FISH SPECIES
IN THE LOWER WAITAKI RIVER
AND ITS TRIBUTARIES

BY

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1. INTRODUCTION

The Lower Waitaki River (Figure 1) is at present under study by the Ministry of Agriculture and Fisheries, Fisheries Research Division, to establish possible effects of future hydro electric power development proposals on the existing fishery. This river provides habitat for a large range of fish species both native and introduced, and the purpose of this paper is to identify the species, their habitat areas, significance, and the possible effects of future development.

2. METHODS

Fish samples were collected by netting, using both seine and gill nets, as described in Lagler (1952), electrofishing (Burnet 1959), and visual observations during field work. Specimens taken were preserved in 10% formalin for laboratory identification, which was carried out using McDowall (1978).

3. FISH SPECIES COMPOSITION AND DISTRIBUTION

(a) Native

Nineteen species of native fish are found in this area. Some spend their entire life cycle in freshwater, others migrate to the sea at various stages in their life cycle and spend varying lengths of time in fresh water. Distributions of the various species are shown in Figures 2 and 3.

(i) Longfinned eel *(Anguilla dieffenbachii)*

Found in slower-flowing areas of the main stream and tributaries, this fish lives under cover or in muddy areas. It is present in most locations, and the population density is light to moderate. The juveniles (glass eels) enter the river from August- December, gradually

