

VEGETATION AND HABITAT TYPES OF
THE LOWER KAITUNA RIVER,
WESTERN BAY OF PLENTY

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WHAKATANE



WILDLAND CONSULTANTS LTD, TAURANGA OFFICE, 558 MAUNGANUI ROAD, MOUNT MAUNGANUI
Ph 07-574-2642, Fax 07-574-2643, email lisette@wildlands.co.nz, www.wildlands.co.nz

99 SALA STREET, P.O. BOX 7137, TE NGAE, ROTORUA
Ph 07-343-9017; Fax 07-343-9018

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PROJECT TEAM

William Shaw – Field survey, avifauna, report compilation
Lisette Collins – Field survey, vegetation descriptions, report compilation
Chris Bycroft – Avifauna
Roger Bawden – GIS mapping

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1. INTRODUCTION

The Kaituna River flows from its source at Lake Rotoiti to the sea at Te Tumu, near Maketu. Wildland Consultants Ltd was commissioned by Environment Bay of Plenty to describe the vegetation and habitat types, and fauna, of the lower Kaituna River. This report presents a map and descriptions of vegetation/habitat types and records of avifauna observed during a field survey. A list of vascular plant species is provided in Appendix 1.

2. ECOLOGICAL CONTEXT

Lake Rotoiti, in the Rotorua Lakes Ecological District, is the source of the Kaituna River. The outlet of the lake is at Okere Falls, on the southern boundary of the Otanewainuku Ecological District. From Okere Falls, the river enters a gorge and flows north, through the semi-coastal bioclimatic zone of the District. The gorge is a ribbon of predominantly indigenous vegetation that passes through extensive areas of exotic pine (*Pinus radiata*) plantation. South of Paengaroa, near the inland boundary of the Tauranga Ecological District, the river emerges from the gorge and continues to flow north through horticultural and agricultural land. Within c.1 km of the sea, part of the river flows into the Maketu Estuary while the remainder flows directly into the Bay of Plenty at Te Tumu.

Thirty-six Special Ecological Sites (SES) have been identified within the administrative boundary of Tauranga City Council (Wildland Consultants 2000a). Site SES 36 is a Category 2 site that comprises four discrete wetlands located along a c.3 km stretch of the true-left side of the Kaituna River. The wetlands include willow forest and raupo reedland, some of which are located on cut-off river meanders that were created when the river was straightened.

The Kaituna Wetland is adjacent to the true-right side of the river. The wetland has been degraded by drainage, grazing, and invasive exotic weeds which have inhibited the regeneration of indigenous plants, but the wetland is now subject to ongoing restoration works. Ti kouka (cabbage tree; *Cordyline australis*) treeland is locally dominant and other indigenous species present include mahoe (*Meliccytus ramiflorus* subsp. *ramiflorus*), tree ferns (*Cyathea dealbata* and *C. medullaris*), and *Coprosma propinqua* subsp. *propinqua*. Japanese honeysuckle (*Lonicera japonica*) is prominent in the understorey, and other pest plant species include pampas (*Cortaderia selloana*), blackberry (*Rubus fruticosus* agg.), Chinese privet (*Ligustrum sinense*), grey willow (*Salix cinerea*), crack willow (*Salix fragilis*), moth plant (*Araujia sericifera*), and tradescantia (*Tradescantia fluminensis*) (Wildland Consultants 2002). A community-based restoration project, with involvement of the Department of Conservation, Fish and Game New Zealand, and gamebird hunters, is undertaking planting, weed control, and pest animal control within the Kaituna Wetland.

The catchment of the Kaituna River is an important habitat with a diverse assemblage of fish species, including twelve species of indigenous fish and four species of introduced fish (Wildland Consultants 2000b). The lower Kaituna River is an important recreational whitebait fishery, and the lower Kaituna River also includes spawning sites for whitebait species (*ibid.*).

3. WATER MANAGEMENT HISTORY

The summary below has been compiled from various sources, including a Department of Conservation account of historical events.

- Historically, the Kaituna River drained through the Matata Estuary to the ocean. The decision to divert the Kaituna River out of Maketu Estuary was made by the Kaituna River Board in March 1954. The mouth of the Kaituna River has been much manipulated since the late 1950s.
- In 1958, a 'cut' was made into the sand dunes at a point close to where the path of the Kaituna River was close to the sea, shortening the length of the river by more than 3 km. This cut can clearly be seen in aerial photographs taken in November 1959. This diversion resulted in a major decline in freshwater input into the Maketu Estuary.
- Accounts vary, but a navigable bar at Maketu was always a problem to shipping as it was often unreliable. Accounts do concur that the outlet shifted occasionally and became silted during severe storms. The scouring action of the river and periodic flooding did, however, always remedy the siltation situation.
- In 1907, after severe floods, the Kaituna River broke through the sandspit at Te Tumu and the estuary declined in use as a port. The new entrance improved the navigability of the lower river and scows continued to use the river to travel to Te Puke.
- After the 1907 breach at Te Tumu, for the next fifteen years, the mouth migrated slowly towards Maketu but often returned to Te Tumu by flood action. The Maketu Māori community made strong representations to central government to have a diversion cut excavated to restore the river through Maketu.
- In 1922, Ford's Cut was put in by the newly-formed Kaituna River Board in an attempt to direct the Kaituna River into the estuary. However, the new entrance did not scour out at Maketu, so in 1926 a new outlet was excavated at Maketu, using a dragline. Despite this the river broke out again at Te Tumu in 1928, before eventually migrating to and stabilising at Maketu.
- Severe floods affected the area again in May 1949 and July 1951. The Kaituna River Board commissioned a report on a comprehensive flood protection and drainage scheme for the lower Kaituna area. This recommended against diversion directly to Te Tumu because it would cause rapid deterioration of the estuary. A major report in 1951 detailed a bold scope of work designed to relieve major flooding. After some years of debate the Soil Conservation and Rivers Control Council adopted the scheme in 1954. Ministry of Works, Treasury, and hence government approval was not forth-coming. A diversion cut at Te Tumu was suggested as a temporary expedient measure which would provide some immediate relief. Implementation would allow time to investigate and promote alternatives that would hopefully gain government approval and funding.

