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**WILDLIFE AND WILDLIFE HABITAT OF
HAWKE'S BAY RIVERS**

by

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WILDLIFE AND WILDLIFE HABITAT OF HAWKE'S BAY RIVERS*

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1. INTRODUCTION

Between October and December 1984, the Fauna Survey Unit (FSU) of the New Zealand Wildlife Service, Department of Internal Affairs, carried out a survey of wildlife and wildlife habitats (Sites of Special Wildlife Interest - SSWI) of the Hawke's Bay Region as part of a national habitat inventory. During that survey the riverbeds of three main rivers (Tukituki/Waipawa, Ngaruroro and Tutaekuri) were walked and a count of riverbirds made (Figure 1). The rivers were surveyed on 30 November, 1, 3 and 7 December 1984. Members of the Hawke's Bay Branch of the Ornithological Society of New Zealand (OSNZ) assisted on the Tukituki and Ngaruroro Rivers on 1 December 1984.

This report summarises the 1984 counts and includes notes on bird presence and numbers made on random visits to several tributaries of the Tukituki and Ngaruroro, and the Mohaka River. It also includes data collected by OSNZ on the Tukituki, Ngaruroro and Tutaekuri Rivers in 1962, 1967 and 1972, and by Hawkins (1985) on the lower Mohaka River.

The mouth of each river is treated as a separate habitat in this report.

Data from the most recent OSNZ survey (Labour Weekend 1986) are shown in Appendix 4.

2. METHODS

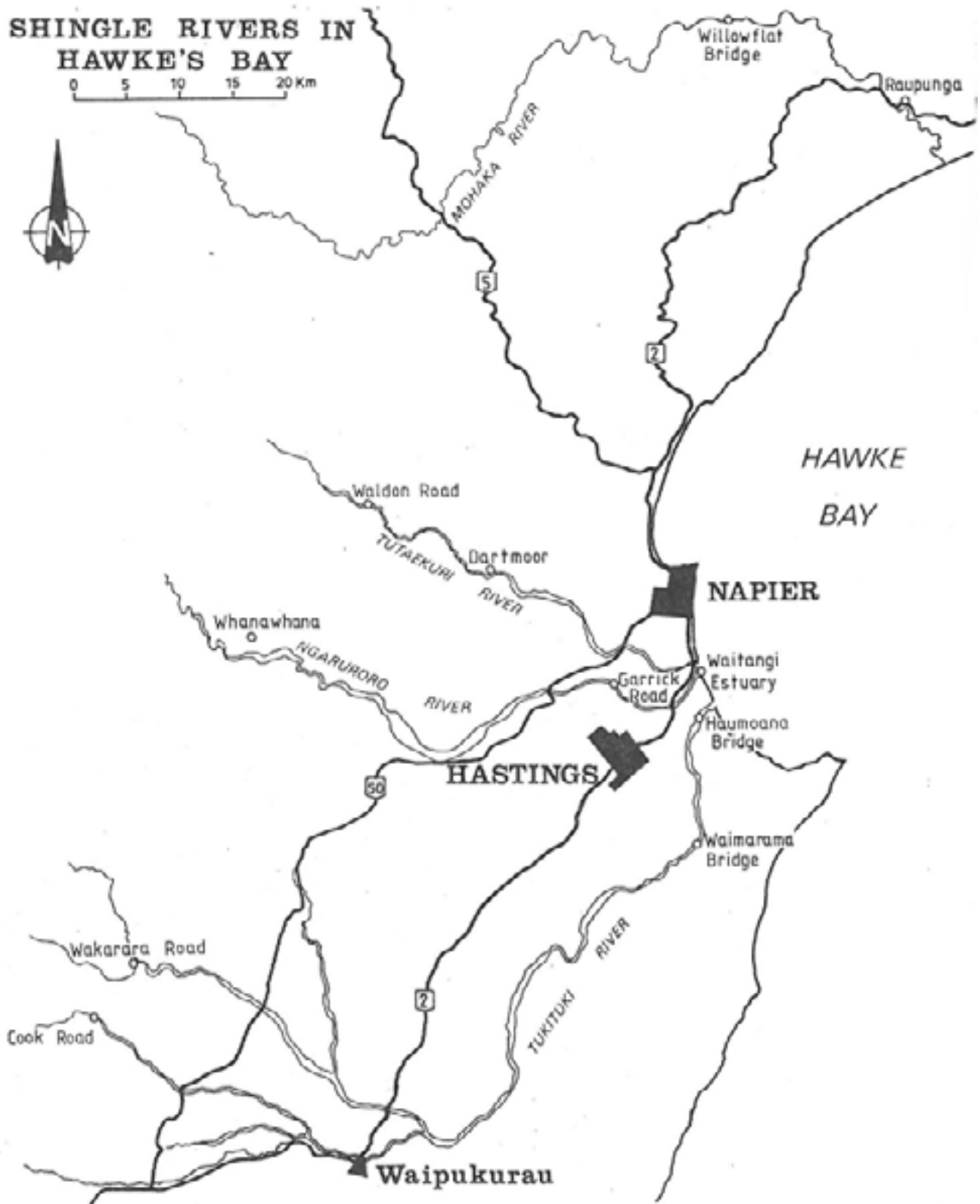
2.1 Survey Techniques

Starting at the foot of the inland mountain ranges survey personnel walked the beds of the three main rivers as far as the coast on the Tukituki River, and to where the river channels become man-made 'canals' on the Ngaruroro and Tutaekuri Rivers. The Mohaka River was covered mainly by raft from Willow Flat Bridge to the rivermouth.

The rivers were divided into sections 6-21 km in length (Parrish, 1985 a, b & c). The length of any given section was dictated by where access was available to or from the river. One or two people walked downstream and counted birds as they passed them. All water-birds, i.e. waterfowl, herons, shags, waders, gulls and terns, were counted individually. A list of terrestrial bird species using the riverbed or adjacent willows, forest or scrub was made but birds were not counted.

*This report was prepared originally as a Fauna Survey Unit report to be published by the New Zealand Wildlife Service. That report series concluded with F.S.U. report No.42, when the New Zealand Wildlife Service became part of the Department of Conservation.

Figure 1: Shingle Rivers of Hawke's Bay



Some species were more difficult to count than others, being highly mobile or secretive. The procedure adopted was standardised as much as possible, but results of bird counts indicate bird conspicuousness rather than a total census.

Because there were insufficient personnel to survey all the riverbeds on one day, the Tukituki and Ngaruroro Rivers were each surveyed over two days (30 November and 1 December 1984 and 1 and 7 December 1984, respectively). This would not have affected the total count significantly because most of the nesting species are territorial, and therefore would have remained on their stretch of river during the time of survey. Species not breeding or territorial on the riverbed, such as waterfowl, herons and shags, could have moved and been counted twice, or not at all.

Much of the Ngaruroro River is very wide and the observers felt they had not adequately covered the riverbed. For this reason the total counts for this river can be considered conservative, particularly for banded and black-fronted dotterels.

Tributaries of the Tukituki and Ngaruroro Rivers (Tukipo, Makaretu, Mangaonuku, Makaroro and Maraekakaho Rivers) were visited where access allowed and short stretches of the riverbed walked. The Mohaka River was treated in this manner also, but has been studied more intensively since by Hawkins (1985).

Data on the wildlife values of rivermouth habitats were gathered from a variety of including personal records and OSNZ reports.

2.2 Ranking of river habitats

After the surveys, each river or rivermouth was rated using criteria formulated by the FSU (modified from Imboden, 1978) and presented in Appendix 1.

The tributaries were included in the rating assigned to the whole river system, although each tributary would rate lower if considered on its own.

3. RIVERBED STRUCTURE

3.1 Riverbed Topography

Typically, rivers can be divided into a number of distinct reaches with torrent, meandering, braided and delta sections. The Tukituki and Waipawa Rivers have short torrent sections and long meandering sections with some braiding, particularly on the Waipawa. Long lengths of these rivers have been converted from a braided to a meandering course by river control works. The Ngaruroro River has almost equal parts of torrent and braided sections while the Tutaekuri has a short torrent stretch and long of gorge-confined and meandering river. The Mohaka is a torrent river for much of its length, and only in the lower parts are there substantial shingle beds.

The river is confined within gorges or between cliffs for its entire length.

The Hawke's Bay rivers formed during a period of rapid uplift and erosion of the main axial mountain ranges (Ruahine, Kaimanawa, Kaweka and Ahimanawa Ranges, and ranges south-west of the Urewera National Park). The parent rock material for the riverbeds is predominantly greywacke.

Because the Ngaruroro and Mohaka Rivers arise in pumice in-filled valleys, pumice is a component of the beds of these two rivers. The lower sections of all rivers are surrounded by limestone-capped ranges and hill country of sandstone, siltstone and mudstone.

The braided sections of the Waipawa and Ngaruroro Rivers consist of two or more unstable channels divided by shingle flats and islands. Channels repeatedly divert and rejoin. Generally there are one, two or three principal channels and numerous side channels. Factors favouring braiding include high regional slopes, very variable discharges, erosion-prone banks and an abundant, coarse-grained sediment supply. The river's full width is occupied by water only during full flood. Shingle riverbeds are in a state of continual erosion and deposition and are often aggrading, and, as such, are highly unstable.

The lower parts of the Ngaruroro, Tutaekuri and Tukituki Rivers, and the sections of the Tukituki and Waipawa Rivers that flow across the Ruataniwha Plains, are unconfined by gorges and cliffs, and in the past these rivers changed course many times. This is especially true on the Ruataniwha Plains. These sections are now confined by river works. River confinement and shingle aggradation have resulted in the riverbed being higher than the surrounding landscape in some parts.

3.2 River Hydrology

The Hawke's Bay rivers are predominantly rain-fed but there is some snow in the winter months. Precipitation is highest between the months June-September and the river flows reflect this. During the driest months (December-March), flows can be insufficient to maintain surface water on some sections especially of the Tukituki and Waipawa rivers where they flow over the Ruataniwha Plains. The more extreme floods tend to be associated with sub-tropical, cyclonic storms in early autumn but can occur at any time of the year.

