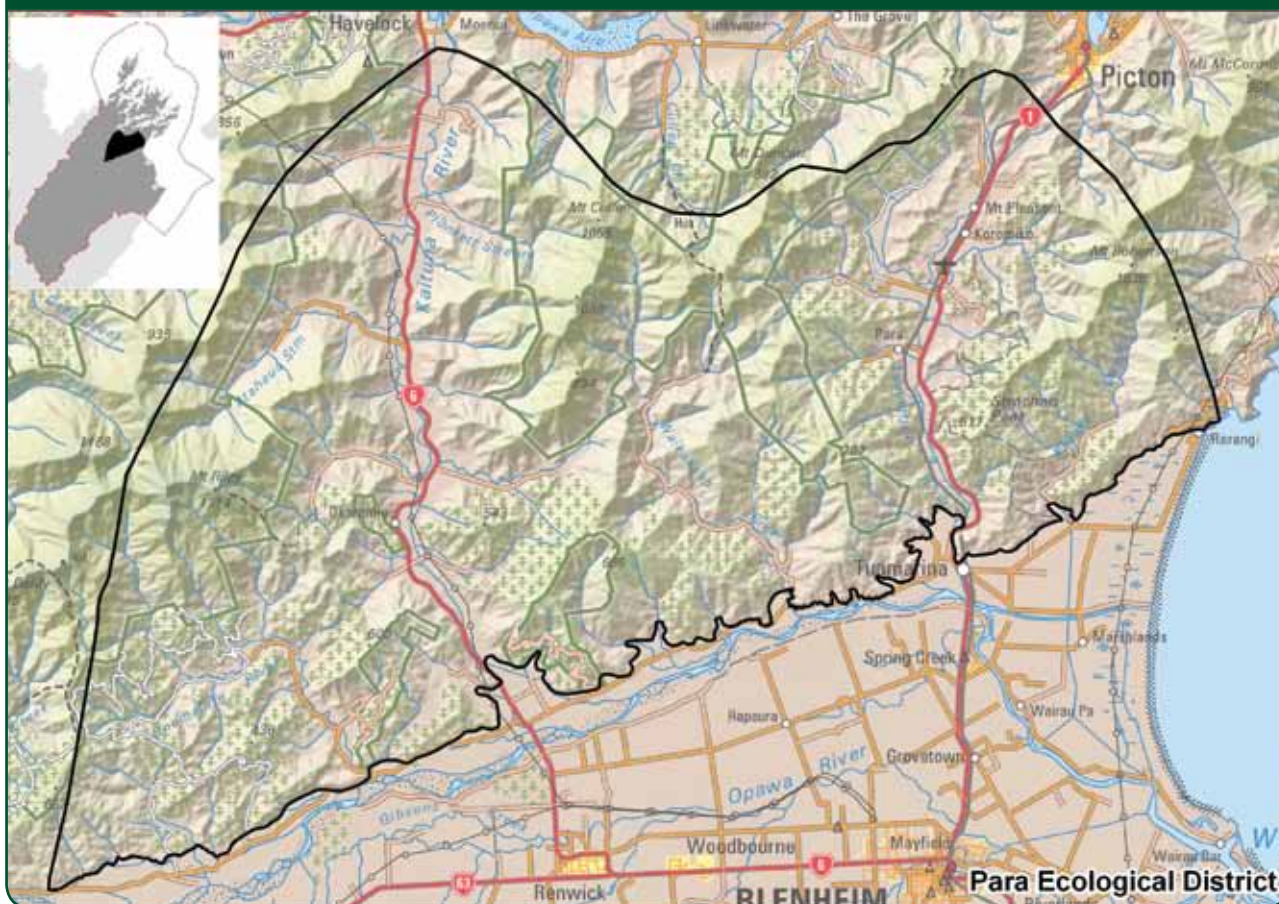


PARA ECOLOGICAL DISTRICT

MAP 6 - PARA ECOLOGICAL DISTRICT



OVERVIEW

The Para Ecological District is the eastern district of the three that form the Richmond Ecological Region. It occupies a transition zone between the humid temperate Marlborough Sounds, the mountains of the Richmond Range and dry southern Marlborough. It rises from sea level (at Rarangi) to 1314m (Mt Riley).

