

Tree Hill, Smart, Mangere, Green Hill, Wiri and Browns Island are less than 20,000 years old. Only Rangitoto Island has been active in historic times. Searle (1964), and Searle and Davidson (1975) give details of volcanic activity in the Region. Short notes on individual features are given below.

Many of the features identified as contributing to the regional significance of Auckland's volcanic landforms have been damaged by infill, drainage, quarrying or other development. However the remnants may retain high scientific value as partial or exposed records of geological activities. In these cases protection is sought for those remaining values which are not within operative quarry zones or where quarrying is an existing or approved use.

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118 MOUNT ALBERT (OWAIRAKA) “Poor, pathetic, decapitated Albert – what can be said of its mutilated torso other than it was once a beautiful scoria cone” (Searle and Davidson 1975). Lava flows from it, streamed mainly to the north to reach the present coast near the Oakley interchange, and at Meola Creek.
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119 MOUNT ROSKILL (PUKETAPAPA) a small but complex scoria cone; small lava flows extended south and east to the Oakley Creek.
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120 THREE KINGS (TE TATUA A RIUKIUTA) Now almost completely quarried away, the Three Kings area provided a miniature but complete collection of volcanic structures – scoria cones, tuff cones, and craters; explosion pits, horseshoe rings and breached craters; dykes and flows, tuff, scoria and lapilli beds. There is also an extensive 200 m cave system with individual chambers up to 10 m wide. The primary heritage feature of value is the remaining cone which is a reserve, and the quarried face of the tuff ring.
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121 ONE TREE HILL (MAUNGAKIEKIE). One of the largest of all the volcanoes in the Auckland volcanic field. The summit peak of the scoria mound overhangs a small elliptical crater and appears to be a remnant of a larger structure destroyed in

later eruptions. Two large breached craters in the north and west were the sources of vigorous lava flows and resulted in the spectacular amphitheatres of One Tree Hill. One Tree Hill is considered to be of national importance.

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122 MOUNT EDEN (MAUNGAWHAU) A complicated scoria cone structure with three main craters in a row, giving an oval shape. Basaltic lavas flowed in all directions filling valleys and depressions and causing massive landscape changes. Lava flows towards Khyber Pass and Newmarket piled up to form a thick pedestal to the mountain, which is today exposed in the quarries below Auckland Grammar School. Mt Eden is considered to be of national importance.
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123 MOUNT ST JOHN (TE KOPUKE) A simple scoria cone formed on associated lava flows, with a typical saucer-shaped crater formed by the deposition of scoria around the vent, and not from an explosive blast.
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124 MOUNT HOBSON (REMUWERA) A small scoria mound with a minor ash-covered lava flow, probably the last member of the Eden cluster to erupt. An armchair-shaped scoria mound formed from fire-fountaining in the north, while lava flowed to the south over swampy land towards the present day railway.
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125 AUCKLAND DOMAIN is one of Auckland's oldest volcanic sites. The sports grounds occupy the explosion crater, while the museum and hospital stand on portions of the tuff ring. A small scoria cone, Pukekaroa, forms a knoll behind the Winter Gardens within the main crater (castle-and-moat). There are number of small lava vents and a further scoria cone remnant at Outhwaite Park. The volcanic features of the Domain are considered to be of national importance.
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126 MOUNT WELLINGTON (MAUNGAREI) The most recent site of mainland activity (about 9000 years ago). Scoria and lava deposits overlie tuff deposits from early eruptions. Lava flows streamed from various points to Penrose and thence to

