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SUBMISSION ON

THE ROTOKINO SWAMP

DRAINAGE SCHEME

FISHERIES RESEARCH DIVISION

MINISTRY OF AGRICULTURE AND FISHERIES

CHRISTCHURCH

Report to: Westland Catchment Board
and Regional Water Board

SUBMISSION ON

THE ROTOKINO SWAMP

DRAINAGE SCHEME

BY

G.A. ELDON

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N.Z. MINISTRY OF AGRICULTURE AND FISHERIES

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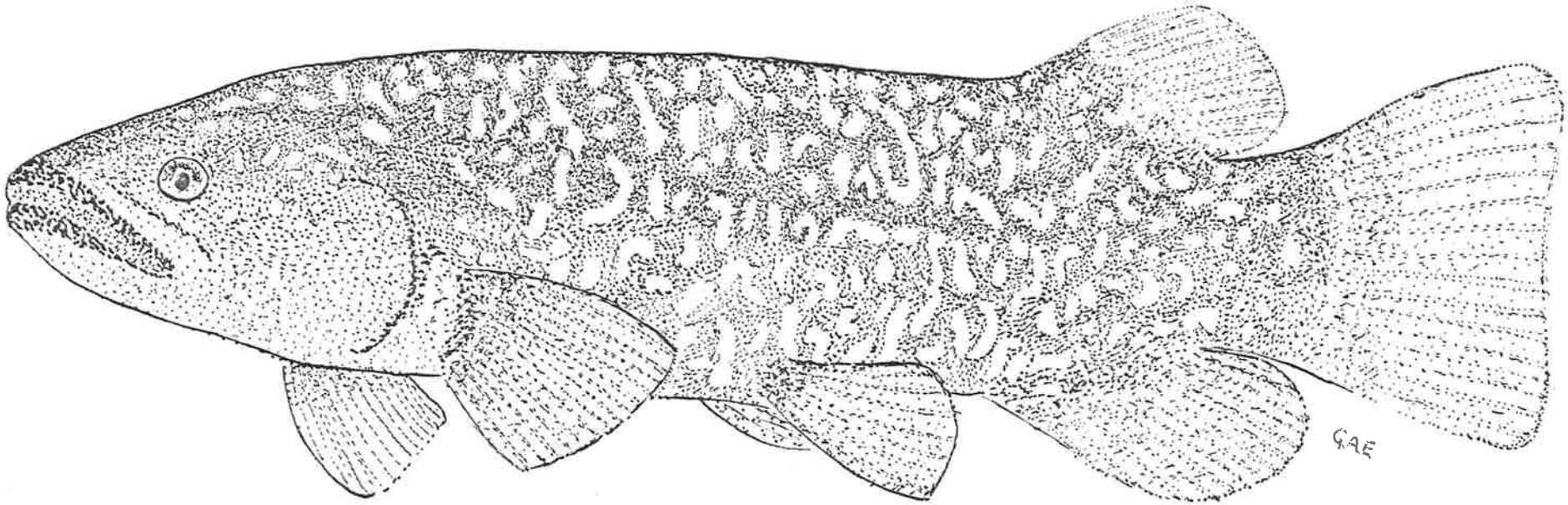

THE GIANT KOKOPU (GALAXIAS ARGENTEUS)

FISHERIES ENVIRONMENTAL REPORTS

Edited by: S.F. Davis

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1. INTRODUCTION

Rotokino Swamp has long been known to Fisheries Research Division (FRD) as an important giant kokopu (*Galaxias argenteus*) habitat. The swamp was featured by McDowall (1978, plate 10) in his book on New Zealand's freshwater fish fauna and also referred to obliquely by Eldon (1969).

The giant kokopu is one of five species of New Zealand freshwater fish which has a whitebait juvenile. McDowall (1978) pointed out that:

> "As pastoral development of New Zealand continues it is likely that we will see the decline of this species continuing. While there does not seem to be any immediate danger of extinction, the giant kokopu should be regarded and treated as a threatened species."

In December 1982, Wildlife Service (WS) of the Department of Internal Affairs expressed concern to FRD about the Westland Catchment Board's Rotokino Swamp drainage scheme. WS was aware of the swamp's value as a kokopu habitat and was worried about the proposed diversion, into an already excavated drain, of the un-named stream (Fig. 1), which rises near Te Taho and flows to White Heron Lagoon (NZMS1 S63: 055948-055994). WS requested FRD's assistance with a fisheries evaluation of the stream.

