassic or later Permian in age, dating back to about 240 million years ago. They belong to the great tract of sedimentary rocks which form the backbone of both North and South Islands.

The oldest volcanic rocks exposed in the Gebbies Pass area erupted about 90 million years ago, during Cretaceous times. They are andesites and rhyolites, much older and of different rock types than most of the rest of the Peninsula.

Between about 85 and 15 million years ago, the geological record is largely missing. About 65 million years ago the area must have been submerged beneath the sea; sediments deposited about this time form the Charteris Bay Sandstone. Thin marine sandy strata about 20 million years old, also outcropping in Charteris Bay, indicate that the Peninsula region was still submerged about this time.

But about 15 million years ago the land had risen above sea level again, probably in response to the first stirrings of the Kaikoura Orogeny, the major uplift which eventually formed the Southern Alps and was largely responsible for the shape of modern New Zealand. The volcanic activity that formed the bulk of Banks Peninsula began about this time (mid-Miocene Period) and continued for the remainder of the Miocene, that is, for the next 9 million years. It began with the eruption of the Governors Bay volcanics, which includes basaltic to andesitic lava flows and rhyolite domes.

The first lava flows of the Lyttelton Volcano poured out about 12 million years ago. They are mostly basaltic, but some of the lavas and many of the dykes are of trachyte. In 2 million years a symmetrical cone about 1500 m high had formed, an isolated volcanic island well separated from the nearest land westwards where the birth of the Southern Alps had hardly yet begun in earnest. Radial dykes in the Lyttelton Volcano point towards a centre above present-day Charteris Bay and indicate the position of the summit vent. Even as the cone was being constructed, erosion was well under way. Many lava flows and lahars were channelled down stream-carved valleys. When eruptions ceased erosion quickly gained the upper hand. By 9.8 million years ago a deep crater had been excavated under the present position of Mount Herbert. The Mount Herbert Volcanics later filled this breach, and new gaps eroded through the crater wall of Lyttelton Volcano, first through Gebbies Pass, and later at the eastern end where Lyttelton Harbour now opens to the sea.

The Mount Herbert Volcanics represent an intermediate stage in the south-easterly migration of volcanic activity from Lyttelton to Akaroa. Mount Herbert volcanism began about 9.7 million years ago, and ceased about 8.5 million years ago, with eruptions from several centres. At one stage a crater lake formed, about 350 m above sea level. Later, thick piles of lava built up Mount Herbert and Mount Bradley. This was about the same time as the earliest eruptions of Akaroa Volcano.

Volcanism began at Akaroa about 9 million years ago, and within a million years a large composite cone was formed. The rocks are very similar to those of Lyttelton Volcano, ranging from basalt to trachyte with basalt predominating. Lava flows buried parts of the south-eastern slopes of the old, eroded Lyttelton Volcano, and interfingered with lava flows from the Mount Herbert centres. Towards the end of activity at Akaroa, trachyte was extruded through cracks in the cone, forming a radiating pattern of dykes and domes. Ōnawe Peninsula owes its existence to the erosion-resistant mass of plutonic rock at its tip, which probably represents the remnants of a main lava conduit.

As volcanic activity at Akaroa died out, new eruptions of olivine-rich basalt (the Diamond Harbour Volcanics) poured from the eroded crater and flanks of the ancient Lyttelton Volcano. They were to be the last flickerings of volcanic fire in the region. Lavas flowed down valleys cut deeply into the much older rocks by millenia of flowing water. From a

fissure near the top of Mount Herbert, lava spread down into the Lyttelton crater and across to Quail Island, forming the long, gentle, shallowly-incised slopes between Herbert and Diamond Harbour. The youngest flows are 5.8 million years old.

Since then the sea has continued to erode the old lava flows into high coastal cliffs, and streams have further deepened the valleys, with the lower ends invaded by the sea to form bays. The pattern of valleys and bays, though, is of ancient origin; it relates to the radial stream patterns established on the active volcano.

There is no evidence that glaciers ever formed on Banks Peninsula, but the ice ages of the last two million years had a big effect here nonetheless. During the glacial periods fine silt, formed by the grinding of ice on rock in the Southern Alps, was carried eastwards by wind and deposited as loess up to 20 m thick across the Peninsula. The same glacial activity eroded vast quantities of rock from the Alps, and the resulting debris, transported eastwards by the big rivers, formed the Canterbury Plains. For all the preceding millions of years of its existence Banks Peninsula had been an island, but some time during the last 20,000 years, despite post-glacial rising sea level, the expanding shingle plains finally secured the island to the South Island mainland.

The major volcanic rock types of Banks Peninsula - basalt, andesite, trachyte and rhyolite - differ in the proportions of their main chemical constituents, especially silica (SiO_2). The lavas of the Peninsula in fact form a continuous series, both mineralogically and chemically, ranging from basaltic (relatively low in silica but high in iron oxides) to trachytic (higher in silica, lower in iron oxides). Rhyolite is higher still in silica (mostly as quartz and feldspar) and very low in iron oxides. The coarse-grained rocks on Ōnawe Peninsula result from the slow cooling of magma deep within the volcano. Gabbro is the coarse-grained equivalent of basalt, and syenite the coarse equivalent of trachyte.

2.3 Human History

Radiocarbon dates from fairly large village sites indicate that people were living on Banks Peninsula at least 700 years ago. The size and other features of the villages suggest they had already been there for some time. McCulloch (1987) infers from this that a thousand years of human occupation on Banks Peninsula is a reasonable assumption.

The first settlers came from tropical Polynesian islands far to the north-east. Their numbers increased in the first 500 years to a level probably higher than at any other time prior to the arrival of Europeans (McCulloch 1987). These early people were essentially hunter/gatherers. They had brought with them *kuri* (Polynesian dog) and *kiore* (Polynesian rat), both of which they used as food, but they must have largely depended on the natural resources of the land, rather than practising agriculture. For the first few centuries food resources included large, ground dwelling, often flightless birds, notably several species of moa but also a giant rail, a flightless goose, and a swan. These times are often known as the Moa-hunting period.

By the end of the first 500 years of human settlement some radical ecological changes had occurred, undoubtedly caused by the Moa hunters and undoubtedly also affecting the moa hunters themselves. About one-third of the forest cover of Banks Peninsula had been removed by fire. In addition, more than 30 species of bird had become extinct, including most, if not all of the moas, and other large ground dwellers. Populations of seals may also have been considerably reduced.

The earliest people identified by name in local oral tradition were known as Waitaha, but the people who were displaced by the arrival of the Ngai Tahu from the North Island in the 17th century were known as Ngati Māmoe. Their numbers were probably much lower than in Moa hunter times. While kūmara cultivation was possible it was difficult this far south, and the principal animal foods seem to have been fish and shellfish. Oral history tells of the arrival of the Ngai Tahu at Parakākāriki, between Sleepy and Ōtanerito Bays, and the conquest of the Ngati Māmoe there.

The Ngai Tahu (often now written in the southern dialectal form Kai Tahu) were the first Banks Peninsula people living according to the "classic" culture, that which we think of today as typically "Māori", characterised by pā building, warfare, greenstone working, wood carving and kūmara growing (McCulloch 1987). Ngai Tahu tradition also tells us that at the time immediately prior to European settlement, the population of Banks Peninsula and the surrounding areas was substantially reduced by a civil war known as the "kai huānga" or "eat relation" feud.

Between 1830 and 1832 the Ngai Tahu were seriously affected by the raids of the Ngati Toa chief Te Rauparaha, from Kapiti Island north of Wellington. Although the Ngati Toa never gained a permanent foothold here, their raids coincided with the first European settlement and the end of the old Māori way of life.

The English navigator James Cook had sighted Banks Peninsula in 1770, thought it was an island, and named it after his scientific colleague Joseph Banks. Close European contact began in the late 1820s when trading ships purchased from the Māori, dressed New Zealand flax (*Phormium*), much sought after fibre for making sail cloth and rope. By the 1830s, American, French, and colonial whalers from Sydney, had established shore stations, mostly along the south coast. Whales and fur seals were rapidly hunted to the verge of extinction. Formal settlement at Akaroa began with the arrival of 63 French and 6 German colonists in 1840. But British sovereignty had been declared earlier that year over the whole of the South Island. Before the end of the 1840s British settlers were outnumbering the French.

With European settlement came difficulties over land ownership. In 1844 Edward Shortland, Protector of Aborigines, observed that "newcomers ... landed full of the idea that there were large spaces of what they termed waste and unreclaimed land, on which their cattle and flocks might roam at pleasure, and to which they had a better right than those whose ancestors had lived there, fished there and hunted there". Despite these sentiments the Ngai Tahu lost nearly all their land through the 1849 Banks Peninsula purchase by William Mantell. Some of the injustices arising from this purchase are only now being faced through the deliberations of the Waitangi Tribunal.

European settlers found a landscape still largely dominated by forest. They began to exploit it immediately, with the twin objectives of harvesting the best timber and creating pasture for their cattle. In the 1850s one surveyor proclaimed that Peninsula timber "alone would supply twenty Canterbury settlements for centuries". But within a few decades it was virtually all gone. Accessible timber on the valley floors was cut first, from sawmills in the bay heads. Later small mills worked on in the more inaccessible places as late as the 1920s. Long before this, however, most of the Peninsula had been converted to grass, the logging overtaken by immense fires, both purposeful and accidental, wasting vast resources of native timber, mostly tōtara, kahikatea and mataī. They sowed exotic grasses in the ashes, often without undertaking the expensive task of removing the charred stumps and logs.

From the late 1850s onwards, Banks Peninsula was famous for its dairy products and its grass seed. Many of the first dairy herds were small, and cheese and butter were often made on the farm. In 1893 the first co-operative dairy factories were started. Many others followed. Cocksfoot was grown as a seed crop until the 1940s and it was big business on the Peninsula around the turn of the century. Seed was sold in the bush burn areas of the North Island, and some was exported to Australia. By 1900, 50-60,000 sacks were being produced each year, and up to a thousand casual labourers helped with the harvest (Pawson 1987). However, the market declined as North Island bush burns ceased.

Since 1950, sheep and beef cattle have formed the mainstay of the Banks Peninsula economy. The emphasis is on wool production. In the last decade, deer farming for meat and antler velvet has taken up a substantial amount of land. At the same time goats became popular, partly as an attempt to help control scrub weeds encroaching on pasture. There is also some exotic forestry. *Pinus radiata* is by far the most widely planted timber tree here, as elsewhere in New Zealand. The climatic advantages for vegetable and fruit crops have been little exploited, largely because of the cost of transport, the lack of flat land, and the sensitivity of grape vines to the herbicides which are widely regarded in the region as essential to control scrub weeds, particularly gorse and broom.

Although the recommendations in this report are principally based on ecological considerations, the Peninsula landscape is, of course, redolent with the echoes of a thousand years of human history, and it has innumerable sites of great historical and cultural value. McCulloch (1987) maps over a hundred known archaeological sites from Māori times and stresses that this number probably represents only about half the sites likely to exist in the area - less if we take into account those that have already been destroyed. She emphasises the value of these sites - not only for the information archaeologists can gain from them but also as tangible evidence of the day to day life of past generations, their achievements and failures; as an important part of our cultural heritage; and as a rich recreational resource. Some of the known archaeological sites are included in RAPs because high ecological and landscape values happen to coincide with their location, (e.g. Tumbledown Bay, RAP 9, Akaroa District). Some, such as Ōnawe (PNA 17, Akaroa District) are already protected. Others, such as the Long Lookout Point Gardens (near RAP 42, Akaroa District) are included neither in a PNA or an RAP. All archaeological sites, as defined in the Historic Places Act 1980, are theoretically protected under the Act but this means little without identification and documentation. There is a great need for a systematic survey of archaeological and historical sites on Banks Peninsula so that conservation needs for this resource can also be adequately met.

2.4 History of the Vegetation and Fauna

Central to an understanding of the present native flora and fauna of Banks Peninsula is the realisation that:

- (a) the region was an island for nearly all of its 15 million year existence.
- (b) ice ages during the last 2 million or so years would have disrupted an otherwise more or less continuous forest cover, but even during the glacial phases forest and scrub are assumed to have persisted on the island.
- (c) human beings arrived remarkably late on the scene, only about 1000 years ago. Their impact on the biota was drastic, and many species became extinct.
- (d) the Peninsula remained largely forested until the arrival of European people 150 years ago. Since then grassland has dominated the landscape and many more species have vanished.

Land has existed continuously in the Banks Peninsula region for 15 million years since the first eruptions of Governors Bay lavas on to uplifted much older rocks in the mid-Miocene. Vegetation certainly would have existed on the growing volcanoes. Successive lava flows may have been as long apart as a thousand years or more, so there was plenty of time for soil and forest to develop. In places layers of baked soil show where vegetation was overwhelmed.

Enough is known from the fossil record of Miocene floras to be sure that podocarps, hardwoods, including beeches, and ferns (Fleming 1980) were important elements of the forest of those times. Banks Island was close enough to other parts of the New Zealand archipelago to share a common gene pool, but it was also isolated enough to evolve endemic forms of plants and animals, especially insects (Johns 1986).

There is little doubt that the land surface has been more or less continuously forested, despite the disruptions of volcanic eruptions for the first 9 million years, and despite the climatic fluctuations of the last 2 million years. The extent of ice-age deforestation is still arguable. During the last (Otiran) glaciation, vegetation zones outside the glaciated mountains may have been at times 800 m below their present altitudes (Couper and McQueen 1954; Wardle 1963). This would still allow forest to survive on Banks Island, although I envisage a retreat of tall podocarp/hardwood forest to sheltered coastal valleys and slopes, and a great expansion of the subalpine element of the flora, especially *Dracophyllum* and snow tussock. I suspect the island retained most of its species, but warm temperate ones like nīkau palm, kawakawa, akeake, tītoki and shining broadleaf were probably eliminated. If so they had to recolonise from more distant refugia; they probably did so more than once as warming climates followed the glacials through the Pleistocene. The most recent recolonisation of Banks Peninsula by some warm temperate elements of the flora is likely to be as recent as within the last 14 000 years, since the climate began to warm again after the Otiran glaciation. It should be noted that the subalpine element was pushed back on to the limited sites of high upland rock outcrops and bluffs but it was not eliminated. Also, while the

vegetation zones were drastically lowered during the glacials, so was the sea level (120 - 150 m below present sea level), allowing more lowland space for forest refugia.

The Pleistocene Period allowed beech (*Nothofagus*) to gain a foothold on Banks Peninsula for the first time. Beech seems incapable of crossing sea barriers, unlike the bulk of the Peninsula's flora which is dispersed by birds, or wind, or even (in the case of kōwhai) by the sea itself. The spreading aprons of shingle spewing out from the rising mountains to the west, combined with lowering sea levels as the onset of the Otiran glaciation locked water into ice-caps and glaciers, finally gave beech its needed bridge. The climate probably also gave beech sufficient competitive edge over the podocarp/hardwood forest to establish on the Peninsula. Since then there must have been a complex and subtle interplay between the beeches and the podocarps. The climatic and soil requirements of red beech and podocarp/hardwood forest are similar but not identical. Black beech is competitive against both red beech and podocarp/hardwood forest only on thinner, less fertile soils and where the climate has greater extremes of temperature. Present conditions across most of the Peninsula favour podocarp/hardwood forest; the beeches have been pushed into the wettest, coolest uplands of the SE corner of Akaroa Ecological District, and black/mountain beech competes well with red beech only on the thin soils of spurs and bluffs.

Isolation left its mark not only on the flora, but on the fauna. "Insular endemics" restricted to Banks Peninsula occur in cicadas, tree wetas, ground beetles, and even (at a subspecies level) in penguins (Fleming 1980). Johns (1986) estimates that at least 2.2% of the total known arthropod fauna of the Peninsula is endemic, and that the figure is probably double this if sufficient information were available.

The arrival of human colonists a thousand years ago put an end to this ecology of isolation. The effect was drastic. Hunting, habitat destruction, and the introduction of Polynesian rats and dogs, exterminated a large proportion of the amazing diversity and abundance of animal life which flourished here. Certainly present at the time of the Polynesian arrival, but gone a few hundred years later, were the following birds: several species of moa, the enigmatic adzebill or *Aptornis* of unknown affinities, flightless geese related to the still-extant Cape Barren geese of Australia, swans related to the Australian black swan, many species of duck including a merganser, a giant eagle (*Harpagornis*), a giant rail, pelicans, a raven, and an owlet-nightjar. To this list should probably be added a huge sea eagle, a goshawk, and other species of rail including takahe. The full effect of the kiore or Polynesian rat on the invertebrate fauna will probably never be known, although it was probably severe on the large, wingless forms that had evolved in New Zealand in the absence of mammalian predators and competitors.

In contrast, the number of plant species lost in Polynesian times was probably very low, if indeed there were any. There were substantial areas cleared of forest; about one-third of the total cover disappeared. Tussock grasses, kānuka and *Coprosma* scrub spread on to the cleared land. Successive fires inhibited forest regeneration.

The impact of European colonists was even more severe. The ruthless removal of virtually all the existing forest, the draining of wetlands, and the introduction of many plants, birds, mammals and insects, ensured a second wave of extinction among the surviving biota. How many plant species became extinct is unclear because of the unreliability of many early records, and because not all hope is abandoned for one or two of the missing species. But a careful estimate of plant extinctions would be about 20 to 25 species. Several more are reduced to a few individuals (e.g. rimu) or small, vulnerable populations (e.g. miro, cedar, *Dicksonia fibrosa*, *Bulbinella angustifolia*, *Gentiana serotina*, *Anarthropteris lanceolata*) and they totter on the verge of extinction, although some of them may always have been rare. My botanical survey revealed a few species that had never been recorded in the botanical literature (e.g. *Pratia perpusilla*) and a few that had not been recorded since their original recording last century (e.g. *Lycopodium australianum*, *Trichomanes endlicherianum*), emphasising that plants are easily overlooked.

Many forest birds which had survived or flourished through Polynesian times, succumbed to the colossal destruction of habitat, the introduction of predators such as rats, cats, stoats and ferrets, and probably also to competition for surviving food sources from introduced birds and mammals. Among those which have vanished from the Peninsula since the European arrival, mostly between 1850 and 1900, are: kiwi, kōkako, kākā, red-crowned kākārīki, yellow-crowned kākārīki, saddleback, robin, bush wren, piopio, New Zealand quail, yellowhead, mottled petrel, laughing owl, long-tailed cuckoo, buff weka, New Zealand dabchick and brown teal. To this list should possibly be added kākāpō, falcon, fernbird and black stilt. The falcon and black stilt are still occasional visitors. Some birds, notably tūī and morepork, are currently at such low numbers their populations may no longer be viable.

Native bats have not been reliably recorded on the Peninsula in recent years.

Some species of native wildlife have benefitted from the transformation of the landscape - for example: harrier, pipit and black backed gull. Other species which have arrived on their own have thrived in the new conditions, whereas earlier they were known, if at all, only as rare stragglers. These include welcome swallows, spur winged plovers, white faced herons, and monarch butterflies. It is intriguing to think that the extinct native swan was almost certainly very closely related to the Australian black swan, now thriving on Banks Peninsula. The species was introduced to New Zealand but ornithologists suggest that it was already introducing itself about the same time. Two native species of lizard - the common gecko and the common skink - have probably benefitted from forest clearance despite the concomitant introduction of predators.

Coastal fauna has escaped a bit more lightly. Fur seal populations have recovered considerably from the near extinction of last century and are now a common sight again. Two sea birds, sooty shearwater (muttonbird) and fairy prion, known to have bred on the mainland of Banks Peninsula before the impact of Europeans, still breed in low numbers on coastal islets and possibly on one or two precipitous headlands. Spectacular colonies of spotted shag still adorn numerous Banks Peninsula cliffs as they must have done for millennia.

2.5 Current landscape, vegetation and fauna

Stripped of most of its ancient forests and dominated by grassland, Banks Peninsula is nevertheless an attractive landscape of vigorously moulded hills, variously sized valleys, two large inlets, a long freshwater lake, and many bays. In many ways it is an intimate landscape when viewed from within, but when viewed from the ridges or summits the nearby hills are surrounded by immense spaces of sea, plain, distant mountains and sky. A major feature of the landscape is the long and intricate coastline with dramatic sea cliffs up to 200 m high, arches, sea stacks and islets, beaches that vary from sand to stones or boulders, small estuaries, saltmarshes and dunes. Inland, rock outcrops contrast with the smoother forms of loess-mantled ridges and spurs. Many of these cones, bluffs, dykes and scarps have distinctive and intriguing forms, ranging from the massive trachyte domes such as Panama Rock to the sculptured rhyolite of Gebbies Valley. Seasonal changes are especially evident in the colours of the dominant grasslands, which are generally bright green in spring and early summer, but turn tawny brown as summer advances. Lucking (1987) gives an overview of the landscape features and values of the Peninsula.

An important element of the current landscape, and one central to the conservation of biological diversity within it, is the broken mosaic of bush, mostly occupying gullies where it has either survived fire and clearance or regenerated there because of better moisture conditions and less disturbance than on surrounding gentler, open ground. The remnants of old growth forest are tiny fragments indeed, occupying only about 800 ha in all, which is less than 1% of their pre-human extent and about 1.2% of their extent 150 years ago at the beginning of the European impact. It comes as a surprise to many people to learn that most of the bush now on Banks Peninsula has regenerated this century. There is about 9000 ha of second growth hardwood forest, of which nearly 3000 ha is predominantly kānuka canopy, and more than 6000 ha is mixed canopy, especially fuchsia, māhoe, fivefinger, lemonwood, lacebark, ribbonwood, pigeonwood, kōwhai and kaikōmako. There is considerable regeneration of podocarps under these canopies, but mostly of browse-resistant tōtara which also regenerates in the open. Most of the second growth bush is depleted of palatable elements such as sevenfinger, tree ferns and ground ferns because of farm stock, possums and goats.

Second growth kānuka and mixed hardwoods are very important habitats for wildlife but appear to be largely undervalued by many farmers, along with scrub of small-leaved shrubs which is also widespread. As well as native bird species - bellbird, brown creeper, fantail, silvereye, rifleman, tomtit, pigeon, etc - such vegetation provides food and shelter for the jewelled gecko and many invertebrate species (Moore 1987, Johns 1986). If given some degree of protection from grazing, such vegetation is also successional to tall forest dominated by podocarps - matāi and kahikatea as well as tōtara - or by beech within its limited range.

Regeneration of some native trees is actually favoured by moderate grazing with sheep, in that the animals remove the competition from tall exotic grass, which is more deleterious than moderate browsing to tree establishment. Thus in many places kānuka, ribbonwood, lacebark, tōtara, kōwhai, kaikōmako and pepperwood have established in part *because of* moderate grazing pressure, rather than despite it, and form open park-like treeland over grazed pasture. Such treeland covers almost 3000 ha of Banks Peninsula and contributes much to the landscape, and probably to birds, lizards and insects.

About 74,000 ha is under pasture of one sort or another, varying from ryegrass-clover swards to browntop-sweet vernal grassland and turf which may include quite a rich diversity of native herbaceous species. The 74,000 ha also includes tussockland, open shrubland, fernland, sedgeland and rushland, and in all covers about 74% of the Peninsula's surface. Some of it is largely native grassland, especially the more closed-over tussock communities, and droughty pasture near the sea of native *Microlaena stipoides* and danthonia. Closed tussock is rather limited in extent, a few thousand hectares at most. Much more common is tussock spaced across grazed pasture. In many places short tussock is being pushed back upslope to make way for 'improved' ryegrass-clover swards. Against this, a proportion of open pasture has reverted over the decades since 1900 to native bracken, shield fern, rushes, or shrubs, especially *Coprosma*, or else to exotic gorse or broom. More than 16,000 ha comes into this category, although the picture is not static - pasture may be being won back in one place, and reverting in another, depending on management and economics. Such reversion is part of a strong trend back into forest. Nature is averse to leaving ground open in a forest climate, and farmers have to work to keep their land in high quality pasture. Under the present economic climate the effort is simply not profitable in some areas.

Gorse itself, the number one noxious scrub weed on the Peninsula, is an appalling weed of pastoral farming, but even gorse has its good points. It is a very useful, soil-enriching, fast-growing shelter for regenerating native forest. Stated simply, the story is as follows (Wilson 1990) : If left undisturbed, gorse grows vigorously for its first few years, but after about ten years in our climate, it slows to a relative standstill. The once dense canopy begins to open up. Because it needs full light to grow well, gorse cannot regenerate significantly under its own shade. Shade-tolerant native species can do so easily, however, so long as they are not grazed off by farm stock or wild animals. Birds and wind spread native seed abundantly into gorse. Plants such as māhoe, fuchsia, wineberry, lemonwood and fivefinger grow up through the ageing gorse canopy, overtop it, and smother it. Replacement of gorse by natives will be faster on some sites than on others. This is influenced by many factors such as altitude, aspect, dampness, topography (e.g., whether the site is on a ridge crest, hill-face, gully, rock outcrop, or hollow), proximity to native seed sources, and browsing pressure. Some sites will see native trees suppress gorse within a decade; on others the process may take three times as long. Unfortunately, if fire or spray intervenes, gorse takes over again, chiefly because light reaches the ground again and stimulates millions of the waiting gorse seeds into growth.

TABLE 1: BANKS ECOLOGICAL REGION

Proportions of vegetation types calculated from the systematic grid sampling.
Areas are based on a rounded off figure of 100,000 ha for the whole region.

Total number of samples	1260		
Number of samples in which native plants are physiognomically dominant	521	(41%)	
Number of samples in which exotic plants are physiognomically dominant	739	(59%)	
Vegetation	Total Sites	%	Area Equivalent (hectares)
A Podocarp/hardwood forest	9	0.7	700
B Beech forest	1	0.1	100
C Second-growth hardwood forest	115	9.1	9100
[mixed	[81	[6.4	[6400]
[kānuka-dominant	[34	[2.7	[2700]
D Treeland	34	2.7	2700
E Native scrub	35	2.7	2700
F Grassland, fernland, open shrubland, sedgeland, rushland	931	74.1	74,100
[short tussockland	[113	[9.0	[9000]
[snow tussockland	[5	[0.4	[400]
[shrubland, fernland, rushland, sedgeland	[147	[11.7	[11,700]
[pasture	[666	[53.0	[53,000]
G Wetlands	39	3.0	3000
[freshwater	[18	[1.4	[1400]
[saltwater	[21	[1.6	[1600]
H Exotic scrub	22	1.7	1700
I Exotic plantation	22	1.7	1700
J, K, L Discontinuous vegetation on rock, roads, cultivated fields, etc	53	4.2	4200
TOTAL	1260	100.0	100,000

About 1700 ha of Banks Peninsula is currently under exotic scrub, mostly gorse and broom. Most of it is uneconomical to clear or suppress with exotic forestry, so much may be gained in conservation value through default. But because to some eyes the early and intermediate stages of forest regeneration through a gorse canopy are far from pretty sights, and because of sometimes arbitrary and unproductive application of the Noxious Weeds legislation by local authorities, a shift in attitudes is needed for this sort of reversion to be seen as acceptable land use.

Despite the colossal destruction and fragmentation of the native vegetation cover, distribution maps of innumerable native species still reveal patterns that obviously reflect subtle variations of microclimate and soil. Cautiously interpreted, these patterns suggest much about the pattern of the "original" vegetation cover, especially when historical records are consulted. They also help to define the ecological districts for the Banks Region, and clarify the part each vegetation type plays in the overall pattern and dynamics of the present vegetation cover. Such an understanding can help in the management of land for any purpose, including farming, forestry and conservation.

Banks Peninsula's native flora is now joined by a diverse array of exotic species, both naturalised and cultivated. About 320 exotic vascular species (trees, shrubs, climbers, herbaceous dicots and monocots, ferns and fern allies) are well established here as fully naturalised elements of the vegetation. Of these, about 260 are common and more or less widespread, the remaining 60 are more local. The majority originate from Europe. At least another 140 species have a toehold here, many as casual garden escapes or as very local wild populations, but many of them have the potential to spread more widely. This total of 460 more or less naturalised vascular plants is still outnumbered by the native vascular flora which numbers about 530 species.

The naturalised flora has an interest of its own, of course, and an economic value, whether as productive pasture or deleterious weeds. Of considerable botanical interest are communities of naturalised plants on the dry cliffs of the north-eastern parts of the Port Hills and Herbert Ecological Districts, especially well-developed around Sumner, Redcliffs, and Lyttelton Harbour. Many of the species are succulent and brightly flowered, and most represent garden escapes native to areas of Mediterranean climate in Africa and southern Europe. Only three species of native plant make up a significant part of this vegetation - *Tetragonia trigyna*, *Muehlenbeckia complexa* and *Disphyma australe*.

The surviving native fauna too has been joined by naturalised species of mammals, birds, amphibians and invertebrates. Further naturalisations are inevitable. Also, alas, further local extinctions of native species, both plant and animal, are likely under prevailing conditions. The situation is far from static.

2.6 Indigenous Flora

Total number of extant vascular species: 530
(See appendix 1)

Gymnosperms	7
Angiosperm trees, shrubs and dwarf shrubs	100
Climbers and related trailers	22
Herbaceous dicots	165
Herbaceous monocots	149
Ferns and fern allies	87
	530

Total number of recorded moss species: 240
(figures for liverworts, hornworts, lichens and fungi are not available).

2.6.1 Locally extinct species:

Vascular species certainly, or almost certainly, present in Banks Region at the time of European settlement, but now apparently locally extinct, are listed below. If at risk nationally, their status is shown. The list cannot be regarded as exact, partly because of the unreliability of many earlier records, and partly because there is a chance that some of the species may still be found here. Where known, the date of the last certain record is given. The list represents between 3 and 4 percent of the likely vascular flora of 1840.

<i>Adiantum fulvum</i>	
<i>Alepis flavida</i>	
<i>Bolboschoenus fluviatilis</i>	
<i>Coriaria angustissima</i>	
<i>Dolichoglottis lyallii</i>	1953
<i>Elymus narduroides</i>	1953
<i>Epilobium pictum</i>	1953
<i>Euphorbia glauca</i>	(nationally vulnerable)
<i>Hymenophyllum malingii</i>	
<i>Hypolepis distans</i>	
<i>Iphigenia novae-zelandiae</i>	
<i>Ischnocarpus novae-zelandiae</i>	1926
<i>Isolepis distigmatica</i>	1919
<i>Lepidium oleraceum</i>	1921
	(nationally vulnerable)
<i>Myosotis forsteri</i>	1919
 <i>Myosurus minimus</i> subsp.	
<i>novae-zelandiae</i>	
<i>Parahebe canescens</i>	
<i>Pittosporum obcordatum</i>	1840
	(nationally vulnerable)
<i>Sebaea ovata</i>	
<i>Taraxacum magellanicum</i>	1953

2.6.2 Rare and uncommon species:

Two species rare in Canterbury as a whole are notably common on Banks Peninsula, namely *Brachyglottis sciadophila* and *Pseudopanax ferox*.

Species of vascular plant rare or uncommon on Banks Peninsula are listed below:

- E = regionally endangered
- V = regionally vulnerable
- R = regionally rare or local

Most of these are more or less common in Canterbury generally, but if not this is indicated. The list represents 18 percent of the total native vascular flora. Five species are regarded as regionally endangered, and 18 as vulnerable. These facts alone underline the urgency of some needed conservation measures on the Peninsula.

V	<i>Anarthropteris lanceolata</i>	(rare in Canterbury)
R	<i>Anemanthele lessoniana</i>	(rare in Canterbury)
R	<i>Anogramma leptophylla</i>	(nationally local)
E	<i>Asplenium polyodon</i>	(rare in Canterbury)
R	<i>Asplenium trichomanes</i>	
R	<i>Baumea rubiginosa</i>	(rare in Canterbury)
R	<i>Botrychium bifforme</i>	
R	<i>Brachyglottis bellidioides</i>	
E	<i>Bulbinella angustifolia</i>	
V	<i>Caladenia lyallii</i>	
V	<i>Carex appressa</i>	(rare in Canterbury)
V	<i>Carmichaelia kirkii</i>	(nationally vulnerable)
R	cf. <i>Centrolepis</i> "Herbert"	(status unknown)
V	<i>Clematis marata</i>	
V	<i>Coprosma acerosa</i>	
V	<i>Coprosma rugosa</i>	
R	<i>Cordyline indivisa</i>	(rare in Canterbury)
R	<i>Corybas orbiculatus</i>	
R	<i>Cyathea medullaris</i>	(rare in Canterbury)
E	<i>Dacrydium cupressinum</i>	
V	<i>Desmoschoenus spiralis</i>	(nationally vulnerable)
V	<i>Dianella nigra</i>	
R	<i>Dicksonia fibrosa</i>	(rare in Canterbury)
R	<i>Earina mucronata</i>	
R	<i>Eleocharis gracilis</i>	
R	<i>Elymus multiflorus</i>	
R	<i>Epilobium macropus</i>	
R	<i>Epilobium pallidiflorum</i>	
R	<i>Epilobium tenuipes</i>	
R	<i>Eryngium vesiculosum</i>	
R	<i>Euphrasia zelandica</i>	
R	<i>Gastrodia cunninghamii</i>	
R	<i>Gastrodia sesamoides</i>	
R	<i>Gaultheria crassa</i>	
R	<i>Gentiana grisebachii</i>	
R	<i>Gentiana serotina</i>	
R	<i>Geum parviflorum</i>	
R	<i>Gnaphalium polylepis</i>	
R	<i>Grammitis ciliata</i>	
R	<i>Hebe odora</i>	

R	<i>Hoheria populnea</i> var. <i>lanceolata</i>	(rare in Canterbury)
R	<i>Hymenophyllum atrovirens</i>	
R	<i>Hymenophyllum bivalve</i>	
V	<i>Hymenophyllum</i> cf. <i>cupressiforme</i>	(national status unknown)
R	<i>Hymenophyllum dilatatum</i>	(rare in Canterbury)
R	<i>Hymenophyllum minimum</i>	
R	<i>Hymenophyllum peltatum</i>	
R	<i>Hymenophyllum rarum</i>	
R	<i>Hypolepis lactea</i>	(rare in Canterbury)
R	<i>Hypsela rivalis</i>	
R	<i>Isolepis pottsii</i>	
R	<i>Juncus caespiticius</i>	
R	<i>Lastreopsis hispida</i>	
E	<i>Leptinella nana</i>	(nationally endangered)
V	<i>Libocedrus bidwillii</i>	
R	<i>Limosella lineata</i>	
R	<i>Lycopodium australianum</i>	
R	<i>Microlaena polynoda</i>	
R	<i>Microseris scapigera</i>	
R	<i>Muehlenbeckia astonii</i>	
R	<i>Muehlenbeckia axillaris</i>	
R	<i>Muehlenbeckia ephedroides</i>	
R	<i>Myosotis pygmaea</i> var. <i>drucei</i>	
V	<i>Myosotis australis</i> var. <i>lytteltonensis</i>	(nationally vulnerable)
V	<i>Myrsine nummularia</i>	
R	<i>Neomyrtus pedunculata</i>	
R	<i>Olearia arborescens</i>	
V	<i>Olearia odorata</i>	
R	<i>Olearia bullata</i>	
R	<i>Oxalis magellanica</i>	
R	<i>Parahebe lyallii</i>	
R	<i>Pellaea calidirupium</i>	
R	<i>Pentachondra pumila</i>	
R	<i>Pleurosorus rutifolius</i>	(nationally rare)
R	<i>Poa astonii</i>	(rare in Canterbury)
R	<i>Potentilla anserinoides</i>	
R	<i>Pratia perpusilla</i>	
V	<i>Prumnopitys ferruginea</i>	
R	<i>Pseudopanax edgerleyi</i>	
E	<i>Pteris macilenta</i>	(rare in Canterbury)
R	<i>Pteris tremula</i>	(rare in Canterbury)
R	<i>Pterostylis alobula</i>	
R	<i>Ranunculus acaulis</i>	
R	<i>Raoulia australis</i>	
R	<i>Raoulia hookeri</i>	

R	<i>Raoulia tenuicaulis</i>	
V	<i>Rumohra adiantiformis</i>	
R	<i>Schoenoplectus validus</i>	
R	<i>Stackhousia minima</i>	
V	<i>Sticherus cunninghamii</i>	(rare in Canterbury)
R	<i>Teucrium parvifolium</i>	(nationally rare)
R	<i>Thelymitra decora</i>	
V	<i>Trichomanes endlicherianum</i>	
R	<i>Trisetum</i> sp. 'slender'	
R	<i>Uncinia</i> sp. (<i>affinis</i> auct.)	
R	<i>Uncinia banksii</i>	
R	<i>Uncinia caespitosa</i>	

2.6.3 Regionally endemic taxa:

<i>Celmisia mackau</i>	
<i>Festuca</i> sp. 'Banks Peninsula blue tussock'	
<i>Hebe lavaudiana</i>	
<i>Hebe strictissima</i>	
<i>Leptinella minor</i>	
<i>Myosotis australis</i> var. <i>lytteltonensis</i>	
? <i>Tmesipteris</i> aff. <i>elongata</i>	(status not yet determined)
? <i>Wahlenbergia</i> 'Akaroa Heads'	(status not yet determined)

2.6.4 Type localities in Region:

The type locality is the place from which the type specimen of a particular taxon was collected. The type specimen is the single herbarium specimen on which the botanical name of a particular taxon is based. The collectors's name, the date of collection, and the country where the specimen is lodged, are provided where this information is known.

<i>Adiantum fulvum</i>	Raoul	1840	?France
<i>Brachyglottis lagopus</i>	Raoul	1840	France
<i>Brachyglottis sciadophila</i>	Raoul	1840	France
<i>Celmisia mackau</i>	Raoul	1840	?France
<i>Chionochoa rigida</i>	Raoul	1840	?France
<i>Clematis foetida</i>	Raoul	1840	France
<i>Clematis marata</i>	?Armstrong		
<i>Convolvulus verecundus</i>	Melville,	1961	NZ
subsp. <i>waitaha</i>	Godley & Mason		
<i>Coprosma robusta</i>	Raoul	1840	?France
<i>Corokia cotoneaster</i>	Raoul	1840	France
<i>Discaria toumatou</i>	Raoul	1840	France
<i>Elaeocarpus hookerianus</i>	Raoul	1840	?France
<i>Griselinia littoralis</i>	Raoul	1840	France
<i>Gunnera monoica</i>	Raoul	1840	France

<i>Hebe lavaudiana</i>	Raoul	1840	?France
<i>Hebe strictissima</i>	Kirk	1876	NZ
<i>Helichrysum aggregatum</i> ¹	Raoul	1840	France
<i>Hoheria angustifolia</i>	Raoul	1840	France
<i>Leptinella minor</i>	Lyall	?	England
<i>Lophomyrtus obcordata</i>	Raoul	1840	France
<i>Luzula banksiana</i> var. <i>orina</i>	Edgar	1964	NZ
<i>Myosotis australis</i> var. <i>lytteltonensis</i>	Laing	1917	NZ
<i>Olearia avicenniifolia</i>	Raoul	1840	France
<i>Pittosporum obcordatum</i>	Raoul	1840	?
<i>Raoulia australis</i>	Raoul	1840	France
<i>Raoulia subsericea</i>	Lyall	?	England
<i>Senecio glaucophyllus</i> subsp. <i>basinudus</i>	Dawson	1954	NZ
<i>Uncinia leptostachya</i>	Raoul	1840	France
<i>Uncinia rupestris</i>	Raoul	1840	France

2.6.5 Distributional limits in Region:

Banks Peninsula is known as the southern limit for several northern taxa:

<i>Alectryon excelsus</i>	tītiki	(common, rather local)
<i>Anarthropteris lanceolata</i>		(rare, local)
<i>Asplenium oblongifolium</i>		(common)
<i>Asplenium terrestre</i> subsp. <i>maritimum</i>		(common)
<i>Cyperus ustulatus</i>	umbrella sedge	(uncommon, local)
<i>Dodonaea viscosa</i>	akeake	(common, local)
<i>Grammitis ciliata</i>		(rare, local)
<i>Macropiper excelsum</i>	kawakawa	(abundant)
<i>Muehlenbeckia astonii</i>		(rare, local)
<i>Passiflora tetrandra</i>	passion vine	(common, rather local)
<i>Pteris tremula</i>		(uncommon, local)
<i>Schoenoplectus validus</i>		(uncommon, local)
<i>Solanum aviculare</i>	poroporo	(common, rather local)

Nikau palm (*Rhopalostylis sapida*) is often claimed as reaching its southern limit here at 43° 52' south, but it grows on Pitt Island in the Chathams at 44° 18' south. Karaka (*Corynocarpus laevigatus*) is almost certainly naturalised rather than indigenous on the Peninsula; it occurs only around known Māori settlement sites.

¹ But regarded in this report as the same species as *H. lanceolatum* with its type locality near Hokianga in Northland.

Pigeonwood (*Hedycarya arborea*) goes no further south on the eastern side of the South Island, but extends a bit further south in the west, into Fiordland. *Griselinia lucida* has a similar pattern. Hīnau (*Elaeocarpus dentatus*) reaches its southern limit in Riccarton Bush in Christchurch, but old records for Banks Peninsula remain unconfirmed.

Two more species appear to have their southern limit at about the latitude of Banks Peninsula: *Cheilanthes distans* and *Leucopogon fasciculatus*. *Hypolepis lactea* and *Hoheria populnea* var. *lanceolata* were both recorded further south in the past, but Banks Peninsula populations appear to be the southernmost known now. If the single known patch of *Pteris macilenta* on Banks Peninsula is truly indigenous, this also represents a southern limit.

Far fewer taxa find their northern limit here. The only clear-cut contender is *Olearia fragrantissima*. *Poa astonii* is almost certainly in this category, but there are dubious earlier records from further north. Two other grasses, *Chionochloa rigida* and *Rytidosperma corinum* find their northern limits about the latitude of Banks Peninsula although they extend a bit further northwards to the west.

It is not hard to suggest why Banks Peninsula is something of a cut-off area for plant distributions. It was buffered from the worst climatic effects of the glacial ages by the surrounding ocean. Today there are microclimates almost without frost. It is thus climatically almost unique in Canterbury. There is a long gap southwards to the Otago Peninsula which is the only landform on the east coast remotely comparable.

The Peninsula thus provides some interesting botanical combinations. Nowhere else does *Olearia fragrantissima* grow with kawakawa, tītoki and akeake. At 400 m in the Peraki Valley in Akaroa Ecological District kawakawa actually meets snow tussock. Less unique, but interesting, is the combination of beech with kawakawa, pigeonwood, ngaio and passion vine.

2.7 Fauna

2.7.1 Invertebrates

Although much remains to be found out, enough is known to indicate a large, diverse invertebrate fauna of considerable scientific interest. Regional endemics among the arthropods total at least 2 or 3 percent of the known fauna (more than 30 of the named species). This compares with about 1.4 percent endemism in the vascular flora. Banks Peninsula endemic arthropods include a cockroach or two, a wētā, several beetles and weevils, flies (including a curious net-winged midge) and millipedes. The Peninsula also contains type localities for a large number of invertebrate species.

Considerable information on Banks Region invertebrates can be found in articles in *The Natural History of Canterbury* (Pilgrim 1969, Harrison 1969, Harrison and White 1969, Johns 1969, Stout 1969) and in Johns 1986.

Because the invertebrate fauna is often overlooked in conservation proposals, and because a full checklist of the several thousand species likely to be present here is not attempted in this report, I discuss below in some detail features of particular interest. By no means all groups are mentioned.

In the context of conservation needs, it should be noted that the forest fauna is now highly fragmented following the massive destruction of forest habitats during the last 150 years. Many of the endemics are forest species, and although in some cases they have persisted in remnant logs or in regenerating scrub and second-growth forest, larger forest reserves are essential for the ensured survival of the whole faunal range. Johns (1986) lists uncommon to rare arthropod species. Those most in danger appear to be:

<i>Hemideina ricta</i>	a large endemic wētā
<i>Mecodema howitti</i>	a large endemic ground beetle
<i>Omasus pantomelas</i>	another endemic ground beetle
<i>Pheloneis graciosus</i>	a beetle
<i>Megacolabus sculpturatus</i>	an endemic weevil, possibly already extinct
<i>Hadramphus tuberculatus</i>	another endemic weevil, and also possibly already extinct
<i>Austrolimnophila</i> sp.	an unnamed tipulid (crane fly)

There is some evidence that native species are being replaced by introduced ones. In contrast to the forest fauna, the grassland fauna is not unique; overall it is relatively poor in species although not necessarily in number of individuals, and it is supplemented by a considerable proportion of introduced species.

Earthworms: Many native species, some very large, are associated with forest remnants and persist in recently forested ground. A few are characteristic of tussockland. Introduced worms have not established in native forest remnants but are abundant in pastures where there are few native species.

Leeches: The native species are aquatic. One is known to feed on freshwater snails, and another on warm-blooded vertebrates, especially water birds.

Molluscs: The common freshwater snails belong to the genus *Potamopyrgus*. A rather rare pea mussel, a small freshwater bivalve, is recorded from springs. Native slugs are a minor element of the forest fauna, but introduced slugs and snails are widespread. Also to be included in the invertebrate fauna of Banks Ecological Region are marine molluscs above low tide; these include chitons, mussels, cockles, pipi, limpets, periwinkles, etc.

Crustaceans: Amphipods (hoppers) are abundant in washed up seaweed along the coast, in leaf litter, and in grasslands. Terrestrial isopods are represented by the common woodlouse or slater (*Porcellio scaber*). Several species of crab are common in the intertidal zone. [The freshwater crayfish *Paranephrops setosus* might be expected in the lower stretches of streams, but I have never seen it here nor can I find any record of it for the Peninsula.]

[Onychophorans: *Ooperipatus viridimaculatus* is the common onychophoran of Canterbury forests, scrub and grasslands, but I have never seen it on Banks Peninsula nor can I find any record of it here.]

Millipedes and centipedes: Several native millipedes are of high scientific interest, including undescribed species and even genera. Centipedes are a relatively minor part of both forest and grassland faunas. The largest local native centipede (*Zelanophilus provocator*) occasionally reaches a length of 10 cm or more.

Spiders, harvestmen and mites: There are numerous native species and some introduced ones. Of special note are the nursery spiders (*Dolomedes minor*) and its even larger relative *D. aquaticus*, native and introduced orb web spiders, funnel web spiders, trapdoor spiders (not dangerous), wolf spiders and jumping spiders, and on probably all Peninsula beaches, the poisonous katipō which is the most dangerous of all native invertebrates. There are numerous native mites, and many introduced ones. Recently, the gorse spider mite has been introduced for the attempted biological control of gorse.

Insects: (This section draws heavily on Johns 1986). Springtails (*Collembola*) are abundant in both forest and grassland. Native cockroaches, including an endemic species *Celatoblatta peninsularis* are common in both grasslands and forests. One of the largest native insects is the dragonfly *Uropetala*, but it is not abundant on Banks Peninsula. Damselflies are common near water. Banks Peninsula probably represents the southern limit for native termites in New Zealand, as well as for the locust (*Locusta migratoria*). Another feature of the Region is the absence of forest or tussock-dwelling native earwigs, although the coastal species *Anisolabis littorea* is common and introduced earwigs are abundant.

All three groups of wētā are represented: tree wētā, ground wētā, and jumping or cave wētā. Small black crickets are abundant in all grasslands, as are grasshoppers. The katydid (*Caedicia simplex*) is introduced to the Peninsula from further north in New Zealand where it is native. Several widespread native species of stick insect are an intriguing element of the fauna, one of them reaching 10 cm or more in length. Plant bugs are diverse and abundant. The introduced spittle bug *Philaneus spumarius* has become excessively abundant since its accidental introduction into New Zealand several years ago. The abundant, large, noisy cicada of forests and plantations is *Amphisalta zealandica*. No native species of aphid are yet recorded from Banks Peninsula, but many introduced ones are important horticultural and pastoral pests. Scales are common. One native one on sevenfinger (*Schefflera*) can badly damage the host plant. Mānuka blight is the association of a scale *Eriococcus orariensis* with a sooty mould; the scale appears to have arrived from Australia this century.

Four orders of insects are particularly well represented in the Peninsula's streams: mayflies, stoneflies, caddisflies, and two-winged flies. Present in smaller numbers are dragonflies, water-boatmen, backswimmers, water beetles, lacewings, dobson flies, and scorpion flies. The lake midge that forms swirling, smoke-like columns around Lake Forsyth is a chironomid midge, *Chironomus zealandicus*. Its larvae are bright red and sometimes known as bloodworms, but this name is also used for some small red species of aquatic annelid worms. The caddisflies have an especially large fauna, and it includes one of the world's

few marine insects, a caddisfly larva plentiful on the rocky shores of Banks Peninsula. Larvae of the dobson fly (*Archichauliodes diversus*) are common in most if not all streams.

The well-known "ant lion" (*Weeleus acutus*) is the curious larva of an attractive lacewing. Because the adult is nocturnal it is seldom seen, but the larva constructs conical pit-traps in very dry, fine sand so that small insects fall into the waiting sharp mouthparts of the ant lion. It is widespread on Banks Peninsula coasts but hardly common.

The Peninsula has at least 40 species of predatory ground beetles or carabids, ranging in size from 1.5 mm to 30 mm long. No fewer than ten are endemic to the Peninsula, and thirteen have their type localities here. Six are introduced. The largest species *Mecodema howitti* may well be in danger of extinction. The larger carabid species eat soil-dwelling insect larvae including porina and grassgrub, but the species soon disappear if pasture is "improved", leaving porina and grassgrub without one of their natural predators. Others are more tolerant of environmental change and are still common. The very common "Alexander beetle" is *Megadromus antarcticus*. Johns (1986) points out that the rare beetle *Omasseus pantomelas* needs a new generic name, as it clearly represents a Banks Peninsula endemic genus with no close relatives elsewhere. Scarab beetles form an important element of the grassland fauna. Apart from the well-known native grassgrub *Costelytra zealandica*, many species of *Odontria* and *Pyronota* are present. Particularly severe infestations of the introduced Tasmanian grassgrub *Aphodius tasmaniae* occur on Banks Peninsula. The adults of these scarabs feed on the foliage of trees and shrubs and particularly heavy infestations can defoliate whole trees. *Pyronota festiva* is the beautifully metallic green mānuka beetle. *Pericoptus truncatus* is the common large sand scarab of Banks Peninsula beaches as elsewhere in Canterbury. Both native and introduced ladybirds are common, but probably the most common is the introduced Tasman ladybird. Tiger beetles (*Cicindela*) are conspicuous on open ground throughout. One beetle (*Pheloneis gratus*) shows a fascinatingly disjunct pattern of distribution. It is present in the beech forests of Akaroa Ecological District, but this is a distant outlier of its main populations which are in the high rainfall beech forests along the Main Divide and in Northwest Nelson. Johns (1986) considers it a key species to understanding the changes which have taken place in the Peninsula's vegetation during and since the Pleistocene. Huhu beetle (*Prionoplus reticularis*) is present in all the podocarp forest remnants and also in exotic plantations.

A large number of weevil species are found on Banks Peninsula, most of them native and abundant. Two large species, *Hadramphus tuberculatus* and *Megacolabus sculpturatus*, almost certainly host specific to *Aciphylla*, are probably extinct. *Aciphylla* is still reasonably common on Banks Peninsula, and the likely chief cause of the weevils' decline is the depredations of rats and mice rather than a reduction of the host plant. Some weevils are pests of plantations, crops and grasslands, such as the introduced Argentine stem weevil, gum tree weevil, and Sitona weevil. Gorse seed weevil was introduced for the biological control of gorse. It is abundant on its host plant throughout the Peninsula but its effect on gorse seed production and regeneration seems to be negligible.

Sixty-six species of tipulids or crane flies are known from the Peninsula. While most are widely distributed through New Zealand, and many are common on Banks Peninsula, five have so far been collected only from here and are quite possibly endemic. All of these are confined to forest or dense scrub and are more or less localised in occurrence.

There are several species of mosquito, one of them the common seashore species *Opifex fuscus* which breeds in splash pools above the high tide mark. Fortunately neither the local mosquitoes nor the local sandfly or blackfly of the Peninsula (*Austrosimulium tillyardianum*) are frequent or aggressive biters.

Among numerous species of flies are many which breed in wet, rotting vegetation. Flies on Banks Peninsula include robberflies, hoverflies, kelp flies, leafminers, fruitflies, bot-flies and blowflies (both native and introduced).

Hymenopteran families (bees, wasps and ants) are represented by 15 or more species of native short-tongued bees, introduced honey bees, bumble bees and wasps, ichneumons, spider-hunting wasps, mason wasps, and both native and introduced ants. Ichneumon wasps are conspicuous, especially large and striking parasites like the native *Certonotus fractinervis*. Exotic ichneumons were introduced to parasitise the naturalised woodwasp *Sirex* which is a pest in timber plantations. The introduced German wasp (*Vespula germanica*) has recently been largely replaced by the very similar and equally pesky common European wasp (*V. vulgaris*) over the whole of Banks Peninsula.

As in the rest of New Zealand, Banks Peninsula has a very large moth fauna and a very meagre butterfly fauna. Of eight butterfly species (including the introduced white butterfly), the most conspicuous are the monarch, red admiral, and yellow admiral. One genus of native moths, *Wiseana*, is of major economic importance because its larvae are the porina caterpillars which damage pasture. The bag-moth, *Liothula omnivoram* (*Oeceticus omnivorus*), is commonly seen on a wide range of trees and shrubs. Many of the moths are closely associated with specific food plants (for example the well known kōwhai moth and cabbage tree moth). A number of them have their type localities on the Peninsula. One or two of them may represent Banks Peninsula endemics but not enough is known of these species to be sure.

2.7.2 Vertebrates

One hundred and seven species of vertebrates are listed as being wild in Banks Ecological Region, 62 of them native, and 45 of them introduced.

Fish: As many as 21 native fish species are likely to be present (Appendix 3); this includes a few estuarine species as well as galaxiids, bullies and eels that spend part of their life history in the sea and part in freshwater streams. Although the torrent fish is not often seen nor its life history well understood, it is reported to be abundant in Banks Peninsula streams (Burnet, Cranfield and Benzie 1969). The upokororo or grayling (*Prototroctes oxyrhynchus*) was probably once common on Banks Peninsula but is now presumed extinct here as elsewhere in New Zealand. Burnet *et al.* note that a number of the galaxiid species and the red-finned bully prefer well-shaded streams, and for Canterbury as a whole are now plentiful

only in the bush streams of Banks Peninsula. The rare Canterbury mudfish may be present on the Peninsula in lowland ditches but this is unconfirmed; it is apparently very rare now throughout its whole range. Recent confirmation is also needed for some of the other listed species.

Whitebait, caught for food by people, are the young of galaxiid species, chiefly *Galaxias maculatus*, which run up the streams from August to December, although better protection of the tidal vegetation essential for their breeding is needed to ensure their future. Adults of this species grow up to 16 cm in length. *Galaxias argenteus* is by far the largest fish in the family, with a maximum length of 58 cm and weight of 2.7 kilos. The largest native fish are long-finned eels; females can attain a length of 2 m.

Four introduced fish are listed. Brown trout and perch appear to be present in Lake Forsyth and some of the larger streams. Salmon are farmed in Akaroa Harbour, but more information is needed as to the extent wild salmon enter Lake Forsyth and Banks Peninsula streams. In general the introduced fish are larger and predatory on many of the native fishes. The good growth rate of brown trout in tidal areas is due in part to the abundance of small native fish. Conversely, native eels prey on young trout and can reduce their numbers significantly (Burnet, Cranfield and Benzie 1969).

Amphibians: The only amphibians in the Banks Ecological Region are two introduced Australian frogs (Appendix 4). I know of no evidence whether or not the primitive New Zealand frog genus *Leiopelma* ever occurred on Banks Peninsula.

Reptiles: Four species of lizard, two geckoes and two skinks, comprise the current known reptile fauna of Banks Peninsula (Appendix 4). Probably none are in imminent danger of extinction, but the conservation status of the jewelled gecko is cause for some concern. This is a richly coloured species of restricted distribution, occurring only in parts of Canterbury and Otago. It does not appear to be very common on Banks Peninsula, and is almost certainly very vulnerable to scrub clearance, spraying, burning, and predation by rats, cats and mustelids.

I know of no evidence to suggest whether or not tuatara (*Sphenodon punctatus*) was present on Banks Peninsula in the past, or whether there were further species of gecko and skink not now present here.

Birds: Fifty-five species are believed to breed within the region, 32 native and 23 naturalised. Another 18 or so species regularly or occasionally visit (Appendix 5). The nearest that Banks Ecological Region gets to having an endemic bird is that the white-flippered penguin, a strong subspecies of little blue penguin, is known to breed only on Banks Peninsula and on Motunau Island some 50 km to the north.

Banks Peninsula has lost a large proportion of its native bird fauna in two major waves of extinction, the first resulting from Polynesian settlement, the second from the impact of European people. The bird fauna at the time of the Polynesian arrival must have totalled about 100 species. About 29 of these vanished during the first few centuries of human occupation. Another 21 or so vanished from the Peninsula (several of them altogether from

New Zealand and the world) within a few decades of European settlement, so that today only half of the diverse and abundant bird fauna of pre-human times survives. The future of several more cannot be assured without the creation and sound management of more and larger protected areas, coupled with research into reasons for declines. Six species may be regarded as currently at risk:

Yellow-eyed penguin

Sooty shearwater

Australasian bittern

Morepork

Tūī

New Zealand falcon (now only an occasional visitor and no longer known to breed on the Peninsula)

Of these 6, only the first is nationally endangered.

A few species of introduced birds are suspected of having detrimental effects on native bird populations. Suspicion lies most heavily on the magpie, and its possible role in the decline of tūī to near local extinction in the last few decades. The little owl may be competing with the native morepork, perhaps for nesting sites. Mallard ducks appear to be swamping the native grey duck populations through hybridising with them and possibly through competition for habitat and food.

Mammalian predators, especially rats, cats, stoats and ferrets are more obviously deleterious, but even here more needs to be known of the interactions, say, between cats and rats, or stoats, rabbits and birds, before control measures can be clearly justified.

Future re-establishment of locally extinct species has been suggested, especially for buff weka and kākārīki, and also for tūī. Under present environmental conditions and conservation management of Banks Peninsula, opportunities for re-establishment are not all that auspicious, but with larger protected areas, appropriate research, and sound management, such releases are worthwhile goals. Even more important is to ensure that populations which at present seem secure enough, do not suddenly slide into decline as the tūī has done. The best safeguards against this are to ensure there are protected areas of sufficient size and quality to maintain healthy, viable, resilient populations of tomtit, rifleman, kererū, brown creeper, bellbird, etc.

Mammals: Native mammals are represented by sea mammals (Appendix 6); fur seals and Hector's dolphins are the most commonly seen. Both species of native bat, once undoubtedly common, are now probably extinct on Banks Peninsula, although unconfirmed recent sightings suggest some possibility that at least the long-tailed bat may persist.

Five mammal species are farmed on the Peninsula to a greater or lesser extent (sheep, cattle, red deer, goats and pigs, roughly in that order of importance) and their grazing affects perhaps 95 percent of the land area. Dogs (*Canis familiaris*) are present now only as domesticated animals, but in the early days of European settlement in Canterbury wild dogs were numerous in places, apparently resulting from the crossing of Māori dogs with

European ones. I can find no direct reference to wild dogs on Banks Peninsula but they were numerous near Riccarton in 1844 and in many other parts of Canterbury (Bull 1969) and may well have contributed to the decline of native ground birds.

Thirteen species of introduced mammals are fully established in the wild on Banks Peninsula, all of them to some degree detrimental to native plants and animals. In most cases effective management of native vegetation and faunal habitats implies careful control of these introduced mammals. In conservation terms, the least harmful of them are probably hedgehogs and weasels, the most harmful goats, possums and stoats. In some cases effective management of native tussocklands may require a moderate level of grazing by sheep, at least for a time, to remove the more deleterious competition of rank introduced grasses. Regeneration of several tree species - particularly kānuka, kōwhai, ribbonwood, lacebark and tōtara - is also enhanced where light to moderate grazing by sheep removes grass competition. But, in all cases where native forest remnants are to be restored and regenerated, complete exclusion of all grazing and browsing is the better option. The presence of goats represents the worst option.

If we could stand back and be completely objective, however, we would have to admit that no other single mammal species naturalised on Banks Peninsula has had such a destructive impact on the biological diversity and ecological health of the Region, or has quite such a destructive potential, as *Homo sapiens*!

2.8 Bioclimatic Zones

A simple zonation for Banks Peninsula is shown in Fig. 1. This uses terms familiar in New Zealand ecological writing and is useful for the purposes of this report. (For global comparisons, Banks Peninsula appears to fall into the cool temperate, oceanic, subhumid bioclimatic cell of Meurk 1984).

Altitudinal zonation is a reflection of falling mean temperature with increasing altitude. Zone boundaries may be conveniently defined by upper and lower limits of several indicator (temperature-sensitive) species of vascular plant. Southern aspect depresses zone boundaries, northern aspect raises them, to the extent of about 50-100 m either way in this region.

On Banks Peninsula a marked altitudinal boundary lies around 500 m, reflected in an abrupt change in the species composition of old-growth forest remnants, and less clearly in second-growth forest. At about this altitude lowland tōtara gives way to thin-bark tōtara, and lowland fivefinger to mountain fivefinger. Māhoe becomes sparse. Mataī, kahikatea, pigeonwood, kawakawa and silver tree fern drop out. Although found at all altitudes, pepperwood becomes very abundant above 500 m, and so does shield fern and crown fern on the floors. Within its limited range in Akaroa Ecological District, beech becomes dominant in the forest canopy. Also characteristic of montane forest are broadleaved cabbage tree, mountain holly, and *Cyathea colensoi*.

No part of Banks Peninsula is above a potential timberline, but there is naturally open ground in the montane zone where thin soils on steep rock, or wet soils in flushes or bogs, provided

limited environments free of trees. Thus a characteristic part of the upper montane flora contains snow tussock, *Dracophyllum*, and a whole collection of plants that a botanist might associate with the subalpine zone of the higher mountains to the west - *Aciphylla*, *Gaultheria*, *Brachyglottis*, *Celmisia*, *Ourisia*, *Forstera*, *Gingidia*, *Leucopogon* and *Pentachondra*. Another characteristic species of the upper montane zone above about 700 m, but this time a tree, is *Libocedrus*, the native cedar.

With decreasing altitude through the lowland zone, warmth-demanding or cold-avoiding species become increasingly diverse and prominent. Some are more or less widespread through the lowland forests, such as kawakawa, pigeonwood, supplejack and silver tree fern. Some are more or less restricted to the warmest microclimates near the sea where they give the forest such a distinctive appearance that their environment may be called 'maritime lowland'. Characteristic of maritime lowland sites on Banks Peninsula are: nīkau palm, mamaku tree fern, and shining broadleaf, plus a longer list of plants that are especially abundant here but extend further inland and upwards through at least the lower part of the lowland zone: akeake, shining spleenwort, fītoki, ngaio, native passion vine, and the ferns *Lastreopsis glabella* and *L. velutina*.

Of course most of Banks Peninsula is now open grassland. Bioclimatic zones are less discernible in such induced vegetation than in old growth forest, but some species are indicative of altitude (Table 2).

Patterns of vegetation and species distributions are determined by many more factors than simply altitude. Important on Banks Peninsula is a steep rainfall gradient from dry headlands to humid valley heads, related to increasing altitude but not simply so. Also important are variations in soil, slope, aspect and drainage.

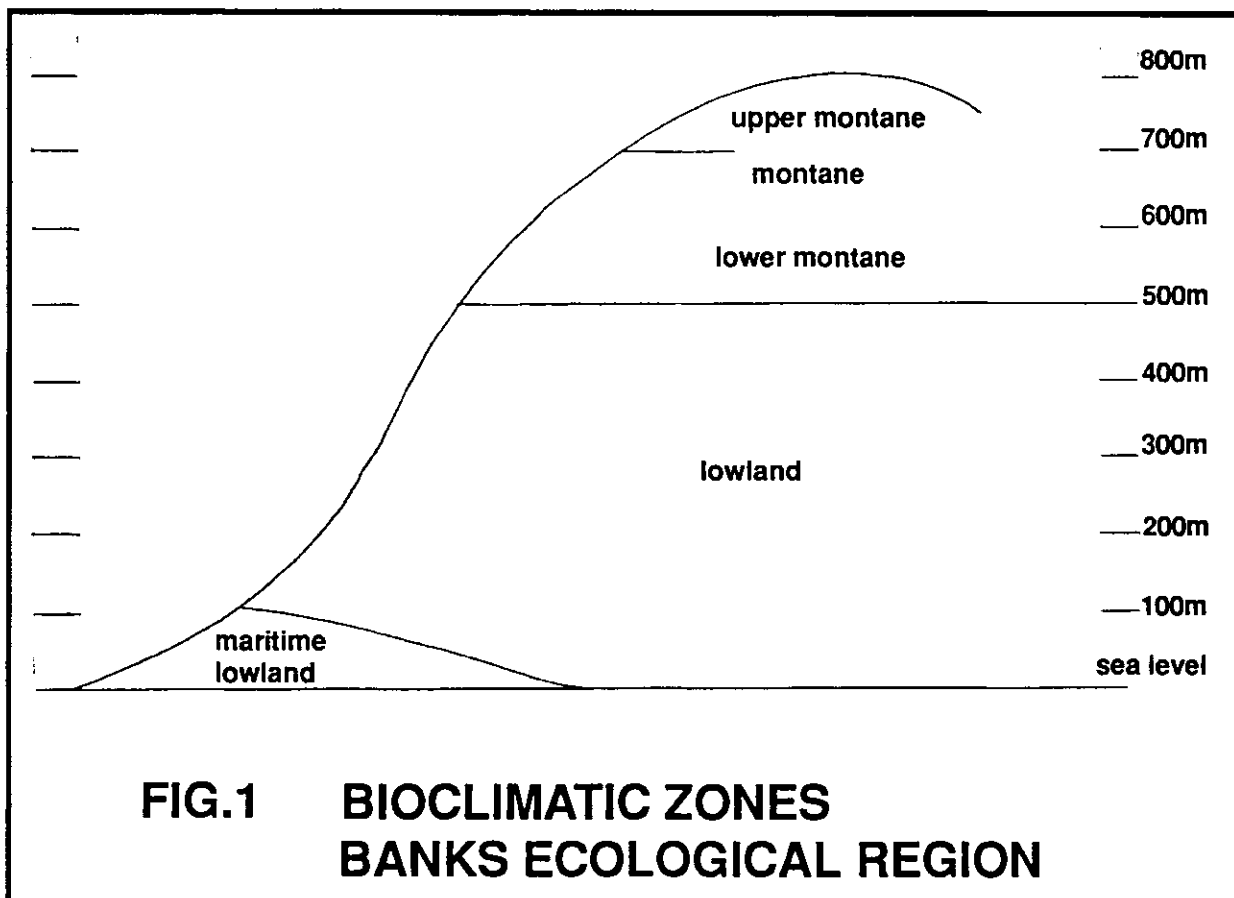


TABLE 2 : Vascular Plant Species indicative of bioclimatic zones
(see Appendix 2 where necessary for scientific names)

Zone	Forest	Non-forest
Upper Montane	Cedar	snow tussock turpentine scrub golden spaniard <i>Kelleria dieffenbachii</i>
Montane	thin-bark tōtara broadleaved cabbage tree mountain fivefinger mountain holly <i>Cyathea colensoi</i> <i>Chionochloa conspicua</i> beech abundant pepperwood	fescue tussock mountain flax
Lowland	lowland tōtara kahikatea mataī kawakawa pigeonwood tītoki silver tree fern akeake ngaio supplejack passion vine lowland fivefinger shining spleenwort	silver tussock lowland flax
Maritime lowland	nīkau palm shining broadleaf mamaku tree fern	<i>Microlaena stipoides</i> <i>Disphyma australe</i>

2.9 Ecological Classes

Vegetation types more or less similar to those forming parts of the vegetation of Banks Peninsula prior to human arrival are indicated by a + beside their number.

Major vegetation categories are prefixed by capital letters A to L, encompassing 44 numbered subcategories.

Structural relationships are suggested by the following symbols:

- / dividing species names which dominate different strata, with the taller stratum first,
- linking species names which characterise more or less the same stratum.
- * naturalised species

A Podocarp/hardwood forest

- +1 Kahikatea - mataī - lowland tōtara/mixed hardwood forest on lowland alluvium.
- +2 Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes.
- +3 Thin-bark tōtara/mixed hardwood forest on montane hill slopes.

B Beech Forest

- +4 Red beech forest on upper lowland and montane hill slopes
- +5 Black beech forest on upper lowland and montane hill slopes.

C Second-growth hardwood forest

- +6 Mixed broadleaved second-growth hardwood forest on lowland and montane alluvium and hill slopes (māhoe, ribbonwood, lacebark, fuchsia, broadleaf, fivefinger, ngaio, tītoki, akeake, akiraho, kōwhai, pigeonwood, kaikōmako, lemonwood, in varying combinations).
- +7 Kānuka-dominant second-growth hardwood forest on lowland alluvium and hill slopes.
- 8 Naturalised deciduous hardwood forest on lowland hill slopes (*sycamore, *ash, *wild cherry).

D Treeland (spaced trees over pasture, tussockland, fernland and scrub)

- 9 Lowland podocarp and podocarp/hardwood treeland on alluvium and hill slopes.
- 10 Montane podocarp and podocarp/hardwood treeland on hill slopes.
- 11 Broadleaved hardwood treeland on lowland and montane alluvium and hill slopes (ribbonwood, lacebark, broadleaf, ngaio, kōwhai, etc).
- 12 Kānuka treeland on lowland alluvium and hill slopes.

E Native Scrub

- +13 Lowland small-leaved scrub on hill slopes (*Coprosma*, *Helichrysum*, *Corokia*, kānuka, mānuka, *Carmichaelia*, etc).
- +14 Montane mixed scrub on hill slopes (*Olearia*, turpentine scrub, *Hebe*, fivefinger, *Coprosma*, fuchsia, etc).

F Tussockland, Grassland, Fernland and open shrubland

- +15 Coastal tussockland and open tussock shrubland on cliffs and banks (silver tussock, blue fescue tussock).
- +16 Coastal tussockland on sand dunes (pingao, *marram, *lyme grass).
- 17 Short tussockland on lowland and montane hill slopes (silver tussock, fescue tussock).
- 18 Pasture
 - (a) on lowland and montane moist alluvium and hill slopes (*ryegrass, *clover, *cocksfoot, *fog, *browntop, *sweet vernal, *bluegrass, *brome, etc).
 - (b) on lowland droughty hill slopes (danthonia, *danthonia, *Microlaena*, *needle grass).
- 19 Fernland on lowland and montane hill slopes (bracken, shield fern, water fern).
- +20 Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes (*Chionochloa rigida*, *C. conspicua*, mountain flax).
- +21 Lowland flaxland (*Phormium tenax*) on lowland alluvium and hill slopes.
- +22 Toetoe tussockland (*Cortaderia richardii*) on lowland and montane alluvium and hill slopes.
- +23 Holygrass grassland on coastal, lowland and montane hill slopes (*Hierochloa redolens*).
- 24 Native open shrubland on coastal, lowland and montane alluvium and hill slopes (matagouri, *Carmichaelia*, *Coprosma*, *Corokia*, *Muehlenbeckia*, dwarf kōwhai, *Helichrysum*, *Hebe*, turpentine scrub, *Olearia*, mountain flax, porcupine shrub, mānuka, kānuka, pepperwood, fuchsia).
- 25 Exotic open shrubland on coastal, lowland and montane alluvium and hill slopes (*gorse, *broom, *Montpelier broom, *barberry, *lupin).
- 26 Mossfield on lowland and montane alluvium and hill slopes (*Polytrichum*, *Racomitrium*).

G Wetlands

- +27 Freshwater lowland and montane marsh, swamp, flush and emergent aquatic vegetation (sedges, rushes, lowland flax, toetoe, raupō, *Schoenus*).
- +28 Freshwater lowland and montane submerged or floating aquatic vegetation (*Potamogeton*, *Ruppia*, *Zannichellia*, water milfoil, charophytes and other algae, bryophytes, **Elodea*, *Crassula sinclairii*, *Ranunculus limosella*).

- +29 Saltmarsh on coastal alluvium (seagrass, *Mimulus repens*, *Samolus*, *Selliera*, glasswort, *Puccinellia*, *Schoenoplectus pungens*, jointed rush, sea rush, saltmarsh ribbonwood, *Isolepis*, *Enteromorpha*).
- +30 Algal communities on intertidal rocks.

H Exotic Scrub

- 31 Exotic leguminous scrub on coastal, lowland and montane sand dunes, alluvium and hill slopes (*gorse, *broom, *Montpelier broom, *tagasaste, *lupin).
- 32 Exotic non-leguminous scrub on coastal, lowland and montane cliffs, alluvium and hill slopes (*barberry, *elderberry, *Himalayan honeysuckle, *boxthorn, *boneseed, *Echium, *Aeonium, *Coryledon, *hawthorn).

I Exotic Plantation

- 33 Coniferous plantation on lowland and montane hill slopes (*pine, *cypress, *Douglas fir, *spruce).
- 34 Evergreen hardwood plantation on lowland alluvium and hill slopes (*Eucalyptus, *wattle).
- 35 Deciduous hardwood plantation on lowland alluvium and hill slopes (*walnut, *ash, *poplar).

J Discontinuous vegetation on Rock

- +36 Scattered plants on coastal rock.
- +37 Scattered plants on lowland rock.
- +38 Scattered plants on montane rock.

K Discontinuous vegetation on sand, stony and bouldery ground.

- +39 Scattered plants on sandy, stony and bouldery coastal beaches and dunes.
- +40 Scattered plants on lowland and montane blockfield and boulderfield.
- +41 Scattered plants on lowland and montane stony or bouldery stream beds.

L Vegetation colonising recently bared ground

- 42 Weedy vegetation and cultivated crops on lowland disturbed soil and wasteland.
- 43 Weedy vegetation on lowland and montane road edges and along railway lines.
- 44 Lichens on lowland and montane tarsealed road surfaces.

2.10 Ecological District Boundaries

The concept of dividing New Zealand into a series of Ecological Regions and Districts evolved because of the need for the establishment of a representative system of reserves which would encompass the country's ecological diversity (McEwen 1987). John Nicholls of the Forest Research Institute in Rotorua pioneered the idea in the late 1970s, and the scheme took shape in the 1980s. Although of necessity somewhat arbitrary, it has proved a very useful framework, particularly for the PNA Programme of which this report is part.

McEwen points out that the scheme has potential values which go well beyond its usefulness in the PNA Programme. For example it helps to make people aware of the natural areas that make their own district unique and can help to promote the feeling of local identity (a sense of place), as well as an awareness of landscape and the need for stewardship of local and national heritage values. It can also be used in many practical ways to organise, record and retrieve biological and other resource information, to help in land use planning and management, and as an educational tool.

An **Ecological District** is defined as a local part of New Zealand where the topographical, geological, climatic, soil and biological features, including the broad cultural pattern, produce a characteristic landscape and range of biological communities (Park *et al.* 1983).

An **Ecological Region** is an aggregation of adjacent ecological districts with very closely related characteristics (Park *et al.* 1983).

Banks Peninsula forms a very distinct Ecological Region, but there has been some discussion about its subdivision into Districts since Brian Molloy initially proposed three. In other parts of New Zealand, single very distinctive Ecological Districts are given the status of Ecological Regions to emphasise their uniqueness; 24 out of the total of 85 Regions for the whole country are treated thus, e.g. Kermadec, Tongariro, Tararua, Gore, Chathams. Overall the country is divided into 268 Ecological Districts.

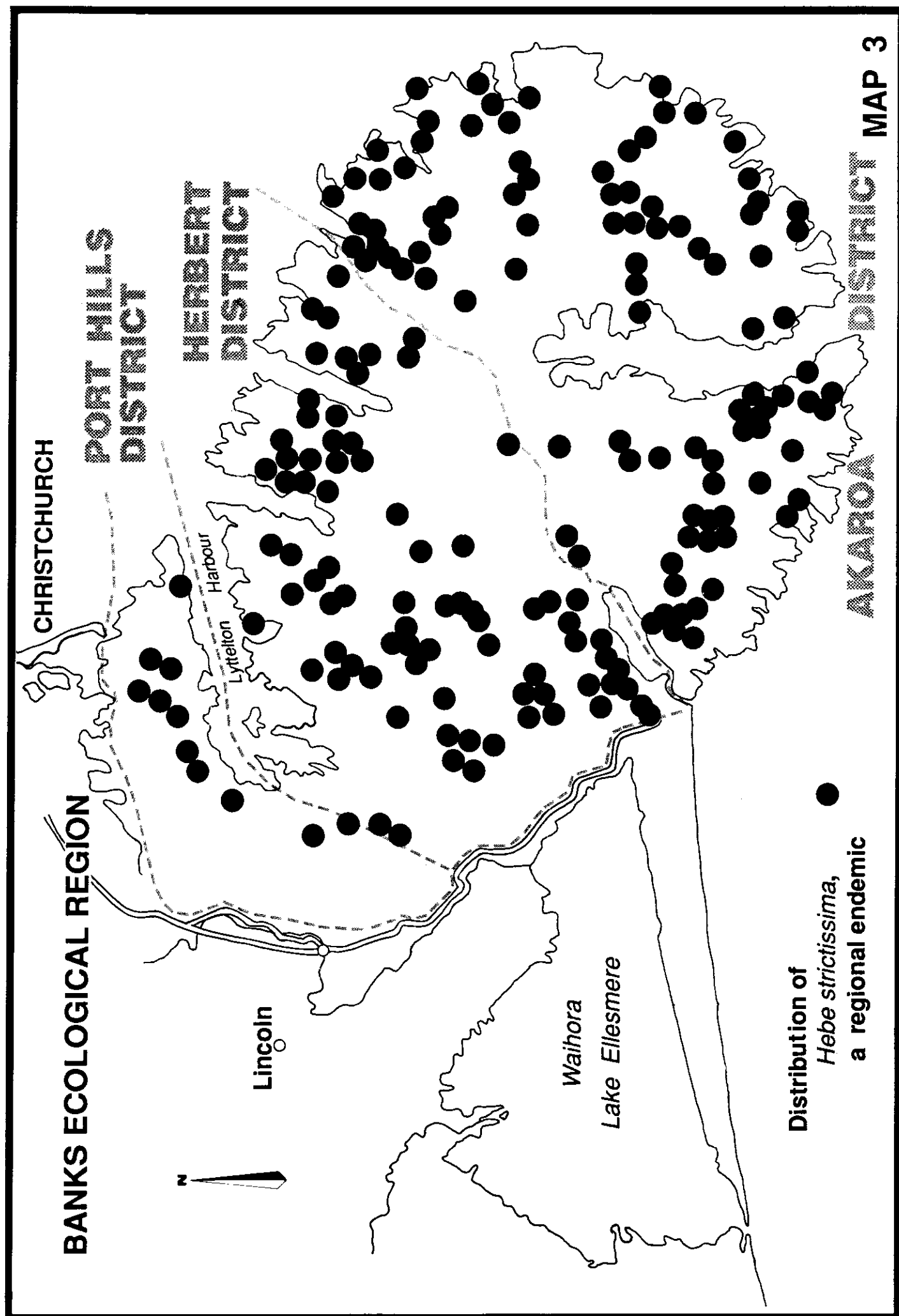
On the basis of the invertebrate fauna Johns (1986) suggested that only two districts were sufficiently distinct in the Banks Ecological Region - a smaller, drier, lower Port Hills District in the west, and a much larger eastern Herbert/Akaroa District. This report maintains Molloy's division of the Region into three districts mainly on botanical, geological and climatic criteria, but with some support from the invertebrate data supplied by Johns.

Some of the botanical patterns and distributions would, it is true, support the concept of regarding the Region as comprising only one District. Many vascular species are widely dispersed throughout the Peninsula, including most of the endemic ones (Map 4 shows two species, *Convolvulus verecundus* subsp. *waitaha*, restricted to the driest end of the spectrum, and *Cyathea dealbata*, silver tree fern, requiring moister conditions). Even this last distribution pattern, however, also shows a marked moisture gradient from drier west to wetter east, to the extent that silver tree fern virtually reaches the coast on the eastern edge of Akaroa Ecological District, and the *Convolvulus* is excluded even from the headlands there.

Other species show very different distributions, with their ranges restricted to one or two of the proposed Districts (Maps 5 - 11; Table 3).

The geological map (Map 12) also shows considerable distinctiveness between the three Districts, although it is true that the igneous rocks of the Lyttelton, Herbert and Akaroa Volcanoes are very similar, and that many of the soils of Banks Peninsula are based on loess overlying all three Districts.

Using all this information the boundaries were refined for this report to those shown on the maps (Maps 3 - 12). It should be noted, however, that the Ōkūti catchment, here included within Akaroa Ecological District, could equally justifiably be included within Herbert Ecological District, with the boundary following the watershed between the Lake Forsyth catchment to the north and west, and the Akaroa Harbour/southern bays catchments to the south and east.