- the Manukau Harbour. While the entire Mt Wellington volcanic complex is of geological interest, much of the lava flow has been modified by urban and industrial development, and consequently the primary heritage value is the remaining scoria cone which is reserved. Mt Wellington is considered to be of national importance.
- ◆ 127 PANMURE BASIN A tidal maar formed by a phreatic eruption resulting from the contact of magma with ground-water. The basin is a nesting area for the pied shag and white-faced heron. The volcanic feature of Panmure Basin is considered to be of national importance.
- ◆ 128 MOUNT RICHMOND (OTAHUHU). A vast 'castle-and-moat' volcano in which the scoria mount 'castle', composed of a coalescing cluster of cones and craters of small size but considerable complexity, lies against one wall of the tuff moat.
- ◆○ 131 ONEHUNGA SPRINGS tap groundwater from below One Tree Hill lava flows. Three springs are known, located in Bycroft and Grotto streets and Captain Springs Road.
- ☒◆ 134 MANUKAU FORESHORE The foreshore and shoreline area from Mangere Bridge westward along Kiwi Esplanade is an important roosting area for seabirds and wading birds. The western part of this land is now reserved as Ambury Regional Park. The coastline to the west is an important bird habitat, being a particularly rich feeding ground and roosting area. Over the last 30 years, 86 species have been sighted in the area, many of which are overseas migrants. Species which breed here include the white-faced heron, banded rail, shoveler duck, pied stilt and welcome swallow. The feeding grounds are also used by waders such as the South Island pied oystercatcher, wrybill, banded dotterel, godwit, knot, turnstone, and golden plover. Dabchicks, paradise ducks, white herons, little egrets, royal spoonbills, black-fronted and New Zealand dotterels are seen occasionally. Rare visitors include the black-fronted tern, black stilt and black-billed gull. Two small islands just off shore in the oxidation ponds and in the Manukau Harbour are being kept clear of vegetation to provide more roosting space in an attempt to keep the birds away from the airport. The foreshore area is considered to be of national importance.
- ☒◆ 135 PUKETUTU ISLAND is a volcanic island joined to the mainland by a causeway. Early explosive eruptions formed a large crater and widespread tuff ring. In the centre of the island was a cluster of coalescing cones piled upon one another, but reaching only 70m above sea level. Lava flows filled the moat between the cone and tuff ring. A small lava field was built and now surrounds the island except where wedges of tuff separate flows. The main areas on the island of value in terms of geological heritage are the remaining volcanic cones, undisturbed areas of tuff ring, the unmodified lava flow surfaces and the intertidal lava reefs which extend into the sea on the western side of the island. These intertidal lava reefs are also of value for coastal bird species and for their association with small saline wetlands. Bird species which utilise the island include stilt, oyster catcher, spoonbill, dotterel and wrybill. In the rehabilitation of the quarried areas of the island, consideration of returning surfaces so that they resemble their original contour is recommended.
- ◆ 138 MANGERE LAGOON is a sea invaded maar with a tiny scoria cone, now surrounded by sludge lagoons associated with the Mangere Waste Water Treatment Plant.
- ◆ 139 MANGERE MOUNTAIN erupted about 18,000 years ago. A huge scoria mound has filled the explosion crater from a number of central vents. Lava escaped from the crater through a breach in the east and the adjacent breached crater (playing field). A small lava dome in the main crater may be a 'tholoid' extruded from a vent beneath. Ash covered lava surrounds the mound extending northwards to form the Manukau Harbour foreshore. Mangere Mountain is considered to be of national importance.