- The Kaituna River Board accepted the Te Tumu cut proposal in March 1954, though they did not favour this option. They also gained approval for estuary and river stopbanking, drainage pumps, and flood gates.
- The diversion works were carried out by the Kaituna River Board and completed in February 1958, with the establishment of a rigid barrier on the eastern side of the Te Tumu cut to prevent further eastward migration of the river mouth, the excavation of a channel at Te Tumu, and blockage of Ford's Cut with a causeway.
- The diversion provided some flood relief but did not result in the substantial improvements sought for the lower Kaituna area. Much concern about apparent and potential changes to the estuary was expressed by local people. Meanwhile extensive drainage and stopbanking activities were undertaken to reclaim wetlands for pastoral development.
- By 1960, various factors related to the diversion had contributed to erosion of an illegally infilled extension to the domain opposite the Maketu estuary entrance and the appearance of large sandbars in the lower estuary. Boat owners and commercial fishermen were concerned for their future operations.
- At about this time, cord grass (*Spartina alterniflora*), was planted in the estuary for conversion of saltmarsh to pasture, thus further complicating the sedimentation problems in the estuary.
- Following the establishment of the Bay of Plenty Catchment Commission (now the Regional Council) in the early 1960s, a major river control scheme known as the 'Kaituna River Major Scheme' was prepared. The scheme proposed widening and realignment of the lower 18 kilometres of the Kaituna river and construction of stopbanks along the main channel, tributaries and around the estuary as well as construction of pumping stations and floodgates.
- The scheme was approved by central government in 1971 but was not constructed at this stage. The proposed scheme was amalgamated with the Upper Kaituna Catchment Control Scheme to form the Kaituna Catchment Control Scheme. Final Government approval was received in 1982 although works on the Lower Kaituna River in the vicinity of Te Tumu commenced in 1981. The scheme provided for the widening and realignment of the Kaituna River, the construction of stopbanks along the main channel and tributaries, and around the estuary. Implementation of scheme works has continued with little modification since 1981, although the proposed stopbanks around the estuary have been modified to ensure that privately-owned salt marsh in the southern section is preserved.
- In 1974 the causeway at Ford's Cut was reinforced with fine material, thus further restricting this source of freshwater flow to the estuary. Informal stopbanking and drainage works were commenced around Papahikahawai Island.
- The Catchment Control Scheme was completed in the early 1990s.

- Partial diversion of the river flow in Ford’s Cut, through culverts under the causeway, was implemented by the Department of Conservation in 1996.

4. HISTORICAL VEGETATION

There is only limited information on the vegetation of habitats present in the current lower reaches of the Kaituna river (as compared with the Maketu Estuary, for which there is a reasonable amount of information). It is apparent, from the extract below from Murray (1978) that, prior to diversion of the river from the estuary, that freshwater habitats dominated by willows were present in the upper estuary.

“Another photograph taken by Mr O.L. Brain in the upper Maketu Estuary, prior to the diversion of the Kaituna River from the estuary, shows that the area was dominated by *Mariscus ustulatus* (endemic) and *Salix cinerea* and *S. carpa* (pussy willows).”

The upper estuary is currently strongly saline in terms of the vegetation of habitats present. The following extract from Murray (1978) describes the upper reaches of the estuary and the lower reaches of the river prior to diversion.

Kirk, in 1872, described the vegetation at Maketu as follows:

“At Maketu *Ruppia maritima* [now either *Ruppia megacarpa* or *R. polycarpa*] occurs in the tidal portion of the Kaituna River, and fragments of *Potamogeton ochreatus* Raoul are floated down the stream. At the mouth of the river is a fine clump of angi-angi (*Coprosma baueriana*) [now known as *Coprosma repens*] and *Elatine americana* [now *E. gratiolooides*] occur near the beach, the latter attaining here its most easterly known habitat. *Cynodon dactylon* is abundant, and from its capacity of resisting drought its diffusion must be beneficial.”

The following extracts are from Bioreseaches (1975), for a site about 1.26 km upstream from the river mouth:

“ Flora - Emergent vegetation consisted of:
Mentha sp. - common as isolated stands of young plants
Polygonum decipiens - occasional stands, generally in a poor condition
Scirpus lacustris - common.

Submerged vegetation present was composed of:
Lagarosiphon major - common under *Polygonum* in deeper water

Comment: Flora and fauna are restricted to salt-water tolerant forms in this tidal region of the river.”

5. SALINITY REGIME

Different aquatic and marsh species have widely varying tolerances and preferences for water salinity levels. Salinity is therefore a key determinant of species composition and relative abundance in tidal environments. Full diversion of the river directly out to sea had two obvious effects in terms of salinity:

- Significant reduction of freshwater inflows to the Maketu estuary, resulting in a dramatic increase in salinity (and the loss of saltmarsh and adjacent freshwater wetlands). [This situation has been ameliorated slightly by the partial redirection of the river in 1996].
- More direct tidal access through the Kaituna Cut has enabled salt water to travel further upriver. The extent of this effect is summarised in McIntosh (1988) and the following key points are from that report:
 - A survey in 1974, prior to the Cut being formed, found that a salt wedge, near the bed of the river, extended 2 km upstream at high tide (a surface effect was measurable 1 km up river).
 - A salinity survey, in 1988, following the 1981 diversion, found that the diversion had allowed the salt wedge to advance a further 2 km up river.

Note: Although the salt wedge is generally 2-2.5 m below the surface on an incoming tide, it becomes entrained in the surface on an outgoing tide (McIntosh 1988). This means that vegetation could be affected up to 4 km from the river mouth.

6. PRESENT DAY VEGETATION AND HABITATS

6.1 General overview

A sandy beach at the mouth of the Kaituna River has patches of spinifex (*Spinifex sericeus*) and panaho (*Calystegia soldanella*). A short distance upstream of the river mouth is an “island” which was created when the river was straightened and a meander was cut off. The original river channel is located on the southern side of the “island” which is connected to the southern shore by a causeway which separates the original river channel from the straightened channel. A boat ramp is located on the side of the original main channel, opposite the southern tip of the “island”. Vegetation on the “island” and in other nearby wetlands adjacent to the straightened channel includes raupo (*Typha orientalis*), *Bolboschoenus fluviatilis*, and *Baumea articulata* in association with other species such as harakeke (flax; *Phormium tenax*), *Schoenoplectus tabernaemontani*, *Carex sinclairii*, makaka, and *Coprosma propinqua*.