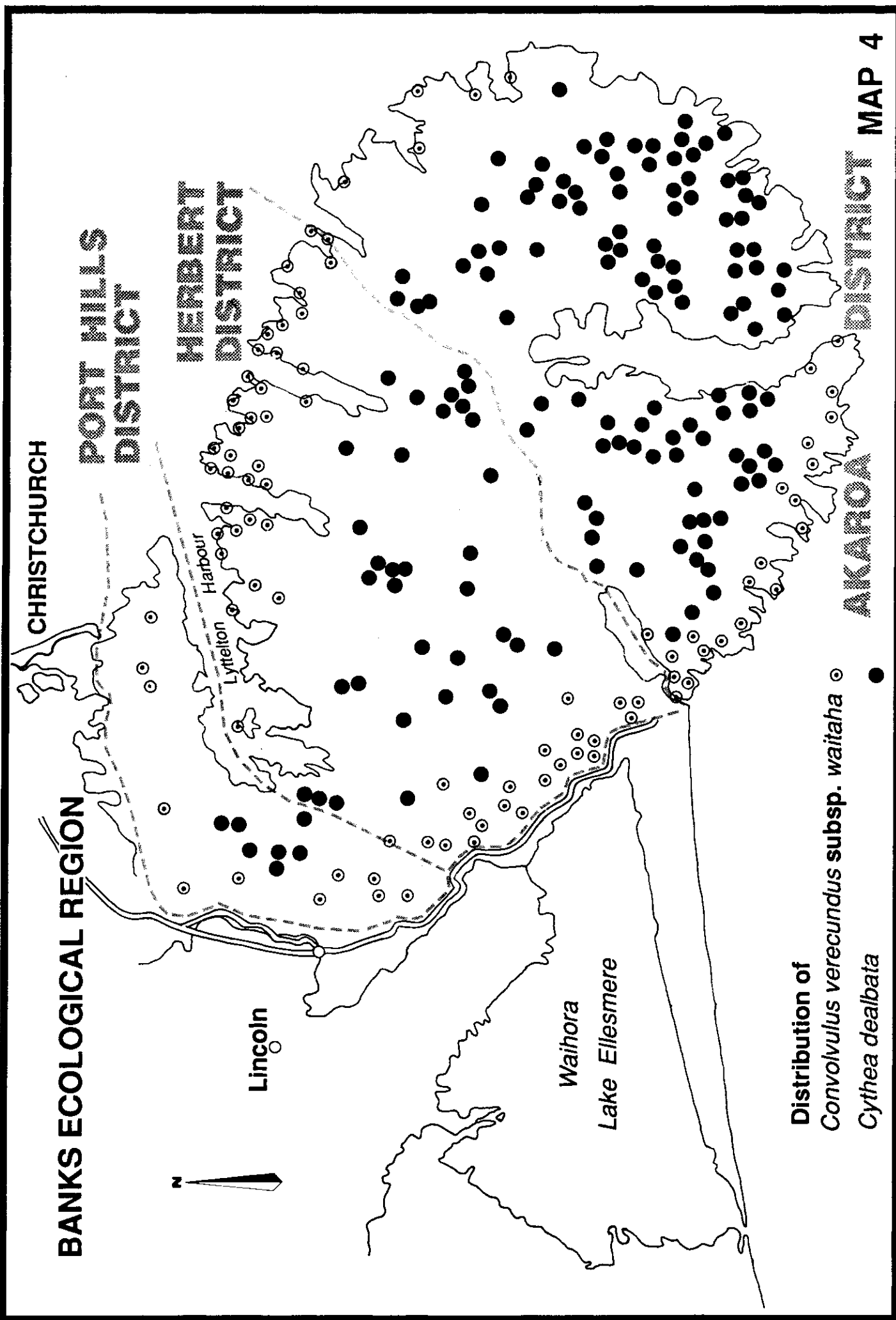
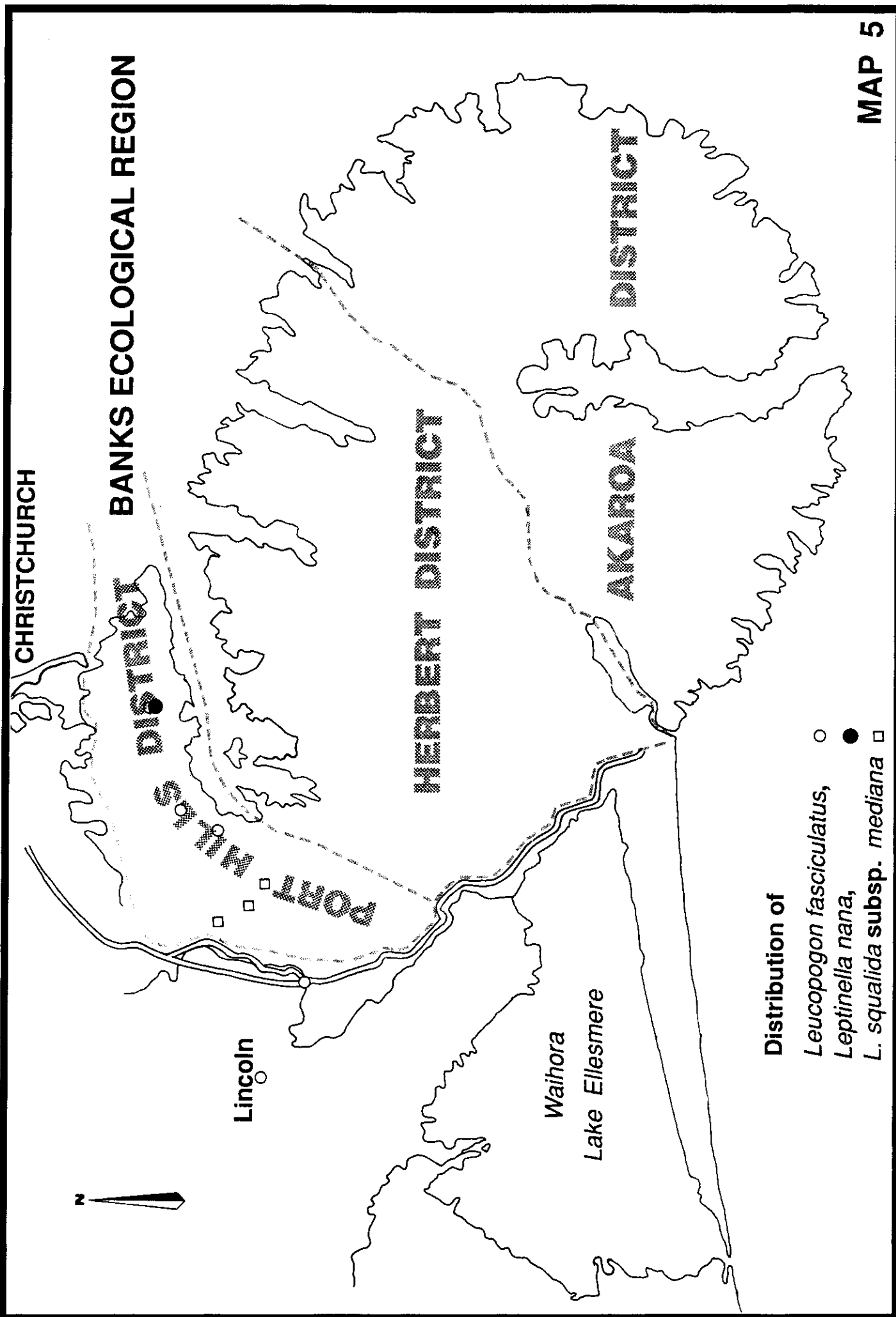
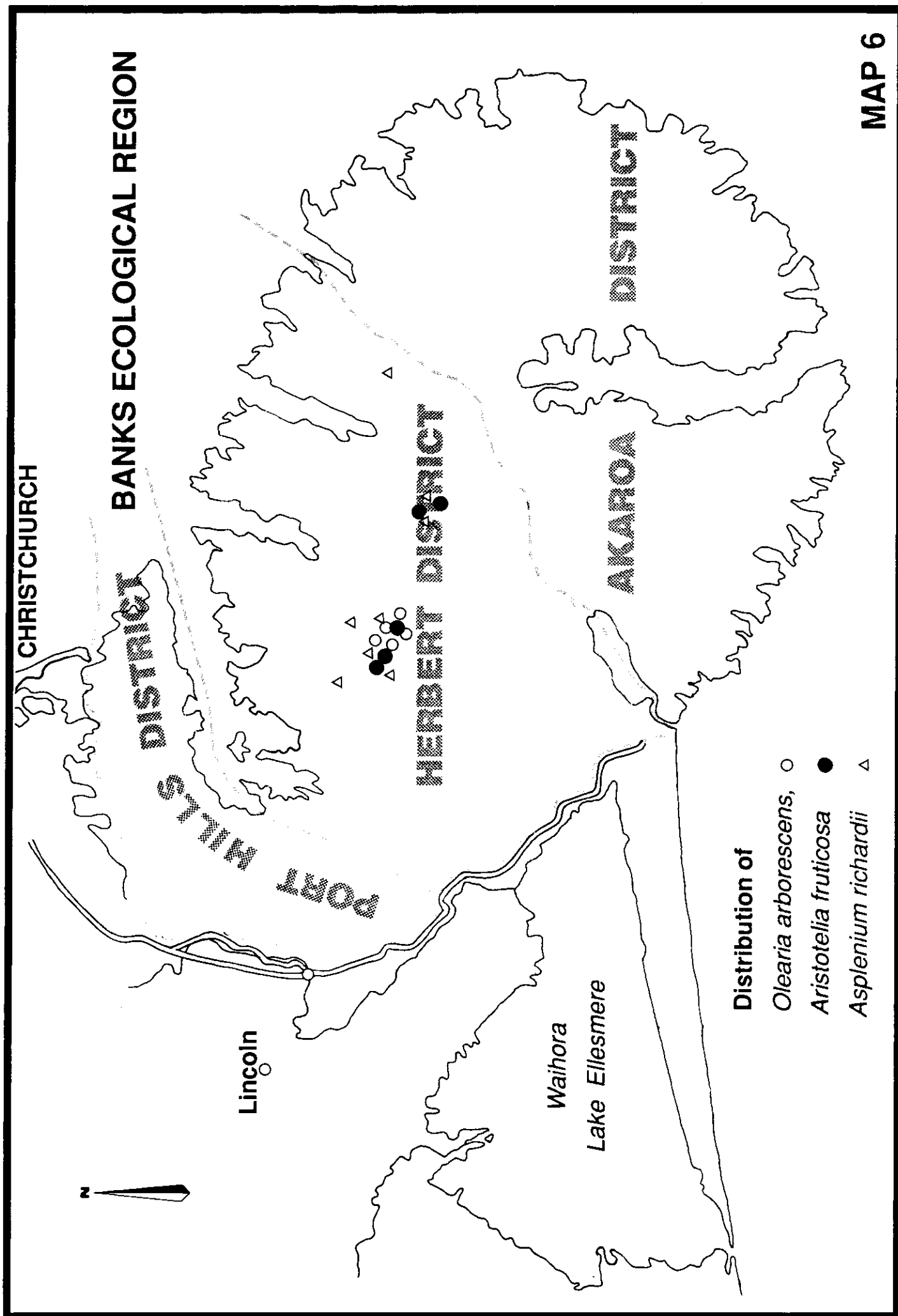


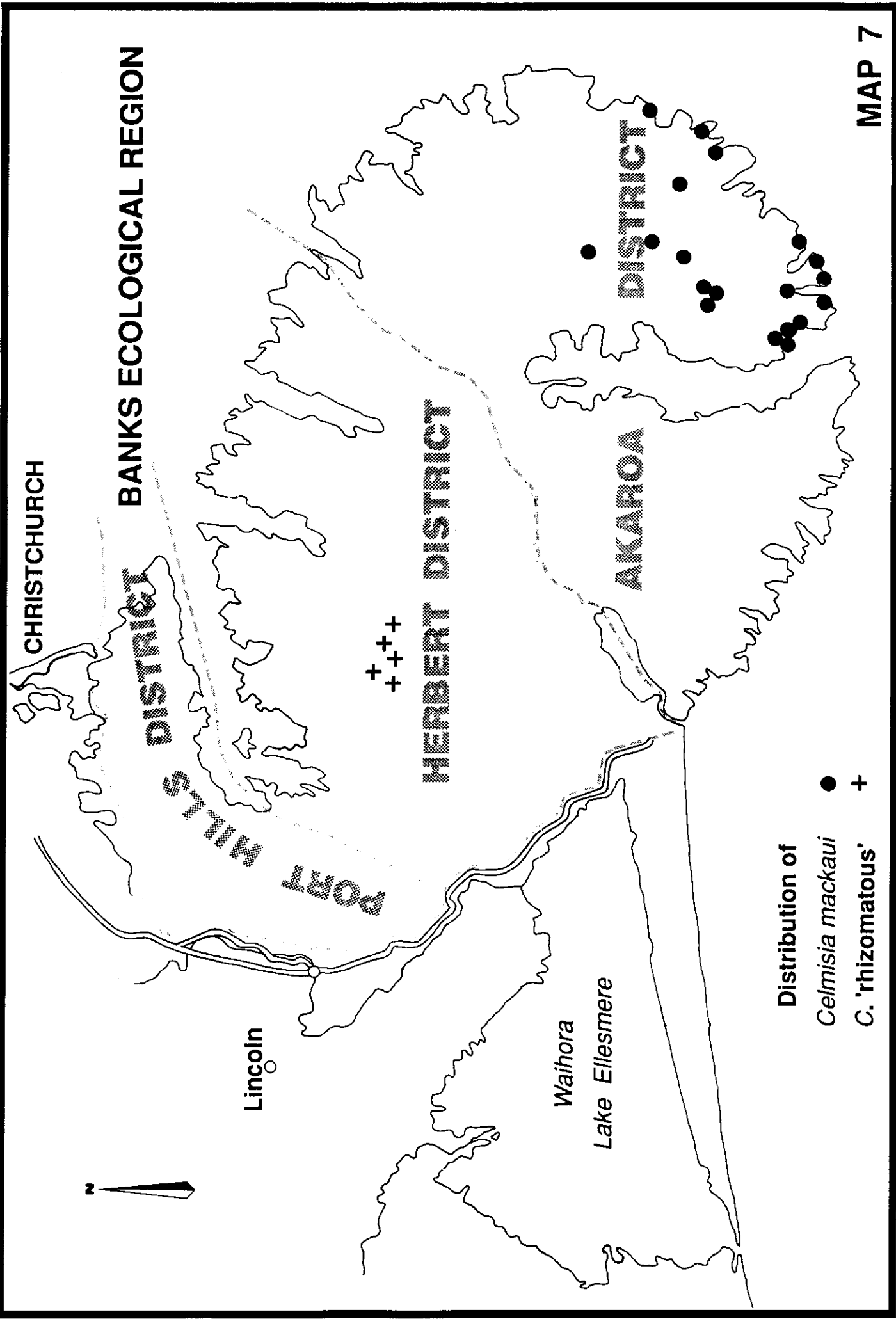
TABLE 3: Vascular plant taxa apparently restricted within Banks Ecological Region to one Ecological District

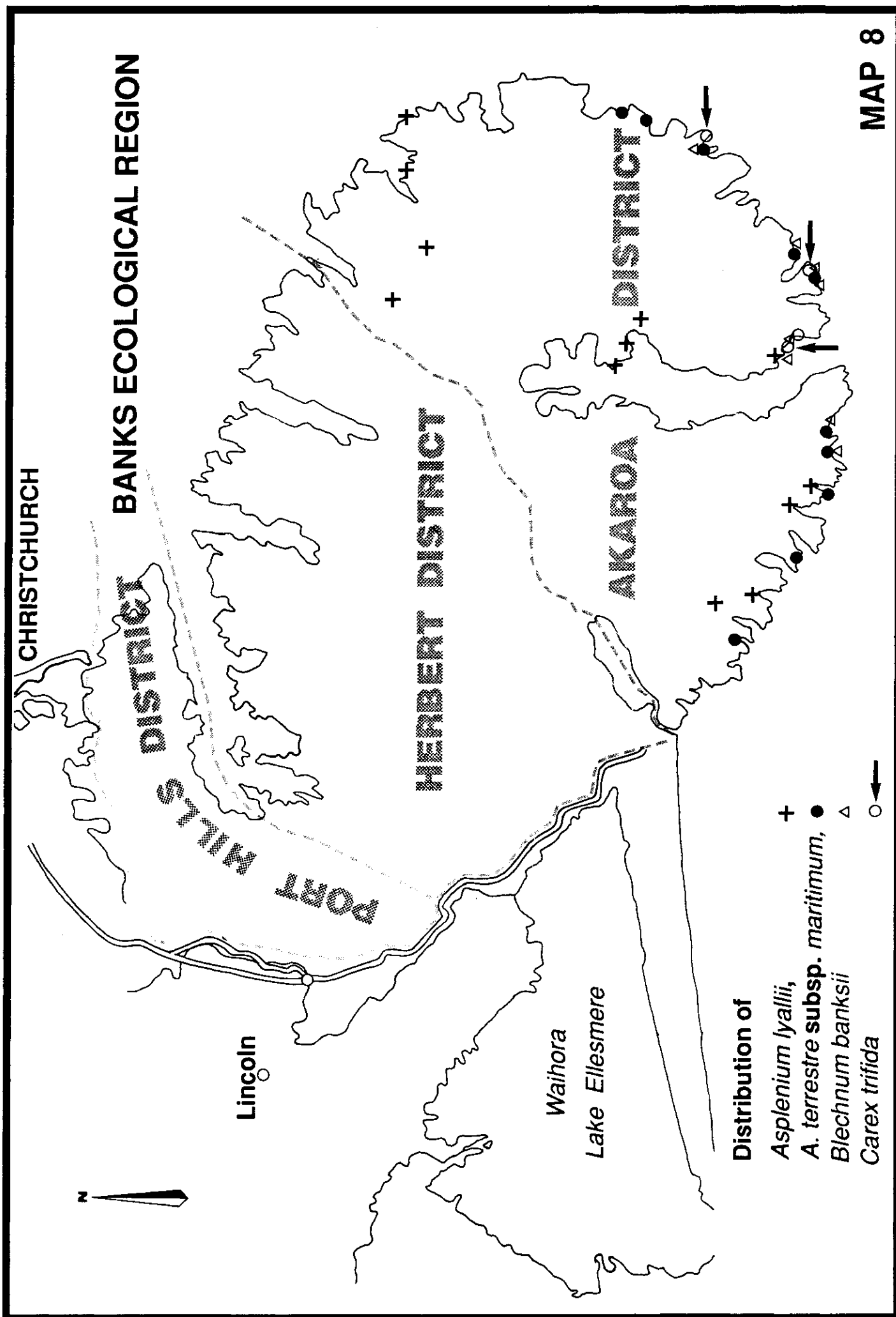
PORT HILLS	HERBERT	AKAROA
<i>Hymenophyllum cf. cupressiforme</i> <i>Leptinella nana</i> <i>Leptinella squalida</i> <i>subsp. mediana</i> <i>Leucopogon fasciculatus</i> <i>Pteris macilenta</i>	<i>Acaena dumicola</i> <i>Aristotelia fruticosa</i> <i>Asplenium richardii</i> <i>Brachyglottis bellidioides</i> <i>Carmichaelia kirkii</i> <i>Celmisia 'rhizomatous'</i> <i>Clematis marata</i> <i>Colobanthus buechananii</i> <i>Dacrydium cupressinum</i> <i>Deschampsia tenella</i> <i>Deyeuxia youngii</i> <i>Eleocharis gracilis</i> <i>Epilobium tenuipes</i> <i>Epilobium macropus</i> <i>Euphrasia zelandica</i> <i>Gaultheria crassa</i> <i>Geum parviflorum</i> <i>Hebe odora</i> <i>Juncus caespiticius</i> <i>Leptinella perpusilla</i> <i>Lycopodium australianum</i> <i>Olearia arborescens</i> <i>Olearia nummularifolia</i> <i>Olearia odorata</i> <i>Prumnopitys ferruginea</i> <i>Pterostylis cynocephala</i> <i>Ranunculus limosella</i> <i>Raoulia tenuicaulis</i> <i>Thelymitra decora</i> <i>Carex sp. 'tenuiculmis'</i> <i>Chenopodium glaucum</i> <i>Crassula sinclairii</i> <i>Deschampsia novae-zelandiae</i> <i>Galium trilobum</i> <i>Gnaphalium polylepis</i> <i>Gnaphalium sphaericum</i> <i>Isolepis basilaris</i> <i>Lachnagrostis 'tall'</i> <i>Lepilaena bilocularis</i> <i>Microseris scapigera</i> <i>Poa cf. pusilla</i> <i>Polygonum salicifolia</i> <i>Pratia perpusilla</i> <i>Ruppia megacarpa</i> <i>Ruppia polycarpa</i> <i>Uncinia caespitosa</i> <i>Uncinia ferruginea</i> <i>Zannichellia palustris</i>	<i>Anarthropteris lanceolata</i> <i>Asplenium lyallii</i> <i>Asplenium terrestre subsp. maritimum</i> <i>Asplenium polyodon</i> <i>Blechnum banksii</i> <i>Carex trifida</i> <i>Celmisia mackau</i> <i>Coprosma acerosa</i> <i>Coprosma rugosa</i> <i>Crassula moschata</i> <i>Cyathea medullaris</i> <i>Earina mucronata</i> <i>Gentiana serotina</i> <i>Hymenophyllum minimum</i> <i>Lagenifera pinnatifida</i> <i>Lobelia anceps</i> <i>Muehlenbeckia astonii</i> <i>Myrsine nummularia</i> <i>Nothofagus fusca</i> <i>Nothofagus solandri</i> <i>Oreomyrrhis rigida</i> <i>Pentachondra pumila</i> <i>Poa astonii</i> <i>Pseudopanax edgerleyi</i> <i>Ranunculus acaulis</i> <i>Raoulia hookeri</i> <i>Rhopalostylis sapida</i> <i>Tetragonia tetragonoides</i> <i>Trichomanes endlicherianum</i> <i>Wahlenbergia 'Akaroa Heads'</i>

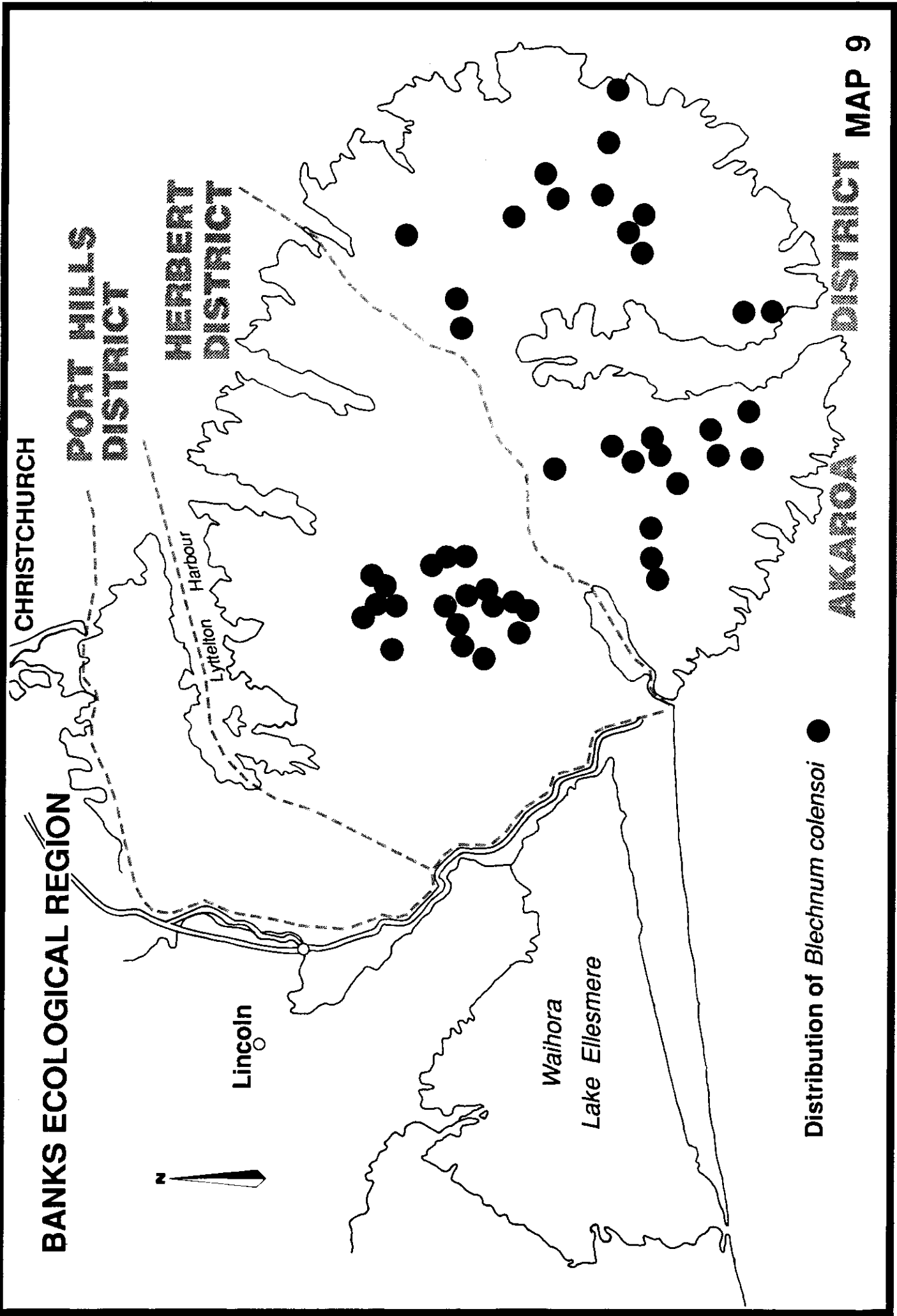


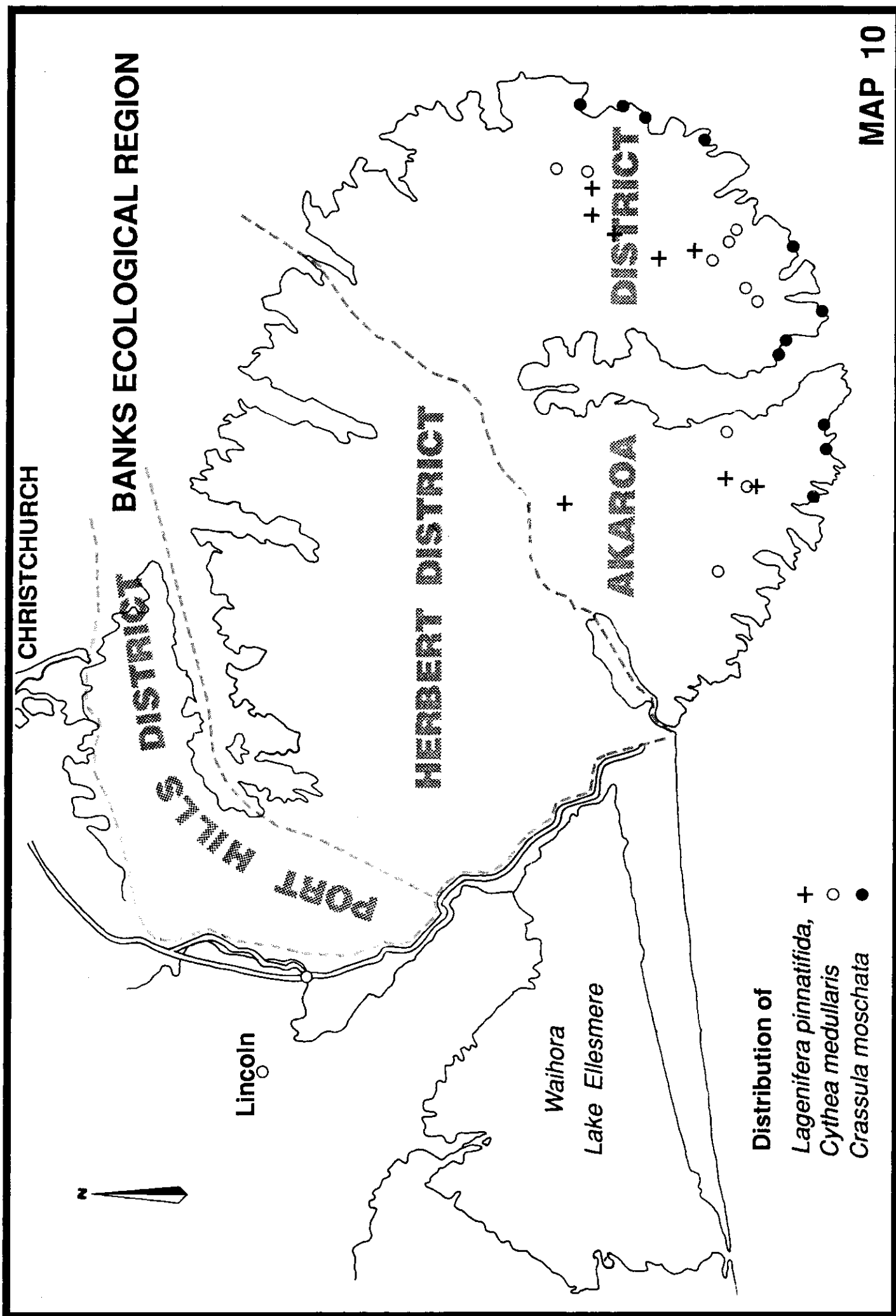


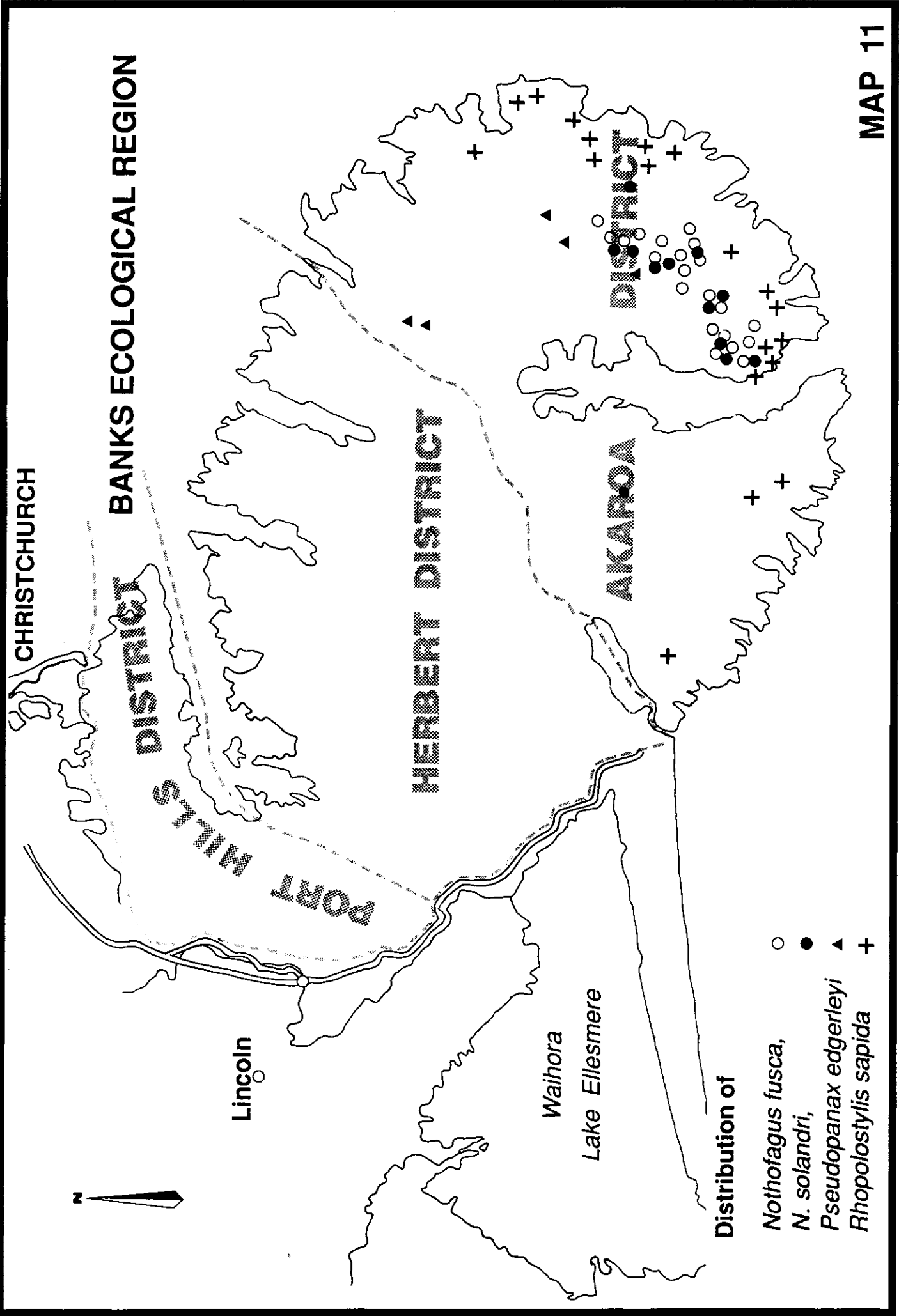
MAP 6

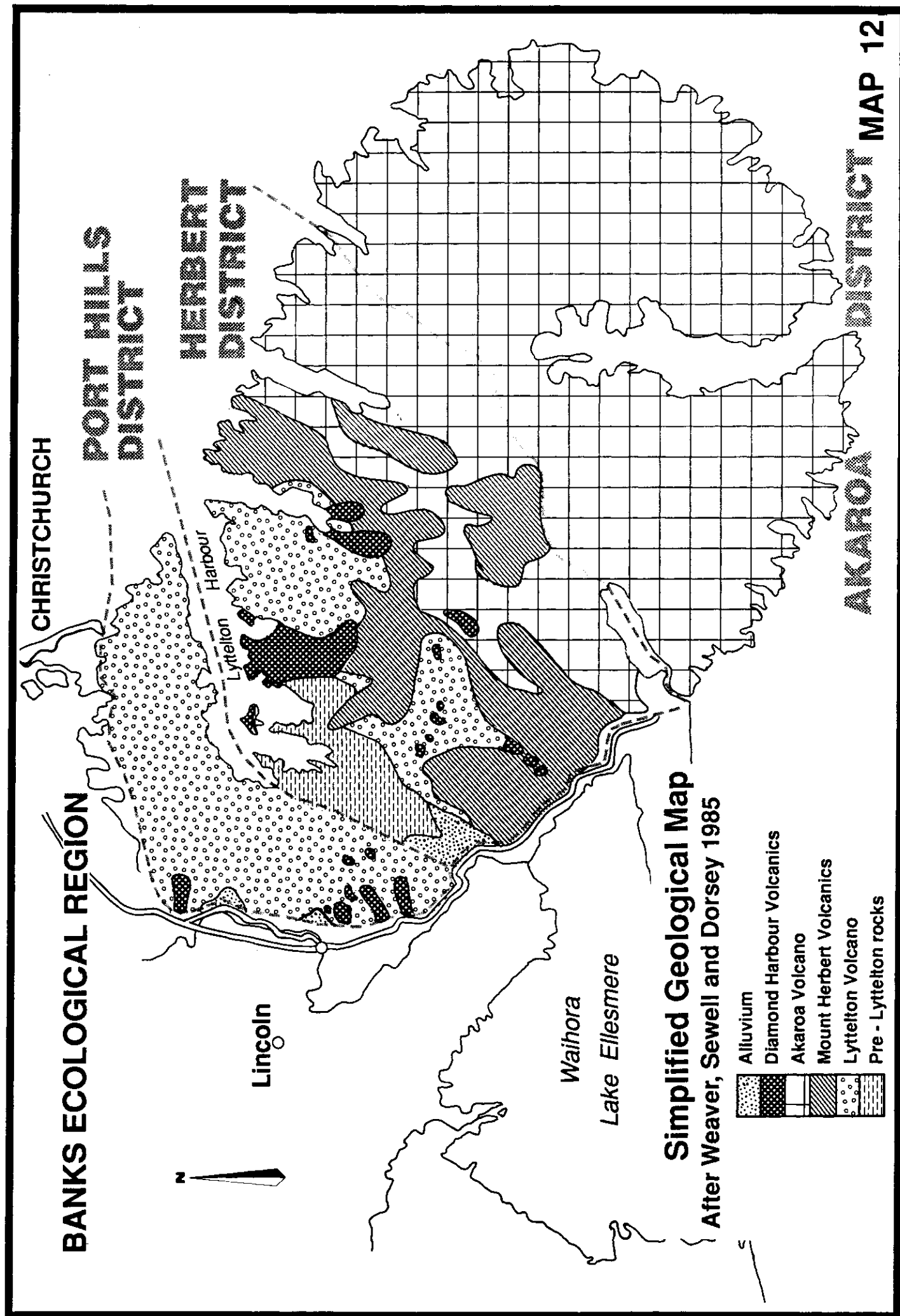












2.11 Protected Natural Areas Summary

Details of total land area, PNAs, and RAPs are summarised for the Region and for each District within the Region.

Banks Ecological Region

Total area approx.	100,500 ha
Total area PNAs approx.	3,640 ha (3.6%)
Total area RAPs approx.	9,280 ha (9.2%)
Combined area PNAs and RAPs approx.	12,920 ha (12.8%)

Port Hills Ecological District

Total area approx.	13,700 ha
Total area PNAs approx.	1,514 ha (11%)
Total area RAPs approx.	651 ha (5%)
Combined area PNAs and RAPs approx.	2,165 ha (16%)

Herbert Ecological District

Total area approx.	41,000 ha
Total area PNAs approx.	1,460 ha (3.5%)
Total area RAPs approx.	4,370 ha (11.0%)
Combined area PNAs and RAPs approx.	5,830 ha (14.5%)

Akaroa Ecological District

Total area approx.	45,800 ha
Total area PNAs approx.	666 ha (1.5%)
Total area RAPs approx.	4,145 ha (9.5%)
Combined area PNAs and RAPs approx.	4,811 ha (11.0%)

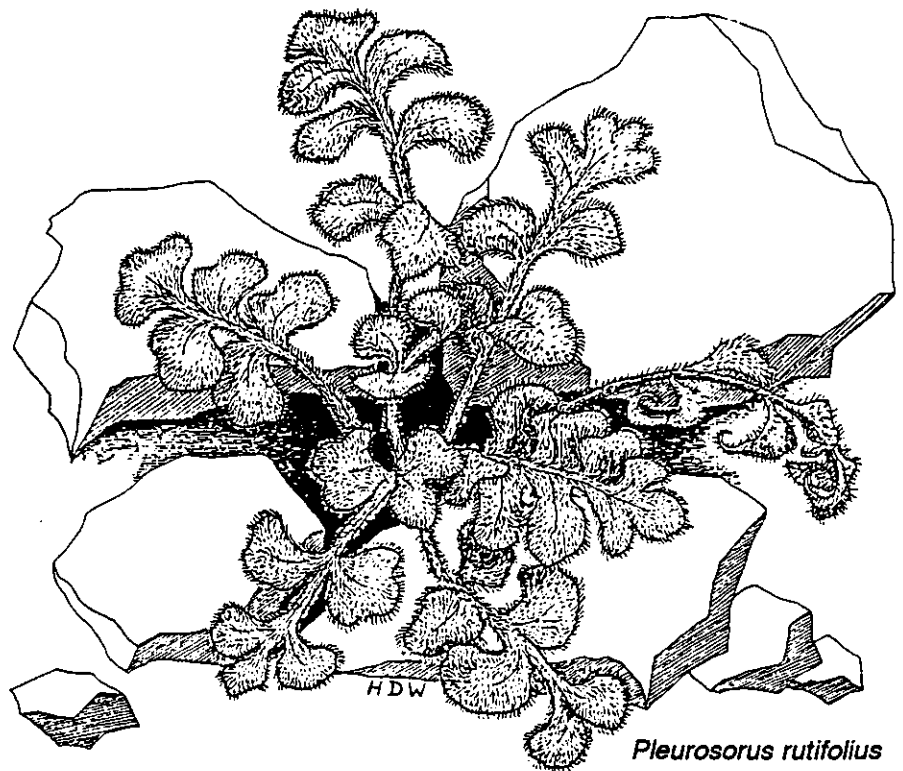
TABLE 4: Best examples of ecological classes in PNAs (P) and RAPs (R)

ECOLOGICAL CLASS	PORT HILLS	HERBERT	AKAROA
A1 Podocarp/hardwood on lowland alluvium	-	P 16	[P 20] R 27
A2 Podocarp/hardwood on lowland hillslopes	[P 24]	R 6 P 8	[R 6] [P 13] R 2
A3 Montane podocarp/hardwood	[P 21]	R 4 [P 8]	R 10 [P 18] R 46
B4 Red beech	-	-	- [P 27] R 26
B5 Black beech	-	-	- [P 27] R 27
C6 Second-growth mixed hardwood	[P 26]	R 4 P 8	[R 6] [P 9] R 24
C7 Kānuka	[P 26]	R 6 P 7	[R 6] P 23 [R 6]
E13 Small-leaved scrub	P 6	[R 7] P 21	[R 16] P 8 [R 46]
E14 Montane scrub	P 21	[R 5] [P 8]	R 4 P 1 [R 10]
F15 Coastal tussock on cliffs and banks	[P 1]	- [P 1]	R 19 P 31 [R 18]
F16 Pingao on coastal dune	-	-	- [R 8]
F20 Snow tussock	[P 22]	- [P 13]	R 4 P 27 [R 30]
F21 Lowland flax	[P 16]	R 2 P 1	[R 7] P 31 [R 16]
G27 - 28 Freshwater wetland	-	[R 10] P 4	[R 17] - [R 11]
G29 Saltmarsh	-	- [P 3]	[R 1] - [R 37]
G30 Intertidal seaweeds	[P 1]	- [P 1]	R 19 P 31 [R 18]
I36 Coastal rock	[P 1]	- [P 1]	R 19 P 31 [R 18]
I37 Lowland rock	P 11	[R 1] P 4	[R 2] P 31 [R 16]
I38 Montane rock	[P 22]	R 5 [P 8]	R 4 P 18 [R 6]

The better example in each category is in square brackets.

SECTION THREE

Port Hills Ecological District



Pleurosorus rutifolius

SECTION THREE: PORT HILLS ECOLOGICAL DISTRICT

3.1 Descriptive Summary

Port Hills Ecological District is the smallest of the Region's three districts with a smaller range of altitude and climate than either Herbert or Akaroa. Total area is approximately 13,700 ha.

3.1.1 Topography

Entirely hilly, slopes rise steeply from Lyttelton Harbour on the southern and eastern margins, rather more gently from the northern and western margins which abut the Pacific Ocean, the Avon-Heathcote Estuary, Christchurch City and the Canterbury Plains, and reach a maximum height of 573 m at Coopers Knob. While most of the ridges are rounded, there are many prominent tors, bluffs and outcrops which add a dramatic element to the landscape, especially against the huge backdrop of plain and sea to the north, west and east.

3.1.2 Geology

Rocks are basalts and trachytes of the Lyttelton Volcano which erupted about 12 to 10 million years ago, but there are also local outcrops of younger olivine-rich basalts (Diamond Harbour Volcanics) which are around 6 million years old (Map 12).

3.1.3 Soils

Soils are derived from both the igneous bedrock and from loess. On lower slopes the soils are mainly loessic with pale, compact subsoils, droughty in summer (yellow-grey earths). On higher slopes the soils are derived either from loess (yellow-brown earths) or basalt (brown granular loams) or a mixture of both; those from basalt have dark brown, blocky structured, stony clay loam subsoils; those from loess have yellowish brown friable to firm silty subsoils; those from mixed loess/basalt have intermediate features. There are also small areas of recent alluvium at the mouths of some valleys. These include gley recent soils, saline gley recent soils, yellow-brown sands, and organic soils (peaty loams).

3.1.4 Climate

Rainfall is in the order of 600-800 mm per annum, more or less evenly spaced throughout the year, but periodically summer droughts can be severe enough to cause severe wilting and some mortality of canopy and subcanopy plants in native bush remnants. Rainfall increases with increasing altitude and from the north-eastern end of the District to the south-western end. Snow lies very briefly after southerly storms in most winters. Occasionally snow may fall deeply enough to cause damage to forest, and can then lie for days. Summits are often cloud-capped, especially in easterly and southerly conditions. Prevailing winds are easterly, but strong dry nor'west winds often exacerbate summer drought conditions.

3.1.5 Drainage

Stream flows are intermittent. In most valleys streams run through the winter and more or less dry up for much of the summer. None are fully permanent. At the moister southern end of the range there are some upper level springs that apparently do not fail completely, even in the driest summers; certainly Rhodes Spring near Coopers Knob just kept dripping water at the end of the severe 1988 drought. Along the western edge of the Port Hills, where the volcanic rock dives under the water-bearing shingly strata of the Plains, strong permanent springs feed small streams and flushes which immediately drain out of the District into the Halswell and Heathcote Rivers of Low Plains Ecological District.

3.1.6 Vegetation

The Port Hills would have been almost entirely forested prior to human arrival, with podocarp/hardwood forest. This was mostly lowland forest of lowland tōtara, mataī, kahikatea, māhoe, broadleaf, kaikōmako, pigeonwood, etc, with montane forest (thin-bark tōtara, broadleaf, pepperwood, soft-leaved tree fern, etc) on the higher ground. On the highest bluffs were non-forest montane species including snow-tussock and *Dracophyllum*. Within the last thousand years Polynesian settlers removed much of the forest from the northern slopes. Large areas here have been under native tussock for centuries, vegetation which must have appeared completely natural to the first European settlers arriving about 150 years ago.

During European times there has been further massive modification of the vegetation. Much of the area is now grazed by sheep, and to a lesser extent by cattle and goats; exotic forest plantings have been extensive in recent years; urban settlement spreads up the north-facing slopes and along Lyttelton Harbour. Only tiny fragments of old-growth forest remain, but a lot more ground has regenerated into mixed hardwood and kānuka-dominant second-growth forest. A lot of tussock survives, but most of it is thinned out, with much intertussock pasture, vegetation very different from the dense silver tussock which met the first European settlers.

3.1.7 Flora

Despite centuries of modification and disturbance, few vascular species appear to be lost altogether. Even some moisture-demanding and browse-vulnerable species have persisted in small areas such as south-facing gullies which are buffered against even the worst of the summer droughts and which are relatively inaccessible to browsing mammals. The current vascular flora totals about 334 species (Appendix 1). These include 6 regionally endemic taxa, but no taxa endemic to the District (*Senecio saxifragoides*, long regarded as a Port Hills endemic, is best regarded as only a minor variant of the widespread *Senecio lagopus* = *Brachyglottis lagopus*). Five species (Table 3) are restricted to the Port Hills within Banks Ecological Region, but are found elsewhere in New Zealand, although one of them (*Leptinella nana*) is nationally endangered.

Other vascular plant species of particular interest and concern in Port Hills District are:

<i>Anogramma leptophylla</i>	(nationally local)
<i>Baumea rubiginosa</i>	(rare in Canterbury)
<i>Brachyglottis sciadophila</i>	(nationally uncommon, rare in Canterbury)
<i>Carex appressa</i>	(rare in Canterbury)
<i>Grammitis ciliata</i>	(rare in Banks Region; southern limit)
<i>Hoheria populnea</i> var. <i>lanceolata</i>	(rare in Canterbury)
<i>Hymenophyllum atrovirens</i>	(rare in Banks Region)
<i>Hymenophyllum</i> cf. <i>cupressiforme</i>	(national status unknown)
<i>Hymenophyllum dilatatum</i>	(rare in Canterbury)
<i>Hymenophyllum rarum</i>	(rare in Canterbury)
<i>Myosotis australis</i> var. <i>lytteltonensis</i>	(rare Banks Region endemic)
<i>Neomyrtus pedunculata</i>	(uncommon in Banks Region)
<i>Olearia fragrantissima</i>	(uncommon in District and Region; northern limit)
<i>Pellaea calidirupium</i>	(nationally local)
<i>Pleurosorus ruifolius</i>	(nationally rare)
<i>Pseudopanax ferox</i>	(nationally uncommon)
<i>Pteris macilenta</i>	(rare in Canterbury)
<i>Raoulia australis</i>	(very rare in Banks Region but common in adjacent Ellesmere District)
<i>Rumohra adiantiformis</i>	(rare in Banks Region)
<i>Schoenoplectus validus</i>	(local in District and Region)
<i>Teucrium parvifolium</i>	(nationally rare)

3.1.8 Fauna

The fauna has fared more badly than the flora, and many species are extinct among both invertebrates and vertebrates (see Section 2.7 for a Regional discussion).

Vertebrate species of particular interest in Port Hills District are:

jewelled gecko
spotted skink

Bush remnants still support a reasonably diverse native avifauna, including kererū, bellbird, brown creeper, greywarbler, fantail and rifleman, but populations are small, and vulnerable to localised extinctions, as has befallen tūi in recent years. There are important spotted shag colonies at Sumner, also under some threat. Other marine species of birds and mammals impinge on the coastal margins of the District, including the white-flipped blue penguin and the New Zealand fur seal. Around 30 native bird species and 20 naturalised ones are currently recorded for the District.

Introduced wild mammals include goat, hare, rabbit, hedgehog, ferret, stoat, weasel, brushtail possum, ship rat, Norway rat, mouse and cat.

3.1.9 Local government and land tenure

The District is split between Christchurch City Council and Banks Peninsula District Council, more or less along the crest of the range. Much of the land is still in private ownership, but increasingly land is being purchased one way or another for public reserves, pushed along by the proximity of the largest urban concentration in the South Island.

3.2 Protected Natural Areas

Eleven percent of the area is protected in one way or another, much more than in Herbert District (3.5 percent) or Akaroa District (1.5 percent). Areas under some form of protection are listed below. Minor council reserves and recreation reserves are not listed. The figures in brackets refer to the card index of natural areas (see Introduction, Section 1.1). In some cases areas are estimated (in hectares).

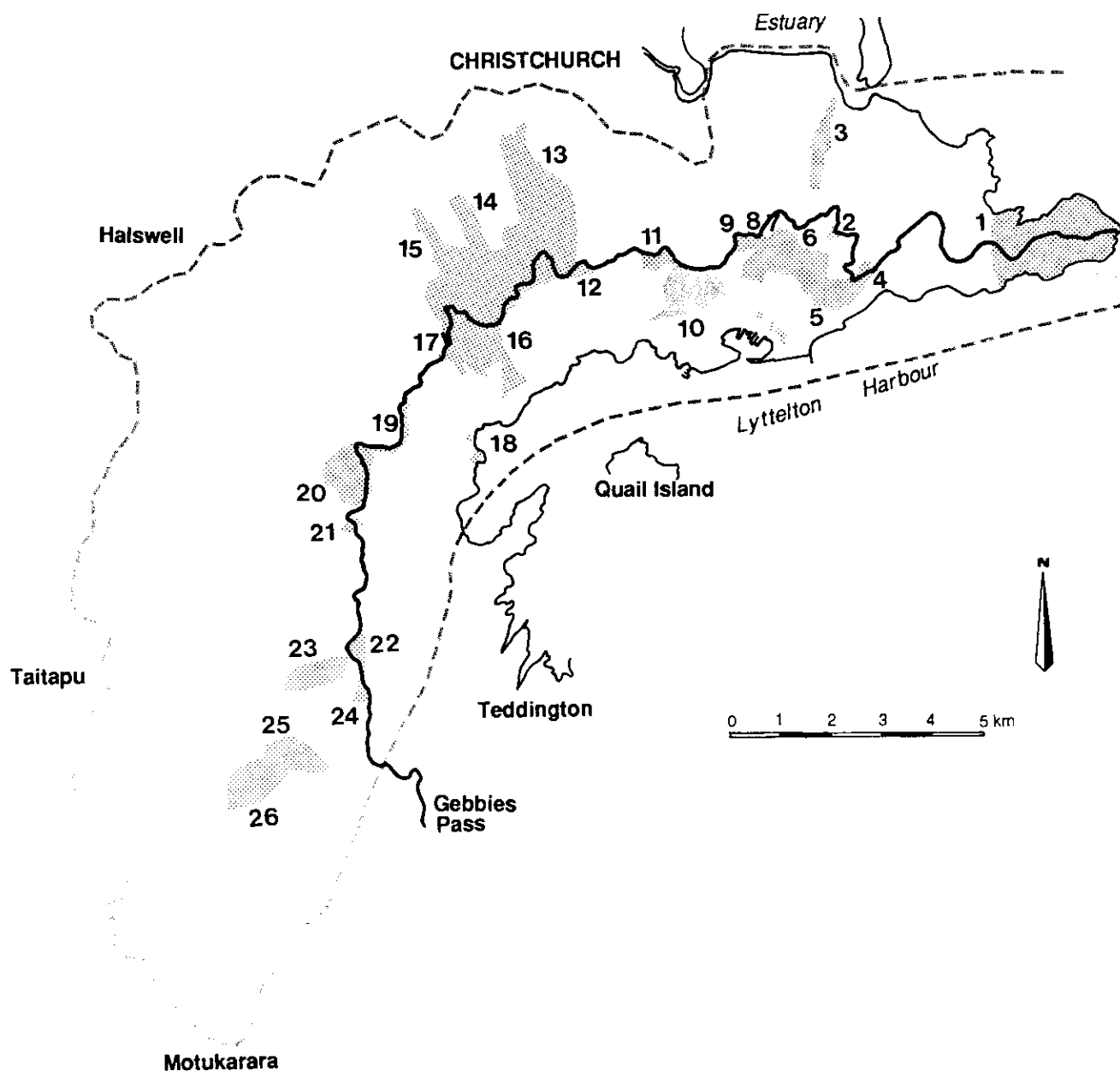
1	Godley Head Farm Park	253 ha	(part 28)
2	Jollies Bush	1.1 ha	(332)
3	Barnett Park	40.1 ha	(part 189)
4	Evans Pass	c. 40 ha	(-)
5	Buckleys Bay	9.4 ha	(125)
6	Ō-Kete Upoko	c. 70 ha	(12)
7	Mount Pleasant	5.4 ha	(part 12)
8	Lyttelton 101	20.1 ha	(12)
9	Mount Cavendish	7.4 ha	(11)
10	Whaka-raupō	86 ha	(-)
11	The Tors	5.3 ha	(174)
12	Witch Hill	5.3 ha	(173)
13	Mount Vernon Park	223.8 ha	(170, 173)
14	Bowenvale Park	194 ha	(126, 127)
15	Victoria Park, Thomson Recreation Reserve and Scott Reserve	108 ha	(-)
16	Sugarloaf	111 ha	(2)
17	Coronation Hill	3.4 ha	(178)
18	Governors Bay Reserves	c. 0.3 ha	(-)
19	Hoon Hay Park	16.6 ha	(181)
20	Kennedys Bush	86.5 ha	(6)
21	Cass Peak	3.2 ha	(7)
22	Coopers Knob	16 ha	(393)
23	Prendergasts' Bush	55.9 ha	(15)
24	Ahuriri	10.9 ha	(206)
25	Ahuriri Tussock	c. 40 ha	(205)
26	Ahuriri Bush	63.3 ha	(205)

MAP 13

Port Hills Ecological District

Protected Natural Areas at June 1991

-  Legally protected reserves
-  Private or other reserves with less formal protection



1 Godley Head Farm Park

Area: 253 ha

Grid Ref centre: N 36 934 354

Reserved: Part reserved prior to 1851 (date unknown) and balance in 1876

Control: Department of Conservation

Access: Summit Road from Evans Pass, Godley Head Walkway from Taylors Mistake or from Summit Road.

Vegetation: Drought-prone pasture across greater part of area, mostly of exotic spp. but with some native elements such as *Convolvulus verecundus* subsp. *waitaha*, *Rytidosperma clavatum* and scattered silver tussock. Steep slopes dropping into Lyttelton Harbour and the coastal cliffs and rocks are of considerable botanical interest, containing excellent silver tussock-shrubland and coastal vegetation. *Carex appressa* occurs above Breeze Bay, a great rarity in Canterbury. Some of the naturalised exotics are of interest, including some colourful shrubby herbaceous and succulent species.

Weeds: *Gorse, *boxthorn.

Other threats: The great danger to the shrublands is fire. Careless spraying of *gorse, or *boxthorn would also be damaging.

Notable wildlife: Spotted shags, white-flippered blue penguins, white-fronted terns, skinks, pipits, skylarks.

Notes: Cessation of grazing of some or all of the steep tussock-shrublands would enhance botanical values. The walkway is a much used recreational facility.

Detailed report: Wilson, Hugh D. 1985: Vegetation and Flora of Godley Head Farm Park. Banks Peninsula Botanical Survey unpublished report, on file.

2 Jollies Bush (Scenic Reserve)

Area: 1.1 ha

Grid Ref. centre: M 36 889 356

Reserved: 1911

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Small area of mixed second-growth hardwood bush planted up and expanded with hundreds of New Zealand trees and shrubs mostly not native to Banks Peninsula. Rangiora is conspicuously naturalised, and planted red beech and black beech form a considerable proportion of the canopy.

Notes: Small size and abundant plantings of "exotic natives" reduce the scientific interest of this reserve, but it forms a very nice place to pause along the Summit Road for a short walk or a sit.

Detailed report: Kelly 1972.

3 Barnett Park (Recreation Reserve)

Area: 40.1 ha

Grid Ref. centre: M 36 887 374

Reserved: 1954, with addition in 1960

Control: Christchurch City Council

Access: Moncks Bay, off Sumner to Christchurch Road.

Vegetation: Silver tussock, pasture, open shrubland, light bush and treeland of māhoe and several other native hardwoods, rock vegetation including both native species and naturalised succulents, especially **Aeonium* and shrubby **Chrysanthemoides*. Lower part of park is recreation reserve with playing fields. Native species of particular interest include: *Anogramma leptophylla*, *Microlaena polynoda*, kawakawa, *Clematis afoliata*, *Carex resectans*.

Weeds: *Gorse, *broom, *elderberry, **Chrysanthemoides*, *hawthorn.

Notes: The Barnett Park Walkway is popular. For many years a neighbouring landowner's Angora goats persistently invaded the reserve to the great detriment of native species. Finally on 5 April 1989 the Council shot 20 goats inside the reserve boundaries.

4 Evans Pass (Pt Claydons Block)

Area: c. 40 ha

Grid Ref. centre: M 36 892 344

Reserved: To be completed

Control: Department of Conservation

Access: Evans Pass Road, Summit Road.

Vegetation: Silver tussock, shrubby and herbaceous species on steep bluff ground with lichens prominent, lowland flax, native trees scattered and in patches. Small areas at the top of Evans Pass are planted in exotic shrubs and New Zealand shrubs many of which are not native to the area. Gentler ground along broad ridge crest has much pasture and some silver tussock. *Festuca* 'Banks Peninsula blue tussock', a regional endemic, is common on the very steep ground and along Evans Pass Road above Lyttelton Harbour.

Notes: Links with other reserves forming the backdrop to Lyttelton.

5 Buckleys Bay (Scenic Reserve)

Area: 9.4 ha

Grid Ref. centre: M 36 887 344

Reserved: 1971

Control: Department of Conservation

Access: Evans Pass Road.

Vegetation: Second-growth bush, steep bluffy ground with shrubs and lichens, open pasture on gently sloped ground on upper part of reserve above the bluffs. Native species of note are: *Sophora prostrata*, *Festuca* 'Banks Peninsula blue tussock', matagouri, lowland flax, *Ileostylus micranthus*, kawakawa, *Scandia geniculata*, *Passiflora tetrandra* and *Olearia fragrantissima*. A feature of the reserve is the abundance of *Fuchsia excorticata* and *F. perscandens* with numerous hybrids, including some obvious backcrosses. *Urtica ferox* is abundant. Silver tussock is common on the steep open ground.

Weeds: *Gorse, *broom, *sweetbrier, *spindleberry.

Detailed report: Kelly 1972.

6 Ō-Kete Upoko (Pt Claydons Block)

Area: c. 70 ha

Grid Ref. centre: M 36 882 350

Reserved: To be completed

Control: Department of Conservation

Access: Walkway from Summit Road through Lyttelton 101 Reserve, or from Lyttelton.

Vegetation: Second-growth mixed hardwood forest, bluff vegetation, silver tussockland, shrubland, scrub, *broom and *gorse scrub with native woody regeneration, exotic grassland, bracken fernland and kānuka forest. The bluffs have both moist and dry habitats; *Sophora prostrata* occurs on the latter. Other species of particular interest include: *Cyathodes juniperina*, *Leucopogon fasciculatus*, *Dracophyllum acerosum*, *Coprosma wallii*, and *Stellaria decipiens* 'big flower'.

Weeds: **Clematis vitalba*, **Berberis darwinii*, *flowering currant, **Pinus radiata*, *gorse and *broom (but see below).

Notes: The purchase of this block for reserve purposes in 1988 is a major conservation gain for the Port Hills. It takes in a sizeable area containing dramatic, steep, bluffy landscapes, several species of restricted distribution on Banks Peninsula, and links three much smaller reserves to protect most of the backdrop to the town of Lyttelton. The Summit Road Society has formed an excellent walking track through the area. Most of the broom and gorse should be left alone; much of it is mature and

reverting to native regeneration which will be enhanced with the elimination of grazing. The name Ō-Kete Upoko (the place of the basket of heads) commemorates an episode of Māori history that happened here.

Detailed report: Wilson, Hugh D. 1989: Notes on the Claydon Block above Lyttelton. Banks Peninsula Botanical Survey unpublished report, on file.

7 Mount Pleasant (Scenic Reserve)

Area: 5.4 ha

Grid Ref. centre: M 36 880 355

Reserved: 1911

Control: Christchurch City Council

Access: Broadleaf Lane, off Summit Road.

Vegetation: Much of the area is disturbed pasture and rocky ground with abundant silver tussock, grazed by sheep. The land falls steeply away on the Lyttelton side into Lyttelton 101 Reserve over bluffs of great botanical interest. Species of note include: *Scleranthus biflorus*, *Scleranthus uniflorus*, *Corokia cotoneaster*, *Hebe strictissima*, *Coprosma wallii* and *C. virescens*.

Notes: The small reserve is dominated and marred by the buildings, pylons and guy-lines constructed within metres of the summit.

Detailed reports: Wilson, Hugh D. 1987: Botanical check on resiting of Telecom mast structure, Mount Pleasant Radio Station, Mount Pleasant Scenic Reserve, Port Hills, Christchurch. Banks Peninsula Botanical Survey unpublished report, on file. Kelly 1972.

8 Lyttelton 101 (Scenic Reserve)

Area: 20.9 ha

Grid Ref. centre: M 36 875 353

Reserved: 1873

Control: Department of Conservation

Access: Summit Road, or from Lyttelton.

Vegetation: Much of area is pasture, shrubland, scrub and treeland, but there are areas of second-growth hardwood forest and an outstanding line of bluffs with unusually moist habitats for the Port Hills. The bluff vegetation also has dry sites, and in all, is extraordinarily diverse, supporting such species as rare filmy ferns and (at the foot of the bluffs under a dripping overhang) the endangered *Leptinella nana*, but also *Sophora prostrata*. Other species of particular interest are: *Leucopogon fasciculatus*, *Cyathodes juniperina*, *Metrosideros diffusa*, *Neomyrtus pedunculata*, *Hoheria populnea* var. *lanceolata*, *Australina pusilla*, and *Olearia fragrantissima*.

Weeds: *Broom, *gorse (but see below).

Notes: The reserve is traversed by both the Major Hornbrook Track and the track into Ō-Kete Upoko Reserve. In the past much unnecessary and counter-productive spraying of *broom and *gorse has occurred in the reserve; both species should be left undisturbed as nurse canopies for native regeneration.

Detailed reports: Thompson 1982; Kelly 1972.

9 Mount Cavendish (Scenic Reserve)

Area: 7.4 ha

Grid Ref. centre: M 36 872 354

Reserved: 1911

Control: Christchurch City Council

Access: Summit Road. Currently plans are proceeding to construct gondola access to the summit from Heathcote.

Vegetation: Much of the area is in open silver tussock and pasture, but there are outstanding dry bluffs facing northwards, and an excellent area of dense silver tussock across the gentle summit. Shrubland and scrub occupy small areas, and there is some *Phormium tenax*. This is one of the few known sites in Canterbury for the rare dry rock ferns *Pleurosorus rutifolius* and *Pellaea calidirupium* which grow with an assemblage of more common but botanically interesting dry habitat species such as prostrate kōwhai and leafless clematis.

Weeds: *Boxthorn, *broom, *gorse. Some exotic dry habitat species such as **Cotyledon orbiculata* are prominent on the bluffs above the road, but probably hardly represent a threat.

Notes: Mount Cavendish has been the centre of much controversy during the 1980s concerning development proposals for a gondola from Heathcote and a restaurant complex on the summit. There is no doubt that the planning approval granted for development of this sort in a tiny scenic reserve sets a serious precedent concerning appropriate uses of protected natural areas.

Detailed report: Kelly 1972; Wilson, Hugh D. 1985: Vegetation on Mount Cavendish in and adjacent to Mount Cavendish Scenic Reserve. Banks Peninsula Botanical Survey unpublished report, on file, with additional notes.

10 Whaka-raupō

Area: 86 ha

Grid Ref. centre: M 36 862 345

Protected: Purchased by Council in 1990

Control: Banks Peninsula District Council

Access: Summit Road, Bridle Path, Lyttelton.

Vegetation: Silver tussock and pasture, *broom and *gorse scrub, many interesting native shrubs and herbs on bluffy ground, including prostrate kōwhai, *Phormium tenax*, broadleaf, māhoe, *Coprosma* spp.

Weeds: * Broom and * gorse. The best management may be to fence off the block of broom and gorse from grazing and allow it to act as nurse canopy for native regeneration.

Notes: Status as protected land is unclear. The District Council purchased this land in 1990 but it is held as Council freehold not reserve. Grazing may continue long-term.

11 The Tors (Scenic Reserve)

Area: 5.3 ha

Grid Ref. centre: M 36 854 350

Reserved: 1911

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Silver tussock dense in places, pasture, shrubland; varied and interesting rock vegetation on scenically very aesthetic outcrops and tors. Species of particular interest include prostrate kōwhai, two regional endemic *Hebe* spp. (*lavaudiana* and *strictissima*), *Cyathodes juniperina* (regionally local), *Lycopodium varium*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Leptinella minor* (regional endemic), *Gingidia enysii*, *Celmisia gracilentia*, *Libertia ixioides*, *Brachyglottis lagopus* and *Convolvulus verecundus* subsp. *waitaha*.

Detailed report: Kelly 1972.

12 Witch Hill (Scenic Reserve)

Area: 5.3 ha

Grid Ref. centre: M 36 840 349

Reserved: 1911

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Rocky shrubland, including prostrate kōwhai, and hybrids with *Sophora microphylla*, pasture with some silver tussock.

Notes: The rock tor and bluffs are good examples of the volcanic dykes radiating from the centre of Lyttelton Volcano and form much of the interest and value of this small reserve.

Detailed report: Kelly 1972.

13 **Mount Vernon Farm Park**

Area: 223.8 ha

Grid Ref. centre: M 36 833 360

Purchased for reserve purposes: 1988

Control: Port Hills Park Trust Board

Access: Hillsborough Terrace, Rāpaki Road, Summit Road.

Vegetation: Mostly silver tussock and pasture, including some good silver tussock areas, some fescue tussock, regenerating native shrubland, scrub and trees in gullies, particularly interesting tussock and rocky summit area on Mount Vernon itself, including a small area of damper, south-facing ground on the Lyttelton Harbour side of Mount Vernon.

Weeds: *Gorse, *broom, *sweet brier, *barberry, *hawthorn, *elderberry, in limited amounts, and selective removal and control is feasible as outlined in the Park's management plan.

Notes: The land is owned by the people of Canterbury having been purchased by the Civic Trust which ceded it by trust deed to the Port Hills Park Trust Board. The management plan indicates a policy of sheep grazing to maintain native tussock cover against competition from rank exotic grasses. The main recreational activities are seen as walking and jogging.

Detailed report: Port Hills Park Trust Board 1989: Mt Vernon Farm Park Management Plan.

14 **Bowenvale Park (Recreation Reserve)**

Area: 194 ha

Grid Ref. centre: M 36 823 347

Purchased for reserve purposes: 1989

Control: Christchurch City Council

Access: Bowenvale Avenue, Huntsbury Track, Summit Road, Dyers Pass Road via Victoria Park.

Vegetation: Predominantly grassland of short tussock and pasture, with some good areas of native tussock. Scattered native small trees and shrubs are continually dispersing into the grassland from localised refugia in gullies, around rocky bluffs, and among fine stands of *Phormium tenax*. One patch of native bush below the Summit Road has been fenced off in the last few years. There is a sizeable exotic plantation of pine. Rock outcrops have an interesting assortment of species.

Weeds: *Broom, *gorse, *nasella, *radiata pine, *flowering currant, *spindleberry, *elderberry, *male fern, *sweet brier, *blackberry, *variegated thistle, *Montpelier broom.

Notes: Management is likely to be along the lines of a farm park like Mount Vernon and Godley Head, with moderate grazing by sheep designed to maintain the native tussockland, and also active protection of bush gullies and patches by excluding grazing from those places. The pine plantation is near harvesting age and could be replaced by native woody species after logging.

Detailed Report: Meurk, Colin D.; Wilson, Hugh D. 1990: Bowenvale Vegetation. Assessment and Management Recommendations. DSIR Land Resources unpublished report, on file.

- 15 **Victoria Park (Recreation Reserve);
Thomson Park (Scenic Reserve); and
Scott Reserve (Recreation Reserve)**

Area: 108 ha

Grid Ref. centre: M 36 815 345

Reserved: Victoria Park 1969, Thomson Park 1947, Scott Reserve 1969

Control: Christchurch City Council

Access: Dyers Pass Road, Summit Road.

Vegetation: Greater part of area is planted as arboretum of exotic species, including many New Zealand natives from other Ecological Regions. There are also areas of silver tussock, pasture, open shrubland, and rock vegetation on outcrops and small bluffs.

Detailed report: Meurk, Colin D.; Wilson, Hugh D. 1990: Bowenvale Vegetation. Assessment and Management Recommendations. DSIR Land Resources unpublished report, on file.

16 Sugarloaf (Scenic Reserve)

Area: 111 ha

Grid Ref. centre: M 36 820 334

Reserved: 1925, 1927

Control: Christchurch City Council

Access: Dyers Pass Road, Summit Road.

Vegetation: Fairly extensive areas of mostly second-growth mixed hardwood forest but with a few surviving podocarps; native scrub, with abundant *Hebe strictissima*; interesting and diverse bluff vegetation; silver tussock; much pasture; good stands of *Phormium tenax*, some matagouri and bracken; * broom scrub which should be left unburnt and unsprayed to provide canopy for expanding native regeneration; small pockets of kānuka. Species of particular interest include *Caladenia catenata*, *Raoulia monroi*, *Leucopogon fasciculatus*, *Cyathodes juniperina*, *Brachyscome sinclairii*, *Leptinella minor*, *Hoheria populnea* var. *lanceolata*, tītoki, kawakawa, native passion vine.

Weeds: **Clematis vitalba*, *barberry (*Berberis glaucocarpa*), *radiata pine, *elderberry, *flowering currant, *spindleberry, *male fern, *gorse and *broom, but established stands of these two species best left undisturbed (see above).

Detailed reports: Kelly 1972, Thompson 1984.

17 Coronation Hill (Historic Reserve)

Area: 3.4 ha

Grid Ref. centre: M 36 813 333

Reserved: 1912

Control: Christchurch City Council

Access: Dyers Pass Road, Summit Road.

Vegetation: Silver tussock grassland and rocky ground, with some native shrubs, including prostrate kōwhai, matagouri, lancewood and fivefinger, with regeneration of forest species in gullies. There is a wealth of lichens on the rocks, and additional ferns and mosses on the south aspects. Around the Sign of the Kiwi are extensive plantings of trees, shrubs, succulents, and herbaceous species exotic to the District.

Weeds: *Broom.

Notes: The reserve is very small, but strategically placed at the intersection of Dyers Pass Road and the Summit Road. Superb views are obtained from all parts of the reserve. Public visitation is very high. The reserve includes the Sign of the Kiwi, popular as a refreshment stop for a high proportion of the public using the Port Hills recreationally; management ideas now under review include making greater use of the building's potential as a Port Hills interpretation centre and tearooms.

Detailed report: Christchurch City Council 1988: Sign of the Kiwi - Coronation Hill Scenic Reserve Management Plan (Draft).

18 **Governors Bay Reserves**

Area: c. 0.3 ha

Grid Ref. centre: M 36 817 315

Reserved: Rhodes Reserve

Control: Rhodes Reserve - Forest and Bird Protection Society, Canterbury Branch

Access: Governors Bay Road.

Vegetation: Rhodes Reserve is a tiny area of second-growth hardwood forest with much māhoe, and some plantings, including species and forms not native to the District.

Weeds: **Clematis vitalba*.

Notes: Besides Rhodes Reserve there are two other very small areas of coastal land reserved within the built-up area of Governors Bay. Despite their small size they have value for native flora and fauna remnants within the Governors Bay community.

19 **Hoon Hay Park (Scenic Reserve)**

Area: 16.6 ha

Grid Ref. centre: M 36 805 315

Reserved: 1912

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Rough pasture with some bracken, occasional shrubs and flax, a little *gorse, and some native plantings (cabbage trees, etc).

Weeds: *Gorse.

Notes: While not important for existing native vegetation, the area is important as recreational open space along the Summit Road and Crater Rim Walkway, and for linking the important new reserves above Governors Bay (see RAP, 4, Port Hills Ecological District) with the Summit Road. The area also adjoins Kennedys Bush Scenic Reserve, PNA 20.

Detailed report: Kelly 1972.

20 **Kennedys Bush** (Scenic Reserve)

Area: 86.5 ha

Grid Ref. centre: M 36 795 307

Reserved: 1906, with additions in 1908, 1914, 1941 and 1954

Control: Christchurch City Council

Access: Summit Road (road runs through the upper part of the reserve).

Vegetation: Second-growth hardwood forest, including māhoe-dominant bush, kānuka-dominant bush, fuchsia/pepperwood bush, and ribbonwood-kōwhai bush and treeland, occupies about a quarter of the area. There are some surviving old podocarps (tōtara and mataī). Elsewhere there is extensive bracken, * gorse, and rough pasture, much of it regenerating into bush either naturally or through extensive assisted planting. Unfortunately much of the planting stock is not of Banks Peninsula origin, including thousands of *Olearia paniculata* of North Island provenance. Parkland-like treeland in the vicinity of the Sign of the Bellbird has high visitor usage, and much aesthetic appeal, plus a good diversity of native tree and shrub species.

Weeds: *Gorse. It should be left alone to be replaced naturally by native regeneration in the absence of fire, grazing and spraying, except in the parkland-like treelands where it would be best removed by hand if invasion occurs.

Notes: While only a few individual podocarps survive to represent the original old-growth forest, the area is a substantial one for native regeneration and significant among the existing Port Hills reserves.

Detailed report: Kelly 1972.

21 **Cass Peak** (Scenic Reserve)

Area: 3.2 ha

Grid Ref. centre: M 36 795 299

Reserved: 1914

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Small area of good thin-bark tōtara/mixed hardwood montane forest, with much broadleaf, pepperwood and mountain fivefinger; some lowland tōtara and mataī below road; also good regeneration of forest species through bracken and flax. The abundance of *Olearia avicenniifolia* is notable - the Cass Peak area has the only population of this species in the District. The fern understorey is good after a long period of fencing, and *Cyathea smithii* is present. (Fencing of part above road was done in 1967).

Weeds: *Himalayan honeysuckle.

Notes: Goats are currently farmed up to the boundary of the reserve and certainly represent a serious threat. This reserve is the only reasonable pocket of montane thin-bark tōtara/hardwood forest surviving in the District. The vegetation type is still reasonably well-represented in the Region.

Detailed report: Kelly 1972.

22 Coopers Knob (Scenic Reserve)

Area: 16 ha

Grid Ref. centre: M 36 795 276

Reserved: 1914

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Extensive bracken with some silver tussock and regeneration of forest species; small areas of second-growth short forest of fuchsia, lacebark, pepperwood, fivefinger, lemonwood, *Coprosma* spp., etc; patches of rough pasture; a few surviving thin-bark tōtara; interesting bluff vegetation - the only site in the District for narrow-leaved snow tussock, with associated species *Cyathodes juniperina*, *Dracophyllum*, *Anisotome aromatica*, etc.

Weeds: * Himalayan honeysuckle.

Notes: There is much regeneration through bracken, especially of *Coprosma robusta*, but this was badly set back in the 1980s by straying cattle from Living Springs. Goats also strayed into Coopers Knob during the time of my survey with very deleterious results.

Detailed report: Kelly 1972.

23 Prendergasts' Bush (National Trust covenant)

Area: 55.9 ha

Grid Ref. centre: M 36 787 270

Protected: December 1985

Control: Landowner in covenant with the National Trust

Access: Private land.

Vegetation: Second-growth bush, with kānuka dominant over much of area but also much mixed hardwood canopy, especially of māhoe, lacebark, ribbonwood, fuchsia, broadleaf, etc; several substantial tōtara and some mataī, with podocarp regeneration.

Three species of tree fern, but almost no regeneration in grazed interior. Species of particular interest in the extensive bushed area are: *Myosotis spathulata*, *Leptolepia novae-zelandiae*, *Rumohra adiantiformis* and *Tmesipteris* sp., but most of these do not appear to be included in the area fenced during the late 1980s.

Notes: There are very good conservation reasons for extending protection over all of the bushed area in this locality.

24 Ahuriri (Scenic Reserve)

Area: 10.9 ha

Grid Ref. centre: M 36 796 267

Reserved: 1914

Control: Christchurch City Council

Access: Summit Road.

Vegetation: Podocarp/mixed hardwood forest with adult and juvenile mataī, adult kahikatea, and diverse hardwoods including māhoe, fuchsia, fivefinger, pepperwood, much *Coprosma rotundifolia* and some māpou. Small areas of bracken rapidly regenerating into second-growth forest since fencing. This is the best remnant of podocarp/hardwood forest in the Port Hills District, although even the big podocarps show evidence of fire. By the mid 1980s much of the interior looked "unbrowsed, damp and lovely" (field notebook, HDW). Species of particular interest include the native climbing groundsel *Brachyglottis sciadophila*, *Coprosma rubra* and *Gastrodia cunninghamii*.

Weeds: *Himalayan honeysuckle, *flowering currant.

Notes: During the 1980s goats were farmed adjacent to this reserve, posing a serious threat.

Detailed report: Kelly 1972.

25 Ahuriri Tussock (National Trust covenant)

Area: 23 ha

Grid Ref. centre: M 36 780 255

Protected: November 1983

Control: Landowner in covenant with the National Trust

Access: Private land.

Vegetation: Moderately close silver tussockland and pasture with scattered cabbage trees, matagouri and kānuka, abutting bush margin along lower edge. Lowland flax, *Aciphylla subflabellata* and *Nertera setulosa* are present.

Notes: The tussockland beautifully complements the extensive forest canopy of Ahuriri Bush. While the forest should be completely ungrazed, perpetuation of the tussock would be favoured by continued light grazing by sheep.

26 Ahuriri Bush (National Trust covenant)

Area: 63.3 ha

Grid Ref. centre: M 36 775 248

Protected: June 1983

Control: Landowner in covenant with the National Trust

Access: Private land.

Vegetation: Extensive second-growth hardwood forest and areas of old-growth forest with abundant podocarps. In the lower part kānuka canopy predominates with kōwhai, lowland ribbonwood and a few cabbage trees. Further up the valley kānuka gives way to mixed hardwood dominance, including akeake and tītoki. The canopy here has abundant tōtara and mataī, with lots of regeneration. There is at least one fine adult kahikatea but no regeneration was noted. Among numerous species of particular interest should be noted: *Microlaena polynoda*, fierce lancewood, velvet fern, native passion vine, *Teucrium parvifolium*, *Olearia fragrantissima*, *Coprosma wallii*. Three species of mistletoe were noted: *Ileostylus micranthus*, *Tupeia antarctica* and *Korthalsella lindsayi*. Ahuriri bush is notable for the number of species that reach their southern limit in Banks Ecological Region: akeake, tītoki, native passion vine, kawakawa. Ngaio is abundant. There is a great diversity of small-leaved and divaricating shrubs, including: *Myrsine divaricata*, *Coprosma virescens*, *C. crassifolia*, *C. rhamnoides*, *C. rotundifolia*, *C. areolata*, *Helichrysum lanceolatum*, *Lophomyrtus obcordata*, *Melicytus micranthus*, *Streblus heterophyllus*, *Melicope simplex*, *Teucrium parvifolium*, *Pseudopanax anomalus*, *Corokia cotoneaster*, plus juvenile *Hoheria*, *Plagianthus*, *Sophora*, *Prumnopitys*, *Carpodetus* and *Pennantia*. On the other hand, tree ferns were not noted.

Notes: This is a very significant stand of bush, perhaps the most outstanding remnant of the Port Hills District. It is also visually important from the Akaroa-Christchurch Highway.

3.3 Priorities for Protection

Priorities for protection in Port Hills Ecological District are listed below in approximate order of importance.

- (i) Old-growth podocarp/hardwood forest: Fragments of the original forest cover of the Port Hills are so rare that all existing examples not yet protected should have the highest priority for protection.

- (ii) More extensive areas of advanced second-growth forest: These represent the best areas of regeneration towards forest similar to the original cover. But in addition, they are currently botanically diverse, visually attractive, and important habitat for native fauna.
- (iii) Extensive dense short tussockland: Dating from Polynesian forest clearance, surviving areas of good short tussock are a major element of the landscape character of the Port Hills. Their conservation involves careful management of grazing, rather than its elimination, as in the case of forest conservation. Slow encroachment of woody plants is inevitable in the absence of fire.
- (iv) Wetlands: These are very rare in the District but the few tiny examples contain significant botanical and zoological values. Some are currently being drained and grazed, so their conservation is an urgent issue.
- (v) Rock outcrops: These are important for geological, landscape and botanical values. They are also much less vulnerable to damage than the other categories. Quarrying represents the greatest threat, but rock-climbers can also affect botanical values to some extent.
- (vi) Dry shrublands and scrub: A reasonable proportion of existing dry shrubland and scrub is already protected in PNAs. The most significant area not included in this report under either a PNA or an RAP is that carded as area 188 between Heathcote and Mount Pleasant, adjoining Mount Cavendish Scenic Reserve.

3.4 Recommended Areas for Protection

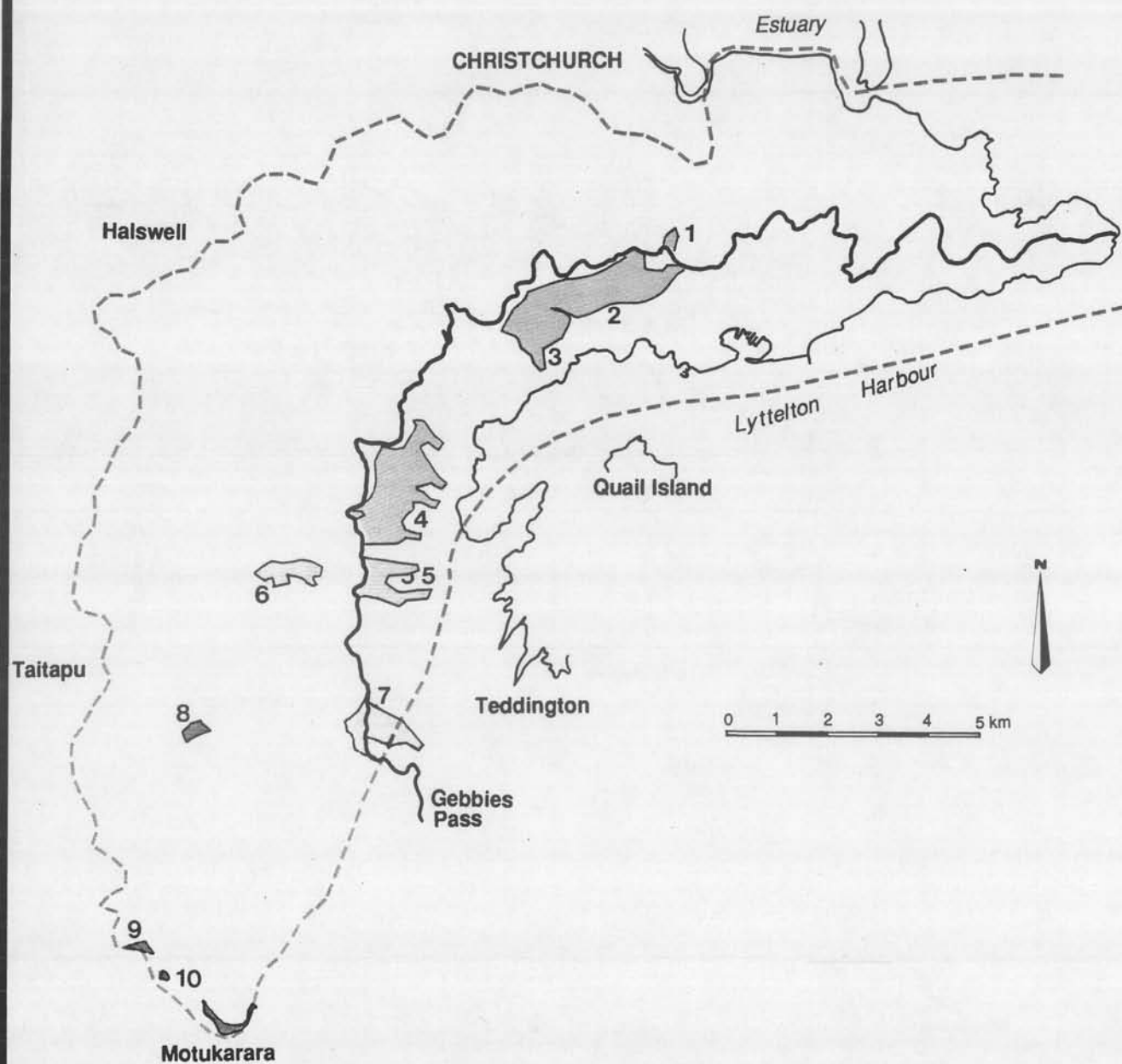
A further 5% of the area of Port Hills District (651 ha) is recommended for protection. This is made up of ten defined areas listed below. The figures in brackets refer to the card index of natural areas (see Introduction, Section 1.1). Areas are estimated in hectares.