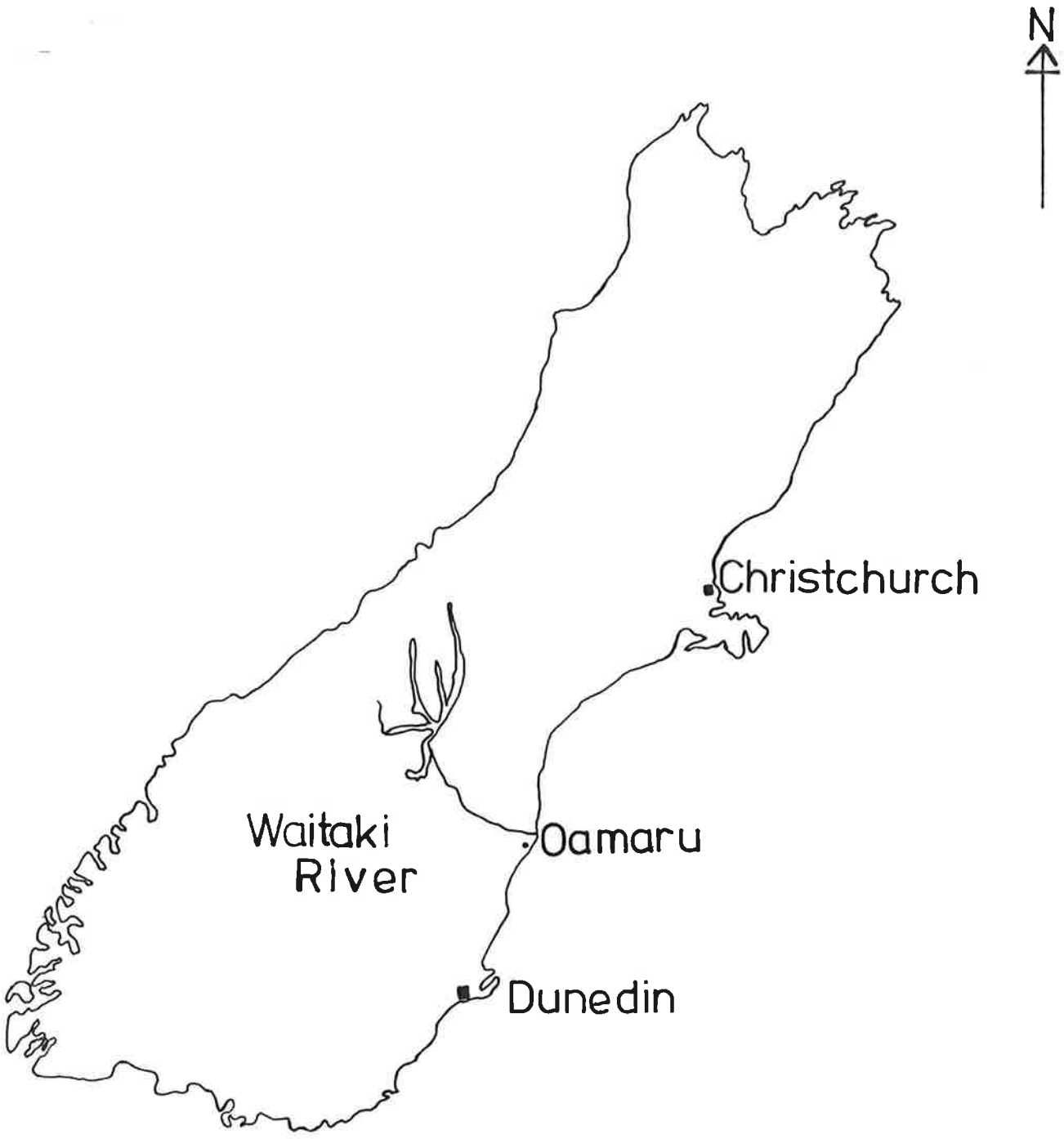

FIGURE 1. The Waitaki River system.

dispersing throughout the system. They can climb obstructions (i.e. Waitaki Dam). The adults migrate to sea during March-April to spawn (probably in deep areas in the Pacific Ocean), after a number of years in fresh water. At migration, the males average age is 22 years, while females average 33 years (McDowall 1978). The average size of males is 645 mm, and females average 1193 mm. Eels feed on both insects and other fish.

This species is of commercial value, although in the Waitaki River the only suitable areas for commercial fishing are the hydro lakes, which are dependant on recruitment of stock from downstream over the hydro dams. Some eels are taken for food purposes from various locations.

(ii) Shortfinned eel *(Anguilla australis)*

This eel is of similar habits to the longfinned eel, but does not grow to such a large size and usually is not found so far up the tributaries. Migration times are similar, but males migrate at an average age of 13 years, and females at 19 years. The size of adult males averages 480 mm, that of females 688 mm.

(iii) Lamprey (*Geotria australis*)

Juveniles are found in sandy or muddy areas both in tributaries and the main river, where they spend several years burrowed into the bottom, feeding on micro-organisms before emerging and migrating to sea. The adults enter the river in late winter - early spring, after several years at sea. They are thought to spawn in sandy or muddy areas and almost certainly die after spawning. Migrations occur at night or on a flood and are therefore seldom seen. The adults are not usually preyed on by other fishes, although juveniles have been recorded from trout stomach contents in the Hakataramea River. Lampreys were formerly valued by the Maori as a food. Adult sizes range from 450 - 600 mm.

(iv) Common smelt *(Retropinna retropinna)*

This species is anadromous, the adults migrating in from the sea to spawn during October-December, and adults are present in the lower part of the river (3 km) until autumn. At times the fish occur in large shoals, spawning in the lower river near the lagoon. The larvae are washed out to sea, and return as adults at two years of age to spawn. Adult size ranges from 70 - 90 mm. The fish are of significant importance as a food for trout, eels, black flounders, kahawai and many of the sea birds found in the area.

(v) Inanga *(Galaxias maculatus)*

This fish is the predominant species in the whitebait catch. The adults live in the lower river and lagoon area in back waters and close to cover, the adult size ranging from 100 - 110 mm. They spawn in the tidal zone on grasses and rushes at the margin of areas which are covered by spring tides in February-April, the eggs hatching at the following spring tide. The larvae then go out to sea returning after six months (August-December) as whitebait. Whitebait are caught by fishermen (not commercially in this river) at the mouth and in the lagoon in small wire-gauze nets. The legal season is 1 September - 30 November each year. This species provides food for trout and other species present in the lower river.