Willows (*Salix* spp.) become increasingly prominent upstream, commonly in association with pasture grasses and/or reed sweetgrass (*Glyceria maxima*). A strip on the true right riverbank has been planted with indigenous species such as harakeke, kanuka (*Kunzea ericoides*), and akeake (*Dodonea viscosa*), and crack willow (*Salix fragilis*). Harakeke has also been planted beneath willows on the true-left bank,

upstream of Bell Road. In front of the stopbanks there are areas of reed sweetgrass that are regularly submerged by the river during high tides.

6.2 Type descriptions

Twenty-one vegetation/habitat types were identified and are described below (refer to Figure 1). The vegetation types include six types of grassland, one sandfield type, five reedland types, one rushland type, one shrubland type, four scrub types, two treeland types, and one forest type. The wetlands on and adjacent to the “island” and along the riverbank near the boat ramp are described below in the descriptions of Vegetation Types 1, 2, 4, 8b, 8c, and 12. Photographs are presented in Appendix 2.

Grassland

1. Pampas grassland

A dense, almost monospecific sward of pampas (*Cortaderia selloana*) forms the canopy in this type, which is located on the margins of an artificial pond that has been created on the “island” (refer to plate 1, Appendix 2). There are occasional ti kouka and manuka (*Leptospermum scoparium*). Pampas is widespread along the lower reaches of the Kaituna River and is a component of many of the vegetation types which are described in this report.

2. (Pampas)-(gorse)-tall fescue-paspalum-Bolboschoenus fluviatilis-searush grassland

This vegetation type is dominated by a variable mixture of pampas, gorse (*Ulex europaeus*), tall fescue (*Schedonorus phoenix*), *Bolboschoenus fluviatilis* and searush (*Juncus kraussii* var. *australiensis*). Other species include *Coprosma propinqua*, harakeke, and toatoa (*Haloragis erecta*). There is one example of this vegetation type, on the “island” adjacent to Vegetation Type 1 and vegetation Type 8b (refer to Plate 2, Appendix 2).

3. Tall fescue-Juncus gregiflorus/paspalum grassland

Tall fescue and *Juncus gregiflorus* are emergent above grazed grassland dominated by paspalum (*Paspalum* sp.). There is an area of this vegetation type on a riverbank where pasture (Vegetation Type 6) grades into *Juncus gregiflorus* rushland (Vegetation Type 13A).

4. Tall fescue/pasture grassland

Grassland dominated by tall fescue emergent above pasture grasses is present on the faces of some stopbanks and on the river margins. Other species present in this vegetation type include pampas, kiokio (*Blechnum novae-zelandiae*), Yorkshire fog (*Holcus lanatus*), lotus (*Lotus pedunculatus*), and occasional Japanese walnut (*Juglans ailantifolia*).



Figure 1. Vegetation/habitat types of the lower Kaituna River (Sheet 1 of 3)

Legend
 1 Vegetation and Habitat Type
 (refer to text)

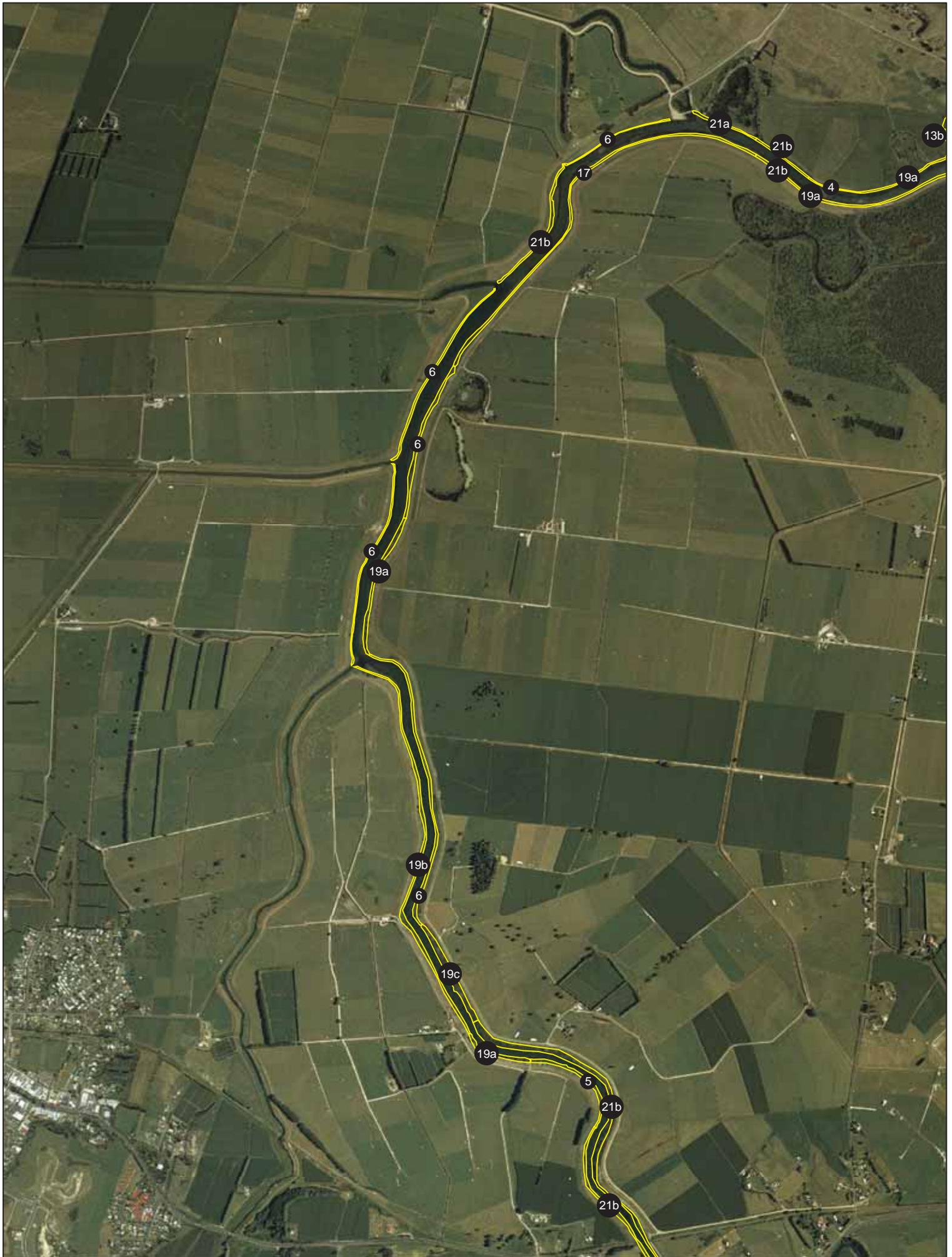




Figure 1. Vegetation/habitat types of the lower Kaituna River (Sheet 2 of 3)