1	Castle Rock	c. 8 ha	(9)
2	Rāpaki - Cass Bay	c. 180 ha	(173, 174)
3	Taukahara	c. 90 ha	(172)
4	Ōhinetahi	c. 180 ha	(181, 387)
5	Living Springs	c. 45 ha	(39, 364)
6	Ōtāhuna	c. 40 ha	(143)
7	Gebbies	c. 85 ha	(207, 397)
8	Tai Tapu	c. 7 ha	(210)
9	L 6 Wetland	c. 6 ha	(213)
10	Motukārara Wetlands	c. 10 ha	(343)

MAP 14

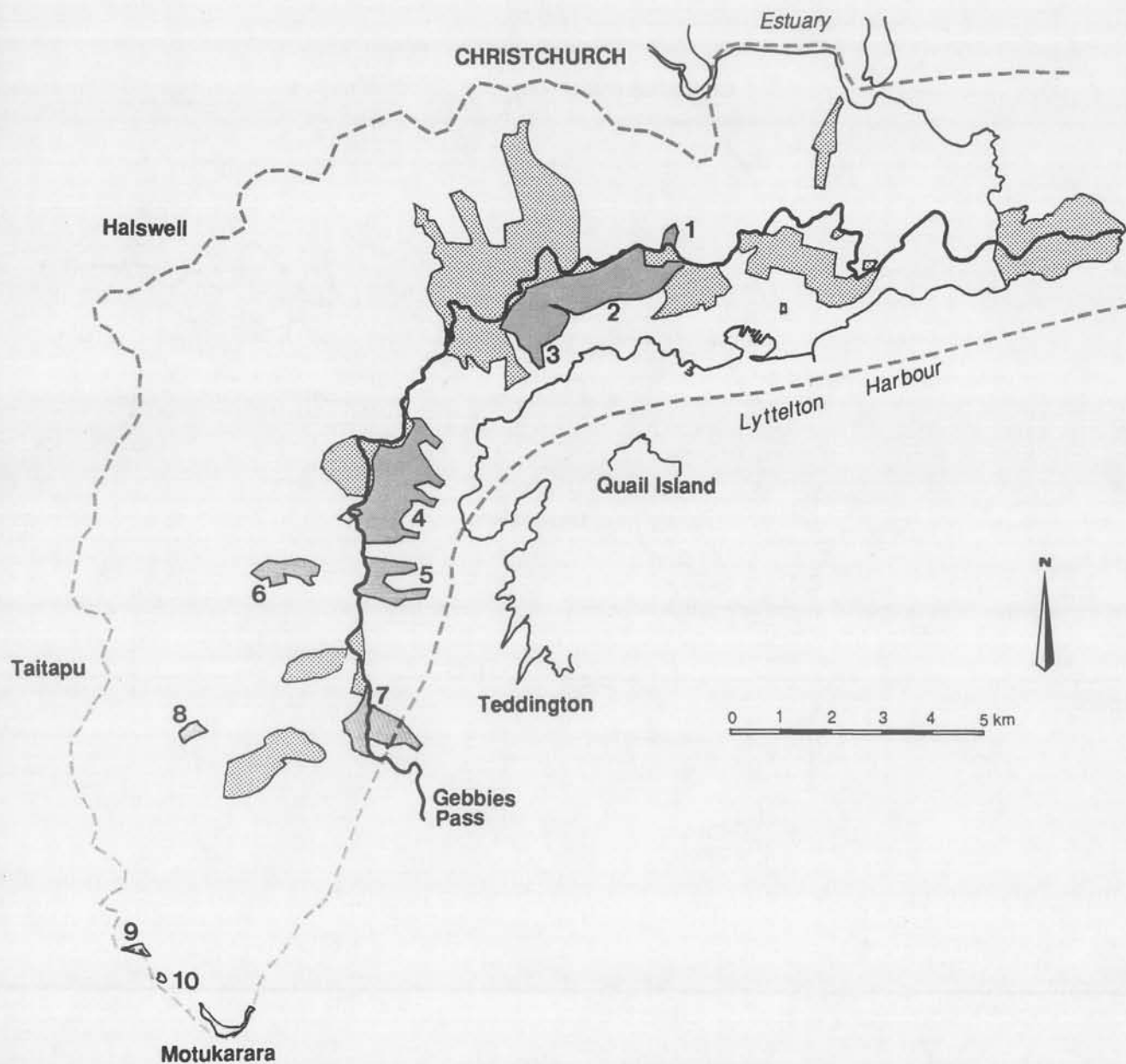
Port Hills Ecological District

 Recommended Areas for Protection



MAP 15**Port Hills Ecological District**

- Recommended Areas for Protection
▨ Areas already under some form of protection





Port Hills RAP 1 - Castle Rock

Area: c. 8 ha

Grid Ref. centre: M 36 857 355

Access: Summit Road; Heathcote (private land).

Ecological classes:

E 13	Lowland small-leaved scrub on hill slopes	5%
F 17	Short tussockland on lowland hill slopes	5%
F 24	Native open shrubland on lowland hill slopes	10%
J 37	Scattered plants on lowland rock	80%

Topography: Castle Rock is a very prominent trachyte dome of the Lyttelton Volcano, one of several very fine examples in Banks Ecological Region and the finest example in Port Hills District.

Plants: A quite extraordinary range of shrubs, herbs, ferns, lichens, mosses and algae inhabits this site. It is the only known Banks Peninsula locality for a tiny fern, *Hymenophyllum* cf. *cupressiforme*. Other rare ferns here are *Pellaea calidirupium* and *Pleurosorus rutifolius*. Among other species of note are: *Asplenium richardii*, *Clematis afoliata*, *Leptinella minor*, *Cyathodes juniperina*, *Earina autumnalis*, *Festuca* sp. 'Banks Peninsula blue tussock', *Gingidia enysii*, *Hebe lavaudiana*, *H. strictissima*, *Korthalsella lindsayi*, *K. salicornioides*, *Leucopogon fasciculatus*, *Raoulia australis*, *R. monroi*, *Scandia geniculata*, *Sophora prostrata* and *Brachyglottis lagopus*.

Wildlife: Common skink.

Weeds: **Pinus radiata* (wilding trees should be removed), *boxthorn, *needle grass.

Notes: Castle Rock is very popular recreationally for rock climbing, scrambling, and viewing. The wide vistas of Canterbury from the rock crest are superlative. Rock climbing has resulted in some damage to botanical features.

Detailed reports: Glenny, David 1987: A checklist of vascular plants at Castle Rock, Heathcote, including a new *Hymenophyllum* to Banks Peninsula. Canterbury Botanical Society Journal 21: 45-48. Fineran, B.A. 1968: The Plants of Castle Rock. In Hutton, D. (Editor) Guide to the Port Hills. Castle Rock and Rapaki Rock: History, Geology, Rock Climbing, and Plants. 15-21. Canterbury University Tramping Club, Christchurch.

Port Hills RAP 2 - Rāpaki - Cass Bay

Area: c. 180 ha

Grid Ref. centre: M 36 845 345

Access: Summit Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	5 %
D 9	Lowland podocarp and podocarp/hardwood treeland on hillslopes	(< 5 %)
D 11	Broadleaved hardwood treeland on lowland hill slopes	(< 5 %)
F 17	Short tussockland on lowland hill slopes	70 %
F 18	Pasture on lowland hill slopes	15 %
F 19	Fernland on lowland hill slopes	(< 5 %)
F 21	Lowland flaxland on lowland hill slopes	(< 5 %)
F 25	Exotic open shrubland on lowland hill slopes	(< 5 %)
J 37	Scattered plants on lowland rock	(< 5 %)

Topography: Steep bluff country with attractive rocky spurs and gullies with much tussock, and some bracken, native trees, shrubs and bush patches.

Plants: The extensive silver tussockland, some of it dense, is the outstanding feature, set off by small bush patches and gullies and by the steep rocky spurs and bluffs. Species of note include: *Festuca* 'Banks Peninsula blue tussock', *Sophora prostrata*, *Rytidosperma corinum*, lowland tōtara, pigeonwood, *Streblus heterophyllus*, *Olearia paniculata*, *Aciphylla subflabellata*, native passion vine, *Ileostylus micranthus*, *Korthalsella lindsay*, mataī, kawakawa, *Senecio glaucophyllus* subsp. *basinudus*, *Brachyglottis lagopus*, *Hebe strictissima* and *Gingidia enysii*.

Wildlife: Common skink, bellbird.

Weeds: **Pinus radiata* (wildings should be removed), *broom, *gorse, *elderberry, *hawthorn, *flowering currant, *spindleberry, **Claytonia perfoliata*, *mouse-ear hawkweed.

Notes: Protection of this large area would conserve much of the extensive south-facing tussock landscape remaining in good condition on the Port Hills. It forms a very pleasing backdrop to the settlements of Rāpaki and Cass Bay. Conservation would not preclude light grazing by sheep across much of the area, but exclusion of grazing from the small bush areas would be very advantageous.

Port Hills RAP 3 - Taukahara

Area: c. 90 ha

Grid Ref. centre: M 36 830 337

Access: Lyttelton-Governors Bay Road; Summit Road.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	5%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	35%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	(< 5%)
D 11	Broadleaved hardwood treeland on lowland hill slopes	(< 5%)
D 12	Kānuka treeland on lowland hill slopes	(< 5%)
F 17	Short tussockland on lowland hill slopes	40%
F 18	Pasture on lowland hill slopes	10%
J 37	Scattered plants on lowland rock	(< 5%)

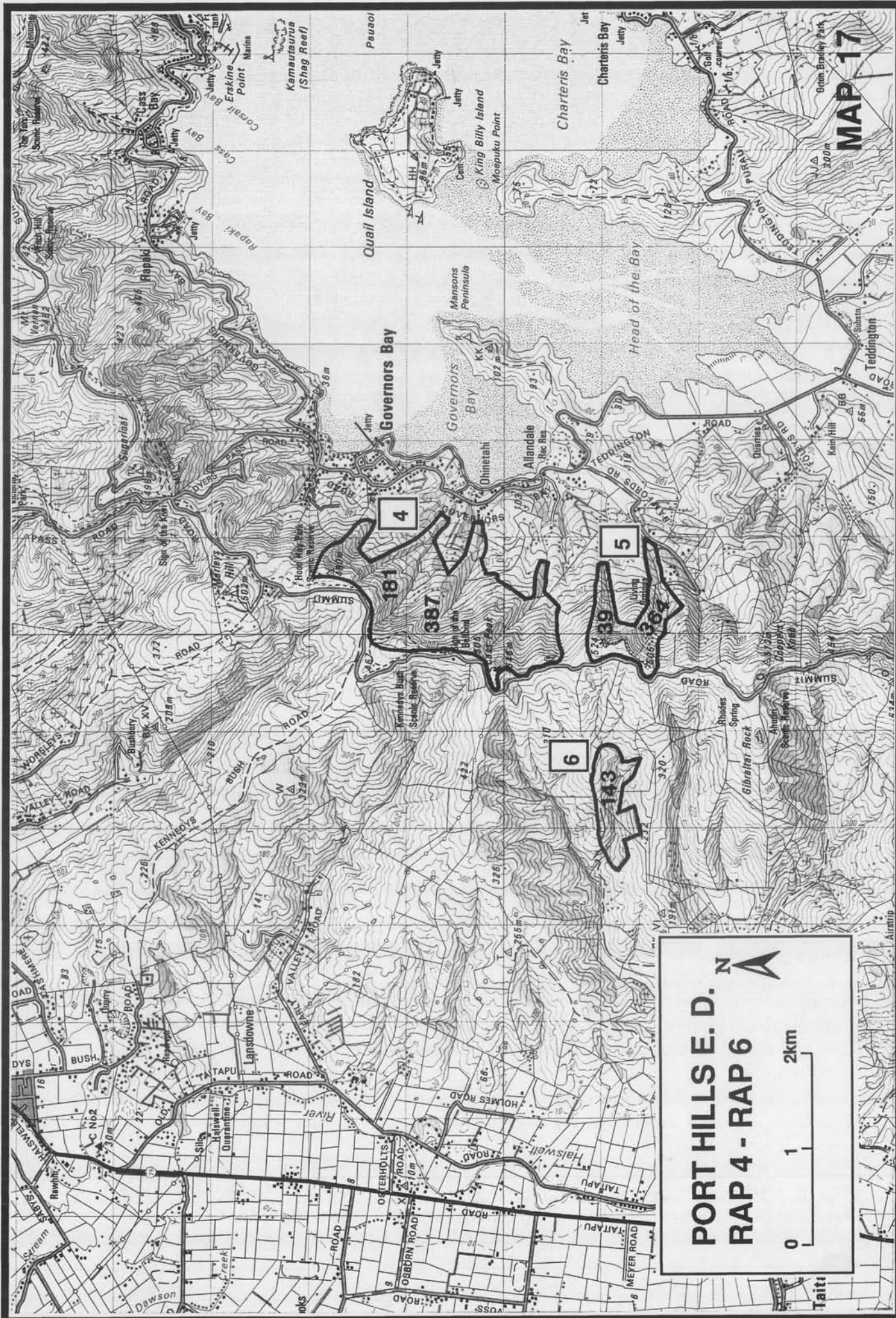
Topography: A steep bushy valley falling from about 440 m down to about 60 m, bounded by steep tussocky and bluffy ground. To the east of the valley a prominent tussocky spur runs out to Te Poho o Tamatea, a large triangular bluff which forms an imposing background to the small settlement of Rāpaki.

Plants: Part of the bush area in the upper part of the valley is dominated by mataī and lowland tōtara. The remainder is typical Port Hills second-growth forest with abundant māhoe, broadleaf, lemonwood, māpou, *Coprosma*, and small areas of kānuka. There are some particularly large specimens of *Lophomyrtus obcordata*. Other species of note include *Hoheria populnea* var. *lanceolata* (rare in District and Region), tītoki, native passion vine, pigeonwood, mānuka (uncommon in District), *Festuca* 'Banks Peninsula blue tussock', *Cyathodes juniperina*, *Sophora prostrata* and *Hebe strictissima*. There is some *Festuca novae-zelandiae* among the silver tussock.

Wildlife: Common bush birds present (e.g. bellbirds, fantails, grey warblers).

Weeds: The most serious is **Clematis vitalba*. At time of writing it is still not widespread but is likely to spread steadily if not checked. Also notable are **elderberry*, **flowering currant*, **Pinus radiata* and **gorse*.

Notes: This is Māori land. The people of Rāpaki (Bill Gillies pers. comm.) are interested in safeguarding the conservation values of the area. Ideally stock should be excluded from the bush areas and the tussocklands should be lightly grazed by sheep. The pine plantation on the western side of the valley (outside the defined area) detracts from the indigenous character of the valley. Te Poho o Tamatea is such a striking landscape feature it might make sense to encourage native woody regeneration on its lower flanks between the bluff and the Lyttelton - Governors Bay Road. The bushed valley is one of the best on the Lyttelton Harbour side of the Port Hills.



Port Hills RAP 4 - Ōhinetahi

Area: c. 180 ha

Grid Ref. centre: M 36 802 305

Access: Summit Road; Governors Bay

Ecological classes:

A 2	Mataī-lowland tōtara/mixed hardwood forest on lowland hill slopes	(< 5%)
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	(< 5%)
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	25%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	(< 5%)
C 8	Naturalised deciduous hardwood forest on lowland hill slopes (wild cherry)	(< 5%)
D 11	Broadleaved hardwood treeland on lowland hill slopes	5%
F 17	Short tussockland on lowland and montane hill slopes	10%
F 18	Pasture on lowland hill slopes	15%
F 19	Fernland on lowland and montane hill slopes	20%
F 21	Lowland flaxland on lowland hill slopes	(< 5%)
F 22	Toetoe tussockland on lowland and montane hill slopes	(< 5%)
F 24	Native open shrubland on lowland and montane hill slopes	5%
F 25	Exotic open shrubland on lowland hill slopes	(< 5%)
H 31	Exotic leguminous scrub on lowland hill slopes	5%
H 32	Exotic non-leguminous scrub on lowland hill slopes	(< 5%)
J 37	Scatter plants on lowland rock	(< 5%)
J 38	Scattered plants on montane rock	(< 5%)

Topography: Steep landscape of gullies falling from crater-rim bluffs, with bush in the gullies, and a range of successional vegetation from pasture and short tussock through bracken, shrubland, scrub, and regenerating mixed hardwoods. Some steep rocky ribs, some of them bushy or shrubby, separate the gullies. There is a steep, wild aspect to these slopes, especially when viewed from the head of Lyttelton Harbour.

Plants: Of particular note are: mataī, lowland tōtara, thin-bark tōtara, *Hoheria populnea* var. *lanceolata* (rare in District and Region), *Sophora prostrata*, *Leucopogon fasciculatus* (uncommon in District, not known from the other two districts of Banks Region), *Olearia avicenniifolia* (local in District and Region), the local abundance of three species of tree fern, *Gingidia montana*, *Celmisia gracilentia* and *Festuca* 'Banks Peninsula blue tussock' (regional endemic).

Wildlife: Common bush birds present (bellbirds, grey warblers, fantails, brown creepers, wood pigeons), harrier hawks, etc.

Weeds: *Gorse, *flowering currant, *elderberry, *wild cherry, **Berberis glaucocarpa*, *gooseberry, *Himalayan honeysuckle, *bittersweet, *blackberry, **Pinus radiata*.

Notes: Wild goats have caused serious damage in this area during the last decade. In June 1991 the Summit Road Society purchased 28 ha of this area and commenced managing it as a reserve, including the provision of better foot access to it. Negotiations are continuing at time of writing to extend reserve status southwards across much of the RAP, with further possible purchases of land by the Summit Road Society.

Detailed reports: Wilson, Hugh D. 1984 to 1986. Three unpublished reports on file, Banks Peninsula Botanical Survey.

Port Hills RAP 5 - Living Springs

Area: c. 45 ha

Grid Ref. centre: M 36 800 287

Access: Summit Road; Living Springs off Bamfords Road, Allandale.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	(< 5%)
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	35%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	30%
D 11	Broadleaved hardwood treeland on lowland hill slopes	(< 5%)
E 13	Lowland small-leaved scrub on hill slopes	(< 5%)
E 14	Montane mixed scrub on hill slopes	5%
F 17	Short tussockland on lowland and montane hill slopes	15%
F 18	Pasture on lowland and montane hill slopes	5%
F 19	Fernland on lowland and montane hill slopes	5%
H 31	Exotic leguminous scrub on lowland hill slopes	(< 5%)
H 32	Exotic non-leguminous scrub on coastal and montane hill slopes	(< 5%)
J 37	Scattered plants on lowland rock	(< 5%)
J 38	Scattered plants on montane rock	(< 5%)

Topography: Steep bushy gullies and regenerating slopes running down from a dramatic crater rim bluff thrusting out over the head of Lyttelton Harbour.

Plants: Only known locality in Port Hills District for two very rare filmy ferns (*Hymenophyllum dilatatum*, *H. atrovirens*). Montane scrub and bluff vegetation is very restricted in District; here it contains turpentine scrub, mountain flax, *Chionochloa conspicua*, *Ranunculus multiscapus*, *Brachyglottis lagopus*, *Pseudopanax colensoi*, *Ctenopteris heterophylla*. The bush areas have some surviving and regenerating podocarps, a few tree ferns, and a diversity of other species including some of particular interest: tītoki, pigeonwood, kawakawa, *Coprosma rubra*, *Hymenophyllum sanguinolentum*, *H. multifidum*, *Hypolepis millefolium* (very rare in District but common in Region), *Lycopodium varium*.

Wildlife: Common bush birds known to be present (bellbirds, grey warblers, fantails, wood pigeons, etc).

Weeds: *Himalayan honeysuckle, *flowering currant, *gorse, *wild cherry.

Notes: This is an outstanding area for the Port Hills, with dramatic landforms, rare plants, and good bush canopies. While some of the bush areas have good interiors little affected by grazing, others are seriously laid bare by farm stock and goats. The whole area except perhaps the short tussockland between the Summit Road and the bluff rim would be best left completely ungrazed.

Detailed reports: Burrows, Colin 1990: Native Forest at Living Springs, Allandale. Unpublished report, Department of Plant and Microbial Sciences, University of Canterbury. Wilson, Hugh 1986: Notes on some areas of particular botanical interest above Governors Bay - Allandale. Unpublished report Banks Peninsula Botanical Survey, on file.

Port Hills RAP 6 - Ōtāhuna

Area: c. 40 ha

Grid Ref. centre: M 36 783 289

Access: Only across private land, from Ōtāhuna (Rhodes Road, Tai Tapu) or from Summit Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	50%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	15%
C 7	Kānuka-dominant second-growth hardwood forest on hill slopes	35%

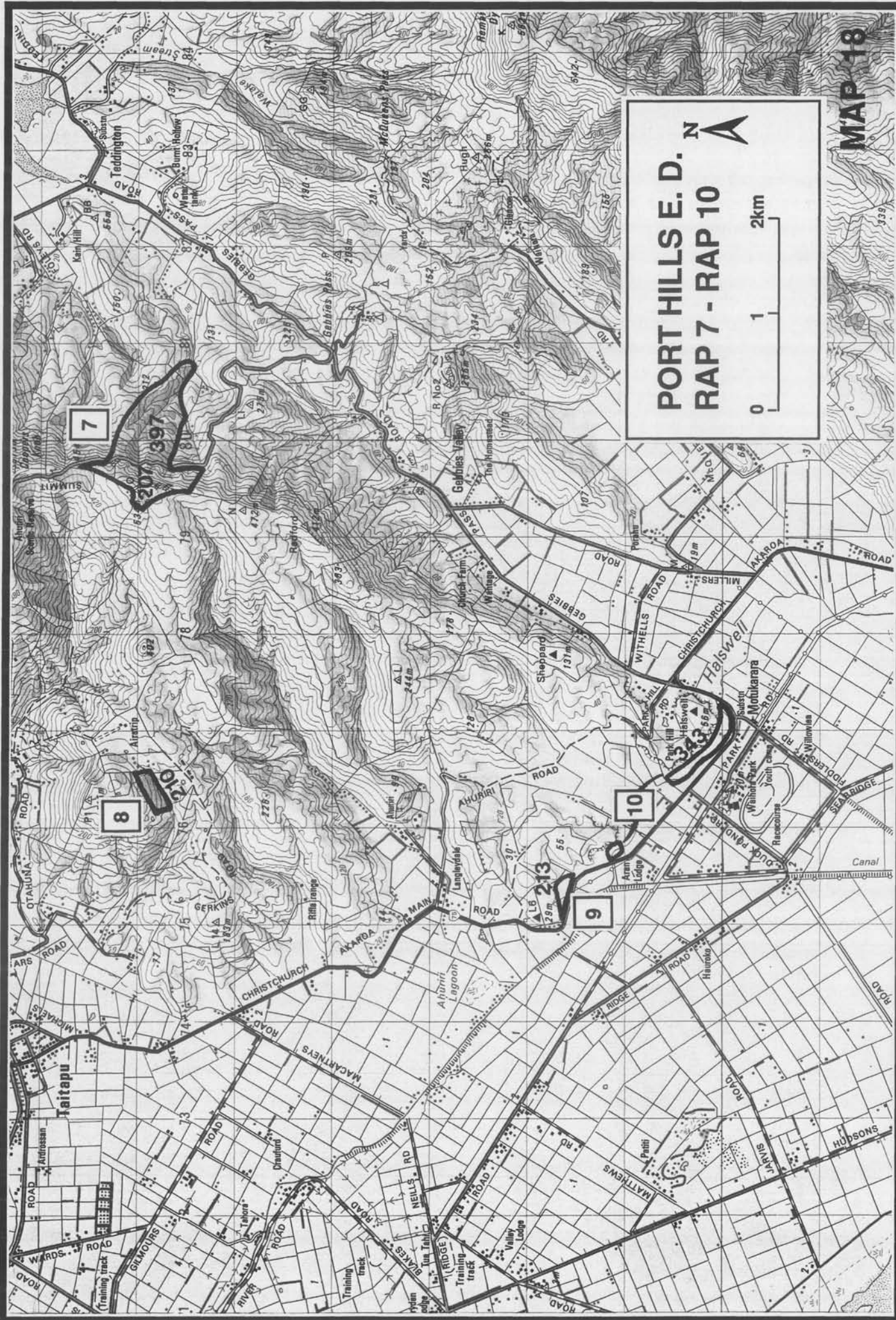
Topography: Gully.

Plants: The abundance of adult and regenerating lowland tōtara and mataī is outstanding. Adult kahikatea, a rarity in Port Hills District, is also present. At least two species of tree fern (*Cyathea smithii* and *C. dealbata*) occur, with some regeneration. There is a very good, extensive population of the uncommon velvet fern (*Lastreopsis velutina*) mixed with *L. glabella*. Cabbage trees and lancewoods are common. Other species of note include: *Metrosideros diffusa*, *Lophomyrtus obcordata*, *Clematis paniculata*, *Echinopogon ovatus*, tītoki and *Streblus heterophyllus*. The kānuka stands are open with a green sward of *Microlaena stipoides*, *Rytidosperma* spp., and *Echinopogon ovatus*, on sharply drained, rather rocky ground.

Wildlife: Common bush birds were recorded (bellbirds, fantails, waxeyes, wood pigeons).

Weeds: *Gorse (see note below).

Notes: This is the best remnant of lowland podocarp/hardwood forest left in the District. At the time of recording it was grazed out, but a rich diversity of species persisted. The greatest threat is spray damage, because gorse comes right up to the edge of the bush. In 1984 there was severe spray damage to kōwhai, kānuka and narrow-leaved lacebark in and near the defined area.



Port Hills RAP 7 - Gebbies

Area: c. 85 ha

Grid Ref. centre: M 36 798 259

Access: Summit Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	25%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	35%
D 11	Broadleaved hardwood treeland on lowland and montane hill slopes	5%
E 13	Lowland small-leaved scrub on hill slopes	20%
F 17	Short tussockland on lowland and montane hill slopes	5%
F 18	Pasture on lowland and montane hill slopes	5%
F 19	Fernland on lowland and montane hill slopes	(< 5%)
H 31	Exotic leguminous scrub on lowland hill slopes	(< 5%)
J 37	Scattered plants on lowland rock	(< 5%)
J 38	Scattered plants on montane rock	(< 5%)

Topography: Very steep slopes dropping from Trig O (534 m) on the southern crest of the Port Hills down through scrubby regenerating bush, tussock and rock outcrops into attractive second-growth bush stands as the slope lessens and runs down through a small bushy valley. Some spectacular rock bluffs.

Plants: Species of particular note are: *Myosotis pygmaea* var. *drucei*, *Brachyglottis sciadophila*, *Hebe strictissima* (regional endemic), *Clematis paniculata*, *Ileostylus micranthus*, pigeonwood, *Lophomyrtus obcordata*, sparse *Cyathea dealbata*, much *Coprosma virescens*, *Coprosma rubra*. There is some very large kānuka, and large *Coprosma robusta* is a feature of the lower altitude bush.

Wildlife: Bellbirds, grey warblers, shining cuckoos, wood pigeons, harrier hawks.

Weeds: *Flowering currant abundant, *elderberry, *gorse; *sweet brier very sparse.

Notes: The whole valley, cut in its upper part by the ascending Summit Road, is particularly wild, steep, attractive and interesting. At the time of recording the regenerating bush was battered by stock, possums, and goats, which had killed adult fivefinger by ring barking, but given respite from grazing and browsing, the regeneration potential is high.

Port Hills RAP 8 - Tai Tapu**Area:** c. 7 ha**Grid Ref. centre:** M 36 764 258**Access:** Only across private land, from Tai Tapu.**Ecological classes:**

A 2 Matai - lowland tōtara/mixed hardwood forest on lowland hill slopes 100%

Topography: Lowland hill slope on side of gully; altitude ranges from about 170 to 270 m.**Plants:** Abundance of adult and regenerating lowland tōtara and matai is outstanding. Good diversity of canopy hardwoods. *Lophomyrtus obcordata* is abundant, and there is good regeneration of narrow-leaved lacebark, and ribbonwood. Other species of particular interest include *Pseudopanax anomalus*, tītoki, native passion vine, *Streblus heterophyllus*, *Melicytus micranthus*. There is a dense, impressive stand of cabbage tree near the upper edge of the bush.**Weeds:** *Gorse adjacent, with a bit of old growth gorse in canopy breaks within the bush area; *elderberry, *broom.**Notes:** This is quite an extraordinary podocarp-rich remnant at a low altitude Port Hills locality. The interior is seriously stock-depleted but the regeneration potential is excellent if stock could be excluded. Gorse patches within the bush should be left alone.

Port Hills RAP 9 - L 6 Wetland

Area: c. 6 ha

Grid Ref. centre: M 36 754 216

Access: Christchurch - Akaroa Road near Motukārara.

Ecological classes:

G 27 Freshwater lowland marsh and flush

100%

Topography: Flat wetland in small embayment on edge of hills, fed by springs upwelling at margin of plains against the Peninsula's basalt. Soil is black and peaty.

Plants: A surprisingly rich assemblage of plant species occupies this small area of marsh, including abundant *Baumea rubiginosa* which is rare in Canterbury. Other species of note are: *Schoenoplectus validus*, *Potentilla anserinoides* (regionally rare and local), *Centella uniflora*, *Carex sinclairii*, *C. flaviformis*, *C. virgata*, *C. flagellifera*, *Epilobium pallidiflorum*, *Eleocharis acuta*, *Schoenoplectus pungens*, *Triglochin striatum* and *Ranunculus glabrifolius*. In the locality, but perhaps not within the defined area, is *Cyperus ustulatus*, a giant sedge which reaches its southern limit in Banks Ecological Region.

Wildlife: Not yet adequately studied, but the locality is close to the rich birdlife of Lake Ellesmere. At the time of writing mallards, grey ducks, and harrier hawks have been noted.

Weeds: **Mimulus guttatus*, **Ranunculus repens*, several naturalised *rushes, *tall fescue, *yorkshire fog, *watercress, **Veronica catenata*. *Grey willow is nearby and is potentially invasive.

Notes: The natural values of this small area of roadside flat land have obviously not been recognised. Drainage ditches have modified the marsh and it is grazed, but a great deal of interest remains. Conservation needs would require blocking the drains and keeping cattle out of the area. Moderate or light grazing by sheep would probably prove beneficial in keeping exotic grasses down around the margins. The land is owned by the Canterbury Regional Council and is leased for grazing. Thus the opportunity exists for protecting this wetland, which is a rare vegetation type within the Port Hills District and Banks Region. Despite this major drainage channels were re-opened in 1991.

Port Hills RAP 10 - Motukārara Wetlands

Area: c. 10 ha (in two bits, the main area opposite Waihora Park, the smaller area, less than a hectare, opposite Aran Lodge).

Grid Ref. centres: Main area, M 36 768 201

Smaller area, M 36 758 212

Access: Christchurch - Akaroa Road near Motukārara.

Ecological classes:

G 27 Freshwater lowland marsh, swamp, flush and emergent aquatic vegetation 95%

G 28 Freshwater lowland submerged or floating aquatic vegetation 5%

Topography: Spring-fed (slightly warm) very gently sloping flush, marsh and swamp running into the very slow moving Halswell River.

Plants: Most of the area is dominated by raupō, with *Schoenoplectus validus* dominant in what appear to be wetter areas. Other areas are dominated by **Juncus articulatus* and pasture spp., especially *yorkshire fog. There are many native species of note: *Baumea rubiginosa* (rare in Canterbury), *Carex sinclairii*, *Ranunculus glabrifolius*, *Triglochin striatum*, *Epilobium billardierianum*, *Ranunculus macropus*, *Potentilla anserinoides*, *Carex flaviformis*, *C. flagellifera*, *C. secta*, *Centella uniflora*, *Juncus planifolius*, *Eleocharis acuta* and *Cotula coronopifolia*. In the stream occur: *Schoenoplectus validus*, *Bolboschoenus caldwellii*, *Azolla filiculoides*, *Potamogeton cheesemanii*, *P. pectinatus*, *Myriophyllum triphyllum*, *Lemna minor*, and a robust charophyte. Lowland flax and toetoe grow on the hillside margin. The smaller area to the north-west is a dense raupō stand, with *Schoenoplectus validus*. Along the hillside margin are a few large tussocks of *Cyperus ustulatus* (southern limit in Region) and toetoe.

Wildlife: Not yet adequately studied but the following were recorded: *frogs (*Litoria raniformis*), *goldfish, spurwinged plovers, whitefaced herons, welcome swallows, *mallards, grey ducks, harrier hawks, black shags, damselflies.

Weeds: *Crack willow, *grey willow, naturalised *rushes, **Mimulus guttatus*, *yorkshire fog, **Ranunculus sceleratus*, *tall fescue, **Ranunculus repens*, *creeping bent, **Glyceria declinata*, **G. fluitans*, **Elodea canadensis*, **Veronica catenata*, **Ranunculus trichophyllus*, *watercress.

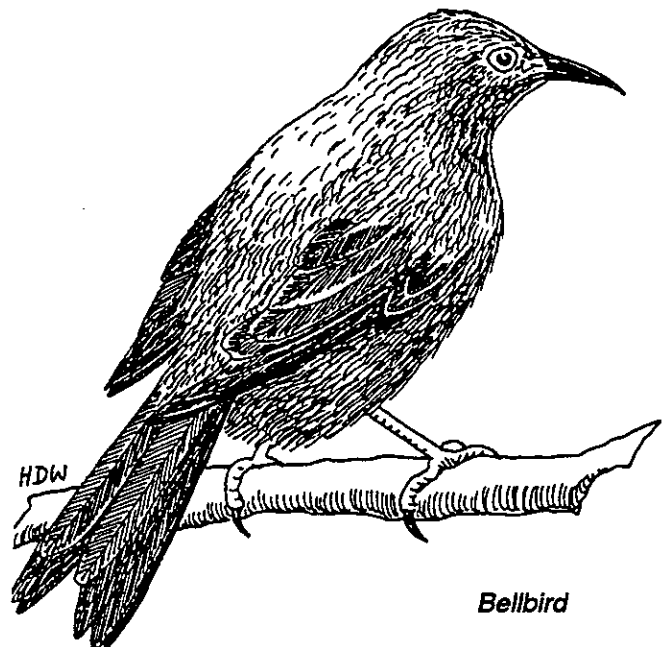
Notes: The main area is a very valuable wetland that unfortunately has already suffered much from grazing by horses, (? and cattle) and from drainage. In 1990 large drainage ditches were dug through raupō and *Schoenoplectus* at the eastern end of these wetlands. The main area is on private land. The smaller area to the north-west, however, is on land owned by the Canterbury Regional Council. At the time of writing it has been slightly affected by horse grazing, but not by drainage. It is also a very valuable stand in terms of conservation, and its protection is in the public interest.

Additional notes, Port Hills RAPs

In addition to the listed and described RAPs, suggestions are made for the possible extension of PNA 23, Prendergasts' Bush. See notes under that entry.

SECTION FOUR

Herbert Ecological District



SECTION FOUR: HERBERT ECOLOGICAL DISTRICT

4.1 Descriptive summary

With a total area of approximately 41,000 ha, Herbert Ecological District is three times the area of Port Hills Ecological District and only a little smaller than Akaroa. It has the highest summits, the greatest altitudinal range, and the greatest climatic range from dry to moist, although it lacks the mildest, moist, oceanic micro-climates which are one of the striking characteristics of the Akaroa District. Herbert is further marked by a much more complex geology than either Port Hills or Akaroa.

4.1.1 Topography

The district comprises dissected hill country rising from sea level to 920 m at the summit of Mount Herbert. Four more summits exceed 800 m altitude, and a further six are 700 m or more high. Three major embayments cut into the northern coastline. Lyttelton Harbour is by far the largest of these, but both Port Levy and Pigeon Bay are longer than 6 km and wider than 1 km. In the south corner Lake Forsyth represents a similar bay, now maintaining only a tenuous connection with the sea, and only slightly brackish. While the northern edge of the District is a marine coastline, the south-western edge abuts the Plains, Lake Ellesmere, and Kaitorete. The valleys are deeply cut and substantial; several exceed 6 km in length, with reasonably extensive areas of alluvial flat land in their lower reaches. Many of the ridges are rounded, but there are many prominent tors, bluffs and outcrops adding a dramatic element to the landscape as on the Port Hills, but on a rather grander scale.

4.1.2 Geology

Herbert Ecological District has a much wider range of rock types and these span a much greater length of geological time than either Port Hills or Akaroa. The oldest rocks are sedimentary, dating back to about 240 million years ago; they represent ancient terrain long predating the volcanoes, and now exposed at the surface as a result of deep erosion of the volcanic overburden. Also exposed are andesites and rhyolites erupted about 90 million years ago, again long predating the basalts and trachytes of the Lyttelton, Akaroa, and Mount Herbert volcanoes. The Charteris Bay sandstones are about 65 million years old, and younger sediments exposed in the same area are about 20 million years old, both resulting from a long interlude of marine submergence before the volcanic activity which formed the bulk of the District and of the Peninsula began about 15-12 million years ago. Most of Herbert Ecological District results from the sequential eruptions of the Lyttelton, Akaroa, Mount Herbert and Diamond Harbour volcanics between 12 and 5.8 million years ago, and the geological map (Map 12 p. 61) shows the complex pattern which ensued. Thus the District has sandstones, andesite, rhyolite, basalt, trachyte, and small areas of unconsolidated recent alluvium, spanning a geological history of about 240 million years.

4.1.3 Soils

Soils are derived from both the igneous bedrock and from loess. (The limited areas of sedimentary rocks are mostly deeply mantled with loess) On lower slopes the soils are mainly loessic with pale, compact subsoils, often droughty in summer (yellow-grey earths). On higher slopes the soils are derived either from loess (yellow-brown earths) or basalt (brown granular loams), or in many cases a mixture of both. Those derived from basalt have dark brown, blocky structured, stony clay loam subsoils; those from loess have yellowish brown friable to firm silty subsoils; those from mixed loess/basalt have intermediate features. Limited areas are flushed or have impeded drainage. There are also significant areas of recent alluvium in the lower stretches and mouths of some valleys. These include gley recent soils, saline gley recent soils, yellow-brown sands, and organic soils (peaty loams).

4.1.4 Climate

Rainfall is in the order of 600-2000 mm per annum, with steep rainfall gradients from drought-prone outer spurs and headlands, to the humid interior. The geographical range of precipitation is much greater than in Port Hills District, but probably more or less comparable with Akaroa District, although the moistest parts of the Akaroa District's coastline are certainly unmatched within Herbert. Rainfall increases rapidly with increasing altitude. It is more or less evenly spread throughout the year but there appears to be a distinct maximum in winter. Snow lies after southerly storms every winter, mostly above about 600 m and for only a few days, but snowbanks may persist for weeks on the highest summits and ridges. Summits are often cloud-capped, especially in easterly and southerly conditions. Prevailing winds are easterly, but these are variably rain-bearing. Strong, dry, nor'west winds often exacerbate summer drought conditions.

4.1.5 Drainage

The larger valleys contain permanently flowing streams, although many smaller valleys have streams which flow through winter but more or less dry up through much of the summer. There are numerous reliable springs, and many of the streams have waterfalls, up to about 30 m high. The largest streams are those in the Kaituna and Little River Valleys. The latter drains into Lake Forsyth, a slightly brackish freshwater lake about 6 km long and about 1 km wide for much of its length. When the lake level gets too high for surrounding farmland it is artificially opened at the shingle barrier preventing its continuous outlet to the sea. The flushing out of the lake basin by this means is not enough to significantly ameliorate the serious eutrophication which has occurred over more than a century of European farming.

Narrow strips of permanently flushed ground below springheads are common in the District, mostly at higher levels. In drought summers they stand out vividly green against the surrounding browned-off pasture. There are very small areas of impeded drainage, and numerous farm ponds, especially on the drought-prone northern spurs.

4.1.6 Vegetation

Herbert Ecological District would have been almost entirely forested, prior to human arrival, with podocarp/hardwood forest. Lowland forest of lowland tōtara, mataī and kahikatea with māhoe, broadleaf, kaikōmako, pigeonwood, etc, occupied the valley floors and hill slopes up to about 500 m. Two further podocarps, rimu and miro, occurred in these forests, probably locally so, but these two trees appear to have been absent from the other two Districts of the Region. Above about 500 m montane podocarp/hardwood forest, dominated by thin-bark tōtara, with native cedar (*Libocedrus*) at the upper levels, was extensive. On the highest bluffs shrubland and scrub of non-forest montane species such as snow-tussock, fescue tussock, *Dracophyllum* and mountain flax maintained a hold in the overwhelmingly forested landscape.

Within the last thousand years Polynesian settlers removed between one-third and one-half of the forest cover, including nearly all that which occupied the land sloping into Lyttelton Harbour and around Gebbies Pass. Tussock, bracken, shrubland, scrub and second-growth forest spread from cliffs, outcrops and rare slips to occupy the deforested land. Large areas, especially in the north, west, and south-west of the District, have been under native tussock for centuries, a vegetation that is not permanent without continuing disturbance such as by fire and grazing, but one that must have looked completely natural to the first European settlers arriving about 150 years ago.

During European settlement nearly all the remaining forest was removed, by logging, burning, and conversion to pasture. The largest continuous area of old-growth forest in Banks Ecological Region survives under Mount Herbert at the head of the Kaituna Valley. It is chiefly thin-bark tōtara/hardwood forest, but at its lowest point (about 350 m) there is lowland podocarp/hardwood forest with lowland tōtara, mataī and kahikatea. Some other fragments of lowland old-growth forest remain in the District. They are tiny in area, but represent the best lowland remnants in the whole of Banks Region.

Much of the District is now grazed by sheep, and to a lesser extent by cattle and goats. There are small areas of exotic forestry plantation and woodlots, and even smaller areas of intensive horticulture and orcharding. Suburban settlement is concentrated around Diamond Harbour along the edge of Lyttelton Harbour. Other settlements are more rural in character. The largest of these is the township of Little River, but there are clusters of scattered housing also at Port Levy and Pigeon Bay.

A lot more ground than remains in old-growth forest has regenerated into mixed hardwood and kānuka-dominant second-growth forest, so that the landscape is much more wooded than it was 100 years ago. Extensive tussockland and fernland survives, but much of the tussock is thinned out with intervening intertussock pasture, vegetation very different from the dense silver and fescue tussock which met the first European settlers. Herbert District has much more fescue tussockland than either of the other two Districts in the Region, largely a reflection of forest clearance in Māori times across extensive areas of high ground. An anomaly is the absence of *Chionochloa rigida* (narrow-leaved snow-tussock) from Mounts Herbert and Bradley. In this area *Chionochloa conspicua* forms significant tall tussocklands.

4.1.7 Flora

Despite centuries of modification and disturbance, complete losses among the vascular species appear to be few, although some are represented by only a few surviving individuals. The current vascular flora totals about 445 species (Appendix 1). These include 5 regionally endemic taxa, but no taxa endemic to the District. Forty eight species recorded in Herbert District during the survey were not recorded in either of the other two Districts, including such conspicuous species as shrubby wineberry, climbing broom, rimu, miro, *Epilobium macropus*, *Gaultheria crassa*, *Geum parviflorum*, *Hebe odora*, *Olearia arborescens*, *O. nummulariifolia* and *Thelymitra decora*. All 48 are found elsewhere in New Zealand, and none are nationally endangered.

Vascular species of particular interest and concern in Herbert District are:

<i>Anemanthele lessoniana</i>	(rare in District and Region)
<i>Anogramma leptophylla</i>	(nationally local)
<i>Asplenium richardii</i>	(rare in District and Region)
<i>Asplenium trichomanes</i>	(rare in District and Region)
<i>Baumea rubiginosa</i>	(rare in Canterbury)
<i>Botrychium biforme</i>	(probably rare in Region)
<i>Brachyglottis bellidioides</i>	(rare in Region where restricted to one locality in District)
<i>Brachyglottis sciadophila</i>	(nationally uncommon, rare in Canterbury)
<i>Carex appressa</i>	(rare in Canterbury)
<i>Carex</i> sp. 'tenuiculmis'	(rare in District and Region)
<i>Carmichaelia kirkii</i>	(nationally vulnerable; very local in District and nowhere else in Region)
<i>Clematis marata</i>	(very rare and local in District and Region, but common elsewhere; type locality in District)
<i>Cordyline indivisa</i>	(rare in District and Region)
<i>Cyperus ustulatus</i>	(uncommon in District and Region; southern limit in Region)
<i>Dacrydium cupressinum</i>	(very rare in District and nowhere else in Region)
<i>Dicksonia fibrosa</i>	(rare in District and Region)
<i>Grammitis ciliata</i>	(rare in Region and at southern limit)
<i>Griselinia lucida</i>	(uncommon in Region and at southern limit)
<i>Hebe odora</i>	(rare and local in District; nowhere else in Region)
<i>Hoheria populnea</i> var. <i>lanceolata</i>	(rare in Canterbury)
<i>Libocedrus bidwillii</i>	(vulnerable in Region)
<i>Lycopodium australianum</i>	(very rare in District, and not known elsewhere in Region)
<i>Microlaena polynoda</i>	(uncommon in Region and in Canterbury)
<i>Myosotis australis</i>	
var. <i>lytteltonensis</i>	(rare Banks Region endemic)

<i>Olearia arborescens</i>	(restricted to District within Region; common elsewhere)
<i>Olearia fragrantissima</i>	(uncommon in District and Region; northern limit)
<i>Olearia odorata</i>	(very rare in District; not elsewhere in Region)
<i>Olearia bullata</i>	(rare in District and Region)
<i>Parahebe lyallii</i>	(rare in District and Region)
<i>Pellaea calidirupium</i>	(nationally local; rare in District and Region)
<i>Pleurosorus rutifolius</i>	(nationally rare; rare in District and Region)
<i>Prumnopitys ferruginea</i>	(rare in District; not elsewhere in Region)
<i>Pseudopanax ferox</i>	(nationally uncommon and local, but quite common in Region and especially in District)
<i>Pteris tremula</i>	(rare in District; uncommon in Region, southern limit)
<i>Raoulia tenuicaulis</i>	(very rare in District; not known elsewhere in Region; but common nationally)
<i>Rumohra adiantiformis</i>	(rare in Banks Region)
<i>Schoenoplectus validus</i>	(local in District and Region)
<i>Sticherus cunninghamii</i>	(rare and local in District and Region)
<i>Teucrium parvifolium</i>	(nationally rare)
<i>Thelymitra decora</i>	(rare and local in District; not known elsewhere in Region)
<i>Tmesipteris tannensis</i>	(rare in Canterbury)

4.1.8 Fauna

In terms of species losses the fauna has fared more badly than the flora from the impact of *Homo sapiens*. Herbert District has lost at least half of the native bird species present at the time of human arrival, and an unknown but certainly large proportion of the invertebrate fauna (see Section 2.7 for a Regional discussion).

Vertebrate species of particular interest or concern in Herbert District include:

- whitebait (*Galaxias* spp.)
- jewelled gecko
- common gecko
- spotted skink
- common skink
- white-flipped blue penguin
- southern crested grebe
- spotted shag
- kererū or wood pigeon
- morepork (now very rare)
- brown creeper
- South Island rifleman
- South Island tomtit
- fur seal

Bush remnants still support a reasonably diverse native avifauna including kererū, bellbird, brown creeper, grey warbler, fantail, rifleman, tomtit and shining cuckoo, but populations are small in some cases and vulnerable to local extinction as has befallen tūi in recent years, and longer ago, but still well after the European pioneering period, kākā, red-crowned and yellow-crown kākārīki, yellowhead and robin.

Many marine species of birds and mammals impinge on the coastal margins of the District. Although in general they have fared better than the terrestrial fauna they are certainly under some threats.

Around 40 native bird species and about 23 naturalised ones are currently recorded for the District.

Introduced wild mammals include goat, hare, rabbit, hedgehog, ferret, stoat, weasel, brushtail possum, ship rat, Norway rat, mouse and cat.

4.1.9 Local government and land tenure

The whole District is administered by Banks Peninsula District Council. Nearly all of the land is in private freehold.

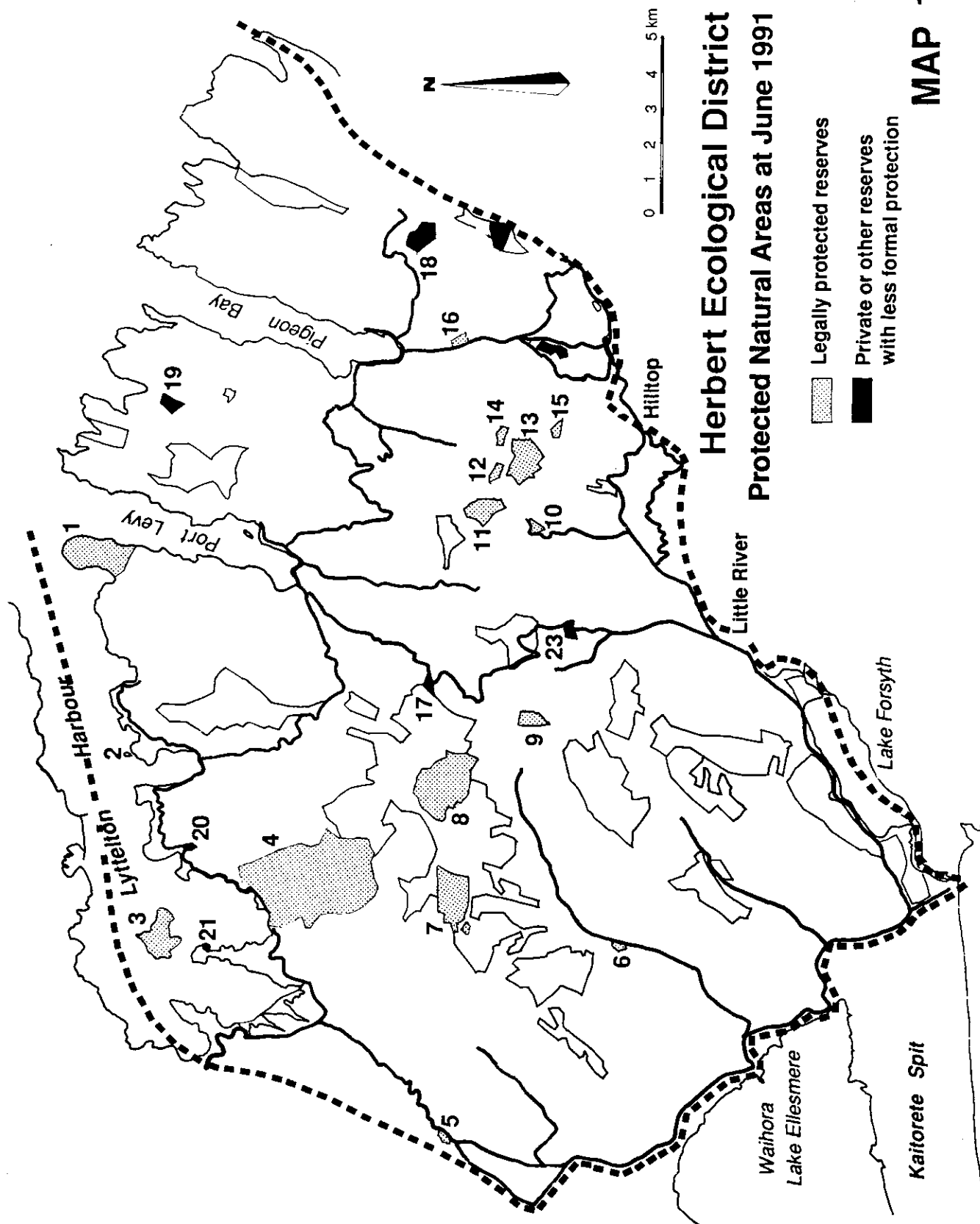
4.2 Protected Natural Areas

Only 3.5% of the District is formally protected one way or another for conservation values, compared with 11% in Port Hills District and 1.5% in Akaroa District at time of writing. Areas under some form of protection are listed below. Minor Council reserves and recreation reserves are not listed. The figures in brackets refer to the card index of natural areas (see Introduction, section 1.1). In some cases areas are estimated (in hectares).

1	Adderley Head	132 ha	(471)
2	Ripapa Island	1.6 ha	(-)
3	Quail Island	81 ha	(103)
4	Orton Bradley Farm Park	c. 640 ha	(169, 194)
5	Gebbies Valley rhyolite	8.1 ha	(-)
6	Kaituna Valley	5.9 ha	(301)
7	Sign of the Packhorse	104 ha	(3, 31)
8	Mount Herbert	240 ha	(14)
9	Kaituna Spur	23 ha	(198)
10	Morice Settlement	6.1 ha	(149)
11	Mount Fitzgerald	43.7 ha	(150)
12	Holmes Valley	c. 10 ha	(558)
13	Mount Sinclair	70.5 ha	(148)
14	Glenralloch	6.8 ha	(552)
15	Whatarangi Tōtara	4.7 ha	(147)
16	Hay	6 ha	(183)
17	Port Levy	8.5 ha	(383)
18	Goodwin	11.6 ha	(283)

19	Double Bay	c. 15 ha	(537)
20	Hunter Native Forest	8.2 ha	(399)
21	Moepuku Point	c. 1.5 ha	(105)
22	Kūkupa Forest Farm Reserve	c. 15 ha	(457)
23	Jones' private reserve, Western Valley	c. 8 ha	(328)
24	Kūkupa Council Reserve	c. 0.5 ha	(462)

[Pearce - see Akaroa District]

**MAP 19**

1 Adderley Head (Scenic Reserve)

Area: 132 ha

Grid Ref. centre: N 36 959 332

Reserved: Date unknown

Control: Department of Conservation

Access: By foot-track across private land from Camp Bay to Little Port Cooper. By sea to Little Port Cooper.

Vegetation: Open droughty pasture with some silver tussock; extensive coastal cliffs and banks with mixed native and naturalised flora including *Disphyma australe*, *Clematis afoliata*, *Linum monogynum*, *Sonchus kirkii*, *Coprosma crassifolia*, *Muehlenbeckia complexa*, *Haloragis erecta*, *Festuca* 'Banks Peninsula blue tussock', *Einadia triandra*, *Phormium tenax*, *Deyeuxia billardierei*, *Samolus repens*, toetoe, *Olearia paniculata*, **Cotyledon orbicularis*, *boxthorn, **Stipa nodosa*, **Matthiola incana*, and **Vittadinia gracilis*.

Weeds: *Boxthorn, *variegated thistle, *gorse.

Notable wildlife: Spotted shags, white-flipped blue penguins, white-fronted terns, occasional fur seals, skinks, pipits, skylarks, welcome swallows, harriers.

Notes: Historic old signal station sits on the open high point behind the headland. The headland itself, abruptly cliffed, is a dramatic landmark at the entrance to Lyttelton Harbour. The coastal cliffs and banks harbour many interesting native species but also some thick infestations of boxthorn. Control of the *boxthorn is probably completely impractical. Light grazing by sheep is probably the best management option for maintaining native tussock in the droughty grassland.

2 Ripapa Island (Historic Reserve)

Area: 1.6 ha

Grid Ref. centre: M 36 902 319

Reserved: 1857 (as a reserve for military defence)

Control: Department of Conservation

Access: By launch from Lyttelton; accessible on foot with some difficulty at low tide from coastline north of Purau across very short gap of shallow water.

Vegetation: Little remains of native flora on this highly modified tiny island; intertidal seaweeds surround it.

Notable wildlife: Several species of seabird such as spotted shags, blackbacked gulls, red billed gulls, white-fronted terns, and white-flipped blue penguins are readily seen about the island.

Notes: The island's chief importance is historical. Once a Māori pā, Ripapa was set aside for defence purposes by European settlers in 1857, although it was used first as a quarantine station. It was fortified during the Russian Scare of the 1880s, and manned during both First and Second World Wars. Now it is a fascinating relic of Victorian engineering and defensive skills.

3 Quail Island (Recreation Reserve)

Area: 81 ha

Grid Ref. centre: M 36 850 310

Reserved: 1976

Control: Department of Conservation

Access: By boat. At extreme low tide the island is accessible on foot with some difficulty across sticky mudflats from Moepuku Point at the head of Lyttelton Harbour.

Vegetation: Largely exotic pasture and planted exotic trees. The NW, W and SW coastal strip retains some botanical values of significance, and there are also some botanical features of note on the northern cliffs. These include small areas of shrubland and scrub. Species of note are: native broom, *Olearia paniculata*, *Senecio glaucophyllus* subsp. *basinudus*, *Epilobium billardierianum*, *Sonchus kirkii*, *Convolvulus verecundus* subsp. *waitaha*, matagouri, māhoe, the grass *Echinopogon ovatus*, saltmarsh ribbonwood, *Sarcocornia quinqueflora*, *Linum monogynum*, *Rubus squarrosus*, *Melicytus alpinus*, *Phormium tenax*, *Coprosma crassifolia*, *C. propinqua*, kōwhai, mānuka and *Hebe strictissima*. A small remnant of kawakawa, after which the island is named in Māori, persists at the north-east tip. Silver tussock is common around the coast.

Weeds: *Boxthorn.

Other threats: Very high rabbit numbers in the late 1980s, until rigorous control measures by the Department of Conservation, badly affected botanical values. Resurgence of rabbit numbers is a continuing threat.

Notable wildlife: There are sizeable breeding grounds for blackbacked gulls. Other seabirds such as spotted shags, and waders such as pied oystercatchers, are readily seen. Kingfishers are often present.

Notes: The island has a complex and fascinating geology. Despite its position it has few rocks related to the eruptive history of Lyttelton Volcano, and despite popular belief it is not the "plug" of the Lyttelton Volcano. The southern part of the island is composed of volcanic basement rocks long predating Lyttelton Volcano (see Section 2.2). The northern half of the island consists of Diamond Harbour Group basalt lavas erupted long after much of Lyttelton Volcano had eroded away.

The island is also notable for historical reasons; it was declared a quarantine station in 1875, and during 1907-1925 it hosted a leper colony. Scott of the Antarctic quarantined his huskies on the island on their way to the ice. The quarantine station was closed in 1956.

In 1981 a New Zealand Walkway was opened on the island.

The native quail, after which the island is named in English, has been extinct for more than a century.

At the time of the arrival of the 'First Four Ships' at the end of 1850, when the Ward brothers selected Quail Island to farm, it was covered in matagouri, cabbage trees and tussock, but this vegetation would have resulted from much earlier Māori clearance of forest.

Detailed report: Jackson, Peter 1990: Quail Island : A Link with the Past. Department of Conservation.

4 Orton Bradley Farm Park

Area: c. 640 ha

Grid Ref. centre: M 36 867 267

Protected: 1981

Control: Orton Bradley Park Board

Access: From main road through Charteris Bay. Foot tracks link with the Mount Herbert Walkway.

Vegetation: Much open pasture, but also exotic coniferous and hardwood plantation, second-growth native hardwood forest, including both kānuka and mixed hardwood canopies, scattered plants on rock outcrops, including 'Big Rock' on the valley floor, the eroded remnant of an andesite dome predating by a few million years the construction of the Lyttelton Volcano; also small areas of flushed ground, some silver tussock, bracken, shrubland, treeland, and second-growth hardwoods regenerating through bracken. Particularly notable species are *Dianella nigra*, possibly the last surviving population on Banks Peninsula, *Hebe lavaudiana*, *Cyathodes juniperina*, and *Carex secta*. Some original podocarps remain, mostly lowland tōtara. There is a good representation of species at their southern limit, including akeake, kawakawa, tītoki, pigeonwood, native passion vine. Easter orchid occurs on Big Rock.

Weeds: **Clematis vitalba*, *elderberry, **Pinus radiata*, **Berberis darwinii*.

Other threats: Fire. The park has a lot of public usage. Goats are farmed on adjacent land.

Notable wildlife: Bellbirds, kingfishers, wood pigeons, common bush birds, harriers.

Notes: This large area is run as a farm park with public access, producing some management problems and conflicts. The policy is to foster already vigorous regeneration of native second-growth hardwoods, especially kānuka, kōwhai, lacebark, māhoe and broadleaf, and also to foster podocarp regeneration, with artificial assistance if necessary. Well-grown exotic trees are a major feature of the Park. The economic side of the operation depends on sheep farming, a small amount of forestry, and latterly a small charge on Park visitors. The area also has considerable historical interest.

Detailed report: Gregory-Hunt, Karen. 1984: Orton Bradley Park. A History. Department of Lands and Survey, Christchurch. Edited by John Wilson.

5 **Gebbies Valley rhyolite** (National Trust covenant)

Area: 8.1 ha

Grid Ref. centre: M 36 794 230

Protected: May 1984

Control: Private landowner, under a National Trust covenant

Access: The rhyolite outcrops which are the main feature of the covenanted area are beautifully visible from the road.

Vegetation: Most of the 8 ha is open, grazed, exotic pasture. Several native species of grass, fern and shrub persist on the rock outcrops out of reach of farm stock.

Notes: The covenant allows for continued grazing around the outcrops, and for continued absence of screening trees. The rhyolite outcrops are wonderfully erosion-sculptured examples of ancient rhyolite flows predating the basalts of Lyttelton Volcano.

Detailed report: Molloy, Brian 1984: Checklist of Native Plants and General Comments: Rhyolite outcrop, Gebbies Pass, Banks Peninsula. DSIR unpublished report, Botany Division 491.

6 **Kaituna Valley** (Scenic Reserve)

Area: 5.9 ha

Grid Ref. centre: M 36 848 183

Reserved: 1957

Control: Department of Conservation

Access: Kaituna Valley Road.

Vegetation: Remnant of kahikatea-matai-lowland tōtara/mixed hardwood forest on lowland alluvium, with abundant fitoki in the hardwood canopy, surrounded by second-growth mixed hardwoods and fringing planted flax and cabbage trees.

Weeds: **Clematis vitalba*, *elderberry, *male fern, *creeping buttercup, *hemlock, **Calystegia silvatica*, *crack willow, *periwinkle, *blackberry, *broom, **Carex muricata*, **Iris foetidissima*, *grey willow.

Other threats: Excessive flooding by Kaituna River may be somewhat deleterious.

Notable wildlife: Bush birds are common, including bellbirds, wood pigeons, fantails, grey warblers, etc.

Notes: Earlier plantings of New Zealand native trees and shrubs alien to the Kaituna Valley were well-intentioned but unfortunate. The reserve also has a serious exotic weed problem, especially **Clematis vitalba*. But it is a very valuable remnant of now exceedingly rare valley floor lowland forest.

Detailed report: Kelly 1972.

7 Sign of the Packhorse (Scenic Reserve)

Area: 104 ha

Grid Ref. centre: M 36 863 228

Reserved: 1914 with an addition in 1923

Control: Department of Conservation

Access: On foot from Kaituna Valley Road or via Mount Herbert Walkway and Mount Bradley from Orton Bradley Park or Diamond Harbour.

Vegetation: Some good lowland and montane podocarp/hardwood forest, second-growth hardwood forest, and kānuka; bluff vegetation with scrub, including *Dracophyllum*, shrubland and scattered herbaceous plants on rock faces; about 60 percent of the area is pasture with varying amounts of fescue and silver tussock. *Browntop is abundant, and there is much *cocksfoot in places. Notable species include *Acaena dunicola*, *Hebe laudiana*, *H. strictissima*, *Dracophyllum acerosum*, much *Clematis paniculata* in bush stands, and *Cyathea colensoi*. Tītoki occurs in the lowest parts.

Weeds: *Gorse is local; spraying of local patches in the 1980s caused more damage than gain. **Pinus radiata* wildings.

Notable wildlife: Bush birds are quite common. Harriers, pipits, skylarks.

Notes: Parts of the reserve which have been fenced for some time are in very good condition. Some of the other bush areas were very battered at time of survey but there has apparently been extensive additional fencing since then. The reserve includes the younger basalts of the Mount Herbert lava flows as well as underlying older Lyttelton flows. The stone hut called 'Sign of the Packhorse' is a notable human feature of the reserve.

Detailed report: Kelly 1972.

8 Mount Herbert (Scenic Reserve)

Area: 240 ha

Grid Ref. centre: M 36 894 231

Reserved: 1915

Control: Department of Conservation

Access: On foot from Kaituna Valley Road, or via Mount Herbert Walkway from Diamond Harbour or Orton Bradley Farm Park.

Vegetation: About one third of the reserve is old-growth forest, ranging from lowland podocarp/hardwood forest with mataī, kahikatea and lowland tōtara, up into montane thin-bark tōtara/hardwood forest. There is also considerable mixed hardwood forest, diverse scrub communities including *Dracophyllum* and mountain fivefinger, extensive mountain flaxland and shrubland, extensive flushed ground with *Schoenus* and other sedges, some *Chionochoa conspicua* tussockland and some fescue short tussockland, many areas of bluff vegetation at all altitudes but especially montane, some areas of kānuka forest, and some areas of grassland dominated by exotic species such as *browntop and *cocksfoot. The flora contains so many species of great interest that the richness can only be hinted at here, but it includes a few sapling cedar, *Olearia nummulariifolia*, *O. ilicifolia*, *O. avicenniifolia*, *O. paniculata*, *Hebe strictissima*, *H. lavaudiana*, *H. odora*, *Acaena caesiiglauca*, *Celmisia* 'rhizomatous', *Acaena dumicola*, *Ourisia lactea*, *Tmesipteris tannensis*, *Tupeia antarctica*, *Cyathea colensoi*, *Aciphylla aurea*, *A. subflabellata*, *Schoenus pauciflorus*, *Geum parviflorum*, *Kelleria dieffenbachii*, *Forstera tenella*, *Grammitis poeppigiana*, *Gingidia montana*, *Parahebe lyallii*, *Gaultheria crassa*, *Lycopodium australianum*, *Deschampsia novae-zelandiae*, *Microseris scapigera*, *Grammitis ciliata* and *Cordyline indivisa*.

There are hundreds of individual podocarps, with regeneration of all four common species.

Weeds: *Gorse, **Pinus radiata*, **Hieracium pilosella*, **Dryopteris filix-mas*.

Notable wildlife: Bush birds are fairly common, including bellbirds, tomtits, brown creepers, wood pigeons, grey warblers and fantails.

Notes: An extremely important and high-priority reserve, it is still badly affected by straying sheep and cattle, and by possums, and is seriously threatened by straying goats in the vicinity over the past decade. The reserve runs up to the top of Mount Herbert on the SE side but the land above the bluffs is grazed by cattle, which are very deleterious. All adult cedar in the reserve died in the 1950s and 60s in a manner not yet understood, and many of the few existing live saplings are ill-thrifty. The apparent timberline is induced by Māori burning and perpetuated by later burning and grazing; prior to human impact woody vegetation would have covered all the highest ground as well.

Detailed report: Kelly 1972.

9 Kaituna Spur (Scenic Reserve)

Area: 23 ha

Grid Ref. centre: N 36 912 207

Reserved: 1915

Control: Department of Conservation

Access: Along unmarked paper roads, easiest from saddle of Port Levy - Little River Road, shorter but steeper from the head of the Kaituna Valley Road.

Vegetation: Thin-bark tōtara/mixed hardwood forest (about 15 percent of area), mixed hardwood forest with scattered surviving tōtara, scrub, bracken, shrubland, silver tussock/*browntop grassland, herbs and shrubs on bluffs. About half of the reserve area is forest of one sort or another, with some excellent canopy, but at time of survey (1985) it was still unfenced and the interior was severely modified except on the steepest ground, although a wide range of fern species survived. There is a good range of common species, and although none are of particular note, the following are worth mentioning: *Hebe strictissima*, *H. lavaudiana* (both regional endemics), *Cyathea colensoi* (very sparse), *Hymenophyllum multifidum* and *Ctenopteris heterophylla*.

Weeds: None of note.

Notable wildlife: Bellbirds and tomtits common.

Notes: The reserve should respond well to recent fencing.

10 Morice Settlement (Scenic Reserve)

Area: 6.1 ha

Grid Ref. centre: N 36 965 207

Reserved: 1907

Control: Department of Conservation

Access: Whites Road, off Puaha Road, NE of Little River.

Vegetation: Good fragment of mid-altitude (around 300 m) podocarp/hardwood forest along stream. A good number of mature, centuries-old kahikatea, mataī and lowland tōtara emerge from mixed aged hardwood canopy with tree ferns and ground ferns prominent. *Dicksonia squarrosa*, *Cyathea smithii* and *C. dealbata* are all common. Just upstream from the reserve occurs *Dicksonia fibrosa*, very rare on Banks Peninsula.

Weeds: **Tropaeolum speciosum*, *flowering currant, *sycamore.

Notable wildlife: Common bush birds. Galaxiids in stream.

Detailed report: Kelly 1972.

11 Mount Fitzgerald (Scenic Reserve)

Area: 43.7 ha

Grid Ref. centre: N 36 970 221

Reserved: 1907

Control: Department of Conservation

Access: From the end of Whites Road, along a paper road through private property for about 1 km; or along the Summit Walkway from near Hilltop or from Port Levy - Little River saddle.

Vegetation: Much diverse second-growth hardwood forest and scrub, some remnant thin-bark tōtara/hardwood forest, areas of good tōtara regeneration, moist bluff vegetation, some fringing short tussock and pasture and open shrubland. Species of note are broadleaved cabbage tree or tōi (more than 20 adults), abundant *Olearia ilicifolia*, a few saplings of *Libocedrus bidwillii*, *Cyathea colensoi*, *Leptolepia novae-zelandiae*, at least 6 species of filmy fern, *Dracophyllum acerosum*, *Hebe lavaudiana*, *Olearia nummulariifolia* (abundant), *Epilobium tenuipes*, *Nertera setulosa*, *Kelleria dieffenbachii*, *Hymenophyllum multifidum*, the mosses *Breutelia pendula*, *Rhacocarpus purpurascens* and *Weymouthia mollis*; *Asplenium richardii* and *Aristotelia fruticosa*.

Weeds: **Tropaeolum speciosum*, **Hieracium pilosella*, **H. praealtum*, *elderberry.

Other threats: Possum damage is serious. Farm stock have had a deleterious effect for a long time. Invasion by wild goats over the past decade is an appalling threat.

Notable wildlife: Jewelled gecko; common bush birds including tomtit.

Notes: Fencing against stock access, and control of possums and goats, are high priorities. Ideally the boundaries of the reserve should be extended to take in the tussocky summit area above the reserve (probably best with continued light grazing by sheep), and the gully running out below the reserve down Hikuika Stream.

Many of the big tōtara are dead or stag-headed. There is abundant young tōtara regeneration on the margins.

Detailed reports: Kelly 1972. Department of Lands and Survey 1979: Mt Fitzgerald Scenic Reserve Management Plan.

12 Holmes Valley

Area: c. 10 ha

Grid Ref. centre: N 36 982 217

Reserved: Late 1980s

Control: Department of Conservation

Access: From summit walkway between Mounts Fitzgerald and Sinclair, or by permission across private land from end of Holmes Valley Road.

Vegetation: Forest, mostly lowland ribbonwood/*Fuchsia* second-growth hardwood forest with battered surviving thin-bark tōtara in upper part. An old slip through the middle of the forest is now a strip of silver tussock and pasture grasses with regenerating *Fuchsia*, *Coprosma*, broadleaf and ferns. Species of particular note including climbing groundsel.

Weeds: *Himalayan honeysuckle, *elderberry.

Other threats: The greatest threat is wild goats. Soon after fencing had been completed in the late 1980s, goats were distressingly common in this bush stand, with some ring-barking evident on *Hoheria*, *Plagianthus*, and *Schefflera*. Before excessive damage had occurred a campaign against the wild goats largely removed them from the area, but the situation must not be allowed to recur.

Notable wildlife: Common bush birds, including bellbirds, rifleman, fantails.

Notes: During the 1980s the Department of Lands and Survey surveyed this bush (\$10,000) and fenced it (\$8,000) and the landowners Hugh and Pip Waghorn generously donated it to the Crown as a new reserve. When I discussed this with the Waghorns in early 1988, they indicated they would like the same thing done to a nearby bush area (Area 559 on card index). This second area extends to a slightly lower altitude. It is mostly good second-growth hardwood forest with scattered surviving adult podocarps, mostly thin-bark tōtara in the upper part but with a few mataī near the toe at around 500 metres. The bush is currently heavily eaten out around the perimeter, but beyond about 40 m from the edge there is a reasonable,

although somewhat battered, surviving fern floor and abundant adult *Cyathea smithii* with no regeneration. In January 1988 there had already been severe ring-barking by goats of mountain fivefinger and koromiko. Both these bush areas have a B classification (see Section 1.4).

13 Mount Sinclair (Scenic Reserve)

Area: 70.5 ha

Grid Ref. centre: N 36 984 288

Reserved: 1915 (Mount Sinclair)

1916 (Purau Track)

1977 (southwestwards extension added)

Control: Department of Conservation

Access: Summit Walkway, from near Hilltop or from road over saddle between Port Levy and Little River.

Vegetation: The larger proportion is thin-bark tōtara/hardwood forest, but there are significant areas of snow tussock and snow tussock shrubland, scrub, especially of *Olearia ilicifolia* and mountain flax, and some fescue tussock/*browntop grassland. The native herbs and shrubs of the bluffs are also significant. Species of particular note are *Chionochloa rigida*, *C. conspicua*, *Olearia ilicifolia*, *O. bullata*, *Cyathea colensoi*, *Aristotelia fruticosa* (regionally rare), broadleaved cabbage tree or tōi, a few sapling cedar, some in poor health, several filmy ferns, *Aciphylla aurea*, *Hebe strictissima*, *H. lavaudiana*, *Ourisia lactea*, *Dracophyllum acerosum*, *Olearia nummulariifolia*, and the woolly alpine moss *Racomitrium lanuginosum*. All of the adult cedar died during the late 1950s and early 1960s, perhaps a delayed result of forest fragmentation and opening up resulting in excessive drying out and reduced buffering against drought years.

Weeds: **Pinus radiata* wildings, **Hieracium pilosella*, **H. praealtum*, *elderberry, *broom (very sparse).

Other threats: Possums, goats. In the 1980s wild goats were a serious threat, and the situation must not be allowed to recur. The reserve must also be strictly secured against straying farm stock, especially cattle, which are deleterious to both forest and snow tussock communities. Any revived notions of carrying through the original suggestion of a Summit Road would also impact heavily on this area. From a conservation point of view it would be very ill-conceived.

Notes: Kelly (1972) suggested adding to the reserve the extensive *Olearia ilicifolia* dominant scrub on the south-west shoulder of Mount Sinclair. This was achieved in 1977, and the Purau Track Scenic Reserve also became part of Mount Sinclair Reserve. The name "Purau Track" refers to the early land route between Lyttelton and Akaroa Harbours, established in Māori times. The current walking route has historical interest as well as superlative upland views.

There are further possibilities of extending the protected area on Mount Sinclair. One possibility is down Te Puaha Stream where there is a beautiful waterfall in second-growth bush. Another is eastwards between Mount Sinclair and Whatarangi Tōtara Reserves through remnant tōtara and regenerating scrub and forest, very visible to the east of the Summit Walkway.

Detailed reports: Kelly 1972.

14 **Glenralloch (Scenic Reserve)**

Area: 6.8 ha

Grid Ref. centre: N 36 992 216

Reserved: 1973

Control: Department of Conservation

Access: From Summit Walkway via an unmarked paper road across private land.

Vegetation: Remnant patch of thin-bark tōtara/hardwood forest with some extensive second-growth mixed hardwood forest and scrub, some lowland ribbonwood in the NW corner, and marginal ungrazed tall pasture and small-leaved *Coprosma* species. Fencing was completed in 1971, and regeneration in most of the understorey is now good although some areas of forest floor are still rather bare. There is good regeneration of *Cyathea smithii*. Some of the tōtara are large, fine specimens, and there are also very large examples of *Olearia ilicifolia* and broadleaf. Other species of note include the climbing groundsel (*Brachyglottis sciadophila*), *Clematis paniculata*, *Cyathea colensoi* and mataī.

Weeds: *Himalayan honeysuckle, *elderberry.

Other threats: Wild goats. In January 1988 there seemed to be a place in the lower part of the reserve where either goats or farm stock were crossing. It would be an enormous pity to reverse 20 years of good regeneration in this forest patch.

Notable wildlife: Common bush birds including tomtits and bellbirds.

Notes: The small forest patch has additional value as a potential part of an enlarged reserve in the Mount Sinclair area.

Detailed report: Kelly 1972.

15 Whatarangi Tōtara (Scenic Reserve)

Area: 4.7 ha

Grid Ref. centre: N 36 993 200

Reserved: 1976

Control: Department of Conservation

Access: Summit Walkway from near Hilltop. The reserve sits astride the track.

Vegetation: Small bush area of mostly thin-bark tōtara/hardwood forest with good regeneration following exclusion of stock. Species of note include *Olearia ilicifolia* (common), climbing groundsel, (*Brachyglottis sciadophila*), mataī, and *Cyathea colensoi*.

Notes: The reserve is small and surrounded by extensive *browntop pasture littered with bleached tōtara and broadleaf logs from forest clearance a century or more ago. The skyline above the reserve boundary, with abundant mountain flax, was marred by a bulldozed farm track in the 1980s. For all that it provides a delightful forested stretch of track on the Summit Walkway with a good array of common Banks Peninsula trees, shrubs, vines and ferns.

16 Hay (Scenic Reserve)

Area: 6 ha

Grid Ref. centre: N 36 018 227

Reserved: 1973; privately protected by the Hay family for many decades before that.

Control: Department of Conservation

Access: Pigeon Bay Road, adjacent.

Vegetation: Lowland podocarp/hardwood forest and mixed hardwood forest, on alluvial soil, with exotic plantings around the NW and S perimeters; also very small areas of kānuka forest on the toe of the eastern valley side, and small open areas regenerating into forest from ungrazed weedy grasses and herbs. Among many species of note are fine specimens of kahikatea, mataī, and lowland tōtara, a mature adult miro (very rare on Banks Peninsula), tītoki, pōkākā, native passion vine, 3 species of tree fern, kawakawa, pigeonwood, *Metrosideros diffusa* and *Pseudopanax anomalus*.

Weeds: **Clematis vitalba*, **Tradescantia fluminensis*, *periwinkle, *sycamore, *ash, *elderberry, *elm, *bittersweet (*Solanum dulcamara*), *crack willow.

Other threats: Stock ingress.

Notable wildlife: Common bush birds including bellbirds and wood pigeons.

Notes: The lowland podocarp/hardwood remnant (about 20% of the total area) is one of the best, if not the best, of only four or five very small surviving fragments in the whole region. Only Kaituna Valley (Herbert PNA 6) and Prices Valley (Herbert RAP 12) are comparable. Hay is a better remnant than Kaituna and about on a par with Prices Valley, although different in detail.

Detailed report: Kelly 1972.

17 Proposed Port Levy (Scenic Reserve)

Area: 8.5 ha

Grid Ref. centre: N 36 922 236

Control: Department of Conservation

Access: Port Levy - Little River Road.

Vegetation: Mid-altitude (around 300 m) podocarp/hardwood forest. As well as many mature mataī, kahikatea and lowland tōtara, six mature and some regenerating miro are also present, making it the best locality for this species in the whole Region. Since fencing in the mid 1980s there has been much regeneration on the forest floor. There is a wealth of species of particular note, including *Dicksonia fibrosa* (very rare in the District and the Region), *Rumohra adiantiformis*, *Botrychium biforme*, *Neomyrtus pedunculata*, *Brachyglottis sciadophila*, pōkākā, pigeonwood and *Leptopteris hymenophylloides*. As well as *Dicksonia fibrosa*, the three common Banks Peninsula tree ferns are thriving (*Dicksonia squarrosa*, *Cyathea smithii* and *C. dealbata*) and there is a delightful wealth and profusion of ground ferns, especially along the road banks and along the stream margins.

Weeds: **Tropaeolum speciosum* is common. The species is hardly a problem.
*Wild cherry needs watching.

Other threats: Stock ingress.

Notable wildlife: Common bush birds, including wood pigeons. Wild sulphur-crested cockatoos use the area from time to time; 2 were present during my survey in July 1986.

Notes: Though small, the area is of great interest and value. An extension downstream below the road would add further mature miro. My large Herbert RAP 4, Mount Herbert, adjoins the area to the west.

18 **Goodwin (Scenic Reserve)**

Area: 11.6 ha

Grid Ref. centre: N 36 047 237

Control: Department of Conservation

Access: Starvation Gully Road, Pigeon Bay; along the ridge across private land from the top of the Gully.

Vegetation: Thin-bark tōtara/hardwood forest, second-growth mixed hardwood forest, and bluff vegetation. The tōtara canopy is notable in being so dense, and also in straddling the crest of a major dividing ridge (it laps over in to the Menzies Stream catchment). Species of note include *Brachyglottis sciadophila*, *Coprosma wallii*, *Hebe strictissima*, *Asplenium richardii*, and *Fuchsia perscandens*.

Weeds: *Sycamore is the major one to watch; it is already common in the vicinity, especially in the head of Starvation Gully, along with *elderberry and *crack willow.

Other threats: Goats, stock.

Notable wildlife: Common bush birds.

Notes: Extending the area northwards through second-growth bush and bluffs to the Starvation Gully Road would be worthwhile.

19 **Double Bay (private reserve)**

Area: c. 15 ha

Grid Ref. centre: N 36 000 307

Protected: Not legally protected

Control: The landowner, currently Deni Stephens

Access: No public access.

Vegetation: Second-growth dry forest, predominantly lowland ribbonwood with large *Coprosma virescens*; also silver tussockland and dry bluff vegetation; all prone to drought. Species of particular note include tītoki, fierce lancewood, leafless clematis, kawakawa, *Olearia fragrantissima*, *Parietaria debilis*, *Scandia geniculata*, *Sophora prostrata*, *Hebe strictissima*, *Fuchsia perscandens*, and the nationally rare *Teucrium parvifolium*.

Weeds: *Variegated thistle, **Torilis nodosa*, *horehound, *winged thistle, *miner's lettuce, and *elderberry.



Other threats: The land is not legally protected. The current landowners have removed stock from the whole paddock for the protection and rehabilitation of the native bush, but a change of ownership could immediately reverse the situation. In March 1991, just before grazing ceased, the bush was looking tatty from grazing and dryness, and a lot of dead emergent lowland ribbonwood were conspicuous. Possums are uncontrolled.

Notable wildlife: Noted on the survey were kingfisher, greywarbler, and *Californian quail.

Notes: The area is classified C on the card index (see Sections 1.3 and 1.4), that is "well worthy of protection; of lower priority than B but worth substantial effort to achieve protection".

20 Hunter Native Forest (Scenic Reserve)

Area: 8.2 ha

Grid Ref. centre: M 36 876 302

Reserved: Declared Protected Private Land in 1983 and Reserved in 1985

Control: Department of Conservation

Access: Charteris Bay - Diamond Harbour Road

Vegetation: Second-growth kānuka and mixed hardwood forest, dry bluffs, scrub, some silver tussock, and a lot of planted New Zealand native trees and shrubs foreign to the District. The close juxtaposition of damp and dry habitats is a nice feature. Of locally native species the following are of note: *Cheilanthes distans*, *C. humilis*, *Leucopogon fraseri* at 125 m altitude, *Daucus glochidiatus*, *Hypericum gramineum*, kawakawa, *Hebe strictissima*, leafless clematis, *Sophora prostrata*, *Corokia cotoneaster*, *Ileostylus micranthus*, *Scandia geniculata*, and akeake (possibly planted).

Weeds: The wide range of planted New Zealand trees and shrubs not native to the District reduces the scientific interest of the gully but has some interest of its own. Of numerous naturalised species the following may be regarded as particularly weedy or invasive: *spindleberry, **Cotyledon orbicularis*, **Aeonium haworthii*, **Chrysanthemoides monolifera*, *tree lucerne, **Sedum praealtum*, **Argyranthemum frutescens*, **Carpobrotus edulis*, **Cotoneaster franchetii*, **Echium candicans*, *broom, **Pinus radiata*, *parsley, **Lathyrus tingitanus*, *spur valerian, **Pelargonium x hortorum*, **Acaena agnipila*, **Aeonium arboreum*, *cherry plum, *sweet brier, *wallflower, *elm, *gorse (very sparse), **Cotoneaster simonsii*. But it must be noted that the abundance, colour, and succulence of many of these naturalised species add up to much of the interest of this small gully area.

