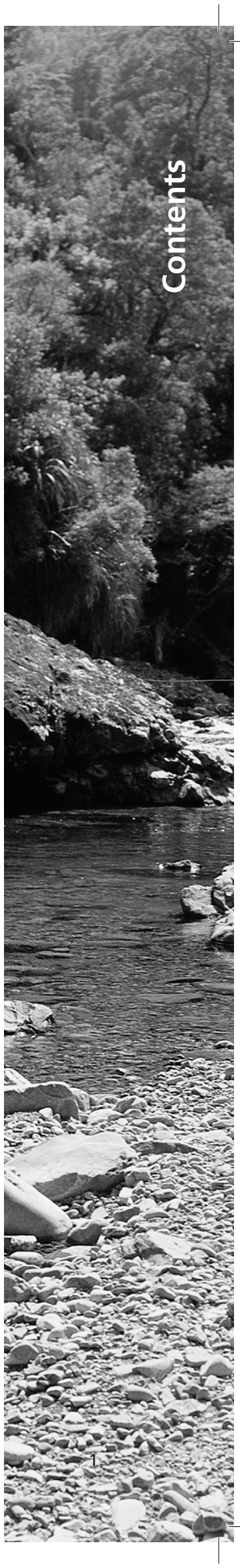
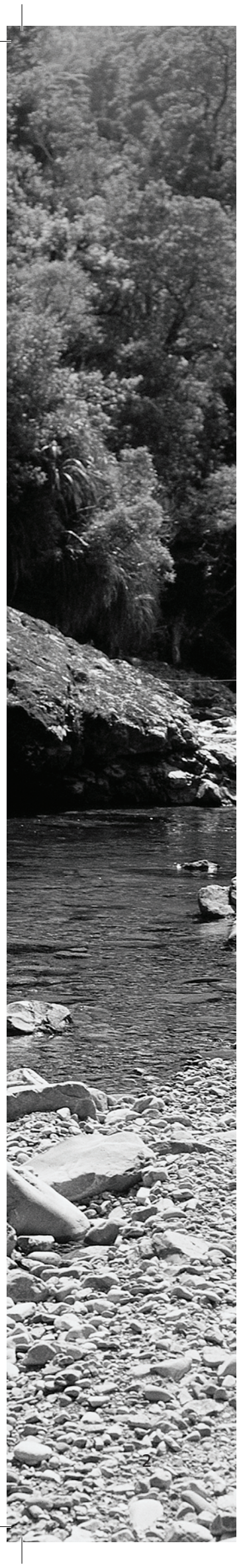
Contents





History and Cultural Heritage

1. History of Kaitoke Regional Park

1.1 Maori history of the area

The Kaitoke Regional Park is part of a region known as Pakuratahi at the head of the valley of Te Awakairangi, Heretaunga or Hutt River. This area was distant from the coastal food resources which attracted Maori Pa and kainga (villages) resulting in the area being less intensely occupied by Maori over the centuries. Pakuratahi was always an integral part of Te Upoko o te Ika (the Wellington region), particularly for those resident around Te Whanganui a Tara (Wellington Harbour). The area was accessible by river which was navigable by waka past what is now Upper Hutt prior to the geological uplift of the region that occurred in 1855. The main river was first known as Te Awakairangi then later as Heretaunga and now as the Hutt River. Te Awakairangi is said to be named by Kupe in his visit many centuries earlier.

The Maori history of the area, like Te Upoko o te Ika generally, has been one of change with waves of migration (heke) of the iwi from Te Tai Rāwhiti (East Coast) starting with Whātonga and his sons with later peoples being their descendants. The East Coast people were followed by the iwi from Te Tai Hauauru (West Coast) being then migrations from the northern Taranaki iwi whose descendants maintain ahi kaa today. Much of the history of Pakuratahi and environs is embodied in the names and places that remain.

Pakuratahi was an area of dense tall forest with the podocarp forest in the valley floor with kahikatea, pukatea, rimu, totara and in other areas rata and a broad mix of forest trees. There were also grassed areas hence the name Haukaretu (now known as Māoribank) which literally means the wind in the sweet smelling grass. The tall forest was still intact when the New Zealand Company surveyors travelled up the valley in 1839. This forest was to later support a large sawmilling industry which lasted many years.

Orongomai is the old Maori name of the area where Upper Hutt now stands. It means “the place of Rongomai”. He was an ancestor and patron of the tribes whose ancestors came in the Kurahaupo canoe. According to their traditions the captain was Whatonga, ancestor of the Ngai Tara and Rangitane tribes.

Pakuratahi (literally meaning first swamp hen) is also the river flowing into the Hutt River at its upper reaches to the east of Kaitoke Regional Park. Maori traversed through this area to the Wairarapa over the Rimutaka (Remutaka) range as an alternative to the coastal route via Turakirae. There are no known Pā or kainga sites in Kaitoke Regional Park or Pakuratahi generally.

Some of the first peoples in this area were the descendants of Whātonga including his sons Tara-ika (after whom Te Whanganui a Tara is named) and Tautoki. It is said that the area was divided along the Heretaunga River with the Tara people to the west including the west coast from Otaki southwards around to Turakirae and Tautoki having the east excluding the coastal area of Fitzroy Bay (Parangarehu). It is noted that Rangitāne was the son of Tautoki.

Following the Ngai Tara, the next migration into the region was from Waipukurau and included the hapu of Ngati Raku-whakairi and Ngati Kahukura-awhiti, both of Ngati Ira. In pre-European times the Pā Whakataka occupied by the Ngati Ira people was located at Te Marua just south of the Park's boundaries on a hill overlooking where the Mangaroa Stream joins the Heretaunga (Hutt River). This Pā was sacked by a war party including Tamati Waka Nene, Patuone and Tuwhare of Ngati Whātua, and others including Te Rauparaha of Ngati Toa. This ope taua or war party had muskets but struggled to overtake this well defended Pā.

Pā Whakapapa was said to be located across the Hutt River from the Te Marua Golf Course off the east end of Gillespie's Road. This was another Ngāti Ira Pā and is probably the remains of a Pā seen by Dieffenbach when he surveyed the valley in 1840. The trails from Heretaunga (Hutt Valley) to the Wairarapa traversed this way. Waka would be taken up rivers as far as possible then the river valley was followed to the Pakuratahi flats and thence across the Rimutaka Range. Dieffenbach when attempting to traverse to the Wairarapa was unsuccessful, however a later expedition lead by Stokes engaged Maori guides and was successful in the traverse. Purehurehu (now known as Moonshine) was also the name of the track from the Hutt Valley to Porirua.

The Maori history saw significant changes in the 19th century in part as a result of the arrival of the musket. The event that triggered these changes was the Amiowhenua taua (a war party) of 1821-22 which originated with Ngati Whatua and other Kaipara, Tamaki and Hauraki peoples which proceeded first through Hawke's Bay and Wairarapa then north again to Waitara where it was joined by Ngati Toa and Ngati Awa[1]. After significant altercations the taua travelled through to the Wellington area, where their actions included the attack on Pa Whakataka described above.

This taua was followed by several waves of migration to the West coast around Waikanae and Kapiti of Ngati Toa and their kin from Ngati Koata and Ngati Rarua from Kawhia along with the Ngati Awa iwi of Ngati Tama, Ngati Mutunga and Te Atiawa from Northern Taranaki. Of these eventually Ngati Tama and Ngati Mutunga came into Te Whanganui a Tara and started to settle around the harbour around 1820 to 1830. Later in this time the fighting Chiefs of Te Atiawa from Nga Motu (now New Plymouth) went to live in the Wairarapa. They returned from the Wairarapa when Ngati Tama and Ngati Mutunga left for the Chatham Islands in 1835 with Te Atiawa taking over places such as Waiwhetu, Ngauranga, Pipitea, and others predominantly around the harbour. After 1842 some of Ngati Tama returned to Wellington from the Chatham Islands and sought to take up their interests again in Upper Hutt.

Eventually the Taranaki people, Te Atiawa, occupied all of the Hutt Valley shortly before the Europeans came, with villages at Te Hau-Karetu (Maoribank) and Whirinaki (Silverstream).

1.2 Making peace

After a period of fighting between the Ngati Kahungunu people in the Wairarapa and the Te Atiawa (Ngati Awa) people now resident in the Hutt, discussions were entered into to make peace in 1840.

When the peace making was being discussed by the two peoples at the Hutt, Peehi (Peehi Tu-te-pakihi-rangi of Ngati Kahungunu) made the following remarks in his

[1] Ngati Awa was the earlier generic term for what are now the iwi of Te Atiawa, Ngati Tama, Ngati Mutunga and Ngati Maru of Taranaki.

speech to Honiana te Puni, to Ngatata, to Kiri-kumara, to Miti-kakau, to Taringakuri and the assemble peoples of Awa and other tribes:[2]

> *"This is my message for you: - I cannot occupy all the land. Yonder stands the great Tararua range, let the main range be as a shoulder for us. The gulches that descend on the western side, for you to drink the waters thereof; the gullies that descend on the eastern side, I will drink of their waters. Remain here as neighbours for me henceforward."*

The offer of peace was accepted, both side agreed thereto, with many many speeches. The boundary between the two peoples ran from Turakirae along the main ridge to Remutaka, along that to Tararua, and on northward along its main summit. And so the two peoples lived in peace on either side of that line.

The tangata whenua today are Te Atiawa/Taranaki whanui who have exercised ahi kaa (or rights of occupation) from the 19th century after successfully taking the place of Ngati Ira who moved to the Wairarapa district.

Westmacott, Robert Marsh, 1801-1870. Pakuratahi River nr. Wairarapa, N.Z. Hutt River [1840]. National Library of Australia nla.pic-an3458422

1.3 The New Zealand Company arrives in Te Whanganui a Tara

In 1839, the New Zealand Company arrived in Wellington with plans of establishing a colony. A scheme to establish the town of Port Nicholson had been set out in a prospectus launched on 2 May 1839. Amid rumours that the British Government would soon intervene in New Zealand to seek sovereignty over the islands, the Company fitted out a ship named the *Tory* and their officials voyaged to New Zealand to buy land for their colonisation scheme. On 20 September 1839, the *Tory* sailed into Te Whanganui a Tara.[3]

The arrival at Te Whanganui a Tara of New Zealand Company officials on the *Tory* was soon followed by negotiations with local Maori to acquire land for settlement. On 27 September 1839, the Port Nicholson Deed was signed with Te Atiawa leaders

---

2 Best, Elsdon *TheLand Of Tara and they who settled it – in Journal of the Polynesian Society* – Vol XXVII Part IV, p 109
3 Ibid., pp.45-8

from Waiwhetu, Pito-one, Nga Uranga, Kaiwharawhara, as well as Pipitea, Kumutoto and Te Aro being involved in this land transaction. At this time, most of the Kaitoke Regional Park was within the boundaries identified by the purchase deed, however parts remained as Crown demesne land (wasteland). There were numerous difficulties with this attempt to purchase land, however. The deed was in English and the interpreter had only a basic grasp of te reo. Te Wharepouri set out the boundaries for the Company using Maori tradition of indicating boundaries starting from the coast and moving along the mountain tops naming peaks as he went to the top of Te Awakairangi River catchment in the Tararua ranges and back along the western hills and back to the coast.[4]

Soon after the Company's arrival, Crown officials landed in New Zealand and, on 6 February 1840, the Treaty of Waitangi was signed at Waitangi. However, it was not signed in Wellington until 29 April 1840 on Te Whanganui a Tara. One of the first actions of the new Government was to set up a Commission of Inquiry to generally inquire into all the many hundreds of land transactions between Europeans and Maori that had allegedly occurred prior to 1840. If these were found to be valid, then they would be ratified by the Crown and a title awarded. During the hearings into the New Zealand Company's transactions for the Wellington district, the problems with the Company's purchase emerged. The Commissioner, William Spain, having heard this testimony, expressed his view in a preliminary report of 12 September 1843, that there were serious flaws in the way of seeing the New Zealand Company's 1839 land transactions as being valid. Despite these findings, a major difficulty existed. On 21 January 1840, the first ships carrying the first Company migrants had arrived in Wellington and since then hundreds of colonists had settled in the town and countryside on the harbour's southern shores. Any finding that the Company's claims had no validity would have major ramifications for these settlers.[5]

With Commissioner Spain reaching a view that this purchase did indeed have problems, a compromise was sought. This entailed getting the various groups of Port Nicholson Maori to signs 'deed of release' giving up all their interests in Wellington, for a further payment and the granting of reserves. Recent evaluations of this arbitration process, which took place in February and March 1844, have found that it proceeded in a coercive manner.[6] However, following the completion of the arbitration process, Commissioner Spain issued his final report for the Port Nicholson claim in March 1845 recommending that the Company receive a Crown Grant for 71,900 acres of land, which effectively equated with the sections that had been surveyed for settlement up to that time. This Grant was issued by Governor FitzRoy in July 1845. It appears that at this time there were no surveyed sections within the area of land now known as the Kaitoke Regional Park, therefore this land was not initially considered as included in the Grant to the New Zealand Company.

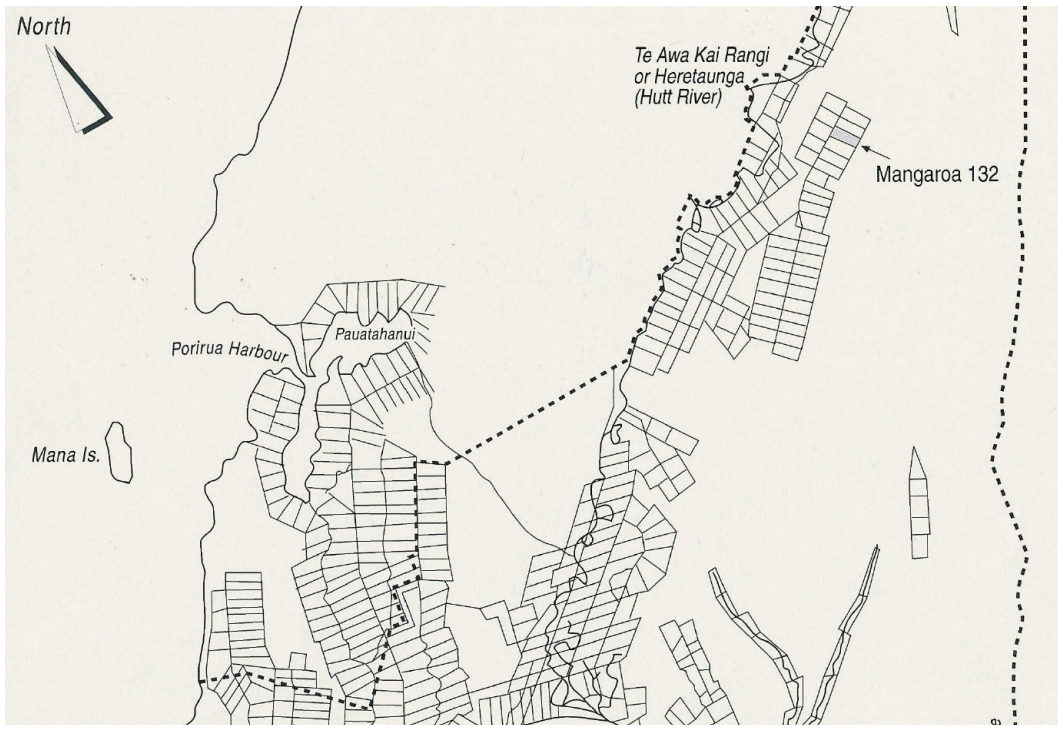
Before FitzRoy's Grant could be accepted as having validity, further concessions of land had to be awarded to various groups of Wellington Maori who were losing important cultivation lands as a result of the Grant having been made. By 1847 a series of land exchanges were made, following which a new Crown Grant was drawn up by Governor Grey and awarded to the New Zealand Company. However, rather than being based on the Company's surveyed land, as recommended by William Spain in 1844, Grey's grant covered the whole of the original block claimed by the New Zealand Company.

---

4 Information on which this subsection is based has come from Waitangi Tribunal *Te Whanganui a Tara me ona takiwä.* Wellington: Waitangi Tribunal, 2003, pp.52-59
5 Waitangi Tribunal, op. cit., pp.60-65 and 199
6 Ibid., pp.145-179

Therefore, instead of receiving almost 70,000 acres as Spain had recommended after investigating the Company's claim and determining that this was the extent of land that had been paid for, the Company was granted all 209,247 acres of their original claim. This extended Grant included much of the hill lands around Wellington. When the New Zealand Company collapsed from financial ruin in 1850, that land became Crown land.[7]

1.4 Tenths Reserves



Te Whanganui a Tara me ona Takiwa, Waitangi Tribunal –part Remaining Rural Tenths in 1873 p 297

One of the representative organisations for Te Atiawa/Taranaki whanui is the Wellington Tenths Trust which inherits those lands known as Wellington Tenths which were not allocated to the various marae. This included the Pakuratahi Block which was initially some 360 acres. Of this land there is still around 73.44 hectares (182 acres) left in the ownership of the Wellington Tenths Trust. Of the allocated lands 60.47 ha are now owned by Agresearch Limited being Pakuratahi District Section 3.