In January 1983, the Westland Catchment Board (aware of FRD's involvement) verbally requested a report on the fisheries aspects of the Rotokino Swamp drainage scheme. In response, two officers of FRD, assisted by an officer of WS, visited the area on 26-28 January 1983, to assess the fisheries value of the stream and the probable impact of diversion. This report presents their findings, discusses the implications of drainage and makes recommendations as to how future swamp drainage proposals should be assessed.

2. DESCRIPTION OF ROTOKINO SWAMP

Rotokino is a moraine swamp situated in the Whataroa catchment 15 km

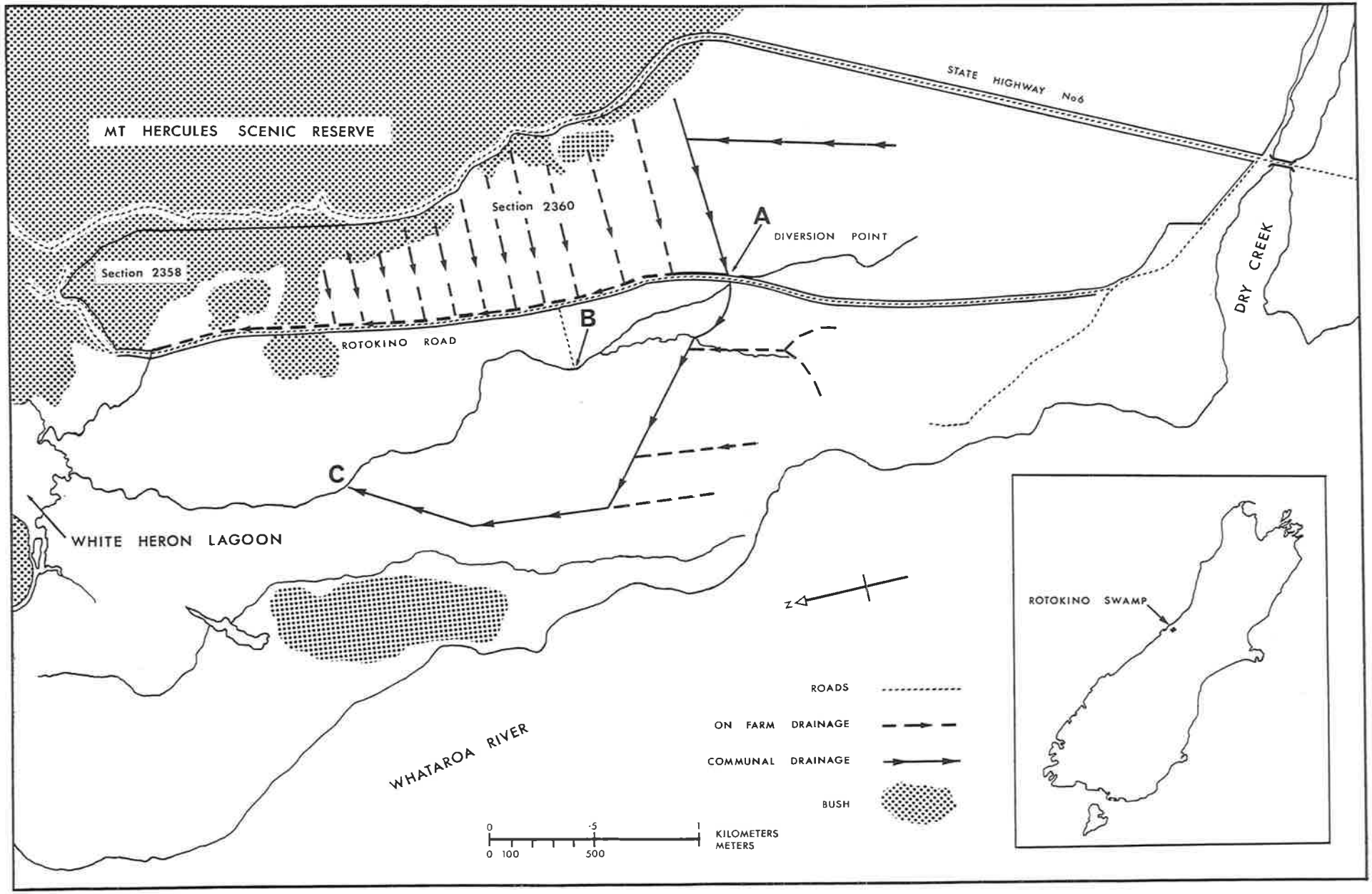

FIGURE 1. Location of Rotokino Swamp.

