To the Waikato Valley Authority

FISHERIES ASPECTS OF THE WHANGAMARINO SWAMP

BY

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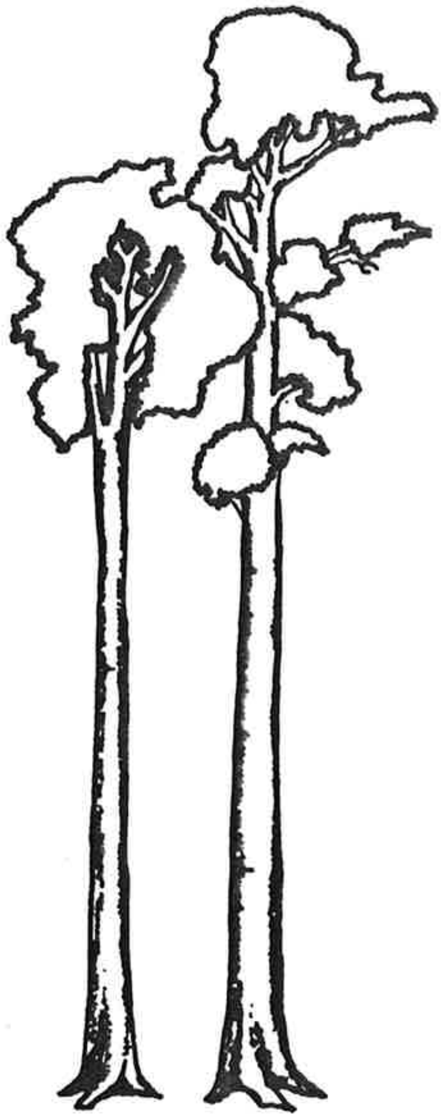

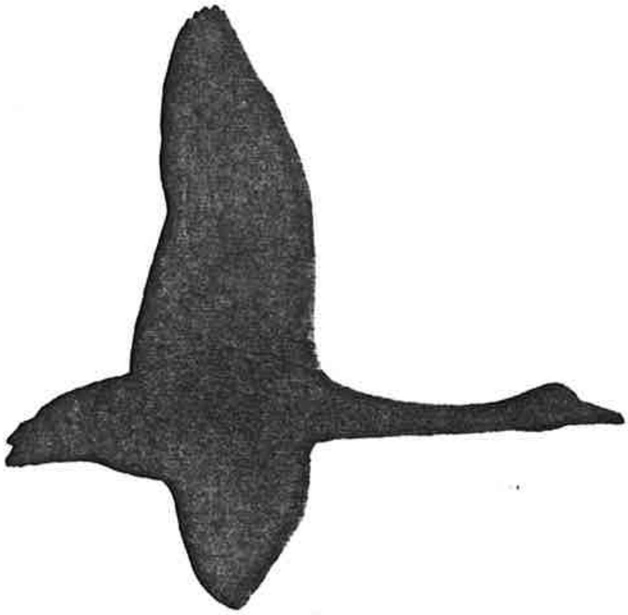

FISHERIES ENVIRONMENTAL REPORT NO. 7

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CONTENTS

FISHERIES ENVIRONMENTAL REPORTS

This report is one of a series of reports issued by Fisheries Research Division on important issues related to environmental matters. They are issued under the following criteria:

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(2) They are for limited circulation so that persons and organisations normally receiving Fisheries Research Division publications should not expect to receive copies automatically.

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(5) These reports will be issued where a substantial report is required with a time constraint e.g. a submission for a tribunal hearing.

(6) They will also be issued as interim reports of on-going environmental studies for which year by year or intermittent reporting is advantageous. These interim reports will not preclude formal scientific publication.

FIGURES

1. INTRODUCTION

Fisheries Research Division were asked by Waikato Valley Authority (WVA) to report on the fisheries values of the Whangamarino Swamp. Information from this report will be used by the WVA in forming part of the biological section of a series of technical reports on the resources of the Whangamarino Swamp.

To date there is little written fisheries information specifically relating to the Whangamarino Swamp. Because of this, and also the time allocated to carry out a survey of the swamp, four goals were set:

(i) Collect all written material available on fisheries aspects of the Whangamarino Swamp.

(ii) Determine the presence and distribution of fish species within the swamp and its catchment.

(iii) Correlate the presence and distribution of fish species with habitat factors.

(iv) Determine the importance of the swamp as a resource area to fishermen and to the public.