Legend
 1 Vegetation and Habitat Type
 (refer to text)

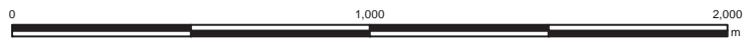




N
 Legend

① Vegetation and Habitat Type
 (refer to text)

Figure 1. Vegetation/habitat types of the lower Kaituna River,
 (Sheet 3 of 3)



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Scale: 1:15,000
 Date: 22/12/05
 Cartographer: RPB

The example of this vegetation type west of the “island” is a narrow strip along a breached stopbank (refer to Plate 3, Appendix 2). Other species include occasional harakeke, searush, *Coprosma propinqua*, and toatoa. On the western side of the area is a small tidal channel which includes patches of oioi, *Baumea articulata*, and *Bolboschoenus fluviatilis*.

5. Reed sweetgrass-pasture grassland

Dense swards of reed sweetgrass intermixed with pasture species are present on the river side of the stopbanks. This type is most common upstream of Bell Road. Much of this type is inundated at high tide and, for this reason, not all examples were mapped.

6. Pasture and wetted pasture

Grazed pasture and grazed wetted pasture dominate the vegetation beyond the banks of the river, and extends to the river margins in places. Species present within this type include soft rush (*Juncus effusus*), rye grass (*Lolium perenne*), and lotus.

Sandfield

7. Spinifex/panaho sandfield

At the river mouth, on the true-left side of the river, there is an area of sandfield with scattered spinifex and panaho (refer to Plate 4, Appendix 2). Other indigenous species include *Carex pumila* and toatoa (*Haloragis erecta*). Exotic species include ripgut brome (*Bromus diandrus*), sea rocket (*Cakile maritima*), haretail (*Lagurus ovatus*), and lupin (*Lupinus arboreus*).

Reedland

8. Raupo reedland

Raupo reedland occupies parts of the river bank and some of the cut-off river meanders downstream of Bell Road. It occurs as near-monospecific stands or in combination with other species, particularly harakeke, *Coprosma propinqua* subsp. *propinqua*, *Baumea articulata*, and/or pampas. Where raupo reedland is not separated from the river channel by a stopbank, *Isolepis cernua* and *Limosella lineata* are present on the partially inundated riverbank. Five sub-types of raupo reedland were mapped:

- 8a - Raupo reedland

A nearly mono-specific stand of raupo, with pampas, gorse, *Coprosma propinqua*, and occasional ti kouka on the margins. The most downstream patch of this type includes a sward of oioi (*Apodasmia similis*).

- 8b - (Harakeke)/raupo-*Baumea articulata* reedland

(Harakeke)/raupo-*Baumea articulata* reedland and sedgeland is present on the “island” opposite the Ford Road boat ramp (refer to Plates 6-10 in Appendix 2) and on the riverbank west of the “island”. On the “island”, harakeke is most abundant on the margins of the vegetation type and is scattered through the interior. Pampas, *Coprosma propinqua*, and occasional ti kouka are present mainly on the river margins. The interior of this vegetation type is dominated by raupo and *Baumea articulata* with scattered harakeke and makaka (*Plagianthus divaricatus*). The adjacent intertidal flats on the riverbank include meadows of *Isolepis cernua* with less abundant arrow grass, makaokao (*Samolus repens*), and *Limosella lineata*.

The area of this vegetation type to the west of the “island” comprises variable mixtures of raupo and *Baumea articulata* with scattered harakeke. *Coprosma propinqua* occurs occasionally, and is most common towards the western side of the site where there is also occasional ti kouka. There are patches and individual plants of pampas along the margins of the area, and occasional individual pampas plants in the interior. Reed sweetgrass is present throughout much of the area, and forms a dense sward along the western end of the channel that flows along its southern edge. Within the channels and adjacent to them are meadows of *Isolepis cernua* and arrow grass (*Triglochin striata*) with frequent bachelor’s button (*Cotula coronopifolia*) and patches of *Limosella lineata*. A central portion of the area is dominated by exotic grasses such as tall fescue and saltwater paspalum (*Paspalum vaginatum*) in association with *Eleocharis acuta*, searush, bachelor’s button, and *Isolepis cernua*. There are scattered gorse, bracken (*Pteridium esculentum*), pampas, and makaka on the riverbank.

- 8c - Raupo/reed sweetgrass-*Schoenoplectus tabernaemontani*-tall fescue reedland

Raupo is emergent above reed sweetgrass and tall fescue. In the northern part of this type, there are also clumps of *Schoenoplectus tabernaemontani* and *Baumea articulata*, and other species include Yorkshire fog, lotus, water pepper (*Persicaria hydropiper*), and swamp plantain (*Plantago australis*). In the southern part of this type, near the boat ramp, *Bolboschoenus fluviatilis* is relatively common and there are scattered harakeke and gorse (refer to Plate 11, Appendix 2). *Baumea articulata* is present on the southern tip of the site.

- 8d - Raupo-*Baumea articulata* reedland

Raupo and *Baumea articulata* form the canopy. Species on the margins include gorse, bracken, kiokio, and ring fern (*Paesia scaberula*).

9. Harakeke-Coprosma propinqua subsp. propinqua/raupo-Baumea articulata flax-reedland

Harakeke and *Coprosma propinqua* subsp. *propinqua* are emergent above raupo and *Baumea articulata*, with occasional emergent ti kouka (refer to Plate 12, Appendix 2). Other species include reed sweetgrass, parrot's feather (*Myriophyllum aquaticum*), watercress (*Nasturtium officinale*), beggar's ticks (*Bidens frondosa*), pohuehue (*Muehlenbeckia complexa*), and occasional patches of Japanese honeysuckle.

10. Coprosma propinqua subsp. propinqua-harakeke-ti kouka/Schoenoplectus tabernaemontani -raupo reedland

Coprosma propinqua subsp. *propinqua*, harakeke, and ti kouka are emergent above *Schoenoplectus tabernaemontani*, and raupo. There is one area of this vegetation type, adjacent to and grading into harakeke-*Coprosma propinqua* subsp. *propinqua/raupo-Baumea articulata* flax-reedland (Vegetation Type 9).

