Figure 19 Areas of the Kaipara Harbour (blue) targeted by customary and recreational fishers (Information from commercial fishers P. and C. Yardley., pers. comm. 2007).

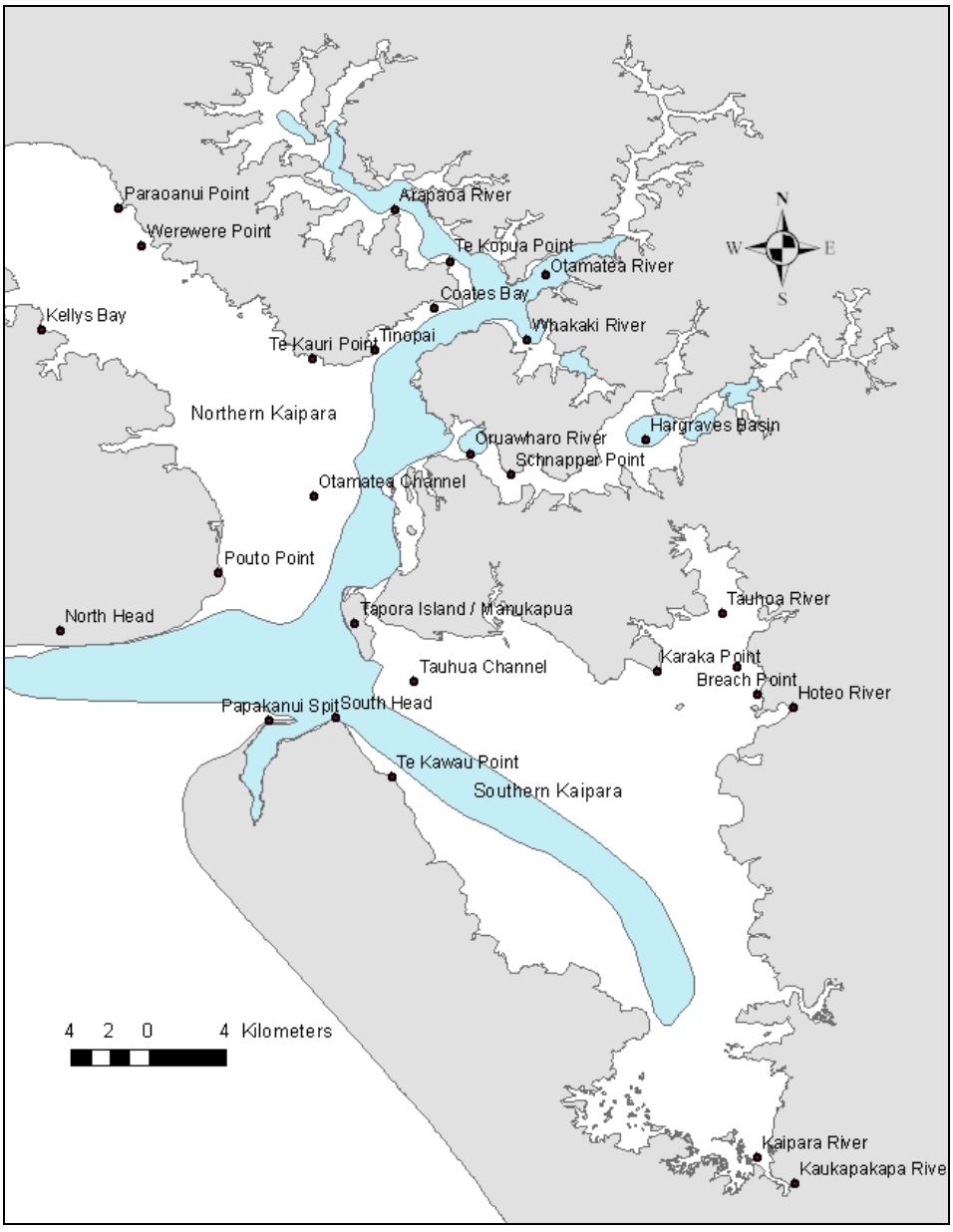


Figure 20 Areas of the Kaipara Harbour (yellow) targeted for scallop harvesting.

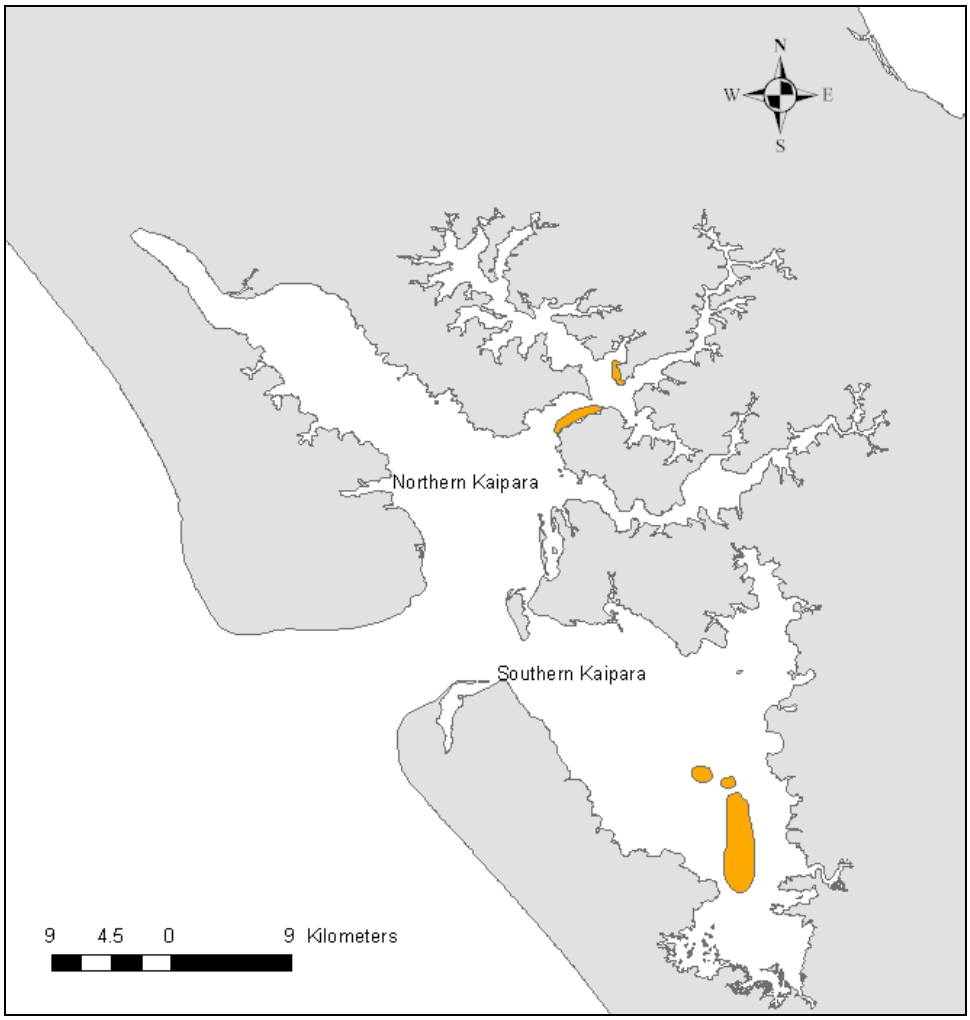


Table 3 Summary of important fisheries within the Kaipara Harbour.