Notable wildlife: Noted on surveys were bellbirds, fantails, kingfishers, skinks.

Notes: Above the small reserved area is a long bushy gully mostly of kānuka and kōwhai, and grazed, much of it open treeland, very attractive in spring when the kōwhai is in flower. At the head of the tree-clad stretch of gully is a small waterfall. Kānuka has been cut in the upper stretches. The gully has some botanical and certainly aesthetic interest, and also potential as part of a Church Bay Walkway should the landowner ever see merit in such an idea.

21 **Moepuku Point** (private reserve)

Area: c. 1.5 ha

Grid Ref. centre: M 36 847 297

Protected: Not legally protected

Control: Pat Cotter leases the land for joint venture forestry with the landowner and has privately protected this small stand of native scrub and regenerating bush from clearance and grazing.

Access: No public access except by permission, or along the "Queen's chain" from the sea.

Vegetation: Seral scrub of native broom, *Coprosma crassifolia* and mānuka with some regeneration of mixed hardwood canopy species such as broadleaf and māhoe despite the frequency of drought at this locality and despite browsing by sheep until their exclusion at the end of the 1980s. Species of particular note include *Olearia paniculata*, *Festuca* 'Banks Peninsula blue tussock', *Libertia ixioides*, *Gingidia montana*, *Aciphylla subflabellata*, toetoe, leafless lawyer, matagouri, and *Linum monogynum*.

Weeds: **Clematis vitalba* (I removed one plant in 1988, the only plant seen then, but it is common in the general area at the head of Lyttelton Harbour and will certainly reappear if it has not already done so); *hawthorn, *broom, *gorse, *Montpelier broom, *elderberry, *sweet brier, **Pinus radiata*,

Other threats: Both planted and wilding pines should be removed from the fenced off area.

Notes: The area is classified C on the card index (see Sections 1.3 and 1.4), that is, "well worthy of protection; of lower priority than B but worth substantial effort to achieve protection".

Detailed report: Wilson, Hugh 1988: Inspection of two bushy patches, Cotters' land at Moepuku Point, head of Lyttelton Harbour. Banks Peninsula Botanical Survey unpublished report, on file.

22 Kūkupa Forest Farm Reserve (private reserve)

Area: c. 15 ha

Grid Ref. centre: N 36 015 202

Protected: Not legally protected

Control: The landowner, Pat Cotter

Access: By permission of the landowner, off Middle Road, Pigeon Bay.

Vegetation: Mature kānuka forest with regenerating mixed hardwoods, ferns, and some podocarps (lots of tōtara seedlings, some saplings, adults very few; one young mataī noted). Included in the fenced off area is one very large **Pinus radiata* and a group of big **eucalypts*. Extensive exotic plantings of **eucalypts*, **Douglas fir*, **spruce*, **larch*, **cypress* and **pine* lie between the kānuka stand and Middle Road. There has been some planting in the bush of New Zealand natives not sourced from Herbert Ecological District, including tawa, rewarewa, *Cordyline banksii*, *Cyathea medullaris*, kauri, pūriri, rangiora, *Libocedrus plumosa*, kahikatea and miro. Native species of note include: *Microlaena polynoda*, *Brachyglottis sciadophila*, pōkākā, kawakawa and *Clematis paniculata*.

Weeds: **Clematis vitalba*, **sycamore*, **hawthorn*, **spindleberry*, **wild cherry*, **crack willow*, **elderberry*, **gorse*, **sweet brier*, **Passiflora pinnatistipula*, **blackberry*, **bittersweet*.

Other threats: The bush has no legally protected status, and a change of ownership could remove protection.

Notable wildlife: Common bush birds including wood pigeons, fantails, bellbirds, rifleman, kingfisher. Long-finned eels in stream.

Notes: Stock had grazed the floor bare until excluded in 1983, since when regeneration of the understorey has been impressive, especially of māhoe, *Cyathea dealbata*, *Asplenium* and kawakawa.

Detailed report: Wilson, Hugh 1987. Provisional list of wild vascular species noted on the Cotters' property, Kūkupa Forest Farm, Pigeon Bay. Banks Peninsula Botanical Survey unpublished report, on file.

23 Jones' Private Reserve, Western Valley

Area: c. 8 ha

Grid Ref. centre: N 36 935 197

Protected: Not legally protected

Control: The landowners Arthur and Paulina Jones

Access: Private land.

Vegetation: Second-growth mixed hardwood forest with much lacebark and some kānuka; also some areas of ungrazed pasture; a few planted New Zealand natives not locally sourced, but the landowners are now using local material for plantings away from the house. There are a few surviving adult podocarps (kahikatea, lowland tōtara and mataī). Other species of note include: *Ileostylus micranthus* (mistletoe), native passion vine, kawakawa, tītoki, pigeonwood, small-leaved milk tree, and *Lycopodium volubile*. Tree ferns are currently very sparse.

Weeds: *Elderberry, *crack willow, **Carex muricata*.

Other threats: Straying goats from neighbouring farmland has been a continual problem for several years. Possums, rabbits. Drought damage during recent dry years has been a source of anxiety to the landowners but of no significance in terms of long-term regeneration. Future change of ownership could remove protection.

Notable wildlife: Common bush birds including wood pigeons, bellbirds, riflemen, brown creepers and shining cuckoos. Also kingfishers and harriers.

Notes: The Jones' protected 8 or so hectares stands out against the surrounding farmland which is marked by bush and scrub clearance, and grazing by farm stock and goats.

24 Kūkupa Council Reserve

Area: c. 0.5 ha

Grid Ref. centre: N 36 018 209

Reserved: 1987

Control: Banks Peninsula District Council

Access: Off Pigeon Bay Road - Middle Road junction at Kūkupa.

Vegetation: Small patch of mostly mixed hardwoods with a few adult and regenerating lowland tōtara, a mataī and a kahikatea either just down valley from reserve or just within it (boundary unclear). The bush is quite varied for such a small patch, with a stream, and open grass between road and stream. Other species of note include: kawakawa, silver tree fern, small-leaved milk tree, *Cyathea smithii*, *Leptopteris hymenophylloides*, *Brachyglottis sciadophila*.

Weeds: *Elderberry, *wild cherry, *gorse (on uphill edge), *hawthorn, *sycamore, **Passiflora pinnatistipula*.

Notable wildlife: Common bush birds, including wood pigeons and bellbirds.

[For Pearce Scenic Reserve see Akaroa Ecological District, Section 5.]

[Horomaka Island and Pukerauaruhe Island in Port Levy are under Department of Conservation control. They support little in the way of native vegetation - Horomaka Island is conspicuously covered with mature **Pinus radiata* - but provide nesting sites for gulls and other birds, and have been suggested as localities for possible revegetation projects.]

4.3 Priorities for Protection

Priorities for protection in Herbert Ecological District are listed below in approximate order of importance.

- (i) Old-growth lowland podocarp/hardwood forest on alluvial ground: The best examples in the whole of Banks Ecological Region occur in Herbert Ecological District and two of the very few fragments are already protected. An excellent remnant in Prices Valley is being registered as a National Trust Covenant as this report goes to press, and another smaller, degraded remnant behind Catons Bay is unprotected. They are such rare survivors of the original vegetation that they should have the highest priority for protection.
- (ii) Old-growth lowland podocarp/hardwood forest on hillslopes: Very little remains and even less is protected.
- (iii) Old-growth montane podocarp/hardwood forest: Much more of this survives than (i) or (ii) and reasonably large areas are protected, but the total area is still very small. All unprotected examples should have a high priority for protection.
- (iv) Extensive areas of advanced second-growth forest: These represent the best areas of regeneration towards forest similar to the original cover. In addition they are currently botanically diverse, visually attractive, and important habitat for native fauna.
- (v) Extensive dense short tussockland: Dating from Polynesian forest clearance, surviving areas of good short tussock are a major element of the landscape character of Herbert Ecological District. The District has the best areas of fescue tussockland in the Region, of which very little is legally protected, and much is threatened. Their conservation involves careful management of grazing rather than its elimination as in the case of forest conservation. The spread of mouse-ear hawkweed in these tussocklands is a recent additional threat, the cause of which is not fully understood, although it is likely that safeguarding against overgrazing (by farm stock as well as by rabbits and hares) is a positive measure. Slow encroachment by woody plants is inevitable in the absence of fire.
- (vi) Wetlands: These are rare in the District, and even the most extensive - the saline flats at the head of Lyttelton Harbour and the very slightly saline wetlands of Lake Forsyth - are under a greater or lesser threat of change and degradation.
- (vii) Rock outcrops: These are important for geological, landscape and botanical values. They are also less vulnerable to damage than other categories, but quarrying, rock-climbing, and wild goats all pose greater or lesser threats to their landscape, botanical and faunal values.

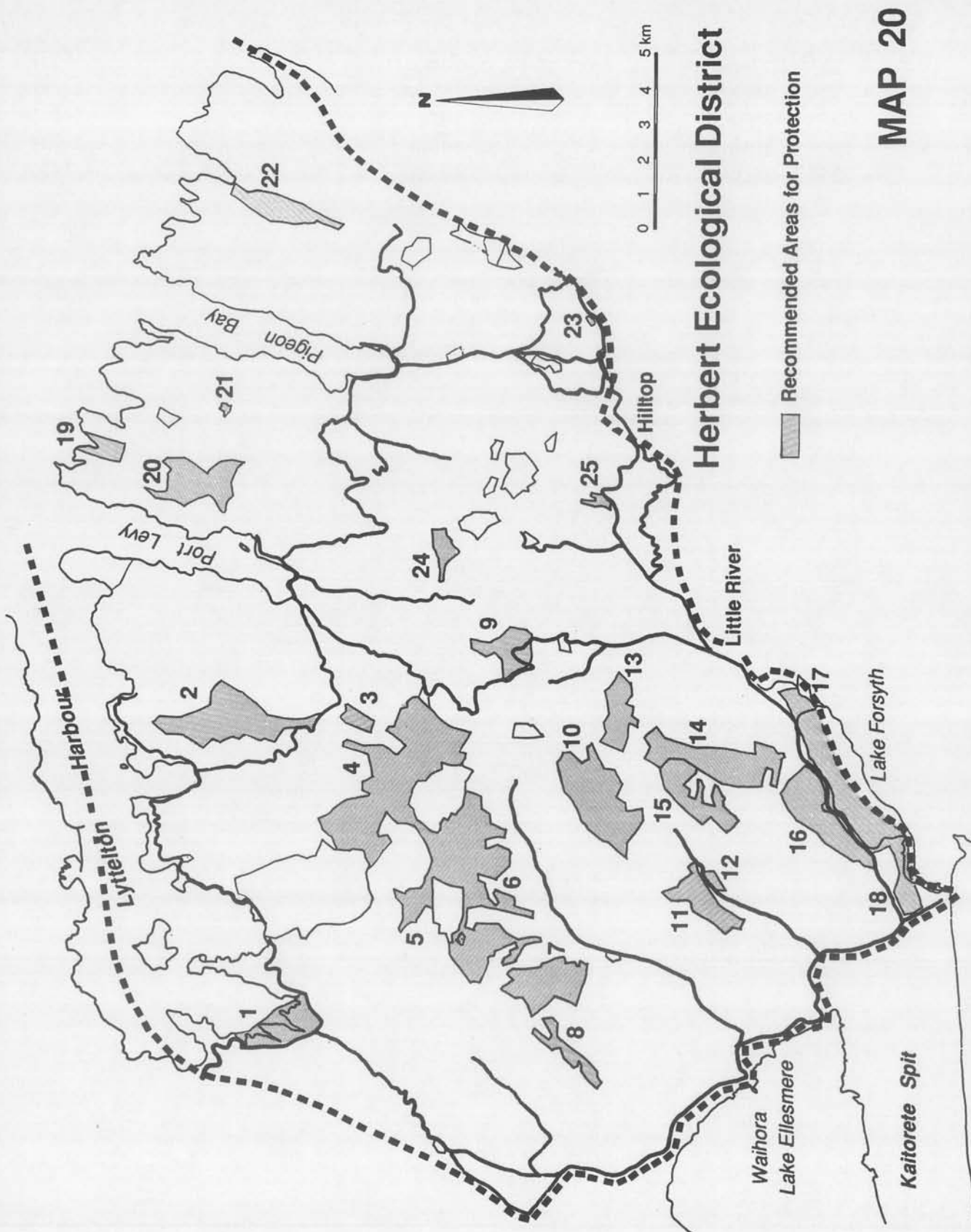
- (viii) Dry shrublands and scrub: Although fairly resilient vegetation types, such areas are very under-represented in existing PNAs, which have focused on forest remnants, and they are vulnerable to some forms of farming development, especially to the use of goats as scrub control agents.
- (ix) Extensive mature kānuka forest: Although kānuka regenerates readily in the District and indeed is often regarded as a scrub weed, mature stands are many decades old, provide excellent habitat for native birds such as brown creeper and grey warbler and bellbird, and add greatly to the landscape character of the District. Unfortunately most stands are grazed out underneath, thus minimising their successional role towards podocarp/hardwood forest. They are underestimated as "bush", too readily cleared for firewood and pasture, and too small a proportion of the total area of kānuka forest is protected from clearance, fire and grazing.
- (x) Montane tall tussockland and tussock shrubland: Most of the existing *Chionochloa* - *Dracophyllum* - *Phormium cookianum* - *Hebe* communities are protected within PNAs.

4.4 Recommended Areas for Protection

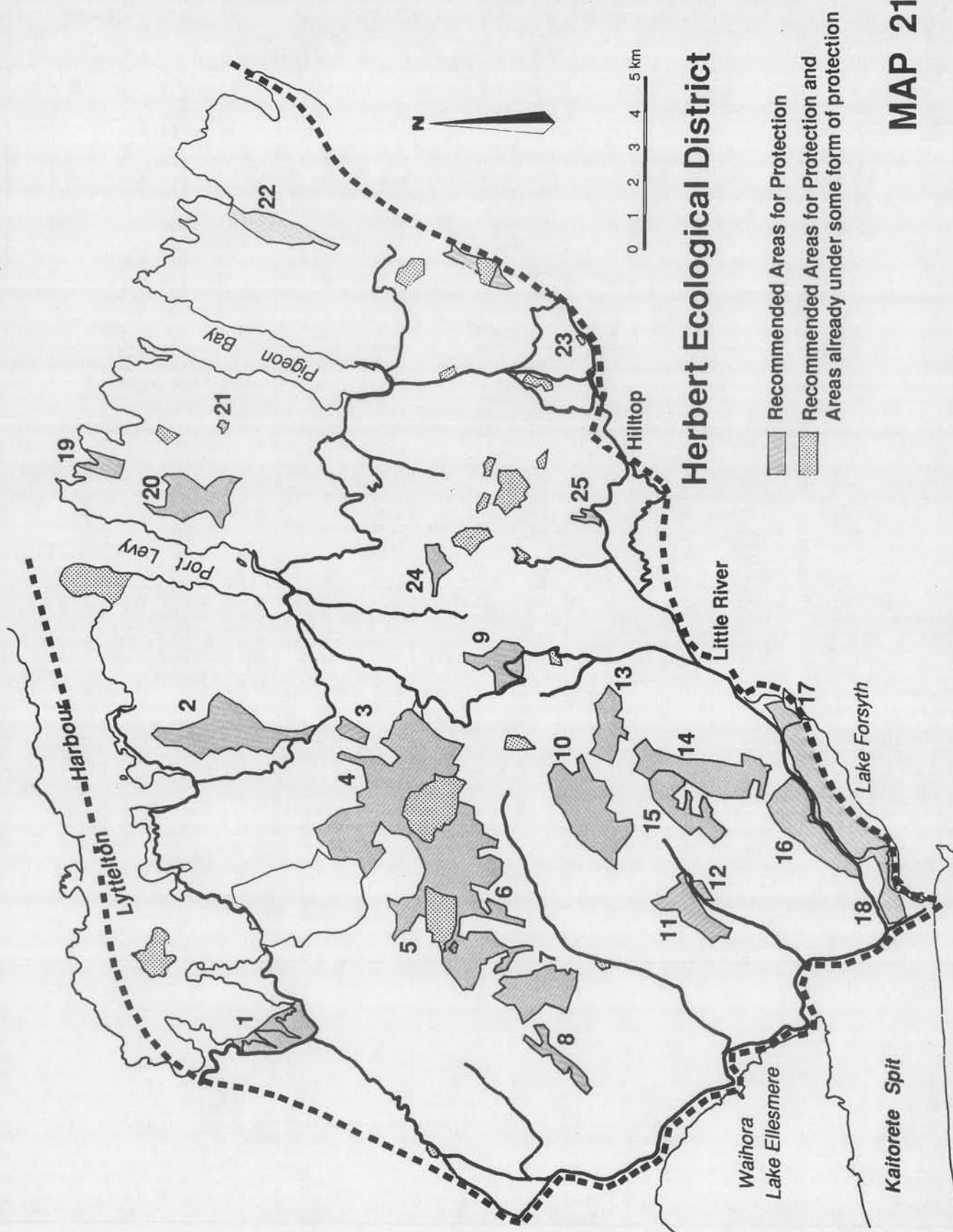
A further 11% of the area of Herbert District (4,370 ha) is recommended for protection. This is made up of 25 defined areas listed below. The figures in brackets refer to the card index of natural areas (see Introduction, Section 1.1). Areas are estimated in hectares.

1	Head of the Bay	c. 100 ha	(388)
2	Mount Evans	c. 300 ha	(8, 25, 26, 27)
3	The Monument	c. 35 ha	(159)
4	Mount Herbert	c. 600 ha	(22, 23, 24, 36, 169, 386)
5	Mount Bradley	c. 75 ha	(34, 35)
6	Upper Kaituna	c. 550 ha	(1, 3, 4, 31, 32, 33, 38, 345)
7	Lower Kaituna	c. 180 ha	(30, 455)
8	Graylees	c. 85 ha	(350)
9	Waipuna	c. 130 ha	(304)
10	Upper Prices	c. 300 ha	(440, 445)
11	Lower Prices	c. 145 ha	(406)
12	Prices Valley	c. 15 ha	(179)
13	Latham	c. 120 ha	(329)
14	High Bare Peak	c. 250 ha	(354, 355, 357, 359, 360, 361)
15	Waikoko	c. 150 ha	(444)
16	Forsyth Spur	c. 180 ha	(363, 501)
17	Wairewa	c. 600 ha	(257, 362)
18	Birdlings Flat	c. 100 ha	(102)
19	Akiraho	c. 50 ha	(541)
20	Pūtiki	c. 180 ha	(473, 545, 546, 547)

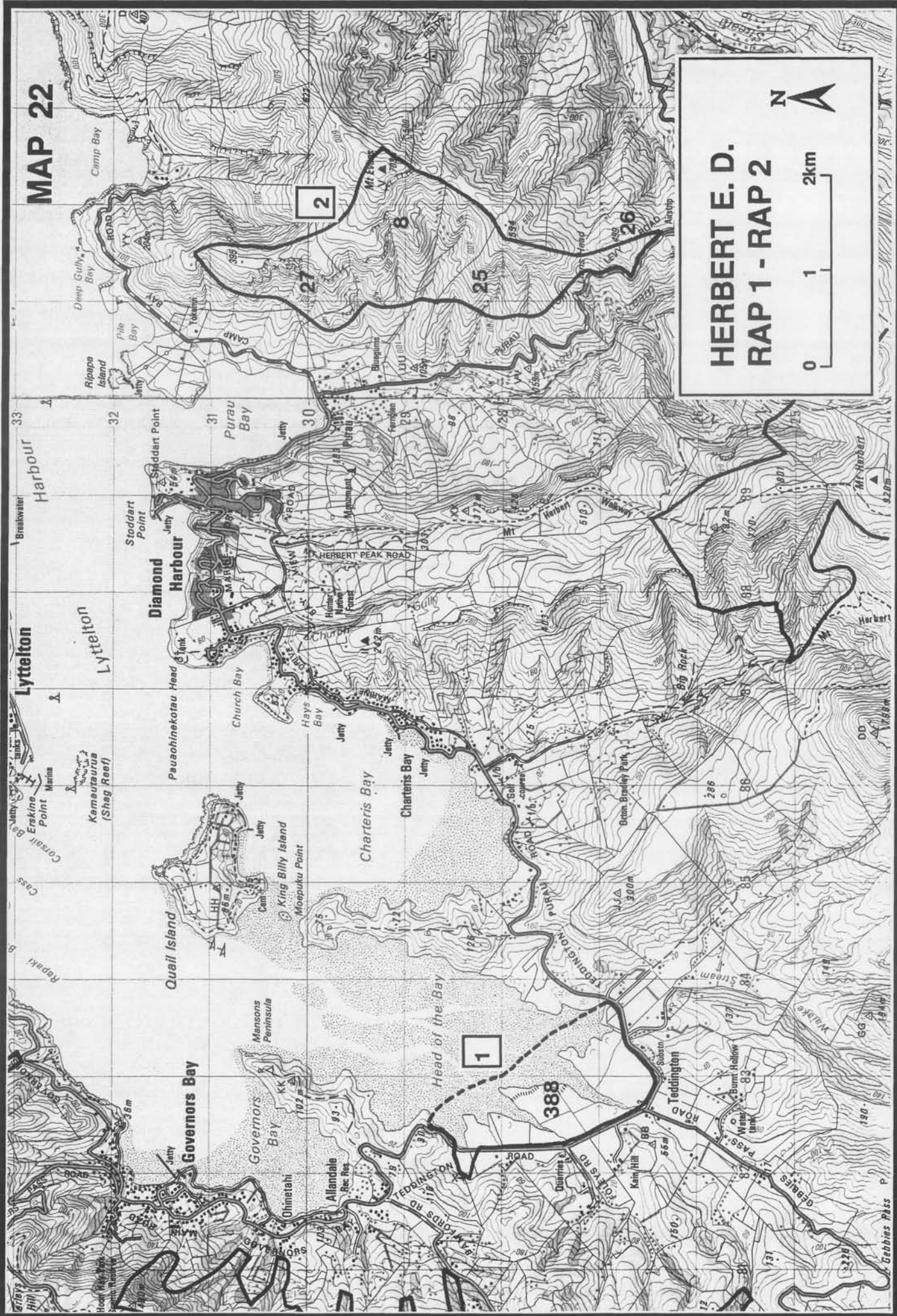
21	Tipperary	c. 6 ha	(543)
22	Menzies	c. 135 ha	(279)
23	Kererū	c. 5 ha	(461)
24	Howden	c. 60 ha	(151)
25	Puaha	c. 20 ha	(145)



MAP 20



MAP 21



Herbert RAP 1 - Head of the Bay

Area: c. 100 ha

Grid Ref. centre: M 36 826 275

Access: Governors Bay - Teddington Road.

Ecological classes:

F 18	Pasture on lowland alluvium	20%
G 29	Saltmarsh on coastal alluvium	80%
	(saltmarsh turf and shrubland	35%)
	(intertidal mudflat	45%)

Topography: A little less than half of the defined area is intertidal mudflat with algae; the remainder is stabilised by vegetation, all virtually flat and at sea level.

Plants: Much of the stabilised flats have been converted to pasture, chiefly *ryegrass and *crested dogtail, with a loss of much botanical and other biological values. The best surviving extensive saltmarsh turf is in the SE portion, dominated by *Puccinellia* and *Sarcocornia*, and with considerable areas of saltmarsh ribbonwood/sea rush shrubland. *Sea barley grass and **Plantago coronopus* are abundant in many places and another naturalised species of note is **Bupleurum tenuissimum*. Further notable native species include *Selliera radicans*, *Samolus repens*, *Leptinella dioica*, *Leptocarpus similis*, *Apium prostratum* and silver tussock, the latter common on embankments.

Wildlife: Crabs are abundant. The flats are used by waders such as oystercatchers and stilts, also by white-faced herons, kingfishers and ducks.

Weeds: **Hordeum marinum*, **Plantago coronopus*, **Lolium perenne*, **Trifolium repens*, **Festuca arundinacea*, **Agrostis stolonifera*.

Notes: Although much of the saltmarsh area is moderately to severely modified and the mudflats have lost their original eelgrass turf to excessive siltation, this is still the best and most extensive saltmarsh vegetation in the District and the Region and is of high conservation value.

Herbert RAP 2 - Mount Evans

Area: c. 300 ha

Grid Ref. centre: N 36 915 290

Access: Purau - Port Levy Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	4%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	1%
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	< 1%
D 11	Broadleaved hardwood treeland on lowland hill slopes	4%
D 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	2%
F 17	Short tussockland on lowland and montane hill slopes	22%
F 18	Pasture on lowland droughty hill slopes	40%
F 19	Fernland on lowland hill slopes	1%
F 21	Lowland flaxland on lowland hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	20%
J 37	Scattered plants on lowland rock	2%
J 38	Scattered plants on montane rock	2%

Topography: Very steep, west-facing, drought-prone slopes, bluffs and gullies rising from about 150 m to 703 m on the tussocky and bluffed summit of Mount Evans, forming a dramatic, abrupt, open landscape above Purau Bay and Valley.

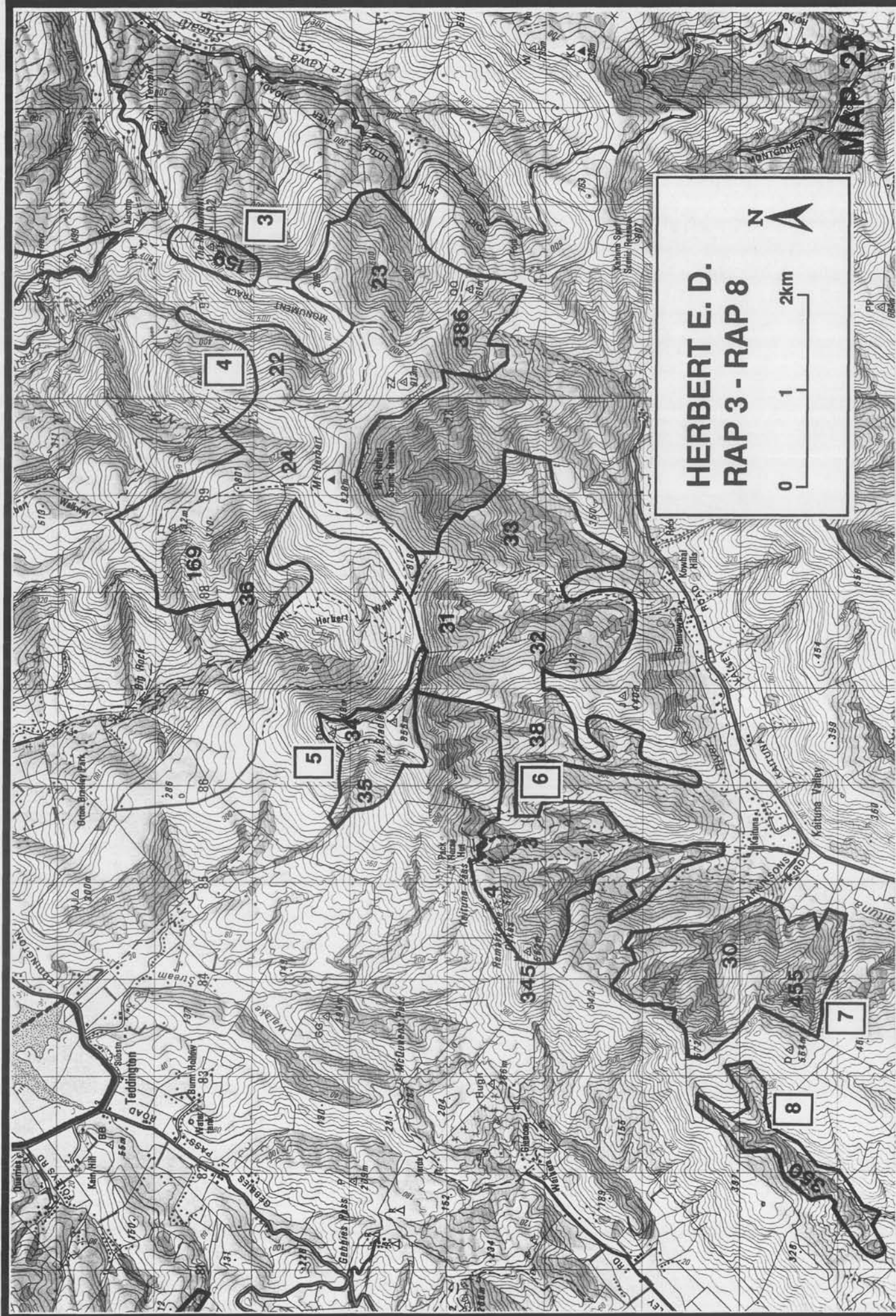
Plants: One of the main gullies holds the best population anywhere of the regional endemic *Myosotis australis* var. *lytteltonensis*. Also of note are: *Sophora prostrata*, leafless clematis, leafless lawyer, *Myosotis spathulata*; the regional endemics *Leptinella minor*, *Hebe lavaudiana*, *H. strictissima* and *Festuca* 'Banks Peninsula blue tussock'; *Cyathodes juniperina*, *Fuchsia perscandens*, the dwarf mistletoe *Korthalsella lindsayi*, *Corybas macranthus* along driplines below bluffs, *Australina pusilla*, *Gingidia enysii* (abundant), *Brachyglottis lagopus*, *Senecio glaucophyllus* subsp. *basinudus*, *Rytidosperma corinum*, *Celmisia gracilentia*, *Colobanthus buechananii* (only known locality in Region), *Convolvulus verecundus* subsp. *waitaha*, *Linum monogynum*, *Scandia geniculata*, *Stellaria* 'big flower aff. *decipiens*', the dry-habitat liverwort *Targionia*, *Anogramma leptophylla*, *Cheilanthes distans*, *Aciphylla subflabellata*, *Daucus glochidiatus* and *Earina autumnalis*.

Thus despite the rather harsh, open, and barren aspect of these slopes, they hold a remarkable dry climate flora, with plants of more moist conditions joining in at higher elevations.

Wildlife: Pipits, *Californian quail, harriers, skinks.

Weeds: *Gorse (sparse), *hawthorn, **Solenogyne gunnii*, **Dryopteris filix-mas*, *miner's lettuce, *variegated thistle, *winged thistle.

Notes: Adequate protection of many of the values inherent in this large block could be achieved simply by continuing present farming practices, with an emphasis on moderate grazing by sheep. Introduction of goats would be a disaster. There will be a slow increase of shrubs and trees under the present regime.



Herbert RAP 3 - The Monument

Area: c. 35 ha

Grid Ref. centre: N 36 915 255

Access: Purau - Port Levy Road. Monument Track.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	15%
C 6	Mixed broadleaved second-growth hardwood forest on montane hill slopes	10%
F 17	Short tussockland on montane hill slopes	50%
F 18	Pasture on montane hill slopes	10%
F 19	Fernland on montane hill slopes	5%
F 23	Holygrass grassland on montane hill slopes	2%
F 24	Native open shrubland on montane hill slopes	4%
J 38	Scattered plants on montane rock	4%

Topography: The Monument is a large volcanic dome prominently terminating a long ridge descending from Mount Herbert. The defined area includes the rock and surrounding tussocky and shrubby slopes, with an area of forest on the SE side.

Plants: Of particular note are: the regional endemics *Hebe strictissima*, *H. lavaudiana*, and *Festuca* 'Banks Peninsula blue tussock'; also *Dracophyllum acerosum*, *Brachyglottis lagopus*, *Celmisia gracilentia*, *Anisotome aromatica*, *Rytidosperma corinum*, *Asplenium richardii* (regionally rare), *Aciphylla aurea*, *A. subflabellata*, *Olearia ilicifolia* and *Leptopteris hymenophylloides*.

Weeds: *Elderberry, *mouse-ear hawkweed.

Notes: The rock massif with its columnar trachyte cliffs, associated dike, ungrazed cap of montane shrubland and holygrass, tussock and shrubland surrounds, and forested SE flank, is magnificent. The forest remnant, with thin-bark tōtara and abundant mountain fivefinger, is almost ungrazed because of its steepness. The route to the summit of the Monument is a satisfying scramble and the view from the summit is superlative. Protection of the values inherent in this RAP could be achieved by continued moderate grazing by sheep rather than cattle, and by maintaining the good tussock cover of the surrounding slopes. Introduction of goats would be a disaster. Rock climbers cause some damage to the rock vegetation.

Herbert RAP 4 - Mount Herbert

Area: c. 600 ha

Grid Ref. centre: M 36 900 243

Access: Mount Herbert Walkway; Summit Walkway.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	4%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	8%
E 14	Montane mixed scrub on hill slopes	5%
F 17	Short tussockland on montane hill slopes	60%
F 18	Pasture on lowland and montane moist hill slopes	5%
F 19	Fernland on lowland and montane hill slopes	5%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes (<i>Chionochloa conspicua</i> , mountain flax)	<1%
F 22	Toetoe tussockland on montane hill slopes	<1%
F 23	Holygrass grassland on montane hill slopes	<1%
F 24	Native open shrubland on montane hill slopes	5%
F 26	Mossfield on montane hill slopes	<1%
G 27	Freshwater montane flush vegetation	1%
J 38	Scattered plants on montane rock	3%

Topography: Summit ridges (mostly rounded), small bluffs, and valley heads; mostly high, open country dominated by short tussockland. This rises to the summit of Mount Herbert at 920 m, the highest point in the District and the Region. The defined area also includes Trig ZZ at 913 m, and several other points over 700 m, but descends to 200 m in the Orton Bradley Valley.

Plants: The area contains a very rich and diverse flora. Outstanding species include: *Libocedrus bidwillii*, *Cordyline indivisa*, *Epilobium macropus*, *Celmisia* 'rhizomatous', *Schoenus pauciflorus*, *Eleocharis gracilis*, *Olearia arborescens*, *Leptolepia novae-zelandiae*, *Sticherus cunninghamii*, several filmy ferns, *Grammitis poeppigiana*, *Cyathea colensoi*, *Anogramma leptophylla*, *Acaena dumicola*, *Gingidia montana*, *Gonocarpus incanus*, *Thelymitra decora*, *Blechnum* 'subalpine', *Olearia ilicifolia*, *Gunnera monoica* x *prorepens*, *Korthalsella salicornioides*, *Tmesipteris tannensis*, *Neomyrtus pedunculata*, *Pterostylis mutica*, *P. foliata*, *P. montana*, *Forstera tenella*, *Ourisia lactea*, *Kelleria dieffenbachii*, *Raoulia tenuicaulis*, *Rytidosperma corinum*, *Oreomyrrhis ramosa*, *Acaena caesiiglauca*, *Aristotelia fruticosa*, *Oreomyrrhis colensoi*, *Deyeuxia youngii*, *Carex* sp. 'tenuiculmis', *C. sinclairii*, *Epilobium tenuipes*, *Euphrasia zelandica*, *Nertera setulosa*, *Hebe lavaudiana*, *H. strictissima*, *Asplenium richardii*, *Gingidia ensysii*, *Raoulia monroi*, *Wahlenbergia albomarginata*, *Corybas macranthus*, *Geum parviflorum*, *Parahebe lyallii*, *Olearia nummulariifolia*, *Rytidosperma buechananii*, *Myosotis pygmaea* var. *drucei*, *Carex wakatipu*, *Cheilanthes distans*, *C. humilis*.

Arnold Wall wrote in 1922 that Mount Herbert "offers by far the best field for botanical study in the immediate vicinity of Christchurch, and there is so much of interest there that it is hard to know how to keep this account within reasonable limits". Such is still the case. Many of the species listed above belong to an upper montane-subalpine element of the Banks Peninsula flora most richly represented in this RAP and the adjoining Mount Herbert Scenic Reserve. Surprisingly absent is *Chionochloa rigida*.

Wildlife: A New Zealand falcon was seen here on my survey, the only sighting of this species I have made on Banks Peninsula. Also recorded were: tomtits, bellbirds, wood pigeons, grey warblers, harriers, pipits, and jewelled gecko.

Weeds: *Mouse-ear hawkweed appears to be increasing; *Himalayan honeysuckle, *elderberry, **Ranunculus repens*, *gorse (local, but abundant nearby at head of Orton Bradley Valley), **Hieracium lepidulum*, *naturalised pasture grasses, especially *browntop and *sweet vernal.

Notes: The summit area of Herbert is of immense biological and recreational (hill-walking) value. Effective protection would involve changes in current farming practices, as cattle-grazing and bulldozed farm tracks have had definitely deleterious effects. However light to moderate grazing by sheep across the tussocklands would reduce competition from naturalised grasses. Hard grazing by stock is likely to exacerbate the spread of mouse-ear hawkweed. At present the fescue tussockland is still in good condition, and the best and most extensive example of this ecological class in the Region.

Herbert RAP 5 - Mount Bradley

Area: c. 75 ha

Grid Ref. centre: M 36 864 236

Access: From Mount Herbert Walkway or from Packhorse Saddle.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	20%
E 14	Montane mixed scrub on hill slopes	5%
F 17	Short tussockland on montane hill slopes	55%
F 18	Pasture on montane hill slopes	6%
F 24	Native open shrubland on montane hill slopes	2%
F 26	Mossfield on montane hill slopes	1%
H 31	Exotic gorse scrub on montane hill slopes	5%
J 38	Scattered plants on montane rock	5%

Topography: Mount Bradley, 855 m, has a plateau-like tussocky summit dramatically ringed by columnar-jointed fortress-like cliffs, resulting from the final eruptions of the Mount Herbert Volcano between about 8.5 and 8.0 million years ago. The defined area takes in this imposing summit and the partly bushed valley to the west down to about 340 m.

Plants: The good summit tussockland contains a strong upper montane-subalpine floristic element, including fescue tussock, *Kelleria dieffenbachii*, *Ourisia lactea*, *Acaena caesiiglauca*, *A. dumicola*, *Leucopogon fraseri*, *Raoulia subsericea*, *R. monroi*, *Gnaphalium traversii*, *Rytidosperma thomsonii*, *Luzula rufa*, *Celmisia gracilentia*, *Wahlenbergia albomarginata*, *Gaultheria depressa*, *Anisotome aromatica*, *Aciphylla subflabellata*, *Racomitrium lanuginosum*, *Scleranthus uniflorus* and *Melicytus alpinus*. Also of note on the bluffs and in the scrub and bush are *Hebe lavaudiana*, *Botrychium biforme*, *Dracophyllum acerosum*, *Fuchsia perscandens*, and *Corybas macranthus*.

The forest canopy is mostly lacebark and ribbonwood with scattered podocarps, including some large tōtara and smaller mataī. On steeper ground māhoe, broadleaf and māpou dominate in shorter, scrubby forest. Except on the steepest ground the forest interior is devastated by farm stock.

Weeds: *Mouse-ear hawkweed appears to be on the increase in the tussockland, with frequent large patches evident by the early 1980s. *Gorse, **Clematis vitalba*.

Notes: Adequate protection of the whole area would require fencing stock out from the bush areas and at most light grazing by sheep across the summit tussocklands. In July 1991 there were lots of goats browsing gorse on the ridge in the eastern spur of the defined area. Spraying, burning, and goat-browsing of the gorse here appears to have been counter-productive for both pastoral and conservation values, although the spread of gorse across the summit tussocklands is certainly undesirable. The recreational value of Mount Bradley for hill-walking, rock climbing and botanising is high.

Herbert RAP 6 - Upper Kaituna

Area: c. 550 ha

Grid Ref. centre: M 36 870 225

Access: Kaituna Valley Road; Mount Herbert Walkway, Packhorse Walkway.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	3%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	3%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	15%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	2%
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	2%
D 11	Broadleaved hardwood treeland on lowland and montane hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	4%
E 14	Montane mixed scrub on hill slopes	3%
F 17	Short tussockland on lowland and montane hill slopes	25%
F 18	Pasture on lowland and montane moist hill slopes	20%
F 19	Fernland on lowland and montane hill slopes	3%
F 21	Lowland flaxland on lowland hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	4%
F 26	Mossfield on lowland and montane hill slopes	< 1%
H 31	Exotic gorse scrub on lowland hill slopes	< 1%
J 37	Scattered plants on lowland rock	< 1%
J 38	Scattered plants on montane rock	< 1%

Topography: Major bushy gullies separated by tussocky spurs and rock outcrops, rising imposingly towards the high summits of Mounts Bradley and Herbert. The altitudes on the defined area range from below 100 m up to 800 m. There are some imposing and interesting geological features, including the Remarkable Dykes. Most of the outcropping rocks are Lyttelton basalts and trachytes but there are also outcrops of younger Diamond Harbour basalts. These represent source vents of the earliest activity of the Diamond Harbour Volcanics, the Church Formation.

Plants: Adult and regenerating podocarps are an outstanding feature, including kahikatea, mataī, lowland tōtara and thin-bark tōtara. Other species of note include the regional endemics *Hebe strictissima* and *H. lavaudiana*; the dwarf mistletoe *Korthalsella lindsayi*; a diversity of small-leaved shrubs including *Pseudopanax anomalus* and *Streblus heterophyllus*; also *Dracophyllum acerosum*, tītoki, *Earina autumnalis*, *Acaena dumicola*, *Celmisia gracilentia*, *Anisotome aromatica*, *Brachyglottis lagopus*, *Aciphylla subflabellata*, *Cyathea colensoi*, *C. smithii*, *C. dealbata*, *Dicksonia squarrosa*, *Pterostylis areolata*, native passion vine, *Centella uniflora*, kawakawa, much *Lophomyrtus obcordata*, *Sophora prostrata* (on Trig K), *Fuchsia perscandens* and *Raoulia monroi*.

The diversity of this area, rather than the presence of any particular rare species, makes this RAP floristically valuable. It also contains some of the best mataī-dominant mid-altitude podocarp forest surviving in the District and the Region.

Wildlife: Common bush birds, also harriers and pipits.

Weeds: **Clematis vitalba*, *gorse, *elderberry, *cherry plum.

Notes: Suggesting some sort of protected status across this large area emphasises the importance of the Kaituna - Bradley - Herbert area for adequate conservation of the natural values of Herbert Ecological District. The RAP links with the Packhorse and Mount Herbert Scenic Reserves and with other RAPs around the summits of Bradley and Herbert. Currently most of the bush areas are seriously eaten out, and natural values are seriously compromised by wild goats, domestic stock, spraying and burning.

Detailed report: Wilson, Hugh 1985: Summary of information gathered in bush areas in two valleys south of Packhorse Hut and Mount Bradley, on several visits 1983-1985. Banks Peninsula Botanical Survey unpublished report, on file.

Herbert RAP 7 - Lower Kaituna

Area: c. 180 ha

Grid Ref. centre: M 36 840 203

Access: Kaituna Valley Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	12%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	20%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	< 1%
D 11	Broadleaved hardwood treeland on lowland hill slopes	4%
D 12	Kānuka treeland on lowland hill slopes	3%
E 13	Lowland small-leaved scrub on hill slopes	2%
F 17	Short tussockland on lowland hill slopes	25%
F 18	Pasture on lowland moist and droughty hill slopes	14%
F 19	Fernland on lowland hill slopes	2%
F 21	Lowland flaxland on lowland hill slopes	2%
F 22	Toetoe tussockland on lowland hill slopes	< 1%
F 24	Native open shrubland on lowland hill slopes	1%
F 25	Exotic open gorse shrubland on lowland hill slopes	< 1%
G 27	Freshwater lowland flush	< 1%
H 31	Exotic gorse scrub on lowland hill slopes	1%
I 33	Coniferous plantation on lowland hill slopes	2%
J 37	Scattered plants on lowland rock	1%

Topography: Two bushy side valleys surrounded by tussocky spurs, some pasture, and rock outcrops. At the head of the valleys are outcrops of rhyolite, long predating the basalts underlying most of the defined area. The altitude range is from about 50 m up to 572 m.

Plants: Notable are the extensive good silver and fescue tussocklands and the bush containing large numbers of podocarps - mataī, lowland tōtara and kahikatea, with good regeneration of the first two. Also of note are: an abundance of the nationally rare shrub *Teucrium parvifolium*; *Scandia geniculata*, *Hebe strictissima* (regionally endemic), pigeonwood, kawakawa, some fine stands of *Phormium tenax*, toetoe and cabbage trees, tītoki, fierce lancewood, small-leaved milk tree, *Carex secta* and *Eleocharis acuta* in flushes, *Uncinia ferruginea*, and *Celmisia gracilentia* on rock outcrops.

Wildlife: Common bush birds, including wood pigeons, bellbirds, grey warblers, fantails, waxeyes; also *Californian quail.

Weeds: **Acaena agnipila*, **Clematis vitalba*, *elderberry, **Pinus radiata*, *gorse.

Notes: These are outstanding bush gullies, unfortunately damaged currently by wild goats, and cattle. The intervening tussock and rock adds greatly to the botanical and landscape values. Also the stands of lowland flax, cabbage trees and toetoe are fine examples of seral vegetation little represented in existing reserves in the District or Region. Another fine feature is the abundance of kōwhai.

Herbert RAP 8 - Graylees

Area: c. 85 ha

Grid Ref. centre: M 36 820 193

Access: Graylees Farm.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	25%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	40%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	< 1%
F 18	Pasture on lowland hill slopes	8%
F 21	Lowland flaxland on lowland hill slopes	< 1%
H 31	Exotic gorse scrub on lowland hill slopes	2%
I 33	Coniferous plantation on lowland hill slopes	4%
J 37	Scattered plants on lowland rock	1%

Topography: Bush-filled narrow valley, diverging at the head into two small tributary streams, one of which (the south-eastern branch) cuts down through small walls and outcrops of rhyolite, of much greater age than the Mount Herbert basalts which underlie the majority of the RAP. The altitudinal range is from about 80 m to 440 m.

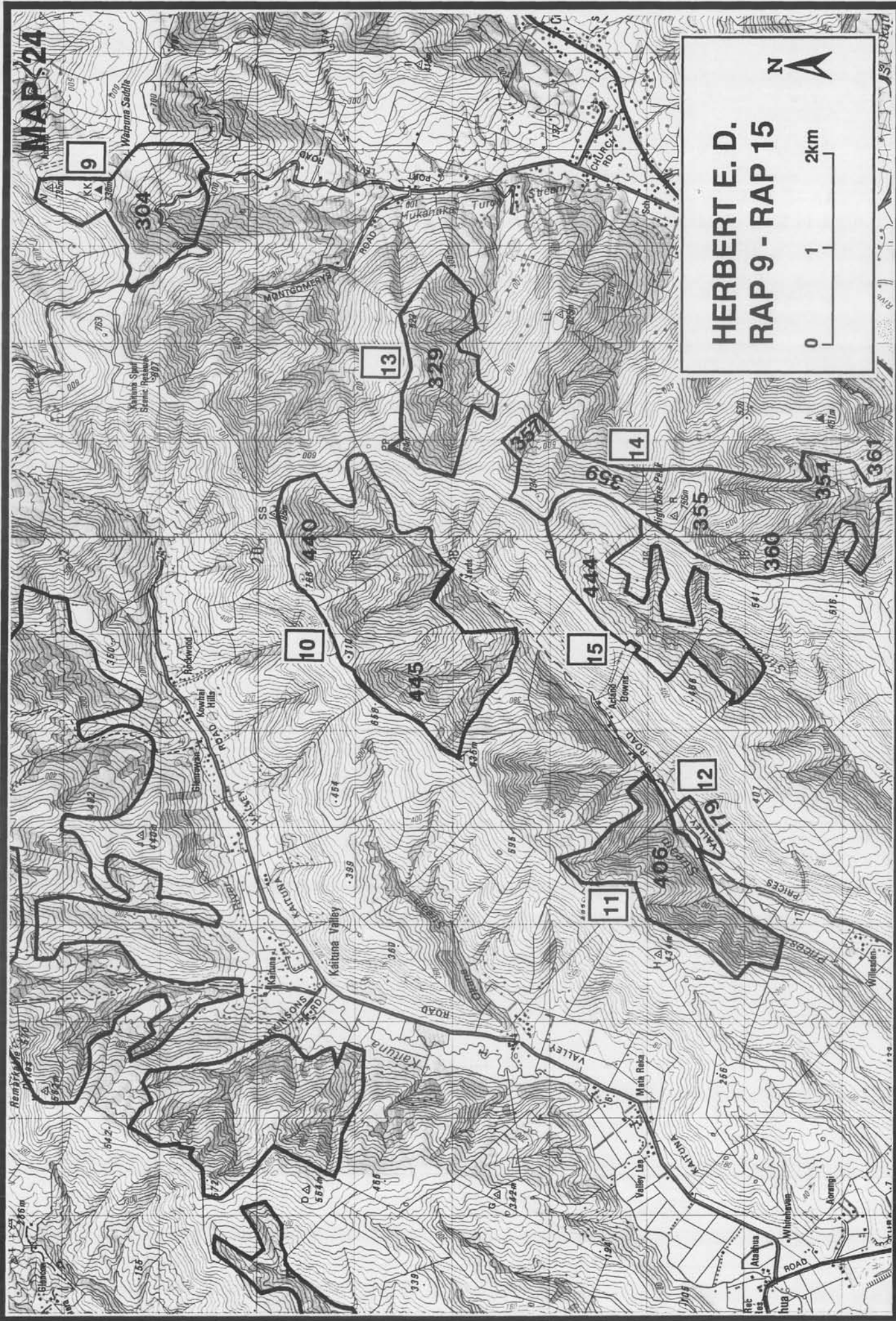
Plants: The abundance of podocarps is outstanding; mataī, lowland tōtara and thin-bark tōtara are represented by numerous adults and much regeneration. Kahikatea is represented only by adults. Two tree fern species (*Cyathea smithii* and *C. dealbata*) are quite common, but declining due to stock browsing; regeneration was noted only on steep banks along the stream inaccessible to stock. Of particular note is the abundance of an uncommon native forest floor grass, *Microlaena polynoda*. Other notable species are: *Korthalsella salicornioides*, *Pseudopanax anomalus*, *Melicytus micranthus*, *Streblus heterophyllus*, *Lophomyrtus obcordata*, tītoki, kawakawa, pigeonwood, *Hebe strictissima*, *Ileostylus micranthus*, *Leptopteris hymenophylloides* and *Cheilanthes humilis*.

Wildlife: Wood pigeons, grey warblers, fantails, bellbirds, harriers, *rock pigeons, cicadas.

Weeds: *Elderberry, *gorse, *mouse-ear hawkweed, **Pinus radiata*.

Notes: Exclusion of stock would represent a big plus for this very interesting bushed area. Without fencing, it is still of considerable interest, although a few of the species such as the tree ferns and ground ferns will continue to decline.

Detailed report: Wilson, Hugh 1985: Notes on bush occupying valley inland from Lakelands and Graylees, on property of B.M. Parkinson and Gray families. Banks Peninsula Botanical Survey unpublished report, on file.



Herbert RAP 9 - Waipuna

Area: c. 130 ha

Grid Ref. centre: N 36 935 212

Access: Port Levy - Little River Road; Summit Walkway.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	15 %
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	34 %
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	5 %
D 11	Broadleaved hardwood treeland on lowland and montane hill slopes	10 %
F 18	Pasture on lowland and montane moist hill slopes	25 %
F 19	Fernland on lowland and montane hill slopes	10 %
F 24	Native open shrubland on montane hill slopes	1 %
J 38	Scattered plants on montane rock	< 1 %

Topography: A summit ridge rising to 738 m and the steep valley head southwards, down to about 380 m, covered in remnant montane old-growth forest, second-growth forest, and rough pasture with fern and woody regeneration. At the northern end Trig W (735 m) has some good vegetated bluffs.

Plants: The outstanding feature is that here one last surviving adult cedar outlived the demise of all other known adult cedars on Banks Peninsula during the 1950s and 60s; this one close to Trig KK is still alive at the time of writing. In April 1985 it had a healthy crown although some dead foliage was evident among the live foliage. Measurements were estimated at about 12-14 m tall, about 80 cm dbh, and about 300+ years old. There is no regeneration here.

Other species of note include: *Hebe strictissima* (regional endemic), *Lycopodium varium*, *Brachyglottis lagopus*, *Celmisia gracilentia*, *Coprosma wallii*, mataī, *Ileostylus micranthus*, *Oreomyrrhis ramosa*, *Leptopteris hymenophylloides* and *Blechnum colensoi*.

Weeds: *Elderberry.

Notes: The area forms an attractive, bushy stretch of the Summit Walkway.

Herbert RAP 10 - Upper Prices

Area: c. 300 ha

Grid Ref. centre: M 36 893 187

Access: Prices Valley Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	1 %
A 3	Thin-bark tōtara /mixed hardwood forest on montane hill slopes	15 %
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	30 %
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	2 %
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	1 %
F 17	Short tussockland on lowland and montane hill slopes	35 %
F 18	Pasture on lowland and montane moist hill slopes	15 %
F 24	Native open shrubland on lowland and montane hill slopes	< 1 %
F 25	Exotic open shrubland on lowland and montane hill slopes	< 1 %

Topography: Small bushed valleys and intervening tussocky spurs, rising steeply from about 200 m to a main ridge crest culminating in Trig SS at 785 m; the defined area includes much of the upper catchment of Prices Valley.

Plants: There is a very good representation of podocarps, including thin-bark tōtara, mataī, kahikatea and lowland tōtara. There is also extensive very good tussock cover of both silver and fescue tussocks. In places the spread of young thin-bark tōtara into tussock and pasture away from the bush margin is impressive. Among regenerating tōtara near Trig SS are 5 saplings of *Libocedrus bidwillii*. Other species of note are: *Scleranthus biflorus*, *Anisotome aromatica*, *Aciphylla subflabellata*, *Gunnera monoica*, *Rytidosperma buehneri*, *Cyathea colensoi*, *Clematis paniculata*, *Leptopteris hymenophylloides*, the goblin moss *Weymouthia mollis*, *Leptolepia novae-zelandiae*, several filmy ferns including *Hymenophyllum flabellatum* and *H. sanguinolentum*, *Hebe strictissima* (regional endemic), *Dracophyllum acerosum* (only one bush noted, on bush margin near Trig SS), *Pseudopanax anomalous*, *Lycopodium varium*, *Korthalsella salicornioides*, and abundant *Ophioglossum coriaceum*. All three of the common Banks Peninsula tree ferns are present; *Cyathea smithii* is quite common, *Dicksonia squarrosa* and *C. dealbata* are rare; all are declining through stock pressure. Parts of the forest interiors were in reasonable condition at time of survey (1987) but large areas were severely eaten out and depleted.

Wildlife: Common bush birds, including bellbirds, grey warblers, fantails, tomtits; skinks in the tussockland.

Weeds: *Mouse-ear hawkweed in the tussockland and pasture, wilding **Pinus radiata*, *elderberry, *gorse (local).

Herbert RAP 11 - Lower Price

Area: c. 145 ha

Grid Ref. centre: M 36 865 159

Access: Prices Valley Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	5 %
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	60 %
D 11	Broadleaved hardwood treeland on lowland hill slopes	5 %
D 12	Kānuka treeland on lowland hill slopes	< 1 %
E 13	Lowland small-leaved scrub on hill slopes	25 %
F 17	Short tussockland on lowland hill slopes	< 1 %
F 18	Pasture on lowland hill slopes	< 1 %
F 21	Lowland flaxland on hill slopes	< 1 %
F 22	Toetoe tussockland on lowland hill slopes	< 1 %
J 37	Scattered plants on lowland rock	< 1 %

Topography: Steep, bushy, side gullies and valley-side slopes from about 40-480 m altitude, with bluffs in places.

Plants: The area is botanically rich scrub and regenerating forest, mostly hardwoods, but with considerable numbers of scattered big adult podocarps and with podocarp regeneration of lowland tōtara and mataī. The nationally rare shrub *Teucrium parvifolium* is common in the defined area. Also of note are: *Australina pusilla*, kawakawa, small-leaved milk tree, pigeonwood, akeake (*Dodonaea viscosa*), tītoki, *Hebe strictissima*, *Lastreopsis velutina*, *L. glabella*, fierce lancewood, very extensive stands of the rare grass *Microlaena polynoda*, *Scandia geniculata*, *Olearia fragrantissima*, *Parietaria debilis*, native passion vine, *Ileostylus micranthus*, leafless lawyer, leafless clematis and *Echinopogon ovatus*.

Wildlife: Noted on the survey were bellbirds, harriers, wood pigeons, fantails, waxeyes, spur-winged plovers, *sulphur-crested cockatoos, ducks, welcome swallows, white-faced herons, and *Uropetala* dragonflies.

Weeds: *Elderberry, *male fern, *sweet brier (very sparse), *broom.

Notes: This area has very high conservation values. Reserve proposals faltered, as I understand, because of change of ownership before arrangements were completed. In January 1987 stock had recently been excluded and valuable regeneration was already under way. This RAP is contiguous with RAP 12.

Herbert RAP 12 - Prices Valley**Area:** c. 15 ha**Grid Ref. centre:** M 36 870 155**Access:** Prices Valley Road.**Ecological classes:**

- | | | |
|-----|--|-----|
| A 1 | Mataī - kahikatea - lowland tōtara/mixed hardwood forest on lowland alluvium | 90% |
| C 6 | Mixed broadleaved second-growth hardwood forest on lowland alluvium | 10% |

Topography: Flat valley floor along stream, altitude c. 50 m.

Plants: The mataī-dominant canopy with some kahikatea and a little lowland tōtara, is outstanding. Tītoki is abundant in the subcanopy, with kawakawa abundant in the understorey. At the time of survey the best part of this area (most of it) has had stock excluded for many years, and it is in fine condition. Other species of note are the nationally rare shrub *Teucrium parvifolium*, also *Melicytus micranthus*, small-leaved milk tree, pōkākā, pigeonwood, *Lophomyrtus obcordata*, fierce lancewood, native passion vine, the rare forest floor grass *Microlaena polynoda*, *Pseudopanax anomalus*, leafless lawyer, *Scandia geniculata*, the mistletoes *Korthalsella lindsayi* and *Ileostylus micranthus*, and basket fungus.

Wildlife: Common bush birds, including bellbirds, wood pigeons, grey warblers, fantails.**Weeds:** *Blackberry, *periwinkle. The stand is almost free of any weeds of consequence.

Notes: This outstanding remnant of valley floor old-growth forest is one of the two best, if not the best, surviving remnants in the District and Region. This RAP is contiguous with RAP 11. The best part of it was being registered as a National Trust Covenant as this report went to press.

Herbert RAP 13 - Latham

Area: c. 120 ha

Grid Ref. centre: N 36 916 181

Access: Western Valley, Little River.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	10%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	60%
E 13	Lowland small-leaved scrub on hill slopes	5%
F 17	Short tussockland on montane hill slopes	5%
F 18	Pasture on lowland and montane moist hill slopes	10%
F 19	Fernland on lowland and montane hill slopes	10%

Topography: Bushy steep side and head of tributary valley rising to Trig PP at 684 m; another high point to the east is 523 m altitude, and the lowest part of the defined area is about 180 m. In mid October 1985 a slip had some time recently started in pasture near the high northern edge of the defined area and scoured both sides of a small tributary stream through second-growth hardwood forest.

Plants: The upper stand of thin-bark tōtara is excellent, large and closely stocked, with abundant regeneration along the top edge. The abundance of kōwhai is another attractive feature. There is much moist, thick, diverse second-growth bush with some extensive ferny floors little damaged by stock. *Cyathea smithii* and *Dicksonia squarrosa* are common. Also of note are: *Tmesipteris tannensis*, *Leptopteris hymenophylloides*, *Blechnum colensoi*, *Scandia geniculata*, *Clematis paniculata*, mataī; around Trig PP there is some close fescue tussockland with *Wahlenbergia albomarginata* and *Koeleria novo-zelandica*.

Wildlife: Noted on survey were bellbirds, brown creepers, shining cuckoos, and harriers.

Weeds: *Elderberry.

Herbert RAP 14 - High Bare Peak

Area: c. 250 ha

Grid Ref. centre: M 36 903 157

Access: Little River - Christchurch road.

Ecological classes:

A 1	Kahikatea - matai - lowland tōtara/mixed hardwood forest on lowland alluvium	< 1%
A 2	Matai - lowland tōtara/mixed hardwood forest on lowland hill slopes	< 1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane alluvium and hill slopes	30%
C 7	Kānuka-dominant second-growth hardwood forest on lowland alluvium and hill slopes	10%
D 9	Lowland podocarp and podocarp/hardwood treeland on alluvium and hill slopes	< 1%
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	< 1%
D 11	Broadleaved hardwood treeland on lowland and montane alluvium and hill slopes	3%
D 12	Kānuka treeland on lowland alluvium and hill slopes	< 1%
E 13	Lowland small-leaved scrub on hill slopes	1%
F 17	Short tussockland on lowland and montane hill slopes	25%
F 18	Pasture on lowland and montane moist alluvium and hill slopes	15%
F 19	Fernland on lowland and montane hill slopes	12%
F 22	Toetoe tussockland on lowland and montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	2%
G 27	Freshwater montane flush	< 1%
J 38	Scattered plants on montane rock	< 1%

Topography: High tussocky ridges culminating in the summit of High Bare Peak at 756 m, and falling away down steep gullies with regenerating bush and tiny remnants of old-growth forest at both high and low altitude. Locally there are small bluffs, and also a very small area of alluvial ground behind Catons Bay at about 50 m altitude.

Plants: There is a wide range of common species. Species of particular note include the podocarps - thin-bark tōtara, lowland tōtara, matai and kahikatea -, also *Coprosma wallii*, *Scleranthus biflorus*, *Aciphylla subflabellata*, *Fuchsia perscandens*, *Leptopteris hymenophylloides*, *Leptolepia novae-zelandiae*, *Hebe strictissima*, *Anisotome aromatica*, *Blechnum colensoi*, small-leaved milk tree, *Lophomyrtus obcordata*, fierce lancewood, kawakawa, *Nertera setulosa*, *Lastreopsis glabella*, *Australina pusilla*, tītoki, pigeonwood, leafless lawyer, *Korthalsella lindsayi*, pōkākā, akeake (*Dodonaea viscosa*), *Scandia geniculata*, *Pseudopanax anomalus*, native passion vine, leafless lawyer, and *Ileostylus micranthus*. The tree fern *Cyathea smithii* is abundant, but is regenerating only on steep ground inaccessible to stock. In many places the interior of the regenerating forest is depleted of such palatables.

Wildlife: Recorded on the survey were: bellbirds (lots), wood pigeons, *skylark.

Weeds: *Elderberry, **Pinus radiata*. To the east of the defined area there are infestations of **Berberis glaucocarpa*, a rather serious invader, also of *blackberry and *gorse.

Notes: Fire has accidentally damaged centuries old podocarps behind Catons Bay. The small stand of valley floor podocarp/hardwood forest here is seriously modified and cattle-grazed, but would be worth protecting even if protection over the rest of this large RAP were unattainable.

Herbert RAP 15 - Waikoko

Area: c. 150 ha

Grid Ref. centre: M 36 890 160

Access: No nearby road or track. The nearest is Birdlings Road to Waikoko Farm, off the Christchurch - Akaroa highway near Birdlings Flat.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	32%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	5%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	< 1%
F 17	Short tussockland on lowland and montane hill slopes	40%
F 18	Pasture on lowland and montane hill slopes	20%
F 25	Exotic open shrubland on lowland hill slopes	< 1%
H 31	Exotic gorse scrub on lowland hill slopes	< 1%

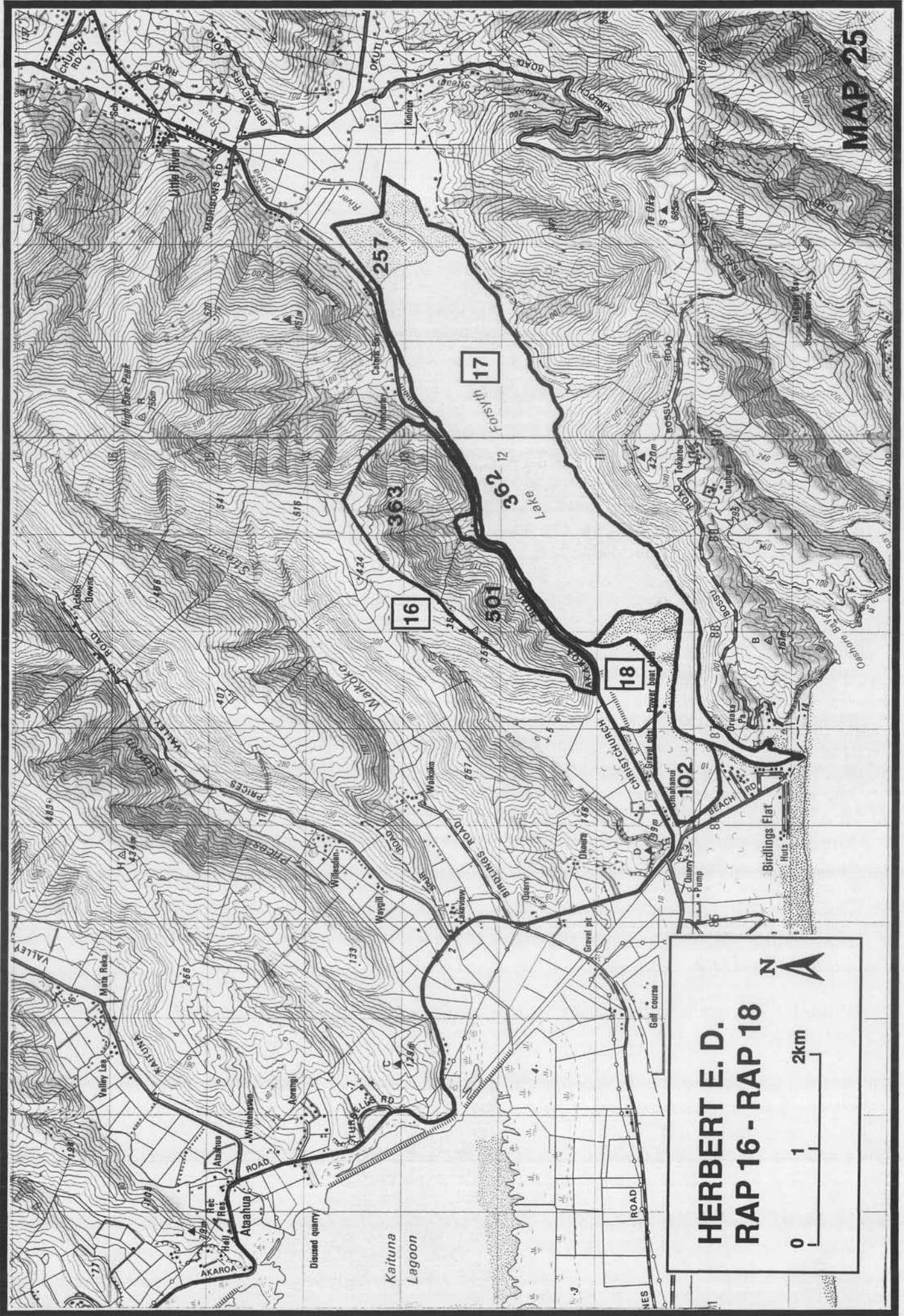
Topography: Head of a small valley, with more or less continuous bush along the gully bottom and in side gullies, running up into open tussocky slopes and surrounding ridge crests, most of the bush second-growth but with old-growth and regenerating podocarps quite common. The altitude range is from about 100 m up to 650 m.

Plants: The four common Banks Peninsula podocarps are represented. Thin-bark tōtara, mataī, and lowland tōtara are represented by both adults and regeneration, but kahikatea apparently by rare adults only. Other species of note are: *Neomyrtus pedunculata*, *Cyathea smithii*, *Clematis paniculata*, *Leptopteris hymenophylloides*, *Blechnum colensoi*, *Dicksonia squarrosa*, *Cyathea dealbata*, kawakawa, tītoki, *Scandia geniculata*, *Anemanthele lessoniana* (very rare in Region), *Teucrium parvifolium* (nationally rare), *Lastreopsis velutina* (uncommon in District and Region), *Lophomyrtus obcordata*, *Streblus heterophyllus*, leafless lawyer, *Aciphylla subflabellata*.

Wildlife: Noted on survey were: bellbirds, grey warblers, shining cuckoo, native bees, tiger beetles, *Uropetala* dragonflies.

Weeds: *Gorse.

Notes: The combination of species rich bush and good extensive short tussockland is appealing. Vehicle tracks across the tussockland detract from the appearance. The bush would certainly do better with stock excluded - cattle have largely eaten out the interior except on steep sites - but the short tussocklands are almost certainly better moderately grazed so that any exclusion of stock from the forest would be problematical without an impractical amount of fencing. Despite cattle grazing, there is considerable regeneration of tōtara both within and beyond the present bush areas. Unfortunately prior to 1987 about 2 ha of second-growth bush was almost obliterated when it was sprayed, along with an adjacent fringe of gorse. This is an RAP where, if current grazing continued in the absence of any pushing back of the bush or tussock, much of conservation value would be retained.



Herbert RAP 16 - Forsyth Spur

Area: c. 180 ha

Grid Ref. centre: M 36 889 127

Access: Christchurch - Akaroa road.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	1 %
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	25 %
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	3 %
D 11	Broadleaved hardwood treeland on lowland hill slopes	4 %
D 12	Kānuka treeland on lowland hill slopes	3 %
E 13	Lowland small-leaved scrub on hill slopes	25 %
F 17	Short tussockland on lowland hill slopes	15 %
F 18	Pasture on lowland hill slopes	10 %
F 21	Lowland flaxland on lowland hill slopes	1 %
F 22	Toetoe tussockland on lowland hill slopes	< 1 %
F 24	Native open shrubland on lowland hill slopes	12 %
J 37	Scattered plants on lowland rock	1 %

Topography: Small amphitheatre-like side valley and steep sides of spurs falling towards Lake Forsyth, with numerous small bluffs, well-vegetated with shrubland, scrub, tussock, and patches of second-growth hardwoods, with ribbonwood prominent. The altitude range is from almost sea level up to 460 m.

Plants: Particularly abundant are small-leaved shrubs such as *Helichrysum lanceolatum*, *Coprosma virescens*, *C. crassifolia*, *Melicope simplex*, etc, native broom, ribbonwood and lacebark. Other species of note are: tītoki, kawakawa, ngaio, *Parietaria debilis*, *Microlaena polynoda*, adult and regenerating mataī and lowland tōtara, *Hebe strictissima*, *Myrsine divaricata*, *Linum monogynum*, *Senecio glaucophyllus* subsp. *basinudus*, *Poa* cf. *pusilla*, *Einadia allanii*, *Earina autumnalis* on bluffs, *Sophora prostrata*, thick stands of *Phormium tenax*, *Festuca* 'Banks Peninsula blue tussock', *Aciphylla subflabellata*, *Leptinella perpusilla* (local in District and Region), pigeonwood, *Streblus heterophyllus*, *Scandia geniculata*, *Carex secta*, *Einadia triandra* (inland occurrence unusual), *Corokia cotoneaster*, *Daucus glochidiatus*, *Leptinella minor* (Regional endemic), *Echinopogon ovatus* and the moss *Grimmia laevigata*.

Wildlife: Recorded on the survey were bellbirds, wood pigeons, *rock pigeons, *skylarks and *rooks.

Notes: The defined area is very visually attractive and wild-looking from the main road to Akaroa as it traverses the side of Lake Forsyth. During the last few years feral goats have done considerable damage to natural values here. Their removal, together with limiting grazing to sheep, and allowing the scrub and forest regeneration to proceed uncleared, would go a long way to safeguarding the natural values inherent in this RAP.

Herbert RAP 17 - Wairewa

Area: c. 600 ha (about 550 ha of this is water)

Grid Ref. centre: M 36 900 120

Access: Christchurch - Akaroa road.

Ecological classes:

F 18	Pasture on lowland alluvium	< 1%
G 27	Freshwater lowland marsh and emergent aquatic vegetation	8%
G 28	Freshwater lowland submerged or floating aquatic vegetation	92%

Topography: Wairewa or Lake Forsyth is a slightly brackish lake about 6 km long by 1 km wide, between high hills, with a tenuous connection to the sea usually blocked off by a shingle barrier but artificially opened from time to time when the lake level is deemed to be too high by the Regional Council. The lake is little more than 2 m deep at its deepest part. Also included in this RAP are the alluvial flats at the upper end, bisected by the Takiritawai River as it enters the lake.

Plants: Marsh and emergent species of note include raupō, *Bolboschoenus caldwellii*, *Schoenoplectus pungens*, *Eleocharis acuta*, *Limosella lineata*, *Crassula sinclairii*, *Lilaeopsis novae-zelandiae*, *Mimulus repens*, *Selliera radicans*, *Ranunculus limosella*, *Carex litorosa*, *Leptinella dioica*, *Triglochin striatum*, *Cotula coronopifolia*, *Sarcocornia quinqueflora*, *Isolepis basilaris*, *Plagianthus divaricatus* and *Eryngium vesiculosum*. Some of these are saltmarsh species, indicating the slight brackishness of the water.

Submerged or floating species include some of the above plus abundant *Potamogeton pectinatus*, also the charophyte *Lamprothamnium papulosum*, and *Myriophyllum triphyllum*, *Lepilaena bilocularis*, *Zannichellia palustris*, *Ruppia polycarpa*, *Potamogeton cheesemanii* and the green alga *Enteromorpha*.

From time to time Wairewa produces blooms of blue-green algae poisonous to mammals; the phenomenon is believed to be related to eutrophication due to runoff from the surrounding farmlands. The chief species responsible is *Nodularia spumigena*.

Wildlife: This is a rich habitat for fish, birds and insects. Huge breeding swarms of the lake midge *Chironomus zealandicus* are frequent. Birds recorded on the lake include *black swans, *Canada geese, southern crested grebe, black shag, little shag, white-faced heron, kōtuku (white heron), cattle egret, Australasian bittern (probably no longer present), Royal spoonbill, Paradise shelduck, grey duck, grey teal, New Zealand shoveler, *mallard, harrier, pūkeko, spur-winged plover, South Island pied oystercatcher, banded dotterel, pied stilt, black-backed gull, red-billed gull, black-billed gull, Caspian tern, black-fronted tern, white-fronted tern, kingfisher, welcome swallow.

Damsel flies and dragonflies can be conspicuous.

Weeds: **Festuca arundinacea*, **Trifolium fragiferum*, **Plantago coronopus*, **Puccinellia distans*, **Elodea canadensis*, **Agrostis stolonifera*, **Hordeum marinum*, **H. hystrix*, **Polypogon monspeliensis*, but all of these naturalised species have to be accepted as part of the flora now; their removal would be impractical and counter-productive.

Notes: The lake is a major part of the landscape and biota of Herbert and Akaroa Districts, and it should not be allowed to deteriorate further. Use of motorised craft here is totally inappropriate. Wildlife and botanical values are very high.

Herbert RAP 18 - Birdlings Flat

Area: c. 100 ha

Grid Ref. centre: M 36-37 874 103

Access: Christchurch - Akaroa road.

Ecological classes:

F 18	Pasture on lowland droughty alluvium	15%
F 24	Native open shrubland on coastal alluvium	70%
G 29	Saltmarsh on coastal alluvium	10%
K 39	Scattered plants on stony coastal beaches	5%

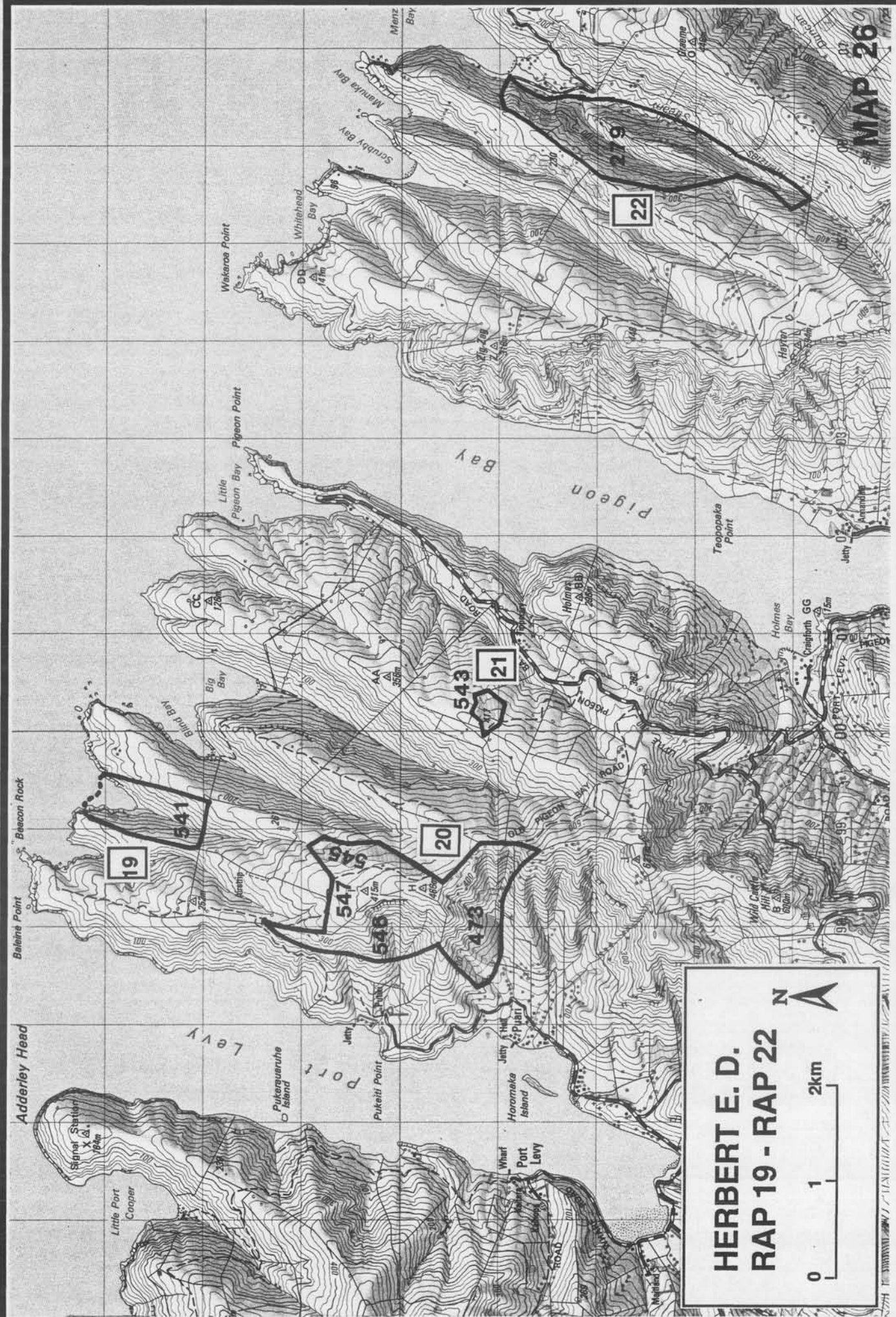
Topography: Flat, stony, semi-arid, near-coastal alluvial ground, running across to stony lake shore of Wairewa or Lake Forsyth.

Plants: The commonest shrubs are *Muehlenbeckia complexa*, *Coprosma propinqua*, *C. crassifolia*, and *Melicytus alpinus*. There is some matagouri, and saltmarsh ribbonwood is abundant along the lake edge. Most of the grasses are naturalised, with **Stipa nodosa* and **Rytidosperma* species dominant. Sea rush occurs in the NE edge of the defined area. Other species of note include: *Cheilanthes humilis*, *Convolvulus verecundus* subsp. *waitaha*, *Eryngium vesiculosum*, *Muehlenbeckia ephedroides*, *Leptinella dioica*, *Selliera radicans*, *Chenopodium glaucum* subsp. *ambiguum*, *Lilaeopsis novae-zelandiae*, silver tussock, leafless lawyer, *Parsonsia capsularis*, *Calystegia soldanella*, *Isolepis cernua*, *Sarcocornia quinqueflora*, *Mimulus repens*, *Triglochin striatum*, and *Schoenoplectus pungens*.

Wildlife: The RAP is adjacent to the rich wildlife of Wairewa or Lake Forsyth. The area itself is used by many of these birds, including *swans, *geese, ducks, waders, harriers, and also pipits and skylarks. Spotted skink may be present, as well as common skink. Swarms of the lake midge, *Chironomus zealandicus*, are a common phenomenon.

Weeds: **Stipa nodosa*, **Rytidosperma racemosum*, **R. caespitosum*, **Vulpia bromoides*, **Vittadinia gracilis*, **Lagurus ovatus*, **Acaena agnipila*, **Trifolium fragiferum*, *sweet brier (sparse), **Verbascum thapsus*, *viper's bugloss, **Glaucium flavum*, **Plantago coronopus*, **Hordeum marinum*, **Festuca arundinacea* and **Agrostis stolonifera* - but some of these naturalised species have their own interest, and virtually all are here to stay whether we like it or not.

Notes: These semi-arid shrublands and lake shore are unique in the Region, although admittedly adjacent to more extensive ones on Kaitorete in the Ellesmere Ecological District of Low Plains Region. They are under considerable threat mainly because there is a common attitude that they are wastelands, and tend to be treated as such. Goats heavily graze a similar area outside this RAP on the other side of the main Christchurch - Akaroa road.



Herbert RAP 19 - Akiraho

Area: c. 50 ha

Grid ref. centre: N 36 992 325

Access: None near a road. Sea landing.

Ecological classes:

D 11	Broadleaved hardwood treeland on lowland hill slopes	1%
D 12	Kānuka treeland on lowland hill slopes	1%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	1%
F 17	Short tussockland on lowland hill slopes	8%
F 18	Pasture on lowland droughty hill slopes	75%
F 24	Native open shrubland on coastal and lowland hill slopes	10%
F 25	Exotic boxthorn and <i>Cotyledon</i> shrubland on coastal hill slopes	< 1%
G 30	Algal communities on intertidal rocks	1%
J 36	Scattered plants on coastal rock	1%
K 39	Scattered plants on stony coastal beach	1%

Topography: The lower end of a small, drought-prone valley meeting the sea in a small rocky cove. The rocky stream bed is usually flowing in winter and dry in summer. On either side steep pasture and silver tussock rises through rocky ground and outcrops to the crest of each bounding spur.

Plants: The RAP is proposed chiefly as a conservation measure for *Carmichaelia kirkii*, a very rare species of native broom. I made the first discovery of this species in Banks Ecological Region in December 1987, in the next gully westwards, where about 10 plants occur. The RAP has about 12 plants, generally occurring on the lip of low stony or rocky banks where they gain partial protection from stock browse.

Much of the pasture in the area is dominated by the native species *Microlaena stipoides* and *Rytidosperma clavatum* ("danthonia"). Also of note are: *Coprosma virescens*, *C. crassifolia*, *C. propinqua*, *Sophora prostrata*, the common native broom, matagouri, leafless clematis, leafless lawyer, *Myrsine divaricata*, *Cheilanthes humilis*, *C. distans*, *Leptinella minor* (regional endemic), *Convolvulus verecundus* subsp. *waitaha* and *Daucus glochidiatus*.

Muehlenbeckia complexa and *Scirpoides nodosus* are common.

There was some mortality of scattered kānuka, māhoe and kōwhai during the 1987-88 drought.

Mānuka occurs as well as kānuka.

Weeds: *Boxthorn, **Cotyledon orbiculata*, **Vittadinia gracilis*, **Stipa nodosa*. Of these boxthorn is the only one for which control is considered desirable.

Notes: Apart from this RAP and the next gully to the west, no other localities for *Carmichaelia kirkii* are known on Banks Peninsula or elsewhere in the vicinity of Christchurch. While they have survived here until now against grazing and drought, a greater degree of protection is certainly desirable.

Detailed report: Baird, Amanda; Wilson, Hugh 1989: Proposal to conserve *Carmichaelia kirkii* on Banks Peninsula. Banks Peninsula Botanical Survey unpublished report to the Department of Conservation, on file.

