There is also a pied shag colony on this lake. It is significant because it is unusual to find such colonies on freshwater lakes. Some little shags are also found in the colony.

☒ 36 MURIWAI AND RANGITIRA BEACH TOHEROA BEDS This is the only location for toheroa in the Region. The shellfish population normally fluctuates between 2–5 million but in recent years stocks have dwindled to well below this level due to a number of factors including over exploitation, natural population fluctuations, wave action and vehicular damage to the sand habitat. The viability of the habitat may be dependent on freshwater seepage from the dune lakes.

The toheroa population is too low to support an open season. The Ministry of Agriculture and Fisheries which administers the beds continues to monitor toheroa numbers.

☒ 37 MURIWAI AND RANGITIRA BEACHES are long, exposed surf beaches with sandy shores, backed by sand dunes, often covered with pingao. Birds of the coast line include the variable oystercatcher, New Zealand dotterel, banded dotterel, pipit, pied stilt, white-fronted tern, little black shag, little shag, white-faced heron, blue penguin, and caspian tern.

☐☒ 38 MOTUREMU ISLAND is a scenic reserve administered by the Department of Conservation. It is a significant area for eastern golden plover and the endangered kaka beak. Pied stilts and grey faced petrels are known to breed in the area. This area is considered to be of international importance.

☐ 39 ATUANUI STEWARDSHIP AREA (MOUNT AUCKLAND) An indigenous state forest since 1887, this area of podocarp/kauri/hardwood forest, although logged, has never been damaged by fire. Rimu and kauri are found in scattered groups and are regenerating throughout. Kahikatea and totara are also seen in scattered locations. Associated with this is a dense mosaic of hardwood species including taraire, karaka, puriri, kohekohe, hinau and kowhai. There are many epiphytes and lianas, and a rare orchid *Yoania australis* is found beneath the taraire. The forest is considered to be of national importance.

The Mt Auckland section of the New Zealand walkway passes through the Glorit farm settlement, through the forest via the Mt Auckland summit (305m) and a small area of exotic afforestation.

☒ 40 JORDAN'S FARM AND OYSTER POINT Due to reclamation there are few remaining roosting areas in the Kaipara Harbour. The Tapora coast is one of the major roosts (see note 25). Jordan's Farm and Oyster Point are the only major ones in the southern part of the harbour where up to 10,000 birds roost during the summer, and are therefore of national and international importance. The following species have been sighted: South Island pied oystercatcher, New Zealand dotterel, banded dotterel, wrybill, godwit, turnstone, knot, grey plover, and eastern golden plover. Pied stilt are known to breed in the area.

☐☒ 43 KAUKAPAKAPA ESTUARY SCIENTIFIC RESERVE has been set aside as it is a significant area of regenerating kauri. It is an important habitat area for wildlife with a colony of shags and other species of birds nesting. The 209 hectare forest is administered by the Department of Conservation.

◆ 45 PARAKAI GEOTHERMAL FIELD This is the hottest geothermal water resource in the Region. Hot water is presently abstracted at an average rate of about 560 cubic metres per day at up to 65oC. There are no surface springs.

It is estimated that the field can sustain up to 700 m3/day draw off.

☒ 47 MAHURANGI HARBOUR This area is a regionally important centre for oyster farming. The catchment should be managed to maintain water quality. Several oyster farms are located within the harbour. Mangroves are significant and important in this harbour. The upper reaches of the harbour are bordered by

remnants of kahikatea swamp forest. Much of the land of the northern side is reserve land.

☒ 58 THE WEITI ESTUARY is notable for the series of chenier-type shell spits which have formed within the estuary. These have been used to derive a sea level curve for the last 10,000 years and are considered to be internationally significant landforms. The estuary is not a significant wading bird feeding ground, but the shell spits are a good high tide roosting site for the wading birds that feed in the adjacent intertidal areas to the south and for the coastal birds that use the estuary itself. The most seaward shell bank is particularly important as one of the key breeding grounds in the Region for the threatened New Zealand dotterel.