The history of the Pakuratahi reserves (located near Kaitoke, north of Upper Hutt) is exceedingly complex, and their origins are somewhat obscure. There is no evidence that they were originally New Zealand Company tenths, although they later came to be regarded as such. In the late 1840s or early 1850s, parts of these sections were cultivated by Ngati Tama under the leadership of Teira Te Whetu, who claimed that Grey had promised to give Pakuratahi to him. In the 1860s, Te Whetu and others were given a right of occupation to part of the Pakuratahi land, and, although the land was not granted to them, they proceeded to lease it out. By the time they returned to Taranaki in the early 1870s, it appears that they had leased out all 300 acres. Heaphy investigated the matter in the early 1870s and evidently considered the Pakuratahi

[7] Ibid., pp.227-278

reserves to be original tenths. He assigned the rent for part of the Pakuratahi land to particular owners, while rents for the rest went into the general native reserve fund. The Pakuratahi reserves were included in schedule d to the Native Reserves Act 1873 (though they were incorrectly listed as sections 2, 3, and 4 rather than as 3, 4, and 7) and were thereafter treated as rural tenths.[8,9]

1.5 Early European explorations and settlement

Upper Hutt River, near junction of the Mangaroa River, 1886.
Barraud, Charles Decimus 1822-1897: Alexander Turnbull Library. C-007-006

Soon after the arrival of Europeans, the Hutt River that lies within the Kaitoke Regional Park became the focus of exploration. The New Zealand Company naturalist Ernest Dieffenbach, seeking to cross the Tararua Mountains and find a way back into the Manawatu Valley, decided to follow the course of the Heretaunga (Hutt) River. He set off with a company of Europeans on 30 July 1840. From his description, it appears that he reached the part of the River now included within the Regional Park on 4 August. At this time, Dieffenbach noted that supplies were "rapidly decreasing." Over the course of the day, the exploring party crossed the river back and forth a total of sixteen times. At one point, Dieffenbach records "the river is shut in by elevated banks" – possibly a description of the Hutt Gorge. In the afternoon, the group reached what appears to be Pakuratahi Forks. On 5 August, there were heavy showers of rain, hail and snow. The river became swollen and could not be crossed. So Dieffenbach's group stayed put for a day. On 6 August, the explorers took the left branch of the fork but found that they could not proceed far as the hills again came down close to the water's edge. Dieffenbach therefore ascended the hills to obtain a view of their location but found that having reached the summit, trees obscured their view in every direction. When a tree was climbed, a view of the snow-covered hills of the Tararuas was seen, inspiring the group to continue onwards in their quest. For the moment, however, they remained stuck at the forks as the river was still deep and rapid and several of the group could not swim. During the night of 7 August, however, the river level quickly dropped and on the following day the party headed along the eastern fork, which would be the Pakuratahi River. Dieffenbach describes the plateau flats surrounding the river as being covered in tawa and rimu. During the course of the day, the party left the boundaries of the Regional Park following the river into what is now the Pakuratahi Forest Block.[10] Further exploits of their journey are detailed in the section of the Regional Forest Lands Resource Statement covering Pakuratahi Forest.[11]

The area around Kaitoke, with its steep forest-clad hills, was not really a site of intensive early settlement for European colonists. However, at some time in the late 1850s, the Benge family established a sawmill in the vicinity of the Kaitoke Regional Park.

---

8 R L Jellicoe, 'Report on Native Reserves in Wellington and Nelson under the Control of the Native Trustee', 26 March 1929,AJHR, 1929, g-1, pp46–47 (doc a24, pp314–315)
9 Waitangi Tribunal, *Te Whanganui a Tara me ona Takiwa, Report on the Wellington District,* 2003 p 298 fn 73
10 Dieffenbach, Ernest. *Travels in New Zealand,* London, John Murray, 1843, pp.82-3
11 Wellington Regional Council. [draft of] Regional Forest Lands Resource Statement. 2007

Benge had come to Wellington in 1841 and lived in the area around Taita. In 1857 he moved north into Upper Hutt buying an existing sawmill located at the Te Marua junction of the Mangaroa River at the present intersection of State Highway 2 and Plateau Rd. The sawmill was water powered.[12] Possibly by the 1860s, however, Benge had established a pit sawmill just within the boundaries of the present day Regional Park. Archaeological evidence of waterways constructed to remove waste has been located. In addition, the family built a two-storied homestead within the Park boundaries close to where the state highway passes. As well as the sawmill, the family also farmed on this location. This area remained a site of family occupation for many years. Although the original homestead was burnt down, it was rebuilt by David Benge and remained there until 1930 when the homestead was replaced by a cottage which stood on the site until the 1970s.

In the late 1920s and mid 1930s, large fires are recorded in the Kaitoke area which destroyed parts of the native forest. In addition, however, there is also evidence of tree felling within the Park boundaries. The Maymorn Timber Company operated a sawmill in the vicinity through until the late 1930s. The tramway through the Park used by the company to drag logs from the Hutt Gorge to its mill can still be discerned. Another tramway stretches into the hills from the Te Marua end of the Park, but its exact history is not known.

Rimutaka Road. Nov. 27th, 1868.
Barraud, Charles Decimus 1822-1897: Alexander Turnbull Library. A-029-064

[12] Kelleher, op. cit., pp.57 and 60-2

1.6 Kaitoke and Wellington's water supply

Kaitoke Weir construction

Early nineteenth century efforts to provide a water supply for Wellingtonians focused on Karori and then Wainuiomata.[13] The Hutt River was first investigated as a resource at the turn of the century, when measurements of volume and flow were recorded to assess the potential for hydro-electricity. Although by 1915 a decision had been made that a power scheme on the Hutt River would not proceed, by 1919 a report on Wellington's water supply flagged the potential of the Hutt River for future development once the Wainuiomata/Orongorongo catchment had been developed to full capacity.

[13] See the entry for Wainuiomata/Orongorongo Water Collection Area in: Wellington Regional Council. [draft of] Current Water Collection Areas Resource Statement. 2007

In 1927, amidst ongoing discussions over ensuring a permanent water supply for Wellington, the Wellington City and Suburban Water Supply Board was established. Catchment areas identified for the Board included the land currently within the Kaitoke Regional Park. Although the land to the west of the Hutt River was in private hands, being part of the Maymorn estate, the rest was held by the State Forest Service who vested the catchment land in the new Board.

A major report by the Wellington City Engineer in 1929 concluded that, of all the potential possibilities for water supplies, the Hutt River provided the most cost effective district-wide scheme. It was estimated that £1 million was required.[14] Despite this recommendation, the Petone and Lower Hutt local authorities chose not to go ahead with the scheme, choosing instead to further develop their artesian water supplies. In the face of losing this support and increasing water shortages, Wellington City also opted in the short term to develop artesian supplies.[15]

Nevertheless, the Hutt River Scheme was still a long term plan for water supply. In 1939, 157 acres of land at Kaitoke was acquired as the site for the headworks for the Hutt River Scheme. Although work had been gradually proceeding, it was a large scale state housing programme in the Hutt Valley that gave further impetus to the Hutt River Scheme to precede. Central government became involved, contributing funding and expertise. From 1946, Ministry of Works labour accounted for 90% of the headworks construction and 75% of the pipe laying operations. Despite the involvement of central government, post-war shortages of labour and materials, and an extension of the scheme slowed progress. Therefore the Hutt River Scheme was not completed until April 1957 at a cost of £3.4 million.

In its final form, the Scheme had involved building a weir across the Hutt River, within what is now the Kaitoke Regional Park, as an intake. The weir is a low concrete gravity dam 40 m long and 8 m high. From here the water passed through a tunnel of just under a kilometre to a water treatment plant. The water then entered a 3 km tunnel to take it through to Te Marua where it was piped through to Karori reserve. In all, six tunnels, 54 km of main pipelines and 12 km of branch piping were constructed.[16] By completion, the water initially supplied Wellington city, its northern suburbs, Upper Hutt and the Porirua Basin. Over time it has been extended to other Wellington and Lower Hutt suburbs.

In 1987, a water treatment plant, pumping station and storage lakes were completed at Te Marua.[17] The Stuart Macaskill Lakes are able to hold enough water for 20 days supply. Improvements have been made over time to the entire water supply network, resulting in the closure of Karori dam for water supply purposes in 1997 and the building of a closed reservoir and pumping station at Ngauranga. Water from any of the three water sources (Te Marua, Wainuiomata and Waterloo) can now be directed to wherever supply is required in the Wellington metropolitan area through the Ngauranga pumping station.

---

14 Wellington Regional Council. *History of Water Supply in the Wellington Regional 1872-1985,* Wgtn, Spectro Print Ltd, c.1985, pp.19-20

15 Hendriksen, E.E. "Wellington Metropolitan Water Supply: Hutt River Scheme". *New Zealand Engineering:* 11 (1), 1956 pp-2-15, found as WRC PAM 628.109936 HEN

16 Wellington Regional Council, op. cit., pp.19-20

17 Wellington Regional Council, 1991: Kaitoke Regional Park Management Plan. Part 2: Resource Statement. Wellington Regional Council. Wellington

1.7 Further land acquisitions

The Maymorn estate was a large block of land that stretched from the Kaitoke area across to the Otaki hills. Discussions by the private owners of selling the estate to interested local bodies began as early as the mid-1920s, but nothing eventuated. Then years later, in 1936, the possibility of acquiring the estate from the English owners again came up. It was found, however, that only 3,000 acres of the land being offered for sale was within the officially designated catchment area. Therefore there was no interest in acquiring the whole block. Furthermore, the price being asked for at the time was considered too high.[18]

Nothing further occurred until 1950 by which time the Akatarawa Sawmilling Company had acquired 8,000 acres of the Maymorn estate. Knowing that 3,000 acres had been identified as being within the Hutt water catchment area, the Company offered the land to the Water Supply Board.[19] The offer was accepted and the land vested in the Wellington City Corporation on 20 November 1951.[20] Part of this land is now within the Kaitoke Regional Park. As part of the deal, the Company was paid cash but was also given the right to cut in the Deadwood (1,776 acres) and Putaputa (826 acres) blocks. The Deadwood block is located in the Akatarawa Forest Block. The Putaputa Block, which is located within the Kaitoke Regional Park, had been unlawfully cut in 1952 and little timber was left. Nevertheless, milling continued. A decade later, the only trees suitable for milling were situated in a long inaccessible gully.[21] By the early 1970s, the Akatarawa Sawmilling Company transferred its cutting rights in the Putaputa Creek area to W. Crighton and Son Ltd. of Levin. Soon after, the Wellington Regional Water Board revoked these cutting rights and paid compensation to the company that held them.

From the completion of the water supply works in 1957, recreational access and facilities had been prohibited at Kaitoke that were inconsistent with water supply developments. In the mid-1970s, when the Wellington Regional Planning Authority (successor to the Water Board) published its plan for establishing a network of regional parks, a bush land park at Kaitoke was envisaged centred on land already owned by the Wellington Regional Water Board.

The discussion of establishing the Park led to further land being brought into the Kaitoke Regional Park. A large triangular block of 1,155.62 ha lay to the east of the Putaputa Creek and Hutt River. In 1974, the Forest Service had purchased much of this land from a private logging firm to protect what was seen as a sequence of unlogged forest stretching down from the Tararua Forest Park. As part of the arrangement to acquire this land for the Regional Park, an exchange was agreed to which resulted in part of the Water Board's Estate at Orongorongo being included in the Rimutaka Forest Park.

Also at this time, the Wellington Regional Water Board purchased 394.9 ha from the Maher family. This involved land on the southern side of the Hutt River near its junction with Putaputa Creek.

---

18 12 Mar 1936, *The Dominion,* WCC File 00001:1751:52/6 pt.1
19 WCC File 00001:1751:52/6 pt.1
20 WCC File 00001:1751:52/6 pt.2
21 Ibid

Bibliography

Archival Sources:

Wellington City Council

WCC file 00001:1751:52/6 pt.1-2

Wellington Regional Council

WRC file 108/5 pt.1

Unpublished Reports:

Kelleher, John Arnold. [draft of] "Upper Hutt: the history" National Library 993.14 KEL 1971

Wellington Regional Council. [draft of] Regional Forest Lands Resource Statement. 2007

Wellington Regional Council. [draft of] Current Water Collection Areas Resource Statement. 2007

Published Material:

Ballara, Angela. *Taua, Warfare in Maori Society in the Early Nineteeth Century,* Penguin Books, 2003

Best, Elsdon. *The Land Of Tara and they who settled it – in Journal of the Polynesian Society –* Vol XXVII Part IV

Brown, James. "Reminiscences of a Pioneer Settler", *Journal of Early Settlers & Historical Association of Wellington,* No.3 Feb 1923, pp.13-9

Dieffenbach, Ernest. *Travels in New Zealand,* London, John Murray, 1843

Kelleher, John Arnold. *Upper Hutt: the history,* Picton, Cape Catley, c.1991

Hendriksen, E.E. "Wellington Metropolitan Water Supply: Hutt River Scheme". *New Zealand Engineering:* 11 (1), 1956 pp-2-15, found as WRC PAM 628.109936 HEN

Waitangi Tribunal *Te Whanganui a Tara me ona takiwa.* Wellington:Waitangi Tribunal, 2003

Wellington Regional Council. *History of Water Supply in the Wellington Regional 1872-1985,* Wgtn, Spectro Print Ltd, c.1985

Wellington Regional Council: Kaitoke Regional Park Management Plan. Part 2: Resource Statement. Wellington Regional Council. Wellington, 1991

Physical Environment

2. Topography, Geology and Landforms

View looking north from the Te Marua Lakes to the Tararua ranges

2.1 Physical features and topography

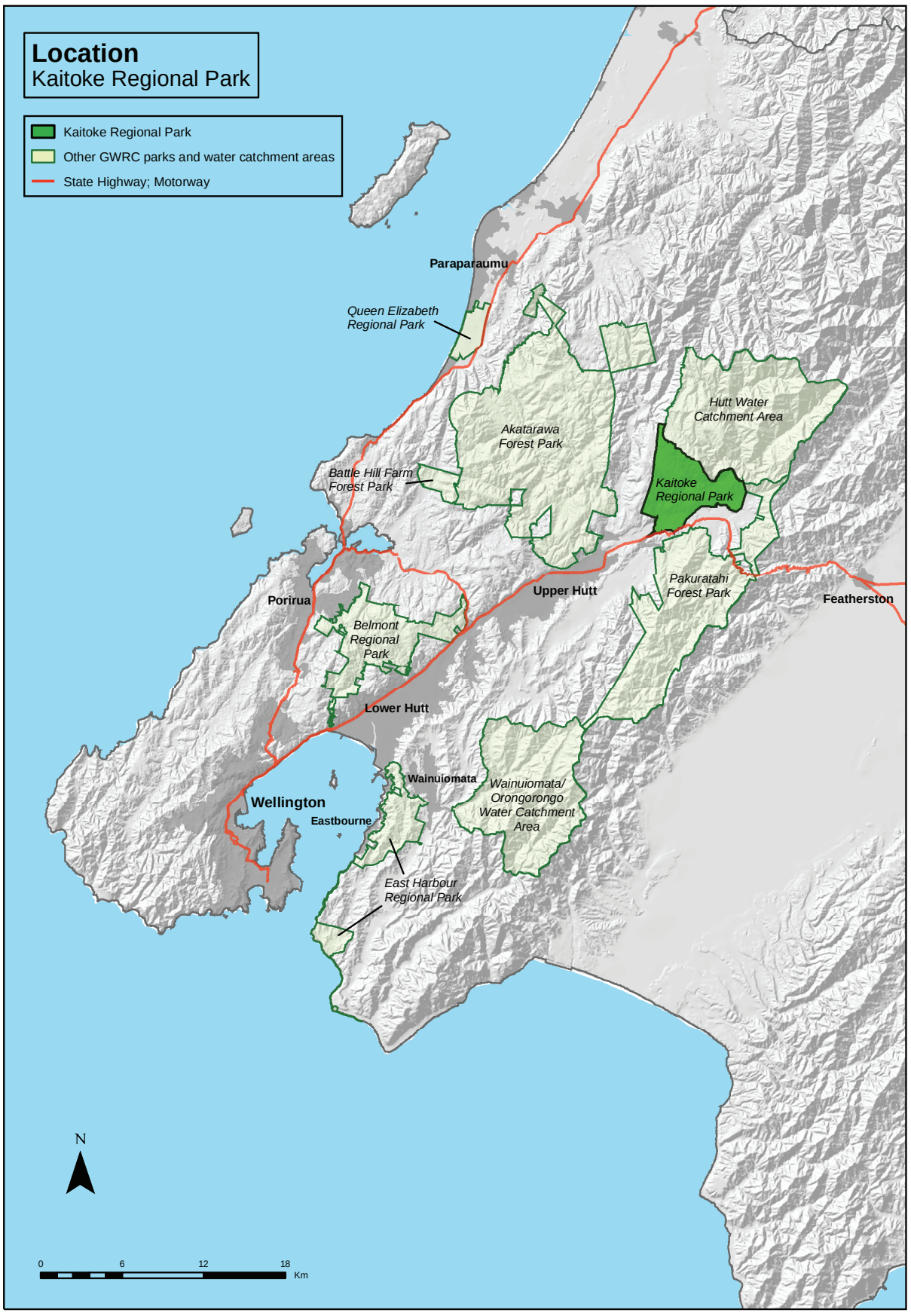
Kaitoke Regional Park (2,860 ha) is located in the foothills of the southern end of the Tararua Range. It is comprised of river flats around Te Marua and at Pakuratahi Forks, rising to hill country, incised by the Hutt River to the north-west. The location of the park with respect to other regional parks managed by Greater Wellington Regional Council is shown in *Map 1*. Kaitoke Regional Park is entirely owned by Greater Wellington Regional Council and held as a Regional Park under the Local Government Act, 1974.

The land formation processes of deposition, erosion and uplift common to the Wellington region are reflected in the park's varied topography where altitude ranges from gently angled riverflats at 140 m altitude (Te Marua) to 575 m (peak of Kakariki) in the park's rugged interior. Broad and gently rolling tops are thought to be remnants of the ancient peneplain that was a feature of the Wellington region between 25 million and 60 million years ago (see section 2.2, below). Rolling hills north and west of Te Marua Flat's river terraces vary between 10° and 35°, while the Tararua foothills and banks of the Hutt Gorge generally exceed 26° (see Table 1). Most of the park is covered with indigenous forest, with water storage lakes, farming and plantation forestry on more accessible lowland areas. The dominant landforms can be seen in *Map 2, Topography and Waterways*.

