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Managing the New Zealand whitebait fishery: a critical review of the role and performance of the Department of Conservation

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1.0 EXECUTIVE SUMMARY

The Department of Conservation (DOC) commissioned a critical review of its role and performance in managing the New Zealand whitebait fishery. The context of this review was a report of the Regulations Review Committee of Parliament, following a complaint to the committee by the West Coast Whitebaiters' Association. The association complained about the 1994 revision of the West Coast Whitebait Fishing Regulations, specifically concerning curtailment of the fishing season, with closure on 31 October (compared with 15 November in previous regulations).

The 1994 DOC revision of the regulations followed instructions from Parliament that there should be a review of the management of the South Westland whitebait fishery. DOC prepared and distributed a Public Discussion Document that canvassed diverse issues relating to the regulation and management of the fishery, and invited public submissions on the regulations. The West Coast Whitebaiters' Association asserted that DOC's consultation process had been deficient with regard to changes to the fishing season, a complaint with which the Regulations Review Committee concurred. As a result, Government rescinded the earlier closure of the season and instructed that further consultation should be undertaken.

DOC's principles for management of the fishery were outlined as:

1. The Department of Conservation has statutory responsibility to protect and preserve the whitebait resource for the purpose of maintaining its intrinsic values;

2. The Department will continue to provide for the appreciation, and sensitive and equitable use, of the whitebait fishery by the public;

3. In its management of the West Coast whitebait fishery the Department will safeguard the options for conservation and management of the whitebait resource for future generations.

DOC variously defined its approach to managing the fishery as conservative, cautious and precautionary. It also indicated that its management of the fishery would, as far as possible, be based on scientific principles.

This review concludes that DOC has endeavoured to consult widely in its approach to review of the regulations, and that it has as far as possible, followed its philosophy in using scientific data for management. However, there is potential conflict between DOC's responsibilities for

both conserving species and managing their exploitation, and that there is some inconsistency in the various cautious, conservative and precautionary approaches to management. The balance achieved by DOC in its emphasis on managing conservation and exploitation seems appropriate.

The Regulations Review Committee recommended that DOC conduct additional research on the fishery, but this can be funded only within DOC's existing research funds and priorities. Analysis shows that considerable research relevant to management of the fishery has been undertaken over the past 3-5 years. The Committee also recommended that statistics on whitebait catch should be collected; however, history shows that this is easier to recommend than it is to undertake successfully.

2.0 INTRODUCTION

The Department of Conservation (DOC) assumed responsibility for management of the New Zealand whitebait fishery with the passage of the Conservation Law Reform Act in 1990. DOC had already assumed responsibility for advocacy of protection of indigenous freshwater fishes at its formation in 1987, at which time the government implemented a major restructuring of departmental responsibilities for conservation of resources, and re-allocated some fisheries conservation and management functions. These responsibilities newly allocated to DOC had hitherto been undertaken by the Marine Department and then Ministry of Agriculture and Fisheries (MAF - since 1972), and latterly under the aegis of the Fisheries Act 1983. DOC's legal mandate to undertake these responsibilities is clear within the Conservation Act 1990: Part II, 6(ab) of the Act includes amongst the Department's functions: "To preserve so far as is practicable all indigenous freshwater fisheries, and protect recreational fisheries and freshwater fish habitat".

Managing the whitebait fishery involves, *inter alia*, establishment of regulations to govern exploitation of whitebait and management of the fishery, encouraging fisher compliance, and enforcement of regulations. DOC is able to make regulations to facilitate management of the fishery under sections 48 and 48A of the Conservation Act, and is required to pay for administration, management and research needed to meet its whitebait fishery management obligations from operational funds.

On assumption of responsibilities for the fishery in 1990, DOC applied regulations already in force - The Fisheries (West Coast Whitebait Fishing) Regulations 1985 (New Zealand Statutory Regulations 1985/211) and the Fisheries (Amateur Fishing) Regulations 1986 (NZSR 1986/211) which regulated the fishery outside the West Coast of the South Island. In 1991 DOC gazetted new regulations to cover the fishery outside the West Coast (The Whitebait Fishing Regulations 1991, NZSR 1991/171). This was done to give DOC power to enforce the regulations that it did not have when the regulations were part of the Fisheries (Amateur Fishing) Regulations 1985.

Over the following years, the Department initiated reviews of the regulations and undertook consultation with whitebait fishers, with the intention of producing new sets of regulations if these proved necessary to allow the application of DOC's conservation principles. These actions culminated in: The Whitebait Fishing Regulations 1994 (NZSR 1994/65) for most of New Zealand, and the Whitebait Fishing (West Coast) Regulations 1994 (NZSR 1994/66) for the West Coast fishery.

The revision of West Coast regulations prior to the 1994 season, involved curtailment of the season, with closure on 31 October in the West Coast whitebait fishery rather than 15 November, as hitherto. This generated protest from whitebaiters, formation of a more cohesive lobby group of West Coast whitebaiters (the West Coast Whitebaiters Association, which had previously existed, somewhat informally, but was hitherto much less proactive). Eventually there was an appeal by the West Coast Whitebaiters Association to the Regulations Review Committee of Parliament to have certain regulatory changes revoked - specifically the 31 October closure of the season. They had no apparent complaint about other changes in the regulations at that time.

In large part as a result of the report and recommendations of the Regulations Review Committee, and on instruction from the government, DOC restored the closure of the whitebait fishing season to 15 November, and commissioned a review of its management and research on the whitebait fishery, requesting the author to:

> "...critically assess the department's philosophical, managerial (policy and actions) and scientific approach to management of the whitebait fishery".

This report is that assessment.

3.0 THE CONTEXT OF DOC'S INVOLVEMENT IN MANAGING THE WHITEBAIT FISHERY

How DOC has performed its responsibilities has to be viewed in its context. This is seen to include:

- Scientific knowledge on the fish and fishery available to the Department at the time;
- DOC's stated position on its policy/intentions;
- Recent past history of regulation and management of the fishery;
- The regulations in force at the time DOC assumed its responsibilities (1 July 1990);
- The extent to which the regulations in force and DOC policy/intentions reflected scientific knowledge;
- DOC's use of the consultation process in developing its policy/intentions and in changing the regulations, and its consistency in doing so.

All of this needs to be understood within a perspective that includes the fact that DOC assumed its responsibilities only in July 1990, that it has operated in an environment of limited

and reducing funding, and that the setting of priorities for whitebait research is undertaken in competition for limited funding with demands for research on other aspects of the New Zealand biota.

4.0 SOME BACKGROUND ON THE WHITEBAIT FISHERY

In order to understand issues and problems relating to management of the whitebait fishery some historical and biological background is necessary, and is briefly canvassed here. Much additional information on the fishery is found in references cited herein and listed at the end of the report (References: p. 35).

What is whitebait? Whitebait is a generic term used in many parts of the world for small, juvenile fish that are captured and eaten "en masse". In New Zealand, they are largely juveniles of five native species of *Galaxias* that are migrating up stream into rivers from the sea during spring, i.e. inanga *Galaxias maculatus*, koaro *G. brevipinnis*, banded kokopu *G. fasciatus*, giant kokopu *G. argenteus*, and shortjawed kokopu *G. postvectis* - listed in approximate order of their contribution to the fishery (McDowall 1984, 1990); however, in a small number of rivers (particularly the Waikato), a species of *Retropinna* (known commonly as smelt) is also caught and marketed ("second class whitebait").

Just as each species' contribution to the fishery varies, so also does its conservation status. Shortjawed kokopu are of considerable conservation concern (a "Category A" species in Tisdall 1994); giant kokopu (a Category B species) and koaro (Category C) are also of some, though lesser concern.

The fishery exploits these juveniles as they migrate up stream, often in mixed-species shoals. However, there are significant differences between the species in their ecology and behaviour, which results in differences in migration strategies and behaviour that relate to:

- Time during the whitebait fishing season;
- Natural characteristics of waters, such as temperature, acidity and the amount of tannin staining;
- Location of fishing sites in a river and distance upstream from the sea;
- Phase and height of the tide during and between days;
- Turbidity and the time elapsed since recent flood events in rivers.