The Richmond Range and the southern Marlborough Sounds are composed of Palaeozoic rocks forming a general sequence north-west to south-east. This is a sequence of increasing metamorphism; in the NW the rocks retain their sedimentary character of greywacke and argillite. The central area is metamorphosed to a low grade schist (Chlorite Zone II), while the SE zone is a more completely metamorphosed schist (Chlorite Zone III). In the Para Ecological District the sequence is made complex by a series of fault lines. Most of the district is composed of Chlorite Zone III schist, but there is Chlorite Zone II schist and greywacke-argillite near Havelock and also to the east of Tuamarina and Picton. The main valleys have deposits of alluvium and terrace gravels. There is a unique series of well-preserved old beach ridges composed of gravels at the coast at Rarangi.

During its formation schist forms chemical layers such as mica and quartz, sometimes with gold in the quartz. The layers can separate when weathered (foliation) and hence the schist in the Para District can erode readily with slabs separating by foliation. This process, coupled with geological compression, tilting and uplift, creates rugged hill country with very steep slopes where the vegetation is always in a cycle of renewal. Schist also weathers into clay with low natural nutrient status but high water retention. Greywacke and argillite also weather into steep slopes and clays. This has influenced aspects of land use in the area.





The climate is generally moist, with annual rainfall ranging from 800-1600mm. Valley fogs are common in winter. The hill country of the district is cut by two major valleys, the Kaituna and the Tuamarina. Both are almost flat and probably represent the courses of big rivers that have since been diverted by tilting or uplift of the land. Swampy flood plains would have been typical, but most have been drained for farming; the largest remaining being the Para Wetland (Para Swamp). There are three other significant valleys, the Onamalutu, the Waikakaho and the Pukaka. The rivers and streams in these valleys have deep pools of clear water, and the upper parts and tributaries are often a series of cascades and pools. Native freshwater fish are present.

Great forests of towering podocarps (kahikatea, matai, rimu, totara and miro) would have occupied the valleys in the past, growing on the rich alluvial soils. Those forests (as well as the swamps and hill forests) would have held an abundance of bird life. Now the only example left is an impressive few hectares in Onamalutu Scenic Reserve, whilst elsewhere are scattered trees as reminders. Valley swamps would have contained kahikatea, pukatea and swamp maire, as well as harakeke (lowland flax), tussock sedges and cabbage trees. Broadleaved trees typical of the North Island lowlands come into Para Ecological District. Foremost of these is tawa, which still occupies many gullies, despite much logging and land clearance for farming in the past. By contrast, southern upland trees are also present, for example Hall's totara and southern rata.

On the hills, the former forest cover would have been dominated by beeches (red, black, silver and hard) with kamahi and various podocarps. Much of that cover has been cleared, but there are remnant tracts and pockets, usually with kanuka, secondary broadleaved trees and tree ferns. All beech species are still present, sometimes growing together, which is unusual in New Zealand.

The natural vegetation pattern has been greatly changed by human activity. This may have been started by Maori inhabitants, associated with hunting, travelling, camping and exploration for stone materials. Subsequent European gold mining led to vegetation clearance (especially the valley floors) and inadvertent fire to high elevations. Clearance for farming has been most widespread. The valleys and slopes have been logged, the valley floors have been drained, and the flax swamps have been milled and now virtually eliminated. Natural infertility coupled with moist soils favours scrub regeneration on marginal farmland, especially of manuka, kanuka and bracken.

Introduced weeds are widespread, including gorse, broom, Spanish heath, Himalayan honeysuckle, old man's beard and blackberry. Feral pigs, deer, possums, goats and predators such as rodents and mustelids have become well established. As a result of the difficulty of pastoral farming, soil depletion and erosion, production forestry has been established on much of the hill country in the last half century. The New Zealand Forest Service formerly owned most of these plantings, but today the production forest is largely privately owned. There is likely to be a long-term problem with conifer wildings in places, but with good stewardship the opportunity exists to protect and enhance the remaining native vegetation and freshwater habitat, along with their populations of native birds, lizards, invertebrates and fish.

SURVEY RESULTS

Of the 25 properties where the owners were approached, 18 were surveyed. A total of 55 significant sites were identified. These have a combined area of 2975 ha and make up approximately 6.2% of the total land area of the ecological district. They are classified into nine basic categories or ecosystem types (see Table 6). They are mostly native forests, the most extensive being beech forests, but there are also other forest types and some wetlands. The sites that have high value for ecological significance are those that occur on valley floors or have intact valley-to-skyline ridge forest sequences.