Species	Common name	Fishery	Biological Characteristics	Kaipara Harbour catch characteristics
Mustelus lenticulatus	Rig	Commercial Customary	Rig are born with a total length (TL) between 25–30 cm. They grow moderately quickly, reaching maturity at 75–110 cm TL (depending on sex and stock) and aged 4–5 years. Females reach a maximum length of 151 cm and males 126 cm TL. Longevity is not known, but estimated to be >20 yrs.	Commercial: Steady decline in catch per unit effort and green weight (tonnes) from 1989-90 to 2001-02. Recreational: Estimated at 100 t in GMU 1 (includes Kaipara Harbour). Customary: No qualitative or quantitative information available, although 100 t allocated by Minister of Fisheries beginning 1989-99.
Mugil cephalus	Grey mullet	Commercial Recreational Customary	Grey mullet has a worldwide distribution, with complex movement patterns. Both sexes mature at 3 yrs at an average size of 33 cm fork length (FL) for males and 35 cm FL for females. Females spawn in northern New Zealand between November and February, and are likely to spawn at sea. Small post-larval grey mullet occur seasonally in estuaries. Longevity is estimated at 12-14 yrs, with the commercial fishery comprised of 5-9 year old fish.	Commercial: Steady decline in catch per unit effort and green weight (tonnes) from 1989-90 to 2001-02. Recreational: Estimated at 100 t in GMU 1 (includes Kaipara Harbour). Customary: No qualitative or quantitative information available, although 100 t allocated by Minister of Fisheries beginning 1989-99.
Rhombosolea leporina, Rhombosolea plebeia	Yellow-belly flounder, Sand flounder	Commercial Recreational Customary	The New Zealand flatfish species studied are fast-growing and mainly short-lived, generally surviving to 3–4 years of age with very few reaching 5–6 years. Juveniles congregate in sheltered inshore waters (e.g. estuarine areas, shallow mudflats and sandflats) where they remain for up to two years. Juvenile survival rates are highly variable. Flatfish move offshore for first spawning aged 2–3 years during winter and spring. Adult mortality is high with many flatfish spawning only once, and few spawning more than two or three times. However, fecundity is high (e.g.from 0.2 million eggs to over 1 million eggs) in sand flounders.	Commercial: Utilises set netting. Recreational: Utilises set netting, drag netting and spearing. Customary: No qualitative or quantitative information available.

Galeorhinus galeus	School shark	Commercial Recreational Customary	School shark are late maturing and slow-growing, with low fecundity and productivity and are predicted to have a slow rate of recovery (rebound potential) from overfishing (Ministry of Fisheries 2006). Age at maturity has been estimated at 12-17 years for males and 13-15 years for females. Breeding occurs once every two or three years. These factors suggest that the stock is less productive and hence more susceptible to overfishing than many other fisheries. The Kaipara Harbour habitat may be of particular importance to the school shark fishery as pupping females migrate there to give birth.	Commercial: Fishery has moderate value but is a predominantly by-catch fishery with a port price that is relatively low compared to other stocks. Recreational: Of moderate importance (see below). Customary: Sharks, including school shark, are an important taonga species and anecdotal information suggests that school shark formed part of a significant, traditional, customary fishery. Ministry of Fisheries proposes to set allowances for customary and recreational catches based on estimates of current catches by recreational fishers. Ministry of Fisheries proposes to set the TACC based on either the existing TACC or recent commercial catch levels.
Paphies subtriangulata	Tuatua	Commercial Recreational Customary	Tuatua reach a maximum shell length of approximately 75 mm. Tuatua greater than 50 mm are sexually mature (Grant 1994, Marsden 1999) and tend to have an annual breeding cycle with semi-continuous spawning over the spring/summer months (Grant & Creese 1995). Larval tuatuas spend about 20 days in the water column before they are ready to settle. Tuatua settlement and recruitment occurs into the mid intertidal zone, with individuals moving to lower tidal heights over time (Grant 1994, Marsden 2000). Tuatua play an important ecological role in New Zealand coastal waters by filtering phytoplankton from the water column (and subsequently converting phytoplankton biomass to growth) and also as prey for a variety of organisms, including large fish such as snapper, octopus, and paddle crabs (Dr. Coral Grant, pers. comm. in 2006).	Commercial: Recreational: Customary: No qualitative or quantitative information available.

3.4 Mammals

There is little detailed information on marine mammal distribution and abundance within the Kaipara Harbour. Most of the information comes from stranding records and casual sightings (Fisher 2005). Commonly reported cetaceans within the Kaipara Harbour include: southern right whale (*Eubalaena australis*), orca (*Orcinus orca*) (Visser 1999), bottlenose dolphin (*Tursiops truncatus*), and common dolphin *Delphinus delphis* (Fisher 2005), although stranding records suggest that the Kaipara is important for a range of taxa. Maui's dolphin (*Cephaloryhnchus hectori maui*) are also reported to frequent the harbour.

The Kaipara Harbour entrance and surrounding coastline has had a high occurrence of whale strandings for a range of cetacean species (Stephenson 1975, Brabyn 1991, Fisher 2005) (Table 4). Stephenson (1975) suggests that the 'treacherous' shifting sand bar that extends 3-7 km seawards from the Kaipara Harbour entrance, coupled with strong surf, are probable local factors likely to disrupt near-shore migration.

Nineteen species of whale and dolphin have been recorded in strandings (beached as live and dead animals) within the coastal approaches to the Kaipara Harbour, with three strandings that were too decomposed to be identified to species level (Fisher 2005). Of the total 69 records, 21 occured within the Kaipara Harbour (Table 4).

The Kaipara Harbour is, potentially, an important area for Maui's dolphin (*Cephaloryhnchus hectori maui*); a morphologically and genetically distinct subspecies of Hector's dolphin. Maui's dolphin is classed as Critically Endangered by the IUCN-World Conservation Union and by the New Zealand Ministry of Fisheries under the Marine Mammals Act, 1978, Section 2(3). Fisher (2005) reports of two sightings of Maui's dolphin in the Kaipara, one in May 1990 and the other in March 2002. In a more recent study conducted in the Kaipara, only one animal was sighted within the inner harbour over a two-year period but acoustic recordings indicate that between one and three may have penetrated into the harbour entrance.

A study to investigate the distribution of Maui's dolphins along the West Coast of the North Island (Ferreira and Roberts 2003) indicated that most sightings of Maui's dolphin were between the Manukau Harbour and Port Waikato, with no dolphins sighted along the coastline between Ahipara and the Kaipara Harbour mouth. The number of dolphins occupying the coastal region between the Kaipara and Manukau Harbour mouths was estimated to be ~10 individuals.

A draft Hector's and Maui's Threat Management Plan has been prepared (Ministry of Fisheries and Department of Conservation 2007) that seeks to describe the nature and

extent of threats to Hectors and Maui's dolphins, and implement strategies to reduce human-induced threats. Submissions on the draft closed on 24 October 2007.

Table 4 Cetacean stranding records for the Kaipara Harbour and seaward coastline between Dargaville and Muriwai (all).