- ◆ 142 BURIED FOREST When Maungataketake erupted about 29,000 years ago, the tuff buried an extensive area of surrounding forest. A well-preserved sample of this ancient vegetation has been exhumed by the sea at Ihumatao and lies exposed on the wide tidal flats which are littered with the remains of forest trees. Some fallen trunks are more than 20m long and show no sign of branching at that height, while other stumps are up to 4m diameter. Today the preserved timber of the trees looks not unlike that of modern drift logs on a beach. The Ihumatao buried forest is considered to be of national importance.
- ☒ 143 THE WIROA ISLAND artificial roost is currently a major wrybill roost in the harbour and is widely used by other birds including gulls. The roost has been constructed to attract birds away from the airport approaches and thus reduce the collision hazard.
- ☒ 144 PUHINUI CREEK area is comprised of a variety of habitats including extensive shell banks, intertidal mudflats, mangroves and extensive shoreline salt marsh. Thousands of international migratory birds and New Zealand endemic waders feed on the mudflats and use the shellbanks as a high tide roost. Banded rails, and fernbirds inhabit the saltmarsh. Part of the area is a wildlife refuge. The water quality of the Puhinui Stream should be maintained and adverse effects on valued natural heritage features from activities on adjoining land and in the coastal marine area should be avoided.
- ◆ 145 PUKAKI LAGOON is a simple circular explosion crater with a tuff ring breached on the seaward side by a narrow channel. The crater was formed during a single burst of activity which piled up a tuff cone on top of a low flat area. The crater became tidal when the sea level rose to become filled with mud, but has recently been drained. This landform has been only slightly damaged and it is an excellent example of a circular explosion crater. The crater, virtually unspoiled by urban development, is a splendid natural amphitheatre.
- ◆ 146 CRATER HILL east of Pukaki is larger and less regular, the tuff ring having been destroyed by subsequent eruptions to the north east as far as the present railway line at Papatoetoe. The inner slopes of the tuff ring have also been eroded back by a freshwater and at times swampy lake. These processes make it unique in the Auckland field and protection, at least in part, is therefore warranted. A strip section down the inside of the crater showing the processes of construction would be appropriate. The area has been exploited as a source of peat, the eastern side modified by a road and parts of the area have been quarried. Crater Hill is considered to be of national importance.
- ◆ 147 MOUNT ROBERTSON (STURGES PARK). A wide explosion crater with a gently sloping tuff ring was the first structure built and constituted the major unit of the volcano. Part of the Otahuhu commercial area is built on one edge of this ring. As explosions ceased, lava rose in the vent and a very short spasm of splashing and spouting created a low cone in the centre of the crater forming a castle-in-moat structure, which today provides an ideal setting for sports fields. The remaining volcanic features are considered to be of national importance.
- ◆ 150 WIRI LAVA CAVE which is 280m in length is unique as it is the only Auckland example embodying several features in their most perfect form. These are smooth, gas-flazed rock surfaces, lava stalactites, circular tube gas vents, ridging on the floors and contraction gaps at the base of walls. The cave is considered to be of international importance.
- ☒ 160 THE TAMAKI ESTUARY is a regionally important wildlife habitat. It is a large river estuary where considerable areas of intertidal flats have accumulated and a sand-shell spit (Tahuna-Torea, see below) has built up near the entrance. There are a number of other roosting sites (notably Pakuranga Creek Roost and the Tamaki River East Roost), which are used by hundreds of wading birds which feed in

the estuary. Intertidal banks (such as the Tamaki East Bank) contain extensive beds of shellfish and are important feeding grounds for these birds.

- ◆ There are also a number of geological features of note along the banks of the estuary. At one point is a small geological exposure of *rhyolitic co-ignimbritic accretionary lapilli* from the Taupo Volcanic Zone, which is exposed as a thin bed near the base of an eroded low sea cliff. The site is considered to be nationally important. The Waiouru Tuff Mound has an indistinct, crater-like depression about 300m in diameter. The crater is breached to the SW by tidal creeks and has an 8m terrace along the Tamaki River. It is one of the oldest members of the Auckland volcanic field, and is considered to be regionally important.

- ◆ 160a TAHUNA-TOREA (GLENLOWIE SAND-SPIT) 'The gathering place of the oystercatcher.' A large stable depositional feature probably dating back to the Pleistocene, it is in dynamic equilibrium (in its natural state) with subtle changes occurring in response to wind, wave and tidal action. Recent excavation and dumping at the proximal end may change this balance.

- ☒ The estuarine area behind the spit has been dammed and developed by the Tamaki Estuary Protection Society, as a brackish pond for feeding and roosting birds. A freshwater wetland has also been developed as a breeding and feeding area. The area provides an interesting complex of marine, intertidal, freshwater and terrestrial habitats for a wide range of birds. It has added value because of its proximity to, and ready access for, a large number of people.

Birds which frequent the area include the South Island pied oystercatcher, pied stilt, godwit, knot, turnstone, golden plover, banded dotterel, New Zealand dotterel, wrybill, black-backed gulls, red-billed gulls, caspian terns, pied shags and little shags; white-faced heron and blue reef heron also feed on the tidal flats.

The grey warbler, fantail, silvereye, and kingfisher along with numerous introduced species can be heard if not seen while walking along the spit. The pipit visits in the winter, the shining cuckoo in the spring.

- Along the sandspit there are several patches of the native shore convolvulus (*Calystegia soldanella*), and springy mattress-like native pohuehue (*Muehlenbeckia complexa*), and the ribbonwood (*Plagianthus divaricatus*).