☒ 59–61 WITHIN THE WAIWERA, WENDERHOLM AND PUHOI area there is a considerable variety of intertidal substrates which together form a complex array of habitats supporting a variety of animal and plant communities. The communities living on the wave-cut platforms at Wenderholm have been found to be diverse and in good condition. The mobility of the substrate on the open beach at Wenderholm means that benthic organisms tend to be confined to subtidal areas. Along the hard shores here the natural marine area adjoins an important area of coastal taraire forest on a headland or peninsula. The intertidal flats within the Waiwera and Puhoi estuaries are used as a feeding ground by a variety of wading birds, many of which use these estuaries as a stepping stone in their travels. Many of these birds roost on the sandy area at the entrance to the Waiwera Estuary at high tide. A variety of other coastal birds feed and roost within this area. A limited amount of saltmarsh and mangrove line the Waiwera Estuary, but it is still a good habitat for coastal fringe birds because of the presence of the freshwater Straka's Dam on the boundary. The saline vegetation areas in the Puhoi Estuary are more substantial and are some of the best in the Rodney ecological district.

◆ 62 WAIWERA GEOTHERMAL FIELD Abstractions of geothermal water from this field average at about 1150 cubic metres/day at up to about 53oC. The capacity of the resource is estimated at 1300 cubic metres/day. Hot springs on the beach ceased in the 1970s due to declining water levels in the field.

☒ 63 OREWA ESTUARY is a moderately-sized estuary with a variety of habitats for plants and animal communities in the marine area. About 85% of the estuary is made up of intertidal banks upon which migratory wading birds feed. They use this estuary as a stepping stone in their travels. A range of coastal birds, particularly shags, also feed within the estuary as do a number of species of waterfowl that utilise the estuary and the adjacent oxidation ponds on the southern margins. The mangroves and saltmarsh that occupy the remaining parts of the estuary are a habitat for secretive coastal fringe birds particularly where adjoining terrestrial vegetation provides shelter for the birds at high tide and potential nesting sites.

☐ 68 TIRITIRI MATANGI ISLAND Grazing animals were removed from this island in 1972 and the plant succession from pasture is being studied. In limited areas succession has progressed from grass land to manuka and kanuka to mapou dominance and further to kohekohe and mahoe. Pohutukawa are now appearing in former grass land and bracken areas. The lack of possum and kikuyu grass makes the island suitable for research on forest regeneration. The absence of rats (other than kiore) and mustelids makes the island of considerable value as a wildlife refuge. It is thus ideal for the study and introduction of native fauna. Numerous bird species breed on the island – tui, spotless crake, little blue penguin, pukeko, grey-faced petrel, fantail, grey warbler, silvereye, kingfisher, pipit, and harrier. It is the nearest island to Auckland inhabited by the bellbird. The red crown parakeet was introduced in 1974 from aviary-reared stock. Saddleback were also introduced in 1985, and are breeding successfully. Diving

petrel and sooty shearwater nest on the rock stacks. Kaka, tomtit and pigeon visit the island.

This island is part of the Hauraki Gulf Maritime Park. There is now open access and people freely visit to experience the wide variety of forest and shore birds found close to Auckland. Since 1984, school groups and members of the public have been involved in tree planting (at a rate of about 37,000 trees per year) to recreate coastal forest in a joint project run by the Department of Conservation and the World Fund for Nature.

☐☒ 69 THE NOISES which include Motuhoropapa Island, Otata Island, Maria Island and David Rocks, are small and unpopulated. They have a diverse and abundant bird life, which depends on their comparative inaccessibly, lack of predators and the plentiful marine life available in surrounding waters and on the foreshores. Norway rats were present on Maria Island for a number of years, although it now appears that since 1962 these have been eradicated by the (then) Wildlife Service. Norway rats were also originally present on Motuhoropapa and Otata islands, and were eradicated in 1962, and again in 1993.

Unfortunately there are now a number of environmentally damaging plants which are undermining the natural values of this island group. For example, *Rhamnus alaternus* is on Motuhoropapa Island, *Phoenix canaeriensis* on Otata Island, and mile-a-minute and boxthorn are present on Maria Island.

Maria Island is one of the few places in the Auckland Region where the white-faced storm petrel breeds. Birds commonly seen in the Noises include kingfisher, blue reef heron, red-billed gull, black shag, pied shag, little shag, white-fronted tern and gannet. The black-backed gull, harrier, welcome shallow, little blue penguin and the less commonly seen grey-faced petrel breed on the islands. The grey warbler, fantail and silvereye are abundant and are known to breed on the islands. Tui, morepork and shining cuckoo are occasionally seen.

The vegetation on some of these islands is close to primitive conditions, but others in the past have suffered from burning. Now the important species are pohutukawa, karo, houpara, tawapou and coastal mahoe (*Melicytus novae-zelandiae*).

Such habitats are of regional and national importance.