	Number of stranding records	
Species	All	Kaipara Harbour
Bryde's whale (*Balaenoptera edeni*)	1	0
Pygmy right whale (*Caperea marginata*)	1	0
Minke whale (*Balaenoptera acutorostrata*)	2	0
Sperm whale (*Physeter macrocephalus*)	13	4
Pygmy sperm whale (*Kogia breviceps*)	9	2
Gray's beaked whale (*Mesoplodon grayi*)	2	1
Blainville's beaked whale (*M. densirostris*)	1	1
Straptoothed whale (*M. layardii*)	1	1
Unidentified beaked whale (*Mesoplodon* spp.)	2	0
Shepherd's beaked whale (*Tasmacetus shepherdi*)	2	1
Cuvier's beaked whale (*Ziphius cavirostris*)	1	0
False killer whale (*Pseudorca crassidens*)	1	0
Long-finned pilot whale (*Globicephala melas*)	5	2
Short-finned pilot whale (*G. macrorhynchus*)	1	1
Killer whale (*Orcinus orca*)	1	0
Dusky dolphin (*Lagenorhynchus obscurus*)	1	0
Bottlenose dolphin (*Tursiops truncatus*)	7	4
Striped dolphin (*Stenella coeruleoalba*)	1	0
Short-beaked common dolphin (*Delphinus delphis*)	13	4
Maui's dolphin (*Cephalorhynchus hectori maui*)	3	0
Unidentified cetacean spp.	1	0
Total	69	28

3.5 Birds

3.5.1 Wading birds

The wading bird habitat on the Kaipara Harbour can be generally divided into two distinct habitats:

- Sandy tidal flats around the entrance of the harbour and the southern expanse of tidal flats in the south-eastern part of the harbour.
- Open muddy tidal flats in the northern arms of the harbour and the mangrove-covered mud flats of the upper reaches of rivers in the southern part of the harbour.

The Kaipara Harbour is one of the five most important areas in New Zealand for wading birds and a case is currently being prepared by the Royal Forest and Bird Protection Society and Ngāti Whatua to nominate the Kaipara as a Wetland of International Importance under the Ramsar Convention. In midsummer, 16% of New Zealand's wading birds use the harbour, equating to an average of 35,400 waders (Table 5).

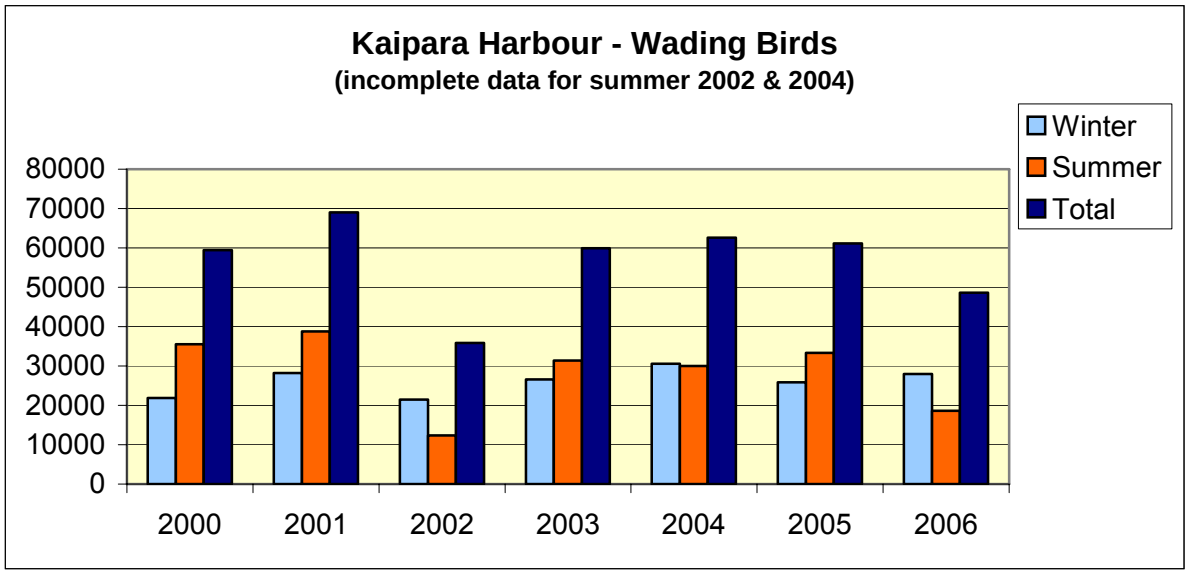
In September each year migratory wading birds arrive from their breeding grounds in Siberia, Alaska, China, Korea, and Japan. Most of the 150,000 migrant waders that visit New Zealand probably pass through the Kaipara on their way to feeding grounds throughout New Zealand, and some of them remain at the harbour for the summer. In March, these migrant waders return to their breeding grounds in the northern hemisphere. Coastal wetlands appear to be particularly important as staging points during the spring and late summer migrations, as the birds congregate at these wetlands on arrival and departure (Bellingham and Davis 1984).

Table 5 Wading birds (Average abundance within the Kaipara Harbour, and as a percentage of the NZ population).

Species	Average Kaipara Harbour (2000-2006)	% of NZ Population
Bar-tailed godwit	10,380	14.8%
South Id pied oystercatcher	13554	19.4%
Knot	7840	14.4%
Pied stilt	2651	20.4%
Banded dotterel	450	7.5%
Turnstone	420	8.9%
Wrybill	115	3.0%
TOTAL	35,410	16.0%

Wading birds also migrate within New Zealand between the rivers and uplands of the South Island and the harbours in the North Island; and there are local migrants within the Northland / Auckland Region. South Island pied oystercatchers, wrybills, banded dotterel, and the Critically Endangered black stilt breed in the South Island and all migrate to the Kaipara in January/February, remaining until August/September. Local migrants include: New Zealand dotterel that breed on beaches in the Northland / Auckland Region and return to the harbour in March/April, pied stilt that breed on damp pasture in spring and return to the harbour in December, and white-faced herons that breed in spring in tall trees within the catchment.

Figure 21 Wading bird census data 2000-2006 (source: Ornithological Society NZ).



Although there are lower total numbers of wading birds on the Kaipara Harbour on the roosts (Figure 21) in winter, there are other birds on minor roosts around the harbour that are not counted. To some extent, this reflects the preference of New Zealand migrant and local waders for the muddier substrates on the harbour, and these birds disperse to adjacent farmland at high tide. Consequently, there are more birds on roosts in the northern Kaipara and on roosts in the upper reaches on the southern Kaipara. .

In summer the wading birds are more concentrated on the larger roosts at Papakanui Spit, Tapora and Manukapua, Glorit and Jordans Farm (Figure 22 and Figure 23), where they aggregate and can be counted at high tide. These birds are, predominantly, northern hemisphere migrant waders that prefer to feed on the sandy flats in the central and southern parts of the harbour. These roosts are safe sites that are close to the prime feeding areas.

Pierce (2005) provides a list of key bird species that utilise the tidal flats within Kaipara Harbour, with their conservation status (Table 6).

Table 6 Key bird species utilising intertidal flats in the Kaipara Harbour (Pierce 2005).

