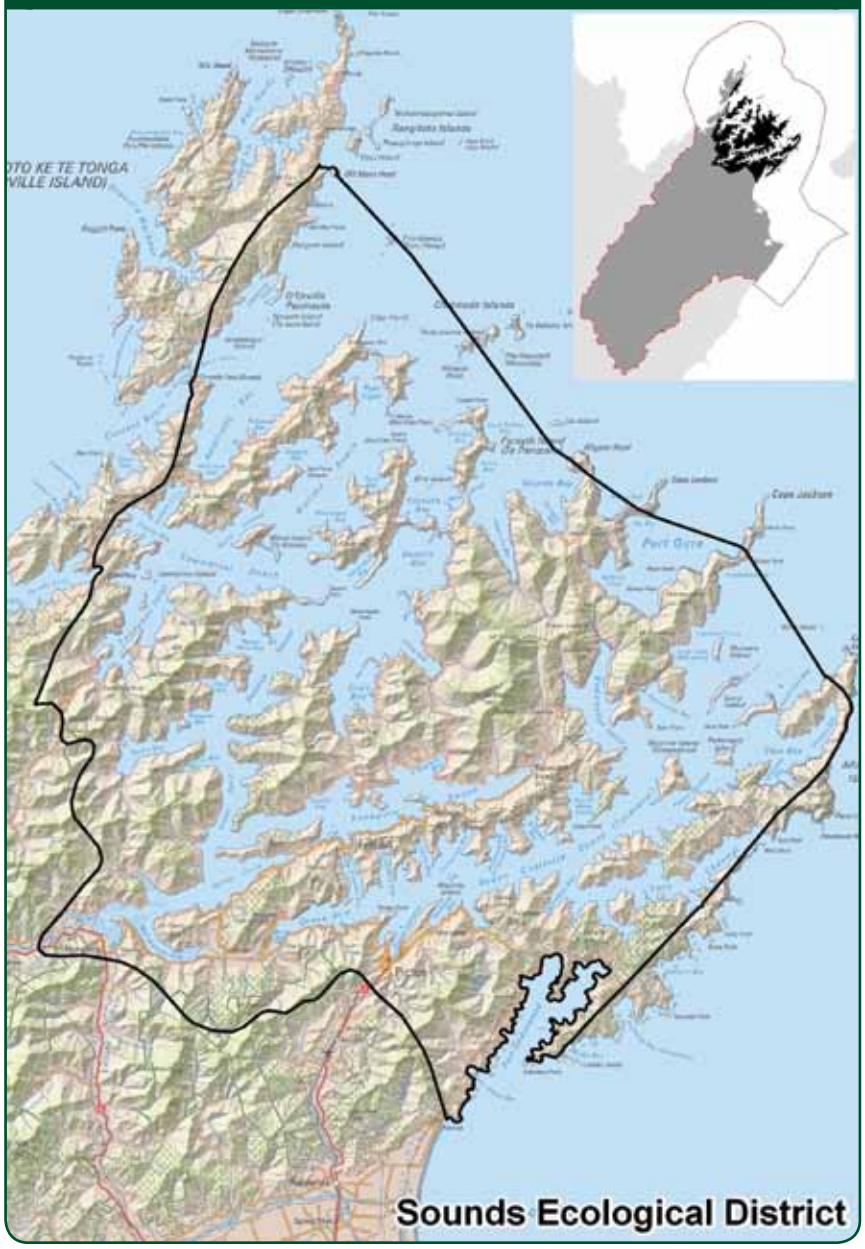
SOUNDS ECOLOGICAL DISTRICT

MAP 4 - SOUNDS ECOLOGICAL DISTRICT



OVERVIEW

The Sounds Ecological District is one of four forming the Sounds-Wellington Ecological Region. It forms the largest and central district, and includes the entire Marlborough Sounds except the very outer reaches, Croisilles Harbour and western D'Urville Island. It is a wonderfully complex labyrinth of convoluted land and waterways ("drowned valleys"), with a robust but rather benign climate. The topography includes peninsulas, headlands, steep hills, strong ridges, gullies and confined flats and inlets. There are several substantial islands within each of the two main sounds, Pelorus and Queen Charlotte, and some smaller islets. The highest point is Mt Stokes (1203m), high enough to have an alpine character.