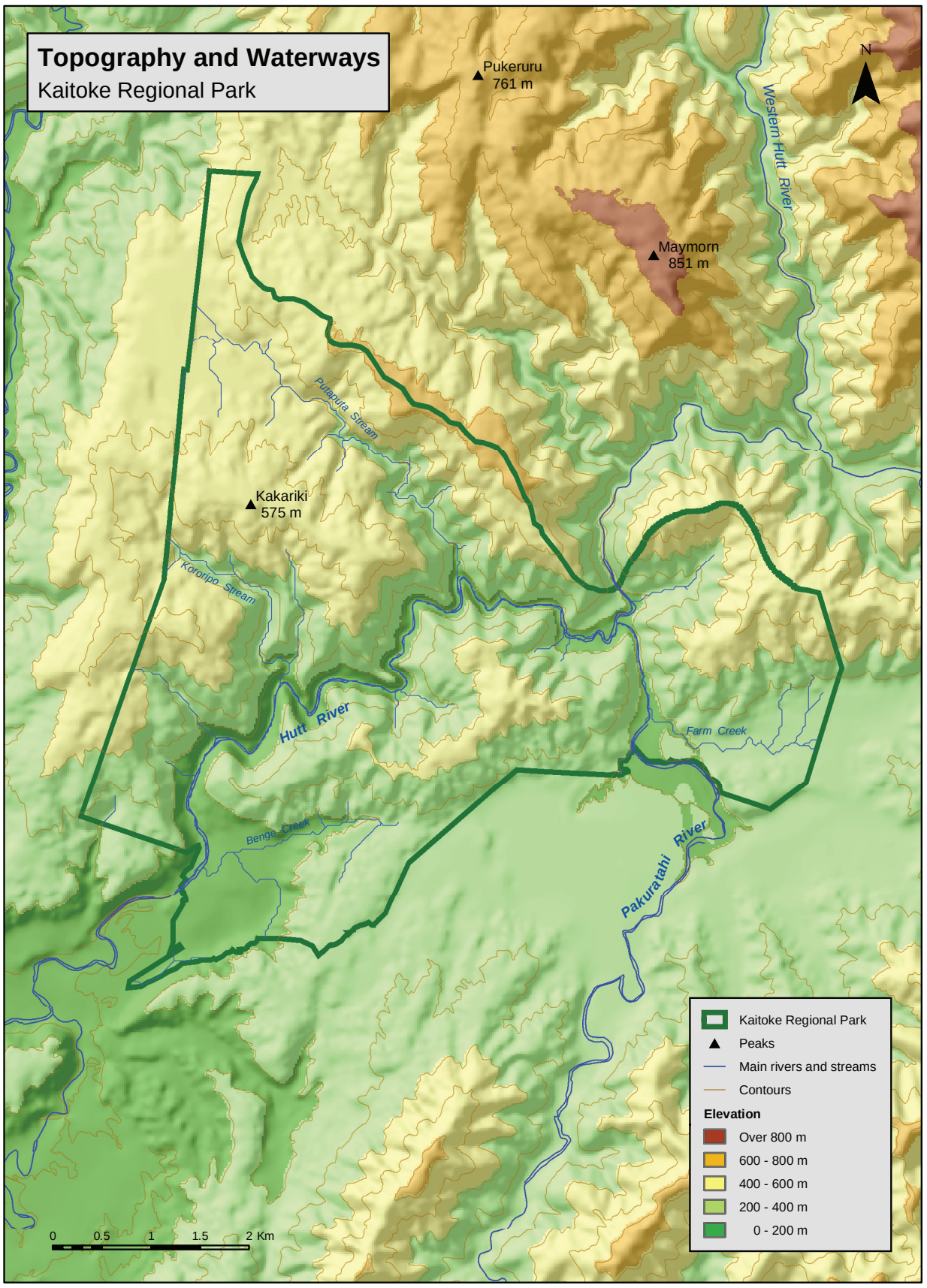
Slope (degrees)	Topography	Area (hectares)	Percent area
0	Lake	30	1
0-3	Flat to gently undulating	188	7
4-7	Undulating	246	9
8-15	Rolling	545	19
16-20	Strongly rolling	424	15
21-25	Moderately steep	432	15
26-35	Steep	675	23
>35	Very steep	323	11

Table 1: Slope of the land in Kaitoke Regional Park.

Map 1 Location of Kaitoke Regional Park



Map 2 Topography and Waterways



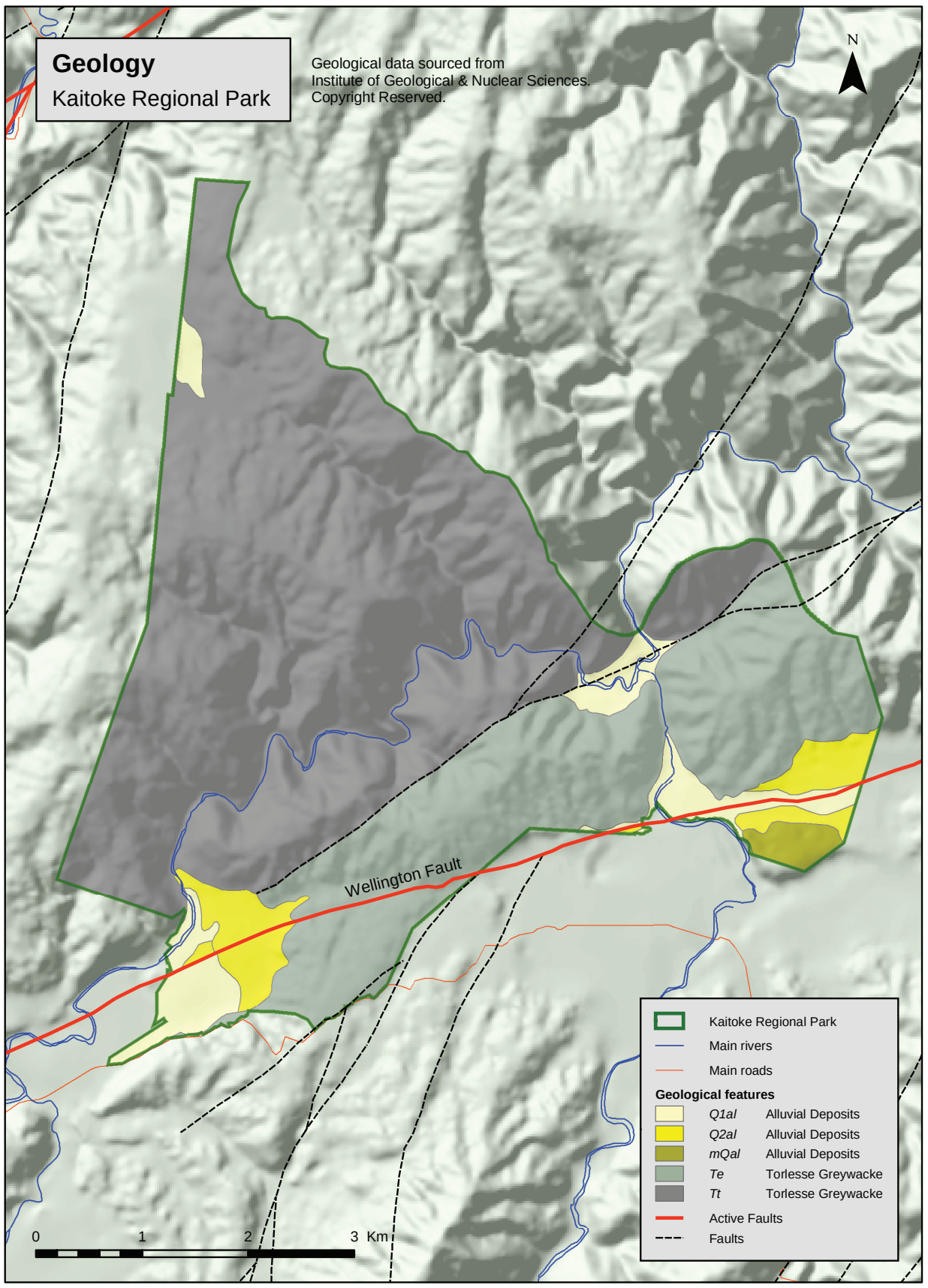
A ridge running from Benge Creek to Farm Creek marks the uplifted side of the Wellington Fault. This change from lowland to steep hill country is defined by a change in land-use from farming to reserved forest. North of this ridge, the deep gorge cut by the Hutt River effectively isolates the interior of the park. Land either side of the gorge and the Putaputa and Kororiko Streams is very steep. This block adjoins the Hutt Water Collection Area and Tararua Forest Park. In contrast to the steep interior, gently sloping river flats at Te Marua and Farm Creek are open and accessible. Fertile river-flats such as these are under-represented in regional parks.

Above the deeply incised streams and river gorge the hilltops of the Park interior are broad and gently rolling. These areas are thought to represent part of an ancient peneplain the remains of which reach from Quartz Hill, near the South Wellington Coast, to the Southern Tararua Range. Support for this theory is demonstrated by the high degree of summit accordance in the area (Cotton, 1912).

2.2 Predominance of greywacke rocks

As shown in *Map 3: Geology,* the rock underlying Kaitoke Regional Park is greywacke, a grey sandstone interbedded with layers of mudstone that forms the bedrock under much of the Wellington region. In geological terms, the Wellington greywacke is part of the Torlesse Terrane (named after Mt Torlesse in the greywacke ranges of Canterbury), which forms much of the mountainous backbone of central and eastern New Zealand (a terrane is the area or surface over which a particular rock or group of rocks is found). The sediments that make up the individual grains in the greywacke were eroded from the eastern part of the ancient continent of Gondwana 240–140 million years ago and deposited in an adjoining trough known as the New Zealand Geosyncline. From 140–100 million years ago, these sediments, now consolidated into rock, progressively rose out of the sea in a major period of tectonic uplift and mountain building (known as the Rangitata Orogeny) to form much of the landmass that was to eventually become New Zealand. Tectonic uplift slowed around 60 million years ago and most of this mountainous landmass was subsequently eroded away to form an extensive and near flat expanse just above sea level called a peneplain. Over the last 25 million years another period of uplift (known as the Kaikoura Orogeny) affected the region and the part of the peneplain surface in what is now Wellington was raised, tilted and progressively eroded. However, remnants of this peneplain surface, named by Cotton (1957) as the 'K surface' (after the prominent Wellington skyline landmark Mt Kaukau), have survived, with examples including Kaitoke Regional Park's rolling tops. Support for this uplifted peneplain theory is further provided by the similar heights of the summits of the western hills which extend all the way from Makara to the forested Akatarawa uplands and the Southern Tararua Range.

Map 3 Geology



2.3 Tectonic setting of Kaitoke Regional Park

Wellington's proximity to the active margin of the continental Indian/Australian Plate and the oceanic Pacific Plate has generated intense tectonic stresses, causing the greywacke bedrock to fracture along lines known as faults. There are four main fault lines in the Wellington region: the Wairarapa Fault; the Wellington Fault; the Ohariu Fault and the Pukerua Fault (McConchie, 2000); each is many tens of kilometres long, and all run roughly parallel to each other with an overall northeast trend. Movements on the faults are mainly *lateral* and *dextral,* that is, if viewed from one side of the fault line, the opposite land moves laterally to the right in an earthquake.

The Wellington faults also display *vertical* displacement of the land. The combined effect of this lateral and vertical movement has produced a series of uplifted blocks tilted to the west, with sharp escarpments just to the west of each fault line and a depression to the east. The topographic effect is steeply rising hills immediately to the west of each fault: the Rimutaka Range adjacent to the Wairarapa Fault reaches up to 900 m within 10 km of the fault, and the hills west of the Wellington Fault (including Kaitoke, where the fault runs across the park's southern boundary) reach 400 m within 4 km.

Movement on the Wellington Fault recurs every 500–800 years on average and, for the Ohariu Fault (west of Moonshine), 2000–5000 years (Berryman, 1990; Heron & van Dissen, 1998). These faults also control Wellington's drainage network, with most of the rivers and streams following the line of easily eroded crushed rock in the fault zone. The Hutt, along with the Wainuiomata and Orongorongo rivers, and major streams like Ohariu Stream, Takapu Stream and Duck Creek all flow along the NE–SW axis of the major fault lines. However, many secondary streams are instead more aligned along the N–S axis of the less active network of splinter faults caused by frictional 'drag' as the land slips sideways along the major fault lines.

It is interesting to note that before major uplift began along the Wellington Fault, the Hutt River flowed to Pauatahanui Inlet along the route now followed by the Haywards Hill Road. But as the hills west of the Wellington Fault rose, the river followed the line of least resistance and turned south-west along the fault, entering the sea where the suburb of Kilbirnie lies today (Stevens, 1991). East of the Wellington Fault, the slipping movement along the fault has caused the ground to buckle and form a sinuous curve. This has created a series of gravel-filled basins of diminishing size, beginning in the south with Wellington Harbour/Hutt Valley followed by the Upper Hutt, Te Marua and Pakuratahi Basins (Stevens, 1973).

2.4 Impact of glacial periods

The Hutt River (and its major tributary the Pakuratahi) is unusual because at Kaitoke the river has left the route of the Wellington Fault and carved a deep gorge through the hills. The explanation for this lies in the relatively recent geological history of the area, which dates from an Ice Age known as the Pleistocene Epoch. During the Pleistocene, which began about 1.8 million years ago, few plants grew in the extreme cold on the hills surrounding the Pakuratahi Basin and the ground was exposed to a vigorous freeze/thaw cycle. The greywacke rock was shattered into coarse debris and washed downstream, filling the basin (and covering some of the surrounding hills) and creating a broad valley floor. No longer confined by the fault depression, the river left the route of the fault and ranged across the valley floor like a South Island braided river.

Vegetation returned to the hills and erosion gradually slowed during warmer periods and at the end of Pleistocene Ice Age about 10,000 years ago. The rivers then began cutting down through the deep gravels in the basin, which was transported to the coast. For most of its length, the river returned to its original course along the fault depression in the lee of the western hills. But at Kaitoke, the Hutt and Pakuratahi were diverted behind some of the buried hills at the foot of the Tararua Range, cutting a deep gorge before returning to their original route at Te Marua.

Today, many of the hills surrounding the Pakuratahi Basin are still capped with gravel from this period. Within the basin, small hummocks of gravel, 20 or 30 m high, stand where streams have eroded around them (Stevens, 1974). On the edges of this and other basins, ancient river terraces have been preserved. These were created during warm 'interglacial' periods during the Pleistocene when the rivers cut down through the gravel. The older terraces and hilltops that were uncovered early in the process have coverings of loess blown there from the Kapiti Coast. Kaitoke and Heretaunga series soils have developed in this loess and gravel substrate. The distribution of Kaitoke series soils today defines the extent to which gravel filled the basin in the past.

Aerial photograph showing entrance to Kaitoke Regional Park. Photo: Lawrie Cairns

Forested valleys and ridges of Kaitoke Regional Park

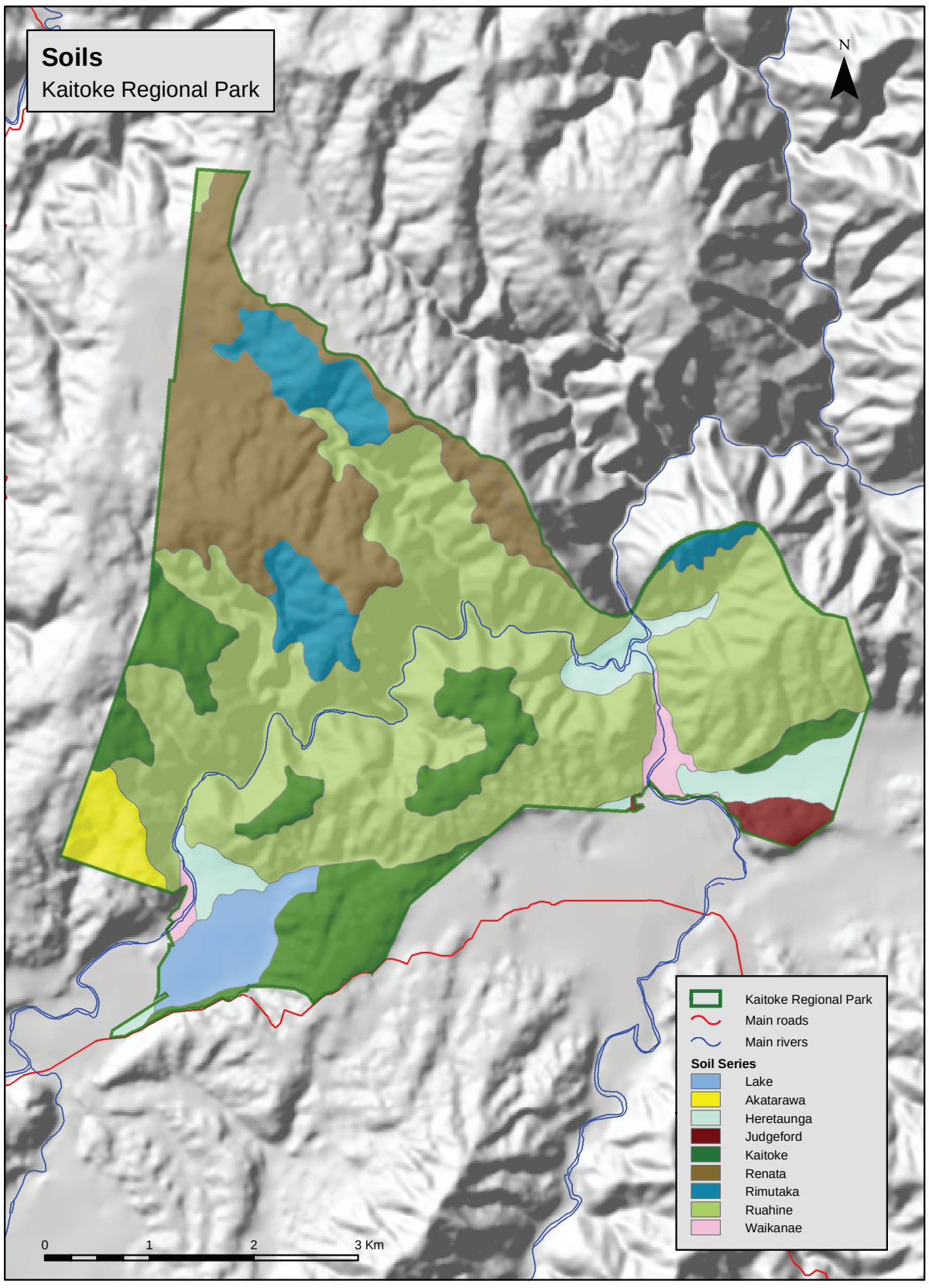
3. Soils

3.1 Soils of Kaitoke Regional Park

The park has a complex mix of versatile lowland soils and thinner steepland (on slopes of 26° or more) soils. These latter soils are subject to severe erosion if the covering vegetation is removed. The most widespread soils in the park are the brown earths. These soils form on materials derived from sedimentary rocks in a climate where the soil rarely dries out and is not waterlogged in winter (Molloy, 1988). Lowland soils have formed on recent alluvial deposits or, in the case of the Kaitoke series soils, on the remnants of once widespread glacial and interglacial gravel deposits. They are free draining but high rainfall ensures that they rarely dry out. These lowland soils developed under podocarp/broadleaf forest. Steepland soils in the park have never been cleared of the podocarp/broadleaf/beech forest under which they developed.