☐ 74 RIVERHEAD ECOLOGICAL AREA This is the last stand of indigenous forest of an appreciable size left in the Riverhead Forest. The most striking feature of the block is its variability with forest types being exhibited from a relatively simple kanuka-*Gahnia* association to highly complex podocarp forest, and all intermediate stages of 'nursery' kanuka-hardwood and scrub-hardwood types. In addition, a coastal forest type is also present.

The two-tier kanuka-*Gahnia* association grades into a number of kanuka-scrub-hardwood types, one of which contains a canopy layer of kanuka with subcanopy and shrub layers of mapou, mahoe, toro, kohuhu, lancewood, hangehange and karamu. Another type consists of emergent rewarewa and putaputaweta with scattered kanuka over a dense mamaku and ponga subcanopy with the same broadleaf species as above.

The simplest type of coastal forest consists of a dense canopy of puriri and nikau with tree ferns mixed throughout the subcanopy.

The most complex of the forest types in the area is podocarp forest. Here canopy layers vary from more or less pure kauri, kahikatea or totara stands to mixtures containing kauri, rimu, totara, tanekaha, miro and even matai. Shrub and ground layers are similarly well developed and contain a number of species not commonly found within the other associations such as maire, *Alseuosmia macrophylla, Corokia buddleioides* and *Gleichenia cunninghamii.*

The indigenous fern, *Loxsoma cunninghamii*, which is found in only a few other areas in the Region, grows in this reserve.

☐ 76 LOOKOUT BIOLOGICAL AREA This area, the dominant vegetative cover of which is kanuka forest, is a representative remnant of a type once found in the area. Where the kanuka canopy is absent, a scrub-hardwood forest has developed.

The kanuka forest has a definite three-tier structure consisting of a canopy layer of kanuka up to 15m high, a dense thicket layer of *Pseudopanax* spp. and a low scrub tier of *Coprosma* spp. and mingimingi. Modifications of this basic pattern are common where rewarewa, kohuhu, akeake are added to the canopy, mapou, mahoe to the subcanopy and kawakawa, *Corokia cotoneaster* and ferns to the ground storey.

The scrub-hardwood association is characterised by mahoe, karamu, hangehange, mapou, five-finger and scattered emergent rewarewa, akeake, kohuhu and cabbage trees. Rangiora, kawakawa and *Coprosma* spp. are found in the subcanopy.

This land is protected by a covenant.

☐ 77 HODGES BASIN BIOLOGICAL AREA This area contains valuable 'relic' groves of typical coastal forest once common in the area. The common pattern is one of dense groves of coastal forest in the sheltered hollows with a kanuka overstorey fringing these on the ridges and slopes.

The pockets of coastal forest contain groups of large karaka, old puriri and emergent rewarewa with kohekohe, wharangi, mangeo, akeake, titoki and ngaio scattered throughout.

The kanuka forest has isolated cabbage tree and rewarewa emergents with a shrub tier of divaricating *Coprosma* spp., *Myrsine divaricata* and mingimingi.

This land is protected by a covenant.

❍☐ 78 LAKE OKAIHAU BIOLOGICAL AREA This reserve contains the best example of true coastal forest still remaining in Woodhill, as well as areas of kanuka-broadleaf scrub and raupo swamp.

The coastal forest consists of a dense canopy layer formed by karaka, puriri, pohutukawa and titoki. Nikau and kawakawa alone are common as ground to subcanopy species. The older trees are blanketed by orchids, ferns, *Astelia* spp., and lianas. On the fringes of these dense groves, a subcanopy layer of broadleaf trees, including kohekohe, whau, turepo, houpara, karamu, wharangi, mahoe and the occasional kowhai and ngaio occurs beneath the more scattered canopy of karaka. A shrub layer of nikau, kawakawa, hangehange, and *Coprosma rhamnoides* occurs in these areas.

The kanuka-broadleaf scrub areas occur on the eastern side of the reserve and consists of about equal portions of kanuka and broadleaf species throughout. The latter includes mahoe, wharangi, karamu, akeake, lancewood, mapou, rangiora, hangehange and cabbage trees.

The swamp areas around Lake Okaihau are chiefly raupo dominated although flax, *Juncus* spp. and *Cyperus ustulatus* are common. Broadleaf shrubs such as karamu, rangiora, hangehange and cabbage trees border the areas.

This land is protected by a covenant.