The salt marsh at Tahuna-Torea is found on the seaward margins of mangrove communities and is essentially unmodified, consisting of glasswort (*Sarcocornia quinqueflora*), salt-meadow primula (*Samolus repens*), starry-flowered Selliera radicans, sea rush (*Juncus maritimus*) and the jointed rush (*Leptocarpus simplex*).

Impounded within the brackish pond of the estuary are a series of low-lying banks stabilised with rushes which are believed to be pre-European fish traps. These unique features deserve protection from siltation flooding and vegetation change.

- ☒ 161 MANGEMANGEROA, TURANGA AND WAIKOPUA are tidal creeks flowing into one large bay, which has a complex of intertidal mud, sand and shell banks. The intertidal banks are a very rich feeding ground and important mid-tide roost for many hundreds of a variety of international migratory and New Zealand endemic wading birds, including a number of threatened species. Large shellbanks at various locations at creek mouths, behind the beach, or near Motukaraka Island are or have been used as high tide roosts by these birds and a variety of other coastal bird species.

In the shelter of the shellbanks and the creeks grow areas of mangroves and saltmarsh, some of it judged to be the best in the Hunua ecological district. There are two major gradations from saline vegetation into terrestrial vegetation. One is from mangroves into the coastal ponga and taraire and kowhai forests. The second

grades from mangroves into saltmarsh into coastal shrublands on islands in the Turanga Creek. The saline vegetation fringing the creeks provides high quality habitat for threatened secretive coastal fringe birds, particularly where it abuts terrestrial vegetation, which provides shelter for the birds at high tide and potential nesting sites.

- 163 CLEVEDON-MARAETAI HILLS A large stand of native forest is found in this area. The pre-European vegetation cover probably consisted of two major forest community types: kauri-hard beech and podocarp-broadleaf. Over the last 100 years the area has been burned and logged. Today kauri is dominant in many parts and regeneration is good. Many seedling species can be found such as tanekaha, rewarewa, kohekohe, taraire, rimu, miro, and totara. Over 100 native vascular plants are found in the area. The chief botanical value lies in the large amount of hard beech (*Nothofagus truncata*) contained both in more or less pure stands and mixed with kauri. The kauri-beech forest type is nationally rare and considerable regeneration which has occurred over the last 100 years, with growth rates comparable to those kauri on the same site, seem likely to ensure the persistence of the kauri-hard beech forest in the area.
- There is a varied and abundant native insect and bird life.

- ☒◆ 165 MOTUKOREA (BROWNS ISLAND) is the relic of a much larger structure created when sea levels were low and the harbour dry land. Remnants of a very large tuff cone are preserved in the north eastern ridge and cliffs.

The scoria mound is a complex of coalescing cones, while the associated lava field is now beneath the sea. The New Zealand dotterel breeds here. Two or three pairs of black-backed gulls nest on the island. Reef herons and variable oystercatchers have been sighted. The island is administered by the Department of Conservation, and the volcanic features are considered to be of international importance.

- ☒◆ 167 RANGITOTO ISLAND is of international significance as a volcanic landform because each stage, from the initial colonisation of raw basalt and scoria to the formation of scrub to immature forest, can be seen. It is the youngest and largest of the Auckland volcanoes having been active at least within the last 400 years. The greater part of the island is a low dome built up by successions of basaltic lava flows, surmounted by a cluster of scoria mounds and cones, the last built of which has a deep central crater. The lava field contains no soil in the usual sense of the word, although rich, fine, dark powder is accumulating in the fissures. Yet, more than 200 species of native ferns and flowering plants grow on the island. Dominant among the trees is pohutukawa; kohekohe, mangeao, puriri, rewarewa, rata, puka, five-finger and manuka are also found. There are knee-deep growths of kidney fern and nearly a score of orchids. There are many mosses and lichens and, in winter and spring, a blue-green algae.