The geology is complex. In the west is Permian argillite and igneous conglomerate, with some areas of ultramafic "Mineral Belt" rocks and volcanics. In the centre is Carboniferous greywacke and argillite, and in the east is Carboniferous Marlborough schist. These are arranged in belts or strips along a NE-SW axis. D'Urville Island has only been separated from the mainland since the last glacial period.

The climate has prevailing west to north-west winds with fairly frequent gales, reliable rainfall, warm summers and mild winters. Soils are steepland soils formed from the parent rocks and include fragmented solifluction debris. They are moderately fertile as a rule, but in the higher rainfall areas are leached and have infertile podzols. In the ultramafic areas, the unusual concentrations of metallic minerals creates soils that inhibit plants such as broadleaved trees and pasture grasses.

The pre-human vegetation cover would have been almost entirely forest, except for eroding scarps, beaches, water bodies and at the summit of Mt Stokes. Much of the forest has been cleared for farming or timber. Hard beech is dominant in most remaining forest areas up to about 500m, with black beech on spurs, kamahi common and some rimu. In the gullies and fertile lower slopes is lush broadleaved forest containing kohekohe, pukatea, tawa and nikau, sometimes with large rimu, matai and kahikatea. There is usually a profusion of ferns, climbers and epiphytes in these forests. Between 500 and 700m in altitude the forest is generally dominated by red beech, with kamahi and silver beech. Southern rata and Hall's totara often occur on ridge crests. Above 700m, the forest is dominated by silver beech, with mountain beech on some western peaks. On the summit of Mt Stokes, above 1100m, is alpine vegetation of snowgrass, alpine daisies and cushion plants, with a fringe of "stoppy-

stop" (leatherwood or tupare, *Olearia colensoi*) scrub. Ultramafic areas retain a little of the former forest cover of hard beech, kamahi and southern rata, but most has been burnt and now supports tight scrub of manuka, inaka (*Dracophyllum filifolium*), tauhinu and other shrubs. Areas of former forest not now in pasture or exotic pines are clad in scrub or regenerating low forest. Kanuka, manuka, tauhinu, gorse and Spanish heath are abundant in such vegetation at an early stage in regeneration, in drier sites or where there is continued grazing. Later in the regeneration process and in gullies, the dominant plants are kanuka and/or numerous broadleaved trees such as five-finger, mahoe, karamu, heketara and putaputaweta, usually with an abundance of tree ferns. Wilding pines are the main weed threat to these areas.

The flora has features of significance such as plants peculiar to the summit of Mt Stokes. These include the distinctive daisy *Celmisia macmahonii* var. *macmahonii* and species confined to the ultramafics. Cook's scurvy grass, once abundant around the coast, has virtually disappeared but still occurs on some islands. D'Urville Island is rather special; because it is possum-free it still has an abundance of mistletoes. It also has threatened plants such as shore milkweed (*Euphorbia glauca*), neinei (*Dracophyllum urvilleanum*) and wind grass (*Anemanthele lessoniana*).

The fauna includes most of the coastal, wetland and bush birds of the region. Threatened species include New Zealand falcon, marsh crake, kereru and South Island kaka. Sadly, little spotted kiwi have disappeared in recent decades from their former range, but have been rescued on some predator-free islands. Weka are still common. There is a nationally endangered endemic frog, Maud Island frog (*Leiopelma pakeka*), found only on the island that gives it its name. Lizards (skinks and geckos) are fairly common still, and the giant landsnails *Powelliphanta hochstetteri obscura* and *Powelliphanta hochstetteri bicolor* are still present. Native fish, including eels, galaxiids and bullies, occur in most streams and wetlands.