(vi) Banded kokopu *(Galaxias fasciatus)*

This species is also present in the whitebait catch. The adults live in some of the tributary streams in pool areas where suitable cover is available. They spawn in these areas in autumn - early winter, and the young migrate to sea during floods. Adult size averages about 200 mm. Population density is low.

(vii) Koaro *(Galaxias brevipinnis)*

This species is also present in the whitebait catch in small numbers.

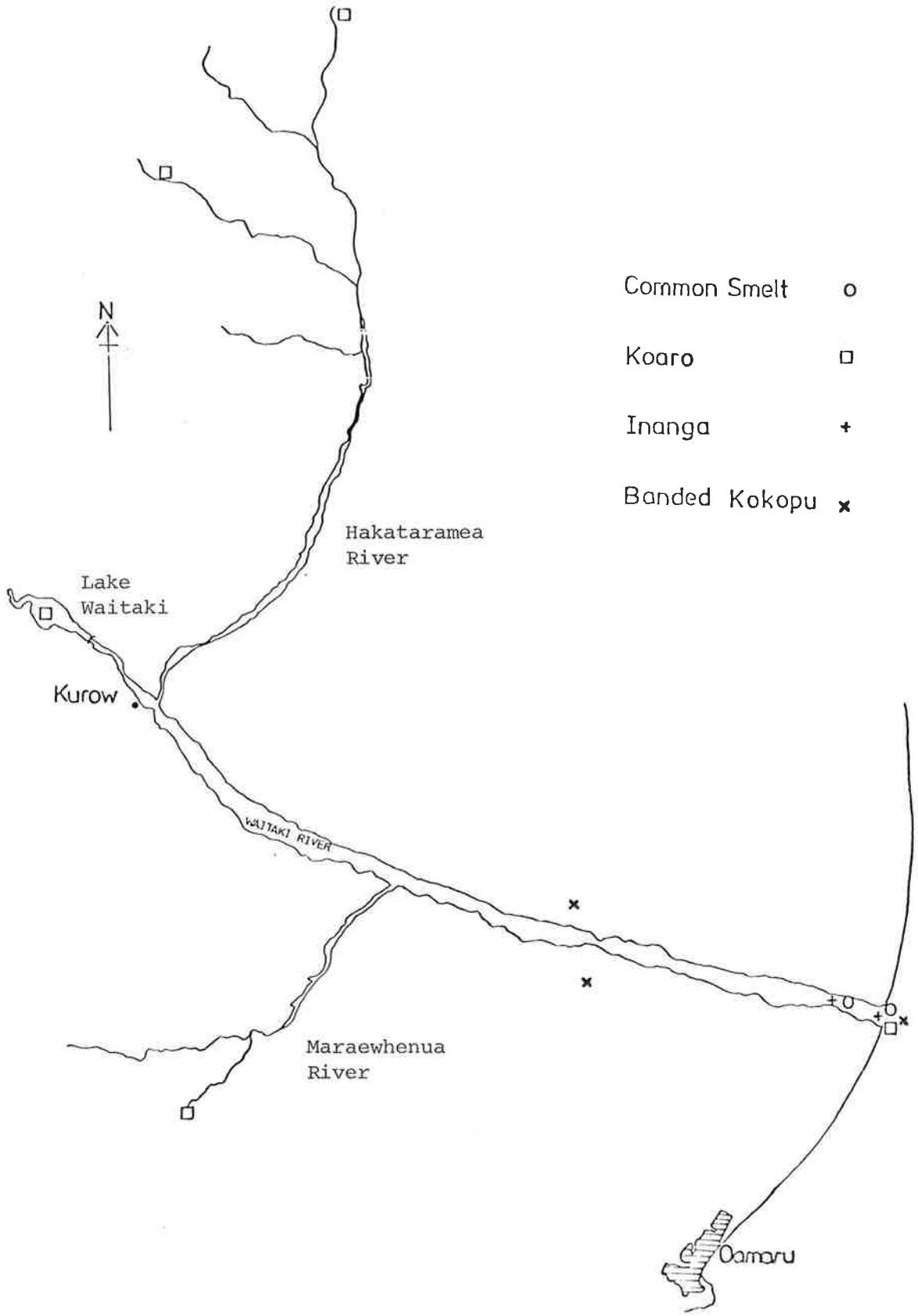

FIGURE 2. Distribution of native fishes in the lower Waitaki River.