Birds found on the island include fantail, hawk, silvereye, grey warbler, blue reef heron, caspian tern, kingfisher, pipit, white-faced heron and nests of the little blue penguin. There are a number of breeding colonies of black-backed gull scattered in the bare lava. Black-backed gulls obtain only a small proportion of their food from traditional feeding areas on tidal flats. In the past, over 10,000 gulls migrated daily from Rangitoto to feed on rubbish tips throughout the urban area. However, the improvement of rubbish disposal techniques in Auckland has resulted in a reduction in the number of black-backed gulls on the island.

This island which is part of the Hauraki Gulf Maritime Park is close to the mainland and readily accessible by many who live there. It provides sheltered anchorage, swimming, fishing, walking, bird watching and opportunities for general nature study. Rangitoto Island is a conspicuous and important landmark which is visible from many parts of the Region and contributes much to Auckland's natural setting.

- 169 HAURAKI GULF and ISLANDS The combination of warm climate, sheltered waters and numerous islands of the Hauraki Gulf makes it a unique marine recreational area and one of the most important amenities of the Auckland Region. Many of the smaller islands and the remote or inaccessible parts of the large islands play an important part in the preservation of native flora and fauna, and as such deserve protection. One of the most attractive features of the gulf islands is the cleanliness and clarity of their surrounding waters. The quality of the gulf's waters has enhanced their value for aquatic sports such as swimming, diving, fishing and boating. It has also fostered the rich marine life which supports the gulf's sea birds. Pipi, cockles and tuatua are still plentiful in the gulf; mussels and rock oysters have been greatly reduced in number due to over exploitation. It is important that the water quality of the Hauraki Gulf is protected.
- The wide range of values of the Hauraki Gulf and islands – ecological, scenic, recreational, cultural, spiritual, historical and economic – make it of regional and national importance.
- 186 TE MATUKU BAY is an estuarine area on the sheltered southern side of Waiheke Island. The extensive intertidal flats, shell banks, and low-lying islands offer a variety of habitats for a range of plant and animal communities. The extensive intertidal areas are a rich feeding ground for large numbers of international migratory and New Zealand endemic wading birds, including substantial numbers of a considerable variety of threatened species. These birds roost on the shell spit in the outer reaches of the bay at high tide, along with a variety of other coastal birds which feed in the waters of the bay. In the shelter of the upper reaches of the estuary there are extensive areas of mangroves and saltmarsh growing in association with terrestrial vegetation on the low-lying islands. The saline vegetation grades into the freshwater raupo wetland and kauri-tanekaha forest in the best such sequence on the island. The saline vegetation and associated freshwater vegetation provide high quality habitat for threatened swamp birds and secretive coastal fringe birds particularly where the wetlands abut terrestrial vegetation which provides shelter for the birds at high tide and potential nesting sites. This area is considered to be of national importance.
- 187 AWAAROA BAY is an estuarine area on the sheltered southern side of Waiheke Island. There are extensive intertidal areas which are a feeding ground for a relatively large number of a variety of wading bird species. These birds roost on the associated shellbanks at high tide, along with a range of coastal birds which feed in the waters of the area. In the shelter of the upper reaches of the estuary there are substantial areas of mangroves and saltmarsh. The saline vegetation grades into the best freshwater raupo wetland on the island.
- 188 FRENCHMANS CAP is a nesting site of the blue reef heron which is threatened by competition with the more aggressive white-faced herons, an immigrant from Australia about 30 years ago. Black-backed gulls, white-fronted terns and a pair of caspian terns are also known to breed here. This important habitat deserves to be protected.
- 191 PONUI ISLAND is a large privately owned island which has been farmed for many years. It is an attractive combination of pasture, native forest and unspoilt coastline with sheltered bays. There are dense stands of young kauri with some tanekaha, and in the valleys taraire, tawa and kohekohe are regenerating.
- Spotted shags and white-fronted terns roost north of Bryants Bay in the north east of Ponui.
- Around the headlands in the north west the pied shag, little shag and blue reef heron are frequent visitors. Other birds found on the island include the pigeon, tui, kaka, North Island brown kiwi, spotless crane, bittern and pukeko. The island is a wildlife refuge.