11. Coprosma propinqua subsp. propinqua -Baumea articulata reedland

A stand of reedland dominated by *Coprosma propinqua* subsp. *propinqua* and *Baumea articulata* is enclosed within grazed *Juncus gregiflorus* rushland (Vegetation Type 13A).

12. Bolboschoenus fluviatilis-raupo reedland

Bolboschoenus fluviatilis and raupo dominate this vegetation type, which occurs on the "island" north of the boat ramp and as patches on the adjacent mudflat/riverbank (refer to Plates 13 and 14, Appendix 2). Species on the margin of this type include oioi, *Baumea juncea*, *Isolepis cernua*, and bachelors button. The main area of this vegetation type, on the "island", includes occasional pampas and harakeke.

Rushland

13. Juncus gregiflorus rushland

Two sub-types of *Juncus gregiflorus* were mapped and are described below:

- 13a - Tall fescue- *Juncus gregiflorus*/reed sweetgrass-*Eleocharis acuta* rushland

Tall fescue and *Juncus gregiflorus* are emergent above reed sweetgrass, *Eleocharis acuta*, and pasture species such as lotus and Yorkshire fog. This vegetation type is grazed by domestic animals.

- 13b - Ti kouka/ *Juncus gregiflorus*/pasture rushland

Scattered ti kouka are emergent above grazed *Juncus gregiflorus* and pasture. This vegetation type appears to have been created recently by the

conversion of willow forest to grazing land. An example of willow forest remains adjacent to this vegetation type.

Shrubland

14. Gorse/tall fescue-pampas-searush/paspalum-bare ground shrubland

Gorse dominates the canopy, particularly on the bank adjacent to the main channel of the Kaituna River. Other species include tall fescue and small pampas plants. Bare ground with scattered bachelors button is relatively widespread beyond the gorse canopy (Refer to Plate 15, Appendix 2). Species present on the western margin of this type (adjacent to the channel) include *Isolepis cernua*, arrow grass, *Schoenoplectus tabernaemontani*, and bachelor's button.

Scrub

15. (Grey willow)/manuka-harakeke scrub

A narrow band of occasional grey willow emergent above manuka and harakeke occurs on the landward side of a patch of raupo reedland (Vegetation Type 8A). Other species include gorse, tall fescue, and pampas.

16. Grey willow-gorse scrub

Grey willow and gorse form a low canopy along a length of stopbank. Other adventive species include Japanese honeysuckle, blackberry, pampas, and tall fescue. Scattered indigenous species include kiokio, harakeke, wheki (*Dicksonia squarrosa*), and ti kouka.

17. Harakeke-tarata-akeake-ti kouka-kanuka-manuka scrub

Parts of the stopbank on the true-right side of the river near the Kaituna Wetland have been planted with a variety of indigenous species, including harakeke, tarata (*Pittosporum eugenioides*), akeake (red and green variants), ti kouka, kanuka, manuka, and kohuhu (*Pittosporum tenuifolium*). Crack willows have recently been planted at the base of the stopbank. Other species within this type are kiokio, wheki, arum (*Zantedeschia aethiopica*), and local *Carex geminata* and *Baumea articulata*.

18. Pampas/gorse scrub

Gorse and pampas dominate a section of the riverbank, to the exclusion of other species.

Treeland

19. Crack willow treeland

Crack willow treeland is common on the river banks upstream of the Kaituna Wetland. On the true-right side, it appears to be a planted cultivar of crack willow. On parts of the true-left side, upstream of Bell Road, harakeke has been planted beneath the willows (Vegetation Type 19B). Elsewhere, the understorey is dominated by pasture grasses and reed sweetgrass.

- 19a - Crack willow treeland
- 19b - Crack willow/harakeke/reed sweetgrass-pasture treeland

20. Maritime pine/boxthorn-radiata pine/pohuehue treeland

Wild maritime pine (*Pinus pinaster*) are emergent above boxthorn (*Lycium ferocissimum*) and planted radiata pine (*Pinus radiata*), with mats of pohuehue and Japanese honeysuckle. Other species include taupata (*Coprosma repens*), tall fescue, Chinese mugwort (*Artemisia verlotiorum*), and purple-top (*Verbena bonariensis*). This vegetation type is present on the bank behind the beach at the river mouth (Vegetation Type 7).

Forest

21. Willow forest

There are patches of willow forest in the cut-off river meanders that are beyond the reach of tidal influence. There are also patches of willow forest on the river banks, particularly upstream of Bell Road. Three types of willow forest were mapped:

- 21a - Grey willow forest
- 21b - Crack willow forest
- 21c - Crack willow-grey willow/raupo forest

7. FLORA

Forty-three indigenous species of vascular plants were recorded (Appendix 1). These are all relatively common species, typical of the vegetation and habitat types present, and none are threatened species, as per de Lange *et al.* (2004). Forty-eight adventive vascular plant species were also recorded.

8. FAUNA

8.1 Avifauna

All birds present at the mouth of the Kaituna River on 16 November 2006 were recorded over one hour at low tide. The conditions were sunny with brisk northerly winds. Viewing was undertaken from alongside Ford Road to c.900 m upstream the Kaituna River mouth. The following species were recorded and notes are provided on their distribution and relative abundance. Threat status is from Hitchmough *et al.* 2007.

Black shag (kawau; *Phalacrocorax carbo* subsp. *novaehollandiae*)

Number recorded: 1

Threat Status: 'At Risk', ranked as 'Sparse'.

Comments: One black shag was recorded c.50 m upstream of the Kaituna River mouth.

Pied shag (karuhiruhi; *Phalacrocorax varius varius*)

Number recorded: 63

Threat status: Not threatened

Comments: Twenty-four birds were nesting in trees on the northern side of the river – more birds are probably present in these trees as only one side of the trees could be seen. Four pied shags were recorded at the sandy river mouth, 14 birds were resting alongside river margins and three birds were recorded flying over the river. The site is an important breeding colony for this species in the Bay of Plenty.

Little shag (kawaupuka; *Phalacrocorax melanoleucos brevirostris*)

Number recorded: 1

Threat status: Not threatened

Comments: One little shag was recorded alongside the river, c.500 m upstream of the river mouth.

White-faced heron (*Ardea novaehollandiae*)

Number recorded: 1

Threat status: Not threatened.

Comments: One white-faced heron was recorded alongside the river c.300 m upstream of the river mouth.