The soils described below and their distribution is shown in *Map 4: Soils.* Soil descriptions given here are from (Bruce, 2000), while a more general description on the relationship between soils and landscapes in the Wellington region can be found in (Molloy, 1988).

Map 4 Soils


Soils
Kaitoke Regional Park
N
Kaitoke Regional Park
Main roads
Main rivers
Soil Series
Lake
Akatarawa
Heretaunga
Judgeford
Kaitoke
Renata
Rimutaka
Ruahine
Waikanae
0
1
2
3 Km

3.1.1 How soils are classified

Soils are given a technical classification and a series name based on a geographical name where that soil was first described (e.g. Rimutaka series). The two soil classification systems used in New Zealand are used below to classify the soils: the New Zealand Genetic Soil Classification (NZG) describes soils according to *how they were formed* (Taylor, 1948), while the present New Zealand Soil Classification (NZSC) describes soils *as they are* (Hewitt, 1998). [A general description of soil 'orders' is currently available from http://www.bush.org.nz/soil/]

Waikanae and **Heretaunga** soils are developed in silty, sandy alluvium and are the major soils of river flats, terraces and fans in the Wellington region. They range in texture from silt loam to sandy loam that may be stony in places. Subsoils have weakly developed blocky structures and finer textures than the topsoils. Below about 80 cm well-rounded gravels are more common. These soils are fertile and have high potential for horticulture and pasture production. They are easy to work except where stones interfere with cultivation. The Waikanae soils are subject to occasional flooding.

Waikanae series
NZSC: *Typic Fluvial Recent soils*
NZG: *Recent soils*

Heretaunga series
NZSC: *Typic Firm Brown soils*
NZG: *Yellow-brown earths*

Judgeford soils develop in loess on older river terraces and fans. These fertile soils are deep and friable. They are well drained, will support high quality pastures if top-dressed and have low erosion potential. The surface horizon of Judgeford soils is generally a dark, greyish brown, silt loam, and the subsoils have mainly silt loam or silty clay loam textures.
NZSC: *Acidic-allophanic Firm Brown soils*
NZG: *Yellow-brown earths*

Kaitoke soils developed in gravel and in places loess and underlying greywacke also form part of the parent material. The gravels are remnants of material brought down from the Tararua Ranges during the last glaciation. Kaitoke soils are generally well drained though water movement may be restricted in the subsoils. They suffer from a susceptibility to sheet erosion and collapse of cuttings. These are low to moderate natural fertility soils, often used for grazing but considered more suited to plantation forestry.
NZSC: *Acidic Firm Brown soils*
NZG: *Yellow-brown earths, strongly leached*

Ruahine soils occur at between 300–600 m and grade into **Rimutaka** soils that range on up to the summit ridges. Profiles are thin and stony and, because of high rainfall, the upper soils are strongly leached. These soils have developed under podocarp/broadleaf forest and tannins from the acidic leaf litter stain the soil.

Ruahine series
NZSC: *Typic Orthic Brown soils*
NZG: *Steepland soil, related to yellow-brown earths*

Rimutaka series
NZSC: *Humose Orthic Brown soils*
NZG: *Yellow-brown earths, weakly podzolised*

Renata soils develop in weathered loess over weathered greywacke on the crests of rolling hilly spurs and ridges between 600–1000 m. They are relatively deep (up to 1 m) and have developed under podocarp/broadleaf/beech forest. Their characteristic reddish colour and mottling are due to the high rainfall moving tannins from the organic layer at the surface. A silt loam topsoil lies over an iron pan below which is a clay loam subsoil. These soils are imperfectly drained and have low natural fertility.
NZSC: *Peaty-silt mantled Perch-gley podzol*
NZG: *Podzol, weak to moderately gleyed*

Akatarawa soils are restricted in their distribution to above 300 m near the Akatarawa River. They have shallow profiles and are developed in weathered greywacke and related slope deposits.
NZSC: *Typic Orthic Brown soils*
NZG: *Steepland soil, related to yellow-brown earths*

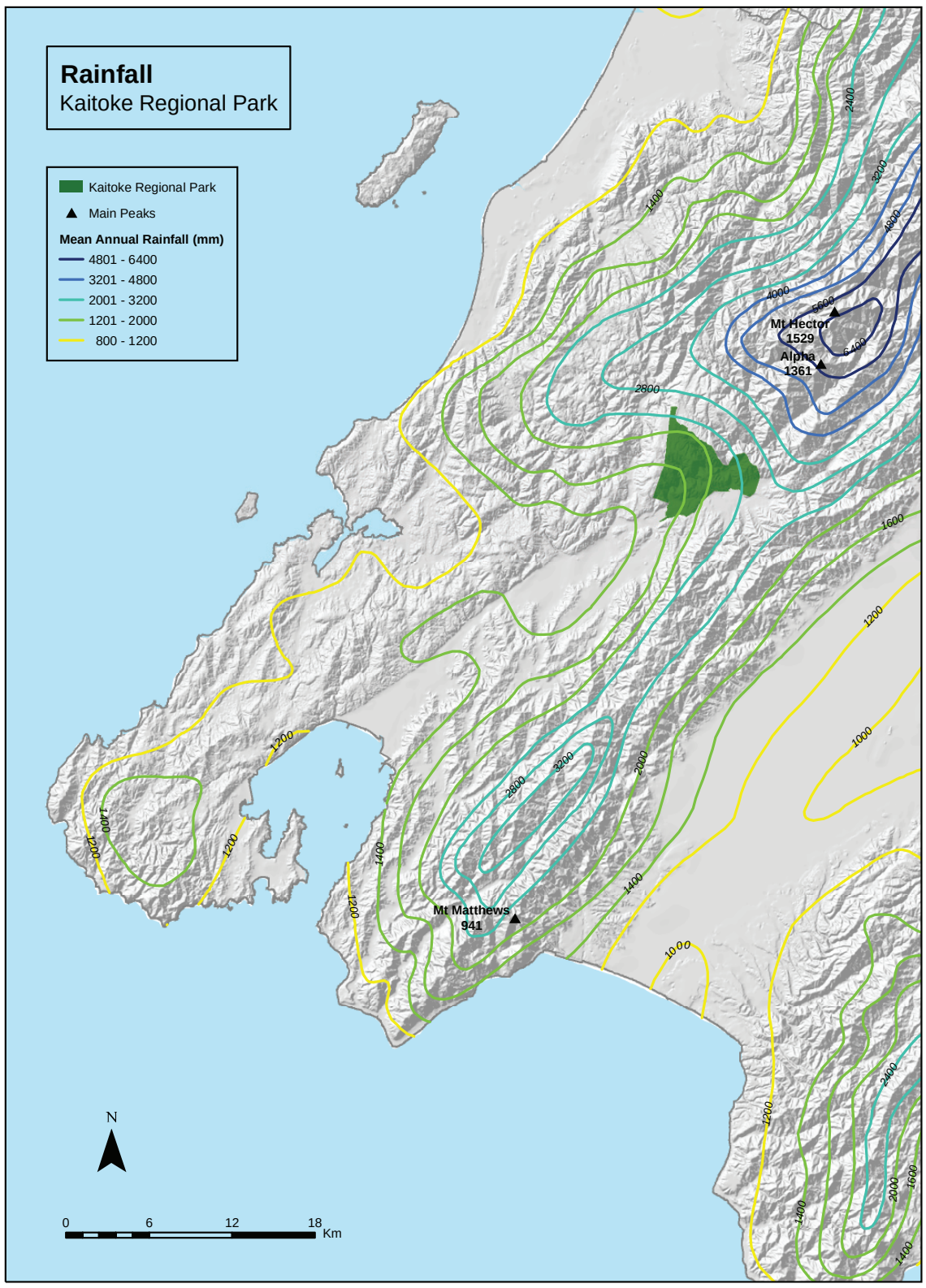
4. Climate

The valleys at Kaitoke are sheltered from the prevailing wind but tend to collect cold air, lowering minimum temperatures and increasing the temperature variation between night and day. Rainfall is relatively high (about 2,000 mm per year) and cloud cover results in low sunshine hours compared with urban areas of the region.

Mean annual temperature in the valleys at Kaitoke is 10.5°C, 2°C lower than at Kelburn. Although the mean daily maximum temperature is similar to Kelburn, minimum temperatures are the lowest in the region (Salinger, 2000). As a result the area has as many as 40 air frosts a year, compared with 33 at Wallaceville, 12 at Wainuiomata and none at Kelburn (Goulter, 1984). This aspect of the climate at Kaitoke makes it difficult for frost tender native plant species such as tawa to establish in areas where the original canopy has been damaged or destroyed. Temperature extremes of –6°C and 29°C have been recorded at Kaitoke (WRC, 1991). At least 1 mm of rain falls on approximately 162 days of the year. This usually arrives with southerly and southeasterly airflows. Rainfall is higher in the northeast of the catchment. Snow occurs most years, with an average of four snow days a year. The precipitation rates in the region are shown in *Map 5, Rainfall.*

Average sunshine hours are some of the lowest in the region, ranging from 75 hours for June to 218 hours in January. Altogether the annual average is 41% of possible sunshine hours compared with 48% at Kelburn. Low sunshine hours result in slower plant growth rates especially on slopes with a southerly aspect. Wind conditions in the park are variable. Channelling in gullies increases wind speed and turbulence, while on the exposed tops wind speed is strong but steady. The prevailing wind is from the north, with maximum flows occurring in the spring. Average monthly wind runs vary between 212 km/day in June and 309 km/day in October, with extremes ranging from 157 km/day to 453 km/day (Goulter, 1984). This is lower than average wind for the region.

Map 5 Rainfall



Hutt River Gorge

Swingbridge at Pakuratahi Forks

View of Te Marua storage lakes looking towards the Hutt Valley

5. Waterways

Kaitoke Regional Park sits at the confluence of the Hutt and Pakuratahi Rivers. At this point the Hutt has fallen almost 1,000 m from its headwaters in the Tararua Range at an average gradient of about 1:6. The Pakuratahi by comparison has flowed along a more winding and leisurely course. As well as being steeper, the Hutt catchment has twice as much rain as the Pakuratahi, responds more quickly to rain, has a greater flow, and carries more and larger sediments. The mean annual flow at Kaitoke weir is 7.644 cubic metres a second, while the Pakuratahi at Truss Bridge has a mean annual flow of just 1.995 cubic metres per second.

The headwaters of the Hutt River are within the Hutt Water Collection Area, which then flows into the Kaitoke Regional Park at the Kaitoke weir. The Hutt Water Collection Area lies upstream of the Kaitoke weir. It comprises approximately 9,000 ha of rugged hill country.

The Pakuratahi River catchment includes the Pakuratahi Forest, flowing through forest reserve, plantation forest and some pasture to reach the Kaitoke Regional Park. The two rivers meet at the Pakuratahi Forks. From here the Hutt River is confined within a narrow rocky gorge and the river bottom consists of boulders with occasional sandy/gravelly beaches.

The Hutt River's flow has been modified by the extraction of water for urban supply at Kaitoke weir. Despite this the flow can still be strong and turbulent during heavy rain. The Pakuratahi receives most rain from the south and the Hutt receives most from the north. Consequently, whether it is raining in the north or south of the region, the river levels below Pakuratahi Forks will be up and the water will be murky with sediments.

Four streams join these rivers within the park boundaries: Farm Creek; Putaputa Stream; Kororipo Stream and Benge Creek. The first three have their headwaters high (400 m) above the river. These streams respond quickly to the rain that occurs frequently here and have eroded deep into the greywacke rock. The fourth stream, Benge Creek, lies on more gentle slopes above Te Marua Flat.

Water from storage lakes built at Te Marua is used to even out fluctuating water supply during summer when low flows occasionally occur. The use of groundwater in alluvial gravels at Te Marua and Pakuratahi Basin has not been investigated.

Water quality in these rivers and streams is excellent according to the measure known as the Macro-invertebrate Community Index (MCI). The MCI gauges water quality by measuring the number and diversity of freshwater invertebrate species (insects, molluscs and crustaceans) present. A MCI score below 120 indicates possible mild pollution. A score of less than 80 indicates possible severe pollution. Scores of 140 in 1999/00 and 2000/01 have been recorded (WRC, 2001a & 2001b).

Biodiversity

6. Flora

6.1 Vegetation in prehistoric Wellington

Before humans came to the region, the climate was the main determinant of vegetation changes in the region. The two main forest types currently found here, beech and podocarp/broadleaf forests, have been present in New Zealand for perhaps 100 million years (Dawson, 1993), however past ice ages have caused fluctuations in their distribution throughout this time. There have been many periods when temperatures in Wellington have been both warmer and colder than today, sometimes by as much as 4°C (Mildenhall, 1994). The warmer periods seem to be associated with higher rainfall and the cooler ones with windier weather.

More than 80,000 years ago the climate was warm, rather similar to today. Palynological studies (of ancient pollen grains and wood fragments found at depth in soil cores) show that the forest around Wellington Harbour was dominated by rimu (*Dacrydium cupressinum*) and tree ferns (*Cyathea* spp.). Northern rata (*Metrosideros robusta*) grew at Seaview (Mildenhall, 1994). The forest retreated into sheltered gullies and warm west facing slopes during the last glaciation. During this time much of the Wellington region was covered with grass and low scrub, while silver beech (*Nothofagus menziesii*) and mountain toatoa (*Phyllocladus alpinus*) were the predominant trees. When this cold period abruptly ended about 10,000 years ago, the forest flourished again with the gradually rising temperature.

About 7,000 years ago, another cooling phase began and the climate also became drier with more frosts and wind, conditions that led to the development of forests seen in contemporary times. Black beech (*Nothofagus solandri* var. *solandri*) and hard beech (*N. truncata*) – both species able to withstand cooler temperatures – slowly invaded southwards along the uplands from the Tararua and Rimutaka Ranges. Beech trees have wind dispersed seeds and slowly colonise open sunny sites, surviving on poor soils and spur crests (Druce & Atkinson, 1959; McGlone, 1988). By 2,000 years ago, black beech and hard beech were replacing podocarps in forest on the south coast at Pencarrow where Lake Kohangatera lies today (Upston, 2002), but podocarp/broadleaf forest still dominated in the lowlands and in the western parts of the region.

Beech Forest at Kaitoke Regional Park

Silver Beech with fruit. Photo: G Tomlinson, DoC

6.2 Human impacts on the vegetation

Human induced changes to New Zealand's natural environment began after Polynesians settled about 1000 years ago. Despite evidence of major fires throughout the country that caused extensive deforestation (most occurring roughly 750 years ago) (McGlone, 1989), Wellington's hills, including those at Kaitoke, appear to have suffered little of this loss.

At the beginning of the nineteenth century the Akatarawa uplands and the Tararua and Rimutaka ranges were dominated by beech forest – in contrast to the western hills of Makara, Karori and Belmont, which were still covered in podocarp/broadleaf forest (Druce & Atkinson, 1959; Park, 1999). The reasons for this pronounced difference in forest type have long been a matter of local scientific speculation. Soil differences are likely to be involved.

Early in 1840 the first European settlers landed on the beach at Petone and, needing wood for building and for fuel, immediately began to fell the forest within the Hutt valley (Oliver & Williams, 1981). A sawmill was established in Kaitoke in the late 1850s. Much of the low-lying areas at Te Marua and Pakuratahi Forks would have been cleared at this time and farmed. Large fires destroyed parts of the native forest in the 1920s and mid 1930s. The Maymorn Timber Company operated a sawmill in Kaitoke in the late 1930s and larger podocarps were removed from the Hutt Gorge and the Ridge Track area. The Putaputa Block, on the eastern side of the park, was unlawfully cutover in the 1950s and 60s. Few millable trees were left in that block by the time native logging ceased in the early 1970s. Much of the interior of the Kaitoke Regional Park forest remained untouched and is attractive to park users because of its scenic qualities.

Tawa foliage

Titoki foliage. Photo: P. de Lange, DoC

Fruiting Titoki Photo: P. de Lange, DoC

Totara berries. Photo: J. Rolfe, DoC

6.3 Vegetation of Kaitoke Regional Park today

Vegetation in this park strongly reflects the environmental influences of soils, topography and climate. The landcover of Kaitoke Regional Park is shown in *Map 6*. Podocarp/broadleaf/beech forest once covered much of the Pakuratahi and Te Marua basins but this rolling land in the south of the park was cleared for farming, while in the north at Kakariki the land was exploited for its timber. Much of the land in the park is now reverting to native vegetation with only a small area remaining in pasture. Land alongside State Highway 2 north of Te Marua has been planted with exotic conifers and around the storage lakes and at picnic and camping sites there are areas of amenity planting. The original vegetation around Te Marua and on the river terraces was thought to have contained pockets of totara (*Podocarpus totara*); matai (*Prumnopitys taxifolia*); kahikatea (*Dacrycarpus dacrydioides*); rimu and northern rata amongst broadleaf/beech forest with pukatea (*Laurelia novae-zelandiae*), occurring in swampy sites. Small but important remnants of this forest type are left at Te Marua. Tawa-titoki forest (*Beilschmiedia tawa- Alectryon excelsus*) can still be seen near Benge Stream.