BIRDS OF LAKE OKAIHAU AREA (OSNZ 1978 Survey) include: mallard duck, pukeko, pied stilt, paradise duck, white-faced heron, rosella parakeet, little shag, black shag, harrier, and black swan. It is a valuable area for wildlife.

☐☒ 80 MURIWAI GANNET COLONY on Motutara Island (known locally as Sugarloaf), a small rock stack off the headland at Muriwai beach, is a spill-over from the larger colony on Oaia Island. Motutara Island has become overcrowded. Repeated attempts by the birds to nest on the mainland, though at first thwarted by interference from humans and dogs, have since been successful. There are now two mainland gannet nesting colonies. All colonies are considered to be of national importance. Restraining fences have been built to protect the colonies and a viewing platform has been provided.

◆ 82 ANDESITIC PILLOW LAVA FLOWS This lava has been deposited under water to form a heap of cylindrical bodies like a pile of pillows. The examples at Maori Bay are the best in New Zealand and among the best in the world; they are therefore of national significance. The pillow lavas are extremely well formed. They include a number of very large individual pillows, deposited in 1500m depth of water. A second series of pillows exposed in the cliffs at the south end of Te Henga are also well preserved. The largest has a diameter of 8m (av. 1–2m) and is deposited under shallower water than those at Maori Bay. These two features provide useful comparative material for the study of pillows formed under different conditions (Searle 1964; WRPS 1978).

☐☒ 83 ERANGI POINT the high promontory north of the Waitakere River, supports the only mainland spotted shag nesting colony in the North Island. There are two grey-faced petrel colonies on Ihumoana Island and Kauwahaia Island north and south of Erangi Point. This petrel (oi) is a burrow dweller and needs protection from rats, cats, people and other predators. Erangi Point is considered to be of national importance.

❍☒◆84 TE HENGA-WAINAMU AREA Swamp lands, lakes, dunes and native forest provide a complex of habitats with rich and diverse flora and fauna not found elsewhere in the Region. The area is considered to be of national importance and worthy of protection.

Te Henga marsh covers some 80 hectares and is the largest coastal freshwater swamp within 120 km of Auckland. It contains virtually all of the notable northern-swamp plant species including large monocotyledons. It provides the required habitat for a number of animal species. This swamp illustrates seral succession related to the depth of the substrate from the water table. Adventive water lilies (*Nymphaea* spp.) and the water fern *Azolla pinnata* are found colonising the open water margins. In shallow waters are found the tall spike rush (*Eleocharis sphacelata*), the native swamp millet (*Isachne australis*), and a milfoil (*Myriophyllum propinquum*). Raupo (*Typha orientalis*), *Baumea* spp. and swamp millet are the dominant species found in areas where the water is a few centimetres deep. Cabbage trees, flax and manuka are found on the margins or islands within the swamp. Te Henga marsh supports up to 15 native bird species. Some of these are not common, in particular, the fernbird, bittern, marsh crake, spotless crake, and banded rail require protection. Those common species found in the swamp include grey ducks, mallard ducks and pukeko.

Te Henga marsh is of high ecological value as such habitats are increasingly rare. It is worthy of protection from drainage, infilling, and waste materials with high oxygen demand on nutrient values, as any such action could cause irreversible damage to this ecosystem. Parts of this swamp have been purchased with the aim of preservation. The Royal Forest and Bird Protection Society owns approximately 30 hectares of it. The Auckland Acclimatisation Society owns 2 blocks totalling 13 hectares. The balance remains in private ownership.

Lakes Waiataru, Kawaupaku, and Wainamu and the lake at the junction of the Waiti and Te Aute streams have been formed by the damming of deep stream valleys by wind-blown Holocene sands. In recent years the Te Henga dunes have been stabilised by vegetation in the area behind the foredune. This has cut off the supply of sand to the inland dunes resulting in accelerated removal of sand from the western parts of the inland dunes and the exposing of large areas of bare rock. The advance of the dune into Lake Wainamu will probably stop as the sand supply runs out. In 1979, 154 hectares around Lake Wainamu, which is the largest natural lake in the Waitakere Ranges were acquired for reserve purposes through joint funding by the then Department of Lands and Survey, Waitemata City Council, Auckland Regional Authority, and the Waitakere Ranges Protection Society and the Queen

Elizabeth II National Trust. The reserve, adjoining the Cascades Kauri Park, has a range of habitats – lake shore, sand dunes, pasture and native forest. Some of the dune area near the lake is a Waitakere City Council reserve, set aside for the purpose of preservation.