- ☒ 201 The FIRTH OF THAMES, extending south from the Hauraki Gulf to the Hauraki Plains, is one of the three areas in the Auckland Region which is of national and international ornithological significance, attracting tens of thousands of birds each year from the South Island and from the arctic and subarctic regions. The east and west coasts of the Firth of Thames are very different: in the east the shore is steep and rocky; to the south and west the water is shallow and at low tide broad intertidal flats and many square miles of eutrophic ooze are exposed. The stretch of coast from Kaiua to Miranda offers ideal conditions particularly for the wading birds. The shell banks which have built up over centuries are crowded with birds each day when tides are high. The Taramaire and Miranda shell banks are extremely popular roosting grounds for birds feeding on the extensive tidal flats and in the swampy paddocks: knots, wrybills, oystercatchers, godwits, pied stilts, red-billed gulls, black-backed gulls, white-fronted terns, caspian terns, turnstones, New Zealand dotterels, and black shags.
- There are also extensive salt marshes and associated lagoons which form a vital part of the wading bird's habitat by providing shelter and food for many. Such areas should be protected from drainage, siltation and rubbish disposal. The short grass of the farm paddocks bordering the area is favoured by the banded dotterel and the New Zealand dotterel. The swamp areas also attract mallard ducks, pied stilts and herons. Approximately 50% of the bird species along the coast have increased in numbers since 1950; the remaining species have stayed nearly constant.
- ☐ Coastal indigenous scrub and cliff vegetation, pohutukawa, puriri, karaka and kowhai can be found between Matingarahi and Miranda; remnants of coastal forest are occasionally encountered, with species of rewarewa, tanekaha, kauri, puriri and taraire.
- ☒ Commonly observed bird species in the Firth of Thames include the South Island pied oystercatcher, variable oystercatcher, New Zealand dotterel, wrybill, godwit, knot, turnstone, red-necked stint, black-backed gull, red-billed gull, caspian tern, white-fronted tern, curlew sandpiper, arctic skua, black shag, mallard duck, white-faced heron, banded dotterel, welcome swallow and pied stilt. Less common species are the black swan, grey teal, shoveller, banded rail, black stilt, little tern, bittern, mongolian dotterel, large sand dotterel, oriental dotterel, Asiatic whimbrel, Asiatic black-tailed godwit, terek sandpiper, pectoral sandpiper, broad-billed sandpiper, white-winged black tern, white heron, royal spoonbill, grey plover, little whimbrel and marsh sandpiper.
- The study and protection of the birds of the area is the prime interest of the members of the Miranda Naturalist Trust which was formed in 1975. The trust has built bird observatories near Miranda Stream and the Taramaire Stream reserve. This trust also fosters the study of the vegetation, geology, marine ecology, zoology and archaeology of the area.
- ☐ 205 MATAITAI STATE FOREST is important as an example of the nationally rare kauri-hard beech association. Tawa forms the bulk of the canopy with scattered kauri, hard beech and tanekaha found throughout. Rimu and miro occur spasmodically. In other areas of the forest the canopy consists of manuka with groups of emergent kauri, tanekaha and hard beech.
- This land is administered by the Department of Conservation.
- ◆○ 206 The HUNUA RANGES are a deeply dissected, upfaulted block of Jurassic siltstone, sandstone, and argillite of the Waiheke group (greywacke). The ranges are bounded on the west by the Wairoa fault and the east by the Hauraki graben. To the south, the Mangatangi fault divides the ranges from the lower Waikato basin and in the north the block is partly truncated by the Clevedon splint fault. Mount Kohukohunui (688m) is the highest point in the ranges. These elevated,

forest covered hills provide an important catchment area for Auckland's urban water supply. The reservoirs are now wildlife habitats, with the Upper Managatwhiri Reservoir of regional significance for its wildlife. Notable species using the lake and its margins include ducks, white-faced heron, black shag, little shag and bittern. The reservoirs also support native fish such as koaro, banded kokopu, long and short finned eels, as well as rainbow trout.

◆ The Hunua Falls, a waterfall with a 30 m drop, cascades over a basalt plug which has intruded through the Wairoa fault. It is considered to be regionally significant.

□ 207 INDIGENOUS FOREST OF THE HUNUA RANGES covers 20,000 hectares much of which is protected as a regional park considered of national and international importance. The major indigenous forest types are tawa-podocarp, kauri-hard beech-tanekaha, and taraire, with localised areas of coastal and montane scrub forest (Barton, 1972).