As a result, the patterns of migration are complex (McDowall and Eldon 1980).

Whitebait catch: Quantities of whitebait migrating (and thus being caught by whitebait fishers) vary greatly between seasons, and within seasons between rivers, between times in the season, and between locations in a river. Although the historical record of annual catches is not good, there is evidence that large between-season fluctuations were a natural feature of the fishery as far back as the 1930s, even in southern rivers of the West Coast that were then fished by only a handful of whitebaiters (typically only two per river). These high fluctuations were characteristic of river catchments in the southern West Coast, in which there had been little or no human modification of the vegetation. Catch on the West Coast has fluctuated by as much as 32 times since the early 1930s (ca. 10 000 kg in 1935 to >322 000 kg in 1955: N.B. this low 1935 catch cannot be attributed solely to low fishing pressure in these early days as catch in 1932 was >177 000 kg, ranking eleventh highest between 1931 and 1973, when records ended). Habitually, good whitebait seasons have been accompanied by whitebaiter euphoria during which past poor seasons are forgotten; poor seasons are accompanied by gloom and despair, pronouncements of final decline, and calls for more conservation, less fishing pressure, and more restrictions on harmful changes to river systems. In such seasons, the fact that there have been surprising recoveries in catch from other, equally poor seasons, is similarly forgotten.

Thus in simple biological terms, quite apart from its regulation and management, the fishery is extremely complex.

Origins and development of the fishery: The whitebait fishery dates back to New Zealand's prehistory, when Maori exploited both the upstream migrating juveniles and the adults when in fresh water. European colonists soon appreciated the culinary qualities of the fish and equally quickly learned to catch them. In more recent decades, as access to the rivers became easier, as technologies for storing the fish in good condition and transporting them rapidly to centres of population improved, and as prices for the commodity on markets rose rapidly in the face of increasing demand and reduced supply, pressure on the fishery has risen. This has led to greater competition for good fishing sites, further increases in fishing pressure, potential for greater inter-personal conflict, and more activity that stretches the intent of the regulations and the potential for more non-compliance. All these changes have made the fishery increasingly difficult to manage. Overall, the whitebait fishery is associated with much tradition, and can be fairly described as the nearest we have to a peasant/artisanal fishery; it has both a strong commercial aspect as well as being a highly popular recreational fishery. The boundaries between the commercial and recreational aspects are blurred, as any whitebaiter may lawfully sell catch without constraints. The catch is highly valued, selling for > $30/kg on the rivers and

sometimes > $70/kg retail. It is a distinctive and important part of New Zealand's culture and a significant aspect of the social life especially on the West Coast.

5.0 WHITEBAIT FISHING REGULATIONS

Regulations for managing the fishery have evolved over the decades. Their history is outlined in McDowall (1984). Once, the regulations were very complex and involved diverse local characteristics to accommodate local practices or idiosyncrasies. More recently there has been a move to more national conformity and greater simplicity, though the highly productive and distinctive West Coast fishery has for decades had special provisions. For most of the fishery's history there have been regulations aimed at both managing exploitation of the fish and controlling the behaviour of the fishers.

Prior to DOC involvement, under Marine Department (to 1972) and MAF (statutory managers of the fishery from 1972 until 1990) administration, the whitebait fishing regulations were continually being modified.

Long-term trends in the Marine Department/MAF-administered regulations included moves towards greater simplicity and geographical conformity, avoidance of locally applicable regulations and the development of geographically widely-applicable or even national controls, shortening of the season (at both ends), and reductions in the size of fishing stands and the number of nets allowed on West Coast rivers, e.g. the season once extended from 1 July to 30 November, but was repeatedly shortened, with opening in North Island rivers pushed back to 1 August and South Island 1 September.

Towards the end of its administration of the fishery, MAF adopted a policy of attempting to minimise the role of regulations in managing the fishers, and focused the statutes increasingly on managing the resource. However, it did this with scant objective information on the impacts of the regulations on the fishery or resource. As a result the regulations shrank from 36 clauses on 14 pages of text in the 1981 regulations (NZSR 1981/102) to only 11 clauses and 6 pages for the West Coast fishery plus 1 clause on 1 page for the rest of the country (NZSR 1986/221). While this may have been appropriate for many fisheries it was, in theory (in my view), less appropriate for the whitebait fishery - where large numbers of fishers, operating in close proximity and often uncomfortable conditions, have sequential and often unequal opportunities to harvest an ever-diminishing but highly valued resource, as the shoals of whitebait make their way up stream past the whitebaiters along the edges of the rivers. Such a fishery seems, to me, to require considerable attention to managing "people" conflicts. These

issues, alongside the fact that, in the West Coast fishery, the Ministry of Agriculture and Fisheries usually employed only two full time staff (and these with only part-time commitment to enforcement of and compliance with the whitebait regulations), meant that there was a growing element of anarchy in the fishery. Other changes added to this.

All of these matters lay within a context of increasingly severe impacts from changes to the landscape, vegetation and water quality, on the populations of fish that sustain the fishery. In particular, these changes involved: deforestation; swamp drainage; encroachment by human population and industry onto river estuaries and their marginal vegetation; pollution and eutrophication; river channelisation; increased flood flows and sedimentation; the introduction of exotic predatory fish; and so on. Cumulatively these are considered likely to have made significant contributions to a decline in the productivity of the fishery. Furthermore, these damaging impacts cannot be distinguished from the possibility of over-harvesting of the fishery and any or all of them may have contributed to a widely held perception that there are now fewer whitebait running in the rivers than there were formerly.

Quantifying such a decline, as well as attributing it to various causes, is virtually impossible. Catch records in the fishery have always been very difficult to obtain. Figures published in the Marine Department Annual Report on Fisheries date back to the early 1930s. However, their reliability is questionable, but they are all the information there is. In the early years the records (Marine Department Annual Report on Fisheries) covered the entire country, but from the late 1950s they gave data only for the West Coast of the South Island, where the largest fishery has always existed, and still does. These figures were derived from the catch records of buyers, and so depended heavily on the Marine Department being in contact with all buyers. As marketing mechanisms diversified, maintaining this contact became more and more difficult, resulting in the published records being restricted to the West Coast fishery in the late 1950s. During the late 1960s and early 1970s, the processes that made reliable record keeping impossible in most of New Zealand increasingly applied on the West Coast. Earlier, when roads were poor and numbers of whitebaiters low, there were only a few buyers who bought most of the catch and marketed it in an orderly fashion, often by public auction, in the major cities. However, during the 1960s access to the rivers improved, numbers of whitebaiters increased, freezers became more available, and rapid transport of whitebait to population centres was easier, prices rose, and "niche marketing" opportunities became available. Consequently, more and more whitebaiters sold their catches directly: to hotel chains; to restaurants; to itinerant travellers along the West Coast roads or locally at home; for raffles in pubs and clubs, etc. Increasingly, it became impossible to obtain catch records of any reliability from buyers. Some of this was driven by attempts by whitebaiters to avoid having tax deducted from whitebait purchases by regular buyers, as became a statutory requirement.

This problem was foreseen in the early 1960s and an attempt made to avert it. With the passage of new whitebait regulations by the Marine Department in 1964, a new regulation required all commercial whitebaiters who fished from registered sites on the West Coast to submit to the Department a record of their daily catches for the season. The result was chaotic. Initially, many of the whitebaiters simply did not bother to submit returns. Keeping paper records in the primitive conditions under which many whitebaiters operated was very difficult in the wet climate of Westland. Some whitebaiters were scarcely literate. Nearly all of them feared that their catch records would become available to the Department of Inland Revenue. Powers of prosecution for non-compliance could be practical and effective only for fishermen with registered sites, since they were under threat of deregistration and loss of a valuable fishing site. Consequently, they responded to threats by providing what seem to be fictitious records of catch. With time, more and more whitebaiters were recreational and unregistered, fishing mostly for fun, selling a bit when a lot was caught, staying on the rivers for a few days or weeks, and shifting often between rivers. Keeping track of them became impossible. As a result more and more of the catch was outside the framework of the registered fishers.