Mean daily flows near the river mouths are 81 cumecs for the Mohaka River, 28 cumecs for the Ngaruroro River and 17 cumecs and 25 cumecs for the Tutaekuri and respectively.

3.3 Vegetation Cover

Before the arrival of Europeans the Hawke's Bay riverbeds would have been sparsely vegetated with indigenous mat-forming plants, principally species of *Raoulia* and *Epilobium*.

Exotic plants such as lupin, willow, gorse, broom and annual and perennial weeds now cover large areas of shingle at the highest riverbed levels, eliminating potential riverbed bird habitat.

Encroachment by willows on some stretches of river is the direct result of planting for river control purposes.

Lupin is sown in the mountain ranges for erosion control and seeds carried down river have established on the riverbed.

The plant cover is not uniform, however, and some shingle beds are bare, particularly the upper, braided parts of the Ngaruroro River.

4. HABITATS OF BIRDS

The shingle rivers of Hawke's Bay provide a variety of habitats for bird species, including areas for breeding, brood rearing, feeding and roosting. Each species uses specific parts of the riverbed and adjacent land.

4.1 Aquatic Habitats

Aquatic habitats provide the main feeding areas for riverbed birds. While some species feed in deep water (shags and terns) and on dry shingle areas (waders), most feed in shallow water at the interface of water and bank, and take in aquatic invertebrates (Appendix 3).

The main aquatic habitats are listed and described below.

- (a) Unbroken flowing pools or runs. The water may be deep and slow-moving in pools, and swifter and shallower in runs; it can be in the main channel or a side channel. Use: mainly by shags, with white-fronted terns in the lower reaches. The edge and shallow side runs are used by dotterels, stilts, gulls and some waterfowl.
- (b) Riffles/rapids (fast flowing broken water, generally of steep gradient over a coarse sediment substrate). These are usually much shallower than (a) Use: shallow slower moving riffles are important feeding habitat for dotterels, oystercatchers and stilts.
- (c) Backwater (area of still water connected to a flowing river channel at its downstream end). A backwater is formed by water backing up into it from the main flows and has only one connection to the channel. Use: mainly by dotterels, stilts, oystercatchers, herons and gulls.
- (d) Seep (a depression/hollow on a shingle flat into which seepage of water occurs forming a shallow surface film of slow-moving water). Use: waders.
- (e) Disconnected pool (enclosed, small pond area on shingle flats). These may after change in river channel flows, for example, when a backwater is isolated by sediment deposition. They are semi-permanent with static water and are often lined by fine silt. Use: waders.
- (f) Swamps/ox-bow wetlands (old water courses and ponds that have changed by natural succession to swamplands). Swamps are now rare on Hawke's rivers as drainage has removed them. The Pigsty wetland on the Ngaruroro River is largely a swamp in an ox-bow which formed about 80 years ago. It is fed by small streams, springs, floods and seepage from the river, and is connected to the river by a stream on the down-stream end. It is the only freshwater swamp of any significance on or near a river in Hawke's Bay. Use: bittern, spotless crane, dabchick, black-fronted and waterfowl.
- (g) Man-made aquatic habitats (drains, irrigation races or irrigated pasture). Use: provide supplementary feeding habitat for spur-winged plover, pied stilt, gulls, shags and some waterfowl.

4.2 Terrestrial Habitats

Terrestrial locations provide important breeding and loafing habitat for riverbed birds. Heavily-vegetated banks, terraces and cliff faces provide habitat for indigenous and exotic passerines.

The main terrestrial habitats are listed and described below.

(a) River terraces (raised level areas beside a river resulting from successive down-cuttings of that river). They originally supported tussock grassland or forest, but are now mostly developed as farmland. Use: feeding and loafing by gulls and paradise shelducks and limited breeding by spur-winged plover.

(b) Low flood or island on river (young terraces immediately adjacent to river). Islands at a similar riverbed level are formed by changes in watercourse and down-cutting of that terrace. Subject to infrequent flooding and most have well-developed vegetation of lupin, willow, gorse and broom. Use: heavily-vegetated areas are used by small passerines and upland gamebirds. Willow areas are frequented by passerines and shining cuckoo, and are used as breeding habitat for waterfowl.

(c) Bar, flat or spit (areas of shingle within the active river floodplain). The habitat may be a small bar in mid-channel, an island of shingle or large shingle flats on the leeward side of a riverbend. Sparsely-vegetated or bare shingled. There is a greater frequency of flooding than in (b). Use: main riverbed breeding habitat for dotterels, stilt, oystercatcher, black-backed and black-billed gulls. Feeding habitat for and pipit.

(d) Exposed rocks in river channel and cliffs and rock outcrops on edge of river. Use: roosting for shags and herons.

(e) Man-made structures (for example stop-banks, groynes and bridges). Use: roosting habitat for shags, gulls and herons. Bridges provide breeding sites for swallows and rock pigeons.

(f) Dry watercourse (where river channel has dried out and substrate is exposed; often with dried film of silt and/or algae). Use: feeding habitat for dotterel, stilt and pipit.

5. RIVERMOUTH HABITATS

The mouths of the shingle rivers form a distinctive wildlife habitat. Rivermouth habitats are directly influenced by the river characteristics and are likely to be influenced by upstream water abstraction, earthworks and hydro-electric development.

The Hawke's Bay rivers discharge directly into the sea and do not form large estuaries. However, tidal arms are formed parallel to the coast behind shingle beaches. These tidal arms are dominated by brackish swamps of a tall, leafy, summer-green sedge, *Scirpus* (= *Bolboschoenus*) *fluviatilis*.

There are small areas of at the mouth of each river. The large flows of the rivers tend to keep the rivermouths open but storms do occasionally close the Ngaruroro/Tutaekuri rivermouth.

The Tukituki and Mohaka rivermouths are relatively natural, but the Ngaruroro and Tutaekuri have been extensively modified. The Tutaekuri River originally flowed into the Ahuriri Lagoon at Napier. Following the 1931 Napier earthquake the river was diverted to discharge at Awatoto. The Ngaruroro was also diverted from its former course (in what is now the Clive River) to a more direct route via a stop-banked 'canal'. These two rivers now form the Waitangi Estuary.

Rivermouths support a wider range of bird species than the rivers proper. All species found on the riverbeds occur at the rivermouths, together with coastal species and migratory wading birds. The brackish swamps contain species such as spotless and bittern. Although a wide variety of species visit the rivermouths, the numbers of birds, except for gulls, are limited by the lack of estuarine mudflats.

6. RESULTS AND DISCUSSION

Tables 1-7 summarise data on the wildlife of Hawke's Bay riverbeds and rivermouths. A total of 77 wetland and terrestrial bird species has been recorded from these habitat types. The riverbeds themselves support up to 32 wetland species while 46 wetland species (including almost all those from the riverbed) have been recorded on rivermouth habitats. Twenty-seven terrestrial bird species have been recorded in riverbed habitats.

6.1 Results and Trends in Riverbed Bird Numbers

Tables 1-4 show counts of riverbed species recorded in the period 1962-85. These tables show that numbers of shags, herons, waterfowl, gulls and terns fluctuate and there are no clear trends. In contrast, the data on waders do show some trends and these are detailed below.

(a) Spur-winged plover. No spur-winged plovers were observed on the riverbeds 1962-72 by OSNZ but 182 birds were counted on the four rivers in 1984. This species established itself in New Zealand in the 1930's and 1940's in Southland and first bred in the North Island in 1973. By 1980 they were well-established in the southern and eastern parts of the North Island, especially in Manawatu and Hawke's Bay (Robertson *et al.* 1985).

(b) Banded dotterel. On the Ngaruroro and Tutaekuri Rivers numbers in 1967 and 1972 were about half those in 1962, but in 1984 were almost as high as in 1962. On the Tukituki River there was a drop in 1972, but numbers were nearly double those recorded in 1967.

(c) Black-fronted dotterel. An Australian species, black-fronted dotterels colonised New Zealand in the 1950's commencing in Hawke's Bay. Their numbers more than doubled on the Ngaruroro and Tutaekuri Rivers between 1962-1984. On the Tukituki River numbers rose spectacularly from seven in 1962 (but not all of the river system was surveyed then) to 368 in 1984. Most of this increase appeared to occur after 1972. The species was observed on several tributaries of the Tukituki River, unlike the banded which generally avoids smaller rivers. Its distribution has also expanded northwards, with at least 13 birds being recorded on the Mohaka River. The figures for the Ngaruroro and Tutaekuri Rivers suggest that black-fronted dotterels have obtained their maximum populations on these two rivers, but expansion could still occur on the Mohaka and possibly the Tukituki.

(d) South Island pied oystercatcher. This species increased nationally from nearly 49,000 in 1973 (Baker 1973) to c. 80,000 in 1985 (OSNZ September 1985). Two birds bred on the Ngaruroro riverbed in 1980, the first record of this species breeding in the North Island (Twydler 1983). In 1984 the breeding population numbered ten birds. It will be interesting to see if this species can emulate the colonisation success of spur-winged plover and black-fronted dotterel.