Although this report is primarily for use by the WVA, it will also provide a basis for any future work.

2. DESCRIPTION AND HISTORICAL BACKGROUND

The Whangamarino Swamp, an area of approximately 93 km^2, lies east of the Waikato River between Mercer and Te Kauwhata. It has a catchment area of 676 km^2 which includes the 215 km^2 catchment of Lake Waikare.

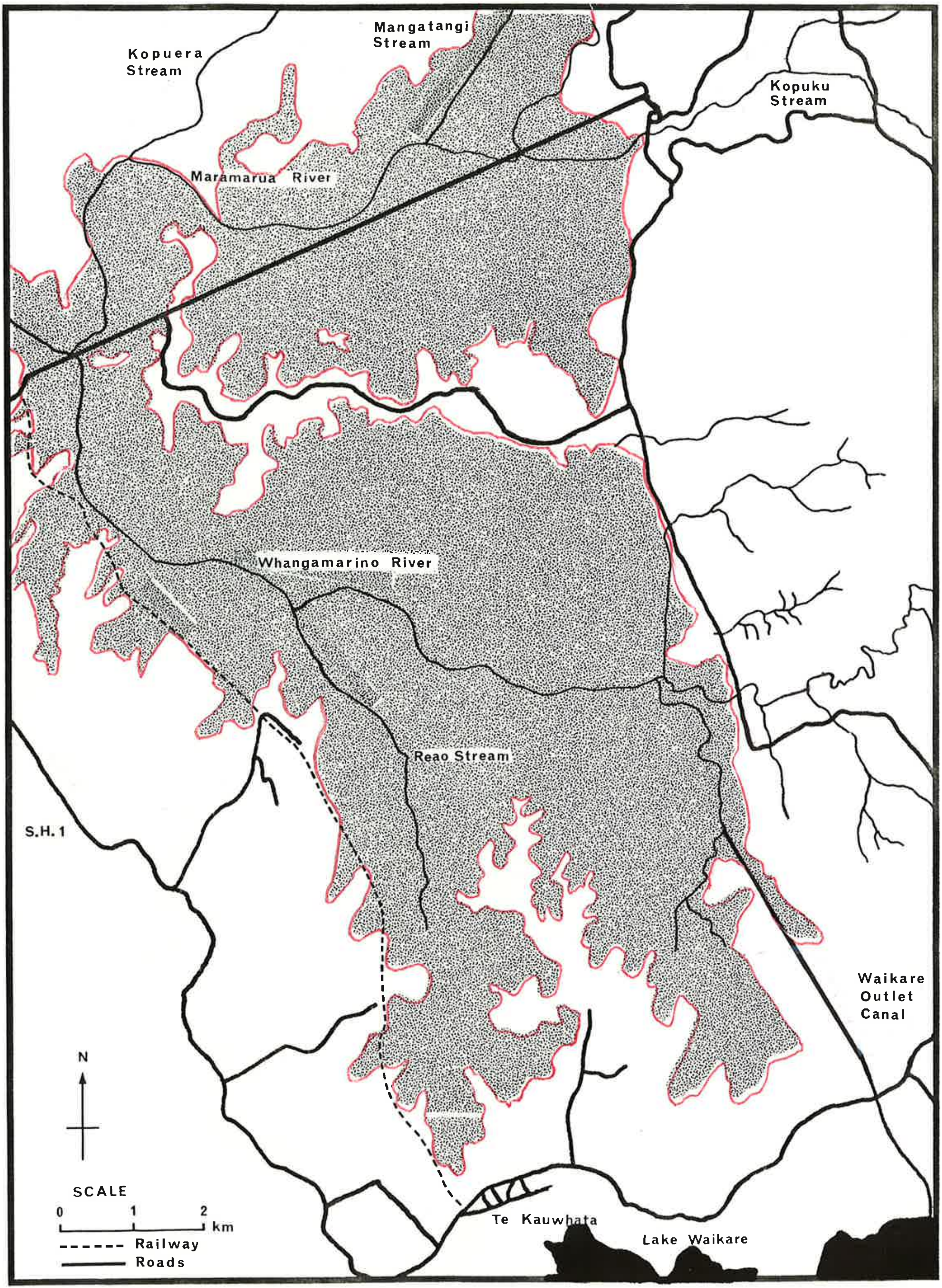
Prior to 1965, Lake Waikare drained into the Waikato River via the Te Onetea Stream near Rangiriri. It is now diverted into the Waikato River through the swamp via the Whangamarino River as part of WVA's flood protection scheme. Before development, Lake Waikare overflowed into the Whangamarino Swamp when lake levels were high. Together, these two areas formed a natural flood-storage area. However in their natural state, they caused flooding of surrounding farm land during high rainfall.