Herbert RAP 20 - Pūtiki

Area: c. 180 ha

Grid Ref. centre: N 36 982 300

Access: From Port Levy.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland/hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	14%
D 11	Broadleaved hardwood treeland on lowland hill slopes	4%
E 13	Lowland small-leaved scrub on hill slopes	10%
F 17	Short tussockland on lowland hill slopes	34%
F 18	Pasture on lowland droughty and moist hill slopes	20%
F 21	Lowland flaxland on hill slopes	< 1%
F 24	Native open shrubland on lowland hill slopes	15%
J 37	Scattered plants on lowland rock	2%

Topography: Steep, drought-prone hill slopes and gullies rising from all sides to Trig H (466 m) and Trig I (415 m). The lowest part of the defined area lies at about 100 m, behind Puari.

Plants: Species of particular note include: mataī, lowland tōtara, *Hebe strictissima*, *Coprosma virescens* (abundant), *Scandia geniculata*, fierce lancewood (common), *Olearia fragrantissima*, *Coprosma wallii*, native broom (abundant), *Streblus heterophyllus*, *Myrsine divaricata*, *Echinopogon ovatus*, *Sophora prostrata*, leafless clematis (common), leafless lawyer, *Ileostylus micranthus*, *Fuchsia perscandens*, *Brachyglottis sciadophila* (common), *Melicytus micranthus*, tītoki, native passion vine, *Lophomyrtus obcordata*, *Microlaena polynoda*, *Parietaria debilis*, *Leptinella minor*, *Convolvulus verecundus* subsp. *waitaha*, *Cheilanthes distans*, *Rytidosperma corinum*, *Festuca* 'Banks Peninsula blue tussock', *Stellaria* 'big flower aff. *decipiens*', *Aciphylla subflabellata*, pigeonwood, *Corokia cotoneaster* and *Carex resectans* (common).

Wildlife: Recorded on the survey were: bellbirds, grey warblers, fantails, waxeyes, shining cuckoo, *Californian quail, and abundant *finches.

Weeds: *Horehound, *boxthorn, *hemlock, *elderberry, *miner's lettuce, **Ranunculus parviflorus*, **Stipa nodosa*, **Coryledon orbiculata*, **Verbascum thapsus*, **Vittadinia gracilis*. Of these only boxthorn and perhaps horehound are of much concern.

Notes: This RAP, and Herbert RAP 2 Mount Evans, are the best examples of steep, semi-arid shrubland, grassland, bluffs and dry forest in Banks Region. The slopes of Annandale above Pigeon Bay are also extensive examples of this sort of country and vegetation. They tend to be under-estimated for conservation values. While forest areas in this RAP would benefit greatly from stock exclusion and possum control, the extensive grasslands and shrublands could be lightly to moderately grazed by sheep with little threat, and indeed some benefits, to conservation values. However, goats would be an unmitigated disaster.

Herbert RAP 21 - Tipperary

Area: c. 6 ha

Grid Ref. centre: N 36 002 292

Access: Nearest road is the Little Pigeon Bay Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	80%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	15%
D 11	Broadleaved hardwood treeland on lowland hill slopes	3%
F 18	Pasture on lowland moist hill slopes	2%

Topography: Rather gently sloping ground near ridge crest; the bush patch lies between about 340 m and 420 m.

Plants: Mataī is particularly abundant, represented by many fine adults and regeneration. Lowland tōtara is represented by several healthy young adults, and kahikatea by at least two fine adult trees. Ribbonwood and lacebark are abundant. Small-leaved milk tree is common, with some large specimens. Other species of note include: *Fuchsia perscandens*, *Australina pusilla* (extensive on floor), fierce lancewood, tītoki, native passion vine, *Brachyglottis sciadophila*, *Hydrocotyle elongata* and *Coprosma linariifolia*.

Wildlife: Recorded on survey were: shining cuckoo, grey warbler, *finches.

Weeds: *Elderberry, *miner's lettuce, **Ranunculus parviflorus*. None of these are of much concern.

Notes: This is such an outstanding mid-altitude mataī-dominant forest remnant, and so damaged by stock, that protection and fencing would be highly desirable. Exclusion of stock would result in progressive reduction of the currently abundant bush nettle in the understorey. No other control measure is necessary.

Herbert RAP 22 - Menzies

Area: c. 135 ha

Grid Ref. centre: N 36 060 275

Access: Menzies Bay Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	5%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	2%
D 11	Broadleaved hardwood treeland on lowland hill slopes	25%
D 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	5%
F 17	Short tussockland on lowland hill slopes	1%
F 18	Pasture on lowland moist and droughty hill slopes	50%
F 24	Native open shrublands on lowland hill slopes	10%
J 37	Scattered plants on lowland rock	1%

Topography: Slopes of two small valleys with a prominent intervening spur, the altitude ranging from near sea level close to the coast at Menzies Bay up to about 300 m.

Plants: Species of particular note include: *Coprosma virescens* (abundant), ngaio (abundant), kōwhai (abundant), small-leaved milk tree, leafless lawyer, fierce lancewood, *Scandia geniculata*, *Corokia cotoneaster*, *Asplenium oblongifolium*, *Olearia fragrantissima* (common), leafless clematis, *Hebe strictissima*, native broom, *Ileostylus micranthus*, *Earina autumnalis*, *Linum monogynum*, *Sophora prostrata*, *Parietaria debilis*, *Pyrrosia eleagnifolia*.

Weeds: *Gorse - in February 1985 only a small patch noted, 10 to 60 cm tall; *elderberry, *horehound.

Notes: This is a somewhat unusual recommendation for protection, as the area is basically farmland with no surviving original vegetation. The combination of attractive, small-scale, valley landforms with abundant regeneration of native trees and shrubs at the dry end of the Banks Peninsula spectrum, plus the diversity of species of note, gives the area considerable conservation value. These values developed under a farming regime, and no recommendations are suggested here for excluding stock or for any significant changes of management. The values identified here, however, would be seriously compromised by physical clearance of native trees, scrub and shrubland by cutting, burning or spraying, or by the introduction of goats. Sheep grazing would be much more in keeping with conserving these natural values than cattle grazing.



MAP 27

Onawa Pa site

Herbert RAP 23 - Kererū

Area: c. 5 ha

Grid Ref. centre: N 36 027 189

Access: Summit Road.

Ecological classes:

A 2	Mataī - kahikatea - tōtara/mixed hardwood forest on lowland hill slope	40%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	60%

Topography: The upper part is gently sloping, near the broad crest of the watershed; the ground slopes away more steeply to the north, towards Pigeon Bay. Altitude is around 400 m.

Plants: The bush patch is rather well-stocked with adult mataī and kahikatea, up to 175 cm dbh. Tōtara is much less common, and appears intermediate between lowland and thin-bark tōtara. There is a range of common Peninsula hardwood species, especially lacebark, horopito, lowland fivefinger, *Fuchsia excorticata*, broadleaf, kaikōmako, ribbonwood, and *Coprosma rotundifolia*. Of particular note are: small-leaved milk tree (common), pigeonwood, *Brachyglottis sciadophila* and *Coprosma rubra*.

Wildlife: Recorded on the survey were: bellbirds, grey warblers.

Weeds: None noted.

Notes: Although only a fragment of old growth forest, and a very degraded one, the big podocarps are very visible from the nearby Summit Road and the bush remnant is well worth preserving. Currently it is completely browsed out and trampled by cattle. In 1990 adult lacebarks along the upper forest edge were severely debarked by cattle. If fencing of the bush remnant could be achieved the regeneration potential is high, and the conservation gain significant.

Herbert RAP 24 - Howden

Area: c. 60 ha

Grid Ref. centre: N 36 964 230

Access: Eastern Valley Road, Port Levy.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	1 %
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	34 %
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	< 1 %
D 11	Broadleaved hardwood treeland on lowland hill slopes	4 %
E 13	Lowland small-leaved scrub on hill slopes	5 %
F 18	Pasture on lowland and montane moist hill slopes	40 %
F 19	Fernland on lowland and montane hill slopes	5 %
F 24	Native open shrubland on lowland hill slopes	10 %
G 27	Freshwater lowland and montane flush	< 1 %

Topography: Mid-part of a small side valley variously forested or regenerating towards forest. The defined area ranges from about 300 m up to about 700 m.

Plants: There are scattered surviving adult podocarps, one to a few each of lowland tōtara, kahikatea and mataī. Other species of note are: *Hoheria populnea* var. *lanceolata* (very rare in District and Region), *Hydrocotyle elongata*, and *Uncinia ferruginea*. The tree fern, *Cyathea smithii*, is sparse, with many more dead trunks than live plants. There are some magnificent stands of lowland ribbonwood above (south-east of) the main bush area.

Weeds: *Elderberry, *hemlock. Neither are of much concern.

Notes: The defined area includes much rough pasture, fern, shrubland and scrub beyond the boundaries of the main bush patch, partly to take in the fine stands of ribbonwood, partly to indicate that the potential for expansion of the second-growth forest is high. It would be a significant conservation gain, however, simply to exclude stock from the main bush area, about 22 ha in all.

Hoheria populnea var. *lanceolata* occurs in only very few localities in Herbert Ecological District, and its presence here raises the value of an interesting but not outstanding mid-altitude bush patch.

Herbert RAP 25 - Puaha

Area: c. 20 ha

Grid Ref. centre: N 36 977 187

Access: Puaha Valley Road and Duddons Track.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	20%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	60%
D 11	Broadleaved hardwood treeland on lowland hill slopes	5%
F 18	Pasture on lowland moist hill slopes	15%

Topography: Low spurs and stream valley sides at junction of Te Puaha Stream with Opuahou Stream, at around 150 m altitude.

Plants: This is the only known locality on Banks Peninsula where definitely wild rimu survives. Two trees exist, both male, one a healthy young adult c. 14 m tall and c. 40 cm dbh in 1984, the other a moribund mature adult c. 18-20 m tall and c. 94 cm dbh in 1984, and appearing similar in 1991. Associated are kānuka 6-10 m tall. Second-growth mixed hardwoods and kānuka occupy most of the defined area, including good stands of ribbonwood, lacebark and kōwhai. The floor is eaten out under most of the canopy, but ferns are common along the steep stream banks including some tree ferns, mostly *Cyathea smithii*. Māhoe, fivefinger, *Fuchsia excorticata*, *Coprosma rotundifolia*, *C. rhamnoides*, *C. areolata* and *Urtica ferox* are common. Also of note are supplejack, *Muehlenbeckia australis*, *Metrosideros diffusa*, leafless lawyer, *Hydrocotyle elongata*, horopito, *Cyathea dealbata*, *Dicksonia squarrosa*, *Coprosma linariifolia*, lancewood, māpou, and some young lowland tōtara. The tallest vegetation is **Pinus radiata*, one of which dwarfs even the larger of the rimu trees. *Tree lucerne is also present.

Weeds: **Pinus radiata*, *blackberry.

Notes: The RAP is suggested mainly to protect the two last surviving rimu trees in the Region, but has other values, especially if stock could be excluded. Rimu from unknown sources is planted at various places on Banks Peninsula, including at nearby Montgomery Reserve, and female trees among them can be expected to throw seed. Also, it is not impossible that wood pigeons could transport seed to the Peninsula from the nearest wild source which is the foothills between the Waimakariri and Waipara Rivers, some 80 km away. A young tree at Ōkuti in the lower Ōkuti Valley, about 5 km from Puaha, is thought by the landowner to have appeared naturally, but its origin is dubious. In 1984 it was about 6-7 m tall. Given all these circumstances, including the fact that there are no known wild female trees of Banks Peninsula origin surviving but that female trees of unknown origin are now on the Peninsula, it would seem sensible to me to introduce rimu from the foothills to the Puaha rimu site if the landowner was willing and resources were available to fence this small bush stand, and give it some long-term protection.

Additional notes, Herbert RAPs

In addition to the listed and described RAPs, suggestions are made for the possible extensions of existing PNAs. See notes under the entries for:

- PNA 11 Mount Fitzgerald
- PNA 12 Holmes Valley
- PNA 13 Mount Sinclair
- PNA 17 Port Levy
- PNA 18 Goodwin
- PNA 20 Hunter Native Forest

SECTION FIVE

Akaroa Ecological District



Akaroa daisy
Celmisia mackaui

SECTION FIVE: AKAROA ECOLOGICAL DISTRICT

5.1 Descriptive summary

Akaroa Ecological District is the largest of the Region's three districts, although at approximately 45,800 ha it is not greatly larger than Herbert. It is comparable to Herbert in altitude and dissection, and in climatic range, but has mild, moist, oceanic microclimates not matched in either the Herbert or Port Hills Districts. This is at least in large part a reason for some quite striking distinctive features in vegetation, flora and fauna. Both the rocks and physical shape of the District are entirely derived from the eruptions and subsequent erosion of the Akaroa Volcano during the last 9 million years.

5.1.1 Topography

Dissected hill country surrounds the large water-filled basin of Akaroa Harbour which is the eroded crater of the volcano. About one quarter of the land area slopes inwards to the harbour basin, and about three quarters radiates outwards from the crater rim to the open sea, as alternating spurs and valleys which end respectively as cliffed headlands or indented bays. Four summits exceed 800 m altitude, two east of the Harbour, and two west, of which Saddle Hill is the highest in the District at 841 m. A further eight exceed 700 m. There are numerous, deep, substantial valleys, several of them exceeding 6 km in length, with reasonably extensive areas of alluvial flat land in their lower reaches. In the western corner of the District the land drains into Lake Forsyth or Wairewa. The ridge crests are generally rounded, but many prominent tors, bluffs and outcrops add a dramatic element to the landscape as in the rest of the Region. In particular there are several striking examples of trachyte domes associated with the radial dike swarm of Akaroa Volcano. Another dramatic element of the landscape is the extensively cliffed outer coastline. Some of the coastal cliffs exceed a sheer 200 m in height. Especially during times of wild seas these outer coastlines are in striking contrast to the relatively sheltered and gentler inner harbour.

5.1.2 Geology

Rock types are very similar to those of the Lyttelton Volcano, ranging from basalt to trachyte, with the former predominating. Many Strombolean cinder cones have been identified, including those on Ōnawe Peninsula and at Scenery Nook (Weaver *et al.* 1985). The erosion-resistant rocks at the southern end of Ōnawe Peninsula are syenite and gabbro - coarse-grained plutonic rocks that crystallised deep within the volcanic pile. All the rocks of Akaroa Ecological District are between 9 and 8 million years old. Much of the surface, however, is mantled with loess derived from the sedimentary mountains to the west. There are also small areas of unconsolidated recent alluvium resulting from the erosion and deposition of both volcanic rocks and loess. This 9 million-year geological history contrasts with the 240 million-year span of Herbert District but is similar to the 12 million-year history of Port Hills District.

5.1.3 Soils

Soils are derived from both the igneous bedrock and from loess. On lower slopes the soils are mainly loessic with pale, compact subsoils (yellow-grey earths). They may be droughty in summer along the northern and southern perimeters of the District, but are less prone to drying out in the higher rainfall interior and along the eastern perimeter. On higher slopes the soils are derived either from loess (yellow-brown earths) or basalt (brown granular loams) or often from a mixture of both. Those from basalt have dark brown, blocky structured, stony clay loam subsoils; those from loess have yellowish brown friable to firm silty subsoils; those from mixed loess/basalt have intermediate features. All these higher altitude soils remain moist in summer and are generally fertile. Bossu hill soils have relatively low natural fertility, and Stewart hill and steepland soils perhaps the highest fertility of the hill soils. The alluvial soils of valley floors are developed on locally derived sediments - that is, from varying combinations of loess and basalt. They are fertile soils, imperfectly drained in places and with properties such as brown colour and blocky structures which reflect a higher content of iron (Vucetich 1969). The small alluvial areas include gley recent soils, saline gley recent soils, yellow-brown sands, and organic soils (peaty loams). Small flushed areas and areas of otherwise impeded drainage also occur on the hill slopes.

Soils are generally stable in Akaroa Ecological District but the loessic soils are prone to tunnel-gullyng, and slips are not at all uncommon on steepland soils during periods of prolonged or intense rainfall.

5.1.4 Climate

Rainfall is comparable to Herbert District, ranging from about 700 mm on the driest headlands to about 2000 mm on the summits. There are steep rainfall gradients; annual precipitation can double over a distance of 3 km up an altitude range of 800 m. The geographical range of precipitation is much greater than in Port Hills District. Although more or less comparable with Herbert District, the driest headlands of Herbert are not quite matched within Akaroa District, and the moistest parts of Akaroa District's coastline are certainly unmatched within Herbert. Rainfall is more or less evenly spread throughout the year but there appears to be a distinct winter maximum.

Snow lies after southerly storms every winter, mostly above about 500 m and for only a few days, but periodically heavy, damaging snowfalls occur, and snowbanks may persist for weeks. Summits are often cloud-capped, especially in easterly and southerly conditions. In some conditions low cloud fills the valleys leaving the summits clear, or lies across the sea and the headlands leaving most of the District clear. Prevailing winds are easterly, but these vary greatly in the amount of cloud and rain they produce. Strong, dry, nor'west winds can exacerbate droughty conditions during summer dry spells.

The pattern of frost incidence is intricate. There are local sites that are virtually frost-free, while other parts can experience ground frosts up to -7°C . Above about 4-500 m winter winds may fall below freezing point.

5.1.5 Drainage

All but the smallest valleys contain permanently flowing streams. Many have waterfalls, up to c. 70 m high. There are numerous reliable springs, and many narrow strips of permanently flushed ground below springheads, mostly at higher levels. Lake Forsyth bounds the western corner of the District; it is a slightly brackish freshwater lake about 6 km long and about 1 km wide for most of its length (see Herbert RAP 17). Very small areas of impeded drainage are scattered about the District. A few of the bayheads have small areas of saltmarsh vegetation, tiny lagoons, or in the case of Okains Bay, a sizeable estuary.

5.1.6 Vegetation

Akaroa Ecological District would have been almost entirely forested, prior to human arrival. This was mostly podocarp/hardwood forest, as in the rest of Banks Ecological Region, but beech stands in the SE portion were (and are) unique in the Region. Lowland forest of lowland tōtara, mataī and kahikatea with māhoe, broadleaf, kaikōmako, pigeonwood, etc, occupied the valley floors and most of the hill slopes up to about 500 m. Above this, montane podocarp/hardwood forest, dominated by thin-bark tōtara and with native cedar (*Libocedrus*) at the upper levels, was extensive. Beech forest probably extended from the summit ridges down to around 200 m within its restricted geographical range, but even within these bounds there were likely to have been some podocarp/hardwood stands, and below 200 m beech would have given way altogether to lowland forests of kahikatea, mataī and tōtara. The warmest microclimates by the sea were characterised by distinctive species such as nīkau palm, tītoki and akeake (*Dodonaea*) with abundant kawakawa in the understorey. On the highest bluffs shrubland and scrub of such non-forest montane species as snow tussock, fescue tussock, *Dracophyllum* and mountain flax maintained a hold in the overwhelmingly forested landscape.

Less forest was removed from Akaroa Ecological District during Māori times than from Herbert and Port Hills Districts. Probably as much as three quarters of the area was still under old growth forest when the Europeans arrived to settle. By 1880 huge inroads had been made into these forests by milling and burning, although huge tracts still remained. By 1900 forest destruction was virtually complete, although mills operated in the Hickory Bay Valley as late as the 1920s. Only fragments of podocarp/hardwood forest and beech forest survived, but since then second-growth kānuka, mixed hardwoods, and regenerating tōtara have reoccupied about 10 percent of their lost ground.

Because European settlers converted the burnt forest directly to exotic pasture, Akaroa District has a lower proportion of tussock and a higher proportion of exotic pasture than either Port Hills or Herbert Districts. However, snow tussock is well represented, and there are substantial areas of bracken, shrubland and scrub.

Much of the District is now grazed by sheep, and to a lesser extent by cattle, deer and goats. There are small areas of exotic forestry plantation and woodlots, and even smaller areas of intensive horticulture, including flower production and, recently, vineyards. The biggest settlement is Akaroa, with smaller clusters at Wainui, Tikao Bay, French Farm, Barrys Bay, Duvauchelle, Robinsons Bay, Takamatua, Onuku, Little Akaloa, Okains Bay and Le Bons

Bay. These places, and scattered farmhouses, are nuclei of exotic plantings, from which a significant part of the District's naturalised flora has 'escaped' into the wild.

5.1.7 Flora

Centuries of modification and disturbance have resulted in some known losses among the vascular flora, and some reductions to extreme and vulnerable rarity. Species which now appear to be locally extinct include: *Pittosporum obcordatum*, *Euphorbia glauca*, *Hymenophyllum malingii*, *Hypolepis distans*, *Lepidium oleraceum*, *Myosotis forsteri* and *Adiantum fulvum* - but it is not inconceivable that some may persist undetected. Considering the scale of deforestation, that is a short list. The current known vascular native flora for the District totals 464 species. This is the greater part of the total Regional flora of 530 species. It includes all eight taxa thought to be endemic to the Region, of which two (*Celmisia mackaui* and *Wahlenbergia* 'Akaroa Heads') are known only from Akaroa District. Fifty-five species recorded in Akaroa District during the survey were not recorded in either of the other two Districts, including such notable species as nīkau palm, red beech, black beech, raukawa, *Asplenium lyallii*, *A. polyodon*, *Blechnum banksii*, *Anarthropteris lanceolata*, *Carex trifida*, *Poa astonii*, Akaroa daisy (*Celmisia mackaui*), Akaroa harebell (*Wahlenbergia* 'Akaroa Heads'), *Coprosma acerosa*, *C. rugosa*, *Crassula moschata*, mamaku, pīngao, *Earina mucronata*, *Gentiana grisebachii*, *G. serotina*, *Grammitis billardierei*, *Hymenophyllum minimum*, *Hypolepis lactea*, *Isolepis pottsii*, *I. reticularis*, *Lagenifera pinnatifida*, *Lastreopsis hispida*, *Lobelia anceps*, *Muehlenbeckia astonii*, *Myrsine nummularia*, *Pentachondra pumila*, and *Ranunculus acaulis*.

Vascular species of particular interest and concern in Akaroa District are:

<i>Acaena caesiiglauca</i>	(uncommon in Region)
<i>Anarthropteris lanceolata</i>	(rare and at southern limit in District)
<i>Anemanthele lessoniana</i>	(rare in Region)
<i>Anogramma leptophylla</i>	(nationally local)
<i>Asplenium polyodon</i>	(very rare in Region)
<i>Botrychium bifforme</i>	(probably rare in Region)
<i>Brachyglottis sciadophila</i>	(nationally uncommon, rare in Canterbury)
<i>Bulbinella angustifolia</i>	(very rare in Region)
<i>Caladenia lyallii</i>	(very rare in Region)
<i>Carex trifida</i>	(rare in Region and in Canterbury)
<i>Celmisia mackaui</i>	(District endemic, uncommon)
<i>Coprosma acerosa</i>	(rare in Region)
<i>Coprosma rugosa</i>	(rare in Region)
<i>Cordyline indivisa</i>	(rare in Region)
<i>Crassula moschata</i>	(uncommon in Region)
<i>Cyathea medullaris</i>	(rare in Region and in Canterbury)
<i>Cyperus ustulatus</i>	(uncommon and at southern limit in District)
<i>Desmoschoenus spiralis</i>	(very rare in Region)
<i>Dicksonia fibrosa</i>	(rare in Region)
<i>Earina mucronata</i>	(very rare in Region)

<i>Gentiana grisebachii</i>	(rare in Region)
<i>Gentiana serotina</i>	(rare in Region)
<i>Griselinia lucida</i>	(uncommon in Region and at southern limit)
<i>Hymenophyllum atrovirens</i>	(rare in Region)
<i>Hymenophyllum bivalve</i>	(rare in Region)
<i>Hymenophyllum dilatatum</i>	(rare in Region)
<i>Hymenophyllum minimum</i>	(rare in Region)
<i>Hymenophyllum rarum</i>	(rare in Region)
<i>Hypolepis lactea</i>	(rare in Region)
<i>Lastreopsis hispida</i>	(rare in Region)
<i>Lastreopsis velutina</i>	(uncommon in Region)
<i>Libocedrus bidwillii</i>	(endangered in Region)
<i>Microlaena polynoda</i>	(uncommon in Region)
<i>Muehlenbeckia astonii</i>	(rare in Region)
<i>Myosotis "australis var. lytteltonensis"</i>	(rare Regional endemic)
<i>Myrsine nummularia</i>	(rare in Region)
<i>Neomyrtus pedunculata</i>	(uncommon in Region)
<i>Nothofagus fusca</i>	(uncommon in Region)
<i>Nothofagus solandri</i>	(uncommon in Region)
<i>Olearia avicenniifolia</i>	(local in Region)
<i>Olearia fragrantissima</i>	(uncommon in Region and at northern limit)
<i>Olearia bullata</i>	(rare in Region)
<i>Parahebe lyallii</i>	(rare in Region)
<i>Pentachondra pumila</i>	(rare in Region)
<i>Poa astonii</i>	(rare in Region and at northern limit)
<i>Potentilla anserinoides</i>	(rare in Region)
<i>Pseudopanax edgerleyi</i>	(rare in Region)
<i>Pseudopanax ferrox</i>	(nationally uncommon and local but quite common in Region)
<i>Pteris tremula</i>	(uncommon in Region and at southern limit)
<i>Pterostylis alobula</i>	(rare in Region)
<i>Pterostylis banksii</i>	(uncommon in Region)
<i>Pterostylis foliata</i>	(uncommon in Region)
<i>Pterostylis mutica</i>	(rare in Region)
<i>Ranunculus acaulis</i>	(rare in Region)
<i>Ranunculus macropus</i>	(rare in Region)
<i>Raoulia hookeri</i>	(rare in Region)
<i>Rhopalostylis sapida</i>	(uncommon in District and at southern limit)
<i>Rumohra adiantiformis</i>	(rare in Region)
<i>Schoenoplectus validus</i>	(uncommon in Region)
<i>Schoenus pauciflorus</i>	(uncommon in Region)
<i>Senecio carnosulus</i>	(uncommon in Region)
<i>Sonchus kirkii</i>	(uncommon in Region)
<i>Stackhousia minima</i>	(uncommon in Region)
<i>Sticherus cunninghamii</i>	(rare in Region)

<i>Teucrium parvifolium</i>	(nationally rare)
<i>Tmesipteris</i> aff. <i>elongata</i>	(uncommon in Region, possibly regionally endemic)
<i>Tmesipteris tannensis</i>	(uncommon in Region)
<i>Trichomanes endlicherianum</i>	(rare in Region)
<i>Wahlenbergia</i> "Akaroa Heads"	(uncommon in District and possibly a District endemic)

5.1.8 Fauna

In terms of species losses the fauna has fared more badly from the impact of *Homo sapiens* than the flora. Akaroa District has lost at least half of the native bird species present at the time of human arrival, and an unknown but certainly large proportion of the invertebrate fauna. At least some of the known endangered invertebrates appear to be restricted to Akaroa District (see Section 2.7 for a Regional discussion).

Vertebrate species of particular interest or concern in Akaroa District include:

- whitebait (*Galaxias* spp.)
- jewelled gecko
- common gecko
- spotted skink
- common skink
- yellow-eyed penguin or hoiho
- white-flipped blue penguin
- southern crested grebe
- fairy prion
- sooty shearwater
- spotted shag
- kererū or wood pigeon
- morepork
- brown creeper
- South Island rifleman
- South Island tomtit
- tūī
- long-tailed bat (probably extinct)
- fur seal

Bush remnants still support a reasonably diverse native avifauna including kererū, bellbird, tūī, brown creeper, grey warbler, fantail, rifleman, tomtit, shining cuckoo, and morepork, but populations are small in some cases and vulnerable to local extinction. Tūī has declined over the past few decades to a few pairs hanging on around Akaroa, and morepork seems to survive in only small numbers. The tomtit population is said to have crashed following heavy snowfalls in the early 1940s, although it is currently in good numbers again, after years of comparative rarity.

Sooty shearwaters are believed to be nesting still on one or two headlands and islets and fairy prion certainly are on the islets. During 1991 an Australian barn owl took up temporary residence in the District.

There is little firm evidence in recent years that native bats persist.

Around 45 native bird species and about 23 naturalised ones are currently recorded for the District.

Introduced wild mammals include *goat, *hare, *rabbit, *hedgehog, *ferret, *stoat, *weasel, *brushtail possum, *ship rat, *Norway rat, *mouse and *cat.

5.1.9 Local government and land tenure

The whole District is administered by Banks Peninsula District Council. Nearly all of the land is in private freehold.

5.2 Protected Natural Areas

At time of writing (1991) only 1.5% of the District is formally protected one way or another for conservation values, compared with 11% in Port Hills District and 3.5% of Herbert District. Areas under some form of protection are listed below. Minor Council reserves and recreation reserves are not listed. The figures in brackets refer to the card index of natural areas (see Introduction, Section 1.1). In some cases areas are estimated (in hectares).

1	Mt Pearce	32.3 ha	(375)
2	Little Akaloa	0.43 ha	(285)
3	Montgomery Park	24.4 ha	(184)
4	Ōkuti Valley	4.3 ha	(89)
5	Te Oka	11.6 ha	(82)
6	Tokoroa	3.5 ha	(497)
7	Magnet Bay	18.9 ha	(451)
8	Peraki Bay	18.7 ha	(517)
9	Devils Gap	48.7 ha	(201)
10	Long Bay	13.5 ha	(316)
11	Carews Peak	68.0 ha	(316, 220)
12	Peraki Saddle (east)	40.6 ha	(218, 288)
13	Peraki Saddle (west)	33.8 ha	(246)
14	Wainui	0.8 ha	(222)
15	French Farm Valley	c. 4.0 ha	(330)
16	Barrys Bay Valley	11.2 ha	(251, 252, 253, 255)
17	Ōnawe	28.4 ha	(248)
18	Ōtepatotu	40.4 ha	(379)
19	Hickory Bay	4.9 ha	(136)
20	Goughs Bay	1.8 ha	(481)
21	Rowanhill	3.9 ha	(65)

22	Ellangowan	7.8 ha	(67)
23	Hinewai	109 ha	(57)
24	Chaney-Shuttleworth	1.9 ha	(176)
25	Garden of Tāne	4.9 ha	(177)
26	Walnut Stream	c. 2 ha	(121)
27	Armstrong	36.6 ha	(43)
28	Flea Bay Road	11.3 ha	(55)
29a	Stony Bay	13.6 ha	(490)
29b	Stony Bay Penguin sanctuary	c. 6 ha	(489)
30	Palm Gully	20.5 ha	(108)
31	Dan Rogers Creek	6.9 ha	(110)
32	Akaroa Heads	15.4 ha	(113)
33	Barrys Bay	c. 0.4 ha	(200)
34	Little Okains	c. 1 ha	(338)
35	Fraser	c. 15 ha	(505)
36	Kaik Hill (see RAP 18)	c. 6 ha	(119)
37	Haylocks	c. 5 ha	(112)
38	Pā Island	1. 1 ha	(336)

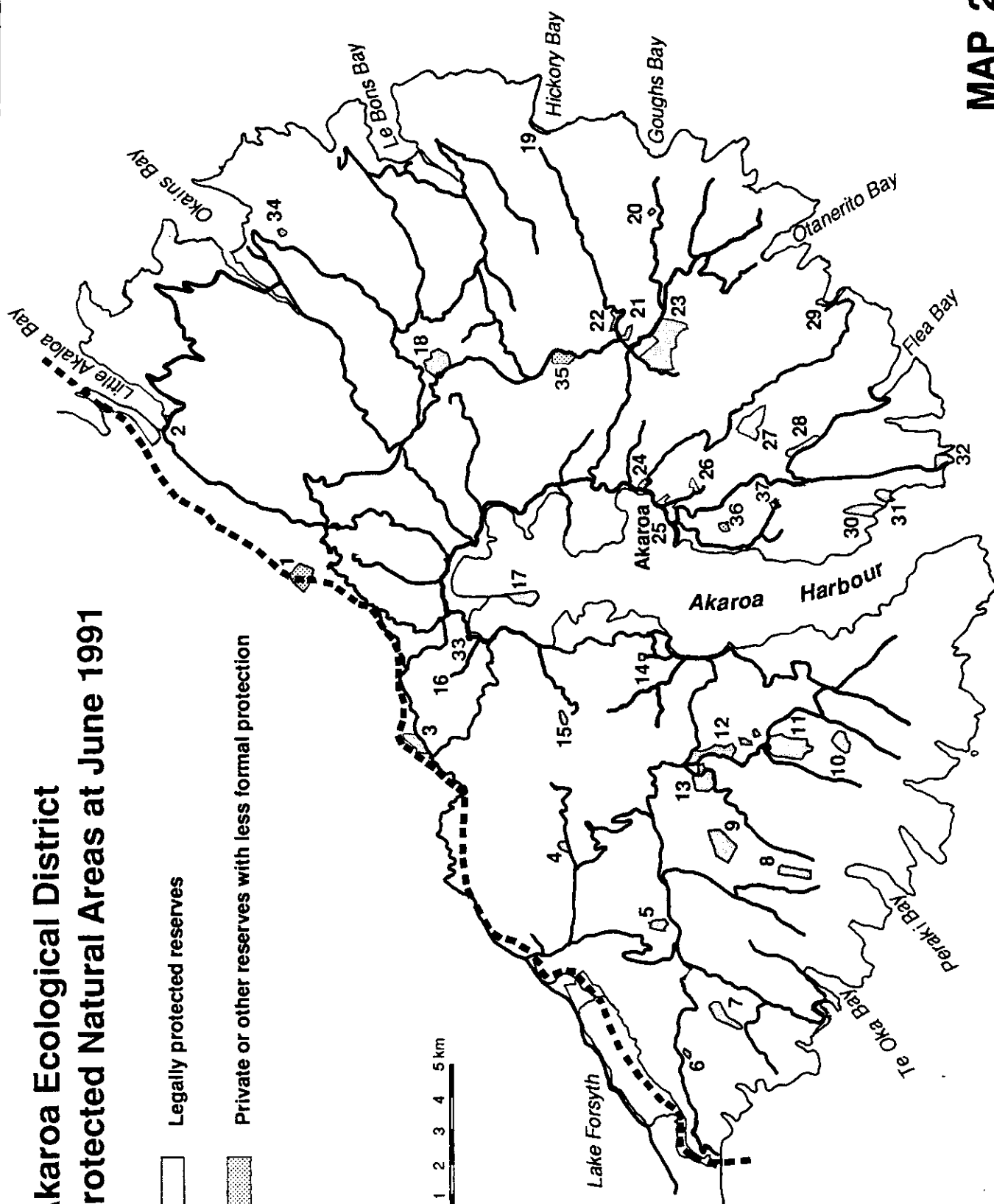
Akaroa Ecological District Protected Natural Areas at June 1991

□ Legally protected reserves

▨ Private or other reserves with less formal protection

0 1 2 3 4 5 km

N



MAP 28

1 **Mt Pearce (Scenic Reserve)**

Area: 32.3 ha

Grid Ref. centre: N 36 048 216

Reserved: 1990

Control: Department of Conservation

Access: Summit Road.

Vegetation: Vigorous regeneration of *Fuchsia*, broadleaf, horopito, ribbonwood, *Olearia ilicifolia*, etc, with areas of dead emergent tōtara and moribund live tōtara. Regenerating tōtara is common, and there is some healthy adult tōtara canopy near the top of the reserve below the messy transmitting installation. *Hymenophyllum villosum* occurs as an epiphyte and *Pseudopanax anomalus* is common.

Weeds: None of note.

Notable wildlife: Bellbirds, brown creepers, grey warblers, fantails, riflemen, harriers, tomtits, silvereyes.

Notes: Gifted to the Crown by A. McKay and the Crows and recently fenced, enhanced regeneration is already well under way. Dennis (1986) regarded this as a "reserve for the future" which is true, but although the bush area still looks decidedly battered, it is already attractively wild-looking and providing habitat for a good range of flora and fauna.

2 **Little Akaloa (Scenic Reserve)**

Area: 0.43 ha

Grid Ref. centre: N 36 097 258

Reserved: 1959

Control: Department of Conservation

Access: Little Akaloa - Chorlton Road.

Vegetation: Coastal light forest of akeake (*Dodonaea*), kānuka and kōwhai, with floor mainly of *wild parsley, *cocksfoot and some native ferns. Other species of note include māhoe, kawakawa, *Coprosma virescens*, *C. robusta*, *C. areolata*, *C. crassifolia*, *Scandia geniculata*, *Asplenium oblongifolium*, native passion vine, ngaio, *Hebe strictissima*, *Einadia allanii*, *Tetragonia trigyna*, *Coprosma linariifolia* and the rare bush grass *Microlaena polynoda*.

Weeds: *Sycamore, **Passiflora mollissima*, *wild parsley, *periwinkle, **Pinus radiata*, *broom. The native *Muehlenbeckia australis* could be a problem in such a small, second-growth bush patch.

Notes: Judging from Kelly's report, akeake has increased at the expense of kānuka since his field work in 1971.

Detailed report: Kelly 1972.

3 Montgomery Park (Scenic Reserve)

Area: 24.4 ha

Grid Ref. centre: N 36 998 183

Reserved: 1940/1968

Control: Department of Conservation

Access: Summit Road near Hilltop.

Vegetation: Podocarp/hardwood forest, mixed hardwood forest, scrub, shrubland, fernland, shrubby bluffs, some rough pasture, and some planted New Zealand beeches, rimu, etc. There is a very large lowland tōtara, plus other tōtara both lowland and thin-bark, and a few mataī. The reserve straddles the lowland - montane transition of about 500 m altitude, with thin-bark tōtara growing beside lowland tōtara at the interface, also lowland fivefinger with mountain fivefinger. *Brachyglottis sciadophila* is common.

Weeds: **Cotoneaster microphyllus* in shrubland, **Berberis darwinii*.

Notable wildlife: Bellbirds, grey warblers, wood pigeons.

Notes: A number of species of New Zealand trees not native to the locality are planted here including *red beech, *silver beech, *rewarewa, *rimu, *ramarama, **Hoheria populnea*, **Nestegis cunninghamii*, and *rangiora, which has gone wild. Many of these date back to several decades ago when there was less awareness of the importance of local genetic stock, but it is disappointing to see additional plantings made in the last 10 years. In the mid 1980s large fringing exotics were felled at the southern end of the reserve, and the resulting battered state of this corner aroused considerable comment. However the regeneration of native second-growth hardwoods here was very rapid, and in October 1987 my notebook comments "The part of Montgomery cleared of exotic trees is looking great now - like native bush again." Possible extensions of the reserve make much conservation sense - below the road is adult and adolescent kahikatea, adding another element to the lowland - montane transition. There is value eastwards as well, across regenerating shrubland, scrub, and a continuation of the magnificent bushy bluffs below Trig HH.

Detailed report: Kelly 1972.

4 Ōkuti Valley (Scenic Reserve)

Area: 4.3 ha

Grid Ref. centre: N 36 965 137

Reserved: 1917 with addition in 1932

Control: Department of Conservation

Access: Ōkuti Valley Road.

Vegetation: Lowland podocarp/hardwood forest and second-growth mixed hardwood forest. The reserve is a long-fenced remnant with surviving big podocarps that is regenerating beautifully back into a splendid example of lowland podocarp/hardwood forest. Much of the second-growth hardwoods are now big trees, including very large kānuka, māhoe, lemonwood, lacebark, ribbonwood, etc. Kawakawa and silver tree fern are abundant in the understorey. All three podocarps show good regeneration. Other species of note include: *Tmesipteris* aff. *elongata*, native passion vine (common), *Ileostylus micranthus*, *Carex secta* in a small wet hollow deep within the bush, *Uncinia banksii* (rare on Banks Peninsula), *Dicksonia squarrosa*, *Teucrium parvifolium* on bush edge by stream, and *Cyathea smithii*.

Weeds: *Sycamore is nearby. Also *blackberry, *cherry plum, *crack willow.

Other threats: In 1987 goats were noted close to the reserve on the other side of the road (farmed).

Notable wildlife: Bellbirds, wood pigeons, grey warblers, fantails, harriers.

Notes: In 1987 I noted recent plantings of *Cordyline banksii* and *Phormium cookianum* of foreign genetic stock. Kelly (1972) reports plantings of 4-5 rimu from Tennyson Inlet, Marlborough, in 1970. None of these adds to the conservation value of this excellent bit of bush in any way.

Detailed report: Kelly 1972.

5 Te Oka (Scenic Reserve)

Area: 11.6 ha

Grid Ref. centre: N 36 941 108

Reserved: 1917

Control: Department of Conservation

Access: From near the junction of Kinloch Road and Bossu Road there is legal access to the reserve along an old farm track across private land.

Vegetation: Lowland second-growth kānuka forest and mixed broadleaved forest with scattered emergent adult podocarps - lowland tōtara, mataī, kahikatea and thin-bark tōtara. These are fire-scarred survivors of forest clearance. Together with the vigorous second-growth they make a pleasing bush patch like a number of other mid-altitude remnants. Both tōtara species are regenerating well, but the other two podocarps very sparsely. Unfenced, the perimeter of the reserve has a depleted understorey, but there is a range of common Peninsula ferns further in on the steep rocky floor, including tree ferns (*Cyathea dealbata* and *Dicksonia squarrosa*). Other species of some note are: pigeonwood, *Lophomyrtus obcordata*, kawakawa, *Metrosideros diffusa*, ngaio, leafless lawyer, *Leptopteris hymenophylloides* and *Lastreopsis glabella*.

Weeds: **Pinus radiata*.

Other threats: Fire. There is quite a high risk, the reserve being surrounded by kānuka and bracken as well as by pasture and tussock.

Notable wildlife: Common bush birds (wood pigeons, bellbirds, brown creepers, silveryeyes, fantails and grey warblers, and harriers.

Notes: The aspect is NW, and the altitude range just laps into the montane zone from the upper lowland zone, so the bush patch with its podocarp survivors and range of common bush species, has considerable value, and is worth fencing. There is also conservation potential in extending the reserved area across and downslope to take in adjacent kānuka, second-growth mixed hardwoods, and early stages of succession via bracken, down to the sharp bend on the Kinloch Road at 180 m.

Detailed report: Kelly 1972.

6 Tokoroa (National Trust covenant)

Area: 3.5 ha

Grid Ref. centre: M 37 901 099

Protected: April 1987

Control: Landowner in covenant with the National Trust

Access: Private land.

Vegetation: Mostly second-growth mixed hardwood forest but with lowland tōtara and mataī both common, in bushed gully around 250 m altitude. The interior is depleted but stock was excluded with an electric fence around 1986 or early 1987 and regeneration was already evident on floor at time of survey (late April 1987). Much of the hardwood canopy is māhoe, with pigeonwood, lemonwood, broadleaf, māpou, kaikōmako, lacebark, etc. Other species of note are: fierce lancewood, kawakawa, small-leaved milk tree, *Lophomyrtus obcordata*, native passion vine, *Scandia geniculata*, *Hebe strictissima*, the rare bush grass *Microlaena polynoda*, tītoki, *Coprosma rubra*, *C. virescens* and the tiny mistletoe, *Korthalsella lindsayi*.

Notable wildlife: Bellbirds, grey warblers and fantails were noted, also *magpies.

7 Magnet Bay (Scenic Reserve)

Area: 18.9 ha

Grid Ref. centre: N 37 914 089

Reserved: 1917

Control: Department of Conservation

Access: No legal access. By permission across private property from Magnet Bay Road.

Vegetation: Lowland second-growth mixed hardwood forest with scattered adult and adolescent mataī, kahikatea and lowland tōtara, and some kānuka, in a quite steep bushy gully running back into tussock clad hills. Māhoe dominates most of the hardwood canopy, with lemonwood, lowland fivefinger, *Olearia paniculata*, lacebark, broadleaf, etc. The bush is an interesting lower mid-altitude stand with many southern limit species such as akeake (*Dodonaea*), tītoki, kawakawa, native passion vine, and a northern limit species *Olearia fragrantissima*. Other species of note are: lots of the rare bush grass *Microlaena polynoda*, velvet fern, pigeonwood, three tree ferns (*Cyathea dealbata*, *C. smithii* and *Dicksonia squarrosa*), *Lophomyrtus obcordata*, *Leptopteris hymenophylloides*, small-leaved milk tree, *Hebe strictissima* and *Carex solandri*.

Weeds: None noted.

Other threats: Goats. Four were seen inside the reserve in 1989. Stock have access; sheep were seen inside the reserve on the survey (1987). Much of the interior is eaten bare, and the regeneration of tree ferns is very sparse, although adults are common.

Notable wildlife: Wood pigeons, bellbirds, fantails, welcome swallows, harriers.

Notes: There is a strong case for adequately fencing this reserve. There are also good possibilities for extensions, taking in adjacent second-growth bush gullies and perhaps some of the good tussockland to the east.

Detailed report: Kelly 1972.

8 Peraki Bay (Scenic Reserve)

Area: 18.7 ha

Grid Ref. centre: N 37 957 065

Reserved: 1898

Control: Department of Conservation

Access: Across private land (an unmarked paper road links the reserve with Robin Hood Bay Road).

Vegetation: A mosaic of second-growth mixed hardwood forest, kānuka forest, small-leaved scrub of *Helichrysum lanceolatum* and *Coprosma* spp., and pasture with some silver tussock; with a few surviving mataī and lowland tōtara. The native shrubs and scrub are encroaching on the remaining pasture. *Microlaena stipoides*, a native pasture grass, is common. Species of some note include *Echinopogon ovatus*, *Daucus glochidiatus*, *Leptinella minor* (regional endemic), *Ileostylus micranthus*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic) and leafless lawyer. There is considerable regeneration of lacebark, kānuka and māhoe.

Weeds: **Lychnis coronaria*, **Physalis peruviana*, *sweet brier; none of these are serious threats here.

Other threats: Stock, and goats.

Notes: The reserved area, a long narrow oblong lying across the slope, bears little relationship to the landforms or natural values of the area. Much of the bush of the immediate vicinity lies below the unfenced reserve boundary. It would make a lot of conservation sense to extend the reserve downhill to the edge of the valley floor and perhaps uphill to the ridge crest, and to exclude stock. There is more conservation potential in such an expanded reserve than suggested by Kelly (1972) or Dennis (1986).

Detailed report: Kelly 1972.

9 Devils Gap (Scenic Reserve)

Area: 48.7 ha

Grid Ref. centre: N 37 965 088

Reserved: 1898

Control: Department of Conservation

Access: Legal access along paper road from Peraki Road.

Vegetation: Diverse, including old lowland second-growth mixed hardwood forest with scattered surviving adult podocarps (mataī, kahikatea, lowland tōtara, thin-bark tōtara), kānuka forest and scrub, large area of *Chionochloa rigida* snow tussock on broad spur above striking bluff (100 m high and 400 m long), and bracken with bush regeneration. The snow tussock is at a relatively low altitude, lying between 400 and 500 m, and comes into remarkably close juxtaposition with warm temperate species such as kawakawa, pigeonwood and akeake (*Dodonaea*). Other notable species include abundant tree ferns (*Cyathea smithii*, *C. dealbata* and *Dicksonia squarrosa*), *Tmesipteris tannensis*, *T. aff. elongata*, *Hymenophyllum demissum*, small-leaved milk tree, *Lophomyrtus obcordata*, *Trichomanes venosum*, *Leptolepia novae-zelandiae*, *Lastreopsis hispida*, abundant *Blechnum colensoi*, *Dracophyllum acerosum*, *Celmisia gracilentia*, *Cyathodes juniperina*, *Gingidia montana*, *Brachyglottis lagopus*, *Cheilanthes humilis*, *Hymenophyllum minimum*, *Gaultheria depressa* var. *novae-zelandiae*, leafless lawyer, *Fuchsia perscandens*, tītoki, velvet fern (common), *Hebe*

strictissima, native passion vine, *Clematis paniculata* and *Leptopteris hymenophylloides*.

Weeds: **Clematis vitalba* is in the vicinity close to the reserve, **Pinus radiata*, *elderberry, *gorse, **Lychnis coronaria*, **Hieracium praealtum*.

Other threats: Fire, goats, farm stock. Stock have access to parts of the reserve.

Notable wildlife: Wood pigeons, fantails, harriers, pipits, grey warblers, silvereyes, tomtits, bellbirds, etc.

Notes: This is a special reserve with a wealth of valuable features, and a special setting beneath the towering volcanic crag of Devils Gap. The reserve is the nucleus of a much larger area with high conservation values - see Akaroa RAP 6 Devils Gap extension. Complete exclusion of stock is highly desirable.

Detailed report: Kelly 1972.

10 Long Bay (Scenic Reserve)

Area: 13.5 ha

Grid Ref. centre: N 37 997 053

Reserved: 1898

Control: Department of Conservation

Access: Island Bay Road.

Vegetation: Lowland second-growth mixed hardwood forest with scattered surviving podocarps, in a long deep valley below a high waterfall (variously estimated at 60 or 70 m high). Also present is some kānuka forest and fringing small-leaved scrub of *Coprosma*, plus some small grassy clearings. Among many species of particular note are: mataī, lowland tōtara, (kahikatea just outside reserve boundary), fierce lancewood, kawakawa, pigeonwood, akeake (*Dodonaea*), tītoki, *Scandia geniculata*, *Cyathea medullaris*, *C. smithii*, *C. dealbata*, *Dicksonia squarrosa*, *Hypolepis lactea*, *Carex secta*, *Oxalis magellanica*, *Chionochloa conspicua*, *Uncinia ferruginea*, native passion vine, velvet fern, *Tmesipteris tannensis*, *Teucrium parvifolium*, *Microlaena polynoda*, leafless lawyer and *Cheilanthes humilis*.

Weeds: None of significance noted.

Other threats: Goats.

Notable wildlife: Bellbirds, fantails, wood pigeons, grey warblers, silvereyes, harriers, kingfishers.

Notes: The waterfall is probably the highest on Banks Peninsula, and the track to it offers wonderful views. Botanically the reserve is very rich. So is the surrounding area, and Akaroa RAP 14 Long Bay suggests an extensive protected area linking Long Bay Scenic Reserve with Carews Peak Scenic Reserve.

Detailed report: Kelly 1972.

11 Carews Peak (Scenic Reserve)

Area: 68 ha

Grid Ref. centre: N 37 995 068

Reserved: 1898 with additions in 1982 and 1985

Control: Department of Conservation

Access: Bossu Road.

Vegetation: The main part of the reserve, south of the Bossu Road, is a substantial bushy valley head filled with mostly second-growth mixed broadleaved forest, with scattered mataī, lowland tōtara and kahikatea adult emergents, all of them regenerating. At the upper portion thin-bark tōtara/hardwood forest is expanding with abundant regeneration of tōtara into snow tussock shrubland. The altitudinal range spans the lowland/montane transition and runs from about 650 m down to about 340 m, with a great wealth of species including some real Peninsula rarities. To the north of the Bossu Road on the other side of the main crest are two small fragmented bits of the reserve - the larger is rather battered second-growth hardwood forest with emergent moribund thin-bark tōtara - the smaller bit is second-growth hardwood forest surrounded by bracken.

Species of particular note include: *Hymenophyllum dilatatum* - the only population known in Akaroa District and the better of only two known in the whole Region; also abundant *Hymenophyllum demissum*, *H. flabellatum*, *H. sanguinolentum*, *Tmesipteris tannensis*, *T. aff. elongata*, *Cyathea colensoi*, *C. smithii*, *C. dealbata*, *Dicksonia squarrosa*, *Leptopteris hymenophylloides*, *Blechnum colensoi*, *Leptolepia novae-zelandiae*, *Trichomanes venosum*, *Cordyline indivisa*, *Aciphylla aurea*, *Kelleria dieffenbachii*, and *Gingidia montana*. The filmy ferns generally are common throughout, a rare situation now in Banks Peninsula forest remnants although undoubtedly a reflection of what would have been the norm in the past.

Weeds: **Hieracium pilosella* rare in tussock fringes; sparse *gorse on margins.

Other threats: Goats. Farm stock now appear to be fenced out.

Notable wildlife: Bellbirds, fantails, harriers, wood pigeons, silvereyes, grey warblers; also *magpies, *skylarks, *finches.

Notes: In the 1980s the reserve was enlarged and fenced, due to the generosity of the landowner. The reserve and surrounding country is so high in conservation values that my Akaroa RAP 14 Long Bay suggests a much more sweeping enlargement to link Carews Peak Scenic Reserve with Long Bay Scenic Reserve.

Detailed report: Kelly 1972.

12 Peraki Saddle (East) (Scenic Reserve)

Area: 40.6 ha

Grid Ref. centre: N 37 994 095

Reserved: 1898

Control: Department of Conservation

Access: Bossu Road, Peraki Saddle, Jubilee Road.

Vegetation: Two patches of bush, some scrub, bluffs along the crest of the crater rim, and much open silver and fescue tussock over pasture along tussocky ridge crest. The bush is montane second-growth hardwood forest and montane thin-bark tōtara/hardwood forest with much *Fuchsia*. The scrub is mostly *Fuchsia*, *Rubus cissoides*, *Coprosma* sp. 't', and bracken. The bluffs have snow tussock and upper montane herbs and shrubs. Other species of note are abundant *Cyathea smithii*, *Leptopteris hymenophylloides*, pigeonwood at 650 m, *Hebe strictissima*, *Gaultheria depressa* var. *novae-zelandiae*, *Dracophyllum acerosum*, *Aciphylla subflabellata*, *Gingidia montana* and *Hymenophyllum atrovirens*. There is an abundance of epiphytic *Usnea* (lichen) and *Weymouthia* (goblin moss) on the tōtara, much of which is moribund.

Weeds: *Gorse, very sparse in grassland.

Notes: See also Akaroa RAP 12 Carews Peak.

Detailed report: Kelly 1972.

13 Peraki Saddle (West) (Scenic Reserve)

Area: 33.8 ha

Grid Ref. centre: N 37 985 095

Reserved: 1898 with addition in 1930

Control: Department of Conservation

Access: Peraki Road.

Vegetation: A substantial stand of lowland matai - tōtara - kahikatea/hardwood forest of just over 2 ha, surrounded by mixed hardwood forest with scattered podocarps, and some kānuka forest and scrub with diverse mixed hardwood regeneration. The old growth forest on the central spur is certainly the best stand of original hillslope podocarp/hardwood forest left on the Peninsula. Species of note include the

podocarps (mataī, lowland tōtara, thin-bark tōtara and kahikatea), a very rare filmy fern *Trichomanes endlicherianum*, abundant tree ferns (*Cyathea smithii*, *C. dealbata*, *Dicksonia squarrosa*), pigeonwood, kawakawa, small-leaved milk tree, *Trichomanes venosum*, epiphytic *Earina autumnalis*, *Blechnum colensoi*, *Leptopteris hymenophylloides*, *Tmesipteris tannensis*, *T. aff. elongata*, *Neomyrtus pedunculata*, and abundant *Metrosideros diffusa*. The stream is particularly ferny, and has a fine 7 m waterfall on it in the heart of the forest.

Weeds: **Pinus radiata*.

Other threats: Fire. Kānuka by the road is at some risk.

Notable wildlife: Bellbirds, brown creepers, fantails, silvereyes, grey warblers, kingfishers.

Notes: There are good areas adjacent to the reserve well worthy of inclusion. In particular the reserve would be enhanced by extending it down the well-bushed stream below the bottom boundary. Another fine waterfall, about 10 m high, abundant ground ferns and tree ferns, abundant pigeonwood and kawakawa, and some excellent adult mataī, would all be included. In addition there is much vigorous regeneration going on through tall gorse and bracken above the road. If its continued progress could be ensured, the forested area will rapidly expand. **Pinus radiata* wildings would need to be controlled.

My notebook for January 1985, written deep in this regenerating area, records: "This is a striking example of suppression of gorse by vigorous regeneration of natives, which are everywhere overtopping the lanky gorse. Floor contains numerous native seedlings, as well as the stems of the native emergents, but no gorse seedlings noted".

Detailed report: Kelly 1972.

14 Wainui (Scenic Reserve)

Area: 0.8 ha

Grid Ref. centre: N 36 023 114

Reserved: 1954

Control: Department of Conservation

Access: Small side road off Cemetery Road, Wainui.

Vegetation: Small patch of creeper-draped lowland mixed hardwood forest with about a dozen emergent adult podocarps (kahikatea and mataī). Abundant climbers are *Muehlenbeckia australis*, *Parsonia heterophylla*, supplejack, *Calystegia tuguriorum*, leafless lawyer and native passion vine. Of note are: abundant pigeonwood and kawakawa, also velvet fern, tītoki, and *Brachyglottis sciadophila*.

There are some plantings in the grassy area just inside the reserve gate, including pōkākā and cabbage tree, both species native to the locality but the genetic source of the planted specimens is unknown to me. Kelly (1972) reports that 155 shrubs were planted here in September 1969, many of them *Pittosporum* of apparently North Island origin.

Weeds: The native *Muehlenbeckia australis* behaves like an invasive weed in such modified fragments of native bush, but in most cases it is best to let nature sort it out! Also present are *hawthorn, **Tropaeolum speciosum*, *blackberry, and *willows planted along the NW bush edge.

Notable wildlife: Wood pigeons, bellbirds, brown creepers, fantails, grey warblers, *Californian quail, *magpie.

Notes: There is certainly scope for extension of this reserve along the SW-facing slopes of the ridge between Trig G and Rocky Peak, through attractive second-growth mixed hardwood forest and treeland, chiefly kānuka, kaikōmako, *Fuchsia*, lacebark, *Coprosma rotundifolia*, māhoe, wineberry, putaputāwētā, pigeonwood, silver tree fern, and abundant kawakawa. Weedy species are **Berberis darwinii*, *hawthorn, and *Montpelier broom. *Urtica ferox* is abundant.

Detailed report: Kelly 1972.

15 French Farm Valley (National Trust covenant)

Area: c. 4.0 ha

Grid Ref. centre: N 36 004 137

Protected: June 1989

Control: Landowner in covenant with National Trust

Access: Private land.

Vegetation: Mid-altitude lowland second-growth mixed hardwood forest with occasional podocarps and much *Muehlenbeckia australis*. Abundant are māhoe, kōwhai, lacebark, pigeonwood, kaikōmako, kawakawa, silver tree fern and *Coprosma rotundifolia*. The largest podocarp is a mature mataī about 25 m tall and 80 cm dbh. Several mataī saplings are present. One adult lowland tōtara and one juvenile were seen, but beyond the covenanted area tōtara is common. Similarly although no kahikatea was seen in the covenanted bush, adult kahikatea is nearby. Kānuka is common on the fringes. Also of note are a few *Cyathea smithii* and *Dicksonia squarrosa*, an abundance of velvet fern in the lower part of the gully, tūtoki, *Lophomyrtus obcordata*, ngaio, small-leaved milk tree, *Brachyglottis sciadophila*, *Clematis paniculata*, native passion vine and *Leptopteris hymenophylloides*. The bush is in a narrow, steep-sided gully and contains two attractive waterfalls, the upper one a fine slanting chute about 15 m high.

Notable wildlife: Bellbirds, wood pigeons, fantails, silvereyes, kingfishers.

Detailed report: Wilson, Hugh 1988: Weir Covenant, Ōtehore, French Farm. Banks Peninsula Botanical Survey unpublished report, on file.

16 **Barrys Bay Valley (National Trust covenant)**

Area: 11.2 ha, total of 3 areas

Grid Ref. centre: N 36 015 175

Protected: March 1990

Control: Landowner in covenant with National Trust

Access: Private land.

Vegetation: Three separate patches of lowland second-growth mixed hardwood forest with some remnant and regenerating tōtara and mataī. Kānuka and kōwhai are abundant, also *Fuchsia excorticata*, māhoe, lacebark, ngaio, and some *Cyathea smithii*.

Notable wildlife: Bellbirds, wood pigeons, brown creepers, grey warblers, fantails.

17 **Ōnawe (Historic Reserve)**

Area: 28.4 ha

Grid Ref. centre: N 36 041 150

Reserved: 1981

Control: Department of Conservation

Access: Ōnawe Flat Road.

Vegetation: Much of the area is in pasture, but second-growth kānuka and mixed hardwood forest and treeland occupy prominent patches on the sides of the Peninsula. Cabbage trees are common and are now regenerating freely in the absence of grazing. There are some very large, unbrowsed native brooms in excess of 4 m tall. Species of particular note include: *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Elymus rectisetus* 'broad blue native race', native dock, *Aciphylla subflabellata*, kawakawa, tītoki, *Lophomyrtus obcordata*, *Carex raoulii*, *Microlaena stipoides*, *Asplenium oblongifolium*, *Olearia avicenniifolia* (the only population in the Region known from sea level), *Trisetum* sp. 'slender' (a rare species in the Region), *Echinopogon ovatus*, *Scandia geniculata*, and *Disphyma australe*.

Weeds: **Macrocarpa*, **Pinus radiata*, *horehound, *elderberry, *broom.

Notable wildlife: Waders, herons, ducks, *geese, kingfishers, etc, associated with the adjacent tidal flats.

Notes: The reserve is highly significant in terms of both natural and human history. Geologically it is unique on Banks Peninsula. The syenite and gabbro forming the hill at the end of the Ōnawe Peninsula are the only exposed plutonic rocks in the whole Region. They represent the solidification at depth (perhaps 2-5 km) of magma

of basaltic and trachytic composition in a main lava conduit, perhaps the main vent of Akaroa Volcano judging by the pattern of radiating dikes in the surrounding hills which all centre on Ōnawe. Ōnawe also exhibits orange-banded trachyte in a prominent dike at the narrow neck of the Peninsula, a red basaltic tuff cone, volcanic bombs preserved on the shore platform, vent breccia, airfall volcanic ash with raindrop-cemented 'accretionary lapilli', and a trachyte sill.

Historically Ōnawe is well known as the site of a major episode in the 1830s, when the Ngati Toa chief Te Rauparaha swiftly ransacked the defensive pā built halfway along the Peninsula by the local Ngai Tahu people. The earthworks are still evident.

Detailed reports: Weaver *et al.* 1985 give details of the geology. Ogilvie 1990 recounts the history.

18 Ōtepatotu (Scenic Reserve)

Area: 40.4 ha

Grid Ref. centre: N 36 115 175

Reserved: 1898 with additions in 1930, 1953, 1976

Control: Department of Conservation

Access: Summit Road.

Vegetation: Extensive areas of montane thin-bark tōtara/hardwood forest, montane second-growth mixed hardwood forest with abundant mountain fivefinger and *Fuchsia*, holygrass grassland and shrubland, montane scrub and shrubland, *Chionochloa conspicua* tall tussockland and tall tussock shrubland, and scattered plants on imposing montane bluffs. There are also small areas of ungrazed pasture, notably at the entrance to the reserve off the Summit Road. Tōtara and mountain fivefinger regeneration is abundant. Much of the upper forest is conspicuously draped with lichen (*Usnea*) and goblin moss (*Weymouthia*). Species of particular note are: *Cordyline indivisa*, filmy ferns (*Hymenophyllum multifidum*, *H. sanguinolentum*, *H. flabellatum*), *Leptolepia novae-zelandiae*, *Leptopteris hymenophylloides*, *Hebe strictissima*, *Pseudopanax anomalus*, *Brachyglottis lagopus*, *Rytidosperma corinum*, *Olearia ilicifolia*, *Cyathea colensoi*, *C. smithii*, *Clematis paniculata* and *Ourisia lactea*.

Weeds: *Gorse (sparse and local), **Pinus ponderosa*, **Hieracium pilosella*, **H. caespitosum*, *spanish heath.

Notable wildlife: Wood pigeons, bellbirds, fantails, silvereyes, tomtits, brown creepers, and riflemen.

Notes: A small plantation of *Pinus ponderosa* was planted above the Summit Road below the Ōtepatotu bluffs, developed into a rather stunted stand, and was removed about the early 1980s. There is considerable regrowth of the pines now among the scrubby second-growth native hardwoods and this would be best removed soon.

From a conservation viewpoint it is very disappointing that *Pinus radiata* was planted quite extensively around 1980 immediately east of the reserve and right up to the boundary, in vigorous tōtara/hardwood regeneration which would have made (and indeed could still make after the pines are harvested) an excellent extension of the forested area. Ōtepatotu is a reserve of very high values and extensions are highly desirable. It has an outlier to the west on Tysons Knob, an attractively imposing volcanic crag with scrubby forest and a few gnarled tōtara between the crag and the road. Between it and the main reserve is pasture and native shrubland which, if it ever were possible to retire from grazing, would regenerate steadily to form eventually a forested slope above the road to the ridge crest. There is also a square shaped block of a hectare or two between the road and the main reserve. It makes good conservation sense to add this to the reserve. *Spanish heath appeared vigorously in this area of native shrubland in 1990-1991 and hundreds of young plants were removed. This would be best rechecked each year to stop this weedy species establishing, both for native regeneration on the reserve, and for pastoral reasons on adjacent farmland.

Detailed reports: Kelly 1972, Dennis 1986.

19 Hickory Bay (National Trust)

Area: 4.9 ha

Grid Ref. centre: N 36 186 145

Protected: October 1985

Control: Landowner in covenant with National Trust

Access: Private land/unformed legal road. The landowners have marked a route from Hickory Bay Road.

Vegetation: Scattered plants on the beach strand zone; coastal pasture and shrubland. Species of note are: ngaio, *Carex pumila*, *Calystegia soldanella*, silver tussock, *Linum monogynum*, *Festuca* 'Banks Peninsula blue tussock', *Crassula moschata*, *Phormium tenax*, and kawakawa. [One adult nīkau palm stands in open pasture near Trig W, just west of the reserved area] Naturalised species on the strand include: *sea rocket, *lyme grass, *horned poppy, and **Atriplex prostratum*. They are more of interest than concern.

Other threats: Predators and excessive human usage certainly impinge on the wildlife values.

Notable wildlife: Yellow-eyed penguin at northern breeding limit, white-flipped blue penguin, fur seals, kingfishers, spotted shags, gulls, terns, etc.

Notes: The covenant was arranged primarily to safeguard the outstandingly wild, open and scenic quality of this bay front, set off by dramatic coastal cliffs on either side. The bay also has both Māori and European historical connections (see Akaroa RAP 34 Crown Island coast).

Detailed report: For historical details see Ogilvie 1990.

20 **Goughs Bay (National Trust)**

Area: 1.8 ha

Grid Ref. centre: N 36 161 111

Protected: February 1988

Control: Landowner in covenant with National Trust

Access: Private land.

Vegetation: Small remnant of lowland podocarp/hardwood forest on valley floor alluvium, containing many large podocarps (kahikatea, mataī and lowland tōtara) and nīkau palms. Despite having been fenced for a number of years by the landowners, only sparse regeneration of mataī is apparent, and none of kahikatea or tōtara. There are about five adult nīkau, with good regeneration. Common hardwood canopy and subcanopy trees include lacebark, māhoe, kaikōmako, tītoki, kōwhai, lemonwood, māpou, small-leaved milk tree, *Lophomyrtus obcordata*, ngaio and abundant kawakawa. Also of note are: epiphytic shining broadleaf, native passion vine, leafless lawyer, *Asplenium oblongifolium*, pigeonwood and *Carex solandri*. Both adult and regenerating tītoki is very common. Ferns are rather sparse on the thick litter of the floor, and although there are many dead trunks of silver tree fern regeneration of this species is not yet evident.

Notable wildlife: Bellbirds, grey warblers, fantails, welcome swallows, *Californian quail, harriers, *rooks, *blackbirds.

Notes: This is the only significant stand of old growth valley floor forest left in Akaroa Ecological District and its protection and fencing by the Masefield family is highly commendable.

21 **Rowanhill (National Trust)**

Area: 3.9 ha

Grid Ref. centre: N 36 123 118

Protected: January 1987

Control: Landowner in covenant with National Trust

Access: Private land.

Vegetation: Montane thin-bark tōtara/hardwood forest. A little *Chionochloa rigida* at upper margin, with *Leucopogon fraseri*, *Raoulia glabra* and *Helichrysum filicaule*. *Fuchsia* is abundant, and dominant down the gully. Also abundant are broadleaf, mountain fivefinger and horopito. The interior is in very good condition; the floor is predominantly large, dense shield fern. *Phymatosorus diversifolius* is an abundant low to high epiphyte, especially on broadleaf, indicating a lengthy period of minimal or no grazing pressure. There is much goblin moss (*Weymouthia*), also much *Ctenopteris*, but no filmy ferns were noted. *Cyathea smithii* is sparse, increasing

towards the lower end of the reserve. *Cyathea colensoi* is common in the upper portion. There are some large broadleaf and fuchsia specimens. Also of note are *Hebe strictissima*, *Coprosma linariifolia*, *Leptopteris hymenophylloides* and *Grammitis billardierei*.

Weeds: A small amount of *gorse at upper margin. **Pinus radiata* wildings are close to reserve margin.

Other threats: Possums.

Notable wildlife: Bellbirds, wood pigeons, brown creepers, grey warblers, fantails, *magpies.

Notes: The protected area is a fine nucleus of old growth montane forest, rather important locally as the site is just within the distribution of red beech in Akaroa District. On the surrounding land native woody regeneration is vigorous, and an extension of 12 ha to the covenanted area, linking it across the slope with Ellangowan Reserve, was registered in February 1992.

22 Ellangowan (Scenic Reserve)

Area: 7.8 ha

Grid Ref. centre: N 36 128 121

Reserved: 1973

Control: Department of Conservation

Access: Hickory Bay Road.

Vegetation: Mostly montane second-growth mixed hardwood forest on a high spur, but with a fair amount of surviving old growth thin-bark tōtara and a few scattered red beech, close to the northern limit of the restricted distribution of beech in the District and the Region. There is also some montane scrub and shrubland, bluff vegetation along an attractive 12 m rock wall at the crest of the reserve, and minor areas of holy grass, bracken fernland and road bank. Kelly (1972) mentions 10 *Cordyline indivisa* trees damaged by possums and by a fire at the south east tip of the reserve in spring 1971, but their continued survival was not checked by me. Mountain fivefinger, broadleaf and fuchsia are abundant. Other species of note include: *Cyathea colensoi*, *Leptopteris hymenophylloides*, *Coprosma linariifolia*, abundant *Hebe strictissima* (regional endemic), *H. lavaudiana* (regional endemic), *Chionochloa rigida*, *C. conspicua*, *Brachyglottis lagopus*, *Anisotome aromatica*, *Koeleria novo-zelandica*, *Clematis paniculata*, *Cyathea smithii*, *Gunnera monoica*, *Lycopodium scariosum*, *L. fastigiatum*, *L. volubile* and *Dracophyllum acerosum*.

Weeds: None noted. Kelly (1972) mentions *gorse and *blackberry.

Notable wildlife: Bellbirds, shining cuckoos, fantails, grey warblers, harriers.

Notes: Surviving ridge crest bush is unusual on Banks Peninsula, and this bushy spur has many details of interest. The track, forming a loop when used in conjunction with the road, provides a delightful walk with magnificent views.

Detailed reports: Kelly 1972, Dennis 1986.

23 Hinewai (Protected Private Land)

Area: 109 ha

Grid Ref. centre: N 36 120 107

Protected: 1987

Control: Maurice White Native Forest Trust in covenant with the Department of Conservation

Access: Long Bay Road, Purple Peak Road, Purple Peak Walkway.

Vegetation: Mosaic of second-growth kānuka forest, second-growth mixed hardwood forest, beech forest, mixed hardwoods regenerating through scrub of *gorse, *broom and kānuka, montane podocarp/hardwood forest, *gorse scrub, *broom scrub, native shrublands, pasture, bracken fernland, waterfern fernland, scattered plants on rock outcrops, rushland, and aquatic vegetation in streams. The altitude range lies between 620 m and 210 m. Along the road boundaries of the reserve there are strips of snow tussock and snow tussock shrubland. Species of particular note include: red beech, black beech, *Cordyline indivisa*, *Dicksonia fibrosa*, pōkākā, mataī, thin-bark tōtara, *Hebe strictissima*, *Caladenia lyallii*, *Chiloglottis cornuta*, pigeonwood, kawakawa, abundant tree ferns (*Cyathea smithii*, *C. dealbata*, *Dicksonia squarrosa*), *Brachyglottis sciadophila*, native passion vine, *Grammitis billardiarei*, *Ctenopteris heterophylla*, *Hymenophyllum demissum*, *H. sanguinolentum*, *H. flabellatum*, *Trichomanes venosum*, *Dracophyllum acerosum*, *Olearia avicenniifolia*, *O. ilicifolia*, *Clematis paniculata*, *Gunnera monoica*, *Blechnum colensoi*, *Leptolepia novae-zelandiae*, *Leptopteris hymenophylloides* and *Rumohra adiantiformis*.

Weeds: *Gorse, *broom, *Himalayan honeysuckle, *elderberry, *blackberry, **Pinus radiata*, **Hieracium pilosella*, **H. lepidulum*, *male fern.

Other threats: Fire, goats, possums, straying farm stock.

Notable wildlife: Bellbirds, brown creepers, tomtits, riflemen, wood pigeons, grey warblers, fantails, silvereyes, moreporks, harriers, shining cuckoos, black-backed gulls, paradise ducks, grey ducks, pipits, welcome swallows, spur-winged plovers, *finches, *magpies, *Californian quail, *mallard, *dunnock, *blackbird, *thrush, *skylark, *rock pigeon, *rook, jewelled gecko, common gecko, common skink.

Notes: The reserve is managed as a conservation and revegetation block. One important feature is the conscious use of gorse and broom as a nurse canopy for native regeneration.

At time of writing, the Maurice White Trust has purchased an additional 870 ha of adjacent land and is adding this to the reserve area. The additional land includes large tracts treated in this report as RAPs or as part of RAPs; see Akaroa RAP 20 Stony Bay, RAP 27 Stony Bay Peak, and RAP 28 Ōtanerito Valley. There are still additional pieces of land of high conservation value that the Maurice White Trust would be happy to include within their protected area as circumstances allow.

Detailed report: Wilson 1988.

24 Chaney - Shuttleworth (Protected Private Land)

Area: 1.9 ha

Grid Ref. centre: N 36 077 113

Protected: 1980s

Control: Landowners in covenant with the Department of Conservation

Access: Private land.

Vegetation: Lowland second-growth mixed hardwood forest with much kānuka and a few remnant old podocarps. Understorey and floor is ungrazed with vigorous kawakawa and ferns. Podocarps are represented by two adult mataī, two young adult lowland tōtara, some young mataī, and abundant young tōtara regeneration. [There is also planted young kahikatea, rimu, and nīkau along stream, the provenance of which is unknown to me.] There are some very large specimens of akeake (*Dodonaea*) and *Lophomyrtus obcordata*, and māhoe is abundant. The bush is on steep slopes bounded by the stream at base.

Species of particular note include a magnificent population of velvet fern, with hundreds of very large individuals, tītoki, *Cyathea dealbata* adults and young, *C. smithii*, *Dicksonia squarrosa*, very large plants of *Pneumatopteris pennigera* along stream, and small-leaved milk tree. Saplings of karaka are common, but I saw no adult trees. *Pteris tremula* appears to be native here, and **P. cretica* naturalised. Another rare species is represented by tussocks of *Anemanthele lessoniana*, apparently native here. Considering the introductions and the proximity of Akaroa gardens, the bush is overwhelmingly truly indigenous. *Muehlenbeckia australis* is sparse.

Weeds: **Clematis vitalba* is the most serious weed threat. Also present and potentially troublesome are: **Tradescantia fluminensis*, **periwinkle*, **ash*, **sycamore*, **Lonicera japonica*, **blackberry*, **Allium triquetrum* and **Selaginella kraussiana*.

Other threats: Fire is a real threat in a built-up area.

Notable wildlife: Up until the time of writing (end of 1991), tūī still persists here; also bellbirds, wood pigeons, fantails, grey warblers, shining cuckoos, kingfishers, red-billed gulls, **magpies*, **rooks*, and **blackbirds*.

Notes: Covenanteeing this area was a remarkable and generous gesture by the landowners concerned; it preserves a wonderful forested backdrop in the heart of Akaroa on land that could have been subdivided. Second-growth forest continues on up the south-facing side of the Balgueri Valley to the turn-off to Mount Vernon Lodge, and up to the reservoir and the French cemetery on L'Aube Hill, where kānuka, akeake, ngaio, māhoe and kawakawa are abundant. Its preservation is certainly in the interest of Akaroa town.

25 Garden of Tāne (Scenic Reserve)

Area: 4.9 ha

Grid Ref. centre: N 36 067 104

Reserved: 1883/1940. Status changed from domain to scenic reserve in 1986

Control: Banks Peninsula District Council

Access: Akaroa: Aylmers Valley Road, Beach Road, Kaik Road.

Vegetation: Large exotic trees (*pines, *oaks, *elms, *ashes, *planes, *firs, *cypresses, etc) with abundant native second-growth hardwood forest, including some very large kānuka, also māhoe, tūtiki, pigeonwood, *Coprosma lucida*, kōhūhū, māpou, and lowland fivefinger. There are a few original adult kahikatea trees and some regeneration. Kawakawa is abundant, especially in gullies. As well as the planted exotics and the native regeneration, a lot of species have naturalised in the domain, including species native to Akaroa District but belonging to races from more distant places. In some cases it is difficult to say whether a species really "belongs" here or not. For example, the Garden of Tāne is the only known locality on Banks Peninsula for the tiny orchid *Pterostylis alobula*, and its distribution elsewhere leaves it uncertain as to whether it is really native here or not. Further species clearly native here and of some note are: small-leaved milk tree, *Lophomyrtus obcordata*, and *Ctenopteris heterophylla*. Nikau palms which have appeared unassisted from bird-dispersed seed may or may not be of local stock, as there are many planted adult specimens in Akaroa gardens which are probably not all of local origin.

Weeds: **Clematis vitalba* is in the vicinity. *Blackberry, *gorse and *broom have been problems in the past.

Notable wildlife: Wood pigeons, bellbirds.

Notes: Arthur Ericson retired to Akaroa in 1964 after a lifetime of farming in Southland, and spent much of his time restoring the neglected domain, clearing weeds and tracks and making extensive plantings. The Department of Conservation adopted a policy of allowing species not native to this part of the Peninsula to live out their natural lives, but to encourage regeneration of local plants only. If the District Council assumes control, I suggest that a similar policy be followed, with the proviso that invasive species such as **Clematis vitalba*, *sycamore and *ash be actively discouraged.

Detailed report: Dennis 1986.

26 Walnut Stream (National Trust)

Area: c. 2.0 ha

Grid Ref. centre: N 37 076 098

Protected: May 1987

Control: Landowners in covenant with National Trust

Access: Private land.

Vegetation: Lowland second-growth mixed hardwood forest and kānuka.

Notable wildlife: Bellbirds, brown creepers, wood pigeons, grey warblers, fantails.

27 Armstrong (Scenic Reserve)

Area: 36.6 ha

Grid Ref. centre: N 37 095 080

Reserved: 1971

Control: Department of Conservation

Access: Off Stony Bay Road near Stony Bay Saddle, along paper road across private land.

Vegetation: Much of the reserved area is red beech forest, with pockets of black beech on thinner soils of spurs and knobs. The reserve includes the summit of Flag Peak at 809 m, and the tussocky slopes between it and the upper edge of the forest (which is not a natural bushline, but a fire-induced one). Thus there is also snow tussock and snow tussock shrubland; bluff vegetation on montane rock outcrops; small areas of montane thin-bark tōtara/hardwood forest; montane scrub with *Dracophyllum*; mixed hardwood forest of *Fuchsia*, broadleaf, fivefinger etc, mostly in gullies; fairly extensive gorse scrub on the SW side of the reserve; kānuka; and dwindling remnants of pasture dominated by sweet vernal.

Before a disastrous fire across Flag Peak in June 1984, several hundred cedar saplings were regenerating among snow tussock and *Dracophyllum* between the bush edge and the ridge. In the area reached by the fires all the cedars were destroyed, along with most other woody plants. Several tens of cedar saplings still survive at other places on the bush margins not affected by the 1984 fire.

Armstrong has a long list of species of particular note in addition to those mentioned above. They include: *Cordyline indivisa*, abundant tree ferns (*Cyathea smithii*, *C. dealbata*, *Dicksonia squarrosa*, *Cyathea colensoi*), *Hebe lavaudiana*, *H. strictissima*, *Celmisia mackau*, *C. gracilentia*, *Aciphylla aurea*, *Gonocarpus incanus*, *Gingidia enysii*, *Neuropogon ciliata* (lichen) and *Racomitrium lanuginosum* (moss), *Brachyglottis lagopus*, *Gaultheria depressa* var. *novae-zelandiae*, *Ctenopteris heterophylla*, *Scleranthus uniflorus*, *S. biflorus*, *Forstera tenella*, *Hymenophyllum multifidum*, *Ourisia lactea*, *Gunnera monoica*, *Uncinia rupestris*, *Grammitis billardi*, *Clematis paniculata*, *Leptopteris hymenophylloides*, *Hymenophyllum sanguinolentum*, *Chionochloa conspicua*, *Earina autumnalis*, *Lycopodium scariosum*,

L. fastigiatum, *L. volubile*, *Viola filicaulis*, *Tupeia antarctica*, *Olearia ilicifolia*, *Lycopodium varium*, *Kelleria dieffenbachii*, and *Uncinia silvestris*.

Weeds: *Gorse (invading snow tussock and snow tussock shrubland - nevertheless attempted control here is only likely to be counter-productive), **Hieracium pilosella*, **H. praealtum*, **H. lepidulum*, *spanish heath, *broom, **Pinus radiata*.

Other threats: Fire. The 1984 fire tragically underlines how vulnerable all Banks Peninsula reserves are to fire. Goats. At time of writing, despite a prolonged campaign in SE Banks Peninsula, wild goats are still not eliminated and are still invading the reserve. Straying farm stock. This is currently still a problem.

Notable wildlife: Moreporks, bellbirds, fantails, harriers, pipits, wood pigeons, riflemen, silvereyes, tomtits, grey warblers, *skylarks, *magpies, *finches.

Notes: Certainly one of the most valuable reserves in the District and the Region. See also Akaroa RAP 25 Armstrong extension.

28 Flea Bay (Scenic Reserve)

Area: 11.3 ha

Grid Ref. centre: N 37 087 064

Reserved: 1991

Control: Department of Conservation

Access: Flea Bay Road.

Vegetation: Narrow stand of red beech forest in gully along stream, lying between 300 and 500 m altitude. Associated species include lancewood, mountain fivefinger, lowland fivefinger, mataī, putaputāwētā, abundant *Fuchsia excorticata*, *Coprosma rotundifolia*, māpou, pigeonwood, kaikōmako, broadleaf, *Olearia ilicifolia*, and tree ferns (*Cyathea smithii*, *C. dealbata*, and *Dicksonia squarrosa*). Gale force winds severely damaged this stand in August 1975, but regeneration has been vigorous. It is now fenced.

Threats: Goats. Straying farm stock. Fire.

29a Stony Bay (National Trust)

Area: 13.6 ha

Grid Ref. centre: N 37 132 057

Protected: September 1985

Control: Landowners in covenant with National Trust

Access: Private land

Vegetation: Pasture, native shrubland, small-leaved scrub, areas of plantings of New Zealand natives, mostly of non-local stock. Near the mouth of the stream is *Carex secta*.

Threats: Ferrets, stoats and cats are a serious threat to the wildlife values. Dogs are also a potential threat. Goats.

Notable wildlife: Yellow-eyed penguins at the northern limit of their breeding range; also white-flipped blue penguins, paradise ducks, grey ducks, *mallards, gulls and terns.

Notes: The main purpose of the covenant is "maintenance of undeveloped foreshore area".

29b **Stony Bay Penguin Sanctuary** (Department of Conservation Agreement)

Area: 6 ha

Grid Ref. centre: N 37 133 059

Protected: Formal protection to be completed

Control: Landowners in consultation with Department of Conservation

Access: Private land

Vegetation: Shrubland and scrub consisting largely of *Coprosma crassifolia*, *C. propinqua*, kaikōmako, *Melicope simplex*, *Parsonsia capsularis*, and some *Cordyline australis*, with some steep pasture and rocks. Tree tutu is present in places, and *Urtica ferox* is locally common.