The adults live high in the upland streams in fast-water areas (upper Maraewhenua, Hakataramea etc.). They spawn in autumn - early winter and in some areas the young migrate to sea. Juveniles are capable of climbing dam rock faces, hydro dam slipways, etc. Lake resident populations are also found in the hydro lakes.

(viii) Giant kokopu *(Galaxias argenteus)*

Also present in small numbers in the whitebait run, this is the largest species of *Galaxias*, sometimes known as native trout. Adults live not far from the sea, in back-water areas where there is plenty of cover, spawning in these areas from autumn - early winter. Adult size averages about 300 mm. The young migrate to sea.

(ix) Common river galaxias *(Galaxias vulgaris)*

Not a whitebait species, this fish is present in moderate to high numbers in most locations in the main river and tributaries. It spawns in the same areas during late winter and spring. Adult size ranges from 100 - 115 mm. The fry appear in schools in back-waters and in the shallows along the stream margins. The fish provides some food for trout.

(x) Canterbury mudfish *(Neochanna burrowsius)*

Although not present in the main river, this species is found in swampy areas on the plains to north and south of the river. It spawns in these swamps and has been known to aestivate when the swamps dry up in drought periods. This species is endangered by drainage.

(xi) Torrentfish *(Cheimarrichthys fosteri)*

Adults are found in fast water in the main river and larger tributaries, in low to moderate water depths. Spawning occurs in the river in summer and early autumn and the eggs or young fish are washed out to sea. They return to fresh water at about 25 mm in length. The adult size ranges from 100 - 125 mm.

(xii) Redfinned bully *(Gobiomorphus huttoni)*

This species is common in the main river and tributaries, spawning in the adult habitat during July-November. The young migrate to sea on hatching, returning to the river when 15-20 mm long. It feeds on invertebrates and is taken by trout as food. Adult sizes range up to 100 mm.

(xiii) Giant bully *(Gobiomorphus gobioides)*

Adults are found in the lagoon area in slow flowing water. It is thought that spawning probably occurs there, the larvae being marine. Adults average about 150 mm in length, and occur only in small numbers.

(xiv) Bluegilled bully *(Gobiomorphus hubbsi)*

Adults are found in the lower river (up to 10 km upstream). Spawning occurs in the adult habitat during spring and summer. Larvae migrate to sea, returning the next spring when 15-20 mm in length. Adult size ranges from 50-60 mm, and the population density is moderate.

(xv) Common bully *(Gobiomorphus cotidianus)*

This species is very common in most areas of the main river and tributaries. Spawning occurs in spring and summer on stones and boulders in the river. The larvae migrate to sea, returning when 15 - 20 mm in length. Adult size ranges from 70 - 150 mm. Important as a food fish for trout, and population densities are high.

(xvi) Upland bully *(Gobiomorphus breviceps)*

This fish is found in most areas throughout the river, spawning on rocks etc., during spring and summer. The young do not migrate to sea but free swim in pools and quiet areas in streams. Adult size ranges from 85 - 90 mm. This species is also important as a trout food, and has high population densities.