Table 1: Bird Counts on Hawke's Bay Rivers 1984-1985 (FSU Surveys and Hawkins)

	Tukituki/Waipawa	Ngaruroro	Tutaekuri	Mohaka	Totals
Black shag	25	3	23	28	79
Pied shag			1		1
Little black shag		1	4		5
Little shag	15	P	8	41	64
Shag sp.				25	25
White-faced heron	61	2	4	19	86
Canada goose		1			1
Feral goose			P	248	248
Paradise shelduck	390	183	59	8	640
Mallard	175	14	35	73	297
Grey duck			1	5	6
Grey teal	4		1		5
NZ shoveler	7		3		10
South Island pied oystercatcher		10			10
Spur-winged plover	85	52	11	34	182
Banded dotterel	939	438	237	32	1670
Black-fronted dotterel	368	127	134	13	642
Common sandpiper	1				1
Pied stilt	1106	461	239	14	1820
Southern black-backed gull	704	2056	600	191	3551
Red-billed gull				2	2
Black-billed gull	107	25	1		133
White-fronted tern	3				3
TOTALS	4014	3373	1361	733	9481

P = present

Table 2: Bird counts on Tukituki River (1962 – 72 OSNZ Data, and 1984 FSU Data)

	1962	1967	1972	1984
			10	25
Black shag		46		
Little black shag		46		
Little shag		60		15
White-faced heron		39	17	61
Paradise shelduck		35	31	390
Mallard		255	139 + 59 ducklings	175
Grey duck		23		
Grey teal				4
NZ shoveler				7
Spur-winged plover				85
Banded dotterel		500	310 + 12 chicks	963
Black-fronted dotterel	7	122	95	368
Pied stilt		464	323+	1106
Southern black-backed gull		518	136+	704
Red-billed gull		1		
Black-billed gull		252	28	107
White-fronted tern				3

Table 3: Bird counts on Ngaruroro River (1962-72 OSNZ Data, and 1984 FSU Data)

	1962	1967	1972	1984
Black shag	18	14	10	3
Little black shag		16	1	1
Little shag	9	24	7	P
White-faced heron	7	10	13	2
Canada goose	3			1
Paradise shelduck	111	108	51 + 13 ducklings	183
Mallard	56	29+	50+	14
Grey duck		23		
Grey teal				4
NZ shoveler	7		7	
South Island pied oystercatcher				10
Spur-winged plover				52
Banded dotterel	514	246+	216+	438
Black-fronted dotterel	39	96	134	127
Pied stilt	323	181+	173+	461
Southern black-backed gull	2125	5032+	1600	2056
Red-billed gull				
Black-billed gull		16	16	25
White-fronted tern				
Eastern bar-tailed godwit	3			

P = Present

Table 4: Bird counts on Tutaekuri River (1962-72 OSNZ Data, and 1984 FSU Data)

	1962	1967	1972	1984
Black shag	21	18	37	23
Pied shag				1
Little black shag				4
Little shag	22	18	18	8
White-faced heron	8	20	8	4
Feral goose				P
Paradise shelduck	71	13	71	59
Mallard	24	105	120	35
Grey duck				
Grey teal				
NZ shoveler	2		30+	3
Spur-winged plover				11
Banded dotterel	372	299	174	237
Black-fronted dotterel	63	105	120	134
Pied stilt	274	344	302+	239
Southern black-backed gull	34	672	447+	600
Red-billed gull		2	1	
Black-billed gull	4	366	10	1
Caspian tern	1			
Eastern bar-tailed godwit			50	

P = Present**Note: OSNZ counts include birds at the rivermouth**

Table 5: Birds recorded in Estuarine Rivermouths

	Mohaka	Ngaruroro	Tukituki	Tutaekuri
Australasian gannet	X	X	X	X
Black shag	X	X	X	X
Little black shag	X	X	X	X
Little shag	X	X	X	X
Spotted shag	X	X	X	X
White-faced heron	X	X	X	X
White heron		X	X	X
Little egret			X	
Reef heron	X		X	
Australasian bittern		X	X	X
Black swan	X	X	X	X
Canada goose	X		X	
Feral goose	X			
Paradise shelduck	X	X	X	X
Mallard	X	X	X	X
Grey duck	X	X	X	X
Grey teal		X		X
New Zealand shoveler		X	X	X
Australasian harrier	X	X	X	X
Spotless crane		X	X	X
Pukeko		X	X	X
Variable oystercatcher	X	X	X	X
Spur-winged plover	X	X		X
Banded dotterel	X	X	X	X
Black-fronted dotterel	X	X	X	X
Wrybill		X		X

Table 5 (Contd.)

	Mohaka	Ngaruroro	Tukituki	Tutaekuri
Eastern bar-tailed godwit	X	X	X	X
Siberian tattler		X		X
Terek sandpiper		X		X
Turnstone		X	X	X
Knot		X	X	X
Sharp-tailed sandpiper		X		X
Pectoral sandpiper		X		X
Curlew sandpiper		X		X
Red-necked stint		X		X
Pied stilt	X	X	X	X
Southern black-back gull	X	X	X	X
Red-billed gull	X	X	X	X
Black-billed gull	X	X	X	X
Black-fronted tern	X	X	X	X
White-winged black tern		X		X
Gull-billed tern		X	X	X
Caspian tern	X	X	X	X
Eastern little tern		X		X
White-fronted tern	X	X	X	X
Kingfisher	X	X	X	X
Skylark	X	X		X
Welcome sparrow	X		X	X
Hedge sparrow	X		X	
North Island fantail	X		X	

Table 5 (Contd.)

	Mohaka	Ngaruroro	Tukituki	Tutaekuri
Blackbird	X		X	
Silvereye	X		X	
Cheffinch	X		X	
Greenfinch	X		X	
House sparrow	X		X	
Starling	X	X	X	X
Indian myna	X		X	

The Waipawa River was counted by OSNZ members at Labour Weekend 1985, the numbers of birds were close to those recorded by the FSU. The counts of some species were (with FSU 1984 counts in brackets): banded dotterel 321 (397), black-fronted dotterel 60 (61), pied stilt 170+ (241) and paradise shelduck 16 (18).

6.2 Conservation Values of Hawke's Bay Rivers

Table 6 summarises findings on the birdlife of Hawke's Bay Rivers.

The values assigned to individual rivers are based on stretches of shingle riverbed and on the birds that inhabit that habitat type. It does not include fisheries values or the headwater catchments where endangered species such as blue duck occur.

6.2.1 Mohaka River

(a) Survey

Visited in various places in October and November 1984 by FSU. Survey by K. Hawkins in February 1985 from Willowflat Bridge (NZMS 1./Map N115, grid ref. 4375 -3987) downstream to the rivermouth. The rivermouth was surveyed on 5 November 1984 but with data available back to 1983. Only the river values downstream of the Ripia/Mohaha confluence are discussed in this report. Bird counts on the Mohaka River cannot be compared with those on other Hawke's Bay rivers because the method of survey used for the Mohaka was different from that used elsewhere. Furthermore, the survey (Section 2.1) was conducted outside of the main breeding period.

(b) Description

River: rises in the Range. Flows through greywacke country until the Te Hoe confluence, then through sandstone, siltstone and limestone country. Confined within gorges for almost its entire length. Shingle banks form whenever the riverbed widens and on the leeward side of riverbends. Relatively wide shingle beds in lower reaches downstream of Raupunga.

Rivermouth: a narrow rivermouth with only small areas of mudflats. Shingle bars either side of mouth.

(c) Conservation Values

The Mohaka River was rated as being of MODERATE value to wildlife. Banded dotterel (c. 40 birds) and black-fronted dotterel (c. 20) breed on the lower reaches. Black-fronted dotterel were recorded breeding on this river for the first time in 1985 (Hawkins 1985); birds were seen upriver as far as the State Highway 5 bridge.

The rivermouth was rated MODERATE. The shingle bars are irregular breeding sites for black-billed gull and white-fronted tern (1200 birds November 1983; nests destroyed by storm, 1985). Visited by small numbers of migratory waders.

Table 6: Synopsis of values of Hawke's Bay rivers

RIVER	MILDLIFE VALUES	KEY RIVERBED BIRD SPECIES*	COMMENTS
Mohaka	Moderate	Moderate	black and little shags, banded dotterel, black-fronted dotterel.
			RIVER: breeding banded and black-fronted dotterels, limited by the amount of shingle nesting area. RIVERMOUTH: irregular breeding of white-fronted terns and black-billed gulls.
Ngaruroro	High	Moderate-High	paradise shelduck, banded dotterel, black-fronted dotterel, pied stilt, southern black-backed gull, black-billed gull, South Island pied oystercatcher.
			RIVER: the widest Hawke's Bay river, relatively free from exotic vegetation. The only North Island river with breeding South Island pied oystercatcher. High numbers of breeding banded and black-fronted dotterels, black-backed gulls. RIVERMOUTH: wide variety of migrant wading birds. Breeding and wintering gull spp. and tern spp. Wintering white heron. Bittern and spotless crane in swamps.
Tuktuki	High	Moderate-High	paradise shelduck, duck spp., banded dotterel, black-fronted dotterel, pied stilt, black-billed gull.
			RIVER: highest recorded numbers of banded and black-fronted dotterels, black-billed gull and pied stilt. Supports highest numbers and variety of waterfowl. RIVERMOUTH: similar to Ngaruroro/Tutaekuri rivermouth but with lower number and variety of species. Wintering black-fronted tern and white heron. Bittern and spotless crane in swamps.
Tutaekuri	High	Moderate-High	banded dotterel, black-fronted dotterel, pied stilt
			RIVER: smaller and more confined than Ngaruroro or Tuktuki rivers but with comparable numbers of dotterels RIVERMOUTH: same as Ngaruroro.

* KEY RIVERBED BIRD SPECIES: species which are most abundance and/or relatively important on particular riverbeds.

6.2.2 Ngaruroro River

(a) Survey

The Ngaruroro was surveyed by FSU and OSNZ on 1 and 7 December 1984 for a distance of 48.7 km between Whanawhana and Garrick Road. The rivermouth was recorded as a separate SSWI in July 1984, using personal observations and extensive OSNZ data.

(b) Description

River: the head of the catchment is in the Range. Confined within deep greywacke gorges until Whanawhana where it widens; broad shingle beds predominate downstream to Chesterhope Bridge where it becomes confined to a single, man-made channel. It is the widest of the Hawke's Bay rivers, being up to 1 km wide between Whanawhana and Ohiti. These wide areas are relatively free of exotic plants, but below Ohiti willows and lupins cover islands, and willows and poplars line stop-banks. Because the Ngaruroro is naturally confined between terraces for much of its length there has been relatively little river control work, and much of its bed is still braided.