Threats: Ferrets, stoats and cats are a serious threat to the wildlife values. Dogs are also a potential threat. Goats.

Notable wildlife: Yellow-eyed penguins at the northern limit of their breeding range; also white-flipped blue penguins, paradise ducks, grey ducks, *mallards, gulls and terns.

Notes: Protection is specifically for the yellow-eyed penguins, but there will be some botanical spin-offs as the coastal scrub develops in the absence of grazing.

The 4-day, privately operated (by participating landowners) Banks Peninsula Track traverses both areas.

30 **Palm Gully (Scenic Reserve)**

Area: 20.5 ha

Grid Ref. centre: N 37 068 045

Reserved: Declared Protected Private Land in 1968 and Reserved in 1989

Control: Department of Conservation

Access: Across private land from The Kaik (Onuku).

Vegetation: Coastal mixed broadleaved hardwood forest with abundant nīkau palms, in very steep, narrow gorge in the great cliffs lining the entrance to Akaroa Harbour. The stream descends a rocky bed and three waterfalls. Also: coastal scrub; extensive bluff vegetation; shrubland; coastal cliff vegetation and salt turf; coastal short tussockland with some lowland flax. Among numerous species of particular interest are: nīkau palms (about 80 adults and abundant regeneration), abundant kawakawa, velvet fern, *Asplenium obtusatum*, *A. oblongifolium*, *Adiantum cunninghamii*, fierce lancewood, akeake (*Dodonaea*), tītoki, pigeonwood, *Scandia geniculata*, *Ourisia lactea*, *Hebe strictissima*, *H. lavaudiana*, *Sonchus kirkii*, *Carex trifida*, *Poa astonii*, *Wahlenbergia* 'Akaroa Heads', *Festuca* 'Banks Peninsula blue tussock', *Celmisia mackaii*, *Clematis afoliata*, *Microlaena polynoda*, *Cyathea dealbata*, *Carex solandri*, *Lophomyrtus obcordata*, native passion vine, *Tetragonia trigyna*, ngaio, *Vittadinia australis*, *Cheilanthes humilis*, *C. distans*, *Linum monogynum*, *Sophora prostrata*, *Carex raoulii*, *Asplenium lyallii*, *Carex secta*, *Solanum aviculare*, *Myosotis* 'australis var. lytteltonensis', *Pterostylis foliata*, and *P. areolata*.

Weeds: *Elderberry, **Hieracium pilosella*, *variegated thistle.

Other threats: Straying farm stock, goats, fire.

Notable wildlife: Wood pigeons, bellbirds, fantails, brown creepers, shining cuckoos, grey warblers, black-backed gulls, red-billed gulls, spotted shags, harriers, pipits.

Notes: Palm Gully is an exceptionally valuable reserve in terms both of scenery and biological values. It is close to Dan Rogers reserve and surrounded by a wider area high in conservation values. See also Akaroa RAP 17 Nīkau.

31 **Dan Rogers Creek (Nature Reserve)**

Area: 6.9 ha

Grid Ref. centre: N 37 073 040

Reserved: 1963

Control: Department of Conservation

Access: Across private land from Lighthouse Road down steep slopes (permission needed); or with some difficulty from the sea.

Vegetation: Coastal hardwood forest with māhoe - pigeonwood/kawakawa and some nīkau palms; extensive bluff vegetation on huge amphitheatre of cliffs; native tussockland of silver tussock and lowland flax; pasture dominated by *brome and *sweet vernal; vegetation on steep wet rocks associated with seepages and by a 40 m waterfall at the head of the amphitheatre; coastal salt turf with *Leptinella*, *Isolepis*, *Samolus*, *Sarcocornia* and *Disphyma*; native scrub, mostly of small-leaved *Coprosma* species but with bush nettle, flax, etc. Among numerous species of particular interest are: nīkau palms (adults and regeneration), *Celmisia mackau* (particularly abundant), *Crassula moschata*, *Blechnum banksii*, *Asplenium obtusatum*, *A. oblongifolium*, *Festuca* 'Banks Peninsula blue tussock', *Poa astonii*, *Schoenus pauciflorus*, *Rytidosperma corinum*, *Wahlenbergia* 'Akaroa Heads', *Asplenium lyallii*, *Anogramma leptophylla*, *Linum monogynum*, *Senecio carnosulus*, *S. glaucophyllus* subsp. *basinudus*, *S. lautus*, (all three spp. appear to be present), *Carex secta*, *C. trifida*, *C. solandri*, *Colobanthus muelleri*, *Ctenopteris heterophylla*, *Ourisia lactea*, and *Scandia geniculata*.

Fire has probably burnt across the area many times and all of the woody vegetation is second-growth.

Weeds: *Gorse (sparse), *monkey musk in stream and on seepages; nothing else of any concern.

Other threats: Goats, fire.

Notable wildlife: White-flipped blue penguins, spotted shags (large breeding colonies adjacent to reserve), bellbirds, fantails, black-backed gulls, red-billed gulls, *rock pigeons, silvereyes, grey warblers, *skylarks, fur seals.

Notes: Wild, dramatic aspect of landscape and vegetation is magnificent, and the biological values very high. It is close to Palm Gully reserve and surrounded by a wider area high in conservation values. See also Akaroa RAP 17 Nīkau.

32 Akaroa Head (Scenic Reserve)

Area: 15.4 ha

Grid Ref. centre: N 37 083 022

Reserved: 1877

Control: Department of Conservation

Access: Lighthouse Road.

Vegetation: Chiefly open silver tussock and pasture, with larger clumps of *Scirpoides nodosus*; and scattered plants on coastal cliffs, particularly *Disphyma australe*. The large exotic ice-plant **Carpobrotus edulis* is also present, from plantings. On cliff ledges and in damp hollows above the cliff edges are patches of saltmarsh turf species, especially *Sarcocornia quinqueflora*, *Leptinella dioica*, *Samolus repens*, *Spergularia media*, *Apium prostratum*, *Selliera radicans*, *Puccinellia*

stricta, *Isolepis cernua*, *Cotula coronopifolia* and *Blechnum banksii* (very local on Banks Peninsula). Also of note by the sea in Haylocks Bay are: *Senecio glaucophyllus* subsp. *basinudus*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Asplenium obtusatum*, *Crassula moschata*, *Einadia allanii* and naturalised **Coprosma repens*. There are areas of dense silver tussock on the slopes into Haylocks Bay. The silver tussock and the salt-tolerant coastal species are the chief botanical interest of the reserve.

Notable wildlife: Spotted shags, black-backed gulls, red-billed gulls, white-fronted terns, white-flippered blue penguins, fur seals. More oceanic birds can sometimes be seen from the reserve, including gannets, mollymawks, shearwaters, fairy prions, cape pigeons and other petrels.

Notes: The reserve itself is small and of limited botanical interest, but the wildlife values are high, the setting superb with wonderful coastal views all around, including the pierced headland of Gateway Point, and there is historical interest; the original lighthouse came into operation on this headland in 1880. One hundred years later, with the introduction of an automatic light in 1977, the lighthouse was removed in 1980 to a site below the Garden of Tāne in Akaroa. Small historical relics remain on the site, such as the iron steps down to the landing in Haylocks Bay. Andy Dennis (1986) writes in his little booklet "Banks Peninsula Reserves" : "Country of this kind can be powerful enough in calm conditions. It is part of the appeal of this reserve that in wild weather it can be awesome".

33 Proposed Barrys Bay (Protected Private Land)

Area: c. 0.4 ha

Grid Ref. centre: N 36 029 165

Protected: 1990

Control: Landowner in covenant with Department of Conservation

Access: Adjacent to Main Road, Barrys Bay, on Christchurch - Akaroa highway.

Vegetation: Modified remnant of coastal kahikatea/hardwood forest on coastal alluvium, adjacent to tidal flats. This sort of forest would have been widespread around the head of Akaroa Harbour, and common until a little over a century ago, but this is the last surviving fragment in the entire Region. Species of note are: kahikatea, mataī, pōkakā, native passion vine, ngaio, kōwhai, lacebark, small-leaved milk tree and *Carex virgata*. As well as the passion vine there are a lot of creepers, including *Muehlenbeckia australis*, *M. complexa*, *Parsonsia heterophylla*, *Calystegia tuguriorum*, and *Rubus schmidelioides*. Several species of small-leaved *Coprosma* (*C. propinqua*, *C. rotundifolia* and *C. crassifolia*) and another small-leaved shrub *Melicope simplex*, are common. Cabbage trees are a conspicuous element. The floor is very open and grassy after decades of grazing by cattle.

Weeds: *Japanese honeysuckle, *crack willow, *elderberry, *cherry plum, *creeping buttercup. The native *Muehlenbeckia australis* behaves like a smothering weed in damaged bush fragments like this; this species and other native climbers were

heavily cut back when the stand was fenced. While it is no bad idea to knock back *Muehlenbeckia australis* and a very good idea to knock back *Japanese honeysuckle and *elderberry, there is no need to attack the other native creepers again.

Notable wildlife: Pūkeko live in the stand. The adjacent tidal flats are rich in birdlife, including paradise ducks, white-faced herons, pied oystercatchers, kingfishers, *Canada geese, black swans, *black shags, little shags, grey duck, *mallards, spur-winged plovers, black-backed gulls, *rooks, etc.

Notes: The landowner, Ross Curry, generously agreed to let the stand be fenced, which was done by the Department of Conservation in 1990. Some of the outer, scattered, small kahikatea trees were left outside the fence.

34 Little Okains (privately protected)

Area: c. 1 ha

Grid Ref. centre: N 36 155 223

Protected: No legal protection, but fenced for several years

Control: Landowner (Murray Thacker)

Access: Private land.

Vegetation: Lowland podocarp/hardwood and second-growth hardwood forest in gully; two nearby patches are fenced, between about 170 and 240 m altitude. Species of note include: mataī, lowland tōtara, kahikatea, ngaio, *Fuchsia perscandens*, tītoki, *Coprosma virescens*, kawakawa, *Scandia geniculata*, *Asplenium oblongifolium*, small-leaved milk tree, *Brachyglottis sciadophila*, *Parietaria debilis*, *Pseudopanax anomalus*, *Melicytus micranthus*, native passion vine, *Lophomyrtus obcordata*, *Tetragonia trigyna*, *Korthalsella lindsayi*, leafless lawyer, fierce lancewood, *Ileostylus micranthus*, *Cyathea smithii* (one specimen seen, and only tree fern noted), pigeonwood, velvet fern and *Hydrocotyle elongata*.

In the lower patch many of the adult and adolescent mataī are in poor health, possibly related to a series of drought years. The upper fenced patch is an excellent stand with all three podocarps as healthy mature adults. There is common regeneration of tōtara and mataī, but kahikatea regeneration is very sparse. The unbrowsed interior along the stream in both patches is very attractive.

Enclosed within the fenced off areas are small patches of tall ungrazed pasture. As a result of the years of stock exclusion the palatable fern *Phymatosorus diversifolius* is common both on the ground and as an epiphyte.

Weeds: *Sycamore is a serious problem. Also present locally are *ash, **Pinus radiata* and *macrocarpa.

Other threats: Fire, goats, straying farm stock, possums.

Notable wildlife: Observed on the survey were bellbirds, grey warblers, silvereyes, kingfishers and *magpies.

Notes: Bush in the gully between the two fenced patches and upstream from the upper one contain much of value, including more fine podocarp specimens, but also much invasive *sycamore.

35 Fraser (privately protected)

Area: c. 15 ha

Grid Ref. centre: N 36 115 137

Protected: No legal protection, but fenced for many years (since about 1974)

Control: Landowners (Neil and Jill Fraser)

Access: Private land. The top margin abuts the Summit Road between the Cabstand and Le Bons Bay.

Vegetation: Montane thin-bark tōtara/hardwood forest, and montane second-growth mixed hardwood forest with abundant *Fuchsia*, extending down into upper lowland second-growth mixed hardwood forest. The altitude range is from about 610 m down to about 430 m. The interior is impressively ferny and ungrazed. Species of particular note include: very large broadleaf up to 160 cm dbh, goblin moss (*Weymouthia*), *Coprosma rubra*, thin-bark tōtara, mataī, *Coprosma wallii*, pigeonwood, *Cyathea smithii* (adults and regeneration), *Leptopteris hymenophylloides*, *Trichomanes venosum*, kawakawa, *Leptolepia novae-zelandiae*, *Metrosideros diffusa*, and one young specimen of *Dicksonia fibrosa*.

Weeds: None of any concern noted.

Other threats: Possums, fire, goats.

Notable wildlife: Recorded on the survey were: bellbirds, wood pigeons, grey warblers, tomtits, brown creepers, fantails, riflemen, *magpies.

Notes: This is a splendid, carefully protected area of private land. Perhaps some thought should be given to providing it with some legal protection in perpetuity. See also Akaroa RAP 30.

Detailed report: Wilson, Hugh 1987: Letter to Neil and Jill Fraser. Banks Peninsula Botanical Survey, unpublished, on file.

36 Kaik Hill (privately protected)

Area: c. 6 ha

Grid Ref. centre: N 37 063 088

Protected: No legal protection but fenced for several years (since about 1980?)

Control: Landowners (Helps families)

Access: Private land.

Vegetation: Lowland podocarp/hardwood remnant on mid-altitude hill slope. Sizeable mataī and lowland tōtara form a significant part of the canopy over a diverse mixed hardwood subcanopy of broadleaf, lacebark, māhoe, sevenfinger, lowland fivefinger, and lancewood. Some tree ferns (*Cyathea smithii*) with kawakawa, *Coprosma areolata*, bush nettle and *Melicope simplex* are prominent in the understorey. At time of survey (February 1984) the interior still looked eaten out, but initial regeneration of the floor was vigorous, including ferns and tree seedlings, notably kawakawa, podocarps, shield fern, *Asplenium hookerianum*, *A. terrestre* and *Pellaea rotundifolia*. **Mycelis muralis* is abundant on the floor. Common climbers are *Muehlenbeckia australis*, supplejack, and *Parsonsia heterophylla*. Also of note are: kahikatea (one specimen about 80 cm dbh), tītoki, native passion vine, *Lophomyrtus obcordata*, *Metrosideros diffusa*, *Brachyglottis sciadophila*, pigeonwood, small-leaved milk tree, ngaio, kōwhai, kaikōmako, māpou, lemonwood, and sparse horopito.

The taller trees are markedly windbent northwards (from the southerlies). The stand lies between about 120 and 240 m.

Weeds: *Elderberry. This is of no great concern, and no other weeds were noted.

Other threats: Straying farm stock (stock is excluded only by an electric fence); goats. Fire risk is hopefully minimal with grazed pasture up to the bush margin.

Notable wildlife: Recorded on survey were: bellbirds, wood pigeons, fantails, *blackbirds, *finches, *starlings, *magpies.

Notes: Because this is an outstanding old-growth remnant and because there is no legal protection in perpetuity, the area is also listed in the RAP Section as Akaroa RAP 17 Kaik Hill.

37 Haylocks (privately protected)

Area: c. 5 ha

Grid Ref. centre: N 37 074 074

Protected: No legal protection, but fenced in the mid 1980s (in three stages between 1983 and 1985)

Control: Landowners (Alan, Joy and Peter Haylock)

Access: Private land.

Vegetation: Lowland beech, mixed hardwoods and podocarp forest in a gully, the altitude ranging from about 250 m up to about 460 m. Red beech is the commonest tall tree in the protected area. Mataī and lowland tōtara are quite common, mostly at the lower end. Much of the canopy is a diverse mixture of native hardwoods. Since fencing there has been good regeneration of ferns, kawakawa, pigeonwood, etc, and regeneration of both tōtara and mataī is common.

Especially in the upper part, all three of the common Banks Peninsula tree ferns (*Cyathea smithii*, *C. dealbata* and *Dicksonia squarrosa*) are represented by numerous adults and abundant regeneration. Species of particular note include red beech, mataī, lowland tōtara, kawakawa, pigeonwood, ngaio, *Coprosma linariifolia*, *Clematis paniculata*, *Metrosideros diffusa*, native passion vine, the tree ferns mentioned above, *Leptopteris hymenophylloides*, *Leptolepia novae-zelandiae*, *Lastreopsis glabella* and *Grammitis billardiarei*.

The Haylocks planted nīkau palm at the bottom end of the protected area; this is from seed from the planted adult tree at their house, which originated locally, although not at this altitude.

**Pinus radiata* is planted as a small woodlot in the upper SE corner of the fenced area. In May 1987 the saplings were about 3 m tall.

Weeds: *Elderberry, *male fern.

Other threats: Straying farm stock, goats, possums, fire.

Notable wildlife: Recorded on the survey were bellbirds, wood pigeons, brown creepers, grey warblers, fantails.

Notes: The dominance of beech at lowland altitudes mixed with lowland podocarps, hardwoods and ferns gives an interesting mix of species well worth continued protection, and one that is virtually unrepresented in any other existing reserve on Banks Peninsula. The mix of beech and lowland species extends on down the gully below the road and is also well worth protecting. See also Akaroa RAP 17 Nīkau.

Detailed report: Wilson, Hugh D. 1987: Haylock's Reserve, Onuku. Preliminary species checklist, from inspection 6 May 1987. Banks Peninsula Botanical Survey unpublished report, on file.

38 Pā Island (Government Purpose Reserve)

Area: 1 ha

Grid Ref. centre: N 36 185 236

Reserved: 1887

Control: Department of Conservation

Access: With difficulty from the sea.

Vegetation: Coastal grassland, shrubland, cliffs and littoral rocks, on steep-sided, loess-capped, basalt islet adjacent to mainland. The main communities are: intertidal seaweed communities marked by robust bull kelp and the brown kelp *Xiphophora*, common here but generally uncommon on Banks Peninsula coastlines; littoral rocks with lichens and coastal grasses and herbs; steep cliffs dominated by *Disphyma australe* and bare rock; open grassy shrubland of *Hebe*, māhoe, lowland flax, grasses and ferns; coastal tussockland; stands of *tree mallow 1 m + tall. Further species of note are: lowland tōtara, one stunted specimen about 3 m tall in the slight shelter of a shallow gully, toetoe, *Asplenium lyallii*, *A. oblongifolium*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Hebe strictissima* (regional endemic), *Linum monogynum*, leafless lawyer, *Sarcocornia quinqueflora*, *Scandia geniculata*, *Senecio carnosulus*, *S. glaucophyllus* subsp. *basinudus* and *Tetragonia trigyna*. The native holy grass is abundant, an indication along with palatable ferns that the islet is more or less free of grazing. However, possum sign is evident. The island has also undoubtedly been burnt in the past.

Weeds: *Naturalised pasture grasses and thistles, especially *cocksfoot, *fog, *brome and *scotch thistle; *tree mallow.

Other threats: Predators. Remains of what seemed to be a cat-killed or stoat-killed rock pigeon, or possibly a fairy prion, were found near the top of the island during the survey in February 1987. Other islets off the Banks Peninsula coast still provide a predator-free environment for the nesting of vulnerable sea birds, but Pā Island has a land connection at low tide, albeit a precipitous and virtually impassable one, and this may allow predator access.

Notable wildlife: Fur seals, spotted shags (breeding), black-backed gulls (breeding-nests common), red-billed gulls, white-fronted terns, white-flipped blue penguins. Burrows in the gully may be penguin or sooty shearwater burrows.

Notes: There are several other islets close to the Banks Peninsula coasts, all more or less important for sea birds and seals. Presumably they are all Crown land within the Queen's chain reserve. Probably the three most significant of them are: Crown Island (N 36 192 125), (see Akaroa RAP 34), Island Nook Island (N 37 124 037), (see Akaroa RAP 19), and Island Bay Island (N 37 994 012). Pā Island is the only one drawn to my attention for a reserve report survey by the then Department of Lands and Survey.

Detailed reports: Wooster, A. *et al.* 1985: Pā Island Reserve. Department of Lands and Survey unpublished report, on file 8/5/C/5. Wilson, Hugh D. 1987: Pā Island Reserve. Banks Peninsula Botanical Survey, unpublished report, on file.

Additional note, Akaroa PNAs

As this report was going to press, the National Trust registered a covenant on approximately 25 ha of land at Childrens Bay, Akaroa, owned by the Masfields. This provides very welcome protection for an attractive landscape of bushed gullies and open spurs behind a sheltered bay, which forms a highly significant part of the outlook from Akaroa town.

5.3 Priorities for Protection

Priorities for protection in Akaroa Ecological District are listed below in approximate order of importance.

- (i) Old-growth lowland podocarp/hardwood forest. Virtually nothing remains on valley floor alluvium, so that even scattered podocarp survivors are of greatest importance here, and every individual tree should be considered sacrosanct. A little more survives on hill slopes but they too are such rare survivors of the original vegetation that they should have very high priority for protection.
- (ii) Old-growth montane beech forest: Within Banks Ecological Region, this vegetation type is unique to Akaroa Ecological District and very restricted even there. Recent developments with Hinewai Reserve are safeguarding more significant stands, but other excellent remnants are still unprotected. Most of the stands are of red beech. Stands of black beech are very small and local, some protected in existing reserves, others not.
- (iii) Old-growth lowland beech forest and beech - podocarp/mixed hardwood forest.
- (iv) Coastal pīngao tussockland on sand dunes: The Tumbledown Bay dunes (Akaroa RAP 9) have the only significant population of pīngao in the whole Region, although it would have once been the dominant vegetation of coastal dunes.
- (v) Old-growth montane podocarp/hardwood forest: The best stands are already reserved, but all significant remnants should be safeguarded.
- (vi) Warm coastal forest remnants with southern limit species such as nīkau, shining broadleaf, akeake (*Dodonaea*), tītoki, etc.
- (vii) Warm lowland forest remnants with mamaku tree fern (*Cyathea medullaris*).
- (viii) Extensive areas of advanced second-growth forest: These represent the best areas of regeneration towards forest similar to the original cover. In addition they are currently botanically diverse, visually attractive, and important habitat for native fauna.
- (ix) Montane tall tussockland and tall tussock shrubland: Quite a lot of this is protected in current reserves. Some of the best is not yet protected.
- (x) Coastal short tussockland and tussock shrubland.
- (xi) Extensive dense short tussockland.

- (xii) Wetlands: Existing freshwater and saltwater wetlands are very restricted in area and those that survive are considerably modified. Virtually none of them are protected within the reserve system.
- (xiii) Dry shrubland and scrub.
- (xiv) Lowland and montane rock outcrops: These are important for geological, landscape and botanical values, and to some extent for wildlife (lizards, insects, birds). They are also less vulnerable to damage than other categories, but quarrying, wild goats and rock climbing all pose greater or lesser threats to their natural values.
- (xv) Extensive mature kānuka forest: Although kānuka regenerates readily in the District, and indeed is often regarded as a scrub weed or a source of firewood, mature stands are many decades old, they provide excellent habitat for some native birds, and add greatly to the landscape character of the District. Unfortunately, most stands are grazed out underneath, thus minimising their successional role towards podocarp/hardwood or beech forest. These mature stands are undervalued for conservation, and much too small a proportion of the total area of kānuka forest is protected from clearance, fire and grazing.
- (xvi) Maritime cliffs: The very inaccessibility of these places has acted to preserve a near-pristine original vegetation cover of tussocks, ferns, sedges, shrubs and herbs. In a sense they are all protected already to some extent because of their location on publicly owned land along the coast and because they are not very vulnerable to change. I draw attention to some of the best of the magnificent vegetated sea cliffs of the Akaroa District by including them in RAPs.
- (xvii) Montane mixed scrub: Very little survives.
- (xviii) Lowland small-leaved scrub: To most farmers this is simply pasture-swallowing weeds or "black scrub", but it has considerable natural value. It appears to be one of the best habitats for jewelled gecko. It comprises a range of small-leaved shrub species of considerable scientific interest. It is also one of the successional paths towards re-establishment of native forest, and for this purpose is perhaps better regarded by farming eyes than *gorse or *broom. The best areas are worthy of reserving.

5.4 Recommended Areas for Protection

A further 9.5% of the area of Akaroa District (c. 4,145 ha) is recommended for protection. This is made up of 50 defined areas listed below. The figures in brackets refer to the card index of natural areas (see Introduction, Section 1.1). Areas are estimated in hectares.

1	Ōruaka	c. 230 ha	(93, 94, 500)
2	Kinloch	c. 110 ha	(92, 428)
3	Breitmeyers	c. 35 ha	(429)
4	Hikuraki	c. 65 ha	(498, 510)
5	Tumbledown Valley	c. 140 ha	(426)
6	Devils Gap extension	c. 200 ha	(201, 237)
7	Robin Hood Valley	c. 60 ha	(512)
8	Tumbledown Bay	c. 20 ha	(256)
9	Robin Hood Bay	c. 3 ha	(513)
10	Saddle Hill	c. 320 ha	(87, 97, 98, 215, 315, 325)
11	Carews Peak	c. 120 ha	(217, 219, 220, 439)
12	Mat White	c. 150 ha	(293, 294)
13	Long Bay	c. 150 ha	(316, 438)
14	Bossu	c. 50 ha	(187)
15	Scenery Nook	c. 45 ha	(292)
16	Nīkau	c. 340 ha	(108, 110, 111, 112)
17	Kaik Hill	c. 6 ha	(119)
18	Flea Bay cliffs	c. 30 ha	(202, 203)
19	Stony Bay	c. 240 ha	(48, 49, 489, 492, 493)
20	Sleepy Bay	c. 65 ha	(71)
21	Fishermans Bay	c. 100 ha	(296)
22	Pāua Bay	c. 45 ha	(298)
23	Forks Gully	c. 70 ha	(42)
24	Armstrong extension	c. 100 ha	(43)
25	Stony Bay Saddle	c. 15 ha	(305)
26	Stony Bay Peak	c. 140 ha	(50, 185)
27	Ōtanerito Valley	c. 150 ha	(69, 74, 487, 491)
28	Grehan	c. 60 ha	(478)
29	Takamatua	c. 120 ha	(505)
30	Ellangowan extension	c. 30 ha	(68)
31	Hickory Bluff	c. 90 ha	(365)
32	Hueston	c. 55 ha	(133)
33	Crown Island coast	c. 50 ha	(136, 370, 484, 485)
34	Panama Rock	c. 40 ha	(378)
35	Le Bons Peak	c. 70 ha	(139)
36	Steep Head Gully	c. 40 ha	(128)
37	Okains Estuary	c. 40 ha	(339, 342)
38	West Peak	c. 60 ha	(416)
39	North West Bay	c. 35 ha	(415)
40	Stony Beach Bush	c. 25 ha	(520)
41	Raupō Bay	c. 50 ha	(522, 526)

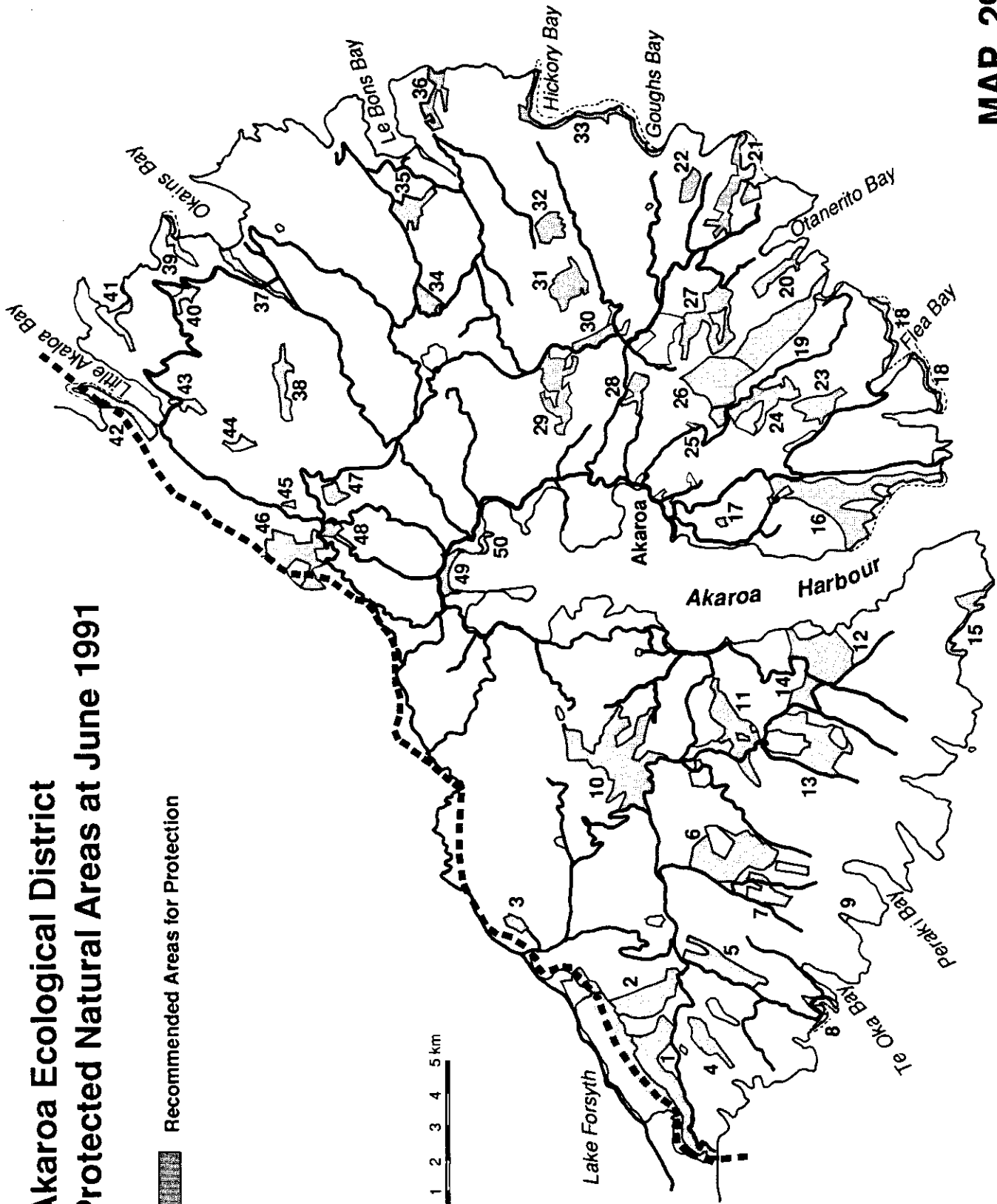
42	Decanter	c. 90 ha	(576, 577)
43	Waterfall Gully	c. 20 ha	(518)
44	View Hill Gully	c. 20 ha	(527)
45	Little Akaloa Raukawa	c. 6 ha	(587)
46	Pearce extension	c. 160 ha	(375)
47	Duvauchelle Peak	c. 25 ha	(414)
48	Pawsons	c. 25 ha	(411)
49	Duvauchelle Bay	c. 25 ha	(249)
50	Ngaio Point	c. 10 ha	(594)

Akaroa Ecological District Protected Natural Areas at June 1991

 Recommended Areas for Protection

0 1 2 3 4 5 km

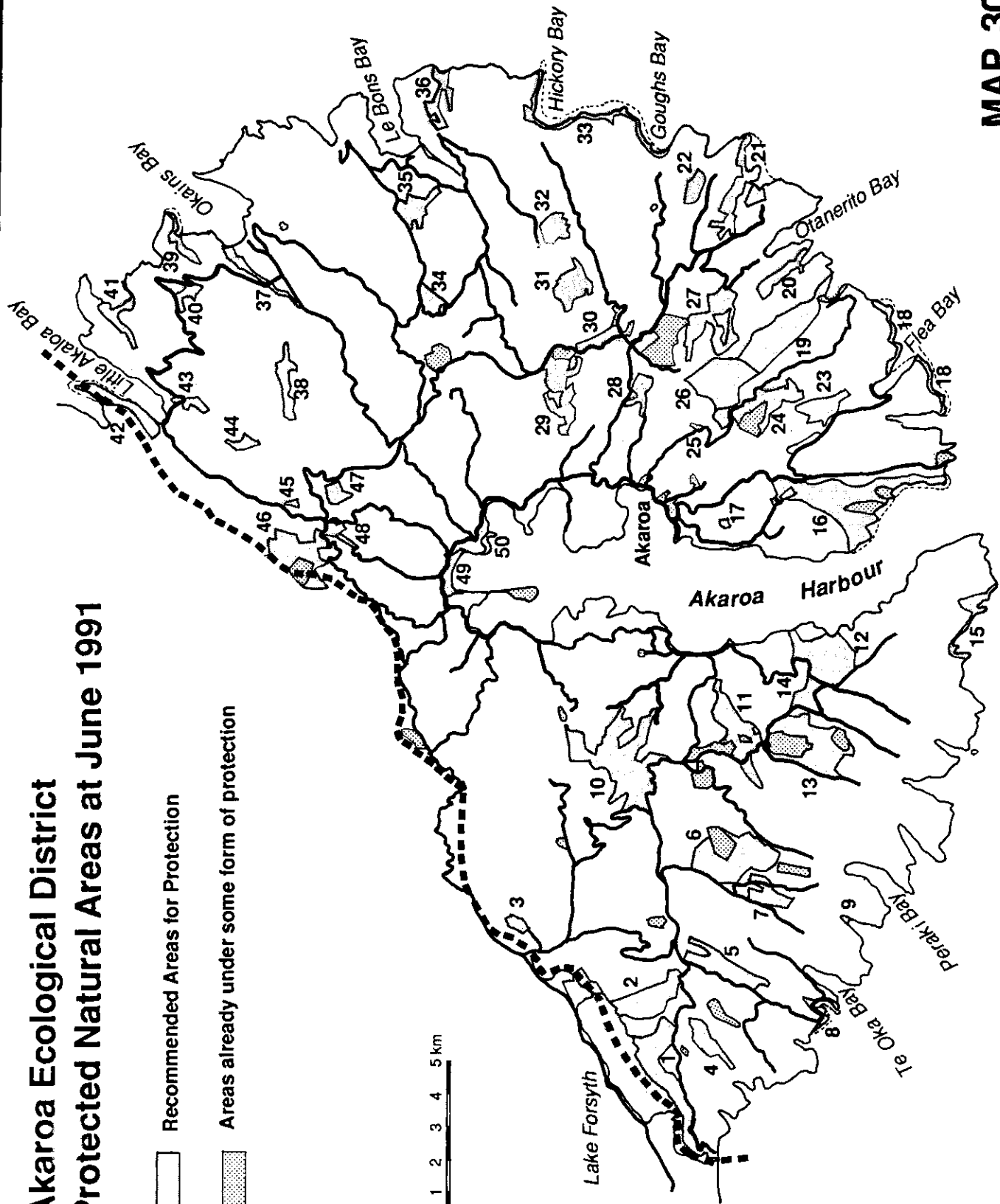
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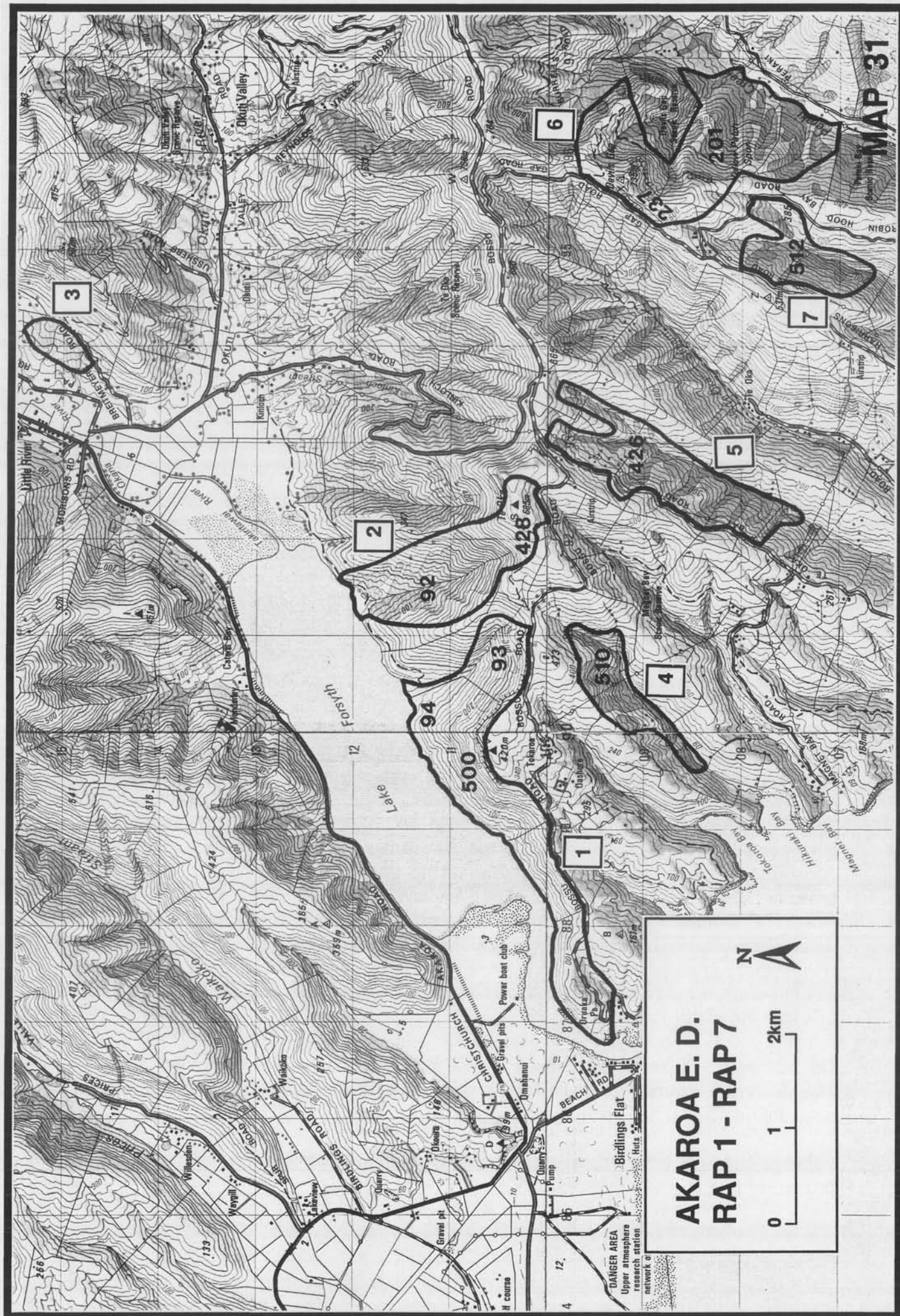


Akaroa Ecological District Protected Natural Areas at June 1991

-  Recommended Areas for Protection
-  Areas already under some form of protection

0 1 2 3 4 5 km





Akaroa RAP 1 - Ōruaka**Area:** c. 230 ha**Grid Ref. centre:** M 36 893 106**Access:** Bossu Road.**Ecological classes:**

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	2%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	< 1%
D 11	Broadleaved hardwood treeland on lowland hill slopes	< 1%
E 13	Lowland small-leaved scrub on hill slopes	2%
F 17	Short tussockland on lowland hill slopes	35%
F 18	Pasture on lowland droughty hill slopes	30%
F 19	Fernland on lowland hill slopes	2%
F 21	Lowland flaxland on hill slopes	< 1%
F 24	Native open shrubland on lowland hill slopes	25%
G 29	Saltmarsh on slightly brackish lake shore	< 1%
J 37	Scattered plants on lowland rock	2%

Topography: Steep N and NW-facing droughty slopes, rock outcrops, and one sizeable gully, between ridge-line and lake-shore. 0 m to about 420 m.

Plants: Extensive good short tussockland has abundant silver tussock and some fescue tussock. Many interesting species occur in the open shrubland, scrub, treeland and very small wooded patches. Several saltmarsh species occur along the slightly brackish lake shore. Among species of particular interest are: akeake (*Dodonaea*), tītoki, fierce lancewood (locally common), pigeonwood, kawakawa, *Scandia geniculata*, *Lophomyrtus obcordata*, small-leaved milk tree, lowland tōtara, mataī, leafless lawyer, leafless clematis, prostrate kōwhai, *Hebe strictissima*, *Microlaena polynoda*, *Leptinella minor*, *Cheilanthes humilis*, *C. distans*, *Convolvulus verecundus*, *Parietaria debilis*, *Aciphylla subflabellata*, the moss *Grimmia laevigata*, *Daucus glochidiatus*, *Echinopogon ovatus*, ngaio, saltmarsh ribbonwood, *Lilaeopsis novae-zelandiae*, *Eryngium vesiculosum*, *Disphyma australe* (well inland occurrence), *Tetragonia trigyna*, *Linum monogynum*, *Festuca* 'Banks Peninsula blue tussock' and matagouri.

Of outstanding interest is a small population of about a dozen healthy shrubs of *Muehlenbeckia astonii*, the only known occurrence in the District and Region although neighbouring Kaitorete is one of the species' strongholds.

Cabbage trees are common, with substantial regeneration, especially along the foot of the prominent line of bluffs under Trig V.

Much of the droughty pasture is dominated by native grass species, particularly *Microlaena stipoides* and *Rytidosperma clavatum*.

Wildlife: The RAP abuts the rich waterbird habitat of Wairewa or Lake Forsyth, with *swans, ducks, *geese, pūkeko, grebes, plovers, shags, herons, etc. Also observed on the survey were bellbirds, grey warblers, harriers, *rooks, *magpies, *skylarks, *blackbirds, *starlings, *rock pigeons and *finches. Lizards were not noted but the area is likely to be good habitat for skinks.

Weeds: *Horehound, *needle grass, *variegated thistle, *elderberry, *ripgut brome, *gorse (sparse).

Notes: With the possible exception of the bushed gully nearly all the current natural values are compatible with moderate grazing by sheep. Incompatible are goats and scrub clearance (whether by fire, chemicals, or other means), and it would represent a considerable conservation loss if the land ever went under exotic trees. This is the driest part of Akaroa Ecological District, and the conservation values of such droughty, open country are easily overlooked. There is also historical value in the area, with the still plainly visible site of Ōruaka Pā at the western end. Hard as it may be to believe, the natural vegetation of the area is forest; the slopes would definitely have been covered in podocarp/hardwood forest prior to Māori burning centuries ago, and the current trend is slowly towards the return of woody plants, nearly all of which still persist within the boundaries of the RAP.

Detailed report: Historical account of Ōruaka Pā see Ogilvie 1990 or Brailsford 1981.

Akaroa RAP 2 - Kinloch

Area: c. 110 ha

Grid Ref. centre: N 36 915 110

Access: Private land (from Kinloch Farm); the top of the RAP abuts the Bossu Road.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	15%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	50%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
C 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	1%
F 17	Short tussockland on lowland and montane hill slopes	15%
F 18	Pasture on lowland and montane moist hill slopes	5%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes (fragmentary only)	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	2%
J 38	Scattered plants on montane rock	1%

Topography: Steep, small, substantially bushed valley between open tussock spurs, rising from lake shore sea level to the prominent rock-rimmed summit of Te Oka Peak at 685 m.

Plants: The suggested area ranges from warm lowland species such as akeake, tītiki, pigeonwood and kawakawa, to montane species including snow tussock (only a few tussocks on summit), *Dracophyllum acerosum*, and regenerating thin-bark tōtara. There is also a sharp contrast between the forest and the open tussock on both sides of the forest. The boundary is probably old, resulting originally from fires in Māori times - that is, the bushed area has been more or less forested continuously and the short tussockland has been tussock for centuries. Further species of special note include: mataī (abundant, with every age class from seedling to mature adult represented), lowland tōtara (common), thin-bark tōtara (regenerating at the upper altitudes), fierce lancewood (common), *Lophomyrtus obcordata*, *Olearia paniculata* (common), *Parietaria debilis*, *Scandia geniculata*, the mistletoe *Tupeia antarctica*, leafless lawyer, *Cheilanthes distans*, native passion vine, *Pteris tremula*, *Aciphylla aurea*, *Brachyglottis lagopus*, *Gunnera monoica*, *Celmisia gracilentia*, *Fuchsia perscandens*, *Hebe strictissima* (regional endemic), *H. lavaudiana* (regional endemic), *Aciphylla subflabellata*, *Ranunculus foliosus* and *R. multiscapus*.

Wildlife: Bellbirds, grey warblers, harriers, pipits, *skylarks. The area abuts the rich waterbird habitat of Wairewa or Lake Forsyth.

Weeds: *Elderberry, *Spanish heath, *sycamore, *grey willow, *mouse-ear hawkweed, *gorse (sparse).

Notes: The bushed valley has been identified as an area of high conservation importance for a long time, and its fencing has been proposed by Dr Brian Molloy and the National Trust. The interior is debilitated by stock and fencing would certainly be an advantage. The inclusion of Te Oka Peak in any reserve possibility would protect a remarkable altitudinal and environmental range, and this RAP is certainly of high priority.

Akaroa RAP 3 - Breitmeyers**Area:** c. 35 ha**Grid Ref. centre:** N 36 940 150**Access:** Breitmeyers Road, Little River.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	30%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	60%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	5%
F18	Pasture on lowland hill slopes	5%

Topography: Relatively gently sloping hillside between steeper slope below going down to the valley floor and much steeper slope above up to Trig T; the bush patch lies between about 80 and 160 m altitude.

Plants: Species of note include mataī (adults and juveniles), kahikatea (adults and one adolescent), lowland tōtara (adults and abundant regeneration of all ages), pigeonwood, ngaio, *Lophomyrtus obcordata*, tītoki, leafless lawyer, extensive patches of *Microlaena polynoda*, native passion vine, *Pseudopanax anomalus*, small-leaved milk tree, *Fuchsia perscandens*, *Ileostylus micranthus*, akeake (*Dodonaea*), fierce lancewood (growing with common lancewood) and velvet fern. Ground ferns are very battered and sparse, and tree ferns are represented by only dead trunks of *Cyathea dealbata*. Kawakawa is very sparse.

Wildlife: Bellbirds, grey warblers, fantails, *finches, *Californian quail, *sulphur-crested cockatoos.

Weeds: **Berberis glaucocarpa*, *gorse, *broom, *sweet brier.

Notes: This is a valuable stand of lowland forest with abundant podocarps, and well-placed as part of the backdrop of Little River township. The canopy is good, tōtara regeneration is striking, and as well as the species noted above there is a diversity of common hardwood species represented. But the interior is devastated, with cattle, hares and rabbits roaming at will, and weed species such as **Berberis*, *hawthorn and *elderberry scattered throughout. The bush would respond brilliantly to stock exclusion. Because there are two patches, a small area of pasture is included in the outlined area, but if necessary pasture inclusion could be minimised. Fencing this bush would be a major conservation plus.

Akaroa RAP 4 - Hikuraki

Area: c. 65 ha

Grid Ref. centre: M 37 - N 37 904 094

Access: Private land.

Ecological classes:

A 2	Matai - lowland tōtara/mixed hardwood forest on lowland hill slopes	2%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	8%
D 11	Broadleaved hardwood treeland on lowland hill slopes	5%
E 13	Lowland small-leaved scrub on hill slopes	20%
F 17	Short tussockland on lowland hill slopes	10%
F 18	Pasture on lowland hill slopes	15%
F 21	Lowland flaxland on hill slopes	<1%
F 24	Native open shrubland on lowland hill slopes	40%
J 37	Scattered plants on lowland rock	<1%

Topography: Gully, mostly the SE-facing side of a small valley but including the gully bottom with stream, a 12 m waterfall, and some W-facing slopes. The outlined area ranges from about 40 m to 380 m altitude.

Plants: Several southern limit species occur, most notably a single adult nīkau palm c. 7 m tall, at 220 m altitude, with a few seedlings evident at time of survey (October 1987) up to c. 35 cm tall. Other southern limit species are tītoki, akeake (*Dodonaea*), kawakawa, native passion vine and pigeonwood, all common to abundant. Also common is *Olearia fragrantissima*, whose northern limit is Banks Peninsula. The extensive shrubland dominated by *Helichrysum lanceolatum*, although a common species, is another notable feature of the lower part of the valley. Other species of note include two regional endemics - *Hebe strictissima* and *Leptinella minor*, ngaio, leafless lawyer, prostrate kōwhai, *Scandia geniculata*, *Teucrium parvifolium*, small-leaved milk tree, *Lophomyrtus obcordata*, fierce lancewood, the moss *Hedwigia ciliata*, matai (adults and regeneration), lowland tōtara (adults and regeneration), *Dicksonia squarrosa* (sparse) and *Clematis paniculata*. Among the abundant small-leaved shrubs, *Coprosma virescens*, *Corokia cotoneaster* and *Myrsine divaricata* are of some note. Cabbage trees are a common and conspicuous element of the vegetation. Tussock sedges of both *Carex secta* and *C. virgata* occur along the stream and on minor seepages.

Wildlife: Noted on the survey were bellbirds, grey warblers, fantails, shining cuckoos, *blackbirds, *finches, eels, and abundant cicadas.

Weeds: *Elderberry.

Notes: In October 1987 goats were grazed adjacent to the outlined area on silver tussock and pasture and gnawed into adult cabbage tree trunks. Ringbarking of mature lacebarks was noted within the defined area. There is a great deal of interest in this valley, and the natural values would be seriously compromised by goat-browsing, fire, cattle-grazing, and scrub clearance.

Akaroa RAP 5 - Tumbledown Valley**Area:** c. 140 ha**Grid Ref. centre:** N 37 928 090**Access:** Te Oka Bay Road.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	3%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	45%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
D 11	Broadleaved hardwood treeland on lowland and montane hill slopes	3%
E 13	Lowland small-leaved scrub on hill slopes	2%
F 17	Short tussockland on lowland and montane hill slopes	5%
F 18	Pasture on lowland and montane moist hill slopes	15%
F 19	Fernland on lowland and montane hill slopes	2%
F 24	Native open shrubland on lowland and montane hill slopes	4%
G 27	Freshwater lowland and montane flush	< 1%

Topography: Gullies, east-facing bushy valley side, and along stream, of long, narrow valley. The defined area ranges from about 80 to 550 m. At about 160 m the stream descends a fine waterfall in beautiful bush.

Plants: All four of the common Peninsula podocarps - mataī, kahikatea, lowland tōtara and thin-bark tōtara - are represented by numerous scattered and grouped adults and by sparse to abundant regeneration. Among diverse mixed hardwoods, several southern limit species are common, including pigeonwood, tītoki, kawakawa, and akeake. Also of note are: cabbage tree (common), *Scandia geniculata*, *Hebe strictissima* (regional endemic), leafless lawyer, *Cheilanthes humilis*, *Cyathea dealbata* (common), small-leaved milk tree, *Dicksonia squarrosa*, *Hydrocotyle elongata*, *Lophomyrtus obcordata* (common), *Tmesipteris* aff. *elongata*, *Rumohra adiantiformis*, *Microlaena polynoda*, *Fuchsia perscandens*, *Blechnum colensoi*, *Gunnera monoica*, *Linum monogynum*, *Cyathea smithii*, and *Leptopteris hymenophylloides*.

The altitudinal range crosses the lowland/montane boundary, with the transition marked by, among other things, the change from lowland fivefinger to mountain fivefinger, lowland tōtara to thin-bark tōtara, and from sparse horopito to abundant horopito.

Wildlife: Bellbirds (lots), fantails, etc.

Weeds: *Sycamore (of concern), *ash (also of concern), *broom (sparse). A naturalised species of interest but not a known threat, is the fern **Cystopteris fragilis*, locally common around 100 m.

Notes: Some of the bush interior is virtually ungrazed, other places are severely eaten out by stock. The survival of so many podocarps and the vigorous regeneration of the forest along such a substantial stretch of valley, with a wide range of species, some of them uncommon, would make fencing something like the defined area a big conservation gain.

Akaroa RAP 6 - Devils Gap extension

Area: c. 200 ha

Grid Ref. centre: N 37 960 086

Access: Gap Road. Peraki Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	2%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	15%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	50%
D 11	Broadleaved hardwood treeland on lowland hill slopes	1%
D 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	1%
E 14	Montane mixed scrub on hill slopes	< 1%
F 17	Short tussockland on lowland and montane hill slopes	15%
F 18	Pasture on lowland and montane moist hill slopes	6%
F 19	Fermland on lowland and montane hill slopes	4%
F 20	Snow tussock tall tussockland and tall tussock-shrubland on montane hill slopes	1%
F 24	Native open shrubland on lowland and montane hill slopes	1%
F 25	Exotic gorse shrubland on lowland and montane hill slopes	< 1%
H 31	Exotic gorse scrub on lowland and montane hill slopes	1%
J 38	Scattered plants on montane rock	1%

Topography: Dominated by the imposing twin-topped and cliffed peak of Devils Gap, 735 m, with tussocky spurs falling away into the deep Peraki Valley down largely bushy slopes and gullies. There are waterfalls and strong-flowing streams. The lowest part of the defined area is at about 60 m altitude. Devils Gap is a ruggedly eroded volcanic dome.

Plants: There is a marvellously close juxtaposition of lowland and montane species so that, for example, kawakawa almost meets snow tussock and *Dracophyllum*. Among numerous species of note are: *Chionochloa rigida*, *Dracophyllum acerosum*, the moss *Rhacocarpus purpurascens*, *Brachyglottis lagopus*, *Wahlenbergia albomarginata*, *Grammitis poeppigiana*, *Hymenophyllum minimum*, *Hebe strictissima* (regional endemic), *H. lavaudiana* (regional endemic), *Gingidia montana*, *Mentha cunninghamii*, *Carex wakatipu*, toetoe, both *Phormium tenax* and *P. cookianum*, *Celmisia gracilentia*, small-leaved milk tree, *Lophomyrtus obcordata*, *Cyathea dealbata*, *Dicksonia squarrosa*, pigeonwood, native passion wine, fītoki, lowland tōtara, thin-bark tōtara, mataī, kahikatea, akeake (*Dodonaea*), *Cyathodes juniperina*, *Gunnera monoica*, *Gaultheria depressa*, *Poa colensoi*, the moss *Racomitrium lanuginosum*, and *Aciphylla aurea*. The rocky summit is rich in lichens.

Wildlife: Wood pigeons, bellbirds, tomtits, grey warblers, fantails, silvereyes, harriers, pipits, eels.

Weeds: **Clematis vitalba*, *gorse, **Pinus radiata*, *ragwort, *elderberry.

Notes: The Devils Gap area is so rich scenically and biologically that any extensions to the existing reserve (see Akaroa PNA 9) would be very worthwhile. Two biologically disastrous events occurred during the 1980s - goats were released on to the Devils Gap cliffs, and the excellent *Dracophyllum/Chionochloa* shrublands on the SE flank of Devils Gap were extensively burned, thus destroying the *Dracophyllum* and increasing the gorse there.

Detailed report: Wilson, Hugh D. 1985: Comments on west side of Peraki Bay Valley in relation to possible reserve extensions. Banks Peninsula Botanical Survey unpublished report, on file.

Akaroa RAP 7 - Robin Hood Valley**Area:** c. 60 ha**Grid Ref. centre:** N 37 950 075**Access:** Harrisons Road. Robin Hood Bay Road.**Ecological classes:**

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	35%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
E 13	Lowland small-leaved scrub on hill slopes	4%
F 17	Short tussockland on lowland hill slopes	5%
F 18	Pasture on lowland hill slopes	15%
F 19	Fernland on lowland hill slopes	20%
F 24	Native open shrubland on lowland hill slopes	10%
J 37	Scattered plants on lowland rock	< 1%

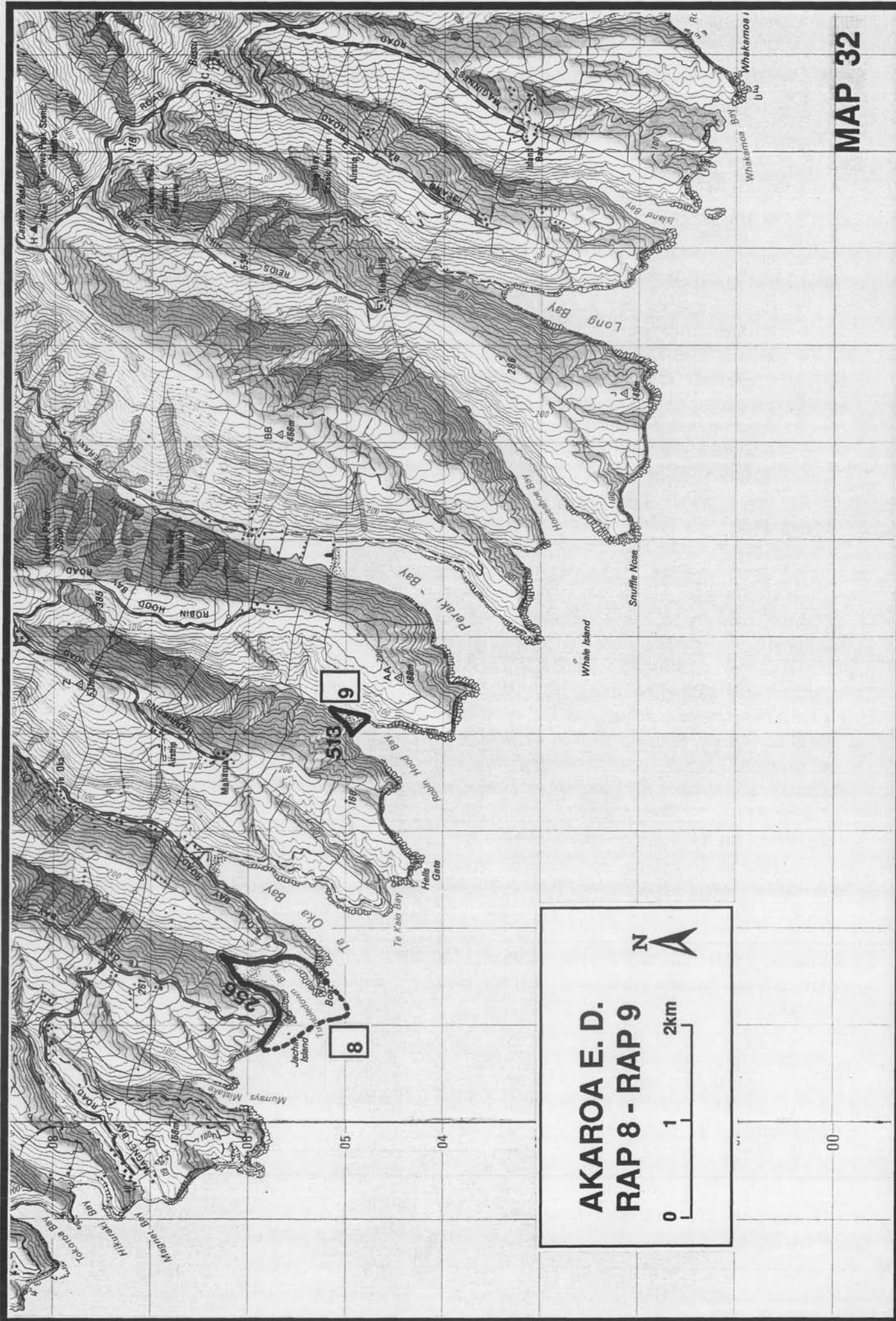
Topography: Small, deep, narrow valley, forking into two gullies at head; gorge-like in places along stream, with two beautiful waterfalls at about 240 m. Altitudinal range of defined area is from about 100 m to 500 m.

Plants: A single young tree of mamaku tree fern (*Cyathea medullaris*) occurs at 100 m. Other species of particular note are: *Cyathea dealbata*, *Dicksonia squarrosa*, lowland tōtara (one big adult), mataī (a few adults and adolescents), *Carex secta*, ngaio, *Clematis paniculata*, kawakawa, pigeonwood, akeake (abundant in lower part of valley), *Lophomyrtus obcordata*, *Hebe strictissima* (regional endemic), fierce lancewood (and also common lancewood), *Cheilanthes humilis*, *Anogramma leptophylla*, *Carex solandri*, leafless lawyer, prostrate kōwhai, and *Scandia geniculata*.

Wildlife: Bellbirds, fantails, grey warblers, *redpolls.

Weeds: **Pinus radiata*, **Hieracium pilosella*, **Lychnis coronaria*.

Notes: The steepness of the terrain gives this rather remarkable, bushy, gorge-like valley considerable natural protection, but stock easily penetrate at the lower end, and goats would be a disaster. This is the westernmost locality for mamaku tree fern in the District and Region.



Akaroa RAP 8 - Tumbledown Bay**Area:** c. 20 ha**Grid Ref. centre:** N 37 915 059**Access:** Te Oka Bay Road.**Ecological classes:**

F 16	Coastal tussockland on sand dunes	5%
F 18	Pasture on coastal droughty hill slopes	40%
F 24	Native open shrubland on coastal hill slopes	15%
G 27	Freshwater lowland emergent aquatic vegetation	1%
G 28	Freshwater lowland submerged or floating aquatic vegetation	1%
G 30	Algal communities on intertidal rocks	8%
J 36	Scattered plants on coastal rocks	15%
K 39	Scattered plants on sandy coastal beaches and dunes	15%

Topography: Small bay with cliffed headlands, a prominent sea stack at each headland, and a sandy beach backed by dunes and a small stream. The western cliffs are about 100 m high.

Plants: This is the only significant population of pīngao (*Desmoschoenus spiralis* - a nationally vulnerable species) in the District and the Region, although neighbouring Kaitorete has a large population. Tumbledown Bay has both pīngao and *marram, which has outcompeted pīngao on many New Zealand dunes. At the time of survey, in December 1986, the area of marram, on the front dune slopes, was about one quarter the area of pīngao. Other vascular species of note are: *Carex pumila*, *Asplenium terrestre* subsp. *maritimum*, *Elymus rectisetus* (broad blue native race), *Calystegia soldanella*, *Ranunculus acaulis*, *Schoenoplectus pungens*, toetoe, *Potamogeton cheesemanii*, *Eleocharis acuta* and *Carex virgata*. The droughty pasture largely comprises the native grasses *Microlaena stipoides* and *Rytidosperma clavatum*.

Wildlife: Spotted shags breed on the cliffs. Also noted were red-billed gulls, spur-winged plovers, welcome swallows, and skinks.

Weeds: *Marram is the most serious. **Lagurus ovatus* is abundant, also *brome and *cocksfoot, *barley grass, and *horned poppy. **Ranunculus trichophyllus* grows in the stream.

Notes: The pīngao and the setting are so special that *marram control should be considered. Most of the defined area would be covered by the publicly owned land along the coast. The bay is popular with the public, and, as far as I know, public access has never been a problem.

Akaroa RAP 9 - Robin Hood Bay

Area: c. 3 ha

Grid Ref. centre: N 37 942 050

Access: Private land.

Ecological classes:

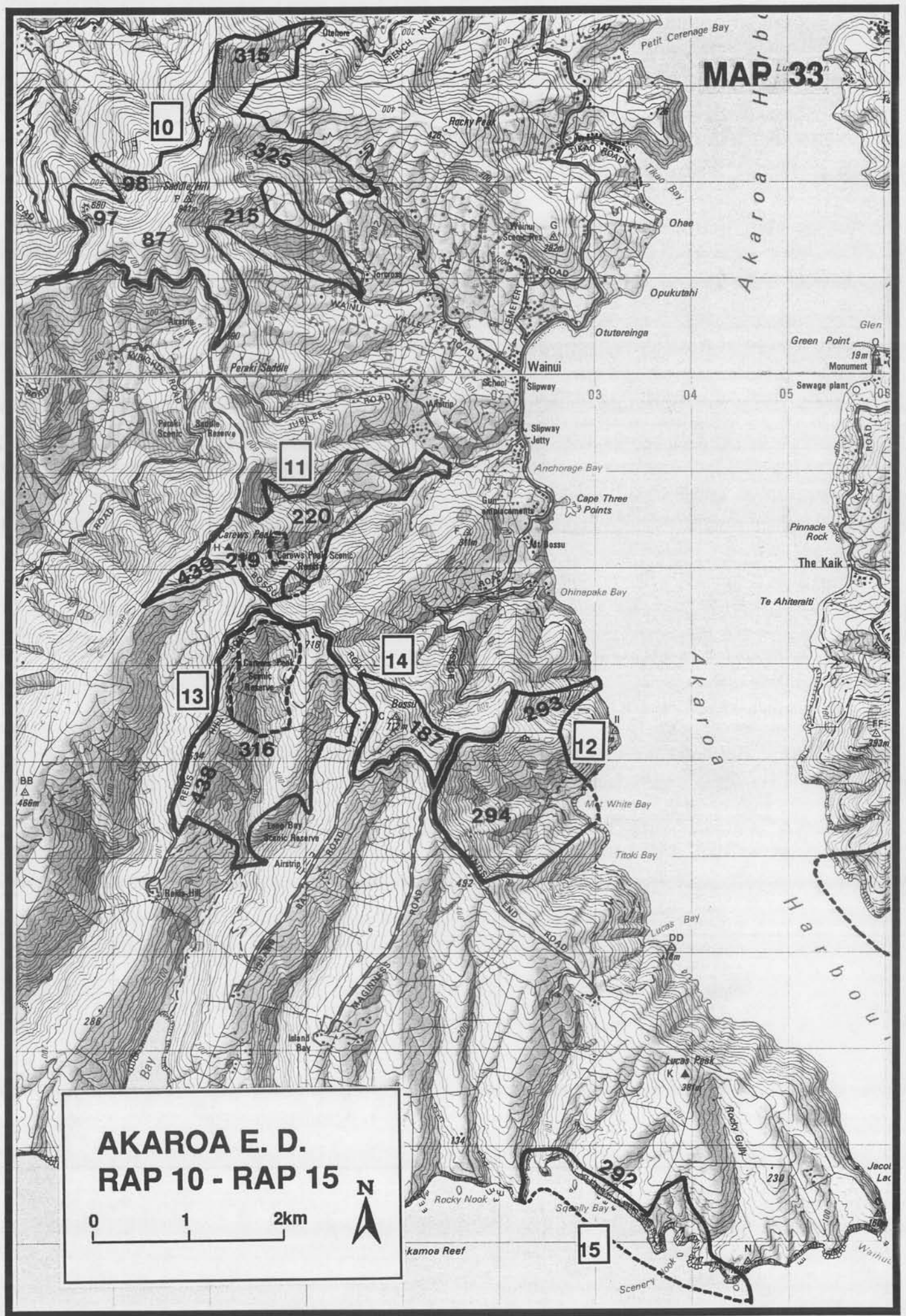
F 15	Coastal tussockland and open tussock-shrubland on cliffs and banks	5%
F 16	Coastal tussockland on sand dunes	5%
G 27	Freshwater lowland swamp and emergent aquatic vegetation	20%
G 28	Freshwater lowland submerged or floating aquatic vegetation	10%
G 30	Algal communities on intertidal rocks	< 1%
K 39	Scattered plants on sandy coastal beach	60%

Topography: Small sandy beach at the head of a small bay, with stream mouth, and backed by a small wetland on a flat valley floor.

Plants: The area of flat sedgeland on the valley floor with the stream passing through the middle has dense *Carex virgata* tussockland with *Carex secta*, lowland flax, *Juncus gregiflorus*, *Carex geminata*, *Hydrocotyle novae-zelandiae*, toetoe and cabbage trees. Species of note on the beach and coastal banks include: *Senecio carnosulus*, *Samolus repens*, *Leptinella dioica*, *Disphyma australe*, *Asplenium lyallii*, *Isolepis cernua*, *Apium prostratum*, *Sarcocornia quinqueflora*, *Calystegia soldanella*, and coastal lichens. At the stream mouth there is *Schoenoplectus pungens* and *Potamogeton cheesemanii*.

Wildlife: Noted on the survey were red-billed gulls, black-backed gulls, spur-winged plovers, and *Canada geese.

Weeds: *Marram, *horned poppy, *monkey musk, *watercress, **Ranunculus trichophyllus*.



Akaroa RAP 10 - Saddle Hill

Area: c. 320 ha

Grid Ref. centre: N 36 988 119

Access: Bossu Road.

Ecological classes:

A 2	Surviving mature mataī and kahikatea over second-growth hardwoods on lowland hill slopes	< 1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	3%
B 5	Black beech forest on montane hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	12%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
E 14	Montane mixed scrub on hill slopes	4%
F 17	Short tussockland on montane hill slopes	30%
F 18	Pasture on lowland and montane moist hill slopes	20%
F 19	Fernland on lowland and montane hill slopes	4%
F 20	Snow tussock tall tussockland and tall tussock-shrubland on montane hill slopes	1%
F 22	Toetoe tussockland on montane hill slopes	< 1%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	4%
F 26	Mossfield on montane hill slopes	< 1%
G 27	Freshwater montane flush vegetation	< 1%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	< 1%
J 38	Scattered plants on montane rock	< 1%

Topography: Saddle hill, 841 m, is the highest summit in Akaroa Ecological District. The defined area takes in the summit ridges of the imposing massif, plus gullies and spurs radiating out from them, falling to about 160 m towards Wainui. It also takes in some imposing rock outcrops, including Coffin Rock and Pulpit Rock which are trachyte lava domes of the late stages of Akaroa Volcano. Several permanent streams drain variously into the Ōkuti Valley, Peraki Valley, and the Akaroa Harbour basin by way of Wainui and French Farm.

Plants: Black beech, including some very large adults plus regeneration and totalling around 50 or 60 trees, represent the only natural occurrence of beech west of Akaroa Harbour within Banks Ecological Region. The whole area is botanically rich and includes many species of particular note, among which are: *Chionochloa rigida*, *Dracophyllum acerosum*, *Hebe laudiana* (regional endemic), *H. strictissima* (regional endemic), *Brachyglottis lagopus*, *Fuchsia perscandens*, *Celmisia gracilentia*, *Aciphylla subflabellata*, *A. aurea*, *Wahlenbergia albomarginata*, *Ourisia lactea*, *Gunnera monoica*, *Ranunculus foliosus*, *R. multiscapus*, *Kelleria dieffenbachii*, *Stackhousia minima*, *Gaultheria depressa* var. *novae-zelandiae*, *Scleranthus brockiei*, *Cyathea colensoi*, *Muehlenbeckia axillaris* (very rare in District),

Nertera setulosa, the moss *Racomitrium lanuginosum*, and *Raoulia subsericea*. Most of these are part of an upper montane flora of Akaroa District particularly well represented here. In the forest and scrub the outstanding rarity is a large population of *Sticherus cunninghamii*, umbrella fern, covering more than 100 square metres of steep forest floor at about 700 m. This is the only known occurrence of the species in Akaroa District, and one of only three occurrences in Banks Region. Other forest species of note include filmy ferns (*Hymenophyllum multifidum*, *H. sanguinolentum*, *H. rarum*), abundant tree ferns (*Cyathea smithii*, *C. dealbata*, *Dicksonia squarrosa*), a diversity of ground ferns including *Blechnum colensoi*, *Leptopteris hymenophylloides*, *Leptolepia novae-zelandiae*, plus trees: kahikatea, mataī, thin-bark tōtara, lowland tōtara, pigeonwood, *Cordyline indivisa*, and a great diversity of common hardwood species. Further shrubby, climbing and herbaceous species of note are: *Cyathodes juniperina*, *Earina autumnalis*, native passion vine and *Clematis paniculata*.

Pulpit Rock is outstanding for its wealth of lichens and for the moss *Grimmia laevigata* on otherwise bare trachyte.

Wildlife: Bellbirds, brown creepers, grey warblers, fantails, wood pigeons, skinks.

Weeds: **Hieracium pilosella*, **H. praealtum*, **Pinus radiata*, *elderberry, **Tropaeolum speciosum*, *gorse.

Notes: This is a substantial area to recommend for protection, but it is very high in landscape, biological and geological values. At the very least it should be safeguarded against goats, fire, and the spread of wilding pines. If exclusion of stock were ever possible, the conservation gain would be considerable. Meanwhile, the steepness of the terrain means that virtually all species of plant currently present should persist. The most obviously vulnerable is *Cordyline indivisa*; the only individual noted seemed severely debilitated by possum browsing.

Akaroa RAP 11 - Carews Peak

Area: c. 120 ha

Grid Ref. centre: N 37 000 083

Access: Bossu Road, also comes close to lower Jubilee Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	2%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	20%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	6%
D 11	Broadleaved hardwood treeland on lowland hill slopes	< 1%
F 17	Short tussockland on lowland and montane hill slopes	10%
F 18	Pasture on lowland and montane moist hill slopes	30%
F 19	Fernland on lowland and montane hill slopes	15%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	10%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrublands on lowland and montane hill slopes	3%
G 27	Freshwater lowland and montane marsh, swamp, flush and emergent aquatic vegetation	3%
G 28	Freshwater lowland submerged or floating aquatic vegetation	< 1%
J 38	Scattered plants on montane rock	< 1%

Topography: Summit area of Carews Peak, 794 m, the high snow tussocky spur projecting SW from the summit, and steep gullies and spurs falling ENE towards Wainui into a small basin with wetland vegetation and incised stream gullies. The lowest point of the defined area is at about 100 m.

Plants: This is the only known locality for *Sphagnum* on Banks Peninsula, and one of only two known localities for the montane dwarf heath *Pentachondra pumila*. It is also a good locality for *Tmesipteris* aff. *elongata* which is common on *Dicksonia squarrosa* trunks at around 230 m. Other species of note include *Chionochloa rigida*, *Hebe lavaudiana* (regional endemic), *Brachyglottis lagopus*, *Celmisia gracilentia*, *Coprosma acerosa* (very rare in Region, and this the only known montane site, at 710 m), *Acaena casesiiglauca*, *Aciphylla aurea*, *A. subflabellata*, *Ranunculus foliosus*, *Scleranthus brockiei*, *Gaultheria depressa* var. *novae-zelandiae*, *Olearia bullata*, *Dracophyllum acerosum*, *Gingidia montana*, *Gunnera monoica*, thin-bark tōtara, mataī, kahikatea, *Cyathea smithii*, *C. dealbata*, *Leptopteris hymenophylloides*, *Trichomanes venosum*, *Eleocharis acuta*, *Azolla filiculoides*, *Ranunculus macropus*, *Centella uniflora* and *Ourisia lactea*.

There are impressively vigorous stands of the common lacebark *Hoheria angustifolia* in the wetland area.

Wildlife: Common bush birds, pipits, harriers.

Weeds: **Hieracium pilosella*, *monkey musk, *elderberry, *gorse (invading snow tussock).

Notes: The wetland area with its *Sphagnum*, and its adjacent tree-fern-filled incised gullies with *Tmesipteris*, is unique in the Region. Linked with the high summit behind it makes an area of great interest and value. The bush areas are damaged by stock, and possums, and gorse is invading the snow tussock, so there are management problems if it ever were to be managed for conservation values. Cattle would seriously damage the wetland area. Goats would be a disaster throughout.

Akaroa RAP 12 - Mat White

Area: c. 150 ha

Grid Ref. centre: N 37 022 057

Access: Bossu Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	26%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	26%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	5%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	< 1%
F 17	Short tussockland on lowland hill slopes	20%
F 18	Pasture on lowland hill slopes	15%
F 19	Fernland on lowland hill slopes	3%
F 23	Holy grass grassland on coastal and lowland hill slopes	< 1%
F 24	Native open shrubland on coastal and lowland hill slopes	2%
G 30	Algal communities on intertidal rocks	< 1%
J 36	Scattered plants on coastal rock	< 1%
J 37	Scattered plants on lowland rock	< 1%

Topography: One large basin-like valley and one small, falling to the sea within Akaroa Harbour, the altitudinal range from 0 m to about 550 m. Within the larger basin are numerous small gullies. The final drop to the sea is steep, and a prominent spur with a steep rock outcrop separates the two main valleys.

Plants: A population of about 20 mamaku tree ferns is an outstanding feature of the smaller valley. While most of the extensive bush is second-growth, a few large podocarps survive (mataī, lowland tōtara and kahikatea), and mataī has abundant regeneration. Other species of particular note are akeake, kawakawa, tītiki, pigeonwood, velvet fern, small-leaved milk tree, *Lophomyrtus obcordata*, leafless lawyer, *Hebe strictissima* (regional endemic), *Scandia geniculata*, *Cyathea dealbata*, *Carex secta*, adult and regenerating cabbage trees, *Carex solandri*, *Asplenium oblongifolium*, *Linum monogynum*, *Lobelia anceps*, *Dicksonia squarrosa*, *Blechnum colensoi*, *Brachyglottis lagopus*, *Cyathea smithii*, *Leptopteris hymeophylloides*, *Lastreopsis hispida*, *Aciphylla subflabellata* and *Olearia ilicifolia*. Thin-bark tōtara occurs sparingly at the upper levels.

Wildlife: Wood pigeons, bellbirds, fantails, white-flipped blue penguins and other seabirds.

Weeds: *Elderberry, *Himalayan honeysuckle, *gorse, **Pinus radiata*, *hemlock, *variegated thistle.

Notes: The area provides a remarkable opportunity to protect and regenerate a whole lowland forest sequence from coast to the edge of the montane zone in a relatively compact area, and also to protect a good but declining population of mamaku, which is a rare and spectacular species in the Region and within the whole of Canterbury. Unfortunately goats have been run here from the late 1980s and have inflicted considerable damage on botanical values. Also a large area of kānuka has been cleared above Mat White Bay since my field work in 1985 to 1988.

Akaroa RAP 13 - Long Bay

Area: c. 150 ha

Grid Ref. centre: N 37 995 060

Access: Bossu Road, Reids Hill Road, Island Bay Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	2%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	15%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	22%
E 13	Lowland small-leaved scrub on hill slopes	5%
E 14	Montane mixed scrub on hill slopes	5%
F 17	Short tussockland on lowland and montane hill slopes	15%
F 18	Pasture on lowland and montane moist hill slopes	10%
F 19	Fernland on lowland and montane hill slopes	3%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	1%
F 22	Toetoe tussockland on lowland hill slopes	1%
F 24	Native open shrubland on lowland and montane hill slopes	20%
F 25	Exotic open shrubland on montane hill slopes	< 1%
G 27	Fresh water lowland and montane flush vegetation	< 1%
J 37	Scattered plants on lowland rock	< 1%

Topography: Two deep, bushy valleys, joining at the lowest part of the defined area, and separated by a prominent tussocky and shrubby spur; the defined area also runs up to the crest of the ridge bounding the larger valley to the west. The altitudinal range is from about 100 m just below the junction of the two streams, to 716 m.

Plants: The area is rich in forest, shrubland and tussockland species, with small areas of dry lowland bluffs adding another element. Species of particular note include: nīkau palm, at c. 200 m, thin-bark tōtara, lowland tōtara, mataī, kahikatea, *Cyathea dealbata*, *C. smithii*, *C. colensoi*, *Dicksonia squarrosa*, *Leptopteris hymenophylloides*, *Mentha cunninghamii*, *Gunnera monoica*, *Scleranthus brockiei*, *Aciphylla subflabellata*, *Lophomyrtus obcordata*, *Clematis paniculata*, kawakawa, pigeonwood, the mistletoe *Ileostylus micranthus*, akeake, fierce lancewood, tītoki, *Chionochloa rigida*, *Ourisia lactea*, *Viola filicaulis*, *Gunnera monoica*, *Aciphylla aurea*, *Brachyscome sinclairii*, abundant *Ophioglossum coriaceum*, *Brachyglottis lagopus*, *Carex solandri*, *Cheilanthes humilis*, *Korthalsella lindsayi*, *Solanum aviculare*, and *Olearia ilicifolia*.

Wildlife: Wood pigeons, bellbirds, harriers, grey warblers, *skylarks.

Weeds: **Clematis vitalba* (very sparse), *gorse (very sparse), *broom (very sparse), **Hieracium pilosella*, **Pinus radiata*, *male fern.

Notes: The defined area links up two outstanding existing reserves (Akaroa PNA 10, Long Bay Scenic Reserve, and Akaroa PNA 11, Carews Peak Scenic Reserve) by adding in more significant forest and some vigorous forest regeneration on marginal land. It should be noted that Carews Peak Scenic Reserve was expanded recently due to the generosity of one of the local landowners.

Akaroa RAP 14 - Bossu

Area: c. 50 ha

Grid Ref. centre: N 37 009 065

Access: Bossu Road.

Ecological classes:

E 14	Montane mixed scrub on hill slopes	10%
F 17	Short tussockland on montane hill slopes	40%
F 18	Pasture on montane moist hill slopes	5%
F 19	Fernland on montane hill slopes	1%
F 20	Snow tussock tall tussockland and tall tussock-shrubland on montane hill slopes	8%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on montane hill slopes	35%
J 38	Scattered plants on montane rock	1%

Topography: Summit area of Mount Bossu, from about 500 m to 712 m, with tussocky ridges, steep slopes of shrubland, scrub and tussock, and lines of bluffs.

Plants: Of special note are *Chionochloa rigida*, *Festuca novae-zelandiae*, *Poa cita*, *Dracophyllum acerosum*, *Brachyglottis lagopus*, *Gunnera monoica*, *Scleranthus brockiei*, *Hymenophyllum villosum*, *Grammitis poeppigiana*, *Hymenophyllum minimum*, *H. multifidum*, *Hebe lavaudiana* (regional endemic), *Aciphylla aurea*, *Hebe strictissima* (regional endemic), *Ranunculus foliosus*, *Mentha cunninghamii*, *Kelleria dieffenbachii*, *Gaultheria depressa* var. *novae-zelandiae*, *Lycopodium varium*, the lichen *Neuropogon ciliatus* and *Corybas macranthus*. There is considerable regeneration of thin-bark tōtara and broadleaf, and *Coprosma* sp. 't' is abundant. The area is rich in bryophytes.

Weeds: *Gorse (sparse).

Notes: Bossu is a distinctive, imposing landmark, and has an interesting montane flora damaged by farm stock, including goats. Exclusion of stock would speed the return of montane scrub and forest, leaving snow tussock and snow tussock-shrubland on the bluffs.

Akaroa RAP 15 - Scenery Nook**Area:** c. 45 ha**Grid Ref. centre:** N 37 035 013**Access:** Private land (from Lands End Road); the area is magnificently viewable from the sea.**Ecological classes:**

F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	5 %
F 17	Short tussockland on lowland hill slopes	5 %
F 18	Pasture on lowland droughty hill slopes	50 %
F 24	Native open shrubland on coastal and lowland hill slopes	2 %
G 30	Algal communities on intertidal rocks	10 %
J 36	Scattered plants on coastal rock	26 %
K 39	Scattered plants on stony and bouldery coastal beaches	2 %

Topography: A very wild, cliffed coast, backed by droughty slopes of pasture with some silver tussock. The landform and geology are the chief reasons for identifying this area as worthy of protection. At Scenery Nook, a superb cross-section through a Strombolean cinder cone is preserved in 200 m sea cliffs (Weaver *et al.* 1985).

Plants: A seaweed, *Xiphophora chondrophylla* occurs on the intertidal rocks. It does not appear to be common around Banks Peninsula. Coastal silver tussockland on steep slopes appears to be a natural tussock-dominated community. Other terrestrial species of note are: *Blechnum banksii*, *Lobelia anceps*, *Sarcocornia quinqueflora*, abundant *Disphyma australe* and other common coastal plants, *Festuca* 'Banks Peninsula blue tussock', *Asplenium obtusatum*, *Senecio glaucophyllus* subsp. *basinudus*, *Crassula moschata*, *Linum monogynum*, *Lachnagrostis richardii*, *Carex secta*, *Cyperus ustulatus* (at extreme southern limit) and *Adiantum cunninghamii*.

Wildlife: Spotted shags, red-billed gulls, black-backed gulls, white-fronted terns, white-flippered blue penguins, fur seals.

Notes: Māori middens are evident under overhangs. This is the southernmost extremity of Banks Peninsula. Most of the RAP comes within the publicly owned land along the coast and is anyway naturally fairly well-protected by its steepness and isolation.