Species	Status	Distribution throughout the Kaipara Harbour
Reef heron	T	Low numbers throughout the harbour.
White-faced heron	C	Common on tidal flats throughout the harbour.
Several waterfowl (Anseriform) species	C	Common and widely distributed throughout the harbour.
South Island pied oystercatcher	E, M	Common (mean winter count 13,554; 24% North Island total) throughout the harbour flats.
Variable oystercatcher	E	Present on the southern and central tidal flats.
Bar-tailed godwit	IM	Common (mean summer count 10,381; 12% New Zealand total) throughout the harbour flats.
Lesser knot	IM	Common (mean summer count of 7,846; 15% New Zealand total) mainly on the southern and central tidal flats.
Turnstone	IM	Present on the southern and central tidal flats.
Pied stilt	M	Common (mean winter counts of 2,651; 17% of North Island total) throughout the harbour on tidal flats.
Black stilt	E, T, M	Small numbers (but up to 10% of the entire population) that frequent the tidal flats near Mairetahi in late summer / winter.
Banded dotterel	E, T, M	Common (mean winter count of 459; 11% of North Island totals) mainly on the southern and central tidal flats.
Northern NZ dotterel	E, T	Present on the southern and central tidal flats.
Wrybill	E, T, M	Present on the southern and central tidal flats.
Black-backed gull	C	Present throughout the harbour.
Red-billed gull	R	Present throughout the harbour.
Caspian tern	T	Largest New Zealand colony is present on an island east of Shelly Beach, but hunt for fish throughout the harbour.
NZ fairy tern	E, T	Present on central tidal flats and roosts. The entire New Zealand population visits the harbour.
Eastern little tern	IM	Small numbers.
White-fronted tern	E, T	Present throughout the harbour.

Status: C = Common, E = Endemic, G = Gradual decline, M = Migrant, IM = International Migrant, NE = Nationally Endangered, NC = Nationally Critical, NV = Nationally Vulnerable, S = Sparse, T = Threatened , R = recently classified as Threatened. (New Zealand Threat Classification System Lists 2007; Hitchmough 2002, Threatened Species Occasional Publication 23, DOC, Wellington. Revised 2007).

Figure 22 Winter numbers of wading birds counted at roosts on the Kaipara Harbour between 2000-06 (source: Ornithological Society NZ).

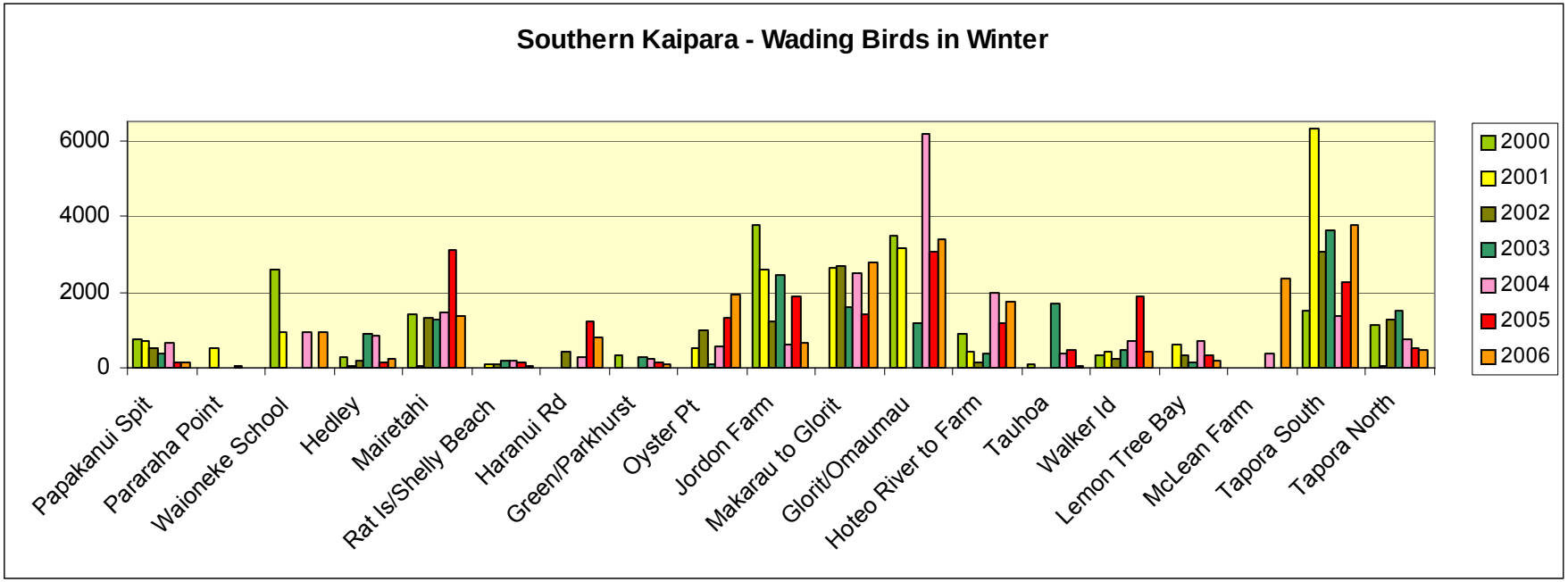
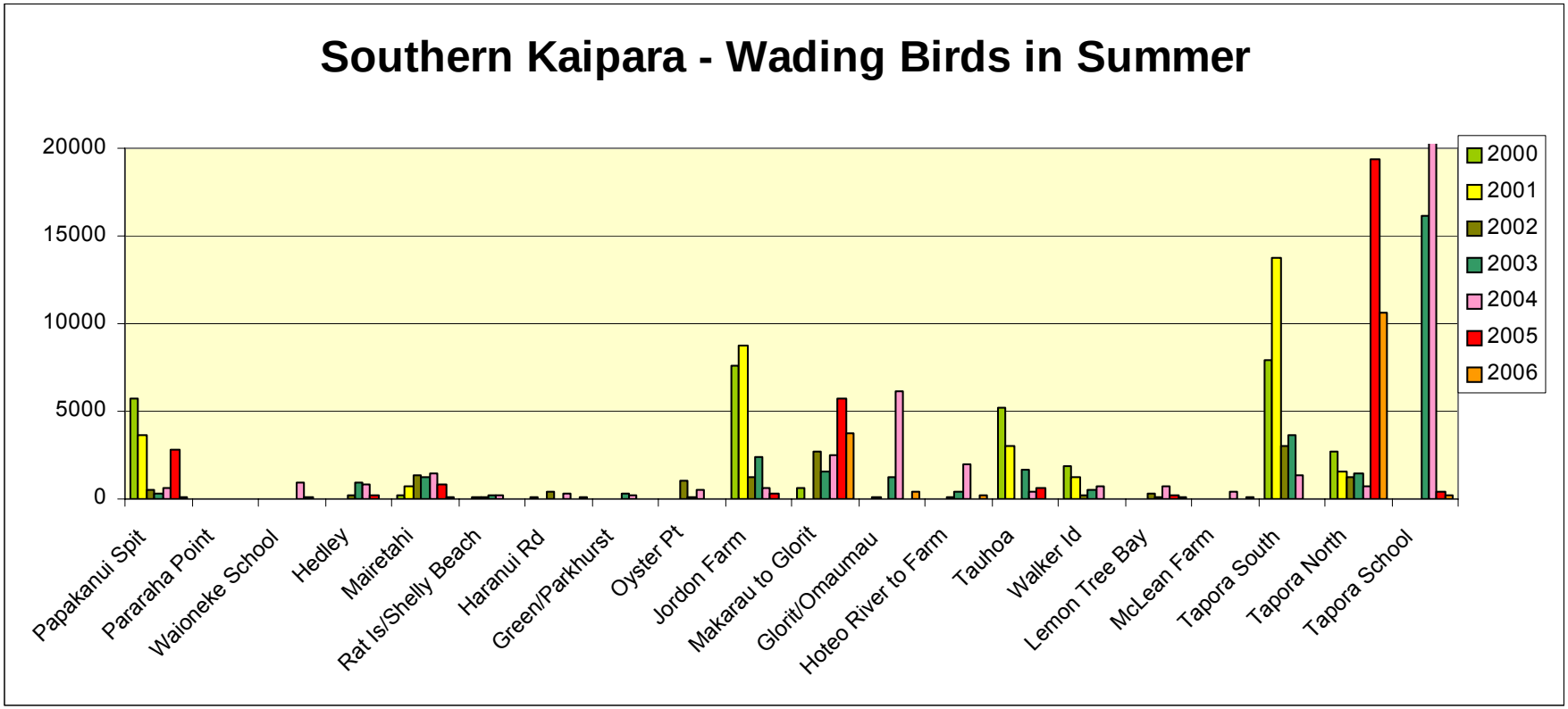