(c) Conservation Values

The Ngaruroro River was rated as being of HIGH value to wildlife. A total of 43 species, including 19 wetland species, was recorded (Tables 1-6). The only river in the North Island with breeding South Island pied oystercatcher. Contains the greatest number of banded dotterel per km of the rivers surveyed; (and numbers were probably higher than were counted; see Section 2.1). Banded dotterel occur also on the upper Ngaruroro: "...common during November and December along the Ngaruroro from the Te confluence to the Panoko Stream" (Challies 1962). Southern black-backed gulls were the most common birds on the river, with over 2000 being recorded.

The combined Ngaruroro/Tutaekuri (Waitangi Estuary) was MODERATE-HIGH. Forty-two wetland species of birds have been recorded there over a number of years. Most are migratory birds; there are generally low numbers of individuals of each species. Black-billed gulls and white-fronted terns nest on the shingle bar. Spotless crane and bittern inhabit the swampland. White herons are frequent winter visitors, mainly on the Clive River and in the upper reaches of the southern tidal arm.

6.2.3 Tukituki River

(a) Survey

The Tukituki/Waipawa river system was surveyed by FSU with assistance from OSNZ on 30 November and 1 December 1984. A total of 143.7 km of riverbed was surveyed from Wakarara Road Bridge on the Waipawa River and Cook Road on the Tukituki River down to Haumoana Bridge.

The rivermouth was visited on 4 September 1984.

(b) Description

River: both the Tukituki and Waipawa Rivers originate in the Ruahine Range. They have a steep gradient at first but level out on the Ruataniwha Plains. The Tukituki River is the more confined and has a coarser substrate than the Waipawa River. This is because Folger's Lake (formed by a slip) impounds most of the fine sediment. The Waipawa is a wide river with braids for much of its length. Below Waipukarau the rivers unite and form a predominantly single channel river. The upper sections of the system are the most heavily vegetated with lupin, gorse and broom. Willows line the banks along most of the river. The rivers are stop-banked across the Ruataniwha Plains and again below the Bridge.

Rivermouth: the estuarine zone is smaller than the Waitangi Estuary but is similar in nature, with small areas of mudflat and *Scirpus (Bolboschoenus) fluviatilis* swamp. Tidal arms/lagoons provide a link between the Tukituki rivermouth and Waitangi Estuary.

(c) Conservation Values

The Tukituki River was rated of HIGH value to wildlife. A total of 51 bird species was recorded, 23 of which were wetland species. It also had the highest number of waders. The number of birds in relation to the amount of habitat was similar to the other rivers. Black-billed gulls were more common on this river than elsewhere, and three nesting sites were seen. Black-backed gulls were fewer and the colonies were smaller than on the Ngaruroro River. Waterfowl were more common than on the other rivers, particularly on the lower half of the river. Two migratory bird species not usually seen on riverbeds (common sandpiper and sanderling) were recorded.

The rivermouth was rated MODERATE-HIGH. A total of 43 bird species has been recorded including 31 wetland species. There are large numbers of shags, gulls and terns but only low numbers of waders. White heron and black-fronted tern are regular winter visitors.

6.2.4 Tutaekuri River**(a) Survey**

Surveyed on 3 December 1984 by FSU, when 41.2 km of riverbed were walked between Waldon Road Ford and the State Highway 50 bridge. The rivermouth was recorded as part of the Ngaruroro rivermouth (Waitangi Estuary).

(b) Description

River: the headwaters are in the Kaweka Range. Like the Mohaka River, it is confined by cliffs for much of its length but has more shingle beds. It does not widen out until downstream of Dartmoor. A stretch of 4 km at Dartmoor is confined by dense willows. Where the river is confined by cliffs there is generally little vegetation on the riverbed but on the wider stretches there are areas of dense annual and perennial weeds with some lupin, gorse and willow. Below the State Highway 50 Bridge the river is confined by stop-banks and there is pasture to the water's edge.

Rivermouth: as for the Ngaruroro River.

(c) Conservation Values

The Tutaekuri River was rated HIGH. Although it had fewer birds than either the Ngaruroro or Tukituki, it still contains a significant breeding population of banded and black-fronted dotterels. A total of 43 bird species was recorded, 19 being wetland species.

The rivermouth is included in the Ngaruroro River, above.

7. THE RIVERBED AND RIVERMOUTH BIRD SPECIES

For formal names see Appendix 2

7.1 New Zealand dabchick

Distribution: North Island with the main breeding population at the Rotorua and Taupo Lakes district. Recorded on the Pigsty wetland of the Ngaruroro River and twice on Waitangi Estuary in 1982 (K. Todd pers. comm.).

7.2 Australasian gannet

Distribution: New Zealand and Australian coastal waters. There is a large breeding colony at Cape Kidnappers.

Occasional visitor to the rivermouths.

7.3 Black shag

Distribution: found throughout New Zealand but more common on inland waters. Present on all four rivers surveyed.

Breeding habitat: one nesting colony of ten birds was located on the Tutaekuri River, in kanuka trees on top of a cliff. Another nesting site, now disused, reported in a similar situation on the Tukituki River in a gorge in the lower reaches. OSNZ found a breeding colony of six nests on the Tukituki River (OSNZ News, Dec 1985).

Feeding habitat: in main channels in deeper water.

7.4 Pied shag

Distribution: most inhabit shallow marine inlets, bays and estuaries, but some are found inland on large lakes and rivers. Rare in Hawke's Bay. One bird seen on the lower Tutaekuri River.

7.5 Little black shag

Distribution: almost entirely restricted to the North Island where it is said to be increasing (Falla et al. 1979). In Hawke's Bay it is most common coastally around the Ahuriri and Waitangi Estuaries in autumn and winter. Present in low numbers on the lower Tutaekuri and Ngaruroro riverbeds, with higher numbers on the rivermouths e.g. 100 at Waitangi on 14 July 1984, and c. 30 at Tukituki rivermouth, 3 November 1984 (OSNZ 1986).

Breeding habitat: not known to nest on any Hawke's Bay rivers.

Feeding habitat: similar to black shag.

7.6 Little shag

Distribution: common and widespread throughout New Zealand in both coastal and inland waters. Fairly common on the Tukituki and Tutaekuri Rivers but few seen on the Ngaruroro.

Breeding habitat: no breeding observed on the rivers during survey but little shags can share the breeding sites with black shag.

Feeding habitat: similar to black shag, largely deep, main river channels and pools. Known food species include eels, bullies, smelt, carp, galaxiids, freshwater crayfish, shrimps, frogs and aquatic invertebrate larvae (Falla and Stockwell 1945, Oliver 1955, Potts 1972).

7.7 Spotted shag

Distribution: common around much of New Zealand's coastline, particularly in the South Island. Several records for Hawke's Bay rivermouths in recent years as a wintering species: two at Haumoana 3 May 1980 (OSNZ 1981); Clive sewer outfall, 19 in prenuptial plumage on 28 July 1984 (OSNZ 1986) and 24 on 15 August 1985 (K. Todd pers. comm.).

7.8 Whitefaced heron

Distribution: self-introduced from Australia, white-faced herons have extended their range greatly since 1940 and are now the most common heron species in New Zealand. Common in both inland and coastal sites. Recorded on all riverbeds surveyed, but far more common on the Tukituki than on the other rivers. Birds tended to be more common on the lower reaches of rivers.

Breeding habitat: most breeding sites are in trees on farmland; no breeding was observed on the riverbeds.

Feeding habit: most feeding was observed in slow-moving or static backwaters, usually with a mud substrate.

7.9 White heron

Distribution: a cosmopolitan species, uncommon in New Zealand. One bird reported present for several months in 1984 on the Tukituki River and seen every year as a wintering species in low numbers at Waitangi Estuary and Tukituki rivermouth.

7.10 Little egret

Distribution: a vagrant species from Australia.

One record for Hawke's Bay rivers "...on the bed of Tukituki River in company with a white heron" (Brathwaite, 1952).

7.11 Reef heron

Distribution: a coastal species, mainly rocky coasts. More common in northern New Zealand. One bird seen at Tukituki River mouth, 7 May 1981 (OSNZ 1982) and one at Mohaka Estuary 1980 (OSNZ 1981).

7.12 Australasian bittern

Distribution: a widespread but uncommon species now considered to be threatened (Bell, 1986).

Not found on the riverbed proper but recorded several times from swamps at the Pigsty, Waitangi Estuary, East Clive Lagoon and Haumoana.

7.13. Royal spoonbill

Distribution: an uncommon species in New Zealand, self-introduced from Australia.

A frequent visitor to the north of but recorded only once on the river mouths; Tukituki Estuary, one with black-backed gulls on 20 1984 (OSNZ 1986).

7.14 Canada goose

Distribution: introduced to New Zealand as a game bird. Breeding populations established in the Noah Island at Tauranga and Wairoa.

One bird seen on the Ngaruroro River during survey. Also recorded by OSNZ on their survey in 1962 (MacKenzie 1963). Irregular visitor to Mohaka Rivermouth.

7.15 Black swan

Distribution: an Australian species, introduced to New Zealand in 1864.

Reported from the Pigsty (J. Renton pers. comm.). Occasional birds seen on rivermouths e.g. 7 at Tukituki Rivermouth on 18 March 1983 (K. Todd pers. comm.).

7.16 Feral goose

Common on the Mohaka (248 seen, Hawkins 1985), and occasional birds seen on the Tutaekuri.

7.17 Paradise shelduck

Distribution: widely distributed throughout New Zealand. Riverbeds appear to be one of the preferred habitats for this species and they were the most common waterfowl recorded on the rivers. On the Tutaekuri River, numbers were greatest on the upper sections, while on the Tukituki River the greatest numbers were on the lower sections. Birds were evenly distributed on the Ngaruroro River.

Breeding habitat: the majority of birds appear to breed off the riverbed or on river margins. Shingle riverbeds are used for brood rearing.