In order to minimise the impact of flooding and to utilise these two areas for more efficient flood storage, stopbanks and control gates were installed. Since this modification, the flood-line has become more confined to the swamp boundary (Fig. 1). As a result, agricultural development has, and still is, encroaching into the swamp by way of further stopbanking and drainage canals. Another modification to the swamp has been the building of the Kopuku-Meremere causeway, which runs east-west through the northern section of the swamp. Overburden from the Kopuku coal mine has also reclaimed a further area of swamp.

Associated with the overall modification of the swamp has been a drastic change of vegetation. Exotic plants have proliferated and indigenous plants have been destroyed. For example, willows are the predominant canopy on the swamp fringes. This niche was formerly occupied by Kahikatea, Kowhai and Manuka, which only remain as remnant stands on the swamp perimeter.

The impact which the various phases of development have had on former fisheries values in the Whangamarino Swamp is unknown.

FIGURE 1 - The Whangamarino Swamp (shaded area shows the extent of the swamp).



3. METHODS

The Fishing Industry Board and various Fisheries Research Division staff who have been associated with the swamp were contacted and Auckland Acclimatisation Society field staff provided local knowledge and assistance.

Reference data relating to the Whangamarino fishery were obtained from D.S.I.R. Science Information Division and by searching through Fisheries publication lists. A literature list relating to the swamp is included at the end of this report.

To obtain information on the eel fishery all eel processors associated with fishermen using the Whangamarino Swamp were contacted. Questionnaires (Appendix 1) were sent to all known eel fishermen utilising the swamp.

Eel fishermen who could be located during the survey were interviewed in addition to the written questionnaire. Further data were collected during a survey in October 1980 using an electric fishing machine as the main sampling method. Various sized samples were taken according to habitat type and numbers of fish caught. Best results were obtained where water flow could be utilised to drift stunned fish into a fine mesh seine net. Black mudfish in particular could only be caught by this method. Other fishing was done occasionally with a dip net, and some commercial fyke nets were lifted and the species composition of the catch recorded. At night spotlighting was carried out with some success in areas where water clarity was sufficient to detect fish.

Total fish lengths were measured to the nearest mm and eels over 300 mm in length were weighed to the nearest g. Water analyses carried out in the field included temperature, dissolved oxygen and pH. Dissolved oxygen and temperature were measured using a "Beckman" Fieldlab Oxygen Analyser in conjunction with a thermometer, and pH was measured with a Lovibond "1000" comparator. Oxygen readings were only recorded in the initial 19 samples because of a fault in the analyser.

4. RESULTS AND DISCUSSION

(i) Habitat types

Before the October 1980 survey it was anticipated that each sample site could be correlated with the vegetation zones mapped for the Whangamarino Swamp by the WVA (WVA Plan 4196/434130). Unfortunately the vegetation map was compiled along very broad lines and did not suit the fishery survey. Different vegetation associations and habitats specifically relating to fish were encountered during the survey and these were often classified under one zone on the vegetation map.

The following classification of habitats was developed during the survey. Consequently each habitat type contained a different number of samples. Notes on each sample site, including a list of plant species recorded is contained in Appendix 2.

Each sample site was classified as belonging to one of the following three habitat types:

Type A - Catchment Drainage

All streams, ditches, etc., draining into the swamp, including several draining into Lake Waikare.

Type B - Swamp Drainage

All stations flowing from a swamp habitat.