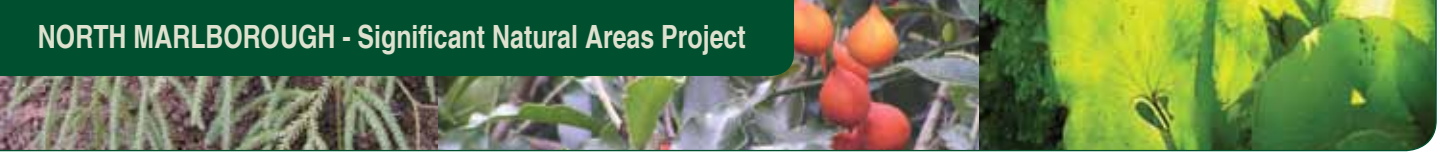


TABLE 6 - SITES IDENTIFIED IN THE PARA ECOLOGICAL DISTRICT

Ecosystem type	Total number of sites	Total area (ha)	% private land area of Ecological District	% total area of Ecological District (DoC and private)
Inland wetlands	5	8		
Beech forests	13	1,628		
Broadleaved forests	9	319		
Broadleaved-tree fern forests	1	108		
Lowland podocarp-beech forests	1	2		
Podocarp-broadleaved-beech forests	13	651		
Kanuka forests	10	230		
Manuka forests	1	24		
Treelands	2	5		
Totals	55	2,975	8.7%	6.2%

ECOSYSTEMS FOUND

Much of the original vegetation cover of Para Ecological District has been disturbed, modified and cleared since human arrival, especially in the valleys and on lower slopes. However, much remains more or less intact and prolific natural regeneration has restored many areas, providing opportunities for protection and enhancement. The main ecosystems found were:

INLAND WETLANDS

Several small wetlands were surveyed. They are mostly seepage-fed swamps with native vegetation, but most have weed issues.

BEECH FORESTS

Dominant in the hinterland and mostly upland.

BROADLEAVED FORESTS

Mostly tawa forest in gullies and other sheltered places.

BROADLEAVED-TREE FERN FORESTS

Secondary regenerating forest of gullies and shaded faces.

LOWLAND PODOCARP-BEECH FORESTS

A few small remnant pockets.

PODOCARP-BROADLEAVED-BEECH FORESTS

Several substantial sites where conditions favour a range of tree species.

KANUKA FORESTS

Fairly common, the result of decades of regeneration following pastoral farming.

MANUKA FORESTS

Although manuka is a common species, especially in regenerating vegetation, it usually fizzles out when overtopped by other trees. It has a competitive advantage in poorly drained situations.

TREELANDS

Several excellent examples, two on private land in the Kaituna Valley and one on public land at Koromiko administered by the MDC. They are echoes of the original great forests on the valley floors. The MDC is working with the local community to restore the Koromiko site to forest with plants raised from local sources.





SPECIAL FEATURES

The ecological district is one of valleys and hills and has a hinterland with extensive tracts of bush. It comes near the coast in places and features coastal habitats at Rarangi. It has a broad array of native vegetation types, flora and fauna, spanning the range from those of the lowlands to those of the alpine tops. One of the most striking features is the zone of near-vertical schist seams on either side of the Kaituna Valley. Another is the abrupt landform and ecological discontinuity formed by the Wairau (Alpine) Fault and the Wairau Valley. Para Wetland (Swamp) is by far the biggest lowland alluvial freshwater wetland system in Marlborough. There are several significant treelands in the lowland valleys, reminders of the former great podocarp-beech forests. A majestic alluvial podocarp forest remnant exists in Onamalutu Scenic Reserve, and there is a smaller one on private land in the Kaituna Valley.