Feeding habitat: most feeding occurs on river margins and adjacent grasslands; on-river feeding occurs mostly in pools and slow-moving backwaters.

7.18 Mallard

Distribution: the introduced mallard is now the commonest duck species in New Zealand. They were recorded on most sections of the rivers but were noticeably more common on the lower sections of the Tukituki. Large numbers of birds are present during the hunting season on the Tukituki River Wildlife Refuge upstream of the Bridge and on the Tukituki rivermouth and Waitangi Estuary which are Closed Game Areas.

Breeding habitat: sheltered backwaters with overhanging willows are particularly suitable nesting and brood-rearing areas. Nests are usually on the ground, but are occasionally in holes and forks in willow trees.

Feeding habitat: riverbeds and mouth are used more for loafing than feeding. Most feeding occurs in slow-moving backwaters and pools at higher riverbed levels and in associated wetlands. Food is largely algae and invertebrates.

7.19 Grey duck

Distribution: native grey ducks are widespread but are being replaced by the mallard throughout New Zealand.

Only one grey duck was positively identified during the survey but low numbers are known to frequent the riverbeds and mouths. Little is known of breeding or feeding behaviour on these rivers but one nest with ten eggs was found on the Ngaruroro River (OSNZ News, Dec1985).

7.20 Grey teal

Distribution: scattered throughout New Zealand. Highest concentrations in South Auckland, Waikato, Hawke's Bay, Lake Ellesmere and Otago. Low numbers recorded on the Tukituki and Tutaekuri Rivers. Grey teal prefer lake-swamp complexes and are probably rare and transient users of shingle riverbeds.

Breeding habitat: no evidence of breeding on shingle rivers.

Feeding habitat: nothing is known about feeding on shingle riverbeds but it is probably limited to pools and backwaters.

7.21 New Zealand shoveler

Distribution: widespread on shallow wetlands throughout New Zealand. Numbers of birds and their usage of Hawke's Bay shingle rivers are similar to grey teal. Birds are present on the rivermouths during winter.

7.22 Spotless crake

Distribution: widespread; more common in the North Island than the South Island. Found in fertile freshwater swamps and in brackish areas of estuaries. Present in many wetland habitats in Hawke's Bay, some as small as 0.5 ha. Recorded from the Pigsty and several records from the rivermouths of the Tukituki, Ngaruroro and Tutaekuri.

Breeding habitat: spotless crake appear strongly territorial, responding quickly to tape-recorded calls at any time of year. Nests in tall, fairly dense swamp vegetation. Feeding habitat: their diet consists mainly of small insects.

7.23 Pukeko

Distribution: a common rail associated with wetlands, widespread in New Zealand. Found throughout Hawke's Bay in wetlands and on adjacent pasture. Not seen on the riverbed proper but quite common around swampy, willow-lined backwaters and drains, and on adjacent low-lying pasture.

Breeding habitat: nests are sited in or on vegetation, either surrounded by saturated ground or near still or slow-moving water.

Feeding habitat: in swamps or wet pasture. Mainly vegetation, eating seeds, shoots and rhizomes; will also eat live animals including small fish, frogs, birds and mammals, and also carrion.

7.24 South Island pied oystercatcher

Distribution: in the breeding season throughout the South Island on braided rivers, developed farmland, subalpine herbfields and swamps. In the non-breeding season large concentrations gather at estuaries in both the North and South Island. In Hawke's Bay small numbers are found at Porangahau and estuaries, Wairoa Rivermouth and Mahia Peninsula lagoons. On the riverbeds, seen on the Ngaruroro River only, where it is a relative newcomer, being recorded breeding for the first time in the North Island in 1980 (Twydle, 1983). Ten birds recorded on the Ngaruroro during this survey. Two records at the rivermouths: one at Waitangi 18 March 1983 (K. Todd pers. comm.), and one at Waitangi 24 October 1986 (pers. obs.).

Breeding habitat: mainly on shingle riverbeds with the majority of nests being on higher level shingle islands. Most nests are located amongst flood debris. Twydle found eggs on the Ngaruroro River as early as 26 September.

Feeding habitat: wide-ranging on riverbeds including riffles, edges of flowing water, pools and bare ground.

7.25 Variable oystercatcher

Distribution: a coastal species, uncommon on central Hawke's Bay beaches but more common in the north at Mahia and south at Porangahau. Recorded from Waitangi: one on 3 November 1984 (OSNZ 1986); two on 1 November 1985 and one at Tukituki Rivermouth 12 June 1986 (K. Todd pers. comm.). Seen also at Mohaka Rivermouth by K. Hawkins who believes they nested there in 1985.

7.26 Spur-winged plover

Distribution: self-introduced from Australia. First recorded breeding in Southland in the 1940's. Now widespread in the South Island and much of the North Island, although still colonising parts of the latter. Found in various habitat types including shingle riverbeds. A recent coloniser of Hawke's Bay Rivers. Not recorded by OSNZ on their three surveys in 1962, 1967 and 1972; recorded on all rivers during our survey. Evenly distributed except on the Tutaekuri where numbers were low.

Breeding habitat: riverbeds, short pasture and ploughed paddocks.

Feeding habitat: mainly areas of short vegetation; grasslands and herbfields. Feeds mainly on insect larvae and earthworms.

7.27 Pacific golden plover

Distribution: an overseas migrant, found mainly on the larger New Zealand harbours.

One bird recorded on Ngaruroro riverbed, just upstream of gravel extraction area, 28 November 1985 (R. Pierce, pers. comm.).

7.28 Banded dotterel

Distribution: an endemic species now classified as threatened (Bell 1986). Throughout New Zealand but more common in the South Island.

Flocks gather at estuaries and the coast during winter and some migrate to Australia. Found in Hawke's Bay on the main rivers and the coast, both as a breeding and wintering species.

Although breeding on the coast at Porangahau, Tukituki/Waitangi and Mahia in low numbers, the majority nest on the rivers. During this survey, the Tukituki/Waipawa Rivers held the greatest numbers (963) while the Ngaruroro held the greatest density of birds. The birds prefer wide, open shingle beds and avoid areas confined by cliffs or vegetation.

Breeding habitat: nest on shingle or sand on riverbeds and coast. Nests are usually sited some way from water, particularly on higher ground with scattered low mat vegetation.

Feeding habitat: feeding is mainly along the edge of main channels but occurs also on unvegetated shingle beds. Invertebrates are the staple diet.

7.29 Black-fronted dotterel

Distribution: a self-introduced species from Australia. First recorded in the now established in both islands with the main concentrations in the North Island. In New Zealand it lives mainly on shingle riverbeds, but in Australia it is widely distributed in lagoons, dams, river pools and slow-moving rivers. Found on all four rivers surveyed, with highest numbers on the Tukituki. MacKenzie (1963) recorded the highest numbers on the Tutaekuri River (63) with only 39 on the Ngaruroro River. Our survey found the lowest numbers on the Ngaruroro also. MacKenzie recorded only seven birds on the Tukituki and concluded that the river was being colonised. First recorded breeding in New Zealand in 1961 on the Tutaekuri River (MacKenzie 1961). Heather (in Robertson *et al.* 1985) stated these occurred south of the Esk River, but in that year (1985) confirmed breeding on the Mohaka.

Breeding habitat: the preferred site is the top of a shingle ridge or terrace within 10-30 m of a backwater or pool for feeding (Heather in Robertson *et al.* 1985). Pairs are well-spaced along a river with each pair holding a stretch of river, pool or backwater.

Feeding habitat: feeds almost exclusively on areas of silt or sand in pools, eddies and backwaters. Feeding consists of surface picking or shallow probing for invertebrates.

7.30 Wrybill

Distribution: an endemic New Zealand species, nesting only in some riverbeds of Canterbury and North Otago. Recorded at Waitangi Estuary several times; first recorded 28 February 1976 (OSNZ 1976). One recorded on Ngaruroro River, Labour Weekend 1986 (OSNZ 1986).

7.31 Eastern bar-tailed godwit

Distribution: a migrant from Siberia and north-western America. The most abundant wader to visit New Zealand. Seen at all the rivermouths most summers in moderate numbers, e.g. c. 60 on 24 June 1978 at Waitangi (OSNZ 1979). Recorded twice on the riverbed proper; three on Ngaruroro River in 1962 (Edgar 1963) and one on Tukituki River (OSNZ News, Dec 1985).

7.32 Siberian tattler

Distribution: an Arctic migratory wader, uncommon but regular visitor to New Zealand. Recorded twice at Waitangi Estuary; one bird 20 December 1975 (OSNZ 1976) and one bird on three occasions 5 February 1977 -5 April 1977 (OSNZ 1977).

7.33 Common sandpiper

Distribution: a rare and infrequent migrant to New Zealand. One bird thought to be this species was seen on the Tukituki River during the 1984 survey.

7.34 Terek sandpiper

Distribution: an Arctic wader reaching New Zealand in low numbers but regularly. One bird recorded at Waitangi Estuary (OSNZ 1984).

7.35 Turnstone

Distribution: a common and regular migrant to New Zealand from holarctic regions. Recorded on both the Tukituki River mouth and Waitangi Estuary on several occasions. One bird recorded on Tukituki riverbed Labour Weekend 1986 (OSNZ News, Dec 1986).

7.36 Knot

Distribution: easily the second most numerous Arctic wader which migrate to New Zealand. A frequent summer visitor to the rivermouths in small numbers, e.g. 18 birds seen at Waitangi Estuary, November 1973 (OSNZ 1976).

7.37 Sharp-tailed sandpiper

Distribution: a regular migrant to New Zealand in small numbers from Siberia. Recorded at Waitangi on three occasions: one on 15 January 1980 and three on 25 January 1983 (K. Todd pers. comm.), and one on 23 October 1980 (OSNZ 1982).

7.38 Pectoral sandpiper

Distribution: an Arctic migrant occurring annually in New Zealand in small numbers. One bird at Waitangi Estuary 8 December 1978 (OSNZ 1979).