Kahikatea forest. Photo: DoC

The moisture loving kamahi (*Weinmannia racemosa*), the dominant species in the park, revels in the high rainfall the area experiences. The forest is essentially a podocarp/broadleaf/beech forest with a large beech component. Hard and black beech are common on the lowland hills. These are replaced by red beech (*Nothofagus fusca*) on damper more fertile sites, grading into silver beech at higher elevations. The southwestern limit for red beech lies between Kaitoke Regional Park and the Whakatikei River. Of particular interest is the virgin lowland podocarp/broadleaf forest on slopes above the Hutt River and the unusually pure stand of hard beech on the terraces downstream from the Farm Creek-Pakuratahi Junction. The area has a wide variety of plant species and previously cleared slopes are regenerating well.

Kahikatea berries. Photo: D.Veitch, DoC

Kamahi. Photo: G Crowcroft

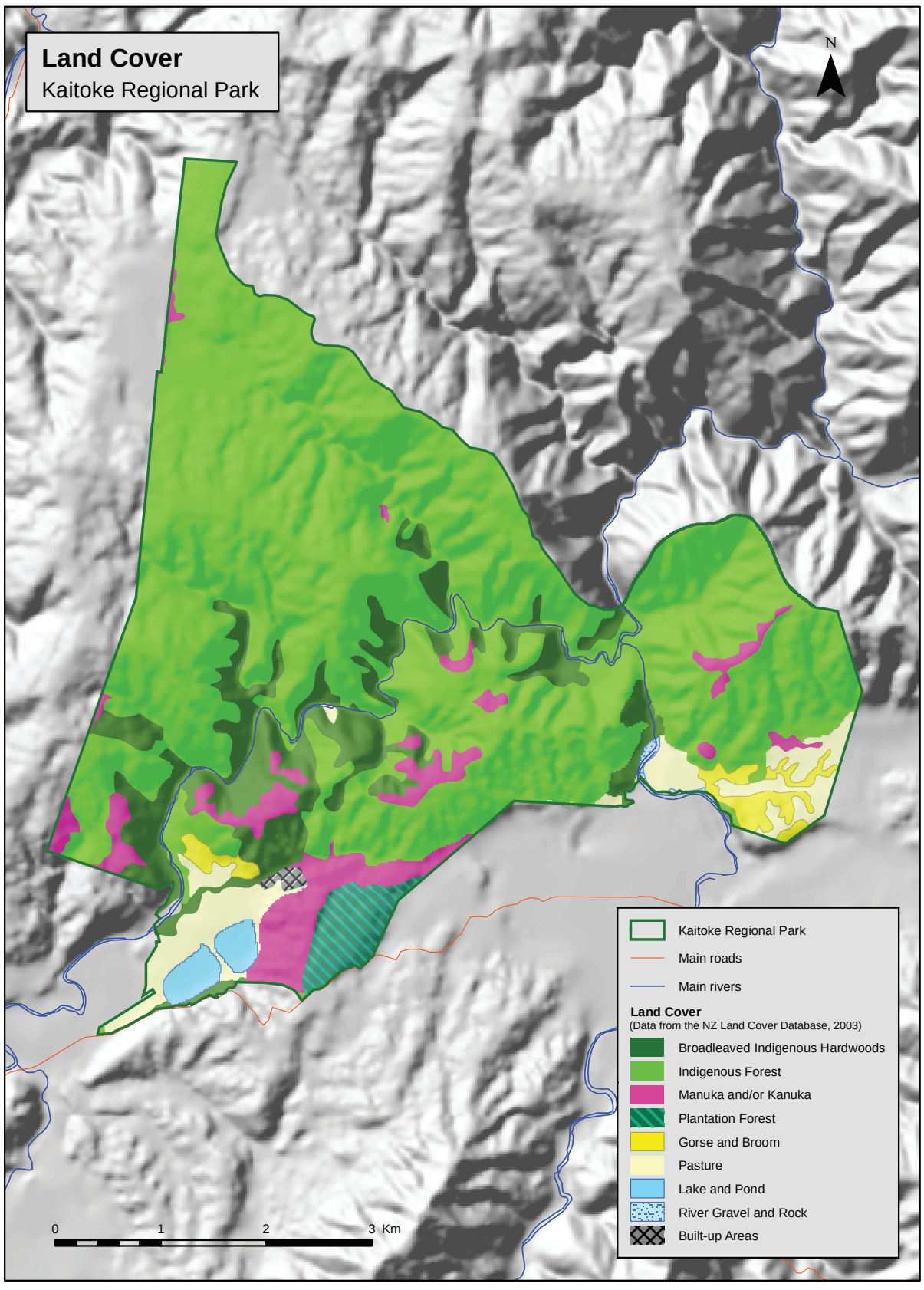
Today, around 90% of the total area of Kaitoke Regional Park (2,860 ha) is registered on the National Land Cover Database (2003) as either indigenous forest (70%) or indigenous scrubland (20%). Around 60 hectares are in exotic pine plantation, while pasture and camping areas total 170 ha. The pine plantation, which was planted for exotic forestry purposes in 1984, is due to be harvested around 2014.

6.3.1 Significant indigenous vegetation

Kaitoke Regional Park is listed as an important biological site in *Biological Resources of the Wellington Region* (WRC, 1984), as it contains vegetation that is representative of the original Akatarawa-Hutt valley vegetation types. These are the low altitude podocarp/broadleaved forest, hard/red beech forest and other hardwood types. A plant species list is given in Appendix One.

Red Beech. Photo: J Maxwell, DoC

Map 6 Land Cover



Hutt Gorge and Terraces

The rich species diversity of the Hutt gorge podocarp/broadleaf forest can be seen around the Pakuratahi Forks, where epiphytes such as *Astelia* spp. and *Collospermum* spp. perch high on the branches of large rimu and hinau (*Elaeocarpus dentatus*). Ancient matai, northern rata and kahikatea emerge above a canopy of kamahi, hinau, miro (*Stachypitys ferruginea*), tawa and both black and swamp maire (*Nestegis cunninghamii* and *Syzygium maire*), with many understorey plants such as kaikomako (*Pennantia corymbosa*), nikau (*Rhopalostylis sapida*), wineberry (*Aristotelia serrata*), hangehange (*Geniostoma rupestre* var. *ligustrifolium*) and mahoe (*Melicytus ramiflorus*) present. Kamahi and hinau are the most common canopy trees. This easily accessible lowland podocarp forest provides an excellent example of this forest type.

Koropito/Putaputa

Northern rata, rimu, miro and pukatea mix with kamahi, silver beech and red beech in this largely podocarp forest. The area was considered of such importance as a representative site that it was selected by a national group of scientists as a site of ecological importance (PASAC, 1985). The rare Kirk's daisy (*Brachyglottis kirkii*) is found here and is now regenerating well in the area.

Successional sites

Small regenerating areas of beech/kamahi have resulted from fires thought to have occurred before 1930. Orchid species are common at these sites. The Ridge Track makes its way through some of these successional sites. The nationally threatened red mistletoe (*Peraxilla tetrapetala*) has also been found on beech trees along the Ridge Track. Many rata present are terrestrial rata, i.e. they started life on the ground, not as epiphytes. In contrast, most northern rata in the Tararua Ranges have established as epiphytes.

Te Marua Bush

This stand of matai, totara and black maire is now one of the few remaining lowland forest remnants of its type in the greater Wellington region. Some of the matai are thought to be 200 to 300 years old.

Red mistletoe. Photo: DoC

Red mistletoe flowers. Photo: DoC

Rimu tree with epiphytes.
Photo: Robin Blake

Northern rata near Pakuratahi Forks.
Photo: Robin Blake

Matai. Photo: N. Singer

7. Fauna

7.1 Birds

7.1.1 Kaitoke as bird habitat in the wider Wellington region

The diversity of birdlife found in the Wellington region today reflects the extensive changes that have occurred in the area since the arrival of European settlers. A number of forest and wetland bird species have become extinct in the region since that time. These include: North Island (NI) saddleback (*Philesturnus carunculatus rufusater*), NZ thrush (*Turnagra capensis tanagra*), NZ robin (*Petroica australis longipes*), NI kokako (*Callaeas cinerea wilsoni*), NI weka (*Gallirallus australis greyi*), stitchbird (*Notiomystis cincta*), banded rail (*Rallus philippensis*), little spotted kiwi (*Apteryx owenii*) and huia (*Heteralocha acutirostris*). Habitat loss and the introduction of predatory mammals have been two of the major causes of this decline. The native birds that remain are much depleted in number and many are now confined to the large tracts of forest that still exist in the ranges in the northern and eastern parts of the region. NI kaka (*Nestor meridionalis septentrionalis*), NI rifleman (*Acanthisitta chloris granti*), whitehead (*Mohoua albicilla*), long-tail cuckoo (*Eudynamys taitensis*) and tomtit (*Petroica macrocephala toitoi*) are no longer seen or heard in the smaller remnants of bush in farmland or in the urban areas of Wellington, but are found in the larger forested areas, such as Kaitoke Regional Park.

All native bird species still surviving in the wild in the Wellington region have been recorded in Kaitoke Regional Park. The park is regarded as a site of special wildlife interest and is ranked as a high value forested site (Parrish, 1984).

7.1.2 Surveys of bird species

Sixteen native and three introduced bird species have been recorded in Kaitoke Regional Park in recent years. Grey warbler (*Gerygone igata*), and silvereye (*Zosterops lateralis*) are present in the greatest densities (around 2 birds per hectare), while whitehead, NI fantail (*Rhipidura fuliginosa placabilis*), bellbird (*Anthornis melanura*) and blackbird (*Turdus merula*) are the next most common species. Two bird species present in the area are regarded as threatened species. These are NZ falcon (*Falco novaeseelandiae*) (nationally vulnerable) and yellow-crowned parakeet (*Cyanoramphus auriceps auriceps*) (gradual decline), (Hitchmough, 2002). North Island kaka (nationally endangered) that nest in the adjoining Hutt Water Collection Area also use Kaitoke Regional Park as part of their territory.

Annual counts of kereru (*Hemiphaga novaeseelandiae*) numbers are made at the lower terrace around the campground given its popularity as a gathering place for these birds. Five counts (each lasting one hour) are made every September. A mean of 30 kereru were counted in 2003, but in 2004 this increased to 55. This improvement in numbers may be due to possum (*Trichosurus vulpecula*)/rat *(Rattus* spp.) control, but a longer timeframe would be required to assess this data because kereru move large distances around the region to various food sources.

A list of bird species recorded within the park is given in Appendix Three.

Kereru. Photo: R. Suisted

Rifleman and mistletoe. Photo: M.F. Soper, DoC

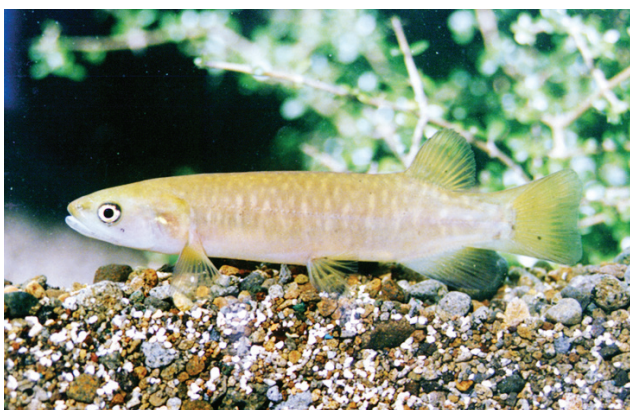
Shining cuckoo (*Chrysococcyx lucidus*). Photo: J.L. Kendrick, DoC

Silvereye. Photo: P. Reese, DoC

Yellow crowned parakeet. Photo: J.L. Kendrick, DoC

New Zealand falcon. Photo: DoC

7.2 Freshwater fish



Giant kokopu (juvenile)

Numerous freshwater fish surveys have been conducted in the Hutt and Pakuratahi Rivers near their confluence at Kaitoke Regional Park. Two small streams (Benge Creek and Farm Creek) in the park have also been surveyed. The park's waterways form part of a large drainage basin approximately 65,000 ha in extent. Within the park and upstream from it the catchment is largely unmodified. Downstream there is a large urban area where the course of the river has been constrained to prevent flooding and erosion.

The abundance and diversity of fish at Kaitoke varies. Differences in diversity recorded in the river and the streams may be due to habitat preferences. Nine species of fish, including two species of eel, have been seen, as well as freshwater crayfish (see Table 2 for details and Appendix Two for a complete species list). This compares well with the nine species in the similar but entirely unmodified Orongorongo River.

Pakuratahi R 1961	Pakuratahi R 1982	Pakuratahi R 1986	Pakuratahi R 1993	Pakuratahi R 1998
brown trout	brown trout	cran's bully	bluegill bully	brown trout
cran's bully	cran's bully		brown trout	cran's bully
redfin bully	longfin eel		cran's bully	dwarf galaxias
			koura	
			longfin eel	
			redfin bully	
			shortfin eel	
Benge Creek 1993	**Benge Creek 1995**	**Benge Creek 1996**	**Farm Creek 1986**	**Farm Creek 1993**
brown trout	brown trout	brown trout	brown trout	brown trout
cran's bully	cran's bully	common bully	cran's bully	cran's bully
koaro	longfin eel	cran's bully	koaro	longfin eel
longfin eel	redfin bully	dwarf galaxias	longfin eel	redfin bully
redfin bully		longfin eel		shortfin eel
shortfin eel		redfin bully		
		shortfin eel		

Table 2: Kaitoke Regional Park freshwater fish statistics (National Institute of Water and Atmospheric Research, 2003; Wellington Fish and Game Council, 1995)

Some fish, such as bluegill and redfin bullies (*Gobiomorphus hubbsi* and *G. huttoni*) are common in the river all year round. Others, such as inanga (*Galaxias maculatus*) may be found throughout the river system at particular times of the year when they are moving to spawning grounds or returning from the sea, but not at other times of the year. On the other hand species such as the upland bully (*Gobiomorphus breviceps*) rarely leave their tiny bush streams, so their absence from a river survey does not indicate that they are not present somewhere in the park. This particular species has been recorded further upstream in both the Pakuratahi and Hutt rivers, but not in Kaitoke.

Historically, the Hutt River supported a productive whitebait fishery, but the fishery has declined since (Taylor & Kelly, 2001). Of the five whitebait species, only koaro (*Galaxias brevipinnis*) is present in the park. Three other whitebait species – giant and banded kokopu (*G. argenteus* and *G. fasciatus*) and inanga – are present in small numbers elsewhere in the Hutt Catchment.

Long-finned eel (*Anguilla dieffenbachii*), which is found throughout the park, and giant kokopu (present downstream) are listed as being in gradual decline under the New Zealand Threat Classification System (Hitchmough, 2002). This means that there is a predicted decline of 5–30% in the total (national) population in the next 10 years due to existing threats. This decline is predicted to continue beyond 10 years (Molloy et al., 2002).

7.3 Lizards

There are eleven species of lizard in the Wellington region (seven skinks and four geckos) (Parrish, 1984). As with the bird species, these fauna will have suffered from habitat loss and predation by introduced mammals. Four of the region's skinks have only been recorded on the coast or on islands, but common (*Oligosoma nigriplantare polychroma*) and copper skink (*Cyclodina aenea*) are likely to be present in the open country of the park. The ornate skink (*Cyclodina ornata*) prefers forest habitat and is thought to be widespread in the region. Of the geckos, one species is confined to Mana Island, but the other three; common (*Hoplodactylus maculatus*), forest (*Hoplodactylus granulatus*) and green gecko (*Naultinus elegans punctatus*) are likely to be present in the park. No official recordings of lizard species have been made in Kaitoke Regional Park.

7.4 Invertebrates

Knowledge of invertebrate diversity is limited in New Zealand, because of a lack of information about most species and their distribution. The vast majority of the indigenous invertebrates are forest-dwellers and it is likely that these species have suffered from the same impacts as the birds and lizards. No studies of invertebrates have been completed in Kaitoke Regional Park, but common insects such as cicada and stick insects have been noted. The presence of the snail *Wainuia urnula* has also been recorded.

Forest gecko. Photo: B.W. Thomas

Green gecko. Photo: Rod Morris

Common gecko. Photo: Rod Morris

Environmental Management & Land Uses

8. Ecosystem Classification and Environmental Protection

8.1 Kaitoke's ecosystems

One of the goals of the Kaitoke Regional Park management plan is to protect and enhance indigenous ecosystems within the park. This ecosystem approach reflects a recognition that everything is interconnected and processes which occur in an ecosystem are as important as the species living within them. Defining ecosystems is not simple, as they generally lack concrete boundaries and biological communities are complex, with continuous variation across landscapes. In the late 1980's ecological districts and regions across New Zealand were defined, using landscape and ecological patterns. Kaitoke Regional Park is part of the Tararua Ecological District, which covers the Akatarawa, Tararua and Rimutaka ranges. This ecological district is characterised by the steep, dissected greywacke and argillite hills, high rainfall and strong westerly winds (McEwen, 1987).

A numerically-based approach to ecosystem classification has recently been developed: the Land Environments of New Zealand (LENZ), (Ministry for the Environment, 2003). Within LENZ, ecosystem patterns are mapped through consideration of 15 environmental drivers, combining climate, landform and soil variables such as temperature, solar radiation, water supply, slope, soil drainage, soil fertility, etc. While the environmental drivers in LENZ were chosen primarily because of their importance for tree species growth, they are also useful for depicting the distribution of other organisms.

Throughout New Zealand, LENZ has defined and mapped these 'environments' at different scales. Ten environments of the most detailed LENZ classification level are found in the park. This reflects the complex soil mosaics and variable altitude and topography. The upland and mid-elevation environments are central hill country and central mountains categories which are still largely in natural cover. However, the lowland environments around Te Marua Bush, Benge Stream and along Waterworks Road are classified as nationally depleted and remaining remnants such as Te Marua Bush are important seed sources for any future restoration of these areas.