south-west of Harihari, at an altitude of 30-40 m. It is bounded to the west by the Whataroa River and to the east by State Highway (S.H.) 6, Mount Hercules Scenic Reserve and the Poerua State Forest (Fig. 1). The swamp drains to White Heron Lagoon (13 ha) and Lake Rotokino (135 ha) to the north, both waters being on the boundary of Saltwater State Forest.

The swamp covers a gross area exceeding 1100 ha, although much of this has been under pasture and grazed for many years. An extensive area of flax swamp on Section 2360 (Fig. 1) was recently drained. The water-courses of this area formerly contained valuable giant kokopu habitat, but the water level has been lowered. The remainder of the swamp contains a number of isolated pools and streams in various degrees of modification.

The stream proposed for diversion contains clear, rapidly flowing water. Normally flows are about 2-3 m^3/s (FRD assessment), with floods of about 15 m^3/s (Westland Catchment Board pers. comm.). The stream follows a serpentine course of 5 km over a direct-line distance of 4 km.

There are two distinct sections in the reach to be diverted. From the proposed diversion site (point A in Fig. 1) to point B, the banks are protected by flax and scrub, and the stream is 2-3 m wide with a water depth of up to 1.2 m. In the lower section, from point B to point C, where the diversion drain re-enters the natural watercourse, the stream flows through pasture and is unprotected from stock. Consequently, the channel is somewhat wider and shallower. Bank and instream cover for aquatic life still exist but are sparser here than upstream. Throughout the surveyed distance (A-C), the stream's fisheries value is limited by the extremely loose and fine bed gravels which fill the pools, providing little stability for the invertebrate fauna on which fish feed (Fig. 2). This seems unnatural, and is probably a consequence of farm settlement and drainage upstream.

3. METHODS

The length of stream to be diverted was visually inspected during the day

FIGURE 2. A section of the stream proposed for diversion at Rotokino. The fisheries advantages of bankside cover (right centre) are nullified in this stream by fine, loose bed gravels (foreground) and collapsing banks (left background).

and some torchlight observations were also made at night. The weather was fine, the stream clear and visibility good.

Conventional, commercial-type, fyke nets, fine-mesh minifykes and baited wire minnow traps were set overnight at intervals along the stream, wherever appropriate. A total of 14 net nights and 15 trap nights were fished in the stream, with additional coverage of 6 net nights in White Heron Lagoon and Hercules Creek.

Also incorporated in this report are data from seven FRD records obtained by electric-fishing, angling and netting during 1966, 1967, 1978 and 1979.

4. FISHES OF THE DIVERSION AREA

In the lower section of stream (B-C), only two species of fish were captured - longfinned eel (*Anguilla dieffenbachii*) and common bully (*Gobiomorphus cotidianus*) - and both were extremely rare. Three or four unidentified small fish, possibly *Galaxias maculatus*, also were observed in a drain confluence, but none were caught in nets set for them.

In the upper reaches (A-B), longfinned eels were present in moderately large numbers, together with common bullies and giant kokopu (*Galaxias argenteus*). Giant kokopu were concentrated around the Rotokino Road Bridge in the vicinity of the diversion intake, where there was suitable habitat formed by sunken logs, deep water and the bridge structure itself. Two adult giant kokopu were captured, and about five others observed. Six eels were captured in the same place, and others were observed throughout the area.

4.1 Other Fish Records

The giant kokopu was once common in the flax area of the swamp and in associated streams adjacent to S.H.6, near Mt Hercules Scenic Reserve. A few still exist where sufficient depth of water remains alongside the road. This species is also present in White Heron Lagoon.

Banded kokopu (*Galaxias fasciatus*) juveniles were recorded from the lower reaches of Hercules Creek in January 1983.

Brown mudfish (*Neochanna apoda*) are known from the fringes of the swamp along S.H. 6 and from Saltwater State Forest.

The common bully has been recorded in small numbers from the flax area, Rotokino outlet and Hercules Creek.

Longfinned eels have been recorded at numerous places in the locality, and shortfinned eels found in White Heron Lagoon.