7.39 Curlew sandpiper

Distribution: a regular migrant to New Zealand from Arctic Asia. Five birds seen at Tutaekuri River mouth 23 October 1980 (OSNZ 1982) and a flock of nine birds at Waitangi Estuary 25 June 1983 (OSNZ 1984).

7.40 Red-necked stint

Distribution: a regular migrant to New Zealand from north-eastern Siberia or north-west Alaska. Two birds seen on two occasions at Waitangi River in November 1980 (K. Todd pers. comm.), also three on 23 October 1980 (OSNZ 1982) and two on 25 November 1984 (OSNZ 1986).

7.41 Sanderling

Distribution: an Arctic migratory species rarely reaching New Zealand. One bird seen on Tukituki River at Bridge during aborted 1985 Labour Weekend survey (OSNZ News, Dec 1985).

7.42 Pied stilt

Distribution: widespread and common throughout most of New Zealand in both coastal and inland sites, generally around wetland areas. Pied stilts were recorded on all rivers surveyed and were the most common species of wader except on the Mohaka. Present all year round at the rivermouths. The high number recorded in 1984 results from the timing of the survey (30 November/1 December) compared to the Labour Weekend surveys of OSNZ. Birds which had nested on adjacent pasture and wetlands in October would have moved with their fledged young on to the riverbeds upon completion of nesting by November-December.

Breeding habitat: the majority of nests were found on high level shingle islands, some on adjacent wet pasture. Pied stilts nest in loose colonies as well as in individual pairs.

Feeding habitat: feeding occurs along the edge of channels and backwaters where the water is slow-moving, and also around static pools. Stilts feed on a variety of invertebrates.

7.43 Southern black-backed gull

Distribution: a common and widespread species found in a variety of habitats throughout New Zealand. Black-backed gulls were present on all rivers surveyed but numbers of breeding birds on the Ngaruroro River were significantly higher, with a total of 2056 recorded.

Breeding habitat: nest in large loose colonies often covering a kilometre or more of the riverbed. The largest colony seen was one of 1000+ birds on the Ngaruroro River.

Feeding habitat: most feeding is off-river, over adjacent farmland, urban areas and refuse tips.

7.44 Red-billed gull

Distribution: common in most coastal areas around New Zealand, rare inland. Widespread in Hawke's Bay but nowhere in large numbers. The only sites for red-billed gull in Hawke's Bay is on Portland Island. Common on the rivermouths but rare upstream.

7.45 Black-billed gull

Distribution: an endemic New Zealand gull, mostly found in the South Island with only scattered colonies in the North Island. Small breeding colonies on the Tukituki riverbed and larger colonies at the Waitangi Estuary and the Mohaka rivermouth. Fewer birds occur on the Ngaruroro River and only one bird recorded on the Tutaekuri River. Breeds at Waitangi in a colony of up to 250 pairs, e.g. "500 birds, 230 nests at Waitangi in October 1981, site vandalised by January 1982" (OSNZ 1983).

Breeding habitat: on shingle islands in the riverbeds or on shingle spits at mouths.

Feeding habitat: on South Island rivers feeding is off-river on adjacent particularly wet paddocks and ploughed land (O'Donnell & Moore 1983).

7.46 Black-fronted tern

Distribution: an endemic species which breeds on shingle riverbeds east of the Southern Alps. Winters on the coasts of the three main islands. Recorded as a wintering species almost annually since 1947 (OSNZ 1948) at the Tukituki rivermouth, also at Waitangi Estuary, where up to 75 have been seen at one time. Birds have also been seen inland; "two adults in breeding plumage seen catching insects over a ploughed paddock by Black Bridge" (Tukituki), (OSNZ 1955).

7.47 White-winged black tern

Distribution: a cosmopolitan tern which has attempted breeding in New Zealand on the Opihi River, South Canterbury (Pierce 1974). Recorded at Waitangi Estuary and at Clive (OSNZ 1985).

7.48 Gull-billed tern

Distribution: a straggler to New Zealand from South-east Asia or Australia.

One or two seen along Hawke's Bay coast in recent years at Napier and Porangahau (pers. obs.). One unconfirmed report at Rivermouth (K. Todd pers. comm.).

7.49 Caspian tern

Distribution: a cosmopolitan species which is found throughout New Zealand's coastal areas and occasionally inland; more common in the north. In Hawke's Bay breeds only at Porangahau but seen along most of the coast. Frequently seen at the rivermouths but not recorded along the riverbeds during the survey.

7.50 Eastern little tern

Distribution: a regular migrant to New Zealand from breeding areas, probably eastern Asia. Occasional birds seen around Waitangi Estuary, e.g. 2 on 28 December 1982 and 3 January 1983 (OSNZ 1984), and 2 on 27 May 1983 (OSNZ 1985).

7.51 White-fronted tern

Distribution: widespread and common in coastal New Zealand. Infrequent breeding at the Mohaka Rivermouth, e.g. 600 pairs flooded out by storm 13-15 November 1983 (Hawkins, 1985). Birds nest also at Clive most years but often desert because of disturbance, vandalism or flooding (250 birds nesting 29 October 1981, washed out on 31 October (OSNZ 1983) and c. 800 at Waitangi on 22 September 1982 and c. 120, of which 75% were juveniles (OSNZ 1984)). Some seasons are successful, e.g. "East Clive c. 300 congregating at nesting site on 18.10.84, built up to a colony of 600 nests with the prolific season" (OSNZ 1986). Three birds seen on riverbed during survey.

7.52 Terrestrial bird species

Twenty-eight species of terrestrial birds were recorded on the riverbeds or in adjacent forest, scrub or willows. These are listed in Table 7. Two species, New Zealand kingfisher and welcome swallow, are dependent to some extent on aquatic habitats. Kingfishers feed on fish, crustaceans, lizards and insects, while swallows hawk for insects over river channels.

New Zealand pipits were common along the riverbeds especially in the upper reaches surveyed. Pipits are rare in the developed countryside of Hawke's Bay and the riverbeds are a major habitat for this species. They feed on insects on bare shingle and along the water's edge. Three species, New Zealand pigeon, tui and bellbird, were seen only in native bush and scrub in the upper reaches of rivers, although pigeons are known to feed on fresh leafbuds of willows.

The game species, quail and pheasant, were common amongst broom, gorse and lupin on shingle beds.

Shining cuckoos were common in old, established willows along the river banks. McMillan (pers. comm.) has shown that shining cuckoos can be more common in willows along the rivers than in native vegetation.

Rock pigeons nest under bridges at several sites along the rivers.

8.1 Lizards

The common (*Leiopisma nigriplantare maccanni*) was recorded on the rivermouth shingle bars of both the Mohaka and Tutaekuri Rivers.

8.2 Bats

The long-tailed bat (*Chalinolobus tuberculatus*) is known from the main ranges which form the headwaters of Hawke's Bay rivers. They are also known from small bush remnants flanking the eastern foothills. The only confirmed reports on the rivers covered in this report are at Bush on the Tukipo River, Bush on the Tukituki River and Puahanui Bush on the Mangaonuku River (M. Daniel, pers. comm.).

8.3 Introduced Mammals

(a) Browsing mammals

Hare (*Lepus europaeus*): hares were noted on most of rivers, and were particularly common on the Waipawa River.

Rabbit (*Oryctolagus cuniculus*): present throughout the river systems in low numbers, except on the Waipawa River where they were more common.

Domestic cattle, sheep and goats: widespread though localised grazing by sheep and cattle was seen throughout on riverbeds. Goats were seen in only one or two places on the southern rivers but were common on the Mohaka River. This grazing keeps some areas in short grass and weeds and some banded were observed utilising these areas. Any benefits of grazing are probably offset by the disturbance stock cause to nesting birds.

Feral goats (*Capra hircus*): very common in the Mohaka River, where counted 55 in February 1985.

Possum (*Trichosurus vulpecula*): possums are present along the riverbanks in willows, which provide suitable holes for shelter as well as a food source in spring and summer, and in native bush and along banks.

(b) Predatory mammals

Feral cats (*Felis domesticus*): two wild cats were seen on the Waipawa River. Common at Mohaka River mouth (K. pers. comm.).

Hedgehog (*Erinaceus europaeus*): seen on the Waipawa River only.

Weasel (*Mustela nivalis*) one seen on Mohaka River edge, chasing a rabbit (K. Hawkins. pers. comm.).

Ferret (*Mustela putorius furo*): footprints thought to be of this species were seen on the Waipawa River. Known also on Mohaka River (K. Hawkins, pers. comm.)

9. WILDLIFE AND RIVER MANAGEMENT

9.1 The National Significance of Shingle Riverbed Habitats in Hawke's Bay

The riverbeds of Hawke's Bay are a major habitat type in the North Island. They provide breeding and feeding habitat for many species of birds, some of which are largely confined to this habitat type, e.g. banded dotterel, black-fronted dotterel, black-billed gull and South Island pied oystercatcher. These rivers would support a high percentage of the North Island breeding population of three species of birds: banded (1670 birds were counted including juveniles); black-fronted dotterel with 642 birds counted; black-billed gull on both riverbeds and rivermouths; and the only North Island breeding of South Island pied oystercatcher.

On a regional level, the rivers and their estuarine mouths support major populations of waterfowl, shags, gamebirds, spur-winged plover, pied stilt, white-fronted tern and smaller numbers of migratory waders and terrestrial birds.