Put simply, the regulation requiring catch records did not work and was abandoned after only two years of unsuccessful attempts to obtain compliance. The data resulting were worthless.

From about the mid 1970s there has been no official attempt to measure catch. Since that time, no catch estimates have been published, and the amount of whitebait taken is totally unknown. The lack of records in part reflects the considerable difficulty in obtaining reliable data. The question of catch records was raised in the report of the Regulations Review Committee (1994) and is discussed at some length, below (p. 22)

6.0 ADOPTION OF CONTROL OF THE FISHERY BY DEPARTMENT OF CONSERVATION

It is against a background of all these trends and events that DOC took control of the fishery in 1990. It inherited the existing regulatory framework as well as all of the various existing historical and regulatory problems. There had been longstanding and chronic dissatisfaction amongst many whitebaiters with MAF's performance (and the Marine Department before it) in managing the fishery. Much of this was little more than the usual antagonism between the enforcement role of a bureaucracy and the activities of those participating in an effectively "hunter/gatherer" fishery. Some of it was based around personalities - of both fisheries officers and whitebaiters. However, some of it related to legitimate grievances as well as to a

perception that not enough effort was being invested by MAF in enforcement, problem solving and conflict resolution.

Like MAF before it, DOC had dual responsibilities for conservation of the species involved in the fishery and management of their exploitation. Under both MAF and DOC jurisdictions, there was an obvious conflict of objectives, since exploitation of the various whitebait species (McDowall 1984) could, in theory, jeopardise conservation of indigenous fishes (including the whitebait species). This potential conflict, perhaps, became more intense given DOC's more general, wide ranging, and more focused responsibility for conservation. However, the principles and issues remained much the same, though perhaps a little more finely honed and explicitly articulated.

7.0 THE SWMEP PROGRAMME AND A REVIEW OF THE WHITEBAIT FISHERY

In the several years before 1990, there had been considerable discussion of the development of an accord to govern the exploitation of indigenous forests in southern Westland - The South Westland south of the Cook River resource management study, or SWMEP (Ministry for the Environment 1988). This was part of a process to lead to the end of indigenous forest cutting in the area, other than on a sustainable basis. One of the recommendations of this process was that there should be a review of the management of the West Coast whitebait fishery (Ministry for the Environment 1988).

Cabinet accepted this recommendation and, on 22 February 1989, instructed DOC to undertake such a review, in cooperation with MAF, and other interested parties. This review was to cover:

- Management of the fishery;
- Length of the fishing season;
- Fishing methods;
- Regulations that controlled the fishery;
- Habitat protection; and
- Resources available to carry out these responsibilities.

8.0 THE DOC PUBLIC DISCUSSION DOCUMENT

After consultation with MAF, DOC produced a substantial whitebait management review and discussion paper on the West Coast whitebait fishery, which it made widely available as a Public Discussion Document (DOC 1990). This document solicited submissions from interested parties. It forms the first articulated account of DOC's philosophical and policy approach to managing the fishery and is, therefore, of high significance in addressing issues relating to DOC's performance as the fishery's manager. A summary of the 195 submissions in response to the Public Discussion Document was prepared by an independent consultant, and published (Rankine and Hill 1991).

The Public Discussion Document (DOC 1990) defined DOC's three "Principles of Management" as follows (in priority order as given in DOC 1994):

1. The Department of Conservation has a statutory responsibility to preserve and protect the whitebait resource for the purpose of maintaining its intrinsic values;

2. The Department will continue to provide for the appreciation, and sensitive and equitable use, of the whitebait fishery by the public;

3. In its management of the West Coast whitebait fishery the Department will safeguard the options for conservation and management of the whitebait resource for future generations.

The Public Discussion Document further stated that:

In support of these principles, DOC will:

- Have some areas where fishing is not permitted;
- Protect and where possible enhance, adult habitat and spawning areas;
- Have clear and understandable regulations which control how, when and where whitebait can be taken.

Managing the fishery for sustained production in the long term is a persistent theme throughout DOC papers on the fishery and its management.

The Public Discussion Document recognised that future management of the fishery must recognise diverse values and benefits, including food, taonga, recreation, money, scientific interest, aesthetic values and ecological importance. And it stated that the Department's management activities will "as far as possible, be scientifically based". It recognised that the scientific information available was very limited, and stated its intention to "proceed cautiously" (DOC 1990, p.7), or to be "conservative" (DOC 1993a, p. 4) in its approach to whitebait management. N.B. This later became a "precautionary" approach (DOC 1993a, p.9); it could be argued that the various perspectives differ - proceeding cautiously could be taken to mean moving with caution from a present position, whereas a conservative or precautionary approach could be interpreted as meaning taking all precautions to ensure that management/conservation goals are met.

The Public Discussion Document also affirmed that "All management decisions taken by the Department of Conservation will have regard to these principles [1-3 above] and any scientific information which is, or becomes, available" (1990, p.13).

No-one can, I believe, take issue with the three Public Discussion Document principles; however, they are very general statements that do not provide much guidance as to future policies and actions. Thus, they are sound without being explicit or prescriptive. They form a philosophical background against which decisions and actions can be measured.

The Public Discussion Document (DOC 1990) went on to canvas a series of three major issues for attention in the review process. These were:

a) **Habitat protection** - which pointed to the need for research and survey work on inanga spawning habitat and adult whitebait habitat requirements (DOC 1990, p. 7-8).

b) **Control of fishing** - regulations were seen as a "framework within which whitebaiters gain an opportunity to share in [harvesting] the resource" as well as a "mechanism ... to ensure sufficient fish get past the nets [= escapement] to breed". A principle of regulation was that "controls must be clear and enforceable". Within this section, the following issues were canvassed:

- Closed areas - and the Public Discussion Document said that DOC would "evaluate the benefits of closing certain tidal estuaries as a means of providing further protection for the fishery" (p. 9).
- Season length - and the Public Discussion Document noted divergent views on shortening or lengthening the season, pointed to the problem of wastage of

"black bait" (fish that have been in the rivers for several weeks, and which have become pigmented) in November, but concluded that DOC considered "that the existing season continues to provide a yield to whitebaiters, while ensuring protection of the resource"; the Public Discussion Document proposed that "the *status quo* for the regulations on whitebait stands and season length be retained" (p. 9).

- Back pegs - and proposed designation, by pegging, of upstream limits to fishing (p. 10) where there were problems in just limiting fishing to areas affected by tidal fluctuations.

- Fishing methods - commenting only that "perhaps it is time to consider the wisdom of some changes in technique being used" (p. 10).

- Net traps - and, based on views of MAF scientists, considered that "in providing for a recreational fishery, and the long term sustainability of whitebait, it is not necessary for nets to have traps"; it signalled giving "serious consideration to [establishing] regulations that would ban traps from nets" (p. 10).

- Sock nets - signalling that it would be giving "serious consideration .. to whether banning sock nets would provide a significant conservation benefit" (p. 11).

- Whitebait stands - recognising that they are "a traditional part of the West Coast whitebait fishery", suggesting maintenance of the *status quo* until passage of the RMA, but explicitly inviting comments from whitebaiters, and others, on the issue of whitebait stands (p. 11).

c) **A whitebait licence** - was suggested as a possible way of self-funding of management of and research on the whitebait fishery (p. 12).

Finally, the Public Discussion Document invited the views of interested people on the document.

This document, thus launched the DOC process of managing the whitebait fishery, applying its management strategies and responsibilities to the fishery, revising the regulations, and beginning its consultation process.

9.0 WHAT IS DOC'S PHILOSOPHICAL APPROACH TO MANAGEMENT OF THE WHITEBAIT FISHERY?

DOC's philosophical approach to management of the whitebait fishery ought to be evident from the principles that it applies, and particularly in the way is deals with the balancing act involved in being both advocate for the conservation of indigenous biota as well as managing the commercial and recreational exploitation of whitebait.