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.
- There is a small alpine zone on the summit of Mt Riley, containing tussock grasses, shrubs and herbs such as mountain daisies.
- Threatened and regionally rare plants that occur in the ecological district include yellow mistletoe (*Alepis flavida*), red mistletoe (*Peraxilla tetrapetala*), raukawa (*Raukaua edgerleyi*) and neinei (*Dracophyllum urvilleanum*).
- The localised presence of swamp maire (*Syzygium maire*), white maire (*Nestegis lanceolata*), nikau, pukatea, kiekie, gully fern (*Cyathea cunninghamii*, a tall elegant tree fern uncommon in the South Island), akeake (*Dodonaea viscosa*), pokaka, lowland ribbonwood, narrow-leaved lacebark, tawa, ngaio, southern rata, a small uncommon daisy known only as *Celmisia* "Tararua" and the native daphne *Pimelea gnidia* is interesting. They are at distribution limits, are uncommon and/or are anomalous.
- All New Zealand beeches (red, hard, silver, black and mountain) are present. So too are the great podocarps (totara, Hall's totara, rimu, matai, miro and kahikatea) of central New Zealand.

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, bellbird, tomtit, brown creeper, silvereye, fantail and grey warbler (riroriro). Of note are the local occurrences of weka, 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, notably Para Wetland. Ducks, paradise shelduck and pukeko are quite common in places. Of note are local records of banded rail, marsh crake and Australasian bittern.
- Moa gizzard stones have been found in the ecological district.
- 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 consobrina* and *Powelliphanta hochstetteri bicolor* are still present in local populations, although severely threatened by feral pigs, possums, rats and thrushes.
- 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, torrentfish, giant kokopu and shortjaw kokopu.



PARA ECOLOGICAL DISTRICT – PHOTO ESSAY



VIEW ACROSS ECOLOGICAL DISTRICT BOUNDARIES

View from the summit of Mt Dobson (702m) in the Para Ecological District of North Marlborough, looking down into the Wairau Valley and Southern Marlborough. The contrast in topography, climatic and resulting land use is obvious. It marks one of the most graphic ecological transitions in New Zealand.



MIXED UPLAND FOREST

Typical upland forest in the Para Ecological District with a rich mix of native plant species present; a good habitat for native bush bird and fish species. The vegetation on most spurs and hill slopes is mixed beech forest in with four of the five beech species represented (red, hard, black and silver beech). Also present are kamahi, kanuka, some southern rata, numerous broadleaved species and abundant tree ferns. Shrubs and ground ferns are common in the understorey. There are also many podocarps (rimu, matai, kahikatea and miro), some of which are enormous and clearly ancient.



GIANT FOREST TREES

A large and ancient kahikatea tree standing out from the surrounding forest, which is a rich mix of beech, broadleaved, podocarp and fern species, regenerating following logging of most of the big podocarp trees.

KANUKA FOREST PATCHES

A triangular patch of kanuka forest (centre) surrounded by exotic forest. There are some large trees present (up to 15m tall) and a diverse understorey of broadleaved species (mainly mahoe, rangiora, putaputaweta and wineberry) and tree ferns (mamaku and ponga) in this area. The site is currently in good condition and is probably in better shape than it was when surrounded by farmland as there are no stock present and the exotic forest provides a sheltered edge prior to harvesting.





LOWLAND WETLANDS

A wetland on alluvial flats within a pastoral farm near Havelock. The few remaining trees around the perimeter (kahikatea, matai, black beech and totara) give a clue as to the original forest that would once have been common in the valleys of the Para Ecological District. Fencing from farm stock and restoration planting of suitable species would soon improve the condition of this relatively weed free wetland.



MARLBOROUGH PLANTS

Neinei (*Dracophyllum urvilleanum*) is a nationally threatened shrub with rust-coloured needle leaves. This plant is found in a few places in the Para Ecological District, and elsewhere in North Marlborough.





FOREST UNDERSTOREY DAMAGE

The bare understorey of beech forest showing the effects of heavy feral animal infestation. Very little regeneration is possible in these circumstances.