8.2 Impacts of introduced pests on the vegetation

Possums, red deer (*Cervus elaphus*), sika deer (*C. nippon*), goats (*Capra hircus*), mustelids (*Mustela* spp.) and rats (*Rattus rattus* and *R. norvegicus*) have major impacts on the ecological values of the park. Pigs (*Sus scrofa*), cats (*Felis catus*), mice (*Mus musculus*), rabbits (*Oryctolagus cuniculus*), hares (*Lepus europaeus occidentalis*), hedgehogs (*Erinaceus europaeus*) and Australian magpies (*Gymnorhina tibicen*) are also contributors to the decline of native flora and fauna. Possums eat leaves, seeds, fruit and seedlings of plants and are also known to predate native birds and insects. Possum damage varies between plant communities and possums will often target certain preferred food sources, such as rata and tawa (Pekelharing, 1995). Possums have colonised the Wellington region since the late 1800s and caused great damage to the vegetation during this early invasion phase. The vegetation change is now more gradual,

but ongoing impacts can be seen where possums are not controlled. Goats browse the seedlings of the forest and shrublands. They also prefer particular species, such as wineberry, pate (*Schefflera digitata*) and tree fuchsia (*Fuchsia excorticata*), the early colonisers of slips. They are capable of removing much of the forest understorey. This browsing causes increases in erosion of steeper slopes, weakens forest structure and inhibits natural regeneration processes. Mustelids and rats prey on birds, invertebrates and lizards.

Pest plants have the potential to significantly change the composition or structure of native habitats. Many climbing pest plants, such as old man's beard (*Clematis vitalba*) and Japanese honeysuckle (*Lonicera japonica*) can smother mature plants, while other plant pests interfere with regeneration and compete with indigenous plants for space and soil nutrients.

8.3 Control of introduced mammalian pests and weeds

Possums

Possums in Kaitoke Forest were culled by cyanide poisoning and trapping by fur hunters during the 1990s. The first major possum control operation occurred in 1998, when the Animal Health Board funded possum control in the lower Pakuratahi, Maymorn/Mangaroa and Kaitoke basin area to control Bovine tuberculosis (TB). Methods used include aerial and ground applications of 1080, trapping and brodifacoum bait in bait stations. Possum control operations in the park are summarised in Table 3 below.

Site in Kaitoke Regional Park	Operation Principal	Year last controlled	Possum numbers prior to control (RTC[24])	Possum numbers after control (RTC)
Front face	Animal Health Board	1998	25.9%	1.9%
Front face	Animal Health Board	2003	20.3%	2.3%
Kaitoke West	Parks and Forests	2000	21.1%	1.5%
Kaitoke West	Parks and Forests	2005	7.8%	0%

Table 3: Possum control operations in Kaitoke Regional Park

Possum control will be completed on an ongoing basis as part of Greater Wellington's five-yearly cycle of possum control in these forested areas.

Ungulates

Goats, deer and pigs are present in the park. Goats were culled throughout the 1990s by New Zealand Deer Stalkers Association members, Department of Conservation (DoC) hunters and rangers from Greater Wellington. Goat numbers varied, but DoC hunters culled 58 goats in 1999. In 2003, professional goat hunters were hired to intensively hunt the park. Over two years, 147 goats were culled and 'Judas' goats[25] were released into the area. Goats are now in very low numbers, but Judas goats will continue to be used in selected sites to keep numbers low.

[24] RTC: Residual trap catch – how many possums caught per 100 traps.

[25] Judas goats wear collars fitted with transmitters, which makes them easy to relocate. Because goats are social animals and tend to mob up with others, the Judas goat unwittingly brings about the 'betrayal' of its companions.

Deer and pigs are hunted by recreational hunters who obtain six-monthly permits from Greater Wellington. Sika deer have been a major issue in the park. Around 1990, 15–20 animals were believed to have been illegally liberated. A similar number were released at the summit of Akatarawa Road. Young deer were seen in later years, indicating that breeding had occurred. In 1993, several sika deer were reported killed by recreational hunters, and in 1997 carrots baited with poison were used by Greater Wellington staff to lower their numbers. It is thought that any surviving sika deer are present in low numbers, but it is difficult to be certain because of their secretive nature and ability to avoid hunters.

Other pest animals

No other pest animals have been targeted for control in the park. Rat numbers are lowered every five years as a result of 1080 possum control operations. This gives the native birds and other fauna a chance to raise their young without predators for one breeding season.

Pest plants

The forest within Kaitoke Regional Park is relatively weed-free. The intact canopy allows little intrusion of pest plant species, but invasive exotic species are found at disturbed sites, such as Te Marua and Pakuratahi Forks. In 2001, 30 pest plant species were identified in a pest plant mapping exercise. Control of these infestations was then prioritised using criteria related to the urgency and practicality of control. Old man's beard is the only pest plant present that is required to be controlled under the Regional Pest Management Strategy.

High priority pest plants selected for control at Pakuratahi Forks were tradescantia (*Tradescantia fluminensis*), old man's beard, selaginella (*Selaginella kraussiana*), Japanese honeysuckle and holly (*Ilex aquifolium*). At Te Marua, tradescantia, ivy (*Hedera helix*), sycamore (*Acer pseudoplatanus*), blackberry (*Rubus fruticosus* agg.), old man's beard, cotoneaster (*Cotoneaster* sp.), Japanese honeysuckle, hawthorn (*Crataegus monogyna*), broom (*Cytisus scoparius*) and Himalayan honeysuckle (*Leycesteria formosa*) are targeted in bush remnants. These small remnants are prone to weed invasion because of their size – the removal of these invaders is essential to aid native regeneration. The largest bush remnant in that area is cared for by the Wellington Botanical Society and working bees are conducted on a regular basis to control pest plants. Ongoing professional control of pest plant infestation in Kaitoke Regional Park has been programmed.

8.4 Ecosystem monitoring and rehabilitation

Two permanent 20 m by 20 m vegetation plots were installed in Kaitoke Regional Park in 1996/97. These plots measure changes in the forest structure over time. They have been placed in different vegetation types, the first being in podocarp/tawa/hinau/northern rata forest and the second in red beech/kamahi forest. These plots were re-measured in 1998/99 and in 2003/04. There was some increase in basal area (a measure of tree growth) in red beech/kamahi forest over time, but the number of stems per hectare remained relatively constant. A good range of seedlings was noted and the variety of seedlings is improving.

Native bush remnant, Te Marua

Other monitoring includes monthly flowering and fruiting recording, which has been completed by the ranger since 2001. This data will prove useful in the long-term to determine flowering and fruiting cycles of key plant species within the park. Lemonwood (*Pittosporum eugenioides)* and kamahi in the park showed heavy flowering and fruiting throughout 2001 to 2003. Tawa fruit-fall plots are also measured annually and this data is used to assess possum and rat abundance. Heavy fruiting of tawa was noted in 2004. As mentioned previously in the fauna section, bird counts have been completed annually since 2001 and kereru counts at the campground since 2003.

There are a number of native bush remnants around Te Marua, which are a priority for restoration. In 2002, the 'Te Marua Development Plan' was prepared (Anstey & Roy, 2002). This document includes reports and concept plans that seek to promote and enhance the ecological values and natural character of the area, as well as the recreational opportunities. The ranger is currently fencing off areas from grazing where possible, and new areas will be planted up over time.

Wellington Botanical Society members have been working towards restoring Te Marua Bush for the past 15 years. Locally sourced native trees and shrubs have been planted on the edges of this remnant over a number of years to help extend this small piece of bush and to increase its resilience. Upper Hutt Forest and Bird have assisted with the project and have grown seedlings in their home nurseries for planting out in the area. Pest plants have been removed over time and an ongoing control programme is in place. The park ranger has been controlling possums using poison bait placed in bait stations.

9. Landscape Character

Kaitoke Regional Park is made up of several landscape character areas.

9.1 Te Marua

Low lying grassy river terraces form the northeast end of the Te Marua Basin. Remnant and regenerating native forest rise steeply on three sides of the basin to form a backdrop to farmland and the Te Marua settlement to the southwest. Key features of this area are the storage lakes, the Hutt River, the treatment plant and the river terraces.

The close proximity of urban development, the stock car track and the water treatment plant have impacted on the existing landscape character of the area. However, the large open spaces, characterised by the storage lakes and landscaped recreation areas associated with the water treatment plant, provide valuable recreation and a landscape character largely unchanged.

The Stuart Macaskill storage lakes are large-scale man made features which have modified the area. These lakes create a focus of interest for visitors and are visible from many viewpoints around the surrounding hills. However, they are less significant at close range because the lakes are less visible from the terraces below the lake embankments, where access is restricted.

The Hutt River flows out of the hills by Benge Flats and skirts the edge of the Park for a short distance. The river is an important feature of the Park, providing water supply and recreation. In this location the steep river terraces limit river access for recreational users.

The treatment plant buildings dominate the elevated ledge at the northern end of the site. Native plantings around the buildings and the regenerating bush on the surrounding slopes will eventually integrate the structures with the bushclad backdrop. As a destination for visitors, the treatment plant will attract people to the area.

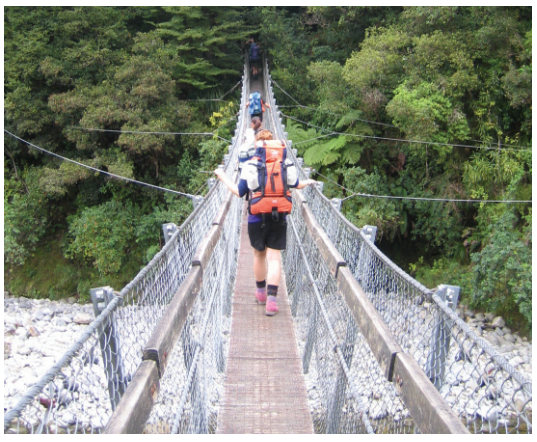
The river terraces below the storage lakes are characterised by gently sloping ground and open spaces with pockets of native vegetation concentrated along the watercourse. This pattern is most evident on Benge Flat where the natural contours are intact.

Aerial view of the Hutt Gorge and Kaitoke Weir

9.2 Kaitoke

The area comprises a zone of pastoral lowlands which are located on the northern edge of the Pakuratahi Basin, nestled at the foot of the Park's steep, forested hill country which extends from the Pakuratahi River to Marchant Road. Here there are open spaces and wide views.

The second zone is the narrow river valley where the Kaitoke Waterworks Road follows the Pakuratahi River into the hills. Forested slopes rise steeply from the narrow river bed. There is a strong sense of enclosure and an emphasis on experiencing the bush environment at close quarters.



Trampers crossing the swing bridge at Kaitoke Forks

Views from the Ridge Track

9.3 Southern ridge

This is the first line of hill country which flanks the pastoral land of the Te Marua and Pakuratahi Basins, right up to Marchant Road at the entrance to Tararua Forest Park. This prominent landscape feature, formed by the Wellington Fault, runs along the foot of the ridge. Here a highly visible change in topography from lowland to steep hill country occurs. This is accentuated by the corresponding change from pasture to forest cover. Consequently the southern ridge is a striking visual feature which brings the rugged wilderness environment to the very edge of the Park.

Placid section of water in the Hutt River Gorge. Photo: Robin Blake

9.4 Park interior

The park interior, lying to the north of the Hutt Gorge, consists of steep hill country covered by indigenous forest. An integral part of the Tararua Range, it meets the Tararua Forest Park and forms part of the Hutt River catchment. It is a rugged environment isolated by the Hutt Gorge and the hill country beyond the park boundaries. As a regionally important conservation area it offers an experience of remote wilderness to the intrepid and glimpses into the wilderness for the less adventurous.

Hutt River Gorge, Pakuratahi Forks

9.5 Hutt Gorge

The Hutt Gorge winds between the southern ridge and the park interior and is a dynamic environment dominated by the forces of nature. Swift flowing water has carved a route between overhanging bluffs. Accessible by river only, it is a dramatic landscape which invites exploration by the adventurous.

Aerial view of Kaitoke Hill with forestry block in foreground

9.6 Kaitoke Hill

The Kaitoke Hill, which separates the Te Marua and Kaitoke basins, forms a low saddle between the Park and the Pakuratahi Forest and forms a recreational link between the two areas. Kaitoke Hill drains into a shallow valley which, although visible from a distance, is screened from adjacent areas and is, therefore, relatively secluded. It is planted with the only exotic forest found in Kaitoke Regional Park. The forestry block seems to fit well into the landscape as the hill is separated from the native forest by the steep escarpment of the southern ridge. A similar landscape character is evident in the nearby plantation of Pakuratahi Forest along the Rimutaka Rail Trail. Native bush is regenerating through scrub on the western flank. This forms an important part of the forest backdrop to the Stuart Macaskill Lakes, as well as a possible ecological link between the remnant beech forest on the hill and podocarp/broadleaf forest to be found in the lowland areas of Kaitoke Regional Park.

10. Recreation

10.1 Recreational opportunities

Kaitoke Regional Park's varied landscape settings allow a range of recreational activities to take place, from day walks and picnicking to activities that require higher levels of skill and fitness such as kayaking, tramping and hunting. Given the small size and rugged nature of the park, recreation is limited mostly to the riverflat areas around Pakuratahi Forks.

The main recreational opportunities are day walking, swimming, picnicking and camping. Horse riding and cycling is expected to increase following the opening of multi-use trails in the park's plantation forest in 2005. Previously these activities were limited to access roads. Kayaking and rafting in the Hutt Gorge are other popular activities. Commercial rafting companies operate in the park under concession arrangements managed by Greater Wellington Regional Council. Other concessions run tours to the site at Pakuratahi Forks where scenes for *Lord of the Rings* were shot. Running, hunting and fishing are minor activities. Recreational hunting is managed through a permit system, (permits are available from the Greater Wellington Regional Council Upper Hutt depot). Hunting is allowed within designated interior zones of the park only.

10.2 Recreational zones and permitted activities

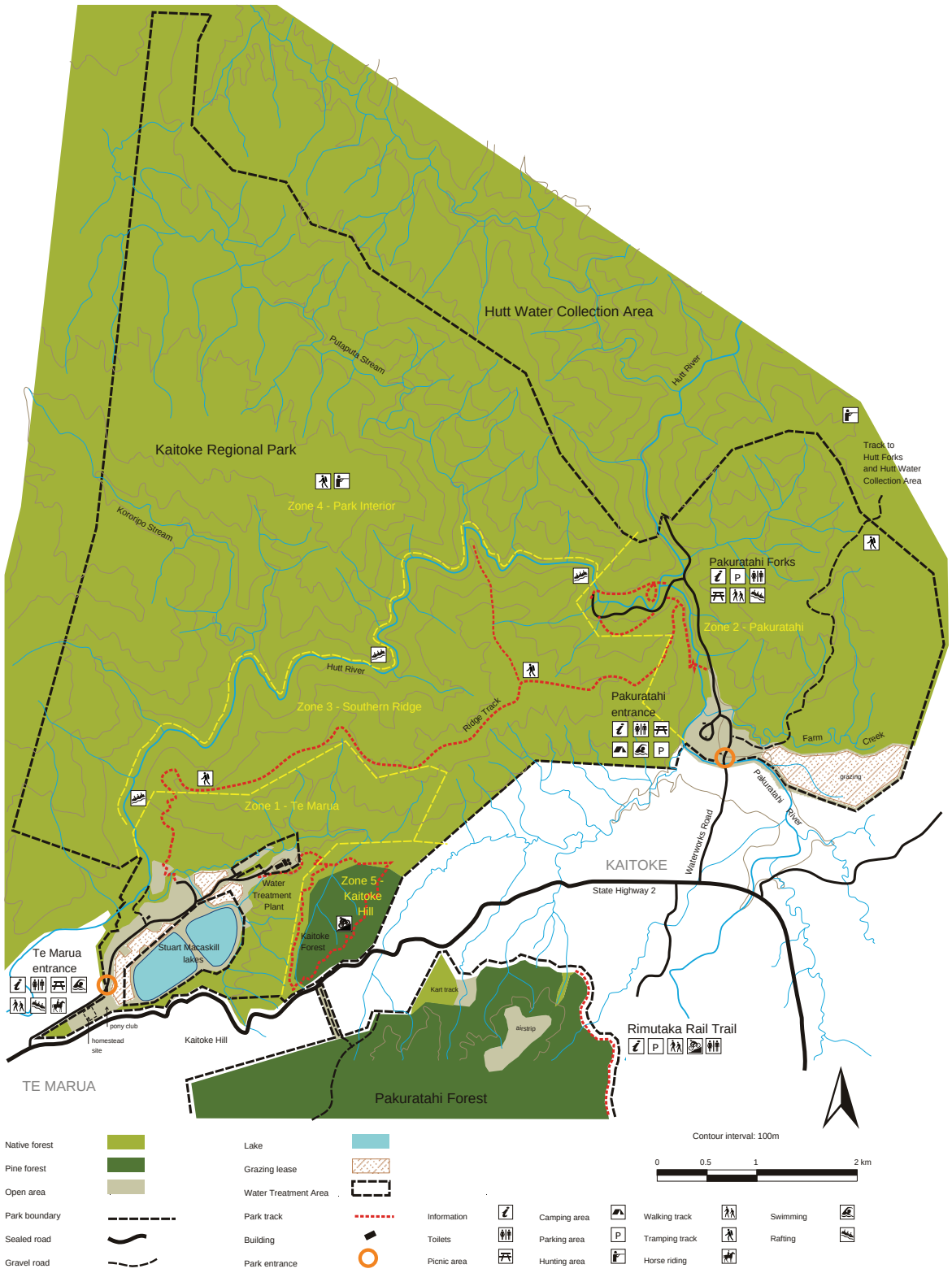
Formal zoning within the park is not used to manage recreational activities. Nonetheless, potential conflict between recreational activities or with waterworks activities is managed by restrictions on access. Public walking access to park trails and the camping area at Pakuratahi Forks is maintained all year round. Horse riding and cycling/mountain-biking is allowed on access roads and multi-use trails in the park's plantation forest, but not on walking tracks. Access to the storage lakes and other waterworks facilities is prevented at Te Marua. The public can access the Hutt Water Collection Area, but no overnight camping is allowed there.