Pingao (*Desmoschoenus spiralis*) and silvery sand grass (*Spinifex hirsutus*) are found on the two large dune areas which remain in their natural state. On the humus-rich sand around the mouth of the Waitakere River there is a distinctive maritime plant community which includes a native herb, milfoil, arrowgrass and *Gunnera arenaria*. Birds which can be seen on the beach and dunes include New Zealand dotterel, banded dotterel, pipit, black-backed gull and red-billed gull. Pied stilt are regularly seen in the small lagoon near the mouth of the main stream. There is a spotted shag colony on Erangi Point.

□ Scrublands and forest types in the area are varied. The most widespread type is dominated by manuka and kanuka; on the cliffs and promontories flax and cabbage trees with numerous native herbs dominate. On the series of fossil sand dunes to the north-east of Lake Kawaupaku, there occurs an unusual type of scrub dominated by manuka and kanuka associated with coprosmas, kowhai, mingimingi and a number of less common species such as rohutu (*Lophomyrtus obcordata*), poataniwha (*Melicope simplex*) and weeping matipo (*Myrsine divaricata*). Nikau and cabbage trees occur in the hollows, and pohutukawa coastal forest around Erangi Point, Ihumoana and Kauwahaia Islands. Surrounding Lake Kawaupaku the coastal forest is comprised of tawapou, karaka, pohutukawa, kohekohe, mahoe and mangeao. To the north of Te Henga swamp there is a kauri-podocarp forest where standards of kauri rickers dominate the ridges. A mixture of rimu, kahikatea, tawa and titoki is found in the gullies. Approximately 70 hectares of this forest are owned by the Royal Forest and Bird Protection Society. The scrub areas support silvereye, fantail, grey warbler and tui. In addition to these, the native forest areas have rosella parakeet, shining cuckoo, morepork and pigeon.

☒ 85 BULL KELP (*Durvillea antarctica*) is rare in the Region. It is found in significant quantities only along the west coast between Te Henga and Piha.

□☒◆87 The WAITAKERE RANGES These hills of Miocene volcanic rock rising to 475m above sea level are the major landform feature west of the urban area and provide water catchment supply areas and outdoor recreation facilities for the Region. It is a botanically rich area containing 20% of all New Zealand's flowering plant species and 60% of all New Zealand fern species. There are a few species which do not extend beyond the borders of the Waitakere Ranges – the local kowhai (*Sophora microphylla* var. fulvida), a forget-me-not (*Myosotis petiolata*) and *Hebe bishopiana*. A large number (43) of regionally threatened plants are found in the Waitakere area. The uncommon orchid *Yoania australis* is dependent on taraire forest and is still found in the Waitakeres.

In spite of extensive milling and clearing in parts for farming, the greater portion of the ranges is clad in native forest, some nearly virgin. Forest unaffected by milling, or only lightly logged, covers about one-fifth of the Waitakeres. Areas which have developed beyond the tea tree stage, and forest which was heavily milled but not burnt, cover more than a third of the ranges. Most is in the Piha – Anawhata – Bethells area. Tea tree makes up about one third of the vegetative cover (Esler 1974).

The unmilled forest has kauri as its most distinctive tree. The kauri tree grows singly or in small clusters, frequently, but not always, on the crests of ridges. Between the widely spaced crowns of mature kauri, emerge rimu, northern rata, miro, totara, tawa, tanekaha and rewarewa. Dense stands of kauri rickers are also found. A very distinctive set of plants grow with kauri grass and species such as tawari, kawaka, *Dracophyllum latifolium* and the ferns *Gleichenia cunninghamii* and *Schizaea dichotoma* which are more likely

to be found with the kauri than away from it. There are parts of the unmilled forest where kauri is not common. In the upper Nihotupu catchment there is a fine stand of rimu and northern rata with no kauri.

The cut-over forest is of variable age, and comprises northern rata with small quantities of tawa, rewarewa, rimu, totara, puriri and kahikatea. The distinctive feature of the canopy is the variety of crown shapes and shades of green. There are many component species such as mahoe, heketara, kohuhu, mapou, coprosmas, tree ferns and nikau. The climbers, supplejack and kiekie, are abundant.

Coastal forest is not extensive but fragments are encountered in many places. Pohutukawa dominate with associates such as flax, *Astelia banksii, Gahnia lacera*, kawakawa, kowhai, tawapou, houpara, rangiora, the ferns *Asplenium oblongifolium* and *Polystichum richardii*, the succulent *Peperomia urvilleana* and the renga lily. In the more sheltered gullies pohutukawa forest grades into the forest of the interior through a zone comprising kohekohe, karaka, wharangi and whau.