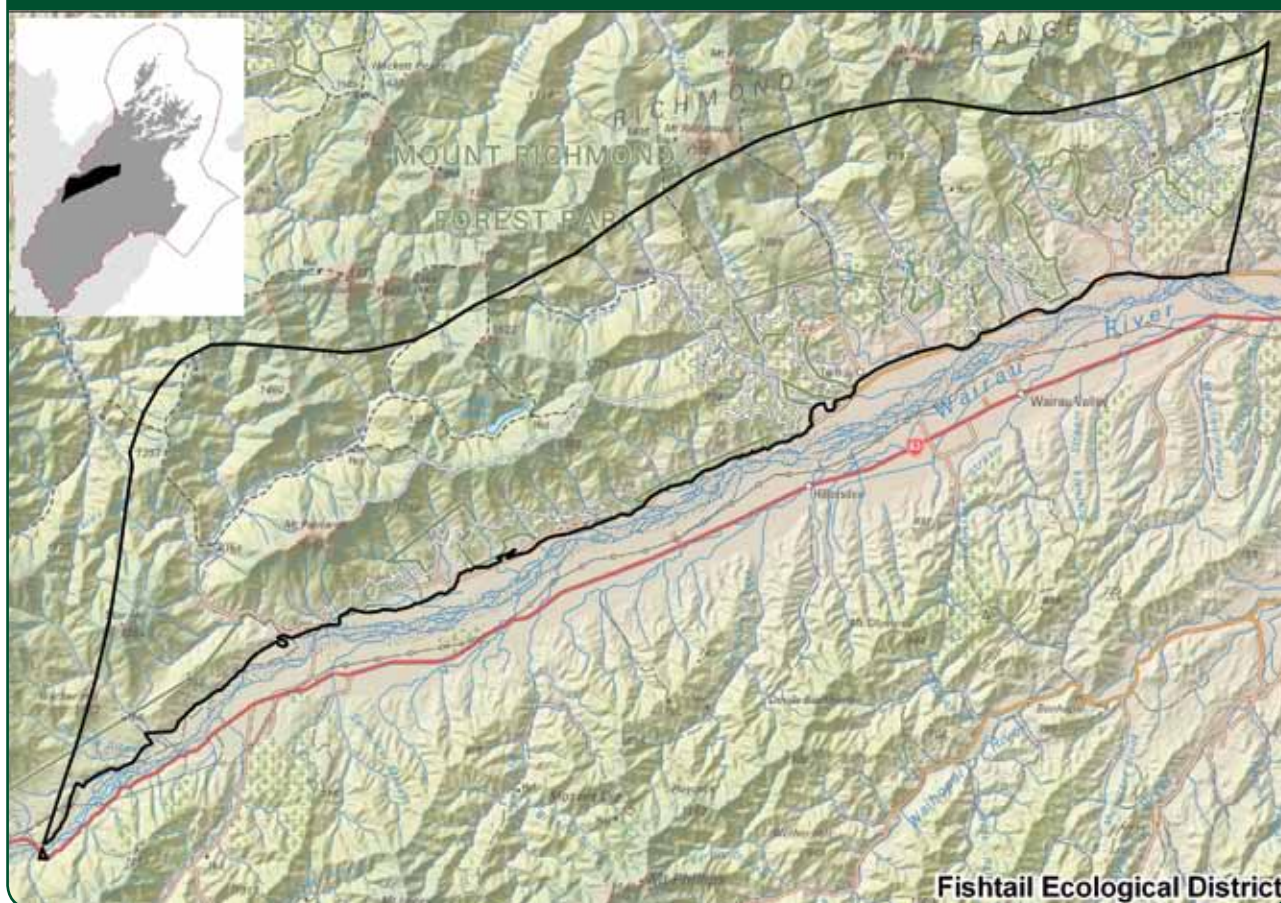


HEALTHY FOREST UNDERSTOREY

A healthier understorey in beech forest with regeneration evident.

FISHTAIL ECOLOGICAL DISTRICT

MAP 7 - FISHTAIL ECOLOGICAL DISTRICT

**OVERVIEW**

The Fishtail Ecological District is the southern-most of three forming the Richmond Ecological Region, a geologically complex area founded on the Richmond Range.

The Richmond Range is composed of Paleozoic rocks forming a sequence south-west to north-east. This is a sequence of increasing metamorphism. In the SW the rocks retain their sedimentary character of greywacke and argillite. The central Fishtail area is metamorphosed to a low grade schist (Chlorite Zone II), while the northern and eastern zone is a more completely metamorphosed schist (Chlorite Zone III). During its formation schist forms chemical layers such as mica and quartz, sometimes with gold in the quartz. The layers can separate when weathered (foliation) and hence the schist in the Fishtail District can erode readily with slabs separating by foliation. This process creates very steep slopes and the vegetation is always in a cycle of renewal. Schist also weathers into clay with low natural nutrient status but high water retention. This has influenced aspects of land use.