Brown trout (*Salmo trutta*) are known from White Heron Lagoon (R. Simpson pers. comm.) and juveniles of this species are present in small numbers in Hercules Creek.

5. DISCUSSION

Five of the fish species known to occur in the Rotokino Swamp and Lake complex - giant kokopu, banded kokopu, brown mudfish, common bully and longfinned eel - are endemic, i.e. they are found only in New Zealand. The shortfinned eel is indigenous and only the brown trout is introduced.

Eels and common bully have a New Zealand wide distribution and a fairly broad range of habitats. In recent times, freshwater eels have become commercially important. The fishery is primarily based on the shortfinned eel (Todd 1982) and this species is very largely dependent on wetlands for its survival. The 1982 figures are not available, but the annual export value of eels exceeded $2 million for the previous seven years,declining from a peak of $4 million. Catches have been in sharp decline for three successive seasons due to overfishing, but there is the potential to stabilise the fishery on a continuous yield basis, provided habitats remain intact.

The banded kokopu is widely distributed in forested areas, while the brown

mudfish is declining. However brown mudfish are not migratory and exist in some scenic reserves where they are not considered endangered (Eldon 1968). The brown trout is an ubiquitous species, which requires no special protection in situations like Rotokino.

However, the giant kokopu is a declining species with distinct habitat preferences and a migratory habit. This makes conservation difficult because fish cannot be confined to a convenient reserve and require suitable habitats over a large extent of their range to maintain the species. Man-induced extinction of the giant kokopu seems likely unless measures are taken to conserve its freshwater habitats. It has already vanished almost entirely from Canterbury and there are other gaps in its distribution which may not be natural (e.g. East Cape, Marlborough and Nelson). Extinction has already overtaken the once abundant, endemic New Zealand grayling, *Prototroctes oxyrhynchus*.

Unlike birds, fish attract little public attention unless they provide food and/or sport, but their extinction by man's activities is equally unacceptable in scientific and moral terms. Giant kokopu are not only endemic and at risk; they form a part of the whitebait fishery, which provides food, sport and income to many West Coasters.

Fisheries authorities have been pleading for the conservation of whitebait habitats since the early 1930's, in an era when the fishery was important enough to merit regular attention in the Marine Department's "Annual Report on Fisheries". The 1932 recorded whitebait catch (probably far less than the actual catch) was 241 198 kg - at 1981 wholesale prices it was worth nearly $5 million.

New Zealand's best remaining whitebait fishery is on the West Coast. Its current monetary value is unrecorded, erratic and strictly seasonal. Although the capital outlay for the fishery is minimal, for the West Coast region the actual catch value is not the only monetary advantage, as the fishery attracts many visitors each year. Further, the fishery is a distinct and colourful component of New Zealand's folklore and a major recreational activity.

Whitebait statistics are no longer collected, for the fishery has declined nationally as habitats have been destroyed on a massive scale. The often repeated belief that diminished runs are a result of overfishing is not proven, and it is considered that the destruction of habitats is more likely to be responsible (McDowall and Eldon 1980).

It would be misleading to imply that the giant kokopu content of whitebait catches is significant, as the species runs late in the season after many whitebaiters have ceased fishing and then its numbers are low. It contributes less than 1% to the total whitebait catch (McDowall and Eldon 1980). However, the future of the whole whitebait fishery is dependent on wetlands.

In 1966, the area of flax on Sections 2358-2360 at Rotokino Swamp (Fig. 1), which was then little-developed, was found to contain giant kokopu. Observations were confined to the vicinity of the road, but conventional angling, together with night-time lantern observations, indicated that large numbers of these fish were present. Rotokino Swamp was recognised by FRD as an important habitat for this declining species, and the significance of the locality was further enhanced by the presence of brown mudfish in associated wetland on the forest edge.

Giant kokopu also occur in White Heron Lagoon and are probably present in Lake Rotokino. However, these habitats have been occupied by brown trout, and wherever this species invades, numbers of kokopu generally become greatly reduced (McDowall 1968). Jellyman (1979) studied giant kokopu at Lake Pounui in the Wairarapa, and found that swamp was the preferred habitat.

In their freshwater habitats, the native fishes are very dependent on cover, such as deep water, turbulent water, fallen logs or instream boulders, undercut banks, overhanging vegetation, and instream vegetation. Swamp drainage and stream channelisation cause gross modifications to the aquatic environment. Removal of natural streamside vegetation for farm development, and destabilisation of stream banks and beds by stock encroachment and/or road works, may be almost as harmful.