The repeatedly stated basic philosophical approach of DOC to its responsibilities for managing whitebait fishing is "to maintain and if possible enhance" the fishery (DOC 1990, p.5). How it goes about doing this can be interpreted from reports, discussion documents, and correspondence associated with managing the fishery.

The following, in no particular order and taken from diverse DOC papers on the fishery issues, are some of the factors that seem to me to illustrate DOC's philosophical approach:

- DOC has accepted the validity of the exploitive nature of the whitebait fishery and its place in West Coast culture and social life, whilst also needing to ensure sustainability of the fishery and protect the intrinsic values of the fish populations. This involves something of a shift of "mind-set" in a "conservation" department, though the whitebait fishery is not unique in this regard within the indigenous biota, and DOC's responsibilities for it, e.g. harvesting of sphagnum moss, muttonbirds, other "customary harvest" by Maori, licensed recreational hunting of some indigenous game birds, such as grey duck, shoveller, pukeko, and commercial fishing of eel also involve the harvesting of indigenous biota.

- DOC appears well aware of the social/cultural values of the fishery to both Maori and Pakeha.

- It recognises the value of scientific research as a basis for management, and that the benefits of much of the research will have long-term fisheries conservation outcomes rather than immediate management benefits.

- It plans for a future in which there is still a productive whitebait fishery.

- It recognises the role of habitat modification and degradation as a key issue for maintenance of the fishery.

- DOC variously espouses adopting a "cautious", "conservative", and "precautionary" approach to management. I take cautious probably to mean that no rapid changes will be made without very good reason, whereas conservative and precautionary I take to mean that protection and maintenance of the fishery resource will take precedence over free-reigning exploitation.

- DOC has shown a willingness to question traditional fishing practices and gear usages in an effort to ensure that the fishery can be maintained and that there is fairness to all fishers competing for the same resource.

- It recognises the need to develop a system of management that fairly balances the various competing imperatives and people issues.

- It recognises Maori and Treaty of Waitangi issues as relevant and important (this is quite explicit in the Conservation Act 1987).

- It has been active in establishing closed areas as conservation measures.

- It has shown itself willing to consult, and I believe meaningfully, in spite of the problems raised through the referral of the 1994 whitebait fishing regulations to the Regulations Review Committee; the row that culminated in this referral I believe relates more to performance in consultation rather than attitude towards the consultation process.

- It established a vigorous programme of identifying and protecting areas important for inanga spawning as a foundation for supporting continued whitebait production.

- It has adopted a "live with the present" management regime and is moving to change it slowly and incrementally, rather than undertaking a major review of management and introducing many changes all at once. Thus it has attempted to "get alongside people", trying to get them on side and accepting of proposals rather than taking an authoritarian approach; this is not always possible, and it appears that when necessary DOC will take unpopular decisions. This can be seen as a pragmatic, consensus, somewhat *ad-hoc* approach rather than doctrinaire and based entirely on principle.

- DOC has been proactive in attempting to educate whitebaiters through publishing material, press releases, etc.

- It has used external consultants to prepare summaries of submissions and provide minutes of public meetings and consultations, to ensure that a fair and objective account is produced.

- It has rather tentatively broached the question of a whitebait fishing licence (DOC 1990, p. 12), with a view to making management and perhaps research on the fishery self-funding, but has not really grappled with that question.

To the extent that these observations really reflect the philosophical approach of the DOC (and there is no implication in this statement that this is not generally the case), it is difficult to be critical. What is of the utmost importance is the balance that DOC develops between the competing imperatives for maintaining and enhancing the fishery that the various policies and activities involve. However, DOC relationships with clients of all types are also important - there are major people issues as well as fisheries issues. Given that DOC was established primarily to conserve, it seems to me that whitebait fishing (an activity that might be regarded as largely at variance with DOC's primary goal, i.e. conservation of natural resources), has been well served. The balance in their approach and performance seems appropriate. That can only be a very personal observation, and no doubt there are others who consider that there is a need for some "fine tuning", i.e. that either more should have been done for conservation, or that the restrictions on fishing that DOC wishes to introduce are unnecessarily severe. This variation in attitude and perspective is inevitable, and is a problem for DOC to resolve and make decisions about.

There seems to me to be some possible conflict between "cautious", "conservative", and "precautionary", and that DOC needs to clarify this issue - to explain what is meant and to ensure consistency.

10.0 DOC AND WHITEBAIT RESEARCH

While DOC's ambition to base its management decisions on science is laudable and appropriate, there is not much scientific information specifically relevant to management - in spite of a long history of research. This is unlikely to change dramatically in the foreseeable future, and DOC is going to have to adapt; this is the justification for its adoption of a precautionary approach to management of the fishery.

Knowledge of whitebait and the whitebait fishery is based on research undertaken largely by researchers associated with previous managers of the fishery. This began with work done for the former Marine Department by Leonard Hayes in the 1930s (Hefford 1931a, b 1932), with some additional university research also occurring in that period (McKenzie 1933). The Marine Department resumed research in the early 1960s (Burnet 1965; McDowall 1964 1965 1966 1968), and there was again during this decade further university research (Benzie 1968a, b, c; Woods 1968). Responsibility for the fishery passed to the Ministry of Agriculture and Fisheries in 1972, and the major commitment to whitebait research at that time culminated largely with the publication of an extensive research bulletin largely on factors that control whitebait migrations (McDowall and Eldon 1980), though other work of specific relevance to whitebait ecology and, therefore, the fishery was also done (McDowall *et al.* 1975; Ots and Eldon 1975; Jellyman 1979; Hopkins 1979a, b; Mitchell and Penlington 1982; Kelly 1988; Hanchet 1990; Rowe *et al.* 1992). Some work in the universities continued (Main and Winterbourn 1987; Main and Lyon 1988). Much of this information was reviewed and summarised in McDowall (1984). Additional research was undertaken by MAF under funding from the Electricity Corporation of New Zealand in the Waikato River in the late 1980s (Stancliff *et al.* 1988a,b).

As DOC staff correctly stated (DOC 1995c): "The easiest research has been done, but we have only scratched the surface". In spite of quite extensive research over a prolonged period, DOC accurately observed in 1990 (DOC 1990, p. 7) that "Our current information on the size and replacement rates of whitebait stocks is poor." This statement is correct, and much more could have been said about the lack of information even on the basic ecology, habitat requirements, behaviour and reproduction of four of the five *Galaxias* species involved in the fishery (the exception is inanga, the ecology of which is much better known - Benzie 1968a,b; McDowall 1968; McDowall and Eldon 1980). There is always a need for "more research", but especially this is often urged by critical commentators when decisions are made based on available information, but when these decisions appear contrary to the interest groups of a particular faction. This is true of the recent controversy between the West Coast Whitebaiters' Association and DOC. It is interesting, in this light, to note that very few of those who made submissions to DOC's 1994 whitebait management review document (Allen 1994) thought that there was a need for more research, even though in another context many seemed to think that whatever information was available to DOC was either inadequate, incorrect, or out of date (DOC 1995, p. 14).

Actions undertaken by DOC to remedy this shortage of information have been the following:

Research underway at the time that DOC assumed responsibility for the whitebait fishery in 1990, and which was funded in part by money in a funding loop between DOC and MAF in the transition phases of all of the departmental/administrative changes occurring, was completed using some DOC finances (McDowall *et al.* 1994); this work related to aging whitebait at migration, determining the time spent at sea, and back-calculating to determine hatch date and spawning time for the five species in the fishery. Though in part funded by DOC, the Department had little control over its focus, and was not then in a position, anyway, to determine its research needs and priorities.