The Fishtail Ecological District drains the southern flank of the Richmond Range. Numerous streams arise from the main ridge and flow steeply to the Wairau River. A series of very scenic peaks form the upper watersheds: Mts Rintoul (1730m), Old Man (1514m), Richmond (1758m), Fishtail (1641m) and Royal (1365m). These peaks rise like islands surrounded by continuous forest and they support several endemic species as a result of this sub-alpine isolation. Mt Patriarch (1520m) is an extremely steep block of schist isolated from the main range by the catchment of the Goulter River, the largest of the watersheds. Active faulting has been responsible for a landslide that has resulted in Lake Chalice. This lake has been dated at 2000 years old, and is noted as the habitat for a population of larger than normal koaro (*Galaxias brevipinnis*), land-locked when the lake formed. Like many areas throughout





the district, Mt Patriarch bears deep stratified weathered rock (regolith) on its flanks, the result of freeze-thaw cycles during the ice age, and these are unstable and deeply gullied. Many of the streams have deep pools of clear water, and the upper parts are often a series of cascading falls and pools.

In the lower valleys narrow, swampy flood plains would have been typical, but most have been drained for farming.

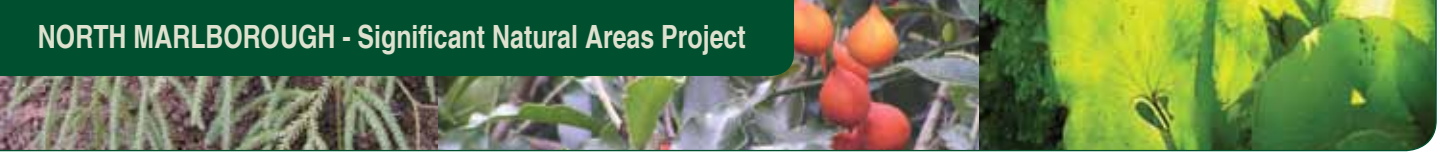
The climate of the Fishtail District is cool and moderately wet, with rainfall varying from 1200mm to 2000mm, depending on altitude. There is a strong rainfall gradient across the Wairau Valley. Lower parts of the district are exposed to periodic drought, exacerbated by strong drying winds, but ameliorated by the water-holding capacity of the clay soils. Snow falls on the higher peaks several times each winter and cold air drainage down the steep valleys has a general cooling effect. The moist forest-covered north bank of the Wairau River contrasts dramatically with the dry grassland-dominated greywacke hills of the south bank.

Owing to the location, physical character and climate the natural vegetation exhibits several gradients: coastal to inland, lowland to sub-alpine, and dry to wet. This results in fairly complex forest patterns. In the lower valleys and slopes podocarps are common, including kahikatea, matai, rimu and occasionally miro and Hall's totara. These are associated with beech forest; black beech at low elevations changing to mountain beech at higher elevations, red beech in the moist gullies and silver beech in both cool valleys and higher slopes and ridges. Frequently all three beech species occur together, a rather uncommon feature in New Zealand.

The coastal to inland gradient influences the composition of the broad-leaved gully vegetation usually beneath the beech-podocarp canopy. A number of lowland species drop out in the Para district to the north-east (nikau, tawa and passion vine, for instance), but others extend into Fishtail, such as supplejack, rangiora, pigeonwood, mamaku and bush cabbage tree. Some species present are more typical of the drier country across the Wairau, such as kowhai, akiraho, matagouri and *Coprosma propinqua*. Lowland species such as mahoe and five-finger are eliminated with altitude, but conversely some become more common (eg pokaka). Mountain species extend down into the valleys, such as southern rata, Hall's totara and mountain daisies. While natural shrubland is rare except above the bushline, dry infertile sites have resulted in a type of 'north bank pakihī' involving some distinctive species such as *Pimelea gnidia*, thickets of prickly mingimingi and a ground cover of blueberry (*Dianella nigra*). Elsewhere, subalpine shrubland dominated by *Dracophyllum* and speargrass has extended down-slope on land that was cleared of beech, then grazed and now retired. *Pittosporum patulum* is a regionally rare small tree species that regenerates in this type of montane shrubland. Together all these patterns combine to create a vegetation and flora of considerable interest.