Some of these factors appear to have damaged the Rotokino Swamp stream. For example, the reach which flows through open pasture contains less cover and fish than the upstream reach which flows through flax and scrub.

Elsewhere in New Zealand, fish species which were once abundant over a wide range of the country are now only common in undisturbed or little altered habitats, or where, by chance, a particular development has been advantageous. This latter situation is known to have occurred only once (with the Canterbury mudfish), but it indicates the possiblity of at least ameliorating the adverse effects of developments on other species.

6. CONCLUSIONS AND RECOMMENDATIONS

Although the new drain to divert the stream at Te Taho has already been excavated, the actual diversion of the stream has been delayed, at the insistence of WS, pending application for a water right. We commend this action, but disapprove of the recent developments at Rotokino which have taken place without water rights.

If FRD had been appraised of the intention to carry out drainage work in the flax area of Sections 2358-2360, objections would have been raised. We consider this development an unfortunate loss to the fish populations of the West Coast. It is a further example of the development of wetlands without consultation with appropriate authorities. We believe that the implementation of new drainage schemes, whether on crown or freehold property, should be subject to water right procedures. Disregard of this requirement cannot be condoned.

FRD has frequently and widely published information on the detrimental impacts of wetlands development on fisheries (e.g. Eldon 1979, 1982, McDowall 1975, 1981), and in 1982 devoted an entire issue of Freshwater Catch (No. 15) to the subject. FRD is also available for consultation on matters related to fisheries.

Drains are almost invariably inferior to natural wetlands as fish habitats.

The loss of habitat may be mitigated, however, given sufficient good will and some initial capital expenditure. Drain construction should take into account the all-round disadvantages of regular cleaning. The more often a drain requires cleaning, the more costly is its upkeep and the less use it is to the fishery.

Drains should maintain the water flow, while at the same time providing cover for fish. To do this effectively, a larger drain is required than a basic drainage ditch, and some deep pools need to be retained at times of low water. Thus, a drain should be carefully surveyed for slope, so that mid-channel silt deposition is kept to a minimum, yet instream cover and bankside vegetation can be permitted without serious obstruction to water flow. Pools should be incorporated in the drain design, providing periodic sites of not less than 1 m depth. The accumulation of silt in such places can be minimised by placing logs so that the current does its own bed scouring.

All drains should be fenced, with a sufficiently wide berm to allow growth of natural bankside vegetation. Any obstruction that such overhanging growth may cause should be compensated by reduced light penetration and subsequently reduced aquatic macrophyte growth.

From the fisheries point of view, it would be preferable if any drain clearing that may still be necessary is carried out with pumps rather than draglines, and that cleaning is staggered, so that only part of a drainage system is cleaned at any one time.

It is realised that these suggestions will require additional initial expense and engineering expertise, and provision of more land for drains than would otherwise be the case. We believe, however, that there would be long-term advantages in savings on maintenance, and that the trade-off of land for drains against the area reclaimed will still be much to the developer's advantage. There will be the additional advantage to the developer of having positive conservation measures to present to objectors.

We also draw attention to the detrimental effect of silt deposition in

streams as a result of construction schemes. The lower reaches of Hercules Creek, for example, are in a totally unnatural condition from silting, which we believe originated with road works. Conditions for road construction and maintenance on the West Coast are often difficult, and siltation of waterways unavoidable. We recommend, however, that the Catchment Board do everything in its power to alleviate conditions which lead to situations such as have occurred at Hercules Creek. The bush streams which feed the swamps and rivers of the West Coast are important fish habitats. Their small size, in lowland forest situations, is not an indication of low value.

In conclusion, the un-named stream at Te Taho (Fig. 1) is considered already to have lost most of its fishery value through farm development and consequent stream bed movement. Accordingly, FRD does not oppose its diversion. It would be encouraging,however, if the diversion drain which has already been excavated, incorporated some of the features discussed in this report. Possibly an enhanced habitat here could go some way to replacing that lost elsewhere in Rotokino Swamp.

7. ACKNOWLEDGEMENTS

The assistance in the field of Messrs G. Kelly (FRD) and R. Simpson (WS) and the co-operation of property owners Messrs J. Parker and A. Weenink, with regard to access, is gratefully acknowledged.

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