Figure 23 Summer numbers of wading birds counted at roosts on the Kaipara Harbour between 2000-06 (source: Ornithological Society NZ).



3.5.2 Rare northern hemisphere migratory waders

A modest number of records exist for rare migratory wading birds on the Kaipara, considering the high number of birds that spend summer at the harbour. The more regular uncommon, migratory wading bird species are large sand dotterel, Mongolian dotterel, tattlers, and whimbrels, along with gull-billed and sooty terns. This may reflect a lower survey effort as most of the wading bird roosts in the Kaipara are difficult for humans to access when compared to roosts at other sites such as Miranda and the Manukau Harbour.

3.5.3 New Zealand species for which the Kaipara is a critical habitat

Black stilt

The Black stilt is categorised by DOC as Nationally Critical (Hitchmough et al. 2007). There are currently 87 adult black stilts, of an even sex ratio, in the wild. The Black Stilt are now restricted to one breeding area, the Upper Waitake (Makenzie) Basin in the South Island (Dowding and Moore 2006), and a few migrate regularly to the Kaipara for winter feeding.

New Zealand dotterel

The New Zealand dotterel is an endemic Endangered species. The North Island subspecies was once widespread and common; nowadays there are only about 1700 birds left, resulting in a threat ranking of Nationally Vulnerable (Hitchmough et al. 2007). This serious decline in numbers is due to a combination of habitat loss, predation by introduced mammals, and disturbance during breeding. The breeding and roosting sites for NZ dotterel on the Kaipara are extremely important, as these sites are among the least threatened of any in Northland and Auckland from disturbance by vehicles, dogs, and / or land development. NZ dotterel also form large, non-breeding flocks on the Kaipara in autumn and winter that can number about 70 birds (M. Bellingham., pers. obs.).

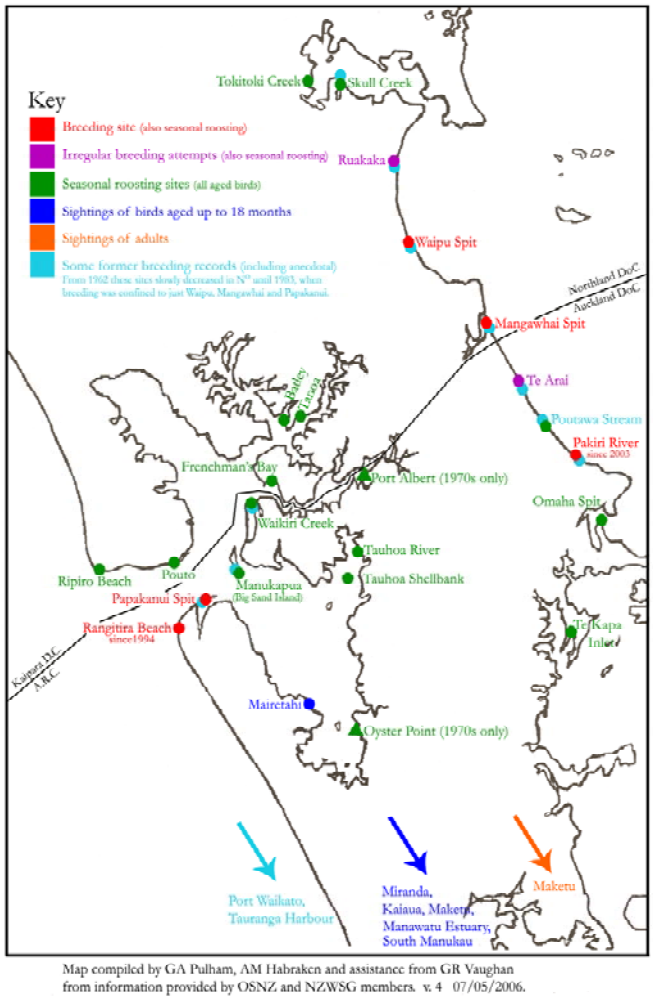
Wrybill

The wrybill is Nationally Vulnerable. The main breeding rivers in the South Island are the Rakaia, Rangitata, Waimakariri, and upper Waitaki and these are all threatened by irrigation and hydroelectric development. After the breeding season they head to the tidal harbours of Northland, Auckland, South Auckland, and the Firth of Thames. The Kaipara supports 4% of the national wrybill over-wintering population.

New Zealand fairy tern

This small endemic tern has a population of 35 to 40 individuals that includes only ten breeding pairs. Consequently, the New Zealand fairy tern is probably New Zealand's rarest breeding bird. It is ranked by DOC in the highest threat category of Nationally Critical (Hitchmough et al. 2007). The NZ fairy tern breeding sites on the Kaipara are extremely important, as these sites are the least threatened by disturbance from vehicles, dogs, and development (Ferreira et al. 2005) (Figure 24) for this species. All of their East Coast breeding sites have housing developments proposed and suffer significant disturbance from dogs, people, and vehicles. In addition, most, if not all, fairy terns in New Zealand spend the autumn and early winter around the Kaipara Harbour, particularly in the Waikiri Creek area and the Papakanui Spit region (Medway 2000).

Figure 24 Recorded sites used by NZ fairy terns between 1991 and 1996 (source: Ornithological Society NZ).



3.5.4 Key habitats for wading birds

Key habitats for wading birds within the Kaipara include: intertidal flats and subtidal areas, Papakanui Spit and Waionui Estuary, Omokoiti Flats, Rat Island and Jordan's, Tauhoa and Manukapua (Tapora) Island) to Waikiri Creek.