Soon after its establishment, the Department commissioned a review of the whitebait fishery from MAF (McDowall 1991); this seems an appropriate way of DOC getting up-to-date evaluation of the research needs. This review identified a series of research and information issues important to managing the fishery, as follows:

1. Difficulties in identification and separation of juveniles of koaro and shortjawed kokopu;
2. Escapement from the fishery;
3. Spawning migration of inanga;
4. Inanga spawning mortality;
5. Conditions for inanga egg development;
6. Whitebait migration at night;
7. Natural history in fresh water of species involved in the fishery;
8. Life at sea;
9. The question of stocks;
10. Impact of fishing mortality on rare species;
11. Habitats important to the species in the fishery;
12. Issues relating to the fishery itself (primarily knowing catch and understanding variations);
13. Barriers to migration;
14. The impacts of eel fishing on adult whitebait;
15. Impacts of exotic species;
16. Tangata whenua/Treaty of Waitangi issues.

These were not listed in order of urgency or priority, and the report noted that "Research issues need to be assessed according to criteria such as practicability, urgency and threats to the populations, costs, likelihood of useful management results being obtained, and ultimate value for management" (McDowall 1991) - issues that were a DOC responsibility on which to set research priorities and allocate research priorities.

An additional consideration for the Department was its ability to deploy its own field staff in generating information that advanced its conservation and management goals. This, in part, involves a need for DOC staff to become informed about whitebait ecology and the fishery.

DOC allocated priority and funding to several principal areas of research, that took into account the various priorities and imperatives:

1. Identifying and protection/management of spawning grounds for inanga, the chief species in the whitebait catch in most rivers, and therefore the most important species to conserve in terms of promoting sustained fisheries production. DOC commissioned studies by MAF, later NIWA, as well as by private consultants, to provide it with criteria that would assist DOC field staff in identifying inanga spawning grounds and in getting the best spawning production from these areas (Mitchell and Eldon 1990; Mitchell *et al.* 1992; Mitchell 1993b 1994b).

   In addition NIWA established and DOC continues to fund a computerised database for recording information on all known inanga spawning grounds (Taylor 1992 1995; Taylor *et al.* 1992). This has led to active management by DOC of some spawning grounds to maximise egg/larval whitebait (inanga) production, enabling DOC staff, at least in some measure, to undertake activities to protect known spawning areas from development, effects of stocking, pollution, etc. In some areas enhancement of spawning grounds has been achieved. This activity has engendered considerable popular support from local authorities, conservationists and whitebaiters, generally, who see value in ensuring prolific inanga spawning.

2. Defining important habitat characteristics for feeding, growth and maturation of inanga, much the most important species in the whitebait fishery, and therefore of high importance to maintaining its productivity (Sagar 1993).

3. Critical habitats for rare species: Several of the species involved in the whitebait fishery are of conservation concern, particularly the shortjawed kokopu which DOC regards as the country's most seriously threatened freshwater fish (Tisdall 1994). Consistent with this ranking, DOC commissioned a substantial, 2-year research programme from NIWA to identify critical habitats for this species (McDowall *et al.* In press). A second whitebait species of concern is the giant kokopu, and this has been assigned high priority for research funding for the coming year (M. Simons, pers. comm.).

4. Stocks: The issue of stocks in the whitebait resource is of high importance to intelligent management. Presently it is not known whether the fishery exploits one large, New Zealand-wide stock, several regional stocks, or many local stocks. Genetic studies of isozymes have indicated that the whitebait species show little differentiation around New Zealand, and this provided no evidence of separate stocks (Allibone and Wallis 1993). More sensitive genetic techniques are now required to determine whether there are stock differences. Studies of galaxiid DNA are underway by NIWA, funded by DOC, to determine whether there are local or regional differences in whitebait around the New Zealand coastline; such differences would imply separate stocks and could influence management decisions.

5. Identification of whitebait of shortjawed kokopu: At present it is not possible to distinguish the whitebait of shortjawed kokopu from those of other species; it is likely that shortjawed kokopu are mis-identified as koaro, partly because they are very similar, and partly because there are probably few shortjawed kokopu present amongst large numbers of koaro. The identification of genetic characteristics of each species is a first step to determining whether there are external morphological criteria that can be used to identify shortjawed kokopu. DOC is funding a programme to identify such genetic markers that will form the basis for certain separation of shortjawed kokopu whitebait, and from that examine the fish for distinctive morphological characters. Genetic markers have been identified (Dijkstra and McDowall, In press). Because of the threatened status of shortjawed kokopu, it is of high importance to be able to identify shortjawed kokopu, and from this, to be able to determine factors and locations favourable for migration and inhabitation by shortjawed kokopu. An eventual goal will be to attempt to establish mechanisms that will minimise the catch of shortjawed kokopu, and thereby avoid further decline in its abundance resulting from exploitation in the fishery.

6. Fish passage: Whitebait species are migratory, and in some species adult habitats are long distances upstream in the small headwater tributaries of rivers (McDowall 1990). Human activities often impede the movement of these migratory fish by the construction of road culverts, dams and weirs, dewatering of reaches of rivers, polluting discharges. DOC has funded research focused on the design and installation of fish passage facilities that assist upstream migrating fish in moving past obstructions (Mitchell 1991 1993a 1994a 1995a, b, c, d; Barrier *et al.* 1995; Boubee 1995). An ongoing NIWA research project is examining the effects of culverts on fish passage up streams and aims at developing design for structures that facilitate passage by upstream migrating small fish.

Thus, within its significant budgetary limitations, DOC has over the past 6 years been active in undertaking, or commissioning and funding, research on whitebait and seeking expert advice that supports its goals and responsibilities for managing the whitebait fishery and conserving the species involved.

- It has sought to consolidate available information by applying and extending knowledge of inanga spawning ecology and habitats by identifying important areas, refining knowledge of what constitutes an important spawning area, and by providing protection for identified areas.

- It has looked at management issues and has sought to apply knowledge to conservation, e.g. by facilitating upstream passage of whitebait by installing fish passes where these may be effective or removing barriers to migration where this is practicable and economic.

- It has identified the most critical conservation issues, and has sought to advance knowledge on these with the objective of being better able to offer protection to endangered species in optimal habitats.

- It has consulted widely with a range of experts in universities, crown research institutes, and other research agencies on issues relevant to its fisheries management and conservation responsibilities.

11.0 THE 1994 REGULATIONS AND THE PARLIAMENTARY REGULATIONS REVIEW COMMITTEE

The West Coast Whitebaiters' Association complained to the Regulations Review Committee of Parliament about DOC's action in gazetting new West Coast Whitebait Fishing Regulations, in 1994. The Association argued that DOC had not adequately signalled the possibility of this change in the regulations, and that the Department should therefore have undertaken further consultation when the decision was made to alter the ending of the season. The Regulations Review Committee held hearings, primarily on the objections to curtailment the fishing season from the West Coast Whitebaiters' Association, and this culminated in publication of "Report of the Regulations Review Committee (RRC) on a complaint relating to the Whitebait Fishing (West Coast) Regulations 1994". In this report, the Regulations Review Committee:

- Criticised the Department for failing to undertake "adequate and fair consultation in the promulgation of these regulations";

- Recommended that the Department revoke the closure of the fishery on 31 October and extend the season to 15 November (reverting thereby to the situation prior to the 1994 regulations);

- Recommended that the Department "undertake greater research on the whitebait fishery";

and

- Recommended that the Department should maintain up-to-date catch records that would assist the Department in determining the status of the fishery in the long-term".

I was a party to the hearings held by the Regulations Review Committee, so that a detailed analysis here of the Regulations Review Committee's report is inappropriate; it suffices to say that much of the evidence presented to the Regulations Review Committee and the Regulations Review Committee's response to that evidence is controversial and certainly arguable.

12.0 GOVERNMENT RESPONSE TO CRITICISMS OF THE REGULATIONS REVIEW COMMITTEE

The Government's responses to these criticisms (Government, n.d.) were:

Consultation: Government agreed that the consultation process could have been improved.