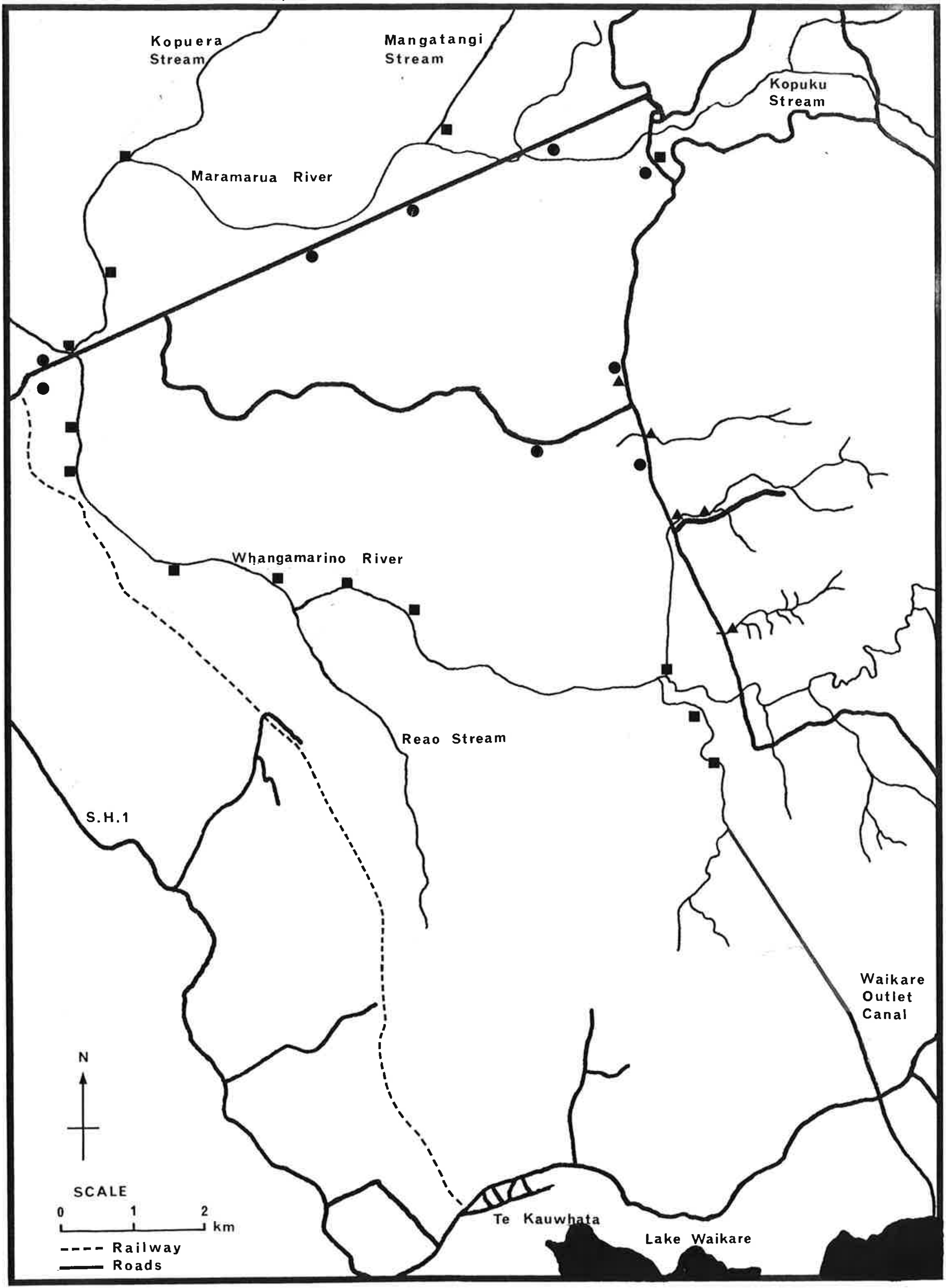
Type C - Swamp Proper

Perimeter areas of main swamp and interior regions accessible by boat.

A complete list of plant species found in habitat types B and C is given in Appendix 3.

Electric fishing sampling sites and their habitat type are shown in Fig. 2. Eleven sites were outside the map area. Two photographs

FIGURE 2 - Electric fishing sampling sites, October 1980.
Habitat types: A = ▲ B = ■ C = ●



typical of each of the three habitat types are shown in Figs. 3-5.

Several sampling problems were encountered with each habitat type. In habitat type C, which contained rotting vegetation and debris, eels were often seen heading for cover during electric fishing and could not be caught. Only eels captured were recorded as being present. It was suspected that other fish species became entangled in vegetation or became paralysed in the mud when electric fishing and were not seen. In some sample sites no fish were recorded because of this problem, although water and weed movement, and mud disturbance, indicated that fish were present.

In the larger drainage canals and streams (habitat type B), commercial fyke net catches made at the same time as our sampling showed a different species composition. For example, electric fishing caught no catfish or goldfish, whereas up to 50% of the fyke net catches comprised these two species.