People have lived in this area for many centuries. Evidence of former Maori settlement - middens, terraces, pits and worked stone material - occur in many places. There are extensive prehistoric quarries, particularly on D'Urville Island, from which material and artefacts were moved throughout the country. Some of the forest cover was burnt during the pre-European period of settlement, but most of the clearance happened since European arrival. Ship Cove is famous for being used by Captain Cook during his explorations in the late 18th century. He liberated pigs and goats for the first time in New Zealand there. The patterns of farming, established during the latter 19th century and early 20th century, still remain. However, they are becoming increasingly replaced by exotic forestry and coastal settlement. In a remarkable reversal of the former trend of destruction and alienation of the indigenous ecosystems, some modern landowners are returning their land to native forest and are tackling pests so that the native fauna and flora can flourish.

Weeds that pose serious ecological threats are wilding conifers (mostly pines) and several vines of which old man's beard is worst. Animal pests are feral pigs, deer, goats and possums, and smaller predators such as rodents, mustelids and hedgehogs. Wasps are also an ecological problem. Techniques for dealing with all these pests are available and with regular control it is possible to keep the threats to a minimum.

The Department of Conservation manages an extensive network of reserves throughout the ecological district. There are areas of private land with protection as QEII National Trust Open Space Covenants. Threatened plant and animal species are being managed on several of the islands, notably Maud Island in Pelorus Sound and Motuara Island in Queen Charlotte Sound.

SURVEY RESULTS

Of the 77 properties where the owners were approached, 61 were surveyed. A total of 182 significant sites were identified. These have a combined area of 11,479 ha and make up approximately 9.5% of the total land area of the ecological district. They are classified into 20 basic categories or ecosystem types (see Table 4). They are mostly native forests, the most extensive being kanuka and beech forests, but there are also several other forest types, coastal sites (including wetlands and a stonefield), inland sites, upland sites and shrublands. Most sites have high ecological values, reflecting the high topographic and biological diversity of the Marlborough Sounds and its hinterland.

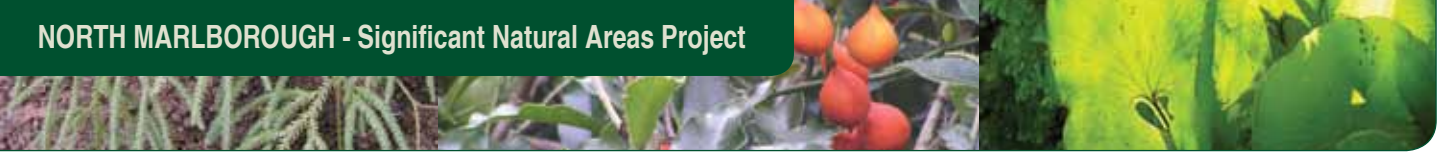


TABLE 4 - SITES IDENTIFIED IN THE SOUNDS ECOLOGICAL DISTRICT

Ecosystem type	Total number of sites	Total area (ha)	% private land area of Ecological District	% total area of Ecological District (DoC and private)
Coastal dune and beach communities	4	22		
Coastal rocky scarp and cliff communities	12	175		
Coastal rock and stonefield communities	1	2		
Coastal wetlands	6	28		
Estuarine vegetation	1	2		
Inland wetlands	2	8		
Riparian communities	2	9		
Lowland shrublands	10	487		
Mixed broadleaved–treefern communities	9	126		
Alluvial valley and coastal flats forests	5	38		
Kohekohe forests	20	115		
Broadleaved forests (coastal gullies)	23	542		
Broadleaved forests (inland gullies and faces)	12	209		
Beech forests	17	1,333		
Lowland podocarp-beech forests	2	341		
Lowland podocarp-broadleaved forests	11	561		
Podocarp-broadleaved-beech forests	8	498		
Upland podocarp-beech forests	1	760		
Kanuka forests	34	5,988		
Manuka forests	3	235		
Total	**182**	**11,479**	**16%**	**9.5%**

ECOSYSTEMS FOUND

The original vegetation cover of the Sounds Ecological District has been disturbed, modified and cleared since human arrival. However, much remains more or less intact and prolific natural regeneration has restored many areas, providing opportunities for protection and enhancement. Some landowners have formally protected natural areas on their land, and are tackling weeds and animal pests. The local community (through the Marlborough Sounds Restoration Trust), MDC and DOC are coordinating protection work on a larger scale, such as eradication of wilding pines that occur on many private properties and conservation land. The main ecosystems found were:

COASTAL DUNE AND BEACH COMMUNITIES

Dunes are very rare in the ecological district, confined to a few beaches in Port Underwood.