Revocation of the early season closure: This was agreed to by Government and undertaken by DOC in October 1994, enabling that season to continue until 15 November, as before (NZSR 1994/230)

Research: The Government's response to the Regulations Review Committee recommendation that there should be more research was that it would "require further consideration and working through with scientists and fishers". No specific funding was made available for any of the additional research recommended and, being practical, it is simply a question of priority setting by DOC about which it is easy to make recommendations, but far more difficult to actively heed without dedicated funding for the work. It is hard to see that whitebait research has any specific priority over the other research priorities of the Department.

Whitebait catch statistics: This recommendation, again, is easy to make, it sounds sensible, but giving effect to it would be a major problem and highly costly. Experience in establishing a statutory framework for obtaining catch records is discussed above (see p. 7-8), and there is no reason to believe that success would be any better in 1996 than it was in 1964. Getting reliable figures would be costly and a major time commitment. Catch figures would provide useful data only over a long time series, and even then, because the factors that contribute to geographical and chronological variations in catch are poorly understood, the catch data themselves, if accurate, would be of little or no practical use. The fishery has always fluctuated and is likely to continue to do so. It may also show a slow decline when these fluctuations are analysed over a long time series, but unless we know why these changes are taking place, the only progress will be that we know how much the fishery does fluctuate and that it is, perhaps, declining. This does not seem like a good allocation of very scarce research funds, given other priorities.

An alternative could be to choose a representative river, or group of rivers to establish a baseline for catch fluctuations. This would require a sustained effort at consultation, liaison and data gathering on each of the selected rivers, to ensure that figures are as complete as possible. There would always be doubts about how representative the selected rivers are, as history shows that catches fluctuate among rivers differently in different years (McDowall and Eldon 1980). Years of high catches in some rivers are sometimes accompanied by poor catches in others nearby, and the reverse is true of years of poor catches.

There would be no use at all in getting catch figures from representative fishers as a basis for addressing catch fluctuations, as the problem of different patterns of fluctuation among fishers is even more prevalent than variation among rivers. Individual fisher success depends on a wide array of fish and river behaviour, seasonal, and personal variables. And again, as noted above, unless reasons for variations are understood, there is little profit in quantifying them.

If there is to be any investment in determining catch, it must be on the basis of a long-term (decades) commitment, and must be accompanied by a programme of environmental monitoring that would lead, hopefully, to the identification of the causes of variation. It must also be accompanied by a sustained investigation of the ecology of the four lesser known species in the fishery, as the relationship between catch fluctuations and environmental variables must be interpreted in the context of the ecologies of the species that sustain the fishery. This investigation would have to include a substantial catch sampling programme so that inter-seasonal variation in the contributions of the five species to the runs is known.

In addition, a study of variation in the size of the whitebait at migration is needed since study shows that > 20% of variation between seasons in the weight of whitebait caught may be due to the fish being larger or smaller at migration (McDowall and Eldon 1980). This, in itself, might seem a simple matter of measuring some fish each year. However, it is not that simple as size at migration also varies widely through each season, with a marked decline in fish size during the latter weeks of fishing (McDowall and Eldon 1980). Size also varies between regions around New Zealand. Thus in tackling these issues we are facing a very substantial, prolonged and costly research programme, and one that cannot be attacked as a sequential series of lesser programmes over a longer period of years. All of these issues need to be studied simultaneously.

13.0 CONSULTATION AND THE NATURE OF THE CONSULTATION PROCESS

The Regulations Review Committee was critical of DOC for the way it carried out the consultation process, alleging that "the defects in this consultation are so serious as to warrant the committee recommending that the current whitebait season for the West Coast for this year be extended to close on the former fishing date of 15 November" (RRC 19 94, p. 23). It further recommended that additional consultation take place. Government accepted both recommendations and an additional series of consultative meetings was held.

The Regulations Review Committee view was derived largely from the complaint from West Coast Whitebaiters' Association which objected to a change in the termination of the open fishing season, on several grounds:

- That there had been insufficient indication of the likelihood of this occurring, and in fact a statement cited elsewhere from the Public Discussion Document (DOC 1990) might have led readers to assume that no change in the season was being considered; and

- That the scientific data upon which the decision was based were out of date and flawed.

In spite of the view expressed by the Regulations Review Committee, documentation shows that extensive and prolonged consultation took place (Rankine and Hill 1991), probably more than before any previous changes to the whitebait fishing regulations. In a day when consultation has become an increasing norm, the fact that there was more consultation than hitherto for the formulation of new whitebait fishing regulations does not necessarily mean that the consultation was adequate by today's standards, or that the process was conducted

adequately or flawlessly by DOC. Government accepted that it could have performed better in undertaking consultation (Government, n.d.), and sought to remedy that shortcoming by holding further meetings with both Maori and whitebaiters.

One of the problems of consultation is that it raises the expectations of those consulted that their viewpoint on change (or lack of change) will be accepted. However, consultation is not the same as decision-making. The whitebaiters, who were consulted extensively are, to put it bluntly, a lobby group with an explicit interest in exploiting whitebait for gain. As well as having interests that may conflict with the interests of others (such as conservationists concerned about the survival of the species, or trout fishers who would prefer that whitebait be left in the rivers for trout food), the whitebaiters have their own conflicting interests. These include conflicts between them wanting to maximise the immediate return from the fishery and wanting to ensure availability of the resource to them (or their children) for the future. The history of wild fisheries exploitation suggests that objectives to maximise immediate gain usually take precedence over the long-term goals, and there seems no reason why the New Zealand/West Coast whitebait fishery should be much different. Because the whitebaiters have a personal and focused interest in the fishery (financial gain), they do not necessarily seek what is best for its long-term survival. If they did, they could be left to self-regulate the fishery, and binding regulations might not be necessary.

Therefore, it is probably an unreasonable expectation that the whitebaiters should necessarily "get their own way" after consultation over pending changes in the regulations. The best that they can reasonably expect is that their views are heard and taken into consideration when changes to the administration/regulations are made. The consultor has some responsibility to signal its provisional intentions and the scope of potential changes during the consultation process (and the failure to do this was probably the single major point in the Regulations Review Committee report). The consultation also needs to demonstrate that the consultees' views have been heard and to provide an explanation for decisions that are finally reached, especially when such decisions run contrary to the wishes of those consulted (it is to be expected that sometimes this happens).

The Regulations Review Committee's criticism of DOC's failure to sufficiently clearly signal proposed changes in the season (RRC 1994) is probably apt. Specifically, in the 1990 Public Discussion Document, (DOC 1990), the Department stated (p. 9) that "Separate regulations and season lengths for the West Coast have in the past been considered necessary because of the special nature of the fishery..." It further stated (p. 10) that "The Department considers that the existing season continues to provide a yield to whitebaiters, while ensuring protection of the resource". The implication of this second statement is that no change in the season was

being considered and this is certainly the view taken by the West Coast Whitebaiters' Association when the Association complained to the Regulations Review Committee. Perhaps the RRC was right, although season length was certainly one of the issues that government instructed should be addressed in the review and was explicitly stated as being up for review (DOC 1990, p. 1). Were it not for side-issues being dragged across the debate during the RCC debate, any logical interpretation would assume that the 1990 review involved the beginning of the season, the ending of the season, and by implication its length. Many submissions following release of the Public Discussion Document included comments on the length of the season. This shows that amongst those making submissions there was clearly an expectation that questions relating to the duration of the season were legitimately a part of the process. In the end, DOC did not openly consult with the whitebaiters before making a decision to curtail the season, hence the ruckus that developed, culminating in the hearing and report from the Regulations Review Committee.

It is further of relevance that although the West Coast Whitebaiters' Association argued that DOC had not indicated a likelihood of a change in the season, and that it was, therefore, not on the agenda for change, the Association also did its own analysis of the submissions on the DOC Public Discussion Document (DOC 1990), and presented its own view on the attitudes of the 151 of 195 submissions that did comment on season length. The Association claimed that most of those who did comment did not want change. Thus it is clear that the Association wanted it "both ways": season length was not signalled as likely to change, but if it was to be discussed most people had said that they were against change. It appears that it is only with hindsight that the Association reached the view that season length was not up for review, and it is perhaps telling that it did not complain that the opening of the season was also shifted - from 1 September to 15 August, actually providing for an earlier start.