AKAROA E. D. RAP 16 - RAP 21

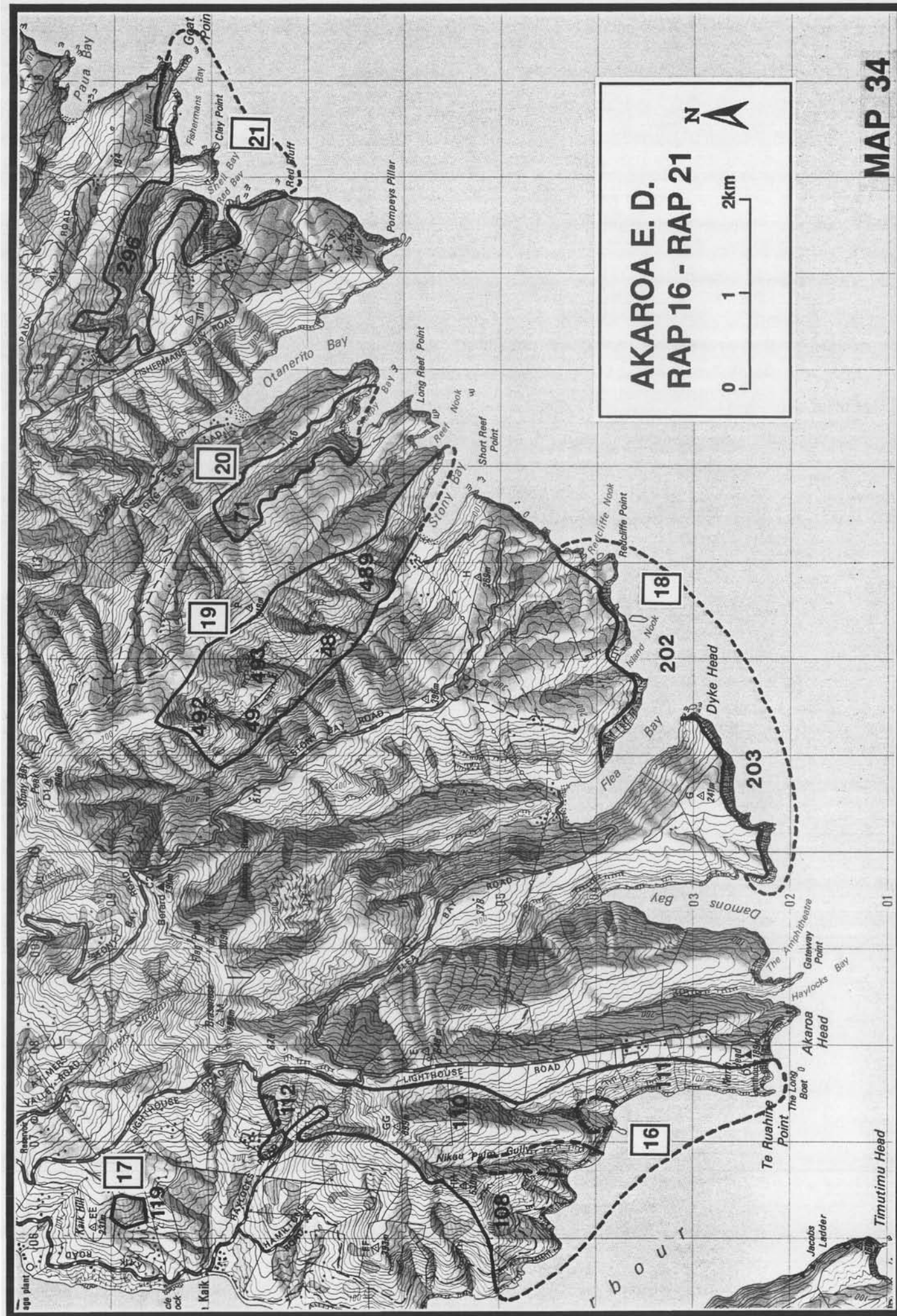


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MAP 34



Akaroa RAP 16 - Nīkau**Area:** c. 340 ha**Grid Ref. centre:** N 37 070 055**Access:** Private land, from the Kaik, or off Lighthouse Road.**Ecological classes:**

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	< 1%
B 4	Red beech forest on upper lowland hill slopes	1%
B 5	Black beech forest on upper lowland hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	14%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	1%
D 11	Broadleaved hardwood treeland on lowland and montane hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	< 1%
E 13	Lowland small-leaved scrub on hill slopes	10%
E 14	Montane mixed scrub on hill slopes	2%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	< 1%
F 17	Short tussockland on lowland and montane hill slopes	6%
F 18	Pasture on lowland and montane hill slopes	12%
F 19	Fernland on lowland and montane hill slopes	6%
F 21	Lowland flaxland on hill slopes	%
F 23	Holy grass grassland on coastal, lowland and montane hill slopes	< 1%
F 24	Native open shrubland on coastal, lowland and montane hill slopes	20%
G 27	Freshwater lowland and montane flush vegetation	< 1%
G 30	Algal communities on intertidal rocks	1%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	< 1%
I 33	Coniferous plantation on montane hill slopes	< 1%
J 36	Scattered plants on coastal rock	2%
J 37	Scattered plants on lowland rock	< 1%
J 38	Scattered plants on montane rock	< 1%
K 39	Scattered plants on stony and bouldery coastal beaches	< 1%

Topography: Dramatic landscape of coastal cliffs, steep hillsides and gullies, rising from 0 m to 699 m on Trig GG, with rock outcropping in many places. There are small streams and waterfalls.

Plants: There is an extraordinary juxtaposition of species such as beech and nīkau palm, with several species at their southern limit of natural distribution (nīkau, kawakawa, tītoki, akeake, pigeonwood, native passion vine, and *Solanum aviculare*). Several Banks Region

endemics grow here (*Hebe strictissima*, *H. lavaudiana*, *Celmisia mackau*, *Festuca* 'Banks Peninsula blue tussock', *Wahlenbergia* 'Akaroa Heads' and *Myosotis australis* var. *lytteltonensis*). Among numerous other species of particular note are: *Scandia geniculata*, *Brachyglottis lagopus*, *Earina autumnalis*, *Echinopogon ovatus*, *Ileostylus micranthus*, *Clematis afoliata*, abundant *Corokia cotoneaster*, abundant *Craspedia minor*, *Dicksonia squarrosa*, *Carex solandri*, leafless lawyer, matai, kahikatea, lowland tōtara, thin-bark tōtara, *Cyathea dealbata*, *C. smithii*, *Blechnum colensoi*, *Leptopteris hymenophylloides*, *Chionochloa rigida*, *Ranunculus foliosus*, *Gaultheria depressa* var. *novae-zelandiae*, *Aciphylla subflabellata*, lowland and mountain flax growing side by side, *Sonchus kirkii*, *Crassula moschata*, *Poa astonii*, *Asplenium oblongifolium*, *Schoenus pauciflorus*, *Rytidosperma corinum*, *Asplenium lyallii*, *Blechnum banksii*, *Tetragonia trigyna*, *Senecio carnosulus*, *S. glaucophyllus* subsp. *basinudus*, prostrate kōwhai, *Lobelia anceps*, *Chiloglottis cornuta*, *Lastreopsis glabella*, *Lophomyrtus obcordata*, *Clematis paniculata*.

The beech below the top of Haylocks Road is among the lowest altitude occurrence on Banks Peninsula. Both species mix with kawakawa, *Cyathea dealbata*, lowland fivefinger, pigeonwood, native passion vine, matai and kahikatea at 130 m.

Dan Rogers Gully falls steeply towards the sea; in about 2.3 km the native vegetation changes from snow tussock and thin-bark tōtara, through beech, down through excellent second-growth mixed hardwood forest, to akeake, nīkau palm, and coastal *Blechnum banksii* and *Crassula moschata*.

Wildlife: Large spotted shag colonies and other seabirds; wood pigeons, bellbirds, fantails, brown creepers, grey warblers; fur seals. Hector's dolphins come close to shore here.

Weeds: *Gorse (sparse and local), **Berberis darwinii* (rare and local but of some concern), *hemlock, *elderberry, **Hieracium pilosella*, *variegated thistle, *sweet brier (very sparse), **Pinus radiata* (both wildings and a small stand planted near Trig GG, at head of the Dan Rogers Gully), *male fern.

Notes: The area is extraordinary. Boundaries of the recommended area are only suggestions; it may be that the portion north of Trig GG should be excluded; much kānuka has been cleared here for pasture. If so, however, the extension of the Haylocks' privately protected bush gully (Akaroa PNA 37) down below the road would be worth consideration, and also certainly the fine stand of black beech on the rocky knoll at about 500 m.

There are sites of historical interest within the area. Trig GG was the location of an ancient Māori observation pā called Ōtehore.

"The Banks Peninsula Track" passes through the RAP across the top of Trig GG.

Detailed report: Wilson, Hugh 1986: Botanical notes on Jeff Hamilton's land between the Kaik and Akaroa Heads. Banks Peninsula Botanical Survey unpublished report, on file.

Akaroa RAP 17 - Kaik Hill**Area:** c. 6 ha**Grid Ref. centre:** N 37 063 088**Access:** Private land.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	70%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	30%

[This area is privately protected by the Helps family and is described under Akaroa PNA 36. It is additionally listed here because it is a particularly good remnant of lowland podocarp/hardwood forest and should be considered for legal protection in perpetuity.]

Akaroa RAP 18 - Flea Bay cliffs

Area: c. 30 ha

Grid Ref. centre: N 37 115 034

Access: Private land. Also from the sea.

Ecological classes:

F 15	Coastal tussockland and open tussock shrubland on cliffs	50%
F 18	Pasture on lowland hill slopes	10%
G 27	Freshwater coastal flush	1%
G 30	Algal communities on intertidal rocks	15%
J 36	Scattered plants on coastal rock	24%

Topography: A very dramatic coastline of cliffs up to 200 m high, on either side of the entrance to Flea Bay. These display a wonderful cross-section of successive lava flows of the Akaroa Volcano, truncated by millennia of sea erosion. The cliffs are indented by coves, and three small islets stand off the coast, two of them capped with vegetation. The largest of these is pierced from side to side by a cave which can be seen through from the appropriate point on the adjacent cliff top. The cliffs are vertical to overhanging in many places, and many permanent seepages flow or cascade down them.

Plants: This is a major stronghold of the district endemic *Celmisia mackau* and many hundreds of plants thrive here. The vertical tussockland is dominated by the regional endemic *Festuca* 'Banks Peninsula blue tussock' and is probably little changed since prehistoric times. Other species of note include lowland flax, toetoe, *Asplenium obtusatum*, *Crassula moschata*, *Blechnum banksii*, *Samolus repens*, *Isolepis cernua*, *Scirpoides nodosa*, *Puccinellia stricta*, *Leptinella dioica*, *Apium prostratum*, *Senecio lautus*, *S. glaucophyllus* subsp. *basinudus*, silver tussock, *Coprosma propinqua*, *Hierochloa redolens*, *Adiantum cunninghamii*, *Carex trifida*, *Lobelia anceps*, *Poa* cf. *anceps*, *Asplenium terrestre* subsp. *maritimum*, *Cotula coronopifolia*, abundant *Disphyma australe*, *Linum monogynum*, *Sarcocornia quinqueflora*, *Elymus rectisetus* 'native broad blue race', *Deyeuxia billardierei*, *Luzula banksiana* var. *orina*, *Einadia allanii*, *E. triandra*, *Wahlenbergia* 'Akaroa Heads', *Myosotis australis* var. *lytteltonensis*, and *Crassula sieberiana*. Lichens are common on the bare rock. Bull kelp is abundant in the surge zone at the base of the cliffs.

Wildlife: Fairy prions and spotted shags breed here. White-flipped blue penguins are numerous. Also noted were black-backed gulls, red-billed gulls, white-fronted terns, harriers, and fur seals.

Weeds: A few exotic pasture grasses, clovers and other herbaceous species form a minor element in the vegetation. A weak specimen of *sweet brier was noted.

Notes: Most of this RAP would be included as publicly owned land along the coast, and is anyway highly protected naturally by virtue of its steepness and inaccessibility. It is included as an RAP to draw attention to its outstanding qualities. "The Banks Peninsula Track" follows the edge of the cliffs for a considerable distance so the area is well-utilised for its recreational and inspirational potential. The coast is also very dramatic when seen from the sea.

Akaroa RAP 19 - Stony Bay

Area: c. 240 ha

Grid Ref. centre: N 37 124 069

Access: Stony Bay Road.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	1%
B 4	Red beech forest on montane hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane alluvium and hill slopes	15%
C 7	Kānuka-dominant second-growth hardwood forest on lowland alluvium and hill slopes	20%
D 11	Broadleaved hardwood treeland on lowland alluvium and hill slopes	2%
D 12	Kānuka treeland on lowland alluvium and hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	2%
E 14	Montane mixed scrub on hill slopes	1%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	< 1%
F 17	Short tussockland on montane hill slopes	1%
F 18	Pasture on lowland and montane moist alluvium and hill slopes	8%
F 19	Fernland on lowland and montane hill slopes	3%
F 20	Snow tussock tall tussockland and tall tussock shrubland on upper lowland and montane hill slopes	1%
F 21	Lowland flaxland on hill slopes	< 1%
F 22	Toetoe tussockland on lowland and montane hill slopes	< 1%
F 23	Holy grass grassland on lowland hill slopes	< 1%
F 24	Native open shrubland on coastal and lowland hill slopes	10%
G 27	Freshwater lowland flush vegetation	< 1%
G 30	Algal communities on intertidal rocks	< 1%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	30%
J 36	Scattered plants on coastal rock	< 1%
J 37	Scattered plants on lowland rock	< 1%

Topography: Steep, SW facing, gullied and bluffed side of Stony Bay Valley and Stony Bay, falling to narrow and substantially bushy valley floor. There are streams and waterfalls, and about 700 m of rocky coastline. The altitude range of the defined area is from sea level up to about 640 m.

Plants: The range of habitats and close juxtaposition of montane and warm coastal lowland species is comparable within Banks Region only to Akaroa RAP 16, Nīkau. Stony Bay also has the best population of mamaku (*Cyathea medullaris*) in the Region, with numerous adults and some regeneration. Other species of particular note include nīkau palm (very sparse though), several other species at their southern limit on the east coast (pigeonwood, akeake, tūtoki, kawakawa, *Solanum aviculare*, *Asplenium oblongifolium*), *Hebe strictissima* (regional endemic), abundant tree ferns (*Cyathea dealbata*, *C. smithii*, *Dicksonia squarrosa*),

Lastreopsis hispida, *L. glabella*, a very large population of *Olearia avicenniifolia*, *Chionochloa rigida*, *Brachyglottis lagopus*, thin-bark tōtara, red beech, and numerous adult cabbage trees. Lowland podocarps are not well represented. Only one kahikatea, an adolescent, was noted among kānuka on the valley floor. A solitary red beech tree grows by the stream on the valley floor at about 100 m, but there is a more extensive stand above 500 m in the northern corner of the RAP.

Wildlife: Yellow-eyed penguins, white-flipped blue penguins, seabirds, wood pigeons, bellbirds, fantails, brown creepers, silvereyes, grey warblers, kingfishers, moreporks, paradise ducks.

Weeds: *Gorse (which should be left as a nurse canopy except on the magnificent snow tussock bluff halfway up the Stony Bay Valley, *broom (ditto), *inkweed.

Notes: About one-third of the area is being added to Hinewai Reserve by the Maurice White Native Forest Trust, and its protection in perpetuity is assured. Serious goat damage occurred during the 1980s and the beginning of the 1990s, but at time of writing (December 1991) the last few goats are being removed. Rather frequent burning of *gorse and kānuka between the new Hinewai boundary and the sea continues on Narbey land in an effort to retain pasture. "The Banks Peninsula Track" passes through the SE end of the RAP.

Akaroa RAP 20 - Sleepy Bay**Area:** c. 65 ha**Grid Ref. centre:** N 37 141 071**Access:** Private land. From the sea.**Ecological classes:**

A 2	Mataī/mixed hardwood forest on lowland hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	86%
D 11	Broadleaved hardwood treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	1%
F 18	Pasture on lowland hill slopes	6%
F 24	Native open shrublands on coastal and lowland hill slopes	1%
G 30	Algal communities on intertidal rocks	1%
H 31	Exotic *gorse scrub on coastal and lowland hill slopes	< 1%
J 36	Scattered plants on coastal rock	2%
K 39	Scattered plants on bouldery coastal beach	< 1%

Topography: A small, narrow, continuously bushed valley draining over a 12 m high waterfall just before entering the sea at a small bay. There is another fine waterfall mid-valley. The northern side of the bay, with scrub, shrubland and cliffs, is included in the outlined area. The southern headland, although not included in this RAP, is a major feature of the locality, being an immense sea arch. The defined boundaries of the RAP follow the bush edge as closely as possible to exclude the adjacent clean pasture. Altitudinal range is from sea level to about 240 m.

Plants: The bush canopy is almost entirely diverse second-growth hardwoods, but there are some sizeable remnant mataī. Some huge shining broadleaf on the steep bush slopes around the waterfall are an important botanical feature of the bay; the species is at its southern limit in the District. Other southern limit species are nīkau palm, pigeonwood, akeake, kawakawa, titoki, *Asplenium oblongifolium* and *Solanum aviculare*. Further species of note include: *Cyathea dealbata*, *C. smithii*, *Adiantum cunninghamii*, *Craspedia minor*, *Aciphylla subflabellata*, *Daucus glochidiatus*, small-leaved milk tree, *Lastreopsis glabella*, *Lophomyrtus obcordata* and *Hebe strictissima* (regional endemic). Supplejack is abundant. Most of the forest interior is severely eaten out by stock.

Wildlife: Fur seals, black-backed gulls, spotted shags, grey ducks, *mallards, *domestic geese, welcome swallows, *finches.

Weeds: *Gorse (local), *horehound.

Notes: The area is closely associated with the ransacking of the adjacent Parakākāriki Pā by the Ngai Tahu around 1700. The bay and waterfall are a very attractive feature on "The Banks Peninsula Track". Burning of local patches of gorse within the RAP area continues up to the time of writing, in efforts by the landowner to maintain pasture. The bush interior would respond beautifully if it were ever possible to exclude farm stock and goats, remove any risk of fire, and control possums which seem to be present in moderate numbers. A few goats remain in the vicinity (four were noted at Sleepy Bay on 7 June 1990).

Akaroa RAP 21 - Fishermans Bay

Area: c. 100 ha

Grid Ref. centre: N 37 170 082

Access: Private land, off Fishermans Bay Road.

Ecological classes:

A 2	Mataī/mixed hardwood forest on montane hill slopes (fragmentary)	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	30%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	28%
D 11	Broadleaved hardwood treeland on lowland hill slopes	3%
D 12	Kānuka treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	2%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	2%
F 17	Short tussockland on lowland hill slopes	< 1%
F 18	Pasture on lowland moist and droughty hill slopes	15%
F 19	Fernland on lowland hill slopes	1%
F 21	Lowland flaxland on hill slopes	< 1%
F 22	Toetoe tussockland on lowland hill slopes	< 1%
F 24	Native open shrubland on coastal and lowland hill slopes	2%
G 27	Freshwater lowland flush vegetation	< 1%
G 30	Algal communities on intertidal rocks	2%
H 31	Exotic *gorse scrub on lowland hill slopes	10%
J 36	Scattered plants on coastal rock	1%
J 37	Scattered plants on lowland rock	1%
K 39	Scattered plants on sandy and bouldery coastal beaches	< 1%

Topography: One large, steep-sided gully, and a smaller, steeper, shorter gully, running down to dramatic embayed and cliffed coastline. Bright red rock on the coast of Red Bay gives that bay its name. On Clay Point and Goat Point the loess overlying the volcanic rock is very obvious. The larger gully is gorge-like, with very steep rock walls. Altitude ranges from sea level up to about 300 m.

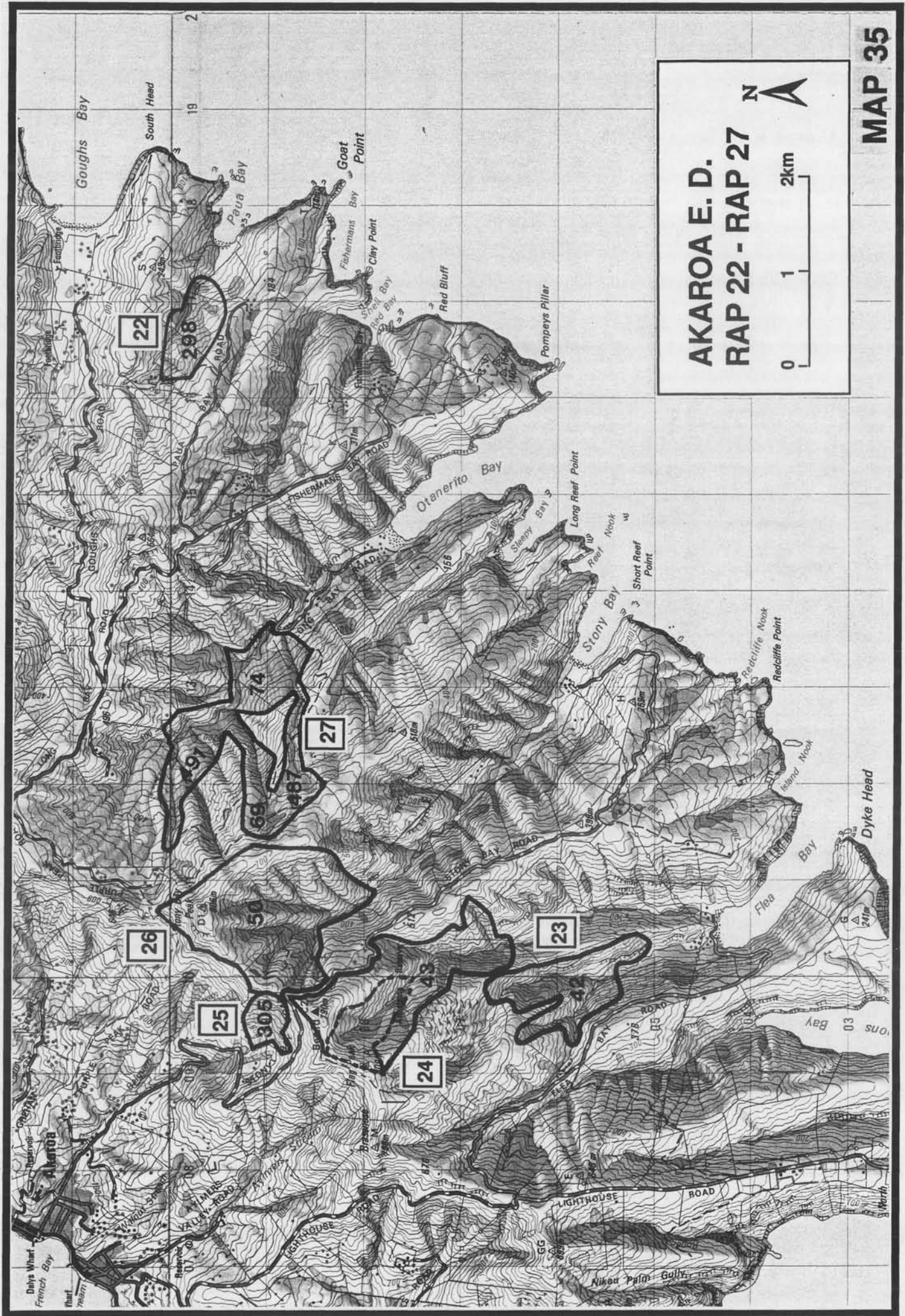
Plants: The area has several Banks Peninsula rarities, notably two ferns at their southern limits, *Anarthropteris lanceolata* and *Pteris tremula*. Other species of note are shining broadleaf, tītoki, kawakawa, pigeonwood, mataī, *Cyathea dealbata*, *Asplenium oblongifolium*, *Dicksonia squarrosa*, *Cyathea smithii*, small-leaved milk tree, abundant ngaio, *Cheilanthes distans*, akeake (abundant), *Parietaria debilis*, *Lophomyrtus obcordata*, *Hydrocotyle elongata*, velvet fern, *Lobelia anceps*, *Linum monogynum*, *Tetragonia trigyna*, *Celmisia mackaui* (Akaroa District endemic), *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Asplenium obtusatum*, *Carex trifida*, *Schoenus pauciflorus*, *Blechnum banksii*, *Asplenium terrestre* subsp. *maritimum*, *Senecio glaucophyllus* subsp. *basinudus*, *Elymus rectisetus*

'native broad blue race', *Sarcocornia quinqueflora*, *Crassula moschata*, *Calystegia soldanella*, leafless lawyer, *Lastreopsis glabella*, *Hebe strictissima* (regional endemic), *Cheilanthes humilis*, *Daucus glochidiatus*, *Solanum aviculare*, the mistletoe *Ileostylus micranthus*, and *Leptolepia novae-zelandiae*.

Wildlife: Spotted shags, white-fronted terns, red-billed gulls, black-backed gulls, bellbirds, grey warblers, fantails, harriers, wood pigeons, *Californian quail, *finches, *skylarks, *magpies, *domestic geese, paradise ducks, cicadas, fur seals.

Weeds: *Gorse (see below), *horehound, *inkweed, *elderberry, *boxthorn (at Shell Bay), *flowering currant (below Browns' house), *ragwort, *variegated thistle.

Notes: All around the edges of the bigger gully, gorse has been sprayed and burnt in efforts to maintain pasture, resulting in a very disturbed wide margin in which gorse is the most successful competitor. If this gully were ever to be protected and managed for conservation values it would be best to pull the battle front back on to easier ground and allow the gorse within determined bounds (suggested on the RAP outline) to act as a nurse canopy for certain native plant regeneration if it is left alone. Admittedly precautions against fire would be a continuing necessity until the less flammable mixed hardwoods took over. The other major threat to the biological values of this area is feral goats.



Akaroa RAP 22 - Pāua Bay**Area:** c. 45 ha**Grid Ref. centre:** N 37 166 089**Access:** Private land. Near Pāua Bay Road.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	40%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	25%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	2%
F 18	Pasture on lowland hill slopes	20%
J 37	Scattered plants on lowland rock	< 1%

Topography: A bushy area within a small valley, with Pāua Bay Stream flowing through the middle. At the lower end of the defined area the stream descends a fine waterfall through a gorge-like defile, flanked by bluffs. There is another small waterfall and pool in the middle of the area, at about 75 m. Altitudinal range of the RAP is from about 20 m up to about 280 m.

Plants: All three common lowland podocarps (mataī, kahikatea and lowland tōtara) are represented by some fine adults, but the forest interior is eaten out and only sparse regeneration of mataī was noted. Nīkau palm is represented by three mature adults and numerous, but graze-doomed, seedlings. The RAP is one of only two localities in Banks Region for the fern *Anarthropteris lanceolata*, here at its southern limit (see also Akaroa RAP 21, Fishermans Bay). Other species of note are: shining broadleaf, tītoki, pigeonwood, kawakawa, *Lophomyrtus obcordata*, small-leaved milk tree, climbing groundsel (*Brachyglottis sciadophila*), *Asplenium oblongifolium*, *Cyathea dealbata*, *Dicksonia squarrosa*, velvet fern, *Lastreopsis glabella*, *Cyathea smithii*, native passion vine, *Hebe strictissima* (regional endemic) and leafless lawyer. The abundance and diversity of southern limit species (8 species) is a feature. By the lower waterfall, shining broadleaf (*Griselinia lucida*) and common broadleaf (*G. littoralis*) grow side by side.

Wildlife: Bellbirds, grey warblers, wood pigeons, paradise ducks, etc.

Weeds: None of concern noted, but **Clematis vitalba* should be watched for.

Notes: Exclusion of stock and control of possums would represent a big conservation plus for this bush area, which is of much more than average interest.

Akaroa RAP 23 - Forks Gully

Area: c. 70 ha

Grid Ref. centre: N 37 098 061

Access: Private land.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	45%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	15%
D 9	Lowland podocarp and podocarp/hardwood treeland on alluvium and hill slopes	< 1%
D 11	Broadleaved hardwood treeland on lowland alluvium and hill slopes	4%
D 12	Kānuka treeland on lowland hill slopes	3%
E 13	Lowland small-leaved scrub on hill slopes	3%
F 18	Pasture on lowland hill slopes	20%
F 19	Fernland on lowland hill slopes	3%
F 22	Toetoe tussockland on lowland hill slopes	< 1%
F 24	Native open shrubland on lowland hill slopes	6%
G 27	Freshwater lowland flush vegetation	< 1%
J 37	Scattered plants on lowland rock	< 1%

Topography: Two steep, small valleys joining in the lower part of the defined area, each with a strong stream and beautiful waterfalls. There is a big range of aspects, giving dry and moist habitats in close proximity. The altitude range is from about 20 m up to about 450 m.

Plants: There is a good population of mamaku tree fern (*Cyathea medullaris*), second only to Akaroa RAP 19, Stony Bay, for the whole region. The smaller tree ferns are also common - *Cyathea dealbata*, *C. smithii* and *Dicksonia squarrosa*. A few mature podocarps survive, mostly above second-growth mixed hardwoods, but two fine kahikatea are nicely positioned on the valley floor near the final waterfall of the southern tributary. Two nīkau palms stand in treeland on the valley floor. There are striking shrublands of mainly *Coprosma virescens* on dry bluffy ground facing N and NE. Further species of note include velvet fern, *Pteris tremula*, *Hebe strictissima* (regional endemic), *Fuchsia perscandens*, *Solanum aviculare*, *Aciphylla subflabellata*, *Ourisia lactea* (by the big waterfall), kawakawa (abundant), *Asplenium oblongifolium* and *Corybas orbiculatus*, a small spider orchid rarely recorded on Banks Peninsula.

Wildlife: Common bush birds, harriers.

Weeds: None of concern noted.

Notes: Moves are under way by the landowner to fence the bush area containing mamaku tree fern, which would be an important conservation gain. In drawing an RAP boundary much wider than the fencing proposal I do not imply that it should all be retired from grazing for conservation purposes, but just that diverse natural values lie within the outlined area, not just the moist forest of the "gorge". Much of the existing forest on the other tributary is at least partly protected from stock by the steep terrain and by some existing fences. Perhaps, if the future allows, a wider area, containing high regeneration potential, could have stock excluded.

"The Banks Peninsula Track" traverses the RAP, and the bush and waterfalls are highlights of this experience.

Akaroa RAP 24 - Armstrong extension

Area: c. 100 ha

Grid Ref. centre: N 37 100 075

Access: Stony Bay Road.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	< 1%
B 4	Red beech forest on upper lowland and montane hill slopes	8%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	45%
F 17	Short tussockland on montane hill slopes	5%
F 18	Pasture on lowland and montane moist hill slopes	10%
F 19	Fernland on lowland and montane hill slopes	8%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	5%
F 24	Native open shrubland on lowland and montane hill slopes	15%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	3%
I 33	Coniferous plantation on montane hill slopes	< 1%
J 38	Scattered plants on montane rock	< 1%

Topography: Summit area of Mount Berard (790 m), falling through tussockland, pasture and bush into the deep valley flowing towards Flea Bay; the lower end of the suggested area is at about 200 m. There are imposing rock bluffs on Mount Berard.

Plants: Species of note include *Chionochloa rigida*, *Dracophyllum acerosum*, *Celmisia mackau* (district endemic), *Gingidia enysii*, *G. montana*, *Hebe lavaudiana* (regional endemic), *Gonocarpus incanus*, *Forstera tenella*, *Cyathea colensoi*, *Ranunculus foliosus*, *R. multiscapus*, *Grammitis poeppigiana*, *Hymenophyllum multifidum*, *Gaultheria depressa* var. *novae-zelandiae*, *Anisotome aromatica*, *Ourisia lactea*, thin-bark tōtara, a few saplings of cedar (*Libocedrus bidwillii*) among snow tussock between the summit of Berard and the existing boundary of Armstrong Reserve, the giant moss *Dendroligotrichum dendroides* (only known site in District and Region), *Aciphylla aurea*, *Scleranthus biflorus*, red beech, black beech, abundant tree ferns (*Cyathea smithii*, *C. dealbata* and *Dicksonia squarrosa*), *Leptopteris hymenophylloides*, pigeonwood, kawakawa (at 400 m), *Blechnum colensoi* (abundant), *Trichomanes venosum*, *Hymenophyllum flabellatum*, *Tmesipteris* aff. *elongata*, *Leptolepia novae-zelandiae* and *Clematis paniculata*.

Wildlife: Common bush birds, including tomtits. Moreporks calling in September 1984 when I was camped beside this area near Stony Bay Road.

Weeds: *Gorse, which poses something of a dilemma in the tussock areas. Ideally, scattered gorse should be removed from tussocklands and boundaries. Attempts to remove block gorse, even where it is invading tussocklands, has to be regarded as negative in a conservation sense; it is best to let woody replacement take its course, through a gorse phase

if gorse is already well-established. **Hieracium pilosella*, **H. lepidulum*, *Himalayan honeysuckle, *Douglas fir (planted by Stony Bay Saddle).

Notes: Armstrong Reserve is so valuable in conservation terms, and its surroundings so complementary to it, that the major extensions suggested here are logical recommendations. They go further than the proposals put forward by the Department of Conservation in the mid 1980s, after the 1984 Armstrong Reserve fire which destroyed most of the locality's (and indeed the Peninsula's) regenerating cedar.

Akaroa RAP 25 - Stony Bay Saddle

Area: c. 15 ha

Grid Ref. centre: N 37 096 090

Access: Private land (near Stony Bay Road).

Ecological classes:

B 4	Red beech forest on montane hill slopes	60%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	30%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%

Topography: Hill slope, straddling the lowland - montane transition and facing WNW. The altitude range is from about 480 m to about 680 m.

Plants: The greater part of the area is a fine canopy of red beech, down to about 570 m. Below that there is much kānuka, ribbonwood, kōwhai, broadleaf and lowland fivefinger. *Fuchsia* is extensive in the gullies and in dips. The floor is eaten out around the perimeter of the bush stand, but deep into the forest there is dense shield fern, and in parts crown fern, on the floor, making a very attractive interior. Further species of interest are: thin-bark tōtara, mountain fivefinger, pigeonwood at 590 m, very large *Coprosma linariifolia*, *Cyathea smithii* (adults quite common but no regeneration noted), *Leptopteris hymenophylloides* and *Olearia paniculata*.

Wildlife: Wood pigeons, bellbirds, tomtits, brown creepers, fantails, grey warblers, silvereys.

Weeds: *Elderberry (not of much concern).

Notes: This is the only stand of red beech facing Akaroa. Permanent protection, and the exclusion of stock by fencing, would be very desirable from a conservation standpoint.

Akaroa RAP 26 - Stony Bay Peak**Area:** c. 140 ha**Grid Ref. centre:** N 37 107 090**Access:** Purple Peak Road, Purple Peak Saddle.**Ecological classes:**

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	< 1%
B 4	Red beech forest on upper lowland and montane hill slopes	30%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	15%
E 14	Montane mixed scrub on hill slopes	< 1%
F 17	Short tussockland on montane hill slopes	3%
F 18	Pasture on montane hill slopes	4%
F 19	Fernland on montane hill slopes	3%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	4%
F 22	Toetoe tussockland on montane hill slopes	< 1%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on montane hill slopes	3%
F 25	Exotic open *gorse shrubland on montane hill slopes	3%
F 26	Mossfield on montane hill slopes	< 1%
G 27	Freshwater montane flush vegetation	< 1%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	34%
J 38	Scattered plants on montane rock	1%

Topography: Summit area of Stony Bay Peak (806 m), with tussockland and imposing bluffs facing NW, falling away to the south through gorse clad and forested slopes and gullies in to the head of Stony Bay Valley. The lowest part of the defined area is at about 300 m.

Plants: The area is botanically rich. The summit is the only known locality on Banks Peninsula for *Myrsine nummularia*, and one of only two localities for *Pentachondra pumila*, a dwarf mountain heath. There is a substantial flora of other upper montane plants, including some that are rare or uncommon generally in the District and Region. Of special note among these plants are: *Myosotis pygmaea* var. *drucei*, *Grammitis poeppigiana*, *Forstera tenella*, *Raoulia hookeri*, *Acaena caesiiglaucula*, *Gingidia enysii*, *G. montana* and *Hymenophyllum minimum*. Several adult *Cordyline indivisa* occur. Further species of note are: *Celmisia mackaui* (district endemic), *Hebe lavaudiana* (regional endemic), *H. strictissima* (regional endemic), *Chionochloa rigida*, *Festuca novae-zelandiae*, *Dracophyllum acerosum*, *Gunnera monoica*, *Brachyglottis lagopus*, *Aciphylla aurea*, *Celmisia gracilentia*, *Gnaphalium traversii*, *Raoulia subsericea*, *Lycopodium varium*, *Ranunculus multiscapus*, *R. foliosus*, *Uncinia rubra*, *Viola filicaulis*, *Ourisia lactea*, *Kelleria dieffenbachii*, *Poa colensoi*, *Gonocarpus incanus*, *Anisotome aromatica*, red beech, *Cyathea colensoi*, *Grammitis billardieriei*, thin-bark tōtara, the goblin moss *Weymouthia mollis*, *Leptopteris*

hymenophylloides, *Clematis paniculata*, *Blechnum colensoi*, *Cyathea smithii*, the hornwort *Megaceros arachnoideus*, *Scleranthus uniflorus*, *Colobanthus strictus*, *Ophioglossum coriaceum*, black beech, *Rytidosperma corinum*, *Lachnagrostis richardii* and *Myrsine divaricata*.

Wildlife: Wood pigeons, bellbirds, tomtits, harriers.

Weeds: *Gorse. Although it seems a conservation minus to have snow tussock vegetation being swallowed up by gorse, the better conservation policy is to let woody regeneration take its course. The snow tussock will be pushed back to the bluffs it was restricted to prior to the arrival of the Polynesians. Scattered gorse can be removed from tussockland but in practice the area that can be achieved is limited. In the absence of animals and fire, block gorse will steadily and surely give way to native trees on this whole block, with the transformation being slowest on the ridges. Other species of greater or lesser concern are *broom, **Pinus radiata*, **Hieracium pilosella*, **H. lepidulum*, *Himalayan honeysuckle.

Notes: About three quarters of the defined area have just been purchased (September 1991) by the Maurice White Native Forest Trust and will be legally reserved in perpetuity as an addition to Hinewai Reserve. It would make much conservation sense to give some form of protection to the remaining quarter of the RAP if the landowner (currently Andrew Studer) - is in agreement. More than half of this area is already under good forest of beech and second-growth hardwoods, and contains additional *Cordyline indivisa*.

The whole area of the RAP has suffered much over the last decade, most drastically from feral goats, but also from cattle, sheep, local burning, and spraying. Several hundred feral goats have been removed in the last two years, although at the time of writing the last few individuals are still being pursued. The area is adjacent to "The Banks Peninsula Track".

Akaroa RAP 27 - Ōtanerito Valley**Area:** c. 150 ha**Grid Ref. centre:** N 37 127 096**Access:** Long Bay Road, Hinewai Reserve.**Ecological classes:**

A 1	Kahikatea - mataī/mixed hardwood forest on lowland alluvium	< 1%
A 2	Mataī/mixed hardwood forest on lowland hill slopes	< 1%
B 4	Red beech forest on upper lowland and montane hill slopes	10%
B 5	Black beech forest on upper lowland and montane hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	20%
C 7	Kānuka-dominant second-growth hardwood forest on lowland alluvium and hill slopes	60%
D 9	Lowland podocarp and podocarp/hardwood treeland on alluvium	< 1%
D 11	Broadleaved hardwood treeland on lowland alluvium and hill slopes	< 1%
D 12	Kānuka treeland on lowland hill slopes	< 1%
F 18	Pasture on lowland and montane moist alluvium and hill slopes	2%
F 19	Fernland on lowland and montane hill slopes	2%
G 27	Freshwater lowland flush vegetation	< 1%
G 28	Freshwater lowland submerged or floating vegetation	< 1%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	5%
J 37	Scattered plants on lowland rock	< 1%

Topography: Bushy floor, sides, and tributary gullies of the mid and upper Ōtanerito Valley. There appears to be some very small areas of flat alluvium along the valley floor, although Narbey Stream is incised, bouldery, and fast. The altitude of the defined area ranges from about 60 m up to about 640 m at the head of Murderers Gully. There are several fine waterfalls.

Plants: Several centuries old kahikatea and mataī survive. Both are regenerating. Both red and black beech are common and both form single species or mixed stands, although red beech is many times more common than black. There is a small amount of thin-bark tōtara down to low altitudes, but lowland tōtara appears to be unusually absent. Tree ferns are abundant - *Cyathea dealbata*, *C. smithii* and *Dicksonia squarrosa*. Mature kānuka forest is extensive, occupying about 90 ha. Other species of note include: pigeonwood, kawakawa, *Solanum aviculare* (these three all southern limit species), *Lophomyrtus obcordata*, *Craspedia minor*, *Brachyglottis sciadophila*, *Olearia avicenniifolia*, *Leptolepia novae-zelandiae*, *Lastreopsis glabella*, *Pteris tremula*, *Blechnum colensoi*, *Tmesipteris tannensis* (one locality at 495 m at the head of Waterfall Gully), *Isolepis reticularis*, *Clematis paniculata* and

Plantago raoulii. Cabbage trees are not uncommon and grow adjacent to both red and black beech.

Wildlife: Wood pigeons, bellbirds, brown creepers, tomtits, grey warblers, silvereyes, fantails, rifleman, shining cuckoos, kingfishers, harriers, grey ducks, *mallards, *rooks, *magpies, *Californian quail, *blackbirds, *thrushes, *finches, eels, cicadas, red admiral butterflies.

Weeds: None of much concern. *Gorse, *broom, *blackberry, *male fern, *tutsan, *Montpelier broom (rare).

Notes: The entire RAP is included within the Ōtanerito block just bought (September 1991) by the Maurice White Native Forest Trust as a major addition to Hinewai Reserve, and will be protected in perpetuity. The area suffered somewhat over the last decade from feral goats (now all removed), fire, and farm stock. "The Banks Peninsula Track" traverses the RAP for about 1.4 km. Fire is a continuing serious risk.

Detailed report: Wilson 1990.

Akaroa RAP 28 - Grehan**Area:** c. 60 ha**Grid Ref. centre:** N 36 105 115**Access:** Private land. Close to Long Bay Road.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	65%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
D 11	Broadleaved hardwood treeland on lowland hill slopes	1%
F 18	Pasture on lowland and montane moist hill slopes	8%
F 19	Fernland on lowland and montane hill slopes	10%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	5%

Topography: Gullies and hill slopes merging into main gully with stream, flowing westwards down towards Akaroa. The altitudinal range is upper lowland just lapping into montane vegetation - that is, from about 200 m up to about 520 m. There is a delightful waterfall at 450 m.

Plants: All four of the common Banks Peninsula podocarps (kahikatea, mataī, lowland tōtara and thin-bark tōtara) are represented by a few adults. Regeneration of both tōtara species and of mataī was observed, including saplings up to 3 m. I saw no regeneration of kahikatea. There is a good diversity of common native hardwoods and ferns. The most significant rarity is raukawa (*Pseudopanax edgerleyi*) noted as several saplings epiphytic on tree fern trunks at about 300 m. Other species of particular note are the fern *Rumohra adiantiformis*, the climbing groundsel *Brachyglottis sciadophila*, kawakawa, *Cyathea smithii*, *C. dealbata*, *Dicksonia squarrosa*, *Blechnum colensoi*, *Leptopteris hymenophylloides*, *Leptolepia novae-zelandiae*, *Trichomanes venosum*, small-leaved milk tree, *Clematis paniculata* and *Coprosma linariifolia*.

Wildlife: Bellbirds, grey warblers, tomtits, wood pigeons, shining cuckoos.

Weeds: *Gorse (best left about bush margins as a nurse canopy for native regeneration), *Himalayan honeysuckle, *elderberry, *hawthorn.

Notes: At time of survey (1987) stock had access into the bush but much of the interior was little grazed. If fencing ever became possible there would definitely be conservation gains in regeneration of kahikatea, tree ferns, and ground ferns, but the main point in designating this area as an RAP is that it is an extensive good bush canopy with podocarps and the regionally rare raukawa, close to Akaroa town. It has value, fenced or unfenced.

Detailed report: Wilson, Hugh 1987: Notes on bush area on Graeme Curry's property, upper Grehan Valley under Purple Peak, above Akaroa. Banks Peninsula Botanical Survey unpublished report, on file.

Akaroa RAP 29 - Takamatua

Area: c. 120 ha

Grid Ref. centre: N 36 104 137

Access: Summit Road. Private land, Takamatua Valley.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	30%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	< 1%
D 11	Broadleaved hardwood treeland on lowland and montane hill slopes	3%
D 12	Kānuka treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	2%
E 14	Montane mixed scrub on hill slopes	1%
F 18	Pasture on lowland and montane moist hill slopes	30%
F 19	Fernland on lowland and montane hill slopes	10%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	1%
J 38	Scattered plants on montane rock	< 1%

Topography: Long, substantially bushy valley with tributary gullies, and stream with small waterfalls. The altitudinal range of the outlined area falls from just over 600 m at the Summit Road down to about 100 m in the Takamatua Valley.

Plants: There is a fair number of surviving big podocarps - kahikatea, mataī and lowland tōtara - with considerable regeneration of mataī. (Thin-bark tōtara is abundant in the privately reserved area at the top of the valley - see Akaroa PNA 35). *Celmisia mackau* occurs on small shrubby bluffs at 560 m. The three common Banks Peninsula tree ferns (*Cyathea smithii*, *C. dealbata* and *Dicksonia squarrosa*) are all common here, and regenerating where the terrain protects them from grazing. Two notable species of some rarity in the District and Region are velvet fern, and *Australina pusilla*, which is abundant along the middle part of the stream. Further species of note include: pigeonwood, tītoki (rare), kawakawa, *Trichomanes venosum*, *Leptopteris hymenophylloides*, *Brachyglottis sciadophila*, small-leaved milk tree, *Lastreopsis glabella*, *Ctenopteris heterophylla*, *Coprosma wallii* (locally abundant), *C. rubra*, *Pseudopanax anomalus* and *Lophomyrtus obcordata*.

Wildlife: Bellbirds, tomtits, wood pigeons, grey warblers, brown creepers, fantails, riflemen, *magpies.

Weeds: **Clematis vitalba* is unfortunately quite common in the lower part of the valley. *Blackberry, *sycamore, *male fern, *inkweed, *ivy, *gorse (very sparse), *crack willow.

Notes: In suggesting such a large area for protection, and including substantial areas of pasture, I chiefly want to indicate the value of retaining and fostering the substantially wooded nature of the valley from top to bottom. Kānuka has been cleared quite extensively from time to time. Fencing of forest additional to that already beautifully protected by the Frasers would be a big plus here, especially at lower altitude and including kahikatea, mataī and lowland tōtara. There is no suggestion that the included pasture areas should necessarily be retired from grazing, unless the land eventually passes into conservation management, in which case they could be regarded as areas for potential forest expansion to consolidate a fine wooded valley.

Detailed report: Wilson, Hugh D. 1987: Letter to Neil and Jill Fraser. Banks Peninsula Botanical Survey, unpublished, on file.

Akaroa RAP 30 - Ellangowan extension**Area:** c. 30 ha**Grid Ref. centre:** N 36 120 125**Access:** Summit Road.**Ecological classes:**

E 14	Montane mixed scrub on hill slopes	20%
F 17	Short tussockland on montane hill slopes	12%
F 18	Pasture on montane moist hill slopes	10%
F 19	Fernland on montane hill slopes	5%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	25%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on montane hill slopes	20%
F 25	Exotic open shrubland on montane hill slopes	< 1%
I 35	Coniferous plantation on montane hill slopes	3%
J 38	Scattered plants on montane rock	5%

Topography: High ridge with rock outcrops, rising at the southern end of the defined area to the attractively pointed summit of Trig J, at 739 m. The lowest altitude of the defined area is about 600 m. There is a small, permanently flowing spring on the steep bank beside the Summit Road under Trig J.

Plants: The chief interest is the excellent snow tussock vegetation dominated by *Chionochloa rigida*. There is also vigorous regeneration of native montane woody vegetation, including thin-bark tōtara. Other species of note are: *Aciphylla aurea*, *Anisotome aromatica* (an intergeneric hybrid between these two species was found here in 1989), *Dracophyllum acerosum*, *Gaultheria depressa* var. *novae-zelandiae*, *Hebe lavaudiana* (regional endemic), *H. strictissima* (regional endemic), *Festuca novae-zelandiae*, silver tussock, *Rytidosperma corinum*, *Aciphylla subflabellata*, *Brachyglottis lagopus*, *Centella uniflora*, *Colobanthus strictus*, *Gunnera monoica*, *Libertia ixioides*, *Oreomyrrhis colensoi*, *O. ramosa*, *O. rigida*, *Phormium cookianum*, *Scleranthus uniflorus*, *Viola filicaulis*, *Ctenopteris heterophylla*, cabbage trees, and *Coprosma wallii*.

Wildlife: Pipits, harriers, *skylarks.

Weeds: *Gorse, *broom (scattered in snow tussock vegetation. Their removal is feasible and desirable). **Pinus radiata* (from a conservation criterion all the pines should be removed right along to the Cabstand if local agreement could be reached), *mouse-ear hawkweed.

Notes: At the time of writing negotiations are proceeding to add this area to Ellangowan Reserve, to which it would make a perfect complement. This is excellent snow tussock vegetation and a superb viewpoint right beside a sealed road close to Akaroa. The bluff slopes above the Summit Road are also very attractive and wild-looking. It is worth some effort to keep the native vegetation free of *gorse, *broom and *pines.

Detailed report: Wilson, Hugh 1986: Botanical notes on the proposed extension to Ellangowan Scenic Reserve. Banks Peninsula Botanical Survey unpublished report, on file.

Akaroa RAP 31 - Hickory Bluff

Area: c. 90 ha

Grid Ref. centre: N 36 135 135

Access: Private land.

Ecological classes:

B 4	Red beech forest on lowland hill slopes (fragment)	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	40%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	5%
D 11	Broadleaved hardwood treeland on lowland hill slopes	1%
D 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	2%
E 14	Montane mixed scrub on hill slopes	10%
F 18	Pasture on lowland and montane hill slopes	25%
F 19	Fernland on lowland and montane hill slopes	5%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	< 1%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	10%
H 31	Exotic *gorse scrub on lowland and montane hill slopes	< 1%
J 38	Scattered plants on montane rock	< 1%

Topography: A striking volcanic lava dome on the steep side of the Hickory Bay Valley, surrounded by bush gullies and spurs. The outlined area runs from the crest of the ridge behind the dome, at about 640 m, down to the upper course of the Ellangowan Stream at about 200 m.

Plants: The damp bluffs of the lava dome are rich in interesting species, among them *Chionochloa rigida*, *Dracophyllum acerosum*, *Brachyglottis lagopus*, *Earina autumnalis*, thin-bark tōtara, the moss *Rhacocarpus purpurascens* (abundant), *Neomyrtus pedunculata*, *Cyathodes juniperina*, *Lycopodium varium*, *Rytidosperma corinum*, *Hymenophyllum multifidum*, *Olearia avicenniifolia*, *Hymenophyllum peltatum*, *Hebe strictissima* (regional endemic), *Chionochloa conspicua*, and a species of *Andreaea* (moss). In bush at 430 m there is one red beech tree which represents the northern extremity of the natural distribution of beech on Banks Peninsula. There are a few surviving thin-bark tōtara. Further species of note include: tree ferns (*Cyathea dealbata*, *C. smithii*, *Dicksonia squarrosa*), pigeonwood, kawakawa, *Clematis paniculata*, *Craspedia minor*, *Oreomyrrhis colensoi*, *Tmesipteris tannensis*, *Ophioglossum coriaceum* and *Leptopteris hymenophylloides*.

Wildlife: Common bush birds, including riflemen.

Weeds: *Mouse-ear hawkweed, **Pinus radiata* (several large pines are established on bluffs), *gorse (some). The wilding pines are of concern.

Akaroa RAP 32 - Hueston

Area: c. 55 ha

Grid Ref. centre: N 36 153 140

Access: Private land between Hickory Bay Road and Hickory Ridge Road.

Ecological classes:

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	10%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	20%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	12%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	1%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	6%
F 18	Pasture on lowland moist hill slopes	25%
F 19	Fernland on lowland hill slopes	2%
F 24	Native open shrubland on lowland hill slopes	20%

Topography: Hill slopes and gullies on the side of Hickory Bay Valley, south-facing, between Hickory Ridge and Ellangowan Stream which forms the bottom boundary. The upper half is steeper country than the lower half. The altitudinal range is from about 80 m up to about 520 m.

Plants: The podocarps and tree ferns are the outstanding features. Lowland tōtara, mataī and kahikatea are represented by mature adults plus regeneration, with most age classes noted. At the upper part of the outlined area thin-bark tōtara is regenerating strongly through shrubland and scrub. The area has one of the finest populations in the region of mamaku tree fern (*Cyathea medullaris*), with about 20 large adults and some sparse regeneration. Silver tree fern (*C. dealbata*) is also represented by numerous large adults and very sparse regeneration. Two further tree fern species, *C. smithii* and *Dicksonia squarrosa*, are present in reasonable numbers. Other species of note are: tūtoki, *Clematis paniculata*, the mistletoe *Ileostylus micranthus*, pigeonwood, kawakawa, *Lophomyrtus obcordata*, ngaio, small-leaved milk tree, *Craspedia minor*, *Lagenifera pinnatifida*, *Libertia ixioides*, *Asplenium oblongifolium*, *Lastreopsis glabella*, *Trichomanes venosum* and *Aciphylla subflabellata*.

Nīkau palms occur less than 1 km away and could establish naturally if stock were excluded from this bush.

Wildlife: Wood pigeons, bellbirds, grey warblers, fantails, harriers, riflemen, cicadas, *magpies.

Weeds: In 1986 *gorse occurred only as a few scattered bushes. *Mouse-ear hawkweed occurred in the grassland and shrubland. No other weeds of concern were noted.

Notes: This is an outstanding forest remnant which will deteriorate further if left unfenced, but which would respond dramatically to stock exclusion and possum control.

Detailed report: Wilson, Hugh 1986: Botanical notes on the Huestons' lower bush area, Hickory Bay, suggested for reservation. Banks Peninsula Botanical Survey unpublished report, on file.

Akaroa RAP 33 - Crown Island Coast

Area: c. 50 ha

Grid Ref. centre: N 36 189 125

Access: Hickory Bay, Goughs Bay, private land, from the sea.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on coastal hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	3%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	25%
F 16	Coastal tussockland on sand dunes	1%
F 18	Pasture on coastal hill slopes	7%
F 21	Lowland flaxland on coastal hill slopes	< 1%
F 23	Holy grass grassland on coastal cliffs	1%
F 24	Native open shrubland on coastal hill slopes	12%
G 27	Freshwater lowland flush vegetation	< 1%
G 29	Saltmarsh on coastal alluvium	< 1%
G 30	Algal communities on intertidal rocks	10%
J 36	Scattered plants on coastal rock	35%
K 39	Scattered plants on sandy, stony and bouldery coastal beaches and dunes	4%

Topography: About 6 km of cliffed and bayed coastline with two major sandy beaches, sea cliffs up to 200 m high, large sea caves, stream mouths (one with a waterfall), coastal scrub and shrubland, reefs, promontories, and a small offshore islet (Crown Island) with vegetation on sides and top. Crown Island is 50 m high. It all forms a very dramatic and interesting coast.

Plants: Much of the cliffs are vegetated; species of particular note include: *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Sonchus kirkii*, *Asplenium lyallii*, *Senecio glaucophyllus* subsp. *basinudus*, *Adiantum cunninghamii*, *Disphyma australe*, *Hebe strictissima* (regional endemic), *Celmisia mackau* (district endemic, sparse), *Wahlenbergia* 'Akaroa Heads' (probable district endemic), *Myosotis australis* var. *lytteltonensis* (regional endemic), *Asplenium obtusatum*, *A. terrestre* subsp. *maritimum*, *Linum monogynum*, *Tetragonia trigyna*, *Crassula moschata*, *Elymus rectisetus* 'native broad blue race', and silver tussock. Further species of note along this coast are: kawakawa, native passion vine, *Carex pumila*, *Calystegia soldanella*, ngaio, one adult nīkau palm close to coast at Hickory Bay, standing in open pasture, small-leaved milk tree, *Asplenium oblongifolium*, toetoe, leafless clematis, *Senecio carnosulus*, *Sarcocornia quinqueflora*, *Einadia triandra*, *E. allanii*, *Olearia paniculata*, *Carex secta*, *Blechnum colensoi*, *Lobelia anceps*, *Schoenoplectus pungens*, shining broadleaf, leafless lawyer and *Oxalis magellanica* (at the foot of the waterfall in Crown Island Stream).

Bull kelp and bladder kelp are abundant at the edge of the sea.

Wildlife: Fur seals, white-flipped blue penguins (breeding), black-backed gulls (breeding), welcome swallows, spotted shags (breeding), white-faced herons, paradise ducks, white-fronted terns, *Canada geese, yellow-eyed penguins (breeding? three noted on survey, April 1987, one moulting).

Weeds: *Sea rocket, *lyme grass, *horned poppy, *inkweed, *horehound, *tree mallow, *marram, **Lagurus ovatus*, *exotic pasture grasses on cliffs such as *cocksfoot and *fog.

Notes: The sea front at Hickory Bay is protected by a covenant (see Akaroa PNA 19) and much of this outlined area would be publicly owned land along the coast. Also, the terrain gives it a great deal of natural protection. I identify the natural values here however because they should be safeguarded in perpetuity against any future threats.

The coastline has both Māori and European historic connections. For details see Ogilvie 1990.

Akaroa RAP 34 - Panama Rock

Area: c. 40 ha

Grid Ref. centre: N 36 133 178

Access: Panama Road. Lavericks Ridge Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	70%
D 11	Broadleaved hardwood treeland on lowland hill slopes	5%
E 14	Montane mixed scrub on hill slopes	5%
F 18	Pasture on lowland and montane moist hill slopes	10%
F 19	Fernland on lowland and montane hill slopes	4%
F 20	Snow tussock tall tussockland and tall tussock shrubland on montane hill slopes	2%
F 23	Holy grass grassland on montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	1%
F 25	Exotic open *gorse shrubland on montane hill slopes	< 1%
F 26	Mossfield on montane hill slopes	< 1%
J 38	Scattered plants on montane rock	2%

Topography: An imposing and classic trachyte dome with its feeder dike trending away south-westwards. The top of the huge outcrop is 610 m. The outlined area includes the north side down to Lavericks Ridge Road, and bushy southern slopes down to about 280 m.

Plants: This is the only known locality on Banks Peninsula for a gentian, *Gentiana serotina*, which grows with snow tussock and *Dracophyllum* around the top of the bluffs. Other species of particular note are: *Hebe strictissima* (regional endemic), *Anisotome aromatica*, *Raoulia glabra*, *Celmisia gracilentia*, *Earina autumnalis*, the moss *Racomitrium lanuginosum*, *Brachyglottis lagopus*, the lichen *Thamnolia vermicularis*, *Lycopodium varium*, the tiny mistletoe *Korthalsella salicornioides* parasitic on dwarfed kānuka, *Cyathodes juniperina*, *Pseudopanax anomalus*, *Rytidosperma corinum* and stunted thin-bark tōtara on the bluffs. The extensive second-growth bush has a wide range of common native species, including two tree ferns, *Dicksonia squarrosa* and *Cyathea smithii*. *Coprosma wallii*, one of the less common small-leaved *Coprosma* species, is not uncommon here.

Weeds: Scattered *gorse would be worth removing from the open shrubland and tussock at the top of Panama Rock, but constitutes no problem at all anywhere else as far as conservation values are concerned. **Pinus radiata* wildings are the most serious concern; several were up to 5 m tall, and one 9 m tall at time of survey in March 1986. *Mouse-ear hawkweed is common.

Notes: Geological values alone would justify this landmark having care taken of it; it is such a classic example of a dike and dome on the flank of an eroded volcano that its photograph appears in textbooks. The botanical values are a bonus, and also contribute to its landscape value as a wild, bushy, steep-sided, flat-topped crag. During the last decade it has suffered the depredations of goats on the valuable vegetation on its side and top, and has had small fires within the second-growth hardwood forest on its mid-slopes, perhaps as a mistaken and counter-productive attempt at gorse control.

Akaroa RAP 35 - Le Bons Peak

Area: c. 70 ha

Grid Ref. centre: N 36 160 184

Access: Lavericks Ridge Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	38%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	1%
D 10	Montane podocarp and podocarp/hardwood treeland on hill slopes	1%
D 11	Broadleaved hardwood treeland on lowland hill slopes	5%
E 14	Montane mixed scrub on hill slopes	2%
F 18	Pasture on lowland and montane hill slopes	44%
F 19	Fernland on lowland and montane hill slopes	2%
F 24	Native open shrubland on lowland and montane hill slopes	5%
G 27	Freshwater lowland flush vegetation	< 1%
J 38	Scattered plants on montane rock	1%
K 40	Scattered plants on lowland and montane blockfield	1%

Topography: Le Bons Peak, 500 m, is a very attractive, sharp-sided summit falling steeply to the Le Bons Valley floor close to the sea. The outlined area takes in the peak itself, which is the most important part of the RAP geologically and botanically. It also takes in the steep, partly wooded gully on the south side of the peak, but the boundaries drawn here are somewhat arbitrary. They descend the gully nearly to sea level.

Plants: The most fascinating feature is the scrub on the summit ridge and cone. It is classified here as montane, and has some elements of montane vegetation, such as stunted thin-bark tōtara. Much of it is dominated by *Hebe strictissima*, a regional endemic of all altitudes on Banks Peninsula. But the scrub has lowland features such as dwarfed māhoe, lowland fivefinger, leafless clematis, leafless lawyer, and dwarfed kōwhai (*Sophora microphylla*). The rocky floor is dense with *Phymatosorus diversifolius*, lichens and mosses.

The other fascinating feature of the summit cone is the collapse blockfield on the south side, rich in lichens, and surrounded by abundant broadleaf and pigeonwood.

Other species of particular note include: *Brachyglottis sciadophila*, *Fuchsia perscandens*, *Scandia geniculata*, *Senecio glaucophyllus* subsp. *basinudus*, *Asplenium oblongifolium*, *Einadia allanii*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Trisetum* sp. 'slender' (rare on Banks Peninsula), small-leaved milk tree, *Myrsine divaricata*, *Lycopodium varium* and kawakawa. In the lower part of the gully there are some big, old, rather battered lowland tōtara.

Weeds: *Ash (south side of Le Bons Peak). There is *wallflower on the east prow of the summit cone.

Notes: In terms of protection, the summit cone has more values at risk (of fire, clearance, goats) than the gully, which although attractive and interesting and worth looking after at least in its present state as a complement to the sharp little peak itself, could be repeated in many places on Banks Peninsula.

Akaroa RAP 36 - Steep Head Gully

Area: c. 40 ha

Grid Ref. centre: N 36 198 175

Access: Private land. Off Dalglishs Road, Le Bons.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	62%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	4%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	< 1%
F 18	Pasture on lowland droughty hill slopes	15%
F 24	Native open shrubland on coastal and lowland hill slopes	3%
G 30	Algal communities on intertidal rocks	< 1%
J 36	Scattered plants on coastal rock	< 1%

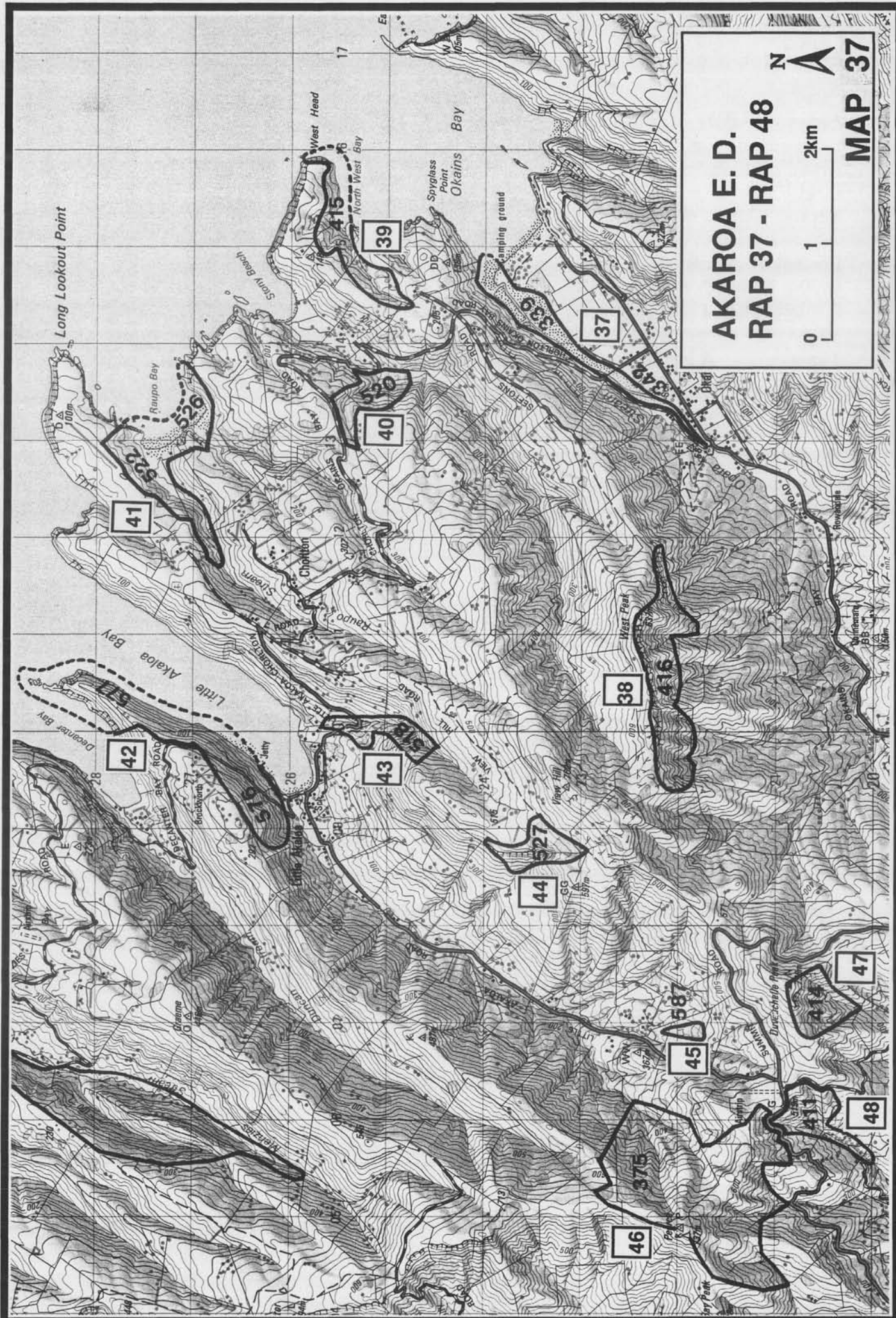
Topography: Narrow, bushy, coastal gully with smaller tributary gully, and an area of scrubby coastal forest, (at the sea end of the gully), which reaches the lip of the sea cliff and is therefore virtually unique on the open ocean coast of Banks Peninsula. The defined area runs from about 230 m altitude down to sea level.

Plants: The gully is rich in trees and shrubs which favour a dry coastal climate. *Olearia fragrantissima* is at its northern limit on Banks Peninsula. Several others are at their southern limit. There are about 14 adult nīkau palms, some trunkless juveniles, and numerous stock-browsed seedlings. Other southern limit species are kawakawa (common), tītoki, native passion vine, pigeonwood, *Asplenium oblongifolium* and shining broadleaf. Fierce lancewood is common. Other notable species are: velvet fern, *Brachyglottis sciadophila*, *Scandia geniculata*, *Carex secta*, *Adiantum cunninghamii*, *Fuchsia perscandens* (the hybrid *F. excorticata* x *perscandens* is common also), *Tetragonia trigyna*, *Einadia allanii*, *Olearia paniculata*, *Parietaria debilis*, *Melicytus micranthus*, lowland tōtara, mataī, *Myrsine divaricata*, *Echinopogon ovatus*, *Lophomyrtus obcordata*, leafless lawyer, *Lastreopsis hispida* (at the upper end of the defined area), *L. glabella* and *Metrosideros diffusa*. Lowland fivefinger is common and large. Common lancewood grows beside fierce lancewood.

Wildlife: Spotted shags (large numbers seen at sea at time of survey, March 1984), brown creepers, silvereyes, bellbirds, grey warblers, fantails, fur seals.

Weeds: *Hawthorn, *wild cherry.

Notes: Excluding stock from this exceedingly interesting gully would be a big plus in terms of Banks Peninsula conservation. The only nīkau palms north of this locality on Banks Peninsula are in nearby Lavericks Bay.



Akaroa RAP 37 - Okains Estuary**Area:** c. 40 ha**Grid Ref. centre:** N 36 144 236**Access:** Okains Bay Road.**Ecological classes:**

G 29	Saltmarsh on coastal alluvium	98%
K 39	Scattered plants on sandy beach and dune	2%

Topography: A long (about 3 km), narrow (widest part about 300 m) tidal estuary, resulting from the gradual infilling of a longer Okains Bay over millennia. The alluvium is sandier at the sea end, and siltier (muddier) at the inland end.

Plants: The chief community dominants are: sea rush, saltmarsh ribbonwood, jointed rush (*Leptocarpus*), *Puccinellia*, saltmarsh turf (*Sarcocornia*, *Samolus*, *Selliera*) and three-square (*Schoenoplectus pungens*). The small dune area included in the defined boundaries is dominated by exotics, chiefly *marram. Other species of note are: *Scirpoides nodosus*, *Mimulus repens*, *Isolepis cernua*, *Apium prostratum*, *Suaeda novae-zelandiae*, *Leptinella dioica*, *Carex litorosa*, *Triglochin striatum*, *Enteromorpha* (green alga), *Carex flagellifera* and *Cotula coronopifolia*. Sea rush (*Juncus maritimus*) is widespread, but jointed rush (*Leptocarpus similis*) is of very limited extent. An interesting hybrid is the shrubby result of the crossing of the totally different-looking parents saltmarsh ribbonwood and lowland ribbonwood.

Wildlife: Kingfishers, grey ducks, paradise ducks, *mallards, spur-winged plovers.

Weeds: Exotics now dominate the low dunes (*marram, **Pinus radiata*, **Senecio elegans*) and impinge on the sandy mudflats (**Festuca arundinacea*, **Parapholis incurva*, **Agrostis stolonifera*, **Plantago coronopus* and **Agropyron repens*). Otherwise the RAP is overwhelmingly indigenous.

Notes: There is damage to the sandy saltmarsh from vehicles, especially to *Sarcocornia*, *Samolus* and *Puccinellia*. Other threats include the risk of reclaiming what some people tend to regard as wasteland, also the risk of pollution by any of a variety of causes. This is the best saltmarsh vegetation in Akaroa District (smaller, less diverse areas exist at Le Bons Bay and at the head of Akaroa Harbour) and is less modified than the extensive but diminishing areas at the head of Lyttelton Harbour in Herbert Ecological District. The Okains Estuary warrants careful protection.

Akaroa RAP 38 - West Peak

Area: c. 60 ha

Grid Ref. centre: N 36 108 223

Access: Private land. No road near.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes (fragmentary)	< 1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	5%
E 13	Lowland small-leaved scrub on hill slopes	20%
E 14	Montane mixed scrub on hill slopes	35%
F 18	Pasture on lowland and montane moist hill slopes	5%
F 19	Fernland on lowland and montane hill slopes	10%
F 23	Holy grass grassland on lowland and montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	15%
G 27	Freshwater lowland and montane flush vegetation	< 1%
J 38	Scattered plants on montane rock	10%

Topography: A high wall of bushy bluffs, facing south into the almost totally deforested open pasture basin of Okains Bay Valley and in nice contrast with it. The ridge crest backing the bluffs culminates in West Peak (637 m) at the eastern end. Below West Peak is a sort of amphitheatre of cliffs, marked by seepages, with many botanical curiosities. The lowest point of the defined area lies at about 380 m, so the bluffs rise through the lowland - montane transition.

Plants: *Hebe strictissima* (regional endemic) is abundant. On the dripping bluffs below West Peak itself is a large population of a Banks Peninsula rarity (although abundant in the mountains), *Parahebe lyallii*. (The only other comparable population is in Herbert PNA 8, Mount Herbert Scenic Reserve). Other species of note here are: *Asplenium lyallii*, *Isolepis pottsii*, *Adiantum cunninghamii*, *Senecio glaucophyllus* subsp. *basinudus*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Ctenopteris heterophylla* and *Lachnagrostis richardii*. Much of the scrub on the wider bluffs is broadleaf - māhoe/*Hebe strictissima* - *Phormium cookianum*, with abundant *Phymatosorus*. This is all second-growth vegetation; the only remnants of old-growth are scattered live and dead thin-bark tōtara over *Fuchsia* - *Coprosma* - *Pseudowintera* scrub and regenerating tōtara to about 2-3 m. Other species of note are pigeonwood, small-leaved milk tree, *Coprosma wallii*, *Olearia paniculata* and toetoe. The tallest second-growth trees are ribbonwood and lacebark.

Weeds: **Pinus radiata*, including at least one mature wilding. **Hieracium caespitosum*.

Notes: Stock are having some deleterious effects on the native vegetation and regeneration, although much is inaccessible to sheep or cattle. Goats would be a disaster.

Akaroa RAP 39 - North West Bay**Area:** c. 35 ha**Grid Ref. centre:** N 36 152 257**Access:** Private land (near Chorlton - Okains Bay Road); from the sea.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	1%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	50%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	10%
D 11	Broadleaved hardwood treeland on lowland hill slopes	3%
D 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	4%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	< 1%
F 18	Pasture on coastal and lowland hill slopes	25%
F 24	Native open shrubland on coastal and lowland hill slopes	1%
G 30	Algal communities on intertidal rocks	1%
I 33-		
I 34	*Macrocarpa - *eucalypt plantation	2%
J 36	Scattered plants on coastal rock	1%
K 39	Scattered plants on sandy, stony and bouldery coastal beaches	1%

Topography: Coastal bushy gully opening on to bush-backed cove tucked in behind a low-cliffed headland (West Head of Okains Bay). The cove has a bouldery coastline with rock banks and small sandy beaches. The altitudinal range of the defined area is from sea level to about 160 m.

Plants: A wild grove of karaka at the coast has about 15 healthy adult trees, and regeneration on steep ground out of reach of grazing, although most of the grove is grazed out beneath. Only at Raupō Bay (Akaroa RAP 41) is there another population as good. This has as much historical interest as botanical interest, as wild karaka on Banks Peninsula almost certainly results from introduction and cultivation by Māori centuries ago. Among many other species of particular interest in this gully and bay are: podocarps (about 10 adults - mostly mataī, but with several lowland tōtara and one fine kahikatea), abundant ribbonwood, lacebark, ngaio and kōwhai, the mistletoe *Ileostylus micranthus*, fitoki (abundant), *Lophomyrtus obcordata*, fierce lancewood (adults, adolescents and juveniles), small-leaved milk tree, *Myrsine divaricata*, native passion vine, *Parietaria debilis*, *Hydrocotyle elongata*, both species of *Parsonsia* (*capsularis* and *heterophylla*), *Fuchsia perscandens*, the dwarf mistletoe *Korthalsella lindsayi*, *Scandia geniculata*, leafless clematis, leafless lawyer, *Hebe strictissima* (regional endemic), *Olearia fragrantissima*, *Stellaria* 'big flower aff. *decipiens*', kawakawa, *Einadia allanii*, *Senecio glaucophyllus* subsp. *basinudus*, *Linum monogynum*, *Asplenium oblongifolium*, *Tetragonia trigyna*, *Disphyma australe*, and cabbage tree.

Small-leaved shrubs are abundant, especially *Coprosma virescens*, *C. crassifolia* and native broom.

Wildlife: Grey warblers, shining cuckoos, harriers, black-backed gulls, red-billed gulls, fantails, *skylarks, *finches, *blackbirds, *thrushes, *rooks, *magpies, *starlings, *wasps.

Weeds: None of concern. *Horehound, **Cotyledon orbiculata*.

Notes: The bush, scrub and treeland is grazed throughout. Botanical values here would respond very positively if grazing could be excluded and possums controlled.

Akaroa RAP 40 - Stony Beach Bush

Area: c. 25 ha

Grid Ref. centre: N 36 135 252

Access: Chorlton - Okains Bay Road.

Ecological classes:

A 2	Mataī - lowland tōtara/mixed hardwood forest on lowland hill slopes	15%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	15%
D 11	Broadleaved hardwood treeland on lowland hill slopes	25%
D 12	Kānuka treeland on lowland hill slopes	3%
E 13	Lowland small-leaved scrub on hill slopes	1%
F 18	Pasture on lowland hill slopes	36%
F 24	Native open shrubland on lowland hill slopes	2%
G 27	Freshwater lowland marsh	3%

Topography: Gully with bush and treeland descending to marshy ground on main valley floor. The altitudinal range of the defined area is from near sea level up to about 200 m.

Plants: This is the only known locality on Banks Peninsula for a fern, *Asplenium polyodon*. It occurs on a single outcrop in steep scrubby ground at about 40 m. Another outstanding feature of this gully is the number of surviving adult mataī and lowland tōtara over a canopy of warm lowland mixed hardwood species. There is some regeneration of both these podocarps. Titoki is common. Other species of note include ngaio, lacebark, kōwhai, broadleaf, small-leaved milk tree (abundant), *Lophomyrtus obcordata*, *Fuchsia perscandens* (some large vines of this species present), *F. excorticata* x *perscandens*, *F. excorticata*, kawakawa, leafless lawyer, *Myrsine divaricata*, pigeonwood, *Brachyglottis sciadophila*, supplejack, *Melicytus micranthus*, *Lastreopsis glabella*, fierce lancewood, *Earina mucronata* (very rare and local on Banks Peninsula), *E. autumnalis*, *Asplenium oblongifolium*, *Stellaria* 'big flower aff. *decipiens*', *Parietaria debilis*, *Scandia geniculata*, *Microlaena polynoda*, native passion vine, *Griselinia lucida*, *Einadia allanii*, *Tetragonia trigyna*, the dwarf mistletoe *Korthalsella lindsayi*, *Olearia fragrantissima*, leafless clematis, akeake, *Hebe strictissima* (regional endemic). Of these species, seven are "southern limit" species on Banks Peninsula, one (*Olearia fragrantissima*) is at its northern limit here.

In the valley floor wetland, species include *Carex secta*, *Blechnum minus*, *Juncus planifolius*, *Eleocharis acuta*, *Epilobium insulare* and *Ranunculus glabrifolius*.

Wildlife: Bellbirds, grey warblers, silvereyes, riflemen, paradise ducks, kingfishers, fantails, *little owls, *Californian quail, *rooks, *magpies, *thrush.

Weeds: *Hawthorn.

Notes: The bush interior is quite heavily stock-used; many species are regenerating moderately well but the interior is very animal-damaged and modified. The core bush area is quite an outstanding remnant of dry, coastal, podocarp/hardwood forest with a high proportion of southern limit, warm lowland species. It would be very much worthwhile to exclude stock and control possums. The outlined area also includes a lot of treeland and a valley floor marsh which together add up to a good conservation unit, but fencing the podocarp/hardwood remnant and the closed canopy second-growth hardwood forest (about 8 ha in all) would be the most important priority.

Akaroa RAP 41 - Raupō Bay**Area:** c. 50 ha**Grid Ref. centre:** N 36 128 275**Access:** Chorlton.**Ecological classes:**

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	4%
D 11	Broadleaved hardwood treeland on lowland hill slopes	15%
D 12	Kānuka treeland on lowland hill slopes	1%
E 13	Lowland small-leaved scrub on hill slopes	8%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	< 1%
F 16	Coastal tussockland on sand dunes	2%
F 18	Pasture on lowland alluvium and hill slopes	52%
F 24	Native open shrubland on coastal and lowland hill slopes	6%
G 27)	Freshwater lowland marsh	
G 28)	Freshwater lowland submerged or floating aquatic vegetation	1%
G 29	Saltmarsh on coastal alluvium	< 1%
G 30	Algal communities on intertidal rocks	1%
J 36	Scattered plants on coastal rock	< 1%
K 39	Scattered plants on sandy beaches and dunes	10%

Topography: A broad sandy bay with a valley entering it at the northern end, and a smaller valley entering it at the southern end. Altitude ranges from sea level up to about 100 m.

Plants: Karaka is common. On all of Banks Peninsula only North West Bay (see Akaroa RAP 39) has a comparable population of karaka. This has as much historical as botanical interest. Karaka is almost certainly not native to the Peninsula, and the few populations here undoubtedly result from introduction (from further north) and cultivation by Māori, centuries ago. At Raupō Bay karaka is scattered in small groves and individual trees about the bay and for some distance up the valley. There are mature trees up to 45 cm diameter at breast height, and some saplings among rocks at the beach front.

Other species of note are; shining broadleaf, kawakawa, ngaio, *Asplenium oblongifolium*, *Tetragonia trigyna*, *Wahlenbergia* 'Akaroa Heads', much *Coprosma virescens* and *Melicope simplex*, *Microlaena polynoda*, leafless clematis, *Parietaria debilis*, cabbage trees, *Hebe strictissima* (regional endemic), *Senecio glaucophyllus* subsp. *basinudus*, *Einadia allanii*, *Linum monogynum*, *Fuchsia perscandens* and akeake.

Wetland species include *Schoenoplectus pungens* and *Eleocharis acuta*.

The low dune vegetation is dominated by *marram, but there are some natives, such as *Calystegia soldanella*, and *Carex pumila*.

Wildlife: White-flippered blue penguins, black-backed gulls, red-billed gulls, white-fronted terns, grey ducks, paradise ducks, grey warblers, *Californian quail, *finches, *starlings, *rooks.

Weeds: **Pinus radiata*, *macrocarpa, *hemlock, *marram, **Senecio angulatus*, **Carpobrotus aequilaterale*, **C. edulis*, *wallflower, **Sedum acre*. Only the pines and the hemlock are of much concern.

Notes: The glorious landscape and recreational value of the sandy beach has at least as much to do with suggesting this as an area to be carefully protected as do the biological values, although these too are considerable. The area has historical significance (see Ogilvie 1990). On adjacent Long Lookout Point the remains of Māori raised gardens for kūmara cultivation are still discernible.

Akaroa RAP 42 - Decanter

Area: c. 90 ha

Grid Ref. centre: N 36 100 270

Access: Little Akaloa.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	8%
D 11	Broadleaved hardwood treeland on lowland hill slopes	6%
E 13	Lowland small-leaved scrub on hill slopes	6%
F 15	Coastal tussockland and open tussock shrubland on cliffs and banks	2%
F 17	Short tussockland on lowland hill slopes	40%
F 18	Pasture on lowland droughty hill slopes	16%
F 24	Native open shrubland on coastal and lowland hill slopes	15%
G 30	Algal communities on intertidal rocks	5%
I 33	Coniferous plantation on lowland hill slopes	< 1%
J 36	Scattered plants on coastal rock	1%
J 37	Scattered plants on lowland rock	1%

Topography: Very steep side of Little Akaloa Bay, with small rocky bluffs and steep slopes falling to coast; running out to Decanter headland, taking in both sides of the spur there and ending in the cliffs and line of sea stacks which give Decanter Bay its name. Altitudinal range is from sea level up to about 280 m.

Plants: The area is rich in interesting species of tree, shrub, climber, herb and fern. Among those of note are: shining broadleaf, fierce lancewood, *Olearia fragrantissima*, *Hebe strictissima* (regional endemic), kawakawa, leafless lawyer, leafless clematis, ngaio, *Ileostylus micranthus*, *Asplenium oblongifolium*, *Senecio glaucophyllus* subsp. *basinudus*, *Sophora prostrata*, akeake, *Linum monogynum*, *Scandia geniculata*, *Einadia allanii*, *E. triandra*, *Parietaria debilis*, native passion vine, *Lophomyrtus obcordata*, tītoki, *Fuchsia perscandens*, *Tetragonia trigyna*, *Senecio lautus*, *Cheilanthes distans*, *Leptinella minor* (regional endemic), *Convolvulus verecundus* subsp. *waitaha* (abundant at headland), *Elymus rectisetus* 'medium bright blue native race', and *Aciphylla subflabellata*.