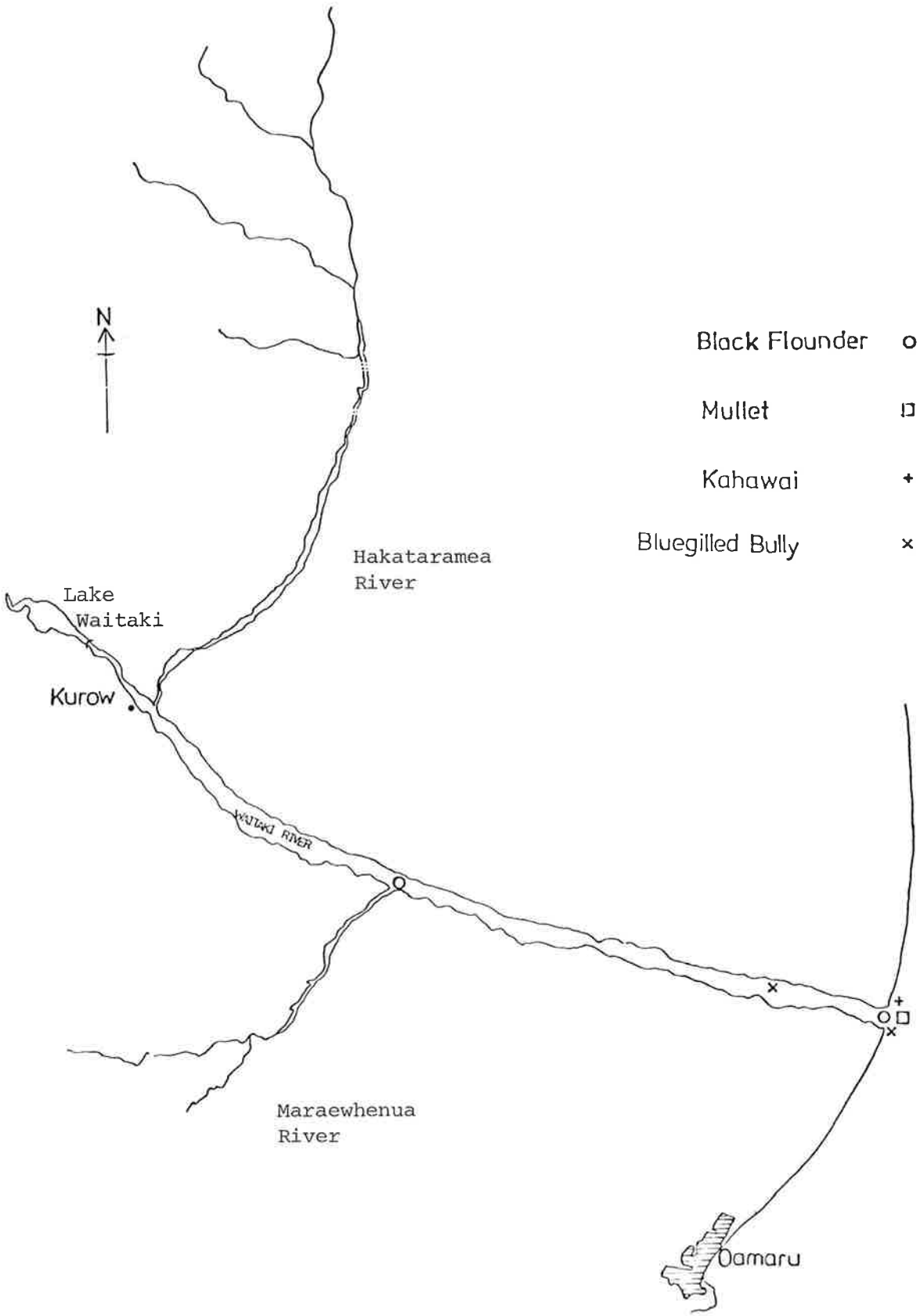

FIGURE 3. Distribution of native fishes in the lower Waitaki River.

(xvii) Black flounder *(Rhombosolea retiaria)*

Adults are found in back-waters and quiet areas of the river for at least 36 km upstream. They could spawn in the river or may migrate to sea for this purpose. The diet includes small insects and the occasional fish. Adult size averages 300 mm. It is very common in the lagoon area during spring months, and is caught by fishermen using net and spear.

(xviii) Yelloweyed mullet (*Aldrichetta forsteri*)

Adults and juveniles shoal in the mouth and lagoon area from September onwards whilst feeding; spawning occurs at sea. They are present in large numbers, and are caught by rod lines and net for food, and as bait for sea fish. Adult size ranges from 150 - 200 mm.