This does not necessarily mean that DOC should not have changed its position on the season timing issue, but rather that it should have notified any proposed change as early as possible and have justified its position carefully. As it happens, DOC did change its position, and chose to eliminate the last two weeks of the season - it did this on ostensibly sound scientific grounds and said so. The reason for this decision was that it desired to protect the migrations of giant kokopu whitebait, which research showed took place mostly during early November (McDowall and Eldon 1980). The Regulations Review Committee asserted that DOC should have taken this issue back for further public consultation (RRC 1994).

DOC has responsibilities that are substantially wider than just the interests of just the whitebait fishery, and these are thus wider than (and sometimes conflict with) what whitebaiters see as their interests - it also is responsible for ensuring the conservation of species/

communities/ecosystems in their natural state (Conservation Act 1987). Thus the consultation process needs to be seen as an opportunity to present information and reveal attitudes that may affect the final decisions that were made when balancing the various, sometimes conflicting responsibilities. Consultation cannot be a substitute for making the decisions themselves. In this instance, decision-making is a DOC responsibility. DOC is statutorily and morally obliged to adopt much wider and longer time perspectives on decisions than those likely to be adopted by the West Coast Whitebaiters' Association and whitebaiters in general, and the Department has to take care in weighing up the conflicting needs of and responsibilities for the whitebait fishery against those related to the long-term conservation of the species involved. Decision making in these situations is a question of weighing up choices in terms of their overall effects and in response to the needs of different, sometimes opposing interest groups and needs.

For these reasons DOC's decisions on whitebaiting are likely, from time to time, to encounter opposition from the whitebaiters, especially on occasions and in situations when the whitebaiters' rights and opportunities are constrained by changes. When this is so, whitebaiters cannot always expect to get their own way. It is not a matter of democracy and the rights of the majority, or of responding to the most vocal or eloquent advocates, so much as DOC meetings its statutory responsibilities. Unfortunately, the "whitebait species" and their "conservation needs" do not have such outspoken and vigorous advocates outside of DOC as the whitebait fishery appears to have. Consequently, DOC is left in a position of being both conservation advocate (with clear statutory backing) and decision maker. This makes the Department vulnerable to criticism of bias by those who misunderstand the totality of its responsibilities.

14.0 THE RATIONALE FOR EARLIER TERMINATION OF THE SEASON

It seems here appropriate to look specifically at the dispute over the decision to change the season by providing for it to end on 31 October, rather than 15 November, as hitherto, i.e. at the decision itself, rather than at the processes leading to the decision.

DOC explained to the Regulations Review Committee that its decision was based on scientific information that suggested that conservation of the giant kokopu would be enhanced by the early season closure, as this would greatly increase escapement of giant kokopu whitebait. It also expressed concern about the high proportion of "black bait" being taken at the end of the

season (fish that have been feeding in fresh water for some time and have become pigmented), and that these fish were often wasted since they are not marketable. The fact that DOC did not in any way foreshadow, and provide for prior discussion of, this decision in the discussion papers, however right this claim may be right, did not make the decision wrong (rather it makes the decision-making process flawed). Correct decisions can be reached by a flawed decision-making process, and it is notable that the RRC did not argue that the decision to end the fishing season on 31 October was wrong.

The West Coast Whitebaiters' Association, however, did argue that scientific information relating to giant kokopu on which the decision was made was out of date and/or inaccurate, being based on research undertaken in the early 1970s (RRC 1994, p. 21) (N.B. this was research by the author of the present report - McDowall and Eldon 1980). It is implied (RRC 1994:21) that the Association thought that season reduction in 1981 was implemented to conserve giant kokopu. This is not correct. It was done because whitebaiters complained that they had to stay fishing on their registered stands until the end of November, although no whitebait were being caught.

The critics did not explain why it was thought that migratory behaviour of the fish might have changed between the early 1970s and the early 1990s, and their argument is simply fallacious. Just as it is known that kowhai trees flower in the early spring, and just as inanga mostly spawn on spring tides in the autumn, so whitebait are known to migrate in the spring. These cycles are eons old and stable. Maori have known of these patterns of nature for centuries and developed patterns of fishing to exploit them. To suggest that the patterns of movement of the different whitebait species (with koaro whitebait migrating early in the spring, banded kokopu later, and giant kokopu mostly later again, in early November - McDowall and Eldon 1980), have changed over the past 20 years is irrational and clutching at straws. The whitebaiters themselves operate by the same principles. Ask them, and many will say that the biggest runs take place on spring tides, and that they peak around Labour Day; they have always said this, from long before the 1970s, and still do. (The fact that data show them to be wrong on both counts seems to matter little, and they continue to believe what they do, and to focus their fishing activity accordingly).

It could be, of course, that the data presented on giant kokopu migrations (McDowall and Eldon 1980) are inaccurate or incomplete, and the West Coast Whitebaiters' Association have argued that this is so (RRC 1994, p. 21). However, this sort of criticism can be applied to all scientific information, especially when it does not suit the ends of critics, and it can always be argued that more data are needed. The Association provided no data, although it did claim

that it had data that show that the proportion of giant kokopu in the catch was greater than had been suggested (Allen 1995:5).

When this claim of the West Coast Whitebaiters Association was put to the test at a workshop to identify samples of whitebait that the Association members had collected, however, they proved unable to distinguish the whitebait of giant kokopu from those of the other species, and further, fish they thought were giant kokopu whitebait were in fact sub-adult inanga (author's unpubl. obs.). Arguments by members of the Association that they had evidence that giant kokopu whitebait migrate over a much longer season than scientists and DOC were alleging, therefore proved unfounded. The Association's criticism of the data used by DOC seems to have little validity. DOC's use of the data available was appropriate as long as it was subject to amendment when further data became available.

15.0 SCIENCE AND THE MANAGEMENT OF THE WHITEBAIT FISHERY

One of DOC's "fundamentals for future management" of the whitebait fishery was that

- "...management activities will, as far as possible, be scientifically based" (DOC 1990, p. 7).

The Department further stated that

- "DOC will develop an information store on which future protection and management of the fishery can be based" (DOC 1990, p. 7); and

- "As the West Coast catch comprises mainly inanga, management options will be developed primarily on the basis of the biology of this species (DOC 1990, p. 2).

Having said that Department recognised that there were serious limitations in the amount of such information available to it:

- "Our current information on the size and replacement rates of whitebait stocks is poor"; and

- "Field research is being continued by DOC and MAF to improve knowledge of the breeding and habitat requirements of whitebait species" (DOC 1990, p. 3).

The Department's "scientific approach to management of the fishery" ought to be evident in the nature of the research it solicits, the way it applies the results of past research (whether solicited by it or undertaken previously or independently of the Department), and in reasons given for the changes invoked in the regulations that govern the fishery. But ultimately it is DOC's performance (largely as seen in the regulations promulgated and their rationale), rather than its profession, that counts in its evaluation of the role of science.

However, no fishery manager can base regulatory activities entirely on science. Economic and sociological factors influence the decision-making process in all fisheries, such as the expectations, incomes and livelihoods of fishers, industries based on fisheries production, support services, continuity of supply, export and consumer expectations, etc. Also, regulations need to be sensible (from both the fisher and enforcer perspective), enforceable, practicable, fair to all fishers, and an argument can be made for a level of geographical uniformity to assist good understanding by fishers and to facilitate enforcement. All of these factors influence decisions in the ways fisheries regulations are structured and fisheries are managed, and the New Zealand whitebait fishery is not isolated from them. Hence, decisions made by DOC should be seen to be a subtle blending of the conservation needs of the species involved in the fishery, the long-term well-being of the fishery itself, practical, enforceable and fair regulations, and the socio-economic issues just mentioned.