The vegetation around Welsey Spragg Memorial includes quantities of *Dracophyllum sinclairii, Persoonia toru* and *Gleichenia circinata* and a smaller amount of flax. This plant community approaches what is called gumfield shrubland which is becoming increasingly rare in the Region.

Differences among tea tree communities result from variations in age, topography (altitude, aspect, slope), proximity to the coast and the effect of grazing cattle. Manuka (*Leptospermum scoparium*) dominates sites adjacent to the coastline, being more resistant to wind-borne salt c.f. kanuka, (*Kunzea ericoides*) found further inland. Tea tree communities represent a transitional stage in the succession towards mature forest, and some are now giving way to kauri or rimu dominated forest (Esler and Astridge, 1974).

Birds which live in the forest include grey warbler, silvereye, fantail, tui, pigeon, rosella, morepork, shining cuckoo, kingfisher, kaka (seasonal) and tomtit. New Zealand falcon and long tailed bats have been reported from the Karekare area.

The forest gecko and native frog *Leiopelma hochstetteri* (both depleted species) are found in the Waitakeres. Two species of native land snail, *Rhytida greenwoodi* (southern) and *R. dunniae* (northern), are found throughout the ranges; a large variety (over 100 species) of smaller snails are numerous. *Paryphanta busbyi*, the large carnivorous kauri snail, can be found in some areas.

The Waitakere Ranges are considered to be of national and international importance.

☒◆ 88 WHATIPU BEACH is an unconsolidated mobile sand area of dense black sand with large admixtures of titano-magnetite characteristic of west coast harbour entrances of the Region. The beach has a history of rapid progradation and recession. High water mark was along the cliff-line in the 1840s and 1930s, and near the present position (about 1 km west) in the 1960s and further out in the 1950s (Williams 1977; Esler 1974). The remote wilderness character of this area is protected by ARC policies of foot access only to the area.

Whatipu is an important nesting area for the white-fronted tern and a feeding area for the caspian tern and blue reef heron. Pingao is also found on the mobile sands, and a diverse range of freshwater wetlands are found on the sand flats close to the coastal cliffs. The area as a whole is considered to be of national importance.

☒ 90 The HUIA AREA is characterised by a diversity of estuarine and salt marsh habitats, scrub, coastal forest, pasture and kauri dominant rain forest. At the end of the lower Huia dam, in the water catchment area, there is a small area of native forest containing a rich variety of

species some of which are rare. At the salt marsh at Huia a small weevil (*Peristoreus australis*), previously only found in the South Island, has been discovered. A newly discovered species of moth has been found in the area living in the flowers and leaves of the marsh ribbonwood. Blue reef heron, pied stilt, oystercatcher and white-faced heron are found on the intertidal flats of Huia Bay.

☐ 95 KAIPATIKI ESCARPMENT These steep south-facing slopes are partly within a reserve area and contain extensive areas of high quality native vegetation consisting of kauri and mixed podocarp-broadleaf forest. The area contains some large kohekohe, puriri, kahikatea and taraire trees with abundant kauri and beech trees. The presence of beech trees, *Nothofagus truncata*, makes the area of special interest.

☐ 97 SMITH'S BUSH, now dissected by the motorway, has an outstanding grove of giant puriri (some up to 6m in girth) and thousands of slender, conical kahikatea as well as smaller numbers of taraire, kowhai, titoki, karaka, tawa and totara. Ground ferns, climbing ferns, sedges and grasses are also found in the reserve.

☐ 98 KAURI POINT is the most prominent tree clad headland in the Waitemata Harbour.

☐ 99 CHELSEA BUSH now confined to the stream areas, is a remnant of the kauri mixed forest which was once common in the Region. Here kauri and hard beech can be seen growing together and near the reservoir a fine stand of the sedge, *Eleocharis sphacelata*, can be found.

THE WAITEMATA HARBOUR

☒ 91 UPPER WAITEMATA HARBOUR CREEKS Brighams, Rangitopuni, Paremoremo, Lucas and Hellyers creeks in the upper reaches of the Waitemata Harbour offer largely unspoilt tidal inlets with hill sides of regenerating native forest in places, particularly in the area of Lucas and Paremoremo creeks.