(xix) Kahawai *(Arripis trutta)*

This species is a valued sporting fish. Adults shoal in the mouth area and enter the lagoon from October-April, but spawning takes place at sea. They are caught by anglers for both sport and food. Small, shoaling fish are the main component of the diet. Examination of stomach contents from this area have shown some salmon smolts present. Adult size ranges from 500 - 550 mm, and they are often present in very large numbers.

(b) Introduced

The known distribution of the five species of introduced salmonids is shown in Figure 4.

(i) Rainbow trout *(Salmo gairdnerii)*

Introduced into New Zealand in 1883, adult rainbow are an important game species in this river, found in all areas of the main river and larger tributaries. Adults migrate to tributary streams and suitable side stream areas to spawn during June - September. The main areas utilised are the Maraewhenua and the Hakataramea Rivers. Rainbow

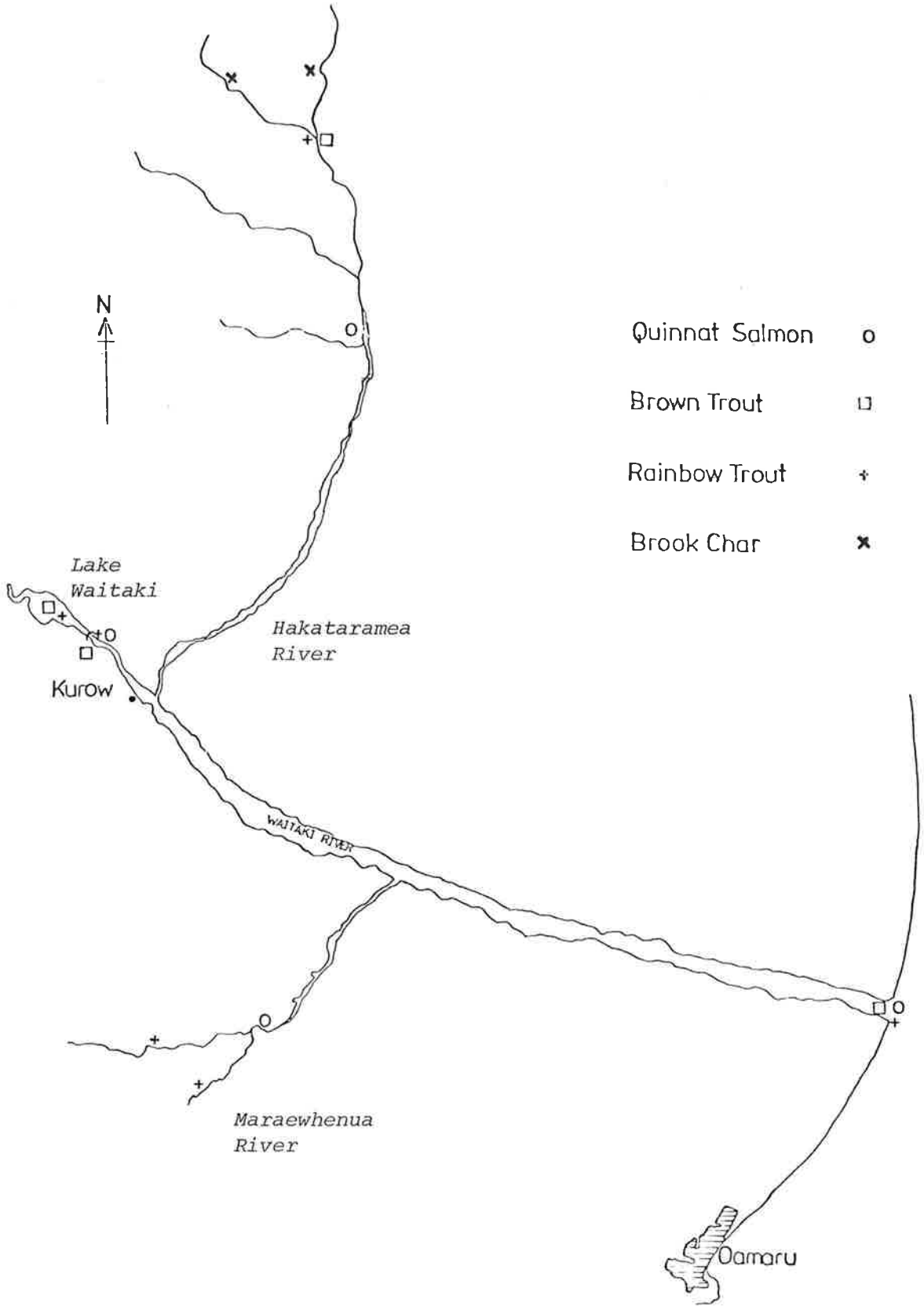

FIGURE 4. Distribution of introduced salmonids in the lower Waitaki River system.

trout mature after three years, and the adult average size is 460 mm.

(ii) Brown trout *(Salmo trutta)*

This is also an important game species found in all areas of the main river and most tributaries. It was introduced into New Zealand in 1867. The adults migrate to tributary streams and suitable side stream areas to spawn from April-June. The main areas used are the Maraewhenua River, Hakataramea River and Awakino. The average size of adult brown trout is 450 mm. They are known to go out to sea, with large fish (up to 7 kg) being caught near the mouth area during spring and early summer.

(iii) Quinnat salmon *(Oncorhynchus tshawytscha)*

Probably the most sought after game fish in this river, adult salmon are caught during the spawning run at the mouth and as they move up the river. Large numbers of anglers are attracted during the spawning run which occurs from late December until April.