Picnicking at Pakuratahi Forks

Steve the ranger briefing walkers at Rivendell

Kayaks at Pakuratahi Forks

Map 7 Public Access, Recreational Facilities and Activities



KAITOKE REGIONAL PARK - Recreation

10.3 Visitor preferences and patterns of recreational use

In 2000, approximately 100,000 people visited Kaitoke Regional Park, a figure not expected to have changed greatly since. Most come during summer months. The popularity of Kaitoke Regional Park with residents from throughout the Wellington region was demonstrated by a 2002 survey (UMR Research, 2002). Seventy-five percent of those surveyed had visited a regional park in the previous 12 months, and of these, 34% visited Kaitoke – the most popular of all regional parks and forests. Upper Hutt was the park's greatest source of visitors, with 63% of Upper Hutt respondents who had visited a park reporting that they went to Kaitoke – compared with 17% of Kapiti residents and 18% from Wairarapa. Many of Kaitoke's visitors (44%) said they went to the park between 2 and 5 times in the previous year.

In a further survey in 2007 (Peter Glen Research, 2007), 13% of 500 Wellington region residents said they had visited Kaitoke Regional Park in the previous 12 months, second to Queen Elizabeth Park (18%). Activities undertaken by those visiting Kaitoke included walking/jogging (56%), picnicking (14%), barbecuing (6%), camping (3%) and swimming (2%). High levels of satisfaction were recorded, with 71% of those who visited in the previous 12 months saying they were "very satisfied with the park", the highest praise. Over fifty percent of Kaitoke visitors who enjoyed the park said they had appreciated the native flora and fauna, scenery, views, cleanliness and open space. They found it a relaxing/peaceful place to go. A further 30% said they liked the tracks and easy access and found the park a good spot for picnicking and camping. In the same survey, 83% recalled the park when prompted.

In the year to June 2005, there were an estimated 90,000 visits to the Kaitoke Regional Park. Note that the term 'visits' rather than 'visitors' has been used as many people make repeat visits.

Bushcraft course Pakuratahi entrance

Hutt River crossing Bushcraft course

Camping river terraces Pakuratahi entrance

Kaitoke Weir

Building the Te Marua storage lakes, 1987

Aerial view of Te Marua storage lakes and water treatment plant

11. Water Supply

The major continuing land use of the Kaitoke Regional Park relates to water supply. When the Wellington Regional Council came into existence in 1980, it took over the responsibilities of the Water Board.

The water supply system at Kaitoke was enhanced by the completion in 1987 of two large storage lakes, a new treatment plant and pumping station at Te Marua (WRC File 108/5 Pt.1, April 1975 – July 1982). Water enters the treatment plant from the Kaitoke intake of Lake No.1. The treatment plant provides for the filtration, chlorination and fluoridation of the water. The plant can also provide for the coagulation of suspended matter enabling a higher standard of disinfection to be achieved when necessary. Coagulation is not provided routinely because the water taken from the Hutt River is of such quality that this is not required. The lakes have a surface area of 13 ha and a maximum depth of 16 m. They have a combined usable capacity of 2,930 ML: the northern Lake One with a capacity of 1,440 ML and Lake Two with a capacity of 1,760 ML.

The newly established Te Marua Pumping station is effectively three pumping stations in one. It transfers water from Lake Two to Lake One, transfers water from Lake One to the treatment plant and boosts flows in the Kaitoke Main.

The storage lakes ensure that a constant yield of water is taken from the river and to guard against taking too much during dry periods when such extraction could damage the river system. Any surplus water from Kaitoke is not treated but will is diverted to the Te Marua lakes. These lakes are formed as self contained basins and are isolated from adjacent unprotected catchments by hill water interception channels. Complex inlet arrangements, which provide for the mixing of stored water so as to prevent stratification (i.e. layering of water into different temperatures and qualities), ensure only water of high quality will be fed into the lakes.

Originally, a 129 ha area of the Te Marua landholding was to be taken for the storage lakes. With the owners complaining that they would not have a viable economic property left, and with the idea of establishing a regional park in the area beginning to take shape, the acquisition eventually came to extend over the whole property.

12. Farming

Greater Wellington Regional Council owns several pastoral units within the Kaitoke Regional Park which are leased to private individuals. A 24.5 ha block is leased for grazing at Te Marua.

Two pastoral blocks with areas of 80.5 ha and 4 ha, located to the east of the Pakuratahi upper terraces and adjacent to Marchant Road respectively, are presently leased for grazing. AgResearch leases a 2.4 ha block of land above Kaitoke stream.

13. Forestry

Kaitoke Regional Park contains a 68 ha block of Monterey Pine (*Pinus radiata*) planted in 1984, located on the northwest facing slopes between the Te Marua Treatment Plant and State Highway 2. *Eucalyptus fastigata, E. fraxinoides* and Tasmanian blackwood (*Acacia melanoxylon*) have been planted immediately adjoining State Highway 2, Kaitoke Hill and adjacent to the pine plantation giving the forestry block an overall area of 74 ha.

14. Utility Networks

Several network utilities cross or are located in the park, the most important being electricity transmission lines, water supply infrastructure, highway, and telecommunications facilities (See *Map 8: Utility Networks*).

14.1 Electricity transmission lines

A high voltage AC electricity transmission pylon line owned by Transpower New Zealand crosses the southern end of the park in a roughly east-west direction. This line, from the Haywards substation crosses the Rimutaka Range into Wairarapa. Overhead and underground DC lines owned by United Networks Ltd also cross the park, servicing Greater Wellington waterworks facilities and local residents. An 11 kV underground line services a Telecom NZ Ltd cellphone tower located on a promontory above Waterworks Road.

14.2 Waterworks

The Hutt River Scheme supplied 47.2 percent of Wellington's total water requirements in the year 2004-2005. Water enters the scheme at the Kaitoke intake weir 0.5 km above the confluence of the Hutt and Pakuratahi Rivers on the north-west boundary of the park. The weir is a low concrete gravity dam 40 m long and 8 m above the foundation. From here water is piped through a 3 km tunnel to emerge at a chamber near the water storage and treatment facilities at Te Marua on the park's southern boundary. The Te Marua facilities consist of two storage lakes (with a combined capacity of 3,400 million litres or 20 days supply), a water treatment plant and pumping station. The pumping station pumps water between the lakes and to the treatment plant, and boosts flow into the Kaitoke Main.

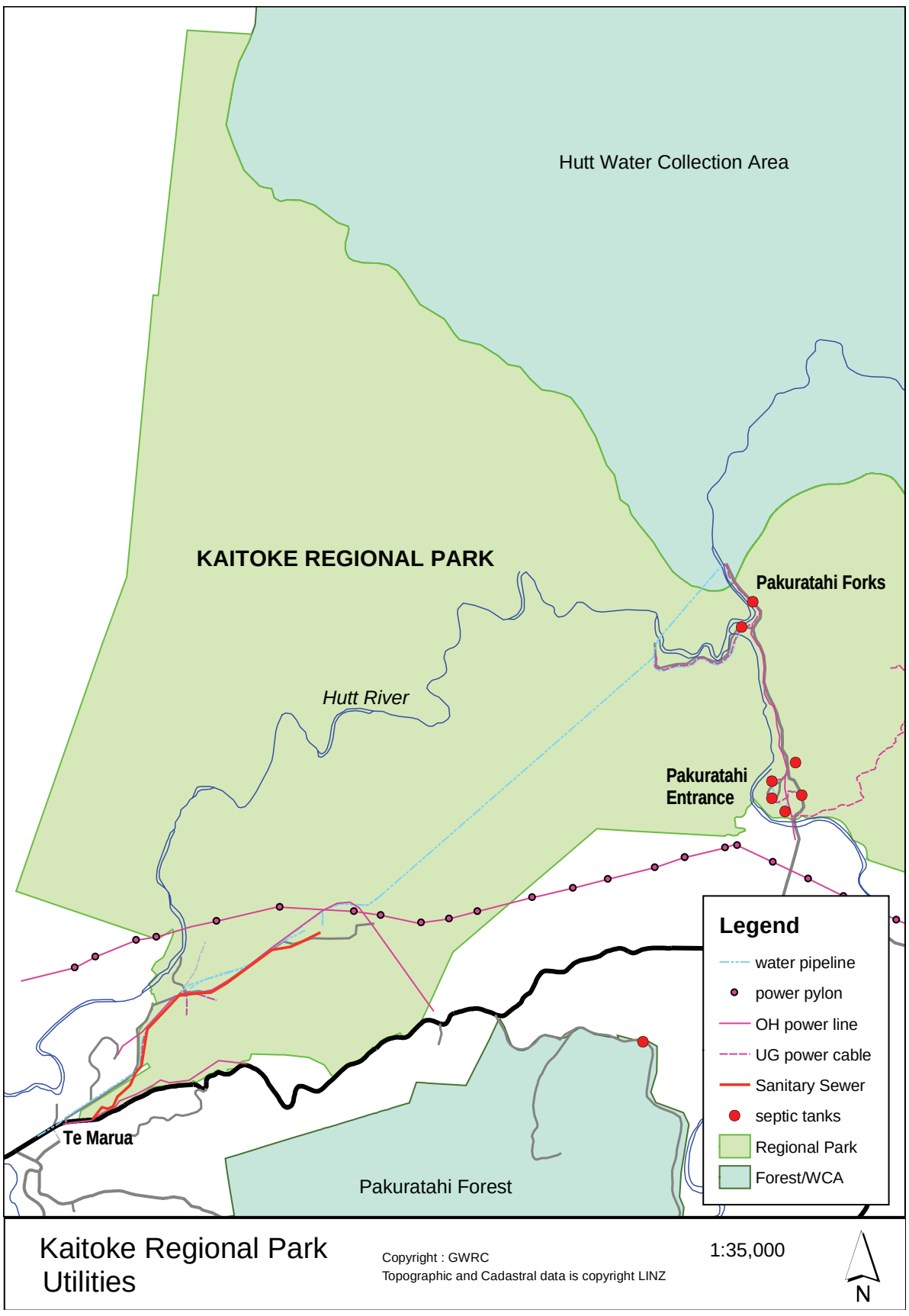
14.3 State Highway

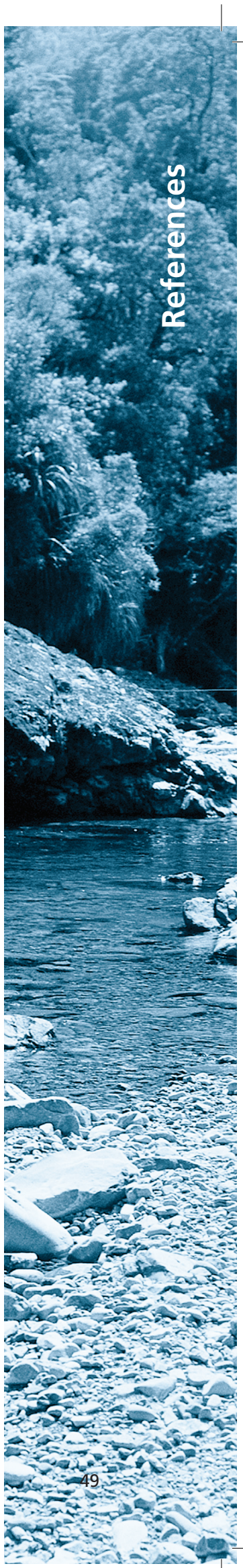
State Highway 2 between Upper Hutt and Wairarapa is located on the park's southern boundary. A recent realignment moved the highway 50 m into the park. A new pedestrian underpass at the top of Kaitoke Hill established during the realignment provides a link to Tunnel Gully. The former state highway route remains as a service road for residents and access to Tunnel Gully, the Rimutaka Rail Trail and go-kart track.

14.4 Telecommunications

A cellphone tower operated by Telecom New Zealand is located in the park above Waterworks Road.

Map 8 Utility Networks





Acknowledgements

This document was drafted by Morris Te Whiti Love, Tony Walzl, Frances Forsyth, Philippa Crisp and Angela McArthur.

References

Anstey, C. & Roy, J. 2002: Te Marua – Kaitoke Regional Park Development Plans. Report prepared for Wellington Regional Council.

Berryman, K., 1990: Late Quaternary movement on the Wellington Fault in the Upper Hutt area, New Zealand. *New Zealand Journal of Geology and Geophysics* 33: 257-270.

Bruce, J., 2000: The Soils of Wellington. *In:* (eds.) McConchie, J., Willis, R. & Winchester, D. Dynamic Wellington, a contemporary synthesis and explanation of Wellington. Institute of Geography, Victoria University of Wellington. Wellington.

Cotton, C.A., 1912: Notes on Wellington physiography. *Transactions and Proceedings of the New Zealand Institute* 44:245–265.

Cotton, C.A., 1957: Tectonic features in a coastal setting at Wellington. *Trans. Roy. Soc.* N.Z. 84:761-90.

Peter Glen Research, 2007: Community survey into usage and awareness of Regional Parks and Forests.

Dawson, J & Lucas, R., 1993: Lifestyles of New Zealand forest plants. Victoria University Press. Wellington.

Druce, A.P. & Atkinson, A.E. 1959: Forest variation in the Hutt catchment. *Proceedings of the New Zealand Ecological Society* 6:41-45.

Goulter, S.W., 1984: The climate and weather of the Wellington region. *New Zealand Meteorological Service Miscellaneous Publication* 115:16.

Heron, D & van Dissen, R., 1998: Late Quaternary movement on the Ohariu Fault, Tongue Point to McKay's Crossing, North Island, New Zealand. *New Zealand Journal of Geology and Geophysics* 41:419-439.

Hewitt, A.E., 1998: New Zealand soil classification. *Landcare Research Scientific Series* 1, 2ed.

Hitchmough, R. (Compiler), 2002: New Zealand Threat Classification lists. *Threatened Species Publication* 23.

McConchie, J., 2000: From shaky beginnings. In, Dynamic Wellington. Eds McConchie, J., Winchester, D., Willis, R. Institute of Geography, Victoria University of Wellington. Wellington.

McEwen, M. 1987. Ecological Regions and Districts of New Zealand. Department of Conservation, Wellington.

McGlone, M.S., 1988: New Zealand. *In*: Huntley, B. & Webb, T., (eds.) Vegetation history. Kluwer Academic Publishers.

McGlone, M.S., 1989: The Polynesian settlement of New Zealand in relation to environmental and biotic changes. *New Zealand Journal of Ecology* 12:115-129.

Mildenhall, D.C., 1994: Palynostratigraphy and paleoenvironments of Wellington, New Zealand, during the last 88 ka, based on palynology of drillholes. *New Journal of Geology and Geophysics* 37:421-436

Ministry for the Environment, 2003: Land Environments of New Zealand. Bateman, Wellington.

Molloy, L., 1988: The living mantle - soils in the New Zealand landscape. Mallinson Rendell in association with the New Zealand Society of Soil Science. Wellington.

Molloy, J.; Bell, B.; Clout, M.; de Lange, P.; Gibbs, G.; Given, D.; Norton, D.; Smith, N.; Stephens, T. 2002: Classifying species according to threat of extinction—a system for New Zealand. *Threatened Species Occasional Publication 22.* Biodiversity Recovery Unit, Department of Conservation, Wellington.

New Zealand Land Cover Database, 2003: LCDB2. Terralink International Ltd.

National Institute of Water and Atmospheric Research (NIWA), 2003: New Zealand Freshwater Fish Database. www.niwa.co.nz/service/nzffd

Oliver, W.H. & Williams, B.R., (eds.) 1981: The Oxford history of New Zealand. Oxford University Press. Wellington.

Park, G., 1999: An inventory of the surviving traces of the primary forest of Wellington City. Unpublished report for Wellington City Council.

Parrish, G.R., 1984: Wildlife and Wildlife Sites of the Wellington Region.New Zealand Wildlife Service, Department of Internal Affairs. Wellington.

PASAC, 1985: Protected Areas Scientific Advisory Committee. Letter to Wellington Regional Council regarding Ecological Areas on Council Land. Greater Wellington files (PK/13/01/05).

Pekelharing, C.J., 1995: Impact of possums on the vegetation in Porirua Scenic Reserve. Landcare Research Contract Report to Porirua City Council.

Salinger, M.J., 2000: The windy city, a climate of contrast. *In*: (eds.) McConchie, J.; Willis, R.; & Winchester, D., Dynamic Wellington, a contemporary synthesis and explanation of Wellington. Institute of Geography, Victoria University of Wellington. Wellington.

Stevens, G.R., 1973: New Zealand geological survey tour guide. Quaternary geology, tectonics and geomorphology of Wellington Peninsula. New Zealand Geological Survey. Lower Hutt.

Stevens, G.R., 1974: Rugged landscape, the geology of Central New Zealand. Reed. Wellington.

Stevens, G.R., 1991: On shaky ground. Geological Society of New Zealand guidebook number 10. DSIR and the Geology and Geophysics and Geological Society of New Zealand. Lower Hutt.

Taylor, N.H., 1948: Soil map of New Zealand. *New Zealand Soil Bureau Map* 280.

Taylor, M.J. & Kelly, G.R., 2001: Inanga spawning habitats in the Wellington Region and their potential for restoration. Part One: Kapiti; Porirua; Wellington and Hutt City. Report prepared for Wellington Regional Council by NIWA. Christchurch.

UMR Research Ltd, 2002: [Draft of] Wellington Regional Council's Parks, Forest and Recreation Areas. A qualitative and quantitative study. Unpublished report for Wellington Regional Council.

Upston, K., 2002: Palynology of Late Holocene sediments from Lake Kohangatera, Fitzroy Bay, Wellington. Unpublished BSc Hons thesis. Victoria University of Wellington.

Wellington Fish and Game Council, 1995: Fisheries survey of Benge Creek. Report prepared for Tonkin and Taylor Ltd. Wellington.

Wellington Regional Council, Queen Elizabeth II National Trust & N.Z. Biological Resources Centre, 1984: Biological Resources of the Wellington Region.

Wellington Regional Council File 108/5 Pt.1, April 1975 – July 1982

Wellington Regional Council, 1991: Kaitoke Regional Park Management Plan. Part 2: Resource Statement. Wellington Regional Council. Wellington.

Wellington Regional Council, 2001a: Wellington Regional Council annual freshwater quality report: 1999-2000. Wellington Regional Council. Wellington.

Wellington Regional Council, 2001b: Wellington Regional Council annual freshwater quality report: 1999-2000. Wellington Regional Council. Wellington.