Table 7: Terrestrial Bird Species Using Riverbed Habitat

	Mohaka	Ngaruroro	Tukituki	Tutaekuri
Australasian harrier	X	X	X	X
California quail	X	X	X	X
Pheasant	X		X	X
New Zealand pigeon	X		X	
Rock pigeon			X	
Shining cuckoo	X	X	X	X
New Zealand kingfisher	X	X	X	X
Skylark		X	X	X
Welcome swallow	X	X	X	X
New Zealand pipit	X	X	X	X
Hedge sparrow	X	X	X	X
Grey warbler	X	X	X	X
N.I. fantail	X	X	X	X
Song thrush	X	X	X	X
Blackbird	X	X	X	X
Silvereve	X	X	X	X
Bellbird	X	X	X	X
Tui	X		X	
Yellowhammer	X	X	X	X
Chaffinch	X	X	X	X
Greenfinch		X	X	X
Goldfinch	X	X	X	X
Redpoll		X	X	X
House sparrow	X	X	X	
Starling	X	X	X	X
Indian myna	X	X	X	X
White-backed magpie	X	X	X	X
Rook	X	X		X

X = Species present

9.2 Specific Threats to Wildlife and Wildlife Habitats

Shingle riverbeds have been modified by a variety of human activities. Some activities may cause critical disturbance during all or part of the life history of riverbed birds.

The following sections (9.2.1-9.2.6) are based on the FSU Report "Wildlife and Conservation of Braided River Systems in Canterbury" (O'Donnell and Moore 1983). Threats to wildlife and wildlife habitat identified in Canterbury rivers apply also to Hawke's Bay rivers.

9.2.1 Vegetation Encroachment

Introduced plant species, particularly lupin, gorse, broom, willow and annual weeds, have encroached upon much of the shingle riverbed habitat of Hawke's Bay and have made extensive areas unavailable to riverbed bird species. Some encroachment is the direct result of planting for river control purposes or erosion control in the headwater ranges.

Natural control of some weeds occurs in flood conditions but this is a localised and long-term process. Actual flow of water is not a primary weed remover as floods tend only to flatten vegetation. It is lateral erosion (undermining of midstream islands and side banks) that is the main vegetation remover. This applies where riverbeds are unconfined by terraces or gorges. However, within confined areas of riverbed, weeds can be completely removed by floods. K. Hawkins (pers. comm.) reports that all riverbed vegetation was removed on the Mohaka River during a flood in March 1985. Lack of nesting space caused by vegetation encroachment may now be a major limiting factor to the breeding of riverbed birds.

9.2.2 Irrigation

Abstraction of river waters for irrigating farmland can result in the following effects:

1. loss of aquatic habitat
2. loss of invertebrate food caused by loss of habitat and, if flow is substantially reduced, by rising water temperature and decreased oxygen concentration;
3. reduced stream channel mobility resulting from lower flows and a change in the process;
4. increased vegetation encroachment; reduction of available terrestrial habitat and increased stability of high level areas;
5. disturbance of wildlife by on-river works, particularly during the breeding season.

9.2.3 Dam Impoundments

The damming of shingle rivers for hydro-electric power generation water storage may modify the wildlife habitat in a number of ways:

- (i) markedly reduced fluctuations in river flow and reduction in flood and fresh frequency;
- (ii) controlled flows leading to vegetation encroachment;
- (iii) drying up of downstream areas during critical low-flow periods;
- (iv) impounding shingle and other sediment and greatly altering the river geomorphology downstream.

9.2.4 Channel Modifications

Channel modifications and riverbed works for gravel extraction, road and bridge construction, land development, water diversion and particularly flood control works can have major impacts on the river system. Some detrimental activities and effects include:

- stop-banking, leading to confinement of river channels, decreased width of habitat and increased height of floods;
- channel diversion and straightening, leading to reduction in the number of active side channels and increased current velocity;
- altered stream sediment aggradation and degradation processes with greater sediment flow out to sea;
- increased bank and bed erosion during floods,
- modification of berm lands by successive planting and eradication of willows;
- continued maintenance of flood control earthworks;
- disturbance of buds by machinery and personnel, particularly during the breeding season.

9.2.5 Recreational Activities

A variety of recreational activities may disturb or threaten riverbed birds, particularly during the crucial breeding season. They may cause destruction of nests, disturbance of sensitive birds or modification of critical feeding habitat. These recreationalists include:

- four-wheel drive vehicle and trail bike enthusiasts;
- jet-boaters, rafters and canoeists;
- fisher people, picnickers and walkers;
- bird watchers, including river wildlife surveying personnel.

Some activities are more likely to cause disturbance than others. Passive recreationalists probably cause less disturbance than the more active, especially the motorised users. Disturbance usually occurs where river users do not identify breeding colonies or well-camouflaged eggs or young and cause birds to desert nests or young.

9.2.6 Modifications of Rivermouth Habitat

Upstream water abstraction, hydro-electric power development and channel modifications influence rivermouth habitat by causing:

- change in sedimentation process e.g. increased deposition with lower river flows;
- change in the frequency of flushing and lagoon openings and permanent bar formation with lower flows;
- change in water regime;
- change in habitat characteristics e.g. vegetation composition;
- change in saline freshwater gradients through less frequent openings to the sea.

9.2.7 Other Threats

A variety of other factors threaten or affect riverbed bird populations, their breeding success and habitat quality:

- natural predators such as black-backed gulls and, to a lesser extent, harriers. Large concentrations of black-backed gulls on the riverbed affect species of waders, e.g. on parts of the Ngaruroro River where gulls nest on the riverbed, very low numbers of waders were seen (Section 6.2(c) Parrish 1985b);
- introduced mammalian predators, viz. three mustelid species (*Mustela* spp.), two species of rat (*Rattus* spp.), cats (*Felis domesticus*) and hedgehogs (*Erinaceus europaeus*);
- effluent discharge into rivers;
- intensive stocking of riverbeds with sheep, goats and cattle. This may, however, have some benefits for wildlife by controlling weed growth, provided it is done within a carefully formulated management plan which ensures minimum bird disturbance at critical times;
- poisoning of rabbits, hares etc may affect non-target bird species.

9.3 Management of Riverbed Habitats for Wildlife

The management of shingle rivers for wildlife is a complex issue and it is not possible to deal with specific issues in this report. Further comment on specific proposals or issues of concern should be sought from the Department of Conservation.

Problems for wildlife may arise when developments are undertaken before there is an understanding of how they may influence riverbed bird populations, or when wildlife values are not even considered. Some developments and activities however, may not be significantly incompatible with the maintenance of riverbed values and some bird species may even benefit. Further study of such issues is required.

9.3.1 Management Considerations in Relation to Specific Threats to Wildlife and Wildlife Habitats

It is possible to state some general principles with regard to riverbed habitat management for the rivers of Hawke's Bay.

9.3.1.1 Vegetation Encroachment

It is now common practice on some rivers to assist flood control by spraying introduced weeds with herbicides. This may be of advantage to riverbed wildlife if it limits weed encroachment, or reverses the current encroachment trends. On the other hand, spraying could have significant detrimental effects on breeding and feeding birds, particularly if carried out on a river during periods of high use by birds. This aspect requires further study, particularly in relation to the most effective spraying periods and conditions, the timing of flood the effects of chemical herbicide on river ecosystems.

9.3.1.2 Irrigation Abstraction, Dam Impoundments, Channel Modifications and Riverbed Works

As stated previously in this report (9.2.2, 9.2.3 and 9.2.4) all of these works and activities can have serious consequences for riverbed birds. The effects of these works must be considered in both the short-term and the long-term. The short-term effects are primarily the disturbance that on-site works have on birds.

Such works include bulldozing, gravel abstraction, stop-banking, spraying, snagging, lopping and layering, tree planting or other river restoration works. They can cause breeding and feeding disturbance or destruction of nests. These effects can be alleviated by the carrying out of these works during the non-breeding season.

The long-term effects are primarily the loss of habitat caused by stop-banking, planting willows, channel straightening and lower water levels. Such past modifications on some rivers have greatly reduced their value for wildlife. It is possible to compensate for these effects to some extent by creating habitat primarily for waterfowl through the creation of shallow water areas in the berm areas and where side drains and streams enter the main river. The Hawke's Bay Catchment Board adopted this approach on the Tukituki River after consultation with the Wildlife Service (Williams, 1985).

The Department of Conservation seeks consultation or involvement in the planning of any further river control or other on-site river works.

9.3.1.3 Recreation Activities

The degree of disturbance of riverbed wildlife by recreationalists can be greatly reduced by increasing their awareness of birds' existence and values.

The Department of Conservation should promote such an awareness, especially through the news media and recreationalists' clubs.

Restriction of access to parts of some riverbeds by four-wheel drive vehicles and trail bikes may be necessary during the breeding season.

9.3.1.4 Modifications to Rivermouth Habitats

The downstream and rivermouth effects of any river modification should be considered when developments are planned. Management intentions at a rivermouth should be to maintain the area as far as possible its natural state.

9.3.1.5 Other Threats or Modifications

The feasibility of predator control on Hawke's Bay rivers need to be assessed. Given the lack of any endangered species of wildlife on Hawke's Bay rivers, mammalian predator control which requires intensive man-power efforts is not envisaged, but a black-backed gull control programme could well be feasible.

Studies are also needed of grazing and poisoning practices to determine what impact they are currently having and whether they could be used to advantage as wildlife management tool.

10. RECOMMENDATIONS

1. That the Department of Conservation advise all statutory and other bodies controlling or having an interest in river use of the value of Hawke's Bay rivers to wildlife.
2. That the Hawke's Bay Catchment Board and others consult the Department of Conservation with regard to all on-river works or works affecting river catchments forest clearance.

3. That routine maintenance and other on-river works, including gravel extraction, be carried out where practical during the non-breeding season (March-August) of riverbed birds.
4. That the Department of Conservation promote an awareness and understanding of the existence and values of wildlife on Hawke's Bay rivers among recreationalists and the public.
5. That the Hawke's Bay Catchment Board monitor and police all water rights granted for irrigation abstraction to ensure sufficient water remains in the rivers to maintain wildlife values, especially during the critical breeding season (September-February).
6. That the feasibility of spraying riverbed weeds be investigated.
7. That a study of southern black-backed gulls be undertaken to determine whether a control programme is needed.