COASTAL ROCKY SCARP AND CLIFF COMMUNITIES

The coast is largely rocky, with steep scarps gnawed at by the sea. They are the habitat of a suite of specialist shore plants and birds such as shags, gulls, terns and little blue penguin.

COASTAL ROCK AND STONEFIELD COMMUNITIES

One site found only.

COASTAL WETLANDS

Coastal wetlands occur in several places; usually quite modified but readily recoverable with stock exclusion.

ESTUARINE VEGETATION

Mostly confined to small sheltered sites, but on a larger scale at places such as Nydia Bay.

INLAND WETLANDS

Rare in the ecological district; two sites found during the survey.

RIPARIAN COMMUNITIES

Mostly highly modified or absent; two interesting sites found during the survey.

LOWLAND SHRUBLANDS

Abundant and widespread, usually on abandoned former farmland. Not identified as ecologically significant except where intermingled with older vegetation or providing habitat for threatened fauna such as giant land snails and lizards.

MIXED BROADLEAVED–TREE FERN COMMUNITIES

Quite common and widespread, usually the result of rapid regeneration following cessation of pastoral farming in gullies and on shaded faces.

ALLUVIAL VALLEY AND COASTAL FLATS FORESTS

Once occupied by towering native forests, but almost completely logged out and converted to pasture. There are a few precious remnants.

KOHEKOHE FORESTS

Only in the outer Sounds, in coastal gullies and on sunny faces. Formerly fairly extensive, but now mostly reduced to small vulnerable remnants. For them to flourish, stock exclusion is necessary. Possum-free sites, such as on D'Urville and Arapawa islands, are nationally important.

BROADLEAVED FORESTS (COASTAL GULLIES)

Occupying coastal gullies and shaded faces. Both natural and the result of regeneration following logging. Main tree species are tawa, pukatea, mahoe, nikau, ngaio and mamaku.

BROADLEAVED FORESTS (INLAND GULLIES AND FACES)

Occupying inland gullies and shaded faces. Main tree species are tawa, mahoe, kamahi, hinau, five-finger, tree fuchsia and putaputaweta.

BEECH FORESTS

Widespread and in many places dominant. They include black and hard beeches in the lowlands and red and silver beeches in the uplands. Podocarps (rimu, matai and miro) are often present.

LOWLAND PODOCARP-BEECH FORESTS

Uncommon, because the podocarps are mostly logged out.

LOWLAND PODOCARP-BROADLEAVED FORESTS

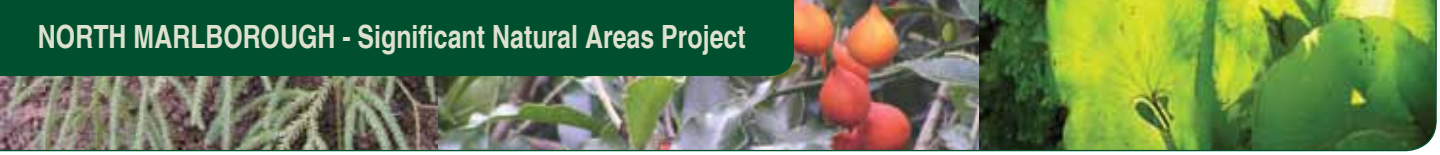
In places where the soil is relatively fertile. The podocarps (especially kahikatea and matai) are often young, having grown up since the old adults were logged.

PODOCARP-BROADLEAVED-BEECH FORESTS

Occurring where a wide range of tree species intermingle, although often the beeches are on dry spurs, the broadleaved trees are in the gullies and the podocarps are in a variety of microsites.

UPLAND PODOCARP-BEECH FORESTS

Above about 500m altitude in the cloud forest zone. The podocarps are Hall's totara and miro.



KANUKA FORESTS

Widespread in the North Marlborough lowlands, the result of prolonged regeneration following forest clearance and farming. If not unduly disturbed, provide good habitat for the regeneration of ferns and tree species that will eventually take over. Manuka is usually present and in a few places is dominant. Good for native ground orchids.