Quinnat salmon were introduced into the Waitaki River in 1901 with releases from the Marine Department Hakataramea hatchery and into streams above Lake Ohau.

The adult fish spawn in side streams and tributaries, (the Hakataramea) during March-June in fast-flowing gravel areas. The fry hatch out after approximately 3 months. Some remain up to one year in fresh water, others migrate to the sea after a short period. Adult fish return after 2-5 years at a size ranging from 2 - 22 kg. The fry feed on small invertebrates, the adult fish do not feed whilst in fresh water.

(iv) Sockeye salmon *(Oncorhynchus nerka)*

Introduced in 1901-2 sockeye occur in the hydro lake system and have been recorded in the lower river - possibly they wash down as

fry from upstream. There is no conclusive evidence to indicate a possible sea-going run.

(v) Brook char *(Salvelinus fontinalis)*

This species occurs in some tributary areas (e.g. Hakataramea), in isolated populations of small, (up to 150 mm) fish. It could also occur in the headwaters of other tributary streams. At present it is of no sporting value in this area.

4. DISCUSSION

Whilst some of the species present are of little fisheries importance, others are necessary links in the food chain of both other fish and certain bird life, e.g. whitebait, common smelt, and some of the bully species. Of the introduced species, brown trout, rainbow trout and quinnat salmon provide excellent sporting recreation, and attract large numbers of anglers to the river. Quinnat salmon also offer the potential of a commercial industry. Pilot studies have already commenced, with fry being released in an attempt to induce a hatchery run of returning adult fish for harvesting. Figure 5 gives a calendar breakdown of various migrations, and critical periods of the life history of some of the species.