Papakanui stewardship area and Waionui Estuary (South Kaipara Spit)

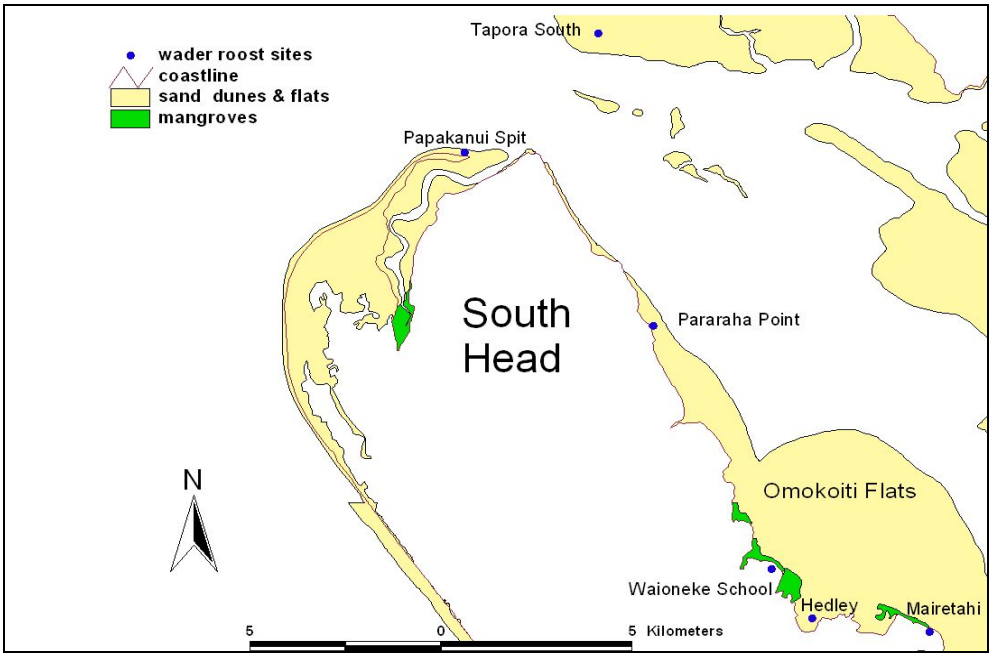
Papakanui is located at the end of South Kaipara Head. A large area of sand dunes further inland tapers off into a spit that encloses the Waionui Inlet (Figure 25). Papakanui is recognised in the Directory of Wetlands in New Zealand (Department of Conservation 1996), the Coastal Resources Inventory (DOC 1994), and the Auckland Regional Plan: Coastal (ARC 2004) as being a key nesting area within the Kaipara Harbour. Along with the Waionui Estuary, Papakanui offers a roosting site for up to 10,000 migratory waders (Shaw and Maingay 1990),

harbouring the greatest number of birds in late September and prior to migration in March. The intertidal areas within Waionui Inlet are an important feeding ground for these migratory birds.

The area offers a vital roosting site for rare and endangered native and endemic species. It is an important breeding and roosting area for terns, including the white-fronted tern and the fairy tern; with most, if not all, fairy terns in New Zealand spending the autumn and early winter around the Kaipara Harbour, particularly at Papakanui Spit (Medway, 2000).

The Endangered New Zealand dotterel, the Threatened variable oystercatcher, the Critically Endangered fairy tern (Parrish and Pulham, 1994a; Parrish and Pulham, 1994b; unpublished Department of Conservation and Wildlife Service wardens' reports), the banded dotterel, and the northernmost colony of black-billed gulls are among other species that nest on the Papakanui Spit. It is also the northernmost breeding site for the New Zealand dotterel. In addition, the Threatened spotless crake, North Island fernbird, banded rail, and possibly the Australasian bitten also breed in the freshwater wetlands, shrublands, salt marshes and mangroves of the spit and Waionui Lagoon.

Figure 25 Wading bird roost sites on South Head.



Omokoiti Flats

Omokoiti Flats is less muddy than the Papakanui Spit and Waionui Estuary and contains a greater amount of shell than any other area in Kaipara Harbour (Figure 26). Consequently, it acts as an important feeding ground for migratory waders such as black stilts. Four or five

black stilts (the equivalent of 5% of the entire population of this Endangered species) spend the winter on the Omokoiti Flats. In bad weather, especially during strong westerlies, this area is also used as a high tide roost site by New Zealand endemic wading birds and a variety of other coastal bird species, including several Threatened species. In addition to the black stilts, around 3000 knots, 3000 godwits, thousands of oystercatchers, 500 to 1000 pied stilts, and a range of other wading bird species use the Omokoiti Flats.

Waioneke School is a significant winter roost for waders (pied stilt and oystercatchers). During spring tides, storms, and easterly winds the birds are found entirely on the paddocks below the school.

Figure 26 Omokoiti Flats looking North.

Rat Island

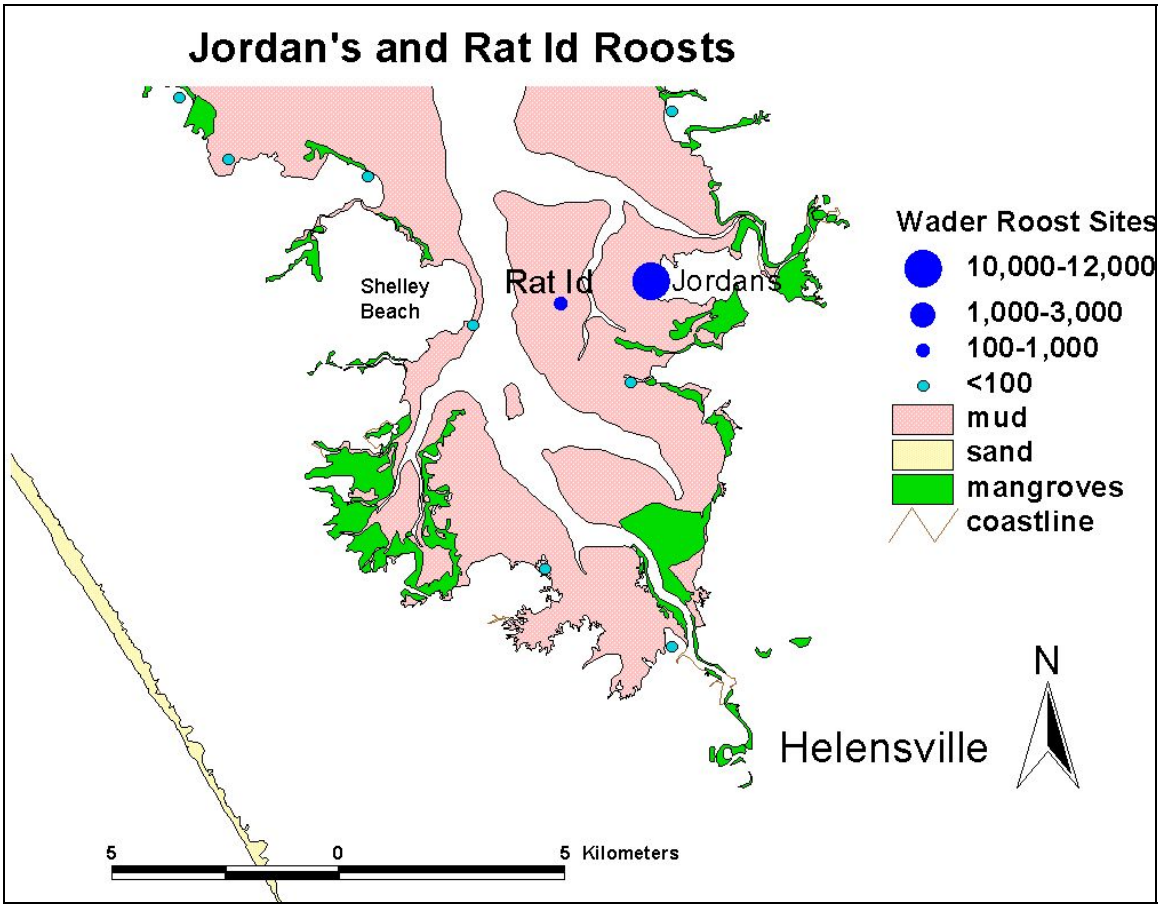
Rat Island provides an important high tide roost on the Kaipara due to its proximity to significant areas of tidal flats where birds are able to feed near Shelly Beach. Of vital importance to the birds during migration time, the proximity of the roost and the feeding grounds allows the birds to conserve valuable energy by minimising travel. Rat Island has become the main nesting site for Caspian terns within the Kaipara after they stopped nesting at Papakanui, probably due to continual disturbance from trail bikes during their summer breeding period. Pied stilt are also known to breed here.