Tawa-podocarp forest occupies a wide range of sites totalling 75% of the entire forest area; the principal species is tawa with scattered emergent rimu, northern rata, kahikatea, totara and miro. Associated understorey species include rewarewa, hinau and pukatea, with kohekohe, usually with nikau and ponga becoming subdominant in drier areas. Kauri-hard beech-tanekaha forest species, in varying combinations, are dominant on the most of the ridge tops and drier land below 240m; hard beech tends to favour the cooler southern slopes, kauri the drier ridge tops and northern slopes, and tanekaha the more moist sites, being the most tolerant of the three species and most widely spread. Subdominants include rewarewa, hinau, towai and *Cyathea dealbata*.

Taraire, with associated puriri and rewarewa, forms an almost continuous canopy over limited areas, mainly in the north and usually on warmer areas of easier topography; kohekohe with nikau and *Cyathea dealbata* form the understorey with a sparse ground cover

and notably little taraire regeneration.

The montane scrub forest is characterised by species not seen below 610m: hutu, toi, horopito and a large number of epiphytes; other species, notably *Hebe macrocarpa*, raukawa, *Blechnum discolor*, wheki and pepperwood, appear to be more abundant here than at low altitudes.

□ The threatened endemic frog (*Leiopelma hochstetteri*), the green gecko (*Naultinus elegans*) and a large variety of native land snails are some of the animals found here. Both the rare short-tailed bat (*Mystacina tuberculata*) and the long-tailed bat (*Chalinolobus tuberculatus*) have been sighted in the past, however no recent sightings have been made. These two species of bat are the only native land mammals in New Zealand. The area of distribution of these animals is very much less than it was 100 years ago, mainly due to loss of habitat.

□ A number of threatened and uncommon plants are known from the Hunua Ranges, such as king fern, *Marattia salicina* which now has the IUCN status of Vulnerable. A small remnant colony of the regionally rare mountain cabbage tree (*Cordyline indivisa*) was found near the summit of Kohukohunui. The communities of montane scrub and kauri-hard beech forests are uncommon occurrences within the Region. A number of plants found in the Hunuas are at or near their geographical limit, including: *Blechnum colensoi*, *Pseudowintera colorata* and *Ascarina lucida*.

□ The diverse forest types of the ranges provide important habitats for a number of bird species, especially pigeon, tui, grey warbler, fantail, silvereye, kingfisher, morepork, pipit, shining cuckoo, and harrier. Kaka and long-tailed cuckoo are frequent visitors. The regionally rare tomtit is present in fluctuating numbers (which upsurged from 1971–1978) and the bellbird which was reduced in number and is now believed to be spreading (Greene, ARC Parks). A small community of the endangered kokako remain in the ranges, and is considered to be the largest

viable mainland population in the Auckland and Northland regions.

- The regeneration of the dominant species in the Hunua Ranges has in the past been considered inadequate, mainly because of the high level of noxious animal infestation during the past 100 years, which has only recently been reduced. Other contributing factors may be the depleted bird populations which adversely affect seed dispersal, and the suspected high rat population resulting in seed destruction, especially of podocarps. Now that control work is underway, it is believed that regeneration trends will improve.
- 214 KIRK'S BUSH in Papakura. Impressive remnants of the now rare taraire dominated forest. The interior is of cathedral-like splendour. Nearby in the smaller Butterworth's Bush are probably the most magnificent taraire in the south Auckland area.

216 – 219

THE NATURAL VALUES OF THE MANUKAU HARBOUR

THE MANUKAU HARBOUR is the second largest estuarine area on the west coast of the North Island and has a great expanse of intertidal areas, providing one of the most important habitats in New Zealand for wading birds including migratory species. Because of the large number of both individuals (up to 50,000 birds at one time) and the variety of bird species which traditionally use the harbour, the natural values of the Harbour are considered to be of international significance. There is some evidence to suggest that the Manukau Harbour may be a major gathering place of migrants in the Auckland area prior to departure to the Northern Hemisphere. Regular large-scale movement occurs within the Region between the Manukau and Kaipara harbours and the Firth of Thames