This river is under consideration for future power development and also river retraining works by the Waitaki Catchment Commission for flood control purposes. With many species requiring access to and from the sea, care must be taken not to block migration paths, destroy necessary spawning areas or living habitat by drainage, siltation, or fluctuating flows. The disappearance of some of the smaller fish species could easily reduce numbers of trout and some of the bird life through removal of food. Previous developments like the Waitaki Hydro Dam, completed in 1935, have already decreased numbers of some

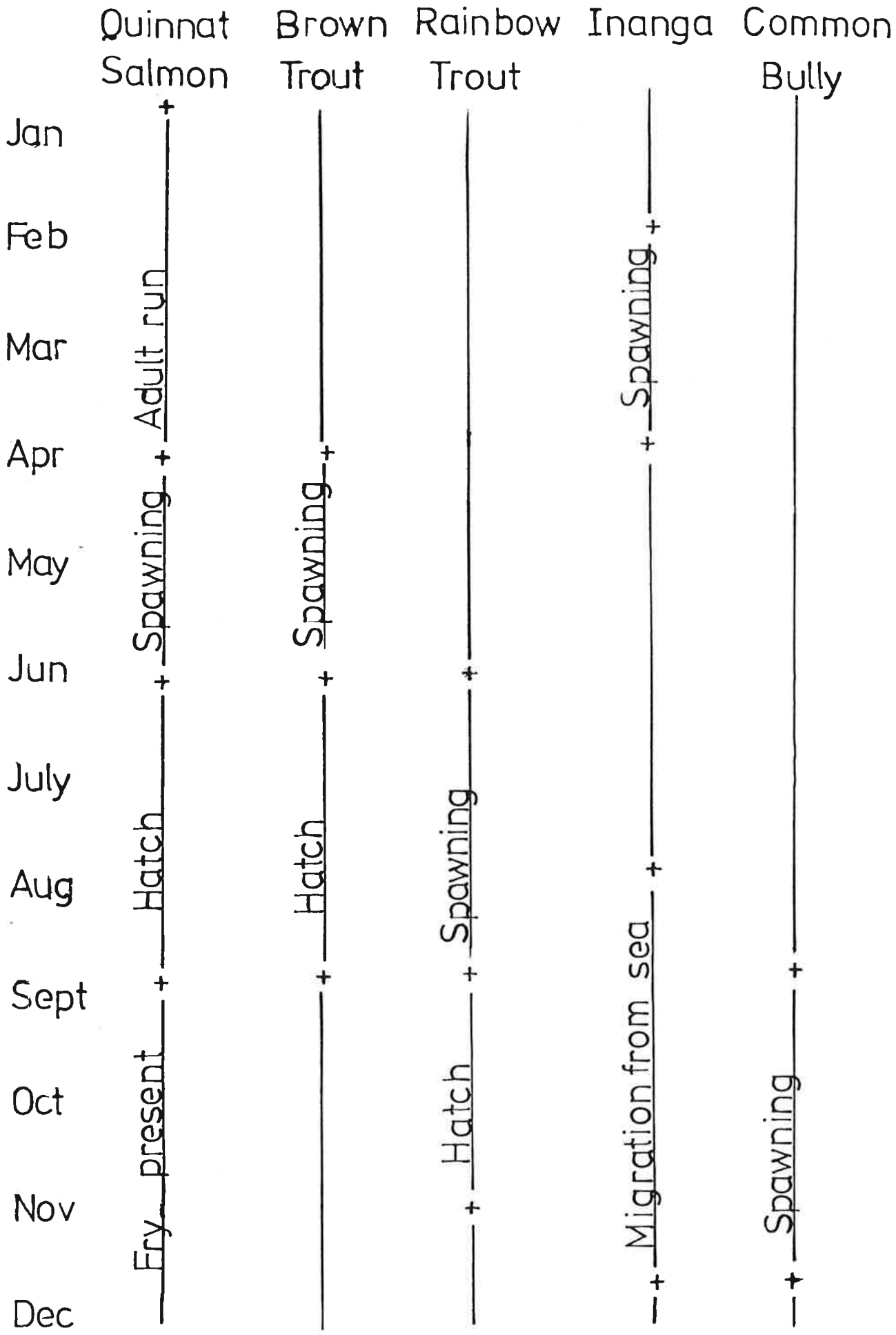

FIGURE 5. Timing of the life history of some lower Waitaki fish species.

species, (e.g. quinnat salmon) and further development, unless carefully planned, could further reduce this and other species in this river.

5. ACKNOWLEDGEMENTS

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