Another problem was that while sampling in the lower Mangatangi Stream, the electric fishing machine caught predominantly shortfinned eels (sample of 53 eels) whereas the fyke nets took nearly all longfinned eels (catch of 180 kgs). Since fyke nets only catch mobile fish, it is possible that they were sampling some migratory phase of the longfinned eel moving down from the upper reaches of the Mangatangi, whereas the electric fishing machine was sampling resident eels from weed and mud banks. Eels living in this type of habitat were virtually all shortfinned and generally quite small, averaging 246 mm. Catches of longfinned eels from the fyke nets appeared to contain much larger eels.

(ii) Eels

The length range of eels measured was 81-865 mm (Table 1). The average length of shortfins was smaller in habitat types A and B than C.

FIGURE 3 - Habitat type A.

FIGURE 4 - Habitat type B.

FIGURE 5 - Habitat type C.

TABLE 1 - Number of eels in each length class recorded from each habitat type.

Length Class (mm)	Habitat Type A Longfin	A Shortfin	B Longfin	B Shortfin	C Longfin	C Shortfin
50 - 99	9	20	-	3	-	-
100 - 149	20	37	-	19	-	-
150 - 199	13	10	-	29	-	-
200 - 249	10	15	-	15	-	-
250 - 299	6	16	1	15	-	-
300 - 349	4	11	-	25	-	1
350 - 399	1	12	-	14	-	1
400 - 449	-	6	-	28	-	-
450 - 499	5	7	-	12	-	1
500 - 549	5	10	-	2	-	-
550 - 599	2	3	-	2	-	-
600 - 649	-	3	-	1	-	1
650 - 699	1	3	-	-	-	2
700 - 749	-	2	-	-	-	-
750 - 799	1	1	-	-	-	-
800 - 849	-	-	-	-	-	-
850 - 899	1	-	-	-	-	-
Total sampled	78	156	1	165	-	6
No. of samples	15	15	12	12	9	9
Average length (mm)	251.4	272.2	255	294.3	-	509.5
Minimum length (mm)	85	81	-	90	-	300
Maximum length (mm)	865	755	-	600	-	650

A large number of small shortfins (50 to 100 mm long) were found in habitat type A where it was expected that longfinned eels would have been predominant. However, a large number of small longfinned eels of similar length were also found in this habitat type.

No longfinned eels were found in habitat type C, and only one was found in habitat type B. In habitat type A they comprised 33 percent of the eel catch.

Weights ranged from 105 g to 2,250 g (Table 2). Shortfins and longfins from habitat type A tended to be heavier than eels from habitat type B. The heaviest eels of each species were found in habitat type A. These were a shortfin of 1,160 g and a longfin of 2,250 g.

The length/weight relationship (Fig. 6) for shortfins indicated that growth was better in habitat type A than B.

TABLE 2 - Summary of eel weight data for eels over 300mm in length.

	Habitat Type			
	A		B	C
	Longfin	Shortfin	Shortfin	Shortfin
Total sampled	15	38	55	4
Percentage of total catch	19	24	33	66
Average weight (g)	607	424	255	420
Minimum weight (g)	180	110	105	200
Maximum weight (g)	2,250	1,160	600	650