Canada goose (*Branta canadensis*)

Number recorded: 1

Threat status: Not ranked – introduced.

Comments: One Canada goose was recorded flying over the river c.500 m upstream of the river mouth.

Mallard/hybrid ducks (*Anus platyrhynchos*)

Number recorded: 7

Threat status: Not ranked – introduced.

Comments: Seven mallard were recorded on the river scattered throughout the survey area.

Pheasant (*Phasianus colchicus*)

Number recorded: 1

Threat status: Not ranked – introduced.

Comments: One pheasant was heard on the northern side of the river.

Variable oystercatcher (Torea; *Haematopus unicolor*)

Number recorded: 6

Threat status: Not threatened.

Comments: Four birds were recorded on sandy sites near river mouth, while two birds were feeding on river margins c.100 m upstream of the river mouth.

Spur-winged plover (*Vanellus miles*)

Number recorded: 2

Threat status: Not threatened.

Comments: Two spur-winged plovers were recorded flying over the river c.150 m upstream of the river mouth.

Black-backed gull (karoro; *Larus dominicanus*)

Number recorded: 52

Threat status: Not threatened.

Comments: Black-backed gulls were present resting on the beach (18 birds) and river margins, flying throughout the area.

Red-billed gull (tarapunga; *Larus novaehollandiae* subsp. *scopulinus*)

Number recorded: 5

Threat status: 'Chronically Threatened', ranked as 'Gradual Decline'.

Comments: Birds were recorded resting or flying around the river mouth.

White-fronted tern (tara; *Sterna striata*)

Number recorded: 76

Threat status: 'Chronically Threatened', ranked as 'Gradual Decline'.

Comments: All birds were either roosting on the beach by the river mouth on sandy areas, or flying nearby.

Skylark (*Alauda arvensis*)

Number recorded: Unknown.

Threat status: Not ranked – introduced.

Comments: Many skylark were heard and seen flying over the pasture near the river mouth.

Welcome swallow (*Hirundo tahitica*)

Number recorded: Numerous.

Threat status: Not threatened.

Comments: Several hundred swallow were present flying over the river, upstream of the river mouth.

Yellowhammer (*Emberiza citrinella*)

Number recorded: 1

Threat status: Not threatened – introduced.

Comments: One yellowhammer was recorded flying over the river c.50 m upstream of the river mouth.

House sparrow (*Pqsser domesticus*)

Number recorded: Numerous

Threat status: Not ranked – introduced

Comments: Many house sparrow were heard and seen flying over the pasture and river margins near the river mouth.

Northern New Zealand dotterel (tuturiwhatu; *Charadrius obscurus* subsp. *aquilonius*) are known to use the beach on the western side of the river mouth and large numbers of white-fronted tern also frequent this area, with up to 400 being recorded here. New Zealand dotterel are ranked as 'Acutely Threatened – Nationally Vulnerable' (Hitchmough *et al.* 2007).

Other indigenous species likely to regularly utilise the habitats present include little-black shag (*Phalacrocorax sulcirostris*), black swan (*Cygnus atratus*), paradise shelduck (putangitangi; *Tadorna variegata*), Australian shoveler (kuruwhengi; *Anus rhynchos*), Australasian harrier (kahu; *Circus approximans*), pukeko (*Porphyrio porphyrio*), pied stilt (poaka; *Himantopus himantopus* subsp. *leucocephalus*), Caspian tern (taranui; *Sterna caspia*), and kotare (sacred kingfisher; *Todiramphus sanctus*). Caspian tern are an 'Acutely Threatened' species ranked as 'Nationally Vulnerable' and little black shags are classed as 'At Risk', ranked as 'Sparse' by Hitchmough (2007).

Exotic species also likely to be present include blackbird (*Turdus merula*), silvereye (tauhou; *Zosterops lateralis*), chaffinch (*Fringilla coelebs*), greenfinch (*Carduelis chloris*), goldfinch (*Carduelis carduelis*), redpoll (*Carduelis flammea*), starling (*Sturnus vulgaris*), myna (*Acridotheres tristis*), and Australian magpie (*Gymnorhina tibicen*).

8.2 Fish

Fifteen indigenous species of fish have been recorded in the catchment of the Kaituna River (refer to Table 1). Three species are included in the New Zealand threat classification lists: giant kokopu ('gradual decline'), long-finned eel ('gradual decline'), and lamprey ('sparse') (Hitchmough *et al.* 2007). The Kaituna River is an important recreational whitebait fishery, and the lower Kaituna River includes spawning sites of whitebait species. Mitchell (1990) identified spawning sites on both sides of the river, within 2 km of the river mouth, and some later work was done on a spawning site on the true-right side of the river (Young and Ellery 2002).

Table 1: Fish species present in the Kaituna River (records from the New Zealand Freshwater Fish Database and Boubée and Baker 2005).

Scientific name	Common name	Status*
Indigenous species		
<i>Aldrichetta forsteri</i> **	yellow eye mullet	
<i>Anguilla australis</i>	short-finned eel	
<i>Anguilla dieffenbachii</i>	long-finned eel	Gradual decline
<i>Arripis trutta</i> **	kahawai	
<i>Cheimarrichthys fosteri</i>	torrentfish	
<i>Galaxias argenteus</i>	giant kokopu	Gradual decline
<i>Galaxias brevipinnis</i>	koaro	
<i>Galaxias fasciatus</i>	banded kokopu	
<i>Galaxias maculatus</i>	inanga	
<i>Geotria australis</i>	lamprey	Sparse
<i>Gobiomorphus cotidianus</i>	common bully	
<i>Gobiomorphus gobioides</i>	giant bully	
<i>Gobiomorphus huttoni</i>	redfin bully	
<i>Retropinna retropinna</i>	common smelt	
<i>Rhombosolea retiaria</i>	black flounder	
Introduced species		
<i>Carassius auratus</i>	goldfish	
<i>Gambusia affinis</i>	mosquito fish	
<i>Oncorhynchus mykiss</i>	rainbow trout	
<i>Salmo trutta</i>	brown trout	

*as per Hitchmough *et al.* 2007

**marine wanderer

9. ECOLOGICAL VALUES

The lower Kaituna River has long been known to have significant ecological values for indigenous vegetation and fauna. Beadel (1994) delineated an area of significant vegetation in the lower reaches of the river, which was primarily freshwater wetland plant communities on both sides of the river. The site was ranked as being of 'District' significance, although Beadel (1994) noted that a higher ranking may be appropriate and the site should be re-evaluated when further information became available.