Appendix One

Kaitoke Regional Park plant species list

Sources: WRC, 1991; Wellington Botanical Society (WBS), 1994; WBS, 2000
Nomenclature follows "Nga Tipu o Aotearoa – New Zealand Plants, Manaaki Whenua – Landcare Research database (http://nzflora.landcareresearch.co.nz)

Species name	Common name	Maori name
Gymnosperm Trees		
Dacrycarpus dacrydioides	white pine	Kahikatea
Dacrydium cupressinum	red pine	Rimu
Phyllocladus alpinus	mountain toatoa or celery pine	Toatoa
Podocarpus hallii	Hall's totara	Totara
Podocarpus totara	totara	Totara
Prumnopitys ferruginea	brown pine	Miro
Prumnopitys taxifolia	matai	Matai
Monocot Trees		
Cordyline australis	cabbage tree	ti kouka
Cordyline banksii	forest cabbage tree	ti ngahere
Cordyline indivisa	mountain cabbage tree	Toi
Rhopalostylis sapida	nikau	Nikau
Dicot Trees and Shrubs		
Alectryon excelsus	titoki	Titoki
Alseuosmia pusilla	mountain alseuosmia	Karapapa
Aristotelia serrata	wineberry	Makomako
Ascarina lucida	hutu	Hutu
Beilschmiedia tawa	tawa	Tawa
Brachyglottis kirkii	Kirk's daisy	Kohurangi
Brachyglottis repanda	rangiora	Rangiora
Brachyglottis rotundifolia	muttonbird scrub	Puheretaiko
Carmichaelia australis	NZ broom, NI broom	Tarangahape
Carpodetus serratus	marbleleaf	putaputäwëtä
Coprosma areolata	thin-leaved coprosma	
Coprosma crassifolia		
Coprosma foetidissima	stinkwood	Hupiro
Coprosma grandifolia	kanono	Kanono
Coprosma linariifolia	yellow wood	
Coprosma lucida	shining karamu	Karamu
Coprosma microcarpa	small seeded coprosma	
Coprosma propinqua	mingimingi	Mingimingi
Coprosma rhamnoides		
Coprosma rigida		
Coprosma robusta	karamu	Karamu
Coprosma rotundifolia	round-leaved coprosma	
Coprosma tayloriae		
Coprosma tenuicaulis	swamp coprosma	
Coriaria sarmentosa	tutu	Tutu
Dracophyllum longifolium	turpentine shrub, grass tree	inanga, inaka
Elaeocarpus dentatus	hinau	Hinau
Elaeocarpus hookerianus	pokaka	Pokaka
Fuchsia excorticata	tree fuchsia	Kotukutuku
Gaultheria antipoda	bush snowberry	Tawiniwini
Gaultheria rupestris		
Geniostoma rupestre		
var. *ligustrifolium*	hangehange	Hangehange
Griselinia littoralis	broadleaf	papauma, kapuka, maihiihi

Species name	Common name	Maori name
Dicot Trees and Shrubs (continued)		
Griselinia lucida	broadleaf	Puka
Hebe stricta var. *atkinsonii*	koromiko	Koromiko
Hedycarya arborea	pigeonwood	Porokaiwhiri
Helichrysum lanceolatum	everlasting daisy	
Hoheria populnea (cultivar)	lacebark, hoheria	Houhere
Ileostylus micranthus	small-flowered mistletoe	pirinoa, pirirangi, pirita
Knightia excelsa	rewarewa	Rewarewa
Korthalsella lindsayi	dwarf mistletoe	
Kunzea ericoides	kanuka	Kanuka
Laurelia novae-zelandiae	pukatea	Pukatea
Leptecophylla juniperina	prickly mingimingi	Mingimingi
Leptospermum scoparium	tea tree	mänuka
Leucopogon fasciculatus	tall mingimingi	Mingimingi
Lophomyrtus bullata	ramarama	Ramarama
Lophomyrtus obcordata	rohutu	rohutu, routu, tuhuhi
Melicope simplex		Poataniwha
Melicytus lanceolatus	narrow-leaved mahoe	mahoe wao
Melicytus micranthus	swamp mahoe	Manakura
Melicytus ramiflorus	whiteywood	Mahoe
Metrosideros robusta	northern rata	Rata
Myrsine australis	Mapou, red matipo	Mapou
Myrsine salicina	toro	Toro
Neomyrtus pedunculata	rohutu	rohutu, routu, tuhuhi
Nestegis cunninghamii	black maire	Maire
Nestegis lanceolata	white maire	Maire
Nestegis montana	narrow-leaved maire	maire rororo, maire kotae, maire rauriki
Nothofagus fusca	red beech	tawhai raunui
Nothofagus menziesii	silver beech	tawhai
Nothofagus solandri var. *solandri*	black beech	tawhai rauriki
Nothofagus truncata	hard beech	tawhai raunui
Olearia arborescens	common tree daisy	
Olearia rani	heketara	Heketara
Olearia solandri	coastal tree daisy	
Olearia virgata	twiggy tree daisy	
Ozothamnus leptophyllus	tauhinu, cassinia	Tauhinu
Parahebe lanceolata	parahebe	
Pennantia corymbosa	kaikomako	kaikömako
Peraxilla colensoi	red mistletoe	
Peraxilla tetrapetala	red mistletoe	
Pittosporum cornifolium	perching kohukohu	tawhirikaro, wharewhareatua
Pittosporum eugenioides	lemonwood	Tarata
Pittosporum tenuifolium	kohuhu	Kohuhu
Plagianthus regius	ribbonwood	Manatu
Pseudopanax arboreus	five-finger	Whauwhaupaku
Pseudopanax colensoi	three-finger	Orihou
Pseudopanax crassifolius	lancewood	Horoeka
Pseudowintera axillaris	lowland horopito	Horopito
Pseudowintera colorata	alpine horopito	Horopito
Raukaua anomalus		
Raukaua edgerleyi	raukawa	Raukawa
Raukaua simplex	mountain three-finger	haumakäroa
Sophora microphylla	kowhai	Kowhai
Schefflera digitata	seven-finger	Pate
Streblus heterophyllus	small-leaved milktree	tawari, towai, turepo
Syzygium maire	swamp maire	maire tawake
Weinmannia racemosa	kamahi	Kamahi

Species name	Common name	Maori name
Monocot Lianes		
Freycinetia banksii	kiekie	Kiekie
Ripogonum scandens	supplejack	Kareao
Dicot Lianes		
Clematis foetida	clematis	
Clematis paniculata	white clematis	puawänanga
Metrosideros colensoi	climbing rata	
Metrosideros diffusa	white climbing rata	Rata
Metrosideros fulgens	scarlet rata	Rata
Metrosideros perforata	small white rata, clinging rata	aka, akatea, akatorotoro, whakapiopio
Muehlenbeckia australis	pohuehue	Pohuehue
Parsonsia heterophylla	NZ jasmine, kaihua	Kaihua
Passiflora tetrandra	NZ passionfruit, kohia	Kohia
Rubus schmidelioides	white-leaved lawyer	
Rubus cissoides	bush lawyer	Tataramoa
Lycopods and Psilopsids		
Huperzia varia	hanging club moss	
Lycopodium scariosum	creeping clubmoss	
Lycopodium varium	clubmoss	whiri-o-Raukatauri
Lycopodium volubile	climbing clubmoss	Waewaekoukou
Tmesipteris elongata	fork fern	
Tmesipteris tannensis	fork fern	
Ferns		
Asplenium bulbiferum	hen and chickens fern	Manamana
Asplenium flaccidum	hanging spleenwort	makawe o Raukatauri
Asplenium oblongifolium	shining spleenwort	huruhuru whenua
Asplenium polyodon	sickle spleenwort	Petako
Blechnum black spot "lowland" formerly *B. capense*		Kiokio
Blechnum chambersii	lance fern	Nini
Blechnum discolor	crown fern	Piupiu
Blechnum filiforme	thread fern	Panako
Blechnum fluviatile	ray water fern	Kiwakiwa
Blechnum novae-zelandiae		Kiokio
Blechnum procerum	small kiokio	
Ctenopteris heterophylla	comb fern	
Cyathea cunninghamii	gully tree fern	
Cyathea dealbata	silver tree fern	Ponga
Cyathea medullaris	black tree fern, mamaku	Mamaku
Cyathea smithii	soft tree fern	Katote
Dicksonia fibrosa	golden tree fern	wheki ponga
Dicksonia squarrosa	rough tree fern	whekï
Grammitis billardierei	strap fern	
Histiopteris incisa	water fern	Matata
Hymenophyllum bivalve	filmy fern	Mauku
Hymenophyllum demissum	drooping filmy fern	irirangi, piripiri
Hymenophyllum dilatatum	filmy fern	matua mauku, irirangi
Hymenophyllum ferrugineum	filmy fern	Mauku
Hymenophyllum flabellatum	Fan-like filmy fern	Mauku
Hymenophyllum multifidum	Much-divided filmy fern	Mauku
Hymenophyllum peltatum	filmy fern	Mauku
Hymenophyllum rarum	filmy fern	Mauku
Hymenophyllum revolutum	filmy fern	Mauku

Species name	Common name	Maori name
Ferns (continued)		
Hymenophyllum sanguinolentum	filmy fern	Piripiri
Hymenophyllum scabrum	hairy filmy fern	Mauku
Hypolepis ambigua		rarauhi nehenehe
Lastreopsis glabella	smooth shield fern	
Lastreopsis hispida	hairy fern	
Lastreopsis velutina	velvet fern	
Leptolepia novae-zelandiae	lace fern	
Leptopteris hymenophylloides	single crepe fern	Heruheru
Lindsaea trichomanoides		
Microsorum pustulatum	hound's tongue	Kowaowao
Paesia scaberula	ring fern,	Matata
Pellaea rotundifolia	button fern	Tarawera
Pneumatopteris pennigera	gully fern	pakau roharoha
Polystichum neozelandicum	shield fern	Pikopiko
Polystichum vestitum	prickly shield fern	Punui
Pteridium esculentum	bracken	Rarauhe
Pteris macilenta	brake	Titipo
Pteris tremula	shaking brake	Turawera
Pyrrosia eleagnifolia	leather-leaf fern	Ota
Rumohra adiantiformis	leathery shield fern	Karawhiu
Sticherus cunninghamii	umbrella fern	
Trichomanes reniforme	kidney fern	Raurenga
Trichomanes venosum	veined bristle fern	
Orchids		
Earina autumnalis	Easter orchid	Raupeka
Earina mucronata	Spring or bamboo orchid	peka-a-waka
Nematoceros rivulare	spider orchid	
Pterostylis sp.	greenhood orchid	Tutukiwi
Singularybas oblongus	spider orchid	
Winika cunninghamii	bamboo orchid	
Grasses		
Chionochloa cheesemanii		
Chionochloa conspicua	plumed tussock grass	toetoe hunangamoho
Cortaderia fulvida	toetoe	Toetoe
Cortaderia toetoe	toetoe	Toetoe
Microlaena avenacea	bush rice grass	
Microlaena stipoides	meadow rice grass	
Poa anceps		Wi
Sedges		
Carex dissita		
Carex geminata	cutty grass	rautahi, toetoe rautahi
Carex secta	purei	purei, purekireki, pukio, mata
Carex virgata	swamp sedge	
Cyperus ustulatus	coastal cutty grass	Toetoe
Gahnia pauciflora	cutting sedge	
Gahnia setifolia		Mapere
Gahnia xanthocarpa	giant sedge	tupari-maunga
Schoenoplectus tabernaemontani		
Uncinia angustifolia		
Uncinia banksii		
Uncinia distans		
Uncinia ferruginea		
Uncinia uncinata	hooked sedge	matau a Maui

Species name	Common name	Maori name
Rushes		
Juncus gregiflorus	leafless rush	wi, köpüpüngäwhä
Juncus pallidus	giant rush	wi, köpüpüngäwhä
Juncus planifolius		Wi
Juncus sarophorus	leafless rush	Wi
Luzula sp.	wood rush	Wi
Other Monocot Herbs		
Astelia fragrans	bush lily	Kakaha
Astelia solandri	perching astelia	Kawharawhara
Collospermum hastatum	collospermum	Kahakaha
Collospermum microspermum		
Dianella nigra	blueberry	Turutu
Libertia grandiflora	NZ iris	mïkoikoi
Luzuriaga parviflora	lantern berry	Nohi
Phormium cookianum	mountain flax	Whaririki
Phormium tenax	swamp flax	Harakeke
Dicot Herbs		
Acaena anserinifolia	bidibid	Piripiri
Cardamine sp.	NZ bittercress	Panapana
Centella uniflora	centella	
Epilobium sp.	willowherb	
Euphrasia cuneata	North Island eyebright	tutae kiore
Gunnera monoica	gunnera	
Hydrocotyle elongata		
Hydrocotyle moschata		
Hydrocotyle heteromeria	wax weed	
Jovellana repens		
Leptinella sp.	button daisy	
Nertera depressa	fruiting duckweed	
Oreomyrrhis colensoi		
Ourisia macrophylla subsp. *macrophylla*		
Oxalis exilis	creeping or yellow oxalis	
Oxalis magellanica		
Plantago raoulii		Tukorehu
Pratia angulata	pratia	Panakenake
Ranunculus reflexus	bush buttercup	
Senecio minimus	fireweed	
Stellaria decipiens	chickweed	
Urtica incisa	scrub nettle, stinging nettle	Ongaonga

Some adventive plants	
Species name	Common name
Dicot Trees and Shrubs	
Acer pseudoplatanus	sycamore
Chamaecytisus palmensis	tree lucerne
Cotoneaster glaucophyllus	cotoneaster
Crataegus monogyna	hawthorn
Cytisus scoparius	broom
Hypericum androsaemum	Tutsan, St John's wort
Ilex aquifolium	English holly
Ligustrum sp.	privet
Rosa rubiginosa	sweet briar
Sambucus nigra	elderberry
Ulex europaeus	gorse

Species name	Common name	Maori name
Dicot Lianes		
Hedera helix	ivy	
Rubus fruticosus agg.	blackberry	
Rubus laciniatus	cut-leaved blackberry	
Grasses		
Dactylis glomerata	cocksfoot	
Rushes		
Juncus effusus	rush	
Dicot Herbs		
Cirsium vulgare	Scotch thistle	
Conyza canadensis	Canadian fleabane	
Digitalis purpurea	foxglove	
Galium aparine	cleavers	
Leycesteria formosa	Himalya honeysuckle	
Lotus pedunculatus	bird's-foot trefoil	
Mycelis muralis	wall lettuce	
Plantago lanceolata	narrow leaved plaintain	
Ranunculus repens	creeping buttercup	
Senecio jacobaea	ragwort	
Solanum nigrum	black nightshade	Raupeti
Stachys sylvatica	hedge stachys	

References

Wellington Botanical Society, 1994: Indigenous vascular plants of Te Marua Bush. 11/6/1994

Wellington Botanical Society, 2000: Some indigenous vascular plants of "remnant number one" Kaitoke Regional Park. 4/7/2000

Wellington Regional Council, 1991: Kaitoke Regional Park Management Plan. Part 2: Resource Statement. Wellington Regional Council. Wellington

Appendix Two

Kaitoke Regional Park freshwater fish species list

Species name	Common name	Maori name
Anguilla australis	short-finned eel	Tuna
Anguilla dieffenbachii	long-finned eel	Tuna
Galaxias brevipinnis	koaro	Koaro
Gobiomorphus cotidianus	common bully	
Galaxias divergens	dwarf galaxias	
Gobiomorphus basalis	cran's bully	
Gobiomorphus hubbsi	bluegill bully	
Gobiomorphus huttoni	redfin bully	
Paranephrops planifrons	freshwater crayfish	Koura
Salmo trutta	brown trout	

Appendix Three

Kaitoke bird species list

This list has been compiled from bird count surveys using the slow walk transect method described by Handford (2000).

Species name	Common name	Maori name
Acanthisitta chloris granti	rifleman	titipounamu
Anthornis melanura	bellbird	korimako, makomako
Chrysococcyx lucidus	shining cuckoo	pipiwhara
Eudynamys taitensis	long-tailed cuckoo	koekoea
Falco novaeseelandiae	New Zealand falcon	karearea
Fringilla coelebs	chaffinch	
Gerygone igata	grey warbler	riroriro
Hemiphaga novaeseelandiae	New Zealand pigeon	kereru
Mohoua albicilla	whitehead	popokatea
Petroica macrocephala toitoi	tomtit	miromiro
Prosthemadera novaeseelandiae	tui	tui
Rhipidura fuliginosa placabilis	fantail	piwakawaka
Sturnus vulgaris	starling	
Tadorna variegata	paradise shelduck	putangitangi
Turdus merula	blackbird	
Turdus philomelos	song thrush	
Zosterops lateralis	silvereye	tauhou

Other species that have been seen by visitors to the park:

Species name	Common name	Maori name
Anas platyrhynchos	mallard	
Anas superciliosa	grey duck	parera
Anthus novaeseelandiae	New Zealand pipit	pihoihoi
Ardea novaehollandiae	white-faced heron	
Carduelis carduelis	goldfinch	
Carduelis chloris	greenfinch	
Carduelis flammea	redpoll	
Circus approximans	Australasian harrier	kahu
Cyanoramphus auriceps auriceps	yellow-crowned parakeet	kakariki
Emberiza citrinella	yellow hammer	
Gymnorhina tibicen	Austalian magpie	
Halcyon sancta vagans	kingfisher	
Hirundo tahitica neoxena	welcome swallow	
Larus dominicanus	black backed gull	karoro
Nestor meridionalis septentrionalis	kaka	
Ninox novaeseelandiae	morepork	ruru
Passer domesticus	house sparrow	
Phalacrocorax carbo	black shag	kawau
Platycerus eximius	eastern rosella	
Porphyrio porphyrio melanotis	pukeko	pukeko
Sturnus vulgaris	starling	
Vanellus miles novaehollandiae	spur-winged plover	

References

Handford, P., 2000: Native Forest Monitoring. A guide for forest owners and managers. Forme Consulting Group Ltd. Wellington.