The natural vegetation pattern has been greatly changed in the valley floors and lower slopes by human activity. This may have been started by Maori inhabitants, associated with hunting, travelling, camping and exploration for stone materials. Subsequent European gold and scheelite mining led to vegetation clearance (especially of podocarps) and inadvertent fire to high elevations. Clearance for farming has been very widespread. The valleys and slopes have been logged, the valley floors drained, and the flax swamps milled and now virtually eliminated.

Natural infertility coupled with moist soils favours scrub regeneration on marginal farmland, especially of manuka and kanuka. Introduced weeds including gorse, broom, Spanish heath and blackberry are widespread. As a result of the difficulty of farming, soil depletion and erosion, both conservation forestry (in areas of high country erosion on the Lake Chalice Ridge and Mt Patriarch) and production forestry using exotic species (mainly Northern Hemisphere conifers) have been established over the last half-century. The New Zealand Forest Service formerly owned these plantings, but today the production forest is privately owned and the conservation planting is part of the conservation land of the extensive Mt Richmond Forest Park. There is likely to be a long-term wilding conifer problem, so a buffer zone between production and conservation land is important.



SURVEY RESULTS

Of the eight properties where the owners were approached, six were surveyed. A total of 33 significant sites were identified. These have a combined area of 1350 ha and make up approximately 3% of the total land area of the ecological district. They are classified into six basic categories or ecosystem types (see Table 7). They are mostly native forests, by far the most extensive being beech forests, but there are also other forest types, shrublands, riparian vegetation and wetlands. The sites that have high value for ecological significance are those that are larger, more intact and more diverse.

TABLE 7 - SITES IDENTIFIED IN THE FISHTAIL 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)
Inland wetlands	2	8.5		
Riparian communities	1	6.5		
Lowland shrublands	1	2.5		
Beech forests	22	1,135.5		
Kanuka forest	4	153.5		
Manuka forests	3	45.5		
Total	33	1,350.5	9%	3%

ECOSYSTEMS FOUND

Much of the original vegetation cover of Fishtail Ecological District has been disturbed, modified and cleared since human arrival, especially in the valleys and lower slopes. However, much remains more or less intact and natural regeneration has restored many areas, providing opportunities for protection and enhancement. The main ecosystems found were:

INLAND WETLANDS

Of the two wetland sites, one is a tarn or small lake on moraine deposits, whilst the other is an elongated valley floor swamp containing harakeke (lowland flax), raupo, manuka and sedges. Other, smaller wetlands occur within several sites that are mostly forest-covered.

RIPARIAN COMMUNITIES

A remnant of riparian black beech forest, with some matai and kanuka, was found.

LOWLAND SHRUBLANDS

Matagouri, porcupine shrub, manuka and other shrubs occur on dry open ground.

BEECH FORESTS

These are by far the most common and extensive of the native vegetation types in the ecological district. Black beech occurs at low elevations, changing to mountain beech at higher elevations, whereas red beech is present in moist gullies and silver beech is in both cool valleys and higher slopes and ridges

KANUKA FORESTS

Kanuka forests are common in the ecological district and achieve considerable stature. They occur where originally there would have been beech forest.

MANUKA FORESTS

Manuka is also common and in places forms low forests.





SPECIAL FEATURES

The ecological district is one of valleys and hills and has a reasonably intact hinterland with extensive tracts of bush and upland habitats. It has a broad array of native vegetation types, flora and fauna, spanning the range from those of the lowlands to those of the alpine tops. The sharp peaks of the Richmond Range soar above the mantle of bush. The abrupt landform and ecological discontinuity formed by the Wairau (Alpine) Fault and the Wairau Valley is just as spectacular. Both have considerable influences on the biodiversity of the ecological district. An added effect is the transition inland, getting well away from the coastal influence.