In spite of DOC's best intentions, the scientific data on the West Coast whitebait fishery are simply not available to permit all management decisions to be based on them (as DOC is well aware). There have always been pressures to increase escapement, especially during and following poor whitebait fishing seasons. The limited, now rather aged, data available on seasonal catch show that fishery goes up and down from year to year. It has been argued that the fact that the catch is sometimes higher means that there is not long-term consistent over-fishing of the resource, and that probably environmental factors (at sea or in fresh water) are major contributors to variation (McDowall and Eldon 1990). But it is difficult to be sure, and DOC's policy is to adopt a "cautious", "conservative", or "precautionary" approach to management. And so these issues have to be dealt with in a somewhat *ad-hoc* manner.

Most of the issues canvassed in a memorandum on proposed regulation changes, sent to the Minister of Conservation prior to the gazettal of the 1994 regulations (DOC 1993b) related to a policy of having a standard set of simple regulations with wide application throughout New Zealand, and to fine-tuning of existing regulations, e.g. proposals for a national start date for fishing, standardising the measurement of nets, distance between fishers, prohibitions on altering the river bank, fishing from boats, etc. Some issues were entirely social, such as

permitting disabled people to fish from boats (otherwise prohibited). A major social (and legal) issue involves the rights of Maori to take whitebait under provisions of the Treaty of Waitangi.

Some, however, related to conservation of the resource:

- **Length of the season**: The basis for this has already been discussed i.e. the desire to protect populations of giant kokopu, a species that is of conservation concern and to avoid wastage of "black bait". However, even these issues cannot be related entirely to scientific data. Choice of the date of closure was based on scientific data that showed that most giant kokopu whitebait migrate after the beginning of November. The impacts of fishing and the need for increased escapement to maintain populations were not, however, demonstrated from data, but rather derived from application of the Department's "precautionary" approach. Moreover, it could be argued, there are socio-economic issues involved, since it was considered that the loss of catch incurred as a result was small, and therefore did not seriously penalise fishers - data on the distribution of catch through the season, compiled after the 1994 regulations were gazetted and for the information of the Regulations Review Committee deliberations (McDowall 1994), showed that closure of the season on 31 October would deprive whitebaiters, of a median loss of catch of 7.5%. As it happened, the previous (1993) fishing season had been a distinctly peculiar one, in which a lot of whitebait were caught (apparently - as there are no catch data) in the first two weeks of November. In my view this was a major reason for inciting the wrath of whitebaiters and fuelling their strong opposition. In 1994, when dealing with the change of season closure, memories of the productive November of 1993 were still far too clear in the whitebaiters' minds, even though it was probably the only really productive November that any of them had ever experienced! Any appeal to science was quite overwhelmed by socio-economic factors.

- **Use of nets with traps**: This issue was discussed in the briefing paper to the Minister at some length (DOC 1993b), and examined a mix of issues. These included allowing for more escapement, problems for people fishing deep river banks, the impacts on old people and children, the need for fishers to modify their nets to comply with a prohibition on traps, the need for fishers to be in close proximity to the nets when fishing, and so a mix of conservation/science and socio-economic factors was implicated. The briefing paper recommended that traps in nets be prohibited; or if this was not agreed, that there be a single trap of minimum dimensions (usually nets have two traps, thereby increasing effectiveness in retaining fish without needing attention). The first choice was based entirely on conservation grounds, mostly on a perceived need for more escapement rather than on explicit, quantitative scientific data; the second choice is a mix of conservation and

socio-economic factors. The traps issue was the subject of considerable consultation with whitebaiters, and engendered a wide variety of responses, from those opposing use of traps to those opposing their prohibition. In the event no change to traps was introduced, and presumably socio-economic factors prevailed.

- **Net setting and use**: This issue relates to setting nets close to structures and physical features that affect the movement of whitebait - groynes, bridge piers, flood gates, stream confluences, and the like. Whitebait tend to accumulate in large shoals where obstructions occur and are highly vulnerable to fishing; historically the whitebait regulations have almost always included restrictions on fishing near such structures. This provision has old historical, conservation, and socio-economic imperatives. Possibly the strongest is a sense of not wanting to make the fish too vulnerable, though quantitative science probably has little to do with it.

- **Closed areas**: Closure of some streams to fishing also has old historic roots, e.g. Mahinapua Creek, a tributary of the lower Hokitika River has been closed to fishing (but heavily fished illegally!) for decades. Later, most of the tributaries that flow into the lower, tidal reaches of all West Coast rivers were closed to fishing. DOC was responsible for addition of 11 areas closed to fishing in the 1994 regulations, some of these indicated by submissions in the first round of consultation and these were confirmed in the second round. This is primarily a conservation measure, based more on a desire to ensure adequate escapement rather than on the certain knowledge that closing these waters does contribute to increased whitebait production. This would fit into DOC's description as a "precautionary" measure; almost everyone "believes in it", so it has some socio-economic elements, also.

- **Dumping of fish**: Some whitebaiters dump unwanted fish, including "black bait" on the river banks to die. Provisions to prevent this are aimed primarily at conservation, though they are based more on "common sense", than on science - which may show that the loss to the populations occasioned by dumping unwanted fish is actually insignificant as far as the size of the eventual breeding populations is concerned. Inclusion of this provision in the regulations was in part to provide consistency with the Freshwater Fisheries Regulations 1983 (NZSR 1983/278). This provision, too, is a mix of science and socio-economics.

Thus, if we look at the changes to the regulations introduced by DOC in 1994, there is, inevitably, something of a mix of all of the various factors that influence regulation making. The single most explicit attempt to apply scientific data was overwhelmed by primarily socio-

- DOC's choice of research priorities has been consistent with the needs of conservation and fisheries management.

- It is difficult, and an expensive long-term prospect, to objectively evaluate the effects of these measures and, therefore, probably unreasonable to expect this.

- Much, perhaps most, research is likely to have long time horizons in investigation, implementation, and evaluation.

Managing the whitebait fishery has never been simple, and it will not be simple as long as real efforts are made to ensure fairness in interactions between individual whitebaiters, and to ensure that the resouce is managed on a sustainable basis. Large areas of knowledge of the fish and fishery remain poorly understood, clarifying them would be at high financial cost, and it is probably not a reasonable expectation that the fishery will ever be managed on proper scientific principles that relate exploitation rates to productivity and variation in the resource. DOC clearly recognises these problems, while also wanting to apply research results to its management actions. In the meantime the fishery has to be managed and regulated.

The public is increasingly seeking input to decision-making in government, and the issue of consultation that sparked the debate over season closure is a reflection of this. However, consultation is not the same as decision-making, and in the specific issue of the termination of the whitebait fishing season, and other matters of regulation of the fishery, DOC has responsibilities that are substantially wider than just ensuring sustainability of the fishery. Furthermore, at times even attempts to ensure sustainability may mean making unpopular decisions, and DOC has clearly signalled that it is willing to do so if the evidence warrants it. I have little doubt that controversy over regulation of the whitebait fishery will recur. To minimise this, DOC and its management of the fishery would benefit from DOC:

- Clarifying its philosophical approach to managing the whitebait fishery;

- Being consistent in describing it approach as "precautionary" (if that is the chosen descriptor);

- Clearly defining what this means; and

- Ensuring that all options for changes in the regulations are clearly articulated in discussion documents made available to whitebaiters for comment.

Management of the fishery is not going to get easier, as environmental degradation continues to cause loss to habitat and the fish species involved, as productivity declines, fishing pressure rises, and prices for whitebait increase. It is to be hoped that management of the fishery can be accomplished in an environment of cooperation and collaboration in which the long-term good of the resource is given priority over the benefits to fishers, and in which benefits from the fishery are equitably shared amongst those who pursue these fascinating little fish, for either pleasure or as a livelihood. The whitebait fishery is a distinctive and worthwhile part of New Zealand's culture and history, and its decline or disappearance would mean the loss of something valuable.

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Taihoro Nukurangi

Managing the New Zealand whitebait fishery: a critical review of the role and performance of the Department of Conservation

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