- ☒ 216 Waders of the Manukau include the godwit, knot, turnstone, golden plover and other northern hemisphere migrants as well as the spoonbills from Australia. The

variable oystercatcher, NZ and banded dotterel, wrybill (which are threatened), the black stilt (which is endangered) and the South Island pied oystercatcher are migrants from within New Zealand. In order to maintain the wader population, it is believed that preservation of major roosting areas is one of the most important factors (food supply appears to be adequate). Important wader roosting areas on the south Manukau harbour include the shell banks and adjoining pasture at Karaka (Kidd's Farm), Seagrove, Waipipi, Puhinui and Pollok Spit. At present there is no reserved land for birds on the south coast of the Manukau harbour and some measures are required to protect these areas as suitable roosts for birdlife. If public land access is to be provided to any of these areas, it should be planned so as to least disturb the features that provide the special interest. Protection of the intertidal sand and mud banks is also essential for the maintenance of the birdlife in the harbour. Of significance in this respect are Te Tau Bank East, which contains large numbers of shellfish, both edible and uncommon within the harbour, Karore off Ihumatao as well as those associated with the large roosting areas.

- ☒ 217 Wetlands (mangroves, salt marshes and eelgrass flats) at present cover less than 5% of the intertidal area of the Manukau Harbour. Areas of particular importance include:- Pahurehure inlet (217), notably Drury Creek, Whangamaire Stream, and Whangapouri Creeks; Taihiki River; Little and Big Muddy Creeks; the coastline around Awhitu Regional Park; and Ann's Creek all of which contain a large percentage of the wetlands in the harbour.
- ☒ Drury Creek is comprised of a variety of intertidal habitats ranging from sandy mud intertidal flats to current-exposed rocky reefs and a variety of saline vegetation. Healthy and often expanding areas of mangroves grow in the shelter of the Pahurehure Inlet, Whangamaire Stream, and Drury and Whangapouri Creeks and in the southern half of the

- Whangapouri Creek are notable eelgrass (*Zostera*) beds. Within the upper tidal reaches of Drury Creek there are a variety of marshes, grading from mangroves through to extensive areas of jointed rush-dominated saltmarsh, to freshwater vegetation in response to salinity changes. This same area is a migration pathway between marine and freshwater habitats for a number of different species of native freshwater fishes.
- ☒ 218 Also significant with respect to the diversity of life found in the harbour are the marine communities. Of particular note is the area west of Mako Point which is subjected to strong, cool lateral currents similar to those at Omanawanui on the opposite side of the harbour mouth. Consequently, this stretch of coast supports a diverse and rich marine fauna which shows open coast, harbour and southern affinities. The south head contrasts with the north because of the softer rocks and platform reefs which mean that the biota differs and is less diverse and abundant.
- ☒ 219 Extensive beds of *Zostera* (eelgrass) were once found on the south Manukau intertidal flats between Clarks Beach and Seagrove (219) (Henriques, 1978). These eelgrass beds have begun to reappear in the Seagrove area. Marine wetlands are particularly vulnerable ecosystems because the water discharge within them is only partial during each tidal cycle and wastes readily accumulate. The remaining wetlands of the Manukau Harbour need and warrant complete protection since they are indispensable to the estuarine biota and foreshore protection.
- 224 BIRDS OF AWHITU LAKES The Awhitu peninsula, largely in pasture, has a series of lakes similar to those of the Kaipara south peninsula, supporting a diversity of wildlife including fernbirds, bitterns, banded rails, dabchicks, pukeko, black swans, shags and ducks. Spotless crakes are found in the raupo swamps around Awhitu and to the north of Waiuku Forest.
- ◆ 245 MIRANDA CHENIER PLAIN Constructural and erosional morphologies of beach ridges and intertidal flats of the chenier plain (i.e., a beach ridge plain perched on a muddy substratum), Firth of Thames (Miranda to Whakatiwai), have enabled the determination of a sequence of past sea levels; radiocarbon dating of shell samples give a time/sea level curve which correlates favourably with transgression periods recorded in Europe. The present rise in sea level is locally 20–23 cm per century, and may be a minor fluctuation in an otherwise stable sea (Schofield, 1960). The area is considered to be of national importance.