NATIVE FLORA

- There is distinct altitudinal zoning of the forest species, with consistent changes at about 600m, 800m and 1000m asl. Many of the high ridges have a capping of cloud forest, festooned with mosses, lichens, filmy ferns and perching orchids. The transition from bush cover to open tops occurs at around 1300m asl.
- Above the bushline are subalpine shrublands, alpine grasslands, herbfields, scree communities and cushion bogs. Some species are endemic to the high peaks, including the mountain daisies *Celmisia macmahonii* var. *hadfieldii* and *C. rutlandii*.
- Threatened and regionally rare plants that occur in the ecological district include *Pittosporum patulum*, *neinei* (*Dracophyllum urvilleanum*), coral mistletoe (*Korthalsella salicomioides*), the sedge *Carex unciifolia*, forest forget-me-not (*Myosotis spathulata*) and dwarf broom (*Carmichaelia corrugata*).
- In addition there are the largest known specimens of the hemi-parasitic *Exocarpus bidwillii*, the only non-ultramafic occurrence of the heath *Epacris alpina* in Marlborough, kowhai treelands, the largest remaining populations of a distinct mid-Wairau race of cabbage trees, remnant pockets of harakeke and a distinctive community of porcupine shrub (*Melicytus alpinus*).
- Other notable plants include the native daphne *Pimelea gnidia*, titoki, supplejack, akeake, mahoe wao (*Melicytus lanceolatus*), matagouri, akiraho (*Olearia paniculata*), parsley fern (*Botrychium bifforme*), green mistletoe (*Tupeia antarctica*), the shield fern *Polystichum silvaticum*, southern rata and pokaka. They reach distribution limits and/or are uncommon.

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, bellbird, tomtit, brown creeper, silvereye, fantail and grey warbler (riroriro). Of note are the local occurrences of weka, New Zealand robin, rifleman, kaka, kakariki and New Zealand falcon (karearea or sparrowhawk). New Zealand pipit is common in open places.
- Wetland birds have few remaining habitats available to them and are therefore not common. However, the occurrence of black-fronted tern (mostly associated with the braided bed of the Wairau River but also visiting side streams and ponds) and fernbird (in shrubland at Manuka Island) is exceptional and of great regional importance.
- Moa gizzard stones have been found in the ecological district.
- Lizards (skinks and geckos) are widely present, especially in rock outcrops, scree, forest and shrubland. These habitats are also good for native invertebrates such as weta, ground beetles, moths and spiders. The giant land snail *Powelliphanta hochstetteri consobrina* is still present in local populations, although severely threatened by feral pigs, possums, rats and thrushes.
- At least 10 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 the anomalous population of koaro at Lake Chalice.



FISHTAIL ECOLOGICAL DISTRICT – PHOTO ESSAY



FISHTAIL ECOLOGICAL DISTRICT LANDSCAPE

A characteristic Fishtail Ecological District landscape showing commercial pine forest on the lower slopes, a diverse beech-podocarp forest on the mid to upper slopes and alpine areas (on conservation land) along the ridgeline.



STEEP WATERWAY

A typical steep waterway with pools and rocky waterfalls. Native fish species can utilise this habitat, climbing upstream through the wet rocky areas such as this.



GIANT FOREST TREES

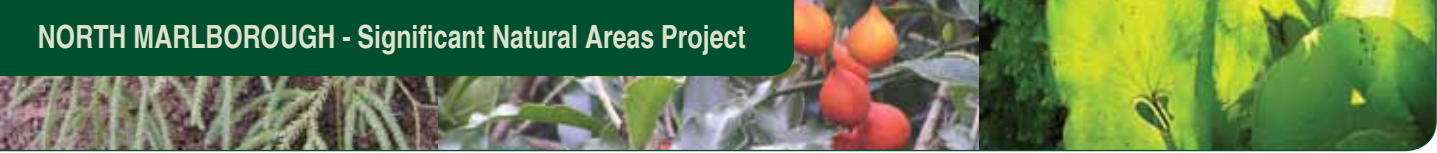
A large matai tree towering over the forest canopy. The hammered appearance of the bark is an easily recognisable feature of this species.



WETLAND REMNANTS

A small wetland of harakeke (lowland flax) and sedges in a valley surrounded by commercial forestry operations. Though only about 0.5 ha in size, this wetland is valuable both as a natural feature and as a water supply. It will remain in the long term if it is carefully managed. Flax requires good light conditions so replanting pine trees too close would be potentially harmful.





FERNS

Ferns are common within the high rainfall Fishtail Ecological District. Several species of filmy fern are found including *Hymenophyllum dilatatum* seen here.



FOREST BIRDS

South Island robin, a native bird found in the forests throughout North Marlborough. These birds are insectivorous and curious, often feeding in the leaf litter on the ground. They are very vulnerable to predation and habitat loss.