Coprosma virescens, *C. crassifolia* and kōwhai are all abundant, but kānuka is sparse. Good silver tussockland is extensive on the Little Akaloa side of the spur. The native grass *Microlaena stipoides* is common in the droughty pastures.

Wildlife: White-flipped blue penguins, red-billed gulls, black-backed gulls, silvereyes.

Weeds: **Solanum marginatum*, *hawthorn, *sweet brier, *horehound, *spindleberry, **Lychnis coronaria*, **Cotyledon orbiculata*, *boxthorn.

Notes: The minimum demands for conservation are simply to graze these slopes as in the past with sheep, and refrain from goats and scrub clearance. However, if exclusion of stock were ever possible the development of coastal forest on these steep slopes would greatly enhance the environment of Little Akaloa Bay. There is much of biological interest here.

Akaroa RAP 43 - Waterfall Gully

Area: c. 20 ha

Grid Ref. centre: N 36 100 250

Access: Little Akaloa - Chorlton Road.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	30%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	2%
E 13	Lowland small-leaved scrub on hill slopes	5%
F 18	Pasture on lowland hill slopes	35%
F 24	Native open shrubland on lowland hill slopes	5%
J 37	Scattered plants on lowland rock	< 1%

Topography: Steep narrow gully with 18 m waterfall and second-growth hardwood forest. Altitudinal range of outlined area is from about 40 m up to 400 m.

Plants: *Earina mucronata*, a very rare orchid on Banks Peninsula, grows on rocks and in scrub in some abundance in this gully, with its more common relative *E. autumnalis*. There are one or two surviving lowland tōtara here. Common in the gully are several "southern limit" species (akeake, tītoki, kawakawa, *Asplenium oblongifolium*, pigeonwood, native passion vine). Other species of note are: the mistletoes *Ileostylus micranthus* and *Korthalsella lindsayi*, *Lophomyrtus obcordata*, ngaio, leafless lawyer, *Scandia geniculata*, *Australina pusilla*, *Hydrocotyle elongata*, leafless clematis, *Senecio glaucophyllus* subsp. *basinudus*, *Hebe strictissima* (regional endemic), fierce lancewood, *Parietaria debilis*, *Tetragonia trigyna*, small-leaved milk tree, *Olearia paniculata* and cabbage tree.

Wildlife: Bellbirds, grey warblers, riflemen, shining cuckoos, fantails, kingfishers, *finches.

Weeds: *Crack willow, *sweet brier (sparse), *ripgut brome, **Lychnis coronaria*.

Notes: Exclusion of stock would enhance this attractive and botanically interesting gully. The waterfall is a fine feature.

Akaroa RAP 44 - View Hill Gully**Area:** c. 20 ha**Grid Ref. centre:** N 36 088 234**Access:** Private land. No formed road near. A legal paper road (View Hill Road) with a formed vehicle track along it, leads to the top edge of the RAP.**Ecological classes:**

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	12%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	50%
E 14	Montane mixed scrub on hill slopes	3%
F 18	Pasture on lowland and montane hill slopes	5%
F 19	Fernland on lowland and montane hill slopes	15%
F 22	Toetoe tussockland on montane hill slopes	< 1%
F 24	Native open shrubland on lowland and montane hill slopes	12%
J 37	Scattered plants on lowland rock	2%
J 38	Scattered plants on montane rock	1%

Topography: A prominent, cliff-rimmed, gorge-like gully with a vertical waterfall at the top end. The RAP includes forest, shrubland, and regenerating tōtara on gentler slopes above the head wall of the gorge. Altitude ranges from about 350 m up to about 620 m, with the top of the waterfall at about the transition from lowland to montane vegetation.

Plants: Adult and regenerating thin-bark tōtara are abundant in the montane segment of the RAP. Otherwise podocarps are represented only by about two old mataī. Other species of note are: *Fuchsia perscandens*, *Coprosma wallii*, *Oreomyrrhis colensoi*, *Pseudopanax anomalus*, *Olearia ilicifolia*, *Myrsine divaricata*, *Olearia paniculata*, *Hebe strictissima* (abundant on steep ground - regional endemic), small-leaved milk tree, *Uncinia ferruginea*, *Adiantum cunninghamii*, *Blechnum colensoi*, *Corybas macranthus*, *Oxalis magellanica*, *Brachyglottis sciadophila* and fierce lancewood (rare). Supplejack is common in the gorge. Māhoe is as usual abundant in the lowland second-growth canopy. There are some enormous broadleaf trees. No tree ferns were noted, and kānuka is rare.

Wildlife: Bellbirds (abundant), grey warblers, fantails, wood pigeons, harriers.

Weeds: **Pinus radiata*.

Notes: This is quite a striking landscape feature of the mid Little Akaloa Valley. Stock are depleting the forest interior, which is intriguing within the "gorge" because of the huge mossy basalt blocks of the floor. Further in, damage is much less. It is an area that would do well with fencing and stock exclusion. Between the defined area and Trig GG there is much bracken fernland with strong regeneration of māhoe, *Hebe*, *Pittosporum* spp., lacebark, broadleaf, *Coprosma*, etc. If stock and fire could also be excluded also from this wider area, there would be a steady expansion of regenerating native forest into it.

Akaroa RAP 45 - Little Akaloa Raukawa

Area: c. 6 ha

Grid Ref. centre: N 36 070 219

Access: Private land.

Ecological classes:

C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	90%
D 9	Lowland podocarp and podocarp/hardwood treeland on hill slopes	< 1%
F 18	Pasture on lowland moist hill slopes	5%
F 24	Native open shrubland on lowland hill slopes	4%
G 27	Freshwater lowland flush vegetation	1%

Topography: Hill slope with small flushed gullies at about 350 m, in the upper Little Akaloa Valley.

Plants: The chief reason for suggesting this small bush patch for protection is the presence of at least four healthy trees of raukawa (*Pseudopanax edgerleyi*), a very rare species in Akaroa District and not known from the other two Districts in Banks Region. The RAP extends a short distance downslope from the bush patch across pasture and *Coprosma* shrubland to take in a slender adult kahikatea. Within the bush patch itself, however, kahikatea is represented by a young adult about 8 m tall. Other species of note within the forest patch besides common canopy hardwoods such as lacebark, ribbonwood and māhoe, are: *Brachyglottis sciadophila*, *Ileostylus micranthus*, pigeonwood and small-leaved milk tree. Tree ferns are represented only by dead stumps, and only a few ground ferns persist.

Wildlife: Recorded on the survey were fantails (abundant, pied and black), grey warblers, *blackbirds and *magpies. *Rabbits were also noted.

Weeds: None of concern noted.

Notes: It would be very desirable to exclude stock from this small patch by fencing, with or without inclusion of the kahikatea and *Coprosma* shrubland downslope.

Akaroa RAP 46 - Pearce extension**Area:** c. 160 ha**Grid Ref. centre:** N 36 055 218**Access:** Summit Road.**Ecological classes:**

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	8%
C 6	Mixed broadleaved second-growth hardwood forest on lowland and montane hill slopes	15%
E 13	Lowland small-leaved scrub on hill slopes	40%
E 14	Montane mixed scrub on hill slopes	12%
F 18	Pasture on lowland and montane moist hill slopes	12%
F 19	Fernland on lowland and montane hill slopes	3%
F 24	Native open shrubland on lowland and montane hill slopes	10%
I 33	Coniferous plantation on montane hill slopes	< 1%

Topography: Gullies, slopes and broad spurs running mostly south and east from the broad summit of Mount Pearce (737 m), down to about 340 m (in the Little Akaloa Valley). Several small streams are also included.

Plants: There is a good stand of thin-bark tōtara/hardwood forest with some large tōtara and an ungrazed, ferny interior, including filmy ferns and goblin moss. The remainder of the land is in various stages of vigorous forest regeneration. Species of particular note include: *Brachyglottis sciadophila*, *Leptolepia novae-zelandiae*, *Coprosma wallii*, *Olearia ilicifolia*, *Myrsine divaricata*, *Clematis paniculata*, *Lycopodium varium*, *Oreomyrrhis ramosa*, *Fuchsia perscandens*, *Coprosma rubra*, *Pseudopanax anomalus*, *Cyathea smithii*, *Hymenophyllum sanguinolentum*, *Ctenopteris heterophylla*, *Cyathea colensoi*, *Viola filicaulis*, *Leptopteris hymenophylloides* and *Blechnum colensoi*.

Wildlife: Bellbirds (abundant), grey warblers, brown creepers, fantails, riflemen, harriers, tomtits, silvereyes, *starlings, *magpies.

Weeds: *Elderberry, *blackberry (very sparse), *broom (very sparse), *mouse-ear hawkweed.

Notes: This is an extraordinary area of regenerating forest on what was mostly clear cocksfoot pasture 75 years ago (Robin Waghorn, landowner, pers. comm.). In places where cattle still penetrate they inhibit regeneration, but even under present farming practices the forest regeneration is vigorous. If circumstances ever allowed the whole RAP to be excluded from grazing this would be a very good future forest reserve. The stand of old-growth forest in the NW segment is a fine element - again virtually untouched by stock under present farming practices. Clearance for pasture or exotic forestry would be highly negative in conservation terms, although it could not be argued against with quite the weight that would be provided if old-growth forest (with centuries-old trees) covered the whole area.

Akaroa RAP 47 - Duvauchelle Peak

Area: c. 25 ha

Grid Ref. centre: N 36 073 207

Access: Private land.

Ecological classes:

A 3	Thin-bark tōtara/mixed hardwood forest on montane hill slopes	55%
C 6	Mixed broadleaved second-growth hardwood forest on upper lowland and montane hill slopes	28%
D 11	Broadleaved hardwood treeland on upper lowland hill slopes	3%
E 14	Montane mixed scrub on hill slopes	5%
F 18	Pasture on upper lowland moist hill slopes	3%
F 20	<i>Chionochloa conspicua</i> tall tussock shrubland on montane hill slopes	< 1%
F 24	Native open shrubland on upper lowland and montane hill slopes	5%
J 38	Scattered plants on montane rock	1%

Topography: Steep bushy and rocky slopes descending from summit of Duvauchelle Peak at 738 m into the narrow head of Pipers Stream Valley. The suggested area descends to about 420 m although the main bush area has its lower edge at around 500 - 535 m.

Plants: Thin-bark tōtara is abundant, although many of the adult trees are battered or moribund. The interior was variously damaged by stock at time of survey (November 1986) with some areas seriously depleted, others apparently untouched, with excellent ferny floors. The abundance of epiphytes is outstanding. At the bottom of the defined area there are fine stands of ribbonwood (*Plagianthus*). Other species of note include: *Aciphylla subflabellata*, *Chionochloa conspicua*, *Andreaea* spp. on vertical rock, *Myrsine divaricata*, *Hebe strictissima* (regional endemic), *Cyathea colensoi*, *Lycopodium scariosum*, *Viola filicaulis*, *Olearia ilicifolia*, mountain flax, *Hymenophyllum multifidum*, *Grammitis billardiarei*, goblin moss (*Weymouthia*), *Usnea* lichens, *Ctenopteris heterophylla*, *Hymenophyllum sanguinolentum*, *Leptolepia novae-zelandiae*, *Blechnum colensoi*, very large *Asplenium flaccidum*, *Leptopteris hymenophylloides*, *Lycopodium varium*, *Cyathea smithii* (very sparse), *Hymenophyllum demissum* and *Clematis paniculata*.

The three listed filmy ferns (*Hymenophyllum* spp.) are an interesting element. Filmy ferns were undoubtedly abundant and diverse on Banks Peninsula in times when huge tracts of forest flourished, but although a good number of species (14) hang on they are now reduced to rather few and scattered sites, and the tally for this patch of bush is above average!

Wildlife: Bellbirds, tomtits, grey warblers.

Weeds: *Elderberry, *mouse-ear hawkweed.

Notes: In terms of landscape and biology, this is an important bush remnant. Although under current farming practices many of its values are reasonably secure, the complete exclusion of stock would be a big conservation plus. In 1986 considerable possum damage was evident on *Fuchsia* and sevenfinger.

Akaroa RAP 48 - Pawsons**Area:** c. 25 ha**Grid Ref. centre:** N 36 060 206**Access:** Summit Road.**Ecological classes:**

A 2	Mataī - lowland tōtara - kahikatea/mixed hardwood forest on lowland hill slopes	30%
C 6	Mixed broadleaved second-growth hardwood forest on lowland hill slopes	35%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	3%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
F 18	Pasture on lowland moist hill slopes	20%
F 24	Native open shrubland on lowland hill slopes	10%

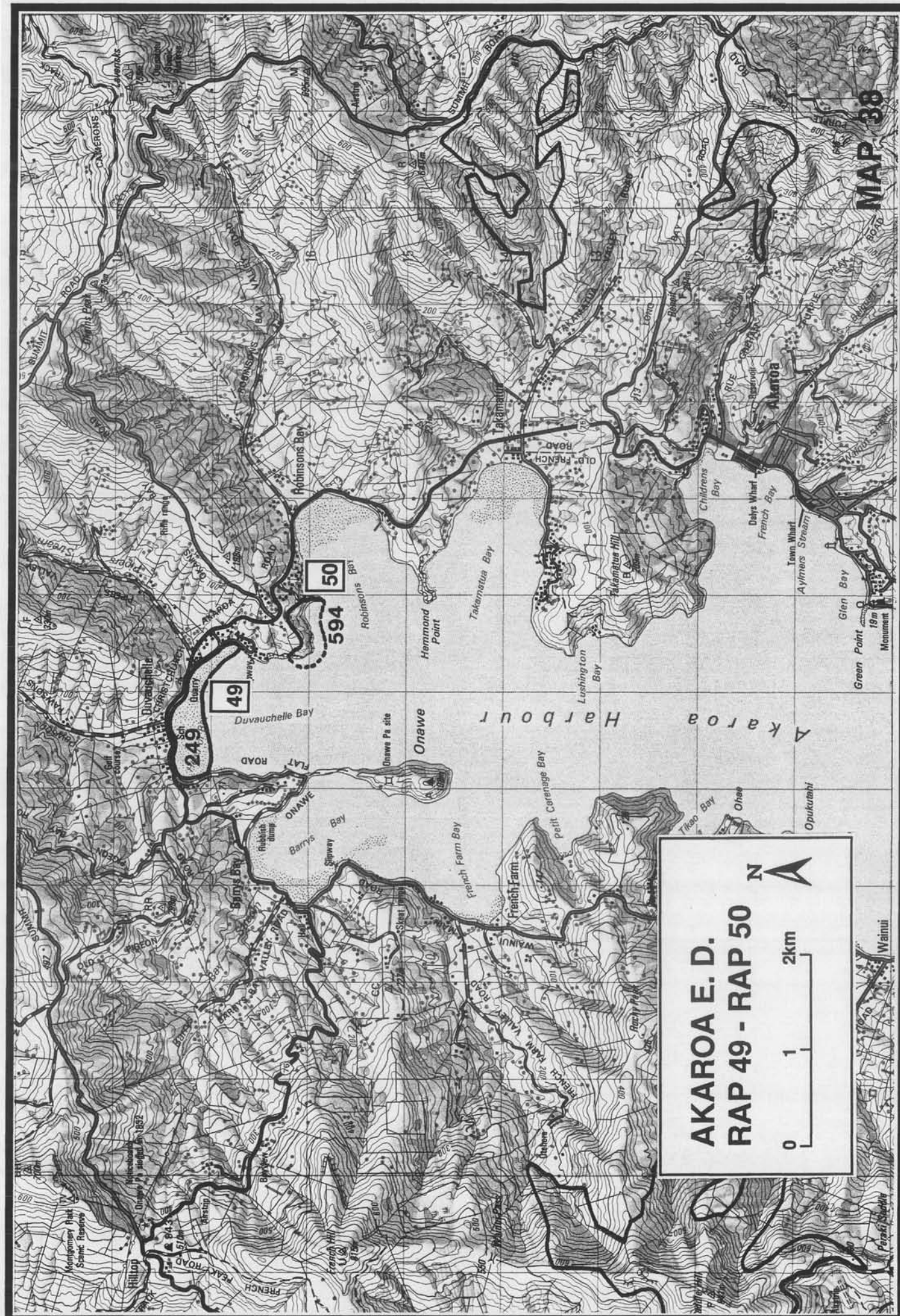
Topography: Mostly wooded slopes and gullies at head of Pawsons Stream Valley, lying between about 540 m and 240 m. (A little further down Pawsons Stream there are some very nice bush-surrounded waterfalls).

Plants: There are a substantial number of big podocarps emergent over a good hardwood canopy, but the interior is severely depleted by grazing, with no regeneration of either podocarps or tree ferns noted. However adult mataī, lowland tōtara, kahikatea (up to 150 cm dbh), some live and many dead *Cyathea smithii*, are all represented. Other notable species include: big ribbonwoods, *Coprosma rubra*, pigeonwood, some very large *Fuchsia excorticata* up to 70 cm diameter at breast height, *Metrosideros diffusa* (common), *Earina autumnalis* as a common epiphyte on senescent mataī, small-leaved milk tree, *Leptolepia novae-zelandiae*, *Trichomanes venosum*, *Fuchsia perscandens* and *Brachyglottis sciadophila*.

Wildlife: Noted on the survey (November 1986) were bellbirds, tomtits and grey warblers.

Weeds: *Elderberry.

Notes: This bush remnant is deteriorating under current land management, and would respond brilliantly to fencing and possum control. It is a very visible feature from the Summit Road between the Pigeon Bay and Little Akaloa turnoffs, and it lies close to, and between, Akaroa RAPs 46 and 47.



Akaroa RAP 49 - Duvauchelle Bay**Area:** c. 25 ha**Grid Ref. centre:** N 36 046 173**Access:** Main Road at Duvauchelle.**Ecological classes:**

G 29 Saltmarsh on coastal alluvium

100%

Topography: Gently shelving tidal flats.

Plants: This is an excellent representative bed of seagrass (*Zostera muelleri*), with small fringing stands of three-square (*Schoenoplectus pungens*) on the landward edge. Also present is some *Sarcocornia quinqueflora* and *Apium prostratum*.

Wildlife: South Island pied oystercatchers, white-faced herons, little shags, paradise ducks, grey ducks, *mallards, spur-winged plovers, *Canada geese, *black swan, pied stilts, black-backed gulls, red-billed gulls, *rooks.

Notes: The continued health of these seagrass beds is one important measure of the health of the Akaroa Harbour ecosystem. Other good stands occur in Barrys Bay, Robinsons Bay, Takamatua Bay and Childrens Bay. Seagrass is an important food plant at the base of the coastal food chain. Greater modification around Lyttelton Harbour, with excessive siltation and turbid water, has resulted in the near-extinction of once-extensive seagrass beds there.

Akaroa RAP 50 - Ngaio Point

Area: c. 10 ha

Grid Ref. centre: N 36 056 161

Access: Private land (near main Christchurch - Akaroa Road). From the sea.

Ecological classes:

A 2	Lowland tōtara/mixed hardwood forest on coastal hill slopes	5%
C 6	Mixed broadleaved second-growth hardwood forest on coastal hill slopes	65%
C 7	Kānuka-dominant second-growth hardwood forest on lowland hill slopes	20%
D 11	Broadleaved hardwood treeland on lowland hill slopes	2%
D 12	Kānuka treeland on lowland hill slopes	2%
G 30	Algal communities on intertidal rocks	5%
H 31	Exotic *gorse - *broom scrub on coastal hill slopes	1%

Topography: Coastal edge of a headland dropping to the harbour between Duvauchelle and Robinsons Bay.

Plants: This is a small but surprisingly diverse patch of dry coastal scrubby forest, including small adults and adolescents of lowland tōtara, abundant ngaio, much *Helichrysum lanceolatum*, salt-burned māhoe, cabbage trees, native broom, tree tutu, lowland fivefinger, tītoki, *Elymus rectisetus* 'broad blue native race', *Olearia paniculata*, *Festuca* 'Banks Peninsula blue tussock' (regional endemic), *Libertia ixioides*, *Linum monogynum*, *Coprosma lucida*, broadleaf, *Puccinellia stricta*, *Senecio carnosulus*, *Apium prostratum*, *Phymatosorus diversifolius*, *Astelia fragrans*, kōwhai, māpou, *Asplenium terrestre*, *Carex raoulii*, *Luzula banksiana* var. *orina*, kawakawa, *Einadia allanii*, *Uncinia leptostachya*, *Lophomyrtus obcordata*, *Scandia geniculata*, *Parsonsia capsularis* and *P. heterophylla*, *Fuchsia excorticata* x *perscandens*, several small-leaved *Coprosma* spp., *C. robusta*, kōhūhū, lacebark, and *Dichelachne crinita*. Kānuka is only abundant further back from the sea.

Wildlife: Bellbirds, fantails (pied and black), little shags, South Island pied oystercatchers, black-backed gulls.

Weeds: *Gorse, *broom, *Montpelier broom, **Chrysanthemoides monolifera*, *hawthorn.

Notes: There is not much mixed canopy coastal forest left inside Akaroa Harbour, or indeed anywhere on Banks Peninsula. This is a prominent bushy headland, well worth protecting. Ideally, it should be fenced against stock along its landward edge.

Additional notes, Akaroa RAPs

In addition to the listed and described RAPs, suggestions are made for the possible extensions of existing PNAs. See notes under the entries for:

PNA 3 Montgomery
PNA 5 Te Oka
PNA 7 Magnet Bay
PNA 8 Peraki Bay
PNA 13 Peraki Saddle West
PNA 14 Wainui
PNA 18 Ōtepatotu
PNA 21 Rowanhill
PNA 23 Hinewai
PNA 24 Chaney - Shuttleworth
PNA 34 Little Okains

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APPENDIX 1 CHECKLIST OF INDIGENOUS VASCULAR PLANTS

Symbols	+	present in Ecological District
	E	endemic to Banks Ecological Region
	TL	type locality in Banks Ecological Region
	S	southern distributional limit in Region or near it
	N	northern distributional limit in Region or near it
	o	rare in Region
	⊙	rare in Canterbury

PH = Port Hills

H = Herbert A = Akaroa Ecological District

	SPECIES	PH	H	A
	<i>Acaena anserinifolia</i>	+	+	+
	<i>Acaena caesiiglauc</i>		+	+
	<i>Acaena dumicola</i>		+	
	<i>Acaena juvenca</i>	+	+	+
	<i>Acaena novae-zelandiae</i> ¹	+	+	+
	<i>Aciphylla aurea</i>		+	+
	<i>Aciphylla subflabellata</i>	+	+	+
	<i>Adiantum cunninghamii</i>	+	+	+
	<i>Agrostis personata</i>			+
S	<i>Alectryon excelsus</i>	+	+	+
S o ⊙	<i>Anarthropteris lanceolata</i>			+
o ⊙	<i>Anemanthele lessoniana</i>		+	+
	<i>Anisotome aromatica</i>	+	+	+
⊙	<i>Anogramma leptophylla</i>	+	+	+
	<i>Apium prostratum</i>	+	+	+
	<i>Aristotelia fruticosa</i>		+	
	<i>Aristotelia serrata</i>	+	+	+
	<i>Arthropodium candidum</i>	+	+	+
	<i>Asplenium bulbiferum</i> (2 races)	+	+	+
	<i>Asplenium flabellifolium</i>	+	+	+

¹ Possibly naturalised from Australia rather than native.

	SPECIES	PH	H	A
	<i>Asplenium flaccidum</i>	+	+	+
	<i>Asplenium hookerianum</i>	+	+	+
	<i>Asplenium lyallii</i>			+
S	<i>Asplenium oblongifolium</i>	+	+	+
	<i>Asplenium obtusatum</i>	+		+
o ☉	<i>Asplenium polyodon</i>			+
	<i>Asplenium richardii</i>		+	
(S)	<i>Asplenium terrestre</i> (2 races)	+	+	+
o	<i>Asplenium trichomanes</i>		+	+
	<i>Astelia fragrans</i>	+	+	+
	<i>Australina pusilla</i>	+	+	+
	<i>Azolla filiculoides</i>	+	+	+
o ☉	<i>Baumea rubiginosa</i>	+	+	
o ☉	<i>Blechnum banksii</i>			+
	<i>Blechnum chambersii</i>	+	+	+
	<i>Blechnum colensoi</i>		+	+
	<i>Blechnum discolor</i>	+	+	+
	<i>Blechnum fluviatile</i>	+	+	+
	<i>Blechnum minus</i>	+	+	+
	<i>Blechnum penna-marina</i>	+	+	+
	<i>Blechnum procerum</i>	+	+	+
	<i>Blechnum</i> sp. 'black spot'	+	+	+
	<i>Blechnum</i> sp. 'subalpine'	+	+	+
	<i>Blechnum vulcanicum</i>	+	+	+
	<i>Bolboschoenus caldwellii</i>	+	+	
o	<i>Botrychium biforme</i>		+	+
o	<i>Brachyglottis bellidioides</i>		+	
TL	<i>Brachyglottis lagopus</i>	+	+	+
TL	<i>Brachyglottis sciadophila</i>	+	+	+

	SPECIES	PH	H	A
	<i>Brachyglottis radicata</i>	+		+
	<i>Bulbinella angustifolia</i>			+
o	<i>Caladenia catenata</i>	+		+
o	<i>Caladenia lyallii</i>		?	+
	<i>Calystegia soldanella</i>	+	+	+
	<i>Calystegia tuguriorum</i>	+	+	+
	<i>Cardamine corymbosa</i>		+	+
	<i>Cardamine debilis</i>	+	+	+
o ☉	<i>Carex appressa</i>	+	+	
	<i>Carex breviculmis</i>	+	+	+
o	<i>Carex buechananii</i>		+	+
	<i>Carex colensoi</i>	+	+	+
	<i>Carex dissita</i>		+	+
	<i>Carex flagellifera</i>	+	+	+
o	<i>Carex flaviformis</i>	+		
	<i>Carex forsteri</i>	+	+	+
	<i>Carex geminata</i>	+	+	+
	<i>Carex litorosa</i>	+		
	<i>Carex pumila</i>			+
	<i>Carex raoulia</i>		+	+
	<i>Carex resectans</i>	+	+	+
	<i>Carex secta</i>	+	+	+
	<i>Carex sinclairii</i>	+		+
	<i>Carex solandri</i>	+	+	+
	<i>Carex</i> sp. 'tenuiculmis'		+	
o ☉	<i>Carex trifida</i>			+
	<i>Carex virgata</i>	+	+	+
	<i>Carex wakatipu</i>		+	+
	<i>Carex</i> (unidentified 'Waikoko')		+	

	SPECIES	PH	H	A
	<i>Carmichaelia</i> 'common'	+	+	+
o ☉	<i>Carmichaelia kirkii</i>		+	
	<i>Carpodetus serratus</i>	+	+	+
o	<i>Cassinia leptophylla</i>		+	+
	<i>Celmisia gracilentia</i>	+	+	+
E TL ☉	<i>Celmisia mackau</i>			+
	<i>Celmisia</i> "rhizomatous"		+	
	<i>Centella uniflora</i>	+	+	+
o	<i>Cf. Centrolepis</i> "Herbert"		+	
S	<i>Cheilanthes distans</i>	+	+	+
	<i>Cheilanthes humilis</i>	+	+	+
	<i>Chenopodium glaucum</i> subsp. <i>ambiguum</i>		+	
	<i>Chiloglottis cornuta</i>	+		+
	<i>Chionochloa conspicua</i>	+	+	+
TL N	<i>Chionochloa rigida</i>	+	+	+
	<i>Clematis afoliata</i>	+	+	+
TL	<i>Clematis foetida</i>	+	+	+
TL o	<i>Clematis marata</i>		+	
	<i>Clematis paniculata</i>	+	+	+
	<i>Colobanthus apetalus</i>			+
o	<i>Colobanthus brevisepalus</i>			+
o	<i>Colobanthus buechananii</i>		+	
	<i>Colobanthus muelleri</i>			+
	<i>Colobanthus strictus</i>	+	+	+
TL	<i>Convolvulus verecundus</i> subsp. <i>waitaha</i>	+	+	+
o	<i>Coprosma acerosa</i>			+
	<i>Coprosma areolata</i>	+	+	+
	<i>Coprosma crassifolia</i>	+	+	+
	<i>Coprosma linariifolia</i>	+	+	+

	SPECIES	PH	H	A
	<i>Coprosma lucida</i>	+	+	+
	<i>Coprosma propinqua</i>	+	+	+
	<i>Coprosma rhamnoides</i>	+	+	+
	<i>Coprosma rigida</i>	+	+	+
TL	<i>Coprosma robusta</i>	+	+	+
	<i>Coprosma rotundifolia</i>	+	+	+
	<i>Coprosma rubra</i>	+	+	+
o	<i>Coprosma rugosa</i>			+
	<i>Coprosma</i> sp. 't'	+	+	+
	<i>Coprosma virescens</i>	+	+	+
	<i>Coprosma wallii</i>	+	+	+
	<i>Cordyline australis</i>	+	+	+
o ⊙	<i>Cordyline indivisa</i>		+	+
	<i>Coriaria arborea</i>	+	+	+
	<i>Coriaria sarmentosa</i>		+	+
TL	<i>Corokia cotoneaster</i>	+	+	+
	<i>Cortaderia richardii</i>	+	+	+
	<i>Corybas macranthus</i>			+
o	<i>Corybas orbiculatus</i>			+
	<i>Corybas trilobus</i> (2 races)	+	+	+
	<i>Cotula coronopifolia</i> ²	+	+	+
	<i>Craspedia minor</i>		+	+
o ⊙	<i>Crassula moschata</i>			+
	<i>Crassula sieberiana</i>	+	+	+
	<i>Crassula sinclairii</i>		+	
	<i>Ctenopteris heterophylla</i>	+	+	+
	<i>Cyathea colensoi</i>		+	+

² Possibly naturalised rather than native.

	SPECIES	PH	H	A
	<i>Cyathea dealbata</i>	+	+	+
o ⊖	<i>Cyathea medullaris</i>			+
	<i>Cyathea smithii</i>	+	+	+
	<i>Cyathodes juniperina</i>	+	+	+
S ⊖	<i>Cyperus ustulatus</i>	+	+	+
	<i>Dacrycarpus dacrydioides</i>	+	+	+
o ⊖	<i>Dacrydium cupressinum</i>		+	
	<i>Daucus glochidiatus</i>	+	+	+
o	<i>Deschampsia novae-zelandiae</i>		+	
o	<i>Deschampsia tenella</i>		+	
o	<i>Desmoschoenus spiralis</i>			+
	<i>Deyeuxia avenoides</i>	+	+	+
	<i>Deyeuxia billardierei</i>	+		+
o	<i>Deyeuxia youngii</i>		+	
o	<i>Dianella nigra</i>	+	+	
	<i>Dichelachne crinita</i>	+	+	+
	<i>Dichondra</i> 'big flower aff. <i>brevifolia</i> '	+	+	+
	<i>Dichondra repens</i>	+	+	+
o ⊖	<i>Dicksonia fibrosa</i>		+	+
	<i>Dicksonia squarrosa</i>	+	+	+
TL	<i>Discaria toumatou</i>	+	+	+
	<i>Disphyma australe</i>	+	+	+
S	<i>Dodonaea viscosa</i>	+	+	+
	<i>Dracophyllum acerosum</i>	+	+	+
	<i>Earina autumnalis</i>	+	+	+
o	<i>Earina mucronata</i>			+
	<i>Echinopogon ovatus</i>	+	+	+
	<i>Einadia allanii</i>	+	+	+
	<i>Einadia triandra</i>	+	+	+

	SPECIES	PH	H	A
TL	<i>Elaeocarpus hookerianus</i>		+	+
	<i>Eleocharis acuta</i>	+	+	+
o	<i>Eleocharis gracilis</i>		+	
	<i>Elymus multiflorus</i>		+	+
	<i>Elymus rectisetus</i> (native races)	+	+	+
	<i>Epilobium atriplicifolium</i>	+	+	+
	<i>Epilobium billardioreanum</i>	+	+	+
	<i>Epilobium brunnescens</i>	+	+	+
	<i>Epilobium cinereum</i>	+	+	+
	<i>Epilobium insulare</i>	+	+	+
	<i>Epilobium komarovianum</i>		+	+
	<i>Epilobium macropus</i>		+	
	<i>Epilobium nerteroides</i>			+
o	<i>Epilobium pallidiflorum</i>	+		
	<i>Epilobium pedunculare</i>	+	+	+
	<i>Epilobium pubens</i>	+	+	+
	<i>Epilobium rotundifolium</i>	+	+	+
o	<i>Epilobium tenuipes</i>		+	
o	<i>Eryngium vesiculosum</i>		+	+
o	<i>Euphrasia zelandica</i>		+	
E	<i>Festuca</i> 'Banks Peninsula blue tussock'	+	+	+
	<i>Festuca novae-zelandiae</i>	+	+	+
	<i>Forstera tenella</i>		+	+
	<i>Fuchsia excorticata</i>	+	+	+
	<i>Fuchsia perscandens</i>	+	+	+
	<i>Galium propinquum</i>	+	+	+
	<i>Galium trilobum</i>		+	
o	<i>Gastrodia cunninghamii</i>	+		+
o	<i>Gastrodia sesamoides</i>	+		

	SPECIES	PH	H	A
	<i>Gaultheria antipoda</i>	+	+	+
o	<i>Gaultheria crassa</i>		+	
	<i>Gaultheria depressa</i> var. <i>novae-zelandiae</i>		+	+
o	<i>Gentiana grisebachii</i>			+
o	<i>Gentiana serotina</i>			+
	<i>Geranium microphyllum</i>	+	+	+
	<i>Geranium retrorsum</i>	+	+	+
	<i>Geranium sessiliflorum</i>	+	+	+
	<i>Geranium solanderi</i>	+	+	+
o	<i>Geum parviflorum</i>		+	
o	<i>Gingidia enysii</i>	+	+	+
o	<i>Gingidia montana</i>	+	+	+
	<i>Gnaphalium audax</i>	+	+	+
	<i>Gnaphalium involucratum</i>	+	+	+
	<i>Gnaphalium traversii</i>		+	+
	<i>Gnaphalium limosum</i>		+	+
o	<i>Gnaphalium polylepis</i>		+	
	<i>Gnaphalium sphaericum</i>		+	
	<i>Gonocarpus aggregatus</i>			
	<i>Gonocarpus incanus</i>		+	+
	<i>Grammitis billardiarei</i>			+
S o	<i>Grammitis ciliata</i>	+	+	
o	<i>Grammitis givenii?</i>			+
o	<i>Grammitis magellanica</i> subsp. <i>nothofageni?</i>			+
	<i>Grammitis poeppigiana</i>	+	+	+
TL	<i>Griselinia littoralis</i>	+	+	+
S	<i>Griselinia lucida</i>		+	+
TL	<i>Gunnera monoica</i>		+	+
	<i>Haloragis erecta</i>	+	+	+

	SPECIES	PH	H	A
E TL	<i>Hebe lavaudiana</i>	+	+	+
o	<i>Hebe odora</i>		+	
	<i>Hebe salicifolia</i>	+	+	+
E TL	<i>Hebe strictissima</i>	+	+	+
S	<i>Hedycarya arborea</i>	+	+	+
	<i>Helichrysum bellidioides</i>	+	+	+
	<i>Helichrysum filicaule</i>	+	+	+
	<i>Helichrysum lanceolatum</i>	+	+	+
	<i>Hierochloe redolens</i>	+	+	+
	<i>Histiopteris incisa</i>	+	+	+
TL	<i>Hoheria angustifolia</i>	+	+	+
(S) o	<i>Hoheria populnea</i> var. <i>lanceolata</i>	+	+	
	<i>Hydrocotyle elongata</i>	+	+	+
	<i>Hydrocotyle heteromeria</i>	+	+	+
o	<i>Hydrocotyle</i> cf. <i>hydrophila</i>		+	+
	<i>Hydrocotyle microphylla</i>	+	+	+
	<i>Hydrocotyle</i> sp. 'montana'	+	+	+
	<i>Hydrocotyle moschata</i>	+	+	+
	<i>Hydrocotyle novae-zelandiae</i>	+	+	+
o	<i>Hymenophyllum atrovirens</i>	+		+
o	<i>Hymenophyllum bivalve</i>		+	+
o	<i>Hymenophyllum</i> cf. <i>cupressiforme</i>	+		
o	<i>Hymenophyllum demissum</i>	+		+
o	<i>Hymenophyllum dilatatum</i>	+		+
o	<i>Hymenophyllum flabellatum</i>		+	+
o	<i>Hymenophyllum minimum</i>			+
	<i>Hymenophyllum multifidum</i>	+	+	+
o	<i>Hymenophyllum peltatum</i>		+	+
o	<i>Hymenophyllum rarum</i>	+		+

	SPECIES	PH	H	A
o	<i>Hymenophyllum sanguinolentum</i>	+	+	+
o	<i>Hymenophyllum villosum</i>		+	+
	<i>Hypericum gramineum</i>	+	+	
	<i>Hypericum japonicum</i>		+	+
	<i>Hypolepis ambigua</i>	+	+	+
(S) o	<i>Hypolepis lactea</i>			+
	<i>Hypolepis millefolium</i>	+	+	+
	<i>Hypolepis rufobarbata</i>	?	+	+
o	<i>Hypsela rivalis</i>		+	+
	<i>Ileostylus micranthus</i>	+	+	+
	<i>Isolepis basilaris</i>		+	
	<i>Isolepis cernua</i>	+	+	+
	<i>Isolepis ? habra</i>		+	+
o	<i>Isolepis pottsii</i>			+
	<i>Isolepis reticularis</i>			+
	<i>Juncus australis</i>	+	+	+
o	<i>Juncus caespiticius</i>	+	+	
	<i>Juncus distegus</i>	+	+	+
	<i>Juncus gregiflorus</i>	+	+	+
	<i>Juncus maritimus</i> var. <i>australiensis</i>	+	+	+
	<i>Juncus novae-zelandiae</i>		+	+
	<i>Juncus pallidus</i>		+	+
	<i>Juncus planifolius</i>	+	+	+
	<i>Juncus sarophorus</i>	+	+	+
	<i>Kelleria dieffenbachii</i>		+	+
	<i>Koeleria novo-zelandica</i>			+
	<i>Korthalsella lindsayi</i>	+	+	+
	<i>Korthalsella salicornioides</i>	+	+	+
	<i>Kunzea ericoides</i>	+	+	+

	SPECIES	PH	H	A
	<i>Lachnagrostis richardii</i>	+	+	+
	<i>Lachnagrostis</i> 'tall'		+	
	<i>Lagenifera pinnatifida</i>			+
	<i>Lagenifera purula</i>	+	+	+
	<i>Lagenifera strangulata</i>		+	+
	<i>Lastreopsis glabella</i>	+	+	+
o	<i>Lastreopsis hispida</i>			+
	<i>Lastreopsis velutina</i>	+	+	+
	<i>Lemna minor</i>	+	+	+
	<i>Lepilaena bilocularis</i>		+	
	<i>Leptinella dioica</i>	+	+	+
E TL	<i>Leptinella minor</i>	+	+	+
o	<i>Leptinella nana</i>	+		
	<i>Leptinella pusilla</i>		+	
	<i>Leptinella squalida</i> subsp. <i>mediana</i>	+		
	<i>Leptocarpus similis</i>		+	+
	<i>Leptolepia novae-zelandiae</i>	+	+	+
	<i>Leptopteris hymenophylloides</i>	+	+	+
	<i>Leptospermum scoparium</i>	+	+	+
S	<i>Leucopogon fasciculatus</i>	+		
	<i>Leucopogon fraseri</i>	+	+	+
	<i>Libertia ixioides</i>	+	+	+
o	<i>Libocedrus bidwillii</i>		+	+
	<i>Lilaeopsis novae-zelandiae</i>		+	+
	<i>Limosella lineata</i>	+	+	
	<i>Linum monogynum</i>	+	+	
	<i>Lobelia anceps</i>			+
TL	<i>Lophomyrtus obcordata</i>	+	+	+
TL	<i>Luzula banksiana</i> var. <i>orina</i>	+	+	+

	SPECIES	PH	H	A
	<i>Luzula picta</i> var. <i>limosa</i>		+	+
	<i>Luzula</i> cf. <i>picta</i> var. <i>pallida</i>		+	+
	<i>Luzula picta</i> var. <i>picta</i>		+	+
	<i>Luzula rufa</i>		+	+
o	<i>Lycopodium australianum</i>		+	
	<i>Lycopodium fastigiatum</i>	+	+	+
	<i>Lycopodium scariosum</i>		+	+
	<i>Lycopodium varium</i>	+	+	+
	<i>Lycopodium volubile</i>	+	+	+
S	<i>Macropiper excelsum</i>	+	+	+
	<i>Melicope simplex</i>	+	+	+
	<i>Melicytus alpinus</i>	+	+	+
	<i>Melicytus micranthus</i>	+	+	+
	<i>Melicytus ramiflorus</i>	+	+	+
	<i>Mentha cunninghamii</i>	+	+	+
	<i>Metrosideros diffusa</i>	+	+	+
	<i>Microlaena avenacea</i>		+	+
o ☉	<i>Microlaena polynoda</i>	+	+	+
	<i>Microlaena stipoides</i>	+	+	+
	<i>Microseris scapigera</i>		+	
	<i>Microtis oligantha</i>	+	+	+
	<i>Microtis unifolia</i>	+	+	+
	<i>Mimulus repens</i>		+	+
S o ☉	<i>Muehlenbeckia astonii</i>			+
	<i>Muehlenbeckia australis</i>	+	+	+
	<i>Muehlenbeckia axillaris</i>		+	+
	<i>Muehlenbeckia complexa</i>	+	+	+
o	<i>Muehlenbeckia ephedroides</i>			+
	<i>Myoporum laetum</i>	+	+	+

	SPECIES	PH	H	A
o	<i>Myosotis</i> 'pygmaea var. drucei'	+	+	+
E TL o ⊙	<i>Myosotis</i> 'australis var. lytteltonensis'	+	+	+
	<i>Myosotis spathulata</i>	+	+	+
	<i>Myriophyllum propinquum</i>	+		+
	<i>Myriophyllum triphyllum</i>	+		+
	<i>Myrsine australis</i>	+	+	+
	<i>Myrsine divaricata</i>	+	+	+
o	<i>Myrsine nummularia</i>			+
	<i>Neomyrtus pedunculata</i>	+	+	+
	<i>Nertera depressa</i>		+	+
	<i>Nertera setulosa</i>	+	+	+
	<i>Nothofagus fusca</i>			+
	<i>Nothofagus solandri</i>			+
	<i>Olearia arborescens</i>		+	
TL	<i>Olearia avicenniifolia</i>	+	+	+
N	<i>Olearia fragrantissima</i>	+	+	+
	<i>Olearia ilicifolia</i>		+	+
	<i>Olearia nummulariifolia</i>		+	
o	<i>Olearia odorata</i>		+	
	<i>Olearia paniculata</i>	+	+	+
o	<i>Olearia bullata</i>		+	+
	<i>Ophioglossum coriaceum</i> (2 forms)	+	+	+
	<i>Oreomyrrhis colensoi</i>		+	+
	<i>Oreomyrrhis ramosa</i>		+	+
	<i>Oreomyrrhis rigida</i>			+
	<i>Ourisia lactea</i>		+	+
	<i>Oxalis exilis</i>	+	+	+
o	<i>Oxalis magellanica</i>		+	+
	<i>Oxalis rubens</i>	+	+	+

	SPECIES	PH	H	A
	<i>Paesia scaberula</i>	+	+	+
o	<i>Parahebe lyallii</i>		+	+
	<i>Parietaria debilis</i>		+	+
	<i>Parsonsia capsularis</i>	+	+	+
	<i>Parsonsia heterophylla</i>	+	+	+
S	<i>Passiflora tetrandra</i>	+	+	+
	<i>Pelargonium inodorum</i> ³	+	+	+
o	<i>Pellaea calidirupium</i>	+	+	
	<i>Pellaea rotundifolia</i>	+	+	+
	<i>Pennantia corymbosa</i>	+	+	+
o	<i>Pentachondra pumila</i>			+
	<i>Phormium cookianum</i>	+	+	+
	<i>Phormium tenax</i>	+	+	+
	<i>Phymatosorus diversifolius</i>	+	+	+
	<i>Pittosporum eugenioides</i>	+	+	+
	<i>Pittosporum tenuifolium</i>	+	+	+
	<i>Plagianthus divaricatus</i>	+	+	+
	<i>Plagianthus regius</i>	+	+	+
	<i>Plantago raoulii</i>	+	+	+
o ⊙	<i>Pleurosorus rutifolius</i>	+	+	
	<i>Pneumatopteris pennigera</i>		+	+
	<i>Poa anceps</i> ?	+	+	+
N o ⊙	<i>Poa astonii</i>			+
	<i>Poa breviglumis</i>			+
	<i>Poa cita</i>	+	+	+
	<i>Poa colensoi</i>	+	+	+
	<i>Poa imbecilla</i>	+	+	+

³ Possibly naturalised rather than native.

	SPECIES	PH	H	A
	<i>Poa matthewsii</i>	+	+	+
	<i>Poa</i> cf. <i>pusilla</i> ?		+	
	<i>Podocarpus hallii</i>	+	+	+
	<i>Podocarpus totara</i>	+	+	+
	<i>Polygonum salicifolium</i>		+	
	<i>Polystichum richardii</i>	+	+	+
	<i>Polystichum</i> cf. <i>silvaticum</i> ?			+
	<i>Polystichum vestitum</i>	+	+	+
	<i>Potamogeton cheesemanii</i>	+	+	+
	<i>Potamogeton pectinatus</i>	+	+	+
o	<i>Potentilla anserinoides</i>	+		+
	<i>Prasophyllum colensoi</i>		+	+
	<i>Pratia angulata</i>	+	+	+
o	<i>Pratia perpusilla</i>		+	
	<i>Prumnopitys ferruginea</i>		+	
	<i>Prumnopitys taxifolia</i>	+	+	+
	<i>Pseudognaphalium luteoalbum</i> agg.	+	+	+
	<i>Pseudopanax anomalus</i>	+	+	+
	<i>Pseudopanax arboreus</i>	+	+	+
	<i>Pseudopanax colensoi</i>	+	+	+
	<i>Pseudopanax crassifolius</i>	+	+	+
o	<i>Pseudopanax edgerleyi</i>			+
⊙	<i>Pseudopanax ferox</i>	+	+	+
	<i>Pseudowintera colorata</i>	+	+	+
	<i>Pteridium esculentum</i>	+	+	+
S o ⊙	<i>Pteris macilenta</i>	+		
S o ⊙	<i>Pteris tremula</i>		+	+
o ⊙	<i>Pterostylis alobula</i> ⁴			+

	SPECIES	PH	H	A
	<i>Pterostylis areolata</i>	+	+	+
	<i>Pterostylis australis</i>	+	+	+
	<i>Pterostylis banksii</i>			+
o	<i>Pterostylis cycnocephala</i>		+	
	<i>Pterostylis foliata</i>	+		+
	<i>Pterostylis graminea</i>	+	+	+
	<i>Pterostylis montana</i>		+	+
o	<i>Pterostylis mutica</i>		+	+
	<i>Puccinellia novae-zelandiae</i>	+	+	+
	<i>Puccinellia stricta</i>	+	+	+
	<i>Pyrrosia eleagnifolia</i>	+	+	+
o ☉	<i>Ranunculus acaulis</i>			+
	<i>Ranunculus foliosus</i>		+	+
	<i>Ranunculus glabrifolius</i>	+	+	
	<i>Ranunculus limosella</i>		+	
	<i>Ranunculus macropus</i>	+		+
	<i>Ranunculus multiscapus</i>	+	+	+
	<i>Ranunculus reflexus</i>	+	+	+
TL o	<i>Raoulia australis</i>	+		(+)
	<i>Raoulia glabra</i>	+	+	+
o	<i>Raoulia hookeri</i>			+
	<i>Raoulia monroi</i>	+	+	
TL	<i>Raoulia subsericea</i>		+	+
o	<i>Raoulia tenuicaulis</i>		+	
S	<i>Rhopalostylis sapida</i>			+
	<i>Ripogonum scandens</i>	+	+	+
	<i>Rubus cissoides</i>	+	+	+

	SPECIES	PH	H	A
	<i>Rubus schmidelioides</i>	+	+	+
	<i>Rubus squarrosus</i>	+	+	+
	<i>Rumex flexuosus</i>	+	+	+
o	<i>Rumohra adiantiformis</i>	+	+	+
o	<i>Ruppia megacarpa</i>		+	
o	<i>Ruppia polycarpa</i>		+	
o	<i>Rytidosperma buchananii</i>		+	+
	<i>Rytidosperma clavatum</i>	+	+	+
N	<i>Rytidosperma corinum</i>	+	+	+
	<i>Rytidosperma gracile</i>	+	+	+
	<i>Rytidosperma merum</i> ?		+	+
	<i>Rytidosperma thomsonii</i>		+	+
	<i>Rytidosperma unarede</i>	+	+	+
	<i>Samolus repens</i>	+	+	+
	<i>Sarcocornia quinqueflora</i>	+	+	+
	<i>Scandia geniculata</i>	+	+	+
	<i>Schefflera digitata</i>	+	+	+
	<i>Schizeilema trifoliolatum</i>	+	+	+
	<i>Schoenoplectus pungens</i>		+	+
S o ☉	<i>Schoenoplectus validus</i>	+	+	+
o	<i>Schoenus pauciflorus</i>		+	+
	<i>Scirpoides nodosus</i>	+	+	+
	<i>Scleranthus biflorus</i>	+	+	+
	<i>Scleranthus brockiei</i>		+	+
	<i>Scleranthus uniflorus</i>	+	+	+
	<i>Selliera radicans</i>		+	+
	<i>Senecio carnosulus</i>	+		+
TL	<i>Senecio glaucophyllus</i> subsp. <i>basinudus</i>	+	+	+
	<i>Senecio glomeratus</i>	+	+	+

	SPECIES	PH	H	A
	<i>Senecio lautus</i>	+	+	+
	<i>Senecio minimus</i>	+	+	+
	<i>Senecio quadridentatus</i>	+	+	+
	<i>Senecio wairauensis</i>		+	+
S	<i>Solanum aviculare</i>	+	+	+
	<i>Solanum laciniatum</i>	+	+	+
	<i>Sonchus kirkii</i>		+	+
	<i>Sophora microphylla</i>	+	+	+
	<i>Sophora prostrata</i>	+	+	+
	<i>Spergularia media</i>	+	+	+
o	<i>Stackhousia minima</i>	+		+
	<i>Stellaria decipiens</i>	+	+	+
	<i>Stellaria</i> 'big flower aff. <i>decipiens</i> '		+	+
o ☉	<i>Sticherus cunninghamii</i>		+	+
	<i>Streblus heterophyllus</i>	+	+	+
	<i>Suaeda novae-zelandiae</i>	+	+	+
	<i>Tetragonia tetragonioides</i>			+
	<i>Tetragonia trigyna</i>	+	+	+
o ☉	<i>Teucrium parvifolium</i>	+	+	+
o	<i>Thelymitra decora</i>		+	
o	<i>Thelymitra hatchii</i>	+	+	+
	<i>Thelymitra longifolia</i>	+	+	+
E? o ☉	<i>Tmesipteris</i> aff. <i>elongata</i>	+		+
o ☉	<i>Tmesipteris tannensis</i>		+	+
o ☉	<i>Trichomanes endlicherianum</i>			+
	<i>Trichomanes venosum</i>	+	+	+
	<i>Triglochin striata</i>	+	+	+
o	<i>Trisetum</i> sp. 'slender'		+	+
	<i>Tupeia antarctica</i>	+	+	+

	SPECIES	PH	H	A
	<i>Typha orientalis</i>	+	+	+
	<i>Uncinia</i> sp. (affinis auct.)			+
o	<i>Uncinia banksii</i>		+	+
	<i>Uncinia caespitosa</i>		+	
	<i>Uncinia clavata</i>		+	+
	<i>Uncinia ferruginea</i>		+	
TL	<i>Uncinia leptostachya</i>	+	+	+
	<i>Uncinia rubra</i>		+	+
TL	<i>Uncinia rupestris</i>			+
	<i>Uncinia</i> cf. <i>scabra</i>		+	+
	<i>Uncinia silvestris</i>			+
	<i>Uncinia uncinata</i>	+	+	+
	<i>Urtica ferox</i>	+	+	+
	<i>Urtica incisa</i>		+	+
	<i>Viola cunninghamii</i>	+	+	+
	<i>Viola filicaulis</i>		+	+
	<i>Vittadinia australis</i>	+	+	+
E?	<i>Wahlenbergia</i> 'Akaroa Heads'			+
	<i>Wahlenbergia albomarginata</i>	+	+	+
	<i>Wahlenbergia gracilis</i> s.l.	+	+	+
	<i>Wolffia australiana</i> ⁵		+	
	<i>Zannichellia palustris</i>		+	
	<i>Zostera muelleri</i>		+	+

⁵ Possibly naturalised rather than native.

APPENDIX 2 - COMMON NAMES OF PLANTS

Common names of plants used in the text or used locally on Banks Peninsula are listed with their scientific name equivalents.

* = not native to Banks Ecological Region.

Akaroa daisy	<i>Celmisia mackau</i>
akeake	<i>Dodonaea viscosa</i>
akeake, mountain	<i>Olearia avicenniifolia</i>
akiraho	<i>Olearia paniculata</i>
*ash	* <i>Fraxinus excelsior</i>
Banks Peninsula hebe	<i>Hebe lavaudiana</i>
*barberry	* <i>Berberis glaucocarpa</i>
*barberry, South American	* <i>Berberis darwinii</i>
*barley grass	* <i>Hordeum</i> spp.
basket fungus	<i>Ileodictyon cibarium</i>
beech, black	<i>Nothofagus solandri</i>
beech, red	<i>Nothofagus fusca</i>
*beech, silver	* <i>Nothofagus menziesii</i>
*bent, creeping	* <i>Agrostis stolonifera</i>
*bittersweet	* <i>Solanum dulcamara</i>
black beech	<i>Nothofagus solandri</i>
*blackberry	* <i>Rubus</i> spp. (= <i>R. fruticosus</i> agg.)
black scrub	<i>Coprosma</i> spp.
bladder kelp	<i>Macrocystis pyrifera</i>
blue tussock, Banks Peninsula	<i>Festuca</i> sp.
*bonesed	* <i>Chrysanthemoides monolifera</i>
*boxthorn	* <i>Lycium ferocissimum</i>
bracken	<i>Pteridium esculentum</i>
*brier rose	* <i>Rosa rubiginosa</i>
*brier, sweet	* <i>Rosa rubiginosa</i>
broadleaf	<i>Griselinia littoralis</i>
broadleaf, shining	<i>Griselinia lucida</i>
broad-leaved cabbage tree	<i>Cordyline indivisa</i>
*brome	* <i>Bromus</i> spp.
*brome, ripgut	* <i>Bromus diandrus</i>
*broom	* <i>Cytisus scoparius</i>
broom, climbing	<i>Carmichaelia kirkii</i>
*broom, Montpelier	* <i>Teline monspessulana</i>
broom, native	<i>Carmichaelia</i> sp.
*browntop	* <i>Agrostis capillaris</i>
bull kelp	<i>Durvillaea antarctica</i> and <i>D. willana</i>
bush nettle	<i>Urtica ferox</i>
bush snowberry	<i>Gaultheria antipoda</i>
*buttercup, creeping	* <i>Ranunculus repens</i>

cabbage tree
 cabbage tree, broad-leaved
 cabbage tree, mountain
 *Californian thistle
 cedar
 *cherry plum
 *cherry, wild
 clematis, leafless
 climbing fuchsia
 climbing groundsel
 *cocksfoot
 *crack willow
 *creeping bent
 *creeping buttercup
 *crested dogtail
 *currant, flowering
 *cypresses

daisy, Akaroa
 daisy, tree
 dock, native
 *Douglas fir
 dwarf heath
 dwarf kōwhai
 dwarf mistletoe

easter orchid
 *elderberry
 *elm
 *fern, male
 fern, velvet
 fern, water
 ferns, filmy
 ferns, tree
 *fescue, tall
 fescue tussock
 fescue tussock, blue
 fierce lancewood
 filmy ferns
 *fir, Douglas
 *firs
 fivefinger, lowland
 fivefinger, mountain
 flax, lowland
 flax, mountain
 *flowering currant
 *fog, Yorkshire
 fragrant tree daisy
 fuchsia, climbing

Cordyline australis
Cordyline indivisa
Cordyline indivisa
 **Cirsium arvense*
Libocedrus bidwillii
 **Prunus cerasifera*
 **Prunus avium*
Clematis afoliata
Fuchsia perscandens
Brachyglottis sciadophila
 **Dactylis glomerata*
Salix fragilis
 **Agrostis stolonifera*
 **Ranunculus repens*
 **Cynosurus cristatus*
 **Ribes sanguineum*
 **Cupressus* spp.

Celmisia mackau
Olearia spp.
Rumex flexuosus
 **Pseudotsuga menziesii*
Pentachondra pumila and *Leucopogon fraseri*
Sophora prostrata
Korthalsella spp.

Earina autumnalis
 **Sambucus nigra*
 **Ulmus* spp.
 **Dryopteris filix-mas*
Lastreopsis velutina
Histiopteris incisa
Hymenophyllum spp. and *Trichomanes* spp.
Cyathea spp. and *Dicksonia* spp.
 **Festuca arundinacea*
Festuca novae-zelandiae
Festuca sp.
Pseudopanax ferox
Hymenophyllum spp. and *Trichomanes* spp.
 **Pseudotsuga menziesii*
 **Abies* spp.
Pseudopanax arboreus
Pseudopanax colensoi
Phormium tenax
Phormium cookianum
 **Ribes sanguineum*
Holcus lanatus
Olearia fragrantissima
Fuchsia perscandens

fuchsia, shrubby

fuchsia, tree

gentians

goblin moss

*gooseberry

*gorse

*grey willow

groundsel, climbing

harsh-leaved tree fern

*hawkweed, mouse-ear

*hawkweeds

*hawthorn

heath, dwarf

hebe, Banks Peninsula

*hemlock

*Himalayan honeysuckle

*holly

holly, mountain

holy grass

*honeysuckle, Himalayan

*honeysuckle, Japanese

*horehound

*horned poppy

horoeke

horopito

houhere

houi

*ice plant

ice plant, native

inaka

*inkweed

Irishman, wild

*ivy

kahikatea

kaikōmako

kānuka

kāpuka

(*)karaka

karamū

kātote

*kauri

kawakawa

kelp, bladder

kelp, bull

Fuchsia excorticata x *perscandens*

(= *F. x colensoi*)

Fuchsia excorticata

Gentiana spp.

Weymouthia mollis

**Ribes uva-crispa*

**Ulex europaeus*

**Salix cinerea*

Brachyglottis sciadophila

Dicksonia squarrosa

**Hieracium pilosella*

**Hieracium* spp.

**Crataegus monogyna*

Pentachondra pumila and

Leucopogon fraseri

Hebe lavaudiana

**Conium maculatum*

**Leycesteria formosa*

**Ilex aquifolium*

Olearia ilicifolia

Hierochloa redolens

**Leycesteria formosa*

**Lonicera japonica*

**Marrubium vulgare*

**Glaucium flavum*

Pseudopanax crassifolius

Pseudowintera colorata

Hoheria spp.

Hoheria spp.

**Carpobrotus edulis*

Disphyma australe

Dracophyllum acerosum

**Phytolacca octandra*

Discaria toumatou

**Hedera helix*

Dacrycarpus dacrydioides

Pennantia corymbosa

Kunzea ericoides

Griselinia lucida

(*)*Corynocarpus laevigatus*

Coprosma robusta and *C. lucida*

Cyathea smithii

**Agathis australis*

Macropiper excelsum

Macrocystis pyrifera

Durvillaea antarctica and *D. willana*

kōhūhū
 koromiko
 kōtukutuku
 kōwhai
 kōwhai, dwarf
 kōwhai, prostrate

lacebark, narrow-leaved
 lancewood, common
 lancewood, fierce
 lawyer
 lawyer, leafless
 leafless clematis
 leafless lawyer
 lemonwood
 lily of the valley shrub
 lowland fivefinger
 lowland flax
 lowland ribbonwood
 lowland tōtara
 *lyme grass

*macrocarpa
 māhoe
 māhoe, shrubby
 *male fern
 *mallow, tree
 mamaku
 mānātu
 mānuka
 māpou
 māpou, weeping
 marbleleaf
 matagouri
 matai
 mikimiki
 mikimiki, prickly
 milk tree, small-leaved
 *miner's lettuce
 miro
 mistletoe

mistletoe, dwarf
 *monkey musk
 *Montpelier broom
 moss, goblin
 mountain akeake
 mountain beech
 mountain cabbage tree
 mountain fivefinger

Pittosporum tenuifolium
Hebe salicifolia
Fuchsia excorticata
Sophora microphylla
Sophora prostrata
Sophora prostrata

Hoheria angustifolia
Pseudopanax crassifolius
Pseudopanax ferox
Rubus spp.
Rubus squarrosus
Clematis afoliata
Rubus squarrosus
Pittosporum eugenioides
Gaultheria crassa
Pseudopanax arboreus
Phormium tenax
Plagianthus regius
Podocarpus totara
 **Leymus racemosus*

**Cupressus macrocarpa*
Melicytus ramiflorus
Melicytus micranthus
 **Dryopteris filix-mas*
 **Lavatera arborea*
Cyathea medullaris
Plagianthus regius
Leptospermum scoparium
Myrsine australis
Myrsine divaricata
Carpodetus serratus
Discaria toumatou
Prumnopitys taxifolia
Coprosma spp., *Cyathodes* spp.
Cyathodes juniperina
Streblus heterophyllus
 **Claytonia perfoliata*
Prumnopitys ferruginea
Ileostylus micranthus
Tupeia antarctica
Korthalsella spp.
 **Mimulus guttatus*
 **Teline monspessulana*
Weymouthia mollis
Olearia avicenniifolia
Nothofagus solandri
Cordyline indivisa
Pseudopanax colensoi

mountain flax
 mountain holly
 *mouse-ear hawkweed
 *musk
 *musk, monkey
 musk, native
 myrtle, native

narrow-leaved lacebark
 *nasella
 native broom
 native carrot
 native cedar
 native climbing groundsel
 native dock
 native ice plant
 native myrtle
 native passion vine
 *needle grass
 nettle, bush
 nettle, tree
 nettles
 *nettles
 ngaio
 nīkau palm
 niniao
 *nodding thistle

*oaks
 *old man's beard (clematis)
 old man's beard (lichen)
 ongaonga
 orchid, easter
 orchid, spider

palm, nīkau
 pāpāuma
 *parsley
 *passion vine, banana
 passion vine, native
 pate
 pepper tree

pepperwood
 *periwinkle
 pigeonwood
 *pine, radiata
 pīngao
 *plane
 poataniwha

Phormium cookianum
Olearia ilicifolia
 **Hieracium pilosella*
 **Mimulus moschatus*
 **Mimulus guttatus*
Mimulus repens
Lophomyrtus obcordata

Hoheria angustifolia
 **Nasella trichotoma*
Carmichaelia sp.
Daucus glochidiatus
Libocedrus bidwillii
Brachyglottis sciadophila
Rumex flexuosus
Disphyma australe
Lophomyrtus obcordata
Passiflora tetrandra
 **Stipa nodosa* and **S. scabra*
Urtica ferox
Urtica ferox
Urtica spp.
Urtica spp.
Myoporum laetum
Rhopalostylis sapida
Helichrysum lanceolatum
 **Carduus nutans*

**Quercus* spp.
 **Clematis vitalba*
Usnea spp.
Urtica ferox
Earina autumnalis
Corybas spp.

Rhopalostylis sapida
Griselinia littoralis
 **Petroselinum crispum*
 **Passiflora mollissima*
Passiflora tetrandra
Schefflera digitata
Macropiper excelsum and
Pseudowintera colorata
Pseudowintera colorata
 **Vinca major*
Hedycarya arborea
 **Pinus radiata*
Desmoschoenus spiralis
 **Platanus* spp.
Melicope simplex

podocarps

pōhuehue
 pōhuehue, scrub
 pōkākā
 ponga
 *poppy, horned
 porcupine shrub
 porokaiwhiri
 poroporo
 prickly mikimiki
 prostrate kōwhai
 *pūriri
 putaputāwētā

*radiata pine
 *ragwort
 *ramarama
 *rangiora
 raukawa
 raupō
 red beech
 *rewarewa
 ribbonwood, lowland
 ribbonwood, saltmarsh
 rimu
 *ripgut brome
 *rocket, sea
 rōhutu

rushes
 *ryegrass

*saltbush
 saltmarsh ribbonwood
 *sea barley grass
 *sea rocket
 sea rush
 *Scotch thistle
 scrub pōhuehue
 sevenfinger
 shining broadleaf
 shrubby fuchsia

shrubby māhoe
 shrubby wineberry
 *silver beech
 silver fern
 silver tree tern

members of the family Podocarpaceae,
 in the genera *Podocarpus*, *Dacrycarpus*
 and *Prumnopitys*

Muehlenbeckia australis
Muehlenbeckia complexa
Elaeocarpus hookerianus
Cyathea dealbata
 **Glaucium flavum*
Melicytus alpinus
Hedycarya arborea
Solanum laciniatum and *S. aviculare*
Cyathodes juniperina
Sophora prostrata
Vitex lucens
Carpodetus serratus

**Pinus radiata*
 **Senecio jacobaea*
 **Lophomyrtus bullata*
 **Brachyglottis repanda*
Pseudopanax edgerleyi
Typha orientalis
Nothofagus fusca
Knightia excelsa
Plagianthus regius
Plagianthus divaricatus
Dacrydium cupressinum
 **Bromus diandrus*
 **Cakile edentula*
Lophomyrtus obcordata and
Neomyrtus pedunculata
Juncus spp.
 **Lolium perenne* and **L. multiflorum*

**Chrysanthemoides monolifera*
Plagianthus divaricatus
 **Hordeum marinum*
 **Cakile edentula*
Juncus maritimus
 **Cirsium vulgare*
Muehlenbeckia complexa
Schefflera digitata
Griselinia lucida
Fuchsia excorticata x *perscandens*
 (= *F. x colensoi*)
Melicytus micranthus
Aristotelia fruticosa
 **Nothofagus menziesii*
Cyathea dealbata
Cyathea dealbata

silver tussock
 small-leaved milk tree
 snowberry
 snowberry, bush
 snow tussock
 snow tussock, narrow-leaved
 soft-leaved tree tern
 *Spanish heath
 spider orchids
 *spindleberry
 *spur valerian
 *sweet brier
 *sweet vernal
 *sycamore

*tagasaste
 *tall fescue
 tauhinu
 *tawa
 thin-bark tōtara
 *thistle, Californian
 *thistle, nodding
 *thistle, Scotch
 *thistle, variegated
 *thistle, winged
 three-square
 tī
 tītōki
 toetoe
 tōi
 tōtara, lowland
 tōtara, thin-bark
 tree daisy
 tree daisy, fragrant
 tree ferns
 tree fern, harsh-leaved
 tree fern, silver
 tree fern, soft-leaved
 tree fuchsia
 *tree lucerne
 *tree mallow
 tree nettle
 tree tutu
 tūrepo
 turpentine scrub
 tussock, blue fescue
 tussock, fescue
 tussock, silver
 tussock, snow
 *tutsan

Poa cita
Streblus heterophyllus
Gaultheria depressa
Gaultheria antipoda
Chionochloa spp.
Chionochloa rigida
Cyathea smithii
 **Erica lusitanica*
Corybas spp.
 **Euonymus europaeus*
 **Centranthus ruber*
 **Rosa rubiginosa*
 **Anthoxanthum odoratum*
 **Acer pseudoplatanus*

**Chamaecytisus palmensis*
 **Festuca arundinacea*
Cassinia leptophylla
 **Beilschmiedia tawa*
Podocarpus hallii
 **Cirsium arvense*
 **Carduus nutans*
 **Cirsium vulgare*
 **Silybum marianum*
 **Carduus pycnocephalus* and **C. tenuiflorus*
Schoenoplectus pungens
Cordyline australis
Alectryon excelsus
Cortaderia richardii
Cordyline indivisa
Podocarpus totara
Podocarpus hallii
Olearia spp.
Olearia fragrantissima
Cyathea spp. and *Dicksonia* spp.
Dicksonia squarrosa
Cyathea dealbata
Cyathea smithii
Fuchsia excorticata
 **Chamaecytisus palmensis*
 **Lavatera arborea*
Urtica ferox
Coriaria arborea
Streblus heterophyllus
Dracophyllum acerosum
Festuca sp.
Festuca novae-zelandiae
Poa cita
Chionochloa spp.
 **Hypericum androsaemum*

tutu	<i>Coriaria</i> spp.
tutu, tree	<i>Coriaria arborea</i>
umbrella fern	<i>Sticherus cunninghamii</i>
*variegated thistle	* <i>Silybum marianum</i>
velvet fern	<i>Lastreopsis velutina</i>
*wallflower	* <i>Cheiranthus cheirii</i>
*watercress	* <i>Rorippa microphyllum</i> and * <i>R. nasturtium-aquaticum</i>
waterfern	<i>Histiopteris incisa</i>
weeping māpou	<i>Myrsine divaricata</i>
whē	<i>Cyathea smithii</i>
whēkī	<i>Dicksonia squarrosa</i>
whēkī - ponga	<i>Dicksonia fibrosa</i>
whiteywood	<i>Melicytus ramiflorus</i>
*wild cherry	* <i>Prunus avium</i>
wild Irishman	<i>Discaria toumatou</i>
*wild parsley	* <i>Petroselinum crispum</i>
*willows	* <i>Salix</i> spp.
*willow, crack	* <i>Salix fragilis</i>
*willow, grey	* <i>Salix cinerea</i>
wineberry	<i>Aristotelia serrata</i>
wineberry, shrubby	<i>Aristotelia fruticosa</i>
*winged thistle	* <i>Carduus pycnocephalus</i> and * <i>C. tenuiflorus</i>
wire bush	<i>Muehlenbeckia complexa</i>
woolly alpine moss	<i>Racomitrium lanuginosum</i>
yellow-wood	<i>Coprosma linariifolia</i>
*Yorkshire fog	* <i>Holcus lanatus</i>

APPENDIX 3 CHECKLIST OF FISHES

Symbols		
	o	native
	*	introduced
	?	current presence needs confirming
o	Lamprey	korokoro <i>Geotria australis</i>
*	Brown trout	<i>Salmo trutta</i>
*	Quinnat salmon	<i>Onchorhynchus tshawytscha</i>
o	Smelt	<i>Stokiella anisodon</i>
o	Smelt	<i>Retropinna osmeroides</i>
o	Smelt	paraki, inanga <i>Retropinna retropinna</i>
o	Whitebait	inanga <i>Galaxias maculatus attenuatus</i>
o	Whitebait	<i>Galaxias brevipinnis</i>
o	Whitebait	<i>Galaxias fasciatus</i>
o	Whitebait	<i>Galaxias argenteus</i>
o	Whitebait	<i>Galaxias vulgaris</i>
o ?	Canterbury mudfish	hauhau, waikaka <i>Neochanna burrowsius</i>
o	Short-finned eel	tuna <i>Anguilla australis schmidtii</i>
o	Long-finned eel	tuna <i>Anguilla dieffenbachii</i>
*	Perch	<i>Perca fluviatilis</i>
*	Goldfish	<i>Carassius auratus</i>
o	Torrent fish	<i>Cheimarrhys forsteri</i>
o	Common lowland bully	hawai, toitoi <i>Gobiomorphus basalis</i>
o	Large estuarine bully	<i>Gobiomorphus gobioides</i>
o	Red-finned bully	<i>Gobiomorphus huttoni</i>
o ?	Upland bully	<i>Philypnodon breviceps</i>
o	Swiftwater bully	<i>Philypnodon hubbsi</i>
o	Yellow-eyed mullet	aua, raukura <i>Aldrichetta forsteri</i>

- | | | |
|---|----------------------|---------------------------------------|
| o | Black flounder | pātiki
<i>Rhombosolea retiaria</i> |
| o | Yellowbelly flounder | pātiki
<i>Rhombosolea leporina</i> |

[Note: The Māori language has a rich vocabulary for fish species, including names for different stages of maturity, etc, and the few names given in this list do not reflect this richness at all.]

APPENDIX 4 CHECKLIST OF AMPHIBIANS AND REPTILES

Symbols o native
 * introduced and more or less naturalised

*	Frog	<i>Litoria raniformis</i>
*	Whistling frog	<i>Litoria ewingi</i>
o	Jewelled gecko	<i>Heteropholis gemmeus</i>
o	Common gecko	<i>Hoplodactylus maculatus</i> agg. (the large, blue-tongued form at least is present)
o	Spotted skink	<i>Leiopisma lineocellatum</i>
o	Common skink	<i>Leiopisma nigriplantare</i> <i>maccanni</i>

APPENDIX 5 CHECKLIST OF BIRDS

Symbols	o	native
	⊙	native, but self-introduced and established as breeding populations in New Zealand only since European settlement
	⊖	regular migratory species
	+	believed to breed in Region
	?	current presence needs confirming
	-	rare vagrant or straggler
	*	introduced and more or less naturalised

o +	Yellow-eyed penguin	hoiho <i>Megadyptes antipodes</i>
o +	White-flippered blue penguin	<i>Eudyptula minor albosignata</i>
o	Southern crested grebe	<i>Podiceps cristatus australis</i>
o +	Fairy prion	tītī wainui <i>Pachyptila turtur</i>
o +	Shooty shearwater	tītī, muttonbird <i>Puffinus griseus</i>
o	Northern giant petrel	nelly <i>Macronectes halli</i>

[Note: Other oceanic petrels such as mollymawks, albatrosses, cape pigeons, storm petrels, shearwaters, diving petrels, etc, are not readily seen from or on land in Banks Ecological Region. They are not listed in full although they may occasionally be viewed from headlands. They are readily seen from boats a short distance offshore, and storm-wrecked bodies are sometimes found on beaches.]

o	Australasian gannet	tākapu <i>Sula bassana serrator</i>
o +	Black shag	kawau, great cormorant <i>Phalacrocorax carbo</i>
o +	Little shag	kawaupaku, little pied cormorant <i>Phalacrocorax melanoleucos</i>
o	Little black shag	little black cormorant <i>Phalacrocorax sulcirostris</i>
o +	Spotted shag	pārekareka <i>Stictocarbo punctatus</i>
⊙ +	White-faced heron	<i>Ardea novaehollandiae</i> <i>novaehollandiae</i>

o	Kōtuku	white heron <i>Egretta alba modesta</i>
o	?Reef heron	matuku moana <i>Egretta sacra sacra</i>
⊙	Cattle egret	<i>Bubulcus ibis coromandus</i>
o	?Australasian bittern	matuku <i>Botaurus stellaris poiciloptilus</i>
o	Royal spoonbill	kōtuku ngutupapa <i>Platalea leucorodia regia</i>
o +	Paradise shelduck	pūtangitangi <i>Tadorna variegata</i>
o +	Grey duck	pārera <i>Anas superciliosa superciliosa</i>
o	Grey teal	tētē <i>Anas gibberifrons gracilis</i>
o	New Zealand shoveler	kuruwhengi <i>Anas rhynchotis variegata</i>
o +	Australasian harrier	kāhu <i>Circus approximans</i>
o -	New Zealand falcon	kārearea <i>Falco novaeseelandiae</i>
o +	Pūkeko	<i>Porphyrio porphyrio melanotus</i>
o	South Island pied oystercatcher	tōrea <i>Haematopus ostralegus finschi</i>
⊙ +	Spur-winged plover	<i>Vanellus miles novaehollandiae</i>
o +	Banded dotterel	pohowera, turiwhatu <i>Charadrius bicinctus</i>
⊖	Eastern bar-tailed godwit	kūaka <i>Limosa lapponica baueri</i>
o +	Pied stilt	poaka <i>Himantopus himantopus leucocephalus</i>

[Note: Many other species of waders are known from the adjacent Ellesmere Ecological District and some might be expected to visit Lake Forsyth from time to time. Also, the Port Hills Ecological District of Banks Ecological Region borders the Avon-Heathcote estuary in the Low Plains Ecological District, and other wader species occur here.]

o +	Southern black-backed bull	karoro <i>Larus dominicanus</i>
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o +	Red-billed gull	tarāpunga <i>Larus novaehollandiae scopulinus</i>
o	Black-billed gull	<i>Larus bulleri</i>
o	Caspian tern	tarānui <i>Hydroprogne caspia</i>
o	Black-fronted tern	tara <i>Sterna albobstriata</i>
o +	White-fronted tern	tara <i>Sterna striata</i>
o +	Kererū	wood pigeon, New Zealand pigeon <i>Hemiphaga novaeseelandiae</i>
⊖ +	Shining cuckoo	pīpīwharau <i>Chrysococcyx lucidus lucidus</i>
o +	Morepork	ruru <i>Ninox novaeseelandiae novaeseelandiae</i>
-	Australian barn owl	<i>Tyto alba delicatula</i>
o +	Kingfisher	kōtare <i>Halcyon sancta vagans</i>
o +	South Island rifleman	tītīpounamu <i>Acanthisitta chloris chloris</i>
⊙ +	Welcome swallow	<i>Hirundo tahitica neoxena</i>
o +	Pipit	pīhoihoi <i>Anthus novaeseelandiae novaeseelandiae</i>
o +	Brown creeper	pīpīpi <i>Finschia novaeseelandiae</i>
o +	Grey warbler	rīroriro <i>Gerygone igata</i>
o +	South Island fantail	pīwakawaka <i>Rhipidura fuliginosa fuliginosa</i>
o +	South Island tomtit	ngirungiru <i>Petroica macrocephala macrocephala</i>
⊙ +	Silvereye	waxeye, white-eye, tauhōu <i>Zosterops lateralis lateralis</i>
o +	Bellbird	korimako <i>Anthornis melanura</i>

o +	Tūī	<i>Prothemadera novaeseelandiae</i>
* +	Black swan	<i>Cygnus atratus</i>
* +	Canada goose	<i>Branta canadensis moffitti</i>
* +	Mallard	<i>Anas platyrhynchos</i> <i>platyrhynchos</i>
* +	Californian quail	<i>Lophortyx californica</i> <i>brunnescens</i>
* +	Pheasant	<i>Phasianus colchicus</i>
* +	Turkey	<i>Meleagris gallopavo</i>
* +	Rock pigeon	feral pigeon <i>Columba livia</i>
* +	Sulphur-crested cockatoo	<i>Cacatua galerita</i>
* +	Little owl	German owl <i>Athene noctua</i>
* +	Skylark	<i>Alauda arvensis arvensis</i>
* +	Dunnock	hedgesparrow <i>Prunella modularis occidentalis</i>
* +	Song thrush	<i>Turdus philomelos clarkei</i>
* +	Blackbird	<i>Turdus merula merula</i>
* +	Yellowhammer	<i>Emberiza citrinella caliginosa</i>
* +	Cirl bunting	<i>Emberiza cirlus cirlus</i>
* +	Chaffinch	<i>Fringilla coelebs gengleri</i>
* +	Greenfinch	<i>Carduelis chloris chloris</i>
* +	Goldfinch	<i>Carduelis carduelis britannica</i>
* +	Redpoll	<i>Carduelis flammea cabaret</i>
* +	House sparrow	<i>Passer domesticus domesticus</i>
* +	Starling	<i>Sturnus vulgaris vulgaris</i>
* +	White-backed Australian magpie	<i>Gymnorhina tibicen hypoleuca</i>
* +	Rook	crow <i>Corvus frugilegus frugilegus</i>

APPENDIX 6 CHECKLIST OF MAMMALS

Symbols	o	native
	*	introduced and more or less naturalised
	+	believed to breed in Region
	-	rare vagrant or straggler
	?	current presence needs confirming

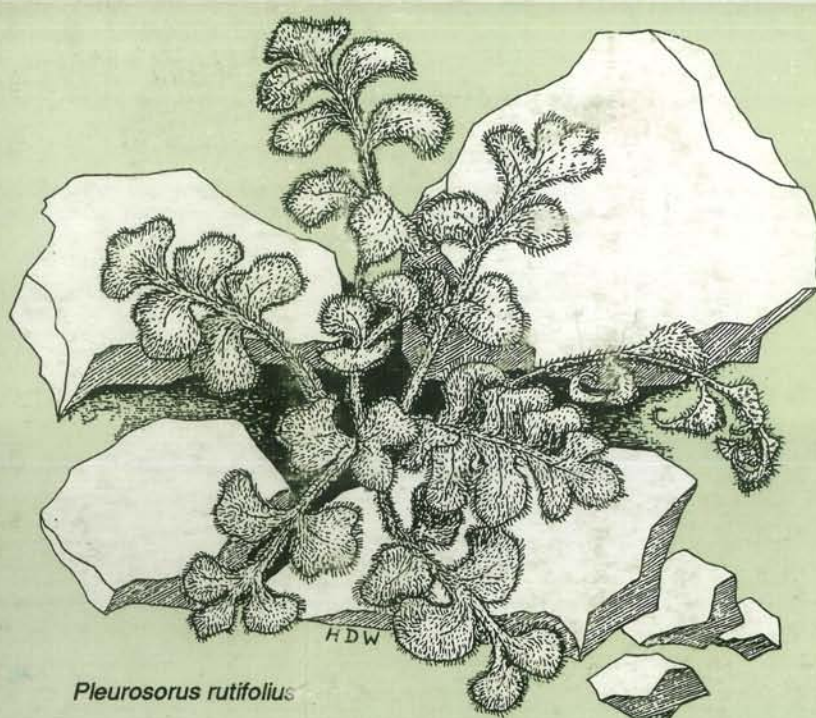
[Note: Sea mammals are included in this list only if they haul up on land in the Region, or are readily seen from the land close inshore.]

o	?Long-tailed bat	<i>Chalinolobus tuberculatus</i>
o	New Zealand fur seal	<i>Arctocephalus forsteri</i>
o -	Elephant seal	<i>Mirounga leonina</i>
o -	Leopard seal	<i>Hydrurga leptonyx</i>
o -	Hooker's sea-lion	<i>Phocarctos hookeri</i>
o	Hector's dolphin	<i>Cephalorhynchus hectori</i>
o	Common dolphin	<i>Delphinus delphis</i>
o	Bottlenose dolphin	<i>Tursiops truncatus</i>
o	Dusky dolphin	<i>Lagenorhynchus obscurus</i>
* +	Wild goat	<i>Capra hircus</i>
* +	Wild pig	<i>Sus scrofa</i>
* +	Hare	<i>Lepus europaeus</i>
* +	Rabbit	<i>Oryctolagus cuniculus</i>
* +	Hedgehog	<i>Erinaceus europaeus</i>
* +	Ferret	<i>Mustela putorius</i>
* +	Stoat	<i>Mustela erminea</i>
* +	Weasel	<i>Mustela nivalis</i>
* +	Brushtail possum	<i>Trichosurus vulpecula</i>
* +	Ship rat	<i>Rattus rattus</i>
* +	Norway rat	<i>Rattus norvegicus</i>
* +	Mouse	<i>Mus musculus</i>
* +	Cat	<i>Felis catus</i>
* +	Cattle	<i>Bos taurus</i>
* +	Sheep	<i>Ovis aries</i>
+	Red deer	<i>Cervus elaphus</i>

[Any occurrence of feral cattle or sheep appears to be very local and temporary. Red deer are not yet known to have gone wild on Banks Peninsula. From time to time wild pig are reported, resulting from escaped farm animals, and there are currently pigs in the Mount Herbert - Kaituna Valley area that appear to be wild.]

* + Human beings

Homo sapiens



Pleurosorus rutifolius