The forest cover consists of kauri on the ridges with puriri and kahikatea dominants on the slopes and in the gullies. The coastal forest is comprised of pohutukawa, kowhai and karaka dominants. Hard beech is also found along the Hellyers Creek escarpment.

The extensive sheltered intertidal areas retain large quantities of soft sediment derived from the watershed. The mangroves and salt marshes are important as wildlife habitats. Birds which can be found in the area include black shag, kingfisher, ducks and white-fronted tern. The ARA/NWASCO Upper Waitemata Harbour Catchment Study provided detailed information on the environment and sensitivity of the catchment above the Greenhithe bridge.

❍☒ 100 BIRDS OF THE UPPER WAITEMATA HARBOUR Birds which are commonly seen throughout the Waitemata Harbour include pied shag, little black shag, little shag, pied stilt, black-backed gull and red-billed gull. Pukeko, mallard duck and kingfisher are commonly found in the tidal creeks and mangroves. The caspian tern can often be seen in the sheltered waters of the upper harbour where they feed on fish caught by diving. The white-fronted tern is found in the vicinity of Hobsonville and Whenuapai. Banded rail are not common but can be seen in some of the mangrove areas. The white-faced heron is commonly found around the tidal flats of the upper harbour where it finds an abundant supply of food in the mangroves. Blue reef herons can be seen in small numbers in the outer harbour area. White herons can on rare occasions be seen at Pollen Island. The black shag is also seen occasionally around the Te Atatu peninsula. The South Island pied oystercatcher is common in numbers of up to 500. As many as 180 banded dotterel have been sighted on Pollen and

Traherne islands. Wrybills are present in season as are godwits. Since 1978 the New Zealand dotterel has made a return to the harbour and has nested successfully in three areas.

☒ 101 HOBSONVILLE Opposite Kaiwhanake Point is a shell bank that attracts a variety of waders. In 1981 this area had a wintering flock of New Zealand dotterel.

This is also one of the two major roosts in the Waitemata Harbour for godwit in the summer and for South Island pied oystercatcher in the winter. The area has no public access except by boat. New Zealand dotterel have nested here but not successfully.

☒ 102 TE ATATU NORTH At the tip of the mangrove area is a series of small shell banks. These are major roosting areas for waders in the Waitemata Harbour, particularly godwit. New Zealand dotterel and caspian tern have successfully nested here in recent years.

☒ 103 SOLDIERS BAY with its sand flats, mangroves, shell bank, saltmarsh and bulrush swamp, has great potential for wildlife, recreational and educational purposes. Pied stilt, white-faced heron, kingfisher, gulls, white-fronted tern, caspian tern and, occasionally, gannet can be seen in the area.

☒ 104 TE ATATU – WHAU RIVER On the east side of the Te Atatu peninsula south of Harbour View Road there are extensive, clean, high-tidal sandflats, healthy mangroves, a prominent shell bank and a high-tidal salt marsh along the shoreline. Such a combination is unusual to find in the Waitemata Harbour and is one of the few worthy of wildlife reserve status. However, the shell banks are deteriorating due to constant use by motorcycles and few birds roost here. The off-shore area remains a major feeding ground. Gulls, terns, pied stilt, white-faced heron and kingfisher are seen in this area.

The mangroves and salt marshes in the Whau River are also worthy of preservation.

An extensive and ecologically healthy area of mangrove and salt marshes can be found in the Henderson Creek. This area is readily accessible and contains good examples of the natural communities for educational purposes.

Kingfisher, pied stilt, white-faced heron, red-billed gull, black-backed gull, pied shag, black shag, welcome swallow, and pukeko are among birds seen in the area.

☒◆ 105 POLLEN AND TRAHERNE ISLANDS These low-lying islands with extensive shell banks, mangroves and salt marshes comprise an important wildlife area in the Waitemata Harbour. While the shell banks at the northern end of Pollen Island are lower than they have been, shell banks have developed 50m off-shore on the harbour side of Pollen Island and are significant roosting areas. Traherne Island is also an important roosting area for birds and is the main roost for banded dotterel and wrybill in the Waitemata Harbour. New Zealand dotterel and fernbird nest in the area. The fernbird colony which survives represents an extremely valuable avian resource. This species is now rare in the Auckland area. The tidal mud barrier on the southern side has probably been very important in preventing access of predators and deterring access by people. The south end of Pollen Island is the only known locality in New Zealand of the minute ant, *Mayriella abstinens*; it is also the type of locality for a new species of psyllid, *Anomalopsylle* which is less than 1mm long. Limiting public access is essential to the preservation of this important wildlife area. The Pollen Island locality is a proposed marine reserve and is considered to be of national importance.