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APPENDIX 1: CRITERIA FOR RANKING SITES OF SPECIAL WILDLIFE INTEREST

1. Outstanding

- a) Presence of a breeding population of a highly endangered or rare endemic species.
- b) A population of an endemic species of very restricted distribution and which could become endangered.
- c) Areas essential to species from (a) and (b) for purposes other than breeding.
- d) Areas of vital importance to internationally uncommon species (breeding and/or migratory).
- e) Areas of vital importance to internally migratory species with very limited distribution or abundance.
- f) Largely unmodified ecosystem or example of original habitat type not represented elsewhere in the country, of large size and containing viable populations of all or almost all species which are typical of the ecosystem or habitat type.

2. High

- a) Site containing an indigenous species which has declined significantly as a result of man's influence.
- b) One of few *or* the only breeding area for a non-endemic indigenous species of limited abundance.
- c) Habitat of an uncommon, discontinuously distributed species not adequately represented in a particular ecological region.
- d) Example of a largely unmodified site which is not represented to the same extent elsewhere in the ecological region and is used by most species which are typical of that habitat type for the region.
- e) Presence of a species of an endemic family which is of limited abundance throughout the country although adequately represented in one ecological region but whose habitat is at some risk.

3. Moderate-High

- a) Presence of a species which is still quite widely distributed but whose habitat has been and still is being significantly reduced or modified as a result of man's influence.
- b) Areas containing high numbers of breeding or moulting birds or where breeding or moulting areas are of inter-regional significance to wildlife.
- c) A large and fairly unmodified site or ecosystem which is represented elsewhere in the ecological region and contains all, or almost all, species typical of that habitat type for a particular region.
- d) An area where any particular species is exceptional in terms of, say, abundance or behaviour but which is otherwise widespread.

4. Moderate

All sites supporting good numbers of species which are typical of that type of habitat within an ecological region and which have not heavily modified by man's influence.

5. Potential

All areas of some wildlife significance whose wildlife values are limited by small size, heavy modification or other factors, but which would have increased wildlife value if left to regenerate or if managed or developed for wildlife. (May include wildlife habitat which functions as a corridor, or which is sub-optimal habitat which may be necessary for maintaining genetic diversity.)

APPENDIX 2: CHECKLIST OF BIRD SPECIES OF HAWKE'S BAY RIVERBEDS AND RIVERMOUTHS

N.Z. dabchick	<i>(Podiceps rufopectus)</i>
Australasian gannet	<i>(Sula bassana serrator)</i>
Black shag	<i>(Phalacrocorax carbo novaehollandiae)</i>
Pied shag	<i>(P. varius varius)</i>
Little black shag	<i>(P. sulcirostris)</i>
Little shag	<i>(P. melanoleucos brevirostris)</i>
Spotted shag	<i>(Stictocarbo punctatus punctatus)</i>
White-faced heron	<i>(Ardea novaehollandiae novaehollandiae)</i>
White heron	<i>(Egretta alba modesta)</i>
Little egret	<i>(E. garzetta immaculata)</i>
Reef heron	<i>(E. sacra sacra)</i>
Australasian bittern	<i>(Botaurus stellaris poiciloptilus)</i>
Black swan	<i>(Cygnus atratus)</i>
Canada goose	<i>(Branta canadensis)</i>
Royal spoonbill	<i>(Platalea leucorodia regia)</i>
Feral goose	<i>(Anser anser)</i>
Paradise shelduck	<i>(Tadorna variegata)</i>
Mallard	<i>(Anas platyrhynchos platyrhynchos)</i>
Grey duck	<i>(A. superciliosa superciliosa)</i>
Grey teal	<i>(A. gibberifrons gracilis)</i>
NZ shoveler	<i>(A. rhynchotis variegata)</i>
Australian harrier	<i>(Circus approximans gouldi)</i>
California quail	<i>(Lophortyx californicus brunnescens)</i>
Pheasant	<i>(Phasianus colchicus)</i>
Spotless crake	<i>(Porzana tabuensis plumbea)</i>
Pukeko	<i>(Porphyrio porphyrio melanotus)</i>
S.I. pied oystercatcher	<i>(Haematopus ostralegus finschi)</i>
Variable oystercatcher	<i>(H. unicolor)</i>
Spur-winged plover	<i>(Lobibyx novaehollandiae)</i>
Pacific golden plover	<i>(Pluvialis dominica fulva)</i>
Banded dotterel	<i>(Charadrius bicinctus)</i>
Black-fronted dotterel	<i>(C. melanops)</i>
Wrybill	<i>(Anarhynchus frontalis)</i>
Eastern bar-tailed godwit	<i>(Limosa lapponica baueri)</i>
Siberian tattler	<i>(Tringa brevipes)</i>
Common sandpiper	<i>(T. hypoleucos)</i>
Terek sandpiper	<i>(Xenus cinereus)</i>
Turnstone	<i>(Arenaria interpres interpres)</i>

Knot	<i>(Calidris canutus canutus)</i>
Sharp-tailed sandpiper	<i>(C. acuminata)</i>
Pectoral sandpiper	<i>(C. melanotos)</i>
Curlew sandpiper	<i>(C. ferruginea)</i>
Red-necked stint	<i>(C. ruficollis)</i>
Sanderling	<i>(C. alba)</i>
Pied stilt	<i>(Himantopus himantopus leucocephalus)</i>
Southern black-backed gull	<i>(Larus dominicanus)</i>
Red-billed gull	<i>(L. novaehollandiae scopulinus)</i>
Black-billed gull	<i>(L. bulleri)</i>
White-winged black tern	<i>(Chlidonias leucopterus)</i>
Gull-billed tern	<i>(Gelochelidon nilotica macrotarsa)</i>
Caspian tern	<i>(Hydroprogne caspia)</i>
Eastern little tern	<i>(Sterna albifrons sinensis)</i>
Black-fronted tern	<i>(S. albostrata)</i>
White-fronted tern	<i>(S. striata)</i>
NZ pigeon	<i>(Hemiphaga novaeseelandiae novaeseelandiae)</i>
Rock pigeon	<i>(Columba livia)</i>
Shining cuckoo	<i>(Chrysococcyx lucidus lucidus)</i>
NZ kingfisher	<i>(Halcyon sancta vagans)</i>
Skylark	<i>(Alauda arvensis arvensis)</i>
Welcome swallow	<i>(Hirundo tahitica neoxena)</i>
NZ pipit	<i>(Anthus novaeseelandiae novaeseelandiae)</i>
Hedge sparrow	<i>(Prunella modularis occidentalis)</i>
Grey warbler	<i>(Gerygone igata igata)</i>
N.I. fantail	<i>(Rhipidura fuliginosa placabilis)</i>
Song thrush	<i>(Turdus philomelos)</i>
Blackbird	<i>(T. merula merula)</i>
Silvereye	<i>(Zosterops lateralis lateralis)</i>
Bellbird	<i>(Anthornis melanura obscura)</i>
Tui	<i>(Prosthemadera novaeseelandiae novaeseelandiae)</i>
Yellowhammer	<i>(Emberiza cirrinella sylvestris)</i>
Chaffinch	<i>(Fringilla coelebs gengleri)</i>
Greenfinch	<i>(Carduelis chloris chloris)</i>
Goldfinch	<i>(C. carduelis britannica)</i>
Redpoll	<i>(Acanthis flammea)</i>
House sparrow	<i>(Passer domesticus domesticus)</i>
Starling	<i>(Acridotheres tristis)</i>
Indian myna	<i>(Acridotheres tristis)</i>
White-backed magpie	<i>(Gymnorhina tibicen hypoleuca)</i>
Rook	<i>Corvus frugilegus frugilegus)</i>

APPENDIX 3 : MACRO-INVERTEBRATE FAUNA OF HAWKE'S BAY RIVERS

Data supplied by Suzanne Porter, Water Resource Scientist, Hawke's Bay Catchment Board.

SPECIES	TUKITUKI	NGARURORO	TUTAEKURI
<i>EMPHEMEROPTERA</i> (Mayflies)			
<i>Deleatidium</i> sp	X	X	X
<i>TRICHOPTERA</i> (Caddisflies)			
<i>Pycnocentroides</i> sp.	X	X	X
<i>Pycnocentroides eruensis</i>		X	
<i>Aoteapsyche colonica</i>	X	X	X
<i>Oxyethira albiceps</i>			X
<i>Hydrobiosis</i> sp.	X		
<i>Hydrobiosella stenocera</i>		X	
<i>PLECOPTERA</i> (Stoneflies)			
<i>Zelandoperla fenestrata</i>	X	X	X
<i>COLEOPTERA</i> (Beetles)			
<i>Elmid</i> sp	X	X	X
<i>DIPTERA</i> (Midges)			
<i>Chironomid</i> sp	X	X	X
<i>Simulidae</i> sp			X
<i>GASTROPODA</i> (Snails)			
<i>Potamopygrus antipodarum</i>		X	X
<i>TURBELLARIA</i> (Flatworms)			
<i>Tubifex</i> sp	X	X	
<i>OLIGOCHAETE</i> (Worms)	X	X	X
<i>OSTROCODA</i>	X		
<i>Daphnia</i>	X		

APPENDIX 4

OSNZ HAWKE'S BAY RIVERS SURVEY RESULTS - LABOUR WEEKEND 1986

SPECIES	NGARURORO	TUTA EKURI*	TUKITUKI	TOTALS
Black shag	5	49	36	90
Little shag	12	7	9	28
White-faced heron	10	13	33	56
Paradise shelduck	150	47	431	628
Mallard	31	59	273	363
Grey duck	0	0	2	2
Grey teal	4	5	17	26
New Zealand shoveler	0	0	15	15
Pukeko	0	0	2	2
SI pied oystercatcher	8	0	0	8
Spur-winged plover	56	38	183	277
Banded dotterel	480	509	1149	2138
Black-fronted dotterel	145	200	341	686
Wrybill	1	0	0	1
Turnstone	0	0	1	1
Pied stilt	220	310	482	1012
Southern black-backed gull	2134	465	1202	3801
Black-billed gull	8	62	174	244
White-fronted tern	0	63	0	63
TOTALS	3264	1827	4350	9441

*Includes some birds at rivermouth (Waitangi)