The true-left side of the river, in Tauranga District (the true-right side is in the Western Bay of Plenty District) was surveyed and mapped by Wildland Consultants in 2000 (Wildland Consultants 2000a&b) and all marginal wetlands were recognised as significant ecological sites. There are also significant ecological sites that include the dunes extending to the east and west from the river mouth (Wildland Consultants 2000a and 2006).

The lower river was included in a national 'Directory of Wetlands in New Zealand' (Cromarty and Scott 1996) as part of a larger site; the 'Maketu-Waihi Estuaries and Kaituna River Mouth Complex'. This site was included on the basis of the habitat complex and the presence of threatened plants and birds.

The Kaituna is well recognised as a habitat for indigenous fish with at least 15 indigenous species present, including three threatened species. There are whitebait spawning sites on both sides of the lower river.

Habitat values for birds are mainly associated with water birds, such as black starg (ranked as 'Sparse' in Hitchmough *et al.* 2007), little black shag ('Range Restricted'), and pied shag.

The beach on the eastern side of the river mouth (inside the bar) is used as a roost by various species, including northern NZ dotterel ('Nationally Vulnerable') and white-fronted tern ('Gradual Decline'). The freshwater wetlands in the lower reaches will be utilised by threatened species such as spotless drake ('Sparse'), bittern ('Nationally Endangered'), and possibly by marsh drake ('Sparse'). The lower river is also adjacent to the very significant lower Kaituna Wildlife Management Reserve, although separated by a large stop bank.

It is clear from the above summary that a suite of significant ecological features is represented in the lower river system, and that part of the reason for the ecological significance of the lower river is that it is part of a large complex connected to the coast and the Maketu estuary. This complex, although significantly modified, nevertheless represents the last vestiges of what was formerly a much larger wetland complex, the Kawa Swamp, that extended across all of the plains that extend inland from the Maketu and Waihi estuaries.

10. OVERVIEW

The Kaituna is a key ecological linkage between the coast and the inland ranges of Lakes (Wildland Consultants 2007a&b). The lower section of the river also has very significant ecological value for vegetation, avifauna, and indigenous fish.

The lower Kaituna River has experienced considerable modification in terms of both direct habitat destruction and modification and also significant alteration of key ecological processes such as tidal inflows. These alterations have resulted in significant direct losses of indigenous habitats and also indirect alterations of the ecosystem and habitat types present.

Alteration of tidal flows (and related ingress of salt water) is primarily a function of establishment of the Kaituna Cut in 1958 which, among other effects, allowed salt water to travel further upriver on inflowing tides. Salinity monitoring undertaken in 1988, after major food control works were completed in 1981, indicate that inflowing tides can, subject to river flow levels, carry salt water up to 4 km up the river from the Kaituna Cut.

The vegetation in the lower reaches of the river reflect the tidal and salinity regimes that it is now subject to. Vegetation in the lower cut-off loop, in the general vicinity of the boat ramp, is a mixture of estuarine and freshwater species. Estuarine species include searush, *Isolepis cernua*, and batchelor's butter while freshwater species include raupo, *Baumea articulata*, harakeke (flax), *Schoenoplectus tabernaemontani*, and the exotic reed sweetgrass. Further upstream on both sides of the river, but still within the tidal zone that carries salt water upstream, there are good quality freshwater wetlands where the vegetation is dominated by species such as harakeke (flax), raupo, *Baumea articulata*, *Coprosma propinqua*, *Schoenoplectus tabernaemontani*, and *Bolboschoenus fluviatilis*. The influence of saltwater, in this part of the river system, is obviously mainly limited to the main channel. There are also other freshwater wetlands adjacent to the river but which are in a degraded state and these sites have considerable potential for ecological enhancement.

Future alteration of the hydrological regime in the lower river, say by directing more river flow into the Maketu estuary, could have some effects on saltwater movement up the main river. It appears very unlikely, however, that these changes would have negative effects on the lower river as most of the wetland vegetation is already dominated by freshwater species.

The lower river also represents further opportunities for ecological vegetation. There are still ecologically-significant wetlands that need to be fenced and degraded wetlands that warrant restoration effort. Further riparian protection works need a strong focus on ecological restoration, with a long-term vision of potential restoration of a habitat corridor between the coast and inland ecosystems.

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LIST OF VASCULAR PLANTS

* present only in planted sites

Indigenous Species

Monocot. trees and shrubs

<i>Cordyline australis</i>	ti kouka, cabbage tree
<i>Phormium tenax</i>	harakeke, flax

Dicot. trees and shrubs

<i>Coprosma propinqua</i> subsp. <i>propinqua</i>	
<i>Coprosma repens</i>	taupata
<i>Coprosma robusta</i>	karamu
* <i>Dodonaea viscosa</i>	akeake
* <i>Kunzea ericoides</i> var. <i>ericoides</i>	kanuka
<i>Leptospermum scoparium</i>	manuka
* <i>Pittosporum crassifolium</i>	karo
* <i>Pittosporum eugenioides</i>	tarata, lemonwood
* <i>Pittosporum tenuifolium</i> subsp. <i>tenuifolium</i>	kohuhu
<i>Plagianthus divaricatus</i>	makaka, marsh ribbonwood
* <i>Pseudopanax</i> sp	

Dicot. lianes

<i>Calystegia soldanella</i>	panahi
<i>Muehlenbeckia complexa</i>	pohuehue

Ferns

<i>Blechnum novae-zelandiae</i> s.s.	kiokio
<i>Cyathea medullaris</i>	mamaku
<i>Dicksonia squarrosa</i>	wheki
<i>Paesia scaberula</i>	matata
<i>Pteridium esculentum</i>	rarahu, bracken

Grasses

<i>Cortaderia fulvida</i>	toetoe
<i>Spinifex sericeus</i>	kowhangatara, spinifex

Sedges

<i>Baumea articulata</i>	
<i>Baumea juncea</i>	
<i>Bolboschoenus fluviatilis</i>	ririwaka
<i>Carex geminata</i>	
<i>Carex pumila</i>	
<i>Carex sinclairii</i>	
<i>Eleocharis acuta</i>	
<i>Eleocharis gracilis</i>	
<i>Isolepis cernua</i>	
<i>Schoenoplectus tabernaemontani</i>	kapungawha