☒◆ 106 TE TOKAROA (BLACK) REEF is a basaltic lava flow, probably from Mt Eden (possibly Mt Albert) which extends into the Waitemata Harbour. It provides a range of habitats and flora and fauna "which is unique both within the Waitemata Harbour and throughout New Zealand" (Larcombe 1973, 339). Extensive salt marshes and mangrove communities associated with the reef enhance the great educational value of this area.

◆ 107 TANK FARM is a former freshwater crater lake formed by explosive eruptions and surrounded by steep tuff rings. With rising sea level this crater has been breeched by the sea, and provides sheltered intertidal mangrove and salt marsh communities important as fish and bird habitats. Tank Farm is of regional significance.

❍◆ 108 LAKE PUPUKE is also formed in a volcanic explosion crater which has been preserved by its tuff sides. The nearly circular freshwater lake has a surface area of 100 ha and is over 50m deep in the centre. The lake is enriched but supports a variety of fish and bird life including pied shag, ducks, black swan, pukeko, white-faced heron, Canadian geese (all of which breed on the lake), tui, fantail, silvereye, and grey warbler.

☒ 109 SHOAL BAY north of a line east of the Northcote motorway interchange, is an important feeding and roosting area. Caspian tern, New Zealand dotterel, pied stilt, white-faced heron, pukeko, kingfisher and gulls can be seen in the area. There are only two significant roosting areas remaining in the bay – a shell bank on the Takapuna side, and another on the motorway side. The latter is the only roosting area used by the New Zealand dotterel between Traherne Island and Browns Island and is a nesting area for the New Zealand dotterel, caspian tern and pied stilt. These shell banks deserve protection not only in their own right and for their ornithological value but also because of the protection they afford coastal margins, salt marsh and mangrove communities. The Wairau and Milford catchments drained through the Shoal Bay valley before the Pupuke eruptions blocked the valley.

◆ 110 MOUNT VICTORIA (TAKARUNGA) is a steep scoria cone, the largest north of the harbour with a summit crater breeched towards the south east from whence lava flowed into the Waitemata valley.

◆ 111 NORTH HEAD (TAKAPUNA). This notable landmark at the entrance to Auckland Harbour has been considerably eroded by the sea and in the recent past (5000 years ago) has been an island. The lower part of the mount is composed of tuff beneath the central scoria cone from which a small lava field flowed.

❍☒ 113 BIRDS OF HOBSON BAY include white-fronted terns, gulls, kingfishers, white-faced herons, pied stilts, mallard ducks and pukeko. The native pigeon can also be seen in the area.

☒◆ 114 ORAKEI BASIN is a phreatic explosion crater which formed a freshwater crater lake (maar) which has been breached to form a tidal mudflat. Subsequently the basin has been closed off by the railway embankment and the water level and flushing of the basin is now controlled. Little shags, pied shags, and little black shags nest around the basin. This volcanic features is considered to be of national importance.

☐ 115 PUREWA VALLEY contains remnants of coastal forest and one of the finest examples of mangrove forest in the Auckland area with some trees up to 4m in height. Several patches of eelgrass, now a rather uncommon species in the Waitemata Harbour since its devastation by disease in the 1950s, are found on the tidal flats. There are some old kanuka, cabbage trees, kowhai and pohutukawa. The forest on the steep northern valley side has a valuable and instructive botany, zoology and geology. ACC and local groups have undertaken the protection and enhancement of this area. Birds of the area include mallard ducks, pied stilts, kingfishers, blue reef herons, grey warblers, tui and pukeko.

◆ 118 – 131

VOLCANIC LANDFORMS OF THE AUCKLAND AREA The Auckland volcanic field is notable because of the very large number of individual volcanoes set in so small an area, and for the small size of the individual volcanoes. Volcanic activity was thought to be restricted to the last 60,000 years of geological history. Recently other methods of dating indicate that the oldest eruptions may have occurred up to 150,000 years ago. Only a few sites such as Albert Park, Symonds Street and perhaps Pupuke are older than 50,000 years; others such as Albert, Roskill, Three Kings, Panmure, Taylors, Victoria, North Head, Hobson, St John, and Pukaki probably date from the period 20,000 – 50,000 B.P.; while Eden, Wellington, One