MANUKA FORESTS

Low regenerating forests in which the manuka remains dominant, not yet outgrown by kanuka, broadleaved species, podocarps or tree ferns.

SPECIAL FEATURES

The ecological district has a complex interplay of land and water, extending from the sheltered inner Sounds to the outer Sounds that are exposed to the turbulence of Cook Strait. Therefore there is a broad spectrum of biological features, with much local variation according to aspect, topography, geology and climate. The ecological district includes portions of D'Urville and Arapawa Islands (both large and possum-free), as well as numerous smaller islands, most of which play strong roles in the conservation of special native flora and fauna.

NATIVE FLORA

- There is distinct altitudinal zoning of the forest species, with consistent changes at about 500m and 700m asl. Many of the high ridges have a capping of cloud forest, festooned with mosses, lichens, filmy ferns and perching orchids.
- Estuarine communities are quite rare and fragmentary in the ecological district, although there is a major system at the mouth of the Pelorus River. They contain distinctive plants such as oioi (jointed rush, *Apodasmia similis*), salt marsh ribbonwood (*Plagianthus divaricatus*) and salt-tolerant turf species. The saline herbs also occur on headlands exposed to regular salt spray.
- There are small areas of the ultramafic zone on eastern D'Urville Island. They include the ultramafic endemics *Hebe urvilleana*, *Olearia serpentina*, an unnamed woollyhead (C*raspedia "serpentine"*) and a newly named gentian (*Gentianella stellata*). The suite of plant species in the native vegetation of the ultramafics is unusual and distinctive.
- D'Urville Island and Arapawa Island have many mistletoes because they are free of possums.
- The small alpine zone on the summit of Mt Stokes is highly distinctive. It includes the endemic mountain daisy *Celmisia macmahonii* var. *macmahonii*, a cushion bog and a fringe of "stoppy-stop" (*Olearia colensoi*).
- Other threatened and regionally rare plants that occur in the ecological district include large-leaved milk tree (*Streblus banksii*), fierce lancewood (*Pseudopanax ferox*), raukawa (*Raukaua edgerleyi*), the rosette daisy *Kirkianella "glauca"*, Cook Strait porcupine shrub (*Melicytus crassifolius*), *Melicytus* aff. *obovatus* and Cook Strait kowhai (*Sophora molloyi*).
- The localised presence of swamp maire (*Syzygium maire*), white maire (*Nestegis lanceolata*), black maire (*N. cunninghamii*) and rewarewa (*Knightia excelsa*) is interesting. They are at distribution limits and/or are anomalous.
- Kohekohe (*Dysoxylum spectabile*) dominates coastal forest in many places in the outer Sounds, imparting a subtropical ecological dimension. It is frequently accompanied by titoki, tawa, wharangi (*Melicope ternata*) and puka (*Griselinia lucida*).
- Karaka (*Corynocarpus laevigatus*), rengarenga (*Arthropodium cirratum*) and harakeke (*Phormium tenax*) occur in localised pockets. They are associated with past Maori settlement, particularly former garden sites. Stands of cabbage trees and occasional kowhai (*Sophora microphylla*) might also indicate former settlement sites.