Rushes

<i>Juncus gregiflorus</i>	wi
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	wi, sea rush

Monocot. herbs (other than orchids, grasses, sedges and rushes)

<i>Apodasmia similis</i>	oioi
<i>Potamogeton</i> sp.	
<i>Triglochin striata</i>	arrow grass
<i>Typha orientalis</i>	raupo
<i>Zostera</i> sp.	eelgrass

Composite herbs

<i>Cotula coronopifolia</i>	bachelor's button
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Dicot. herbs (other than composites)

<i>Haloragis erecta</i> subsp. <i>erecta</i>	toatoa
<i>Limosella lineata</i>	mudwort
<i>Samolus repens</i>	makaokao

Adventive Species

Gymnosperms

<i>Pinus pinaster</i>	maritime pine
<i>Pinus radiata</i>	radiata pine

Dicot. trees and shrubs

<i>Alnus glutinosa</i>	alder
<i>Juglans ailantifolia</i>	Japanese walnut
<i>Lupinus arboreus</i>	lupin
<i>Lycium ferocissimum</i>	African boxthorn

<i>Paraserianthes lophantha</i>	brush wattle
<i>Rubus</i> sp. (<i>R. fruticosus</i> agg.)	blackberry
<i>Salix cinerea</i>	grey willow
<i>Salix fragilis</i>	crack willow
<i>Ulex europaeus</i>	gorse

Dicot. lianes

<i>Calystegia silvatica</i>	
<i>Lonicera japonica</i>	Japanese honeysuckle

Grasses

<i>Anthoxanthum odoratum</i>	sweet vernal
<i>Bromus diandrus</i>	ripgut brome
<i>Cortaderia selloana</i>	pampas
<i>Elytrigia pycnantha</i>	sea couch
<i>Glyceria maxima</i>	reed sweetgrass
<i>Holcus lanatus</i>	Yorkshire fog
<i>Lagurus ovatus</i>	harestail
<i>Lolium perenne</i>	ryegrass
<i>Paspalum distichum</i>	Mercer grass
<i>Paspalum vaginatum</i>	saltwater paspalum
<i>Schedonorus phoenix</i>	tall fescue

Rushes

<i>Juncus articulatus</i>	
<i>Juncus effusus</i>	soft rush

Monocot. herbs (other than orchids, grasses, sedges and rushes)

<i>Tradescantia fluminensis</i>	tradescantia
<i>Zantedeschia aethiopica</i>	arum lily

Composite herbs

<i>Aster subulatus</i>	sea aster
<i>Bidens frondosa</i>	beggars' ticks
<i>Conyza albida</i>	fleabane
<i>Hypochoeris radicata</i>	catsear
<i>Osteospermum fruticosum</i>	dimorphotheca
<i>Senecio jacobaea</i>	ragwort

Dicot. herbs (other than composites)

<i>Artemisia verlotiorum</i>	Chinese mugwort
<i>Cakile maritima</i>	sea rocket
<i>Ceratophyllum demersum</i>	hornwort
<i>Galium aparine</i>	cleavers

<i>Galium palustre</i>	marsh bedstraw
<i>Lotus pedunculatus</i>	lotus
<i>Myriophyllum aquaticum</i>	parrot's feather
<i>Nasturtium officinale</i>	watercress
<i>Plantago australis</i>	swamp plantain
<i>Polygonum hydropiper</i>	water pepper
<i>Rumex obtusifolius</i>	dock
<i>Scrophularia auriculata</i>	
<i>Trifolium repens</i>	white clover
<i>Verbena bonariensis</i>	purple-top





Plate 1: Pampas (*Cortaderia selloana*) grassland (Vegetation Type 1) adjacent to the pond on the “island”. In the foreground is raupo (*Typha orientalis*)-*Baumea articulata* reedland (Vegetation Type 8b).



Plate 2: (Pampas)-(gorse, *Ulex europaeus*)-tall fescue (*Schedonorus phoenix*)-*Bolboshcoenus fluviatilis* grassland (Vegetation Type 2) on the “island”.



Plate 3: A narrow strip of tall fescue/pasture grassland (Vegetation Type 4) along a breached stopbank west of the “island” This shows Vegetation Type 4 in the foreground, and stands of oioi (*Apodasmia similis*) and *Baumea articulata* in the midground, along a small tidal channel.



Plate 4: Beach on the western side of the river mouth (Vegetation Type 7). Spinifex (*Spinifex sericeus*) and panaho (*Calystegia sepium*) dominate the vegetation above the level of tidal inundation.



Plate 5: Raupo reedland (Vegetation Type 8a).



Plate 6: (Harakeke)/raupo-*Baumea articulata* reedland (Vegetation Type 8b) is dominant on the southern part of the “island”.



Plate 7: The margins of Vegetation Type 8b ((Harakeke)/raupo-*Baumea articulata* reedland), showing a stand of harakeke on the southern margin of the type.



Plate 8: The margins of Vegetation Type 8b ((Harakeke)/raupo-*Baumea articulata* reedland showing scattered *Coprosma propinqua*.



Plate 9: There are meadows of *Isolepis cernua* on the intertidal flats adjacent to the “island”. This is the eastern side of the “island”, looking south. Note the abundance of pampas.



Plate 10: The eastern side of the island showing raupo-*Baumea articulata* reedland (vegetation type 8b), although the raupo is browned off. In the foreground there are clumps of the low-growing sedge, *Isolepis cernua*.



Plate 11: Raupo/reed sweetgrass-tall fescue grassland (Vegetation Type 8d) immediately west of the Ford Road boat ramp.



Plate 12: Part of an area of harakeke-*Coprosma propinqua* /raupo-*Baumea articulata* flax-reedland (Vegetation Type 9).



Plate 13: There are stands of *Bolboschoenus fluviatilis* and raupo (Vegetation Type 12) on the intertidal flats adjacent to the island. This photograph was taken in September, when *B. fluviatilis* is browned off. Compare this image to the following one.



Plate 14: *Bolboschoenus fluviatilis* on the intertidal flats adjacent to the “island”. This photograph was taken in late December.



Plate 15: A large area of bare ground within Vegetation Type 14 (gorse/tall fescue-pampas-searush/paspalum-bare ground).



Plate 16: Willows and pampas are common on the riverbanks, particularly upstream of the Kaituna Wetland.



Plate 17: Grazed pasture extending to the river margin, upstream of Bell Road.