Jordan's, Kaipara Flats, and Kakaraia (Kakarai on chart) Flats

During the summer, Jordan's is a key roosting site for up to 10,000 international migratory and New Zealand endemic wading birds, including a number of Threatened species (Figure 27). Bird species include the South Island pied oystercatcher, New Zealand dotterel, banded

dotterel, wrybill, godwit, turnstone, knot, grey plover, whimbrell, pied stilt, and eastern golden plover. The Kaipara and Kakaraia Flats are important feeding areas for these wading birds.

Figure 27 Wading bird roost sites in the southern Kaipara Harbour.

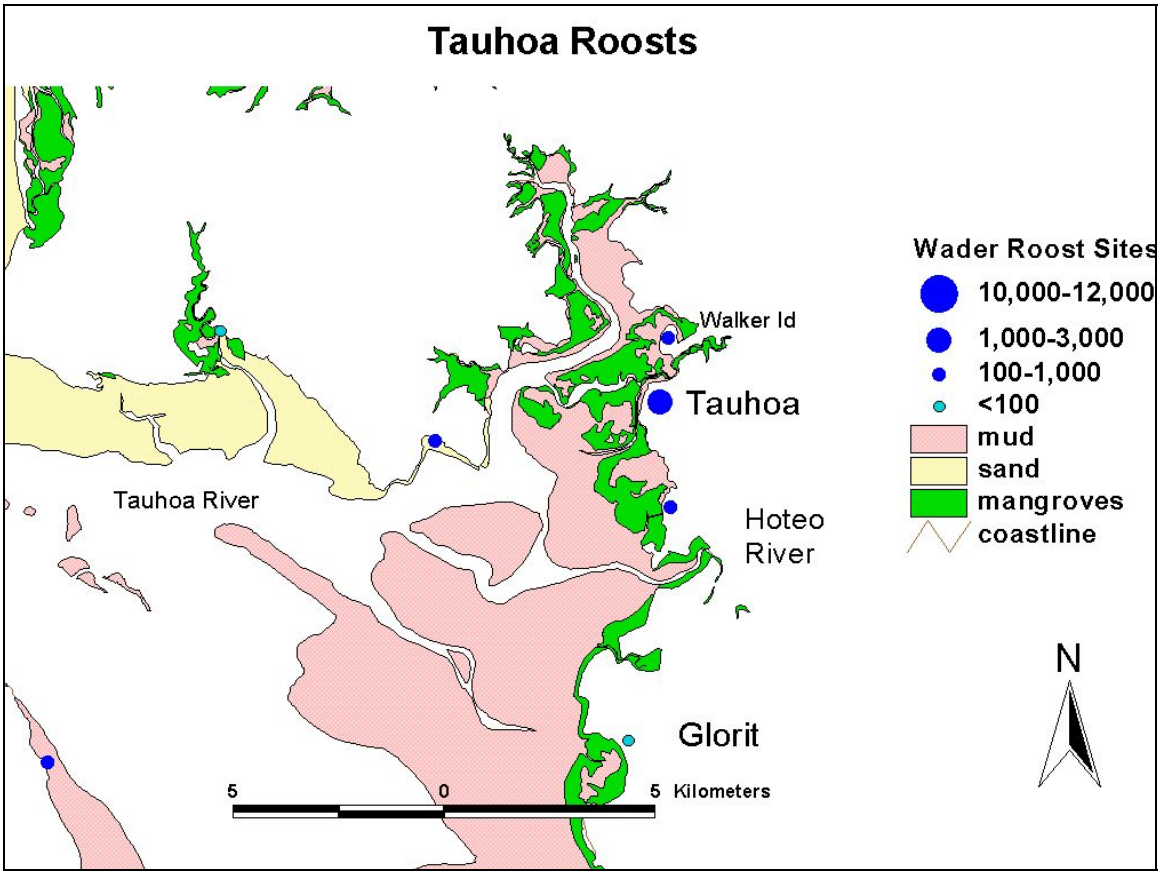


Tauhoa River (from Karaka Point to Breach Point, out to and including Moturemu)

The Tauhoa River area is an important feeding and roosting area for tern. In summer it is particularly important to the migratory Little Tern (Figure 24) and in winter it is equally important for the Critically Endangered New Zealand fairy tern. Grazing within the coastal marine area has inhibited mangrove growth in this area (relative to other parts of the Kaipara) creating excellent roost sites and this may, at least partially, contribute to its importance. The Walker Island roost is also important for fairy terns.

The tidal flats along the adjacent coastline and around Moturemu Island provide important feeding areas for wading birds. These feeding areas, along with the sand flats around Tapora and the Omokoiti Flats, are the most significant on the harbour for wading birds, particularly the international migratory waders.

Figure 28 Wading bird roost sites at Tauhoa River.



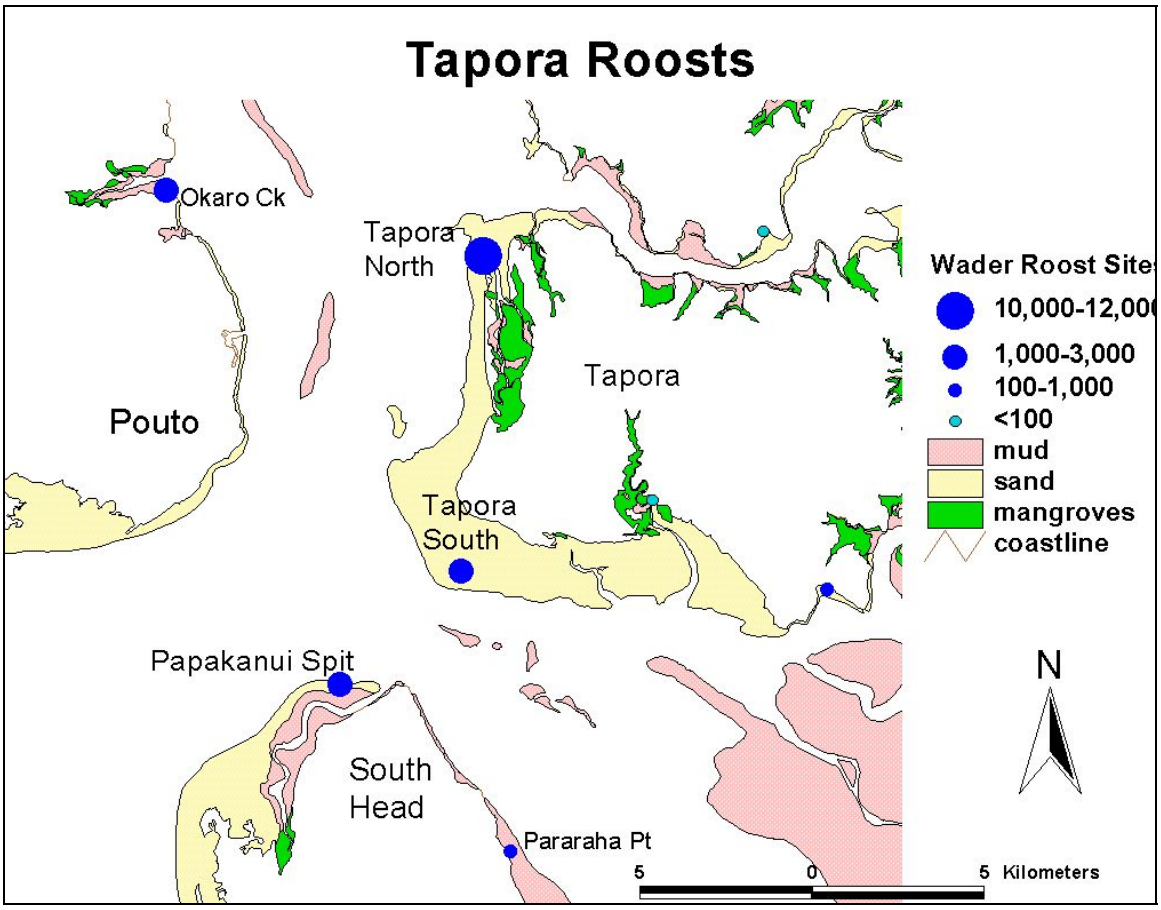
Tapora bank, including Manukapua (Big Sand Island) to Waikiri Creek