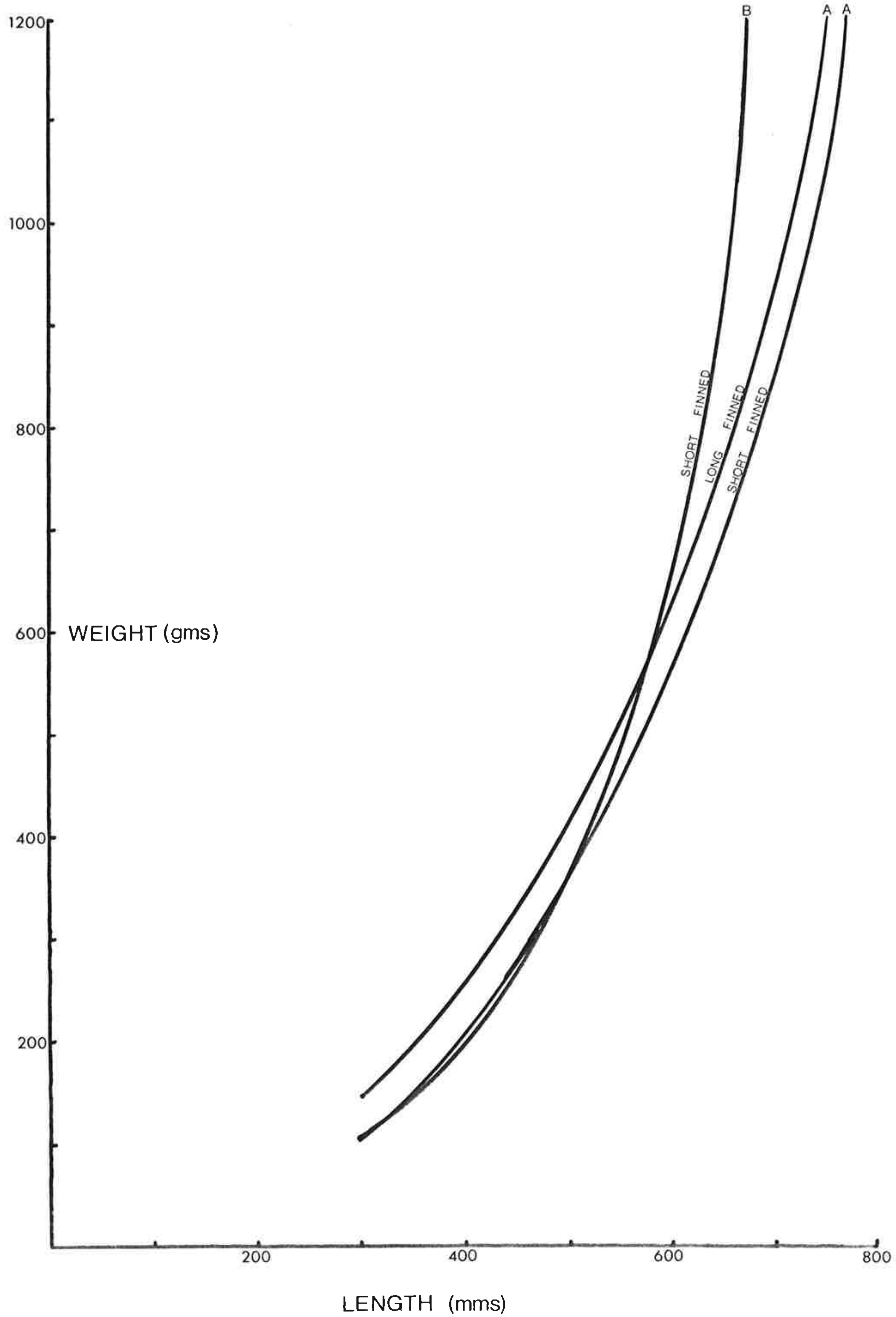
(iii) Black mudfish (*Neochanna diversus*)

Black mudfish were recorded throughout the swamp region (Fig. 7).

During winter months fry in the shoaling stage were found throughout the swamp in shallow water with a low flow. Nearly half of the mudfish locations shown in Figure 7 refer to sightings or capture of fry.

Mudfish captured during the October 1980 survey with the electric fishing machine were all caught in habitats which had a flow. These

FIGURE 6 - Length-weight relationship for eels from habitat types A and B.



habitats were usually natural channels where natural swamp drainage occurred (Fig. 4). Although no fish were found in habitat type C during the October 1980 survey, they were recorded as fry in this habitat during winter months of the same year.

Only one mudfish caught could be classifed as an adult. The failure to catch any adults was probably due to theiraestivating, or to bottom and nocturnal feeding which made them difficult to capture. It is also possible that there is a high mortality rate before the adult stage making adults much less abundant than fry.

Black mudfish lengths recorded during the survey varied from 17.2 mm (fry) to 71 mm (adult) (Table 3). The average length was around 30.8 mm, and some of this size class were still exhibiting juvenile characteristics such as utilising open water by day. (Several attempts at catching adult mudfish during the day and night using different methods were tried without success.)

Water quality analyses for all sampling sites are given in Table 4. The water quality for each sampling site where mudfish were recorded (Table 5) showed no pattern because of the small number of samples taken. However, the best sample site in terms of numbers found and large range of size classes, had recordings of 15^{o}C for temperature and a pH value of 6.6.

The continued survival of black mudfish in the Whangamarino Swamp depends upon the carrying capacity of the swamp for all the stages of the mudfish's development. The biology of black mudfish in the Whangamarino Swamp requires more research before a value can be placed on the swamp as an important habitat for this fish. Until this is done, the adult black mudfish's occurrence should be regarded as sparse, although widely distributed.