NATIVE FAUNA

- Bush birds are still quite prevalent, due to the extent of bush cover and diversity of other native vegetation. The forests and shrublands support strong populations of tui, kereru, weka, bellbird, tomtit, brown creeper, silvereye, fantail and grey warbler (riroriro). Of note are the local occurrences of New Zealand robin, rifleman, kaka, kakariki and New Zealand falcon (karearea or sparrowhawk). New Zealand pipit is common in open places.
- Wetland birds have remaining habitats available to them. Ducks, paradise shelduck and pukeko are quite common in places. Of note are local records of banded rail, marsh crake and Australasian bittern.
- Coastal birds are common and include gulls, terns, shags, herons, oystercatchers, gannet and various transient waders. Of note are little blue penguin, king shag, pied shag, black shag, Caspian tern and reef heron: all are listed as nationally threatened. The recently established gannet colony at Waimaru Bay has dramatically expanded. Fluttering shearwater is frequently within the waterways of the Sounds, although it breeds on the Cook Strait islands. A recent sighting of a brown booby at D'Urville Island is of interest: this is a species of the tropics.
- Moa bones and gizzard stones have been found in the ecological district.
- The nationally endangered endemic Maud Island frog (*Leiopelma pakeka*) is found only on the island that gives it its name.
- Lizards (skinks and geckos) are quite common, especially in rock outcrops, screes, forest and shrubland. These habitats are also good for native invertebrates such as weta, ground beetles, moths and spiders. The giant land snails *Powelliphanta hochstetteri obscura* and *Powelliphanta hochstetteri bicolor* are still present in local populations, although severely threatened by feral pigs. Velvet worm (*Peripatus*) occurs in places.
- At least 14 species of native freshwater fish have been recorded from the rivers and streams of the ecological district. Of particular note are longfin eel, lamprey, giant kokopu and shortjaw kokopu.
- New Zealand fur seals are making a comeback and are frequent around the outer coasts. Dolphins regularly come into the Sounds.

SOUNDS ECOLOGICAL DISTRICT – PHOTO ESSAY

SOUNDS VEGETATION PATTERNS

A typical pattern of vegetation in the Sounds, with mature native forest on the upper slopes and lower slopes regenerating native vegetation invaded by wilding exotic pines, on the lower slopes which were logged and cleared for farming in the past.

KARAKA TREE

A karaka tree by the shore in a small bay. Its presence indicates former Maori settlement, as it was deliberately planted for food, although the fruit can be poisonous if not properly prepared.

MOA GIZZARD STONES

Rounded quartz moa gizzard stones like these can be found in places far from water - a link with the primeval ecosystem when birds were the dominant animals.

ARGILLITE ROCK FLAKES

Flakes of metasomatised argillite can be found on many beaches in the Marlborough Sounds, remnants of a former Maori culture with sophisticated stone-working skills. The argillite naturally occurs only in ultramafic areas, where it was quarried then distributed throughout New Zealand.

COASTAL WETLANDS

Coastal wetlands like this are rare in the Sounds, most having been cleared and drained for farming and settlement. If not disturbed, these sites can regain a natural appearance as plants like cabbage trees and harakeke (lowland flax) regenerate or grow from restoration plantings.

MARLBOROUGH GREEN GECKO

Prior to human arrival, lizards would have been abundant throughout the region. They now have to run the gauntlet of introduced predators and loss of suitable habitat. This gecko on Arapawa Island, is a rare yellow form of manuka gecko (*Naultinus manukanus*), also known as the Marlborough green gecko. This species is endemic to North Marlborough and is on the list of nationally threatened fauna.

GIANT FOREST TREES

Lowland forests throughout the Sounds have mostly been logged of their big old podocarp trees. Reminders of the former forest giants, such as these emergent rimu, remain in places.

KOHEKOHE FOREST REMNANTS

A kohekohe forest remnant on a pastoral farm distinguished by its bright green colour. These remnants provide shelter for stock but the understorey is almost completely lacking in these circumstances. Partial fencing, or fencing of some pockets so that there was still some stock shelter, would allow regeneration to occur and ensure a future for such sites.

SALT TURF AREAS

Salt turfs develop in exposed coastal places that are frequently lashed by wind-driven salt spray. They contain typical estuarine turf-forming native plants such as glasswort, iceplant, *Selliera radicans* and *Samolus repens*. Plants listed as at risk, such as the uncommon native sow thistle *Sonchus kirkii* and sea holly (*Eryngium vesiculosum*),are found at some sites.

COASTAL FOREST

Where lush forest comes down to the shore, it is possible to visualise the primeval forests that occupied most of the lowlands of the Sounds.

INSECTS

Large stick insects and a cicada on the trunk of a rohutu (*Lophomyrtus obcordata*) in riparian forest. They indicate the value of such forests to invertebrates, which in turn provide food for various native birds.

LOWLAND TOTARA

Lowland totara, once common in the Sounds, has been logged so systematically that few signs of its existence remain. This tongue of forest – mostly totara – on the valley floor of Manaroa is very special.