The end of the Tapora peninsula (Figure 29) and the surrounding area is one of the most important roost sites for coastal wading birds in the Northland and Auckland regions and in New Zealand (Medway 2000). New Zealand dotterel, banded dotterel, godwit, knot, pied stilt, grey plover, and eastern grey plover roost here; and more than 1% of New Zealand's turnstones, oystercatchers, wrybills, curlew sandpipers, and red-necked stints also roost here. The curlew sandpipers and red-necked stints are rarely found in other areas of the Kaipara Harbour.

Approximately 5% of the New Zealand dotterel population use the end of the Tapora Peninsula as a post-breeding roost site. Until the 1990s, New Zealand fairy terns used to breed here. The Tapora Wildlife Management Reserve is listed by the Department of Conservation as a Site of Special Wildlife Interest (SSWI) due to its habitat value for wrybill and dotterel as well as several other birds (Department of Conservation 1995). Additionally, the sand and mudflats on the southern coast of the peninsula are an important feeding area for waders. Gum Store Creek on the tip of the Tapora peninsula has a rich assemblage of habitats including mangroves, mudflats, sandbanks, scrub, and freshwater wetlands that

combine to offer pied (*Phalacrocorax varius*), black (*Phalocrocorax carbo*), and little shags (*Phalocrocorax melanoleucos*) an important roosting site.

Figure 29 Wading bird roost sites in the central Kaipara Harbour.



Northern Kaipara

The northern Kaipara (Northern Kaipara and Northern Wairoa roost sites) (Figure 30) has significant numbers of local migratory waders (NZ dotterel, pied stilt, and banded dotterel) and resident bird species, but fewer numbers of international migratory waders. This area of the harbour has less variety of feeding substrate, consisting mainly of mudflats with only a few areas of sandflat. Wading birds from the roosts at Ruawai and Tinopai mainly feed on the large expanse of mudflats west of Tinopai and along the Northern Wairoa River.

The Ruawai roost is particularly important even though it is located entirely on open farm paddocks along the Northern Wairoa River. Birds shift around this area, depending on disturbance from farming activities and weather conditions but the expanse of open paddocks ensures sufficient, flexible, roost sites.

In the north-eastern Kaipara, birds spread out from a number of small roosts (Figure 31) onto the mudflats that fringe this area. Bird feeding in this area has been studied less than elsewhere, mainly because this area is accessible only by boat.

Figure 30 Wading bird roost sites in the northern Wairoa River.

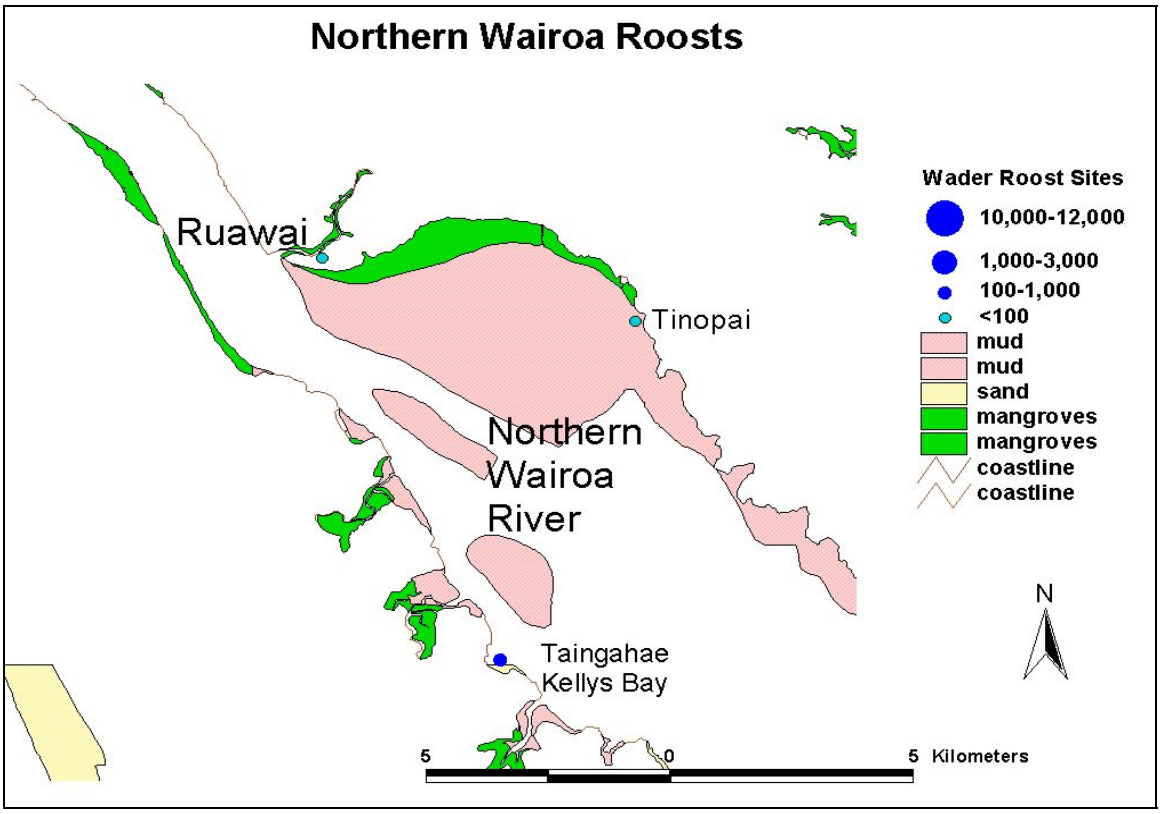


Figure 31 Wading bird roost sites in the north-eastern Kaipara Harbour.