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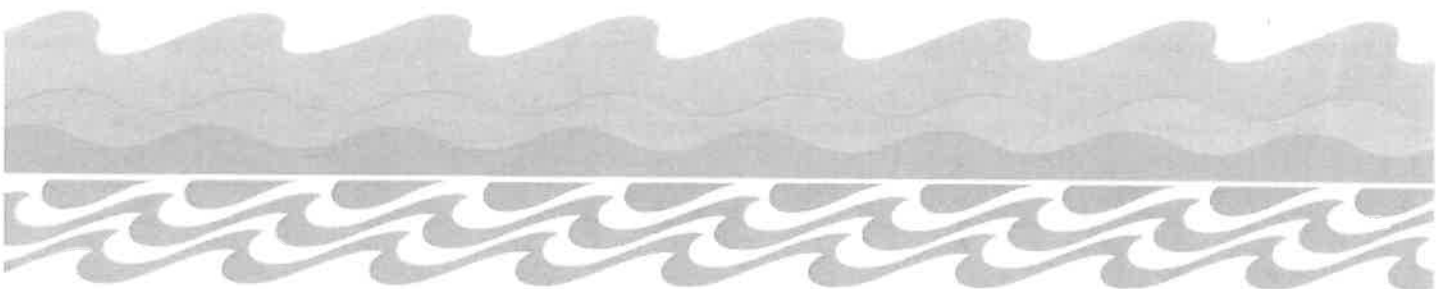
No. 96

PRELIMINARY PROTECTION OF WHITEBAIT (INANGA) SPAWNING AREAS IN HAWKES BAY

(Short Answers in Conservation Science)

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**PRELIMINARY PROTECTION OF WHITEBAIT (INANGA) SPAWNING AREAS
IN HAWKES BAY**

H Rook, Department of Conservation, P O Box 644, Napier

INTRODUCTION

In 1987 the whole "whitebait (inanga) management scene" was transferred from various government departments and handed over to the new Department of Conservation (DOC).

Prior to 1987 and in the following three fishing seasons, local catches of whitebait in Hawkes Bay were at best described as abysmal. These local observations came as quite a shock, as I grew up spending a lot of time pursuing whitebait on Bay of Plenty rivers during the 1960's and early 1970's when catches were good. During 1989, Charles Mitchell (then Fisheries Research Division, Ministry of Agriculture & Fisheries) visited this Conservancy to look at our local rivers and was of the opinion that our local whitebait fishery was almost defunct. However, he felt that locating and protecting any remaining spawning habitats was well worth pursuing. He considered that grazing relief was most likely to foster conditions suited to spawning.

With these words of encouragement, a concerted effort was made to locate and protect these valuable sites and many hours of Departmental and my own private time went into this project.

It must be emphasised that it is not within the scope of this report to make technical statements, but merely to record and report on activities and my own observations.

Of historical interest are my own personal observations since the late 1970's on stock grazing patterns in Hawkes Bay. Today and back then, my leisure time activities centred around locating where pheasants lived, prior to the hunting period. Many hours were spent working bird dogs through some of the sites we have identified as whitebait spawning grounds today. I have noticed that pasture grazing does not occur now with the same intensity as it did up until 4 years ago. Stock numbers have dropped drastically throughout the whole district, and nationally, in comparison to what was the norm during the late 1970's and early 1980's when farming was subsidized.

2. METHODS

To date, the work has centred on northern Hawke's Bay, and has had as its focus to:

1. Identify whitebait spawning sites.
2. Fence these sites off to exclude stock as quickly as practicable.
3. Observe and record results.
4. Consider any methods that could be utilised to enhance spawning sites for inanga.
5. Encourage other DoC staff, both within the Hawkes Bay Conservancy and in other conservancies to undertake similar work in areas not covered.
6. Monitor the peak spring tides each month (1.8 +) looking for spawning activity. Determine when the best time could be to undertake any habitat enhancement work, whilst not destroying eggs.
7. To update and maintain liaison with the Hawke's Bay Regional Council staff, lessees of Council land, private landowners and whitebaiters.

3. CLIVE RIVER SPAWNING SITE (310 METRES) (FIGURE 1)

In 1991, 80 metres of spawning habitat was identified at this location.

As an experiment we built a fence (160 metres long) to exclude stock grazing, for the express purpose of determining if inanga would in fact utilise enlarged spawning habitat created by fencing. The fence was completed in the winter of 1992. It is most important to note that very little pasture grazing was lost by fencing work and in most cases only several metres back from the high tide level. No opposition has been experienced over any of these projects on private, crown or leasehold lands.

On the 1.8 metre spring tides in April and May 1993 spawning inanga were observed utilising our entire 160 metre fenced area.

During the winter months in 1993 our original 160 metre site was extended a further 65 metres downstream and 85 metres upstream. During the 1994 spawning periods it is proposed to monitor these sites and determine if inanga will again utilise these newly enlarged habitats. Recent discussion with a local resident leads me to believe that spawning took place approximately 400 metres upstream of our existing site, 2 years ago. Should spawning take place throughout the entire 310 metre fenced section, then we could confidently pursue extending fencelines upstream. We do not know the upper and lower limits of spawning. From a practical perspective the only way to determine this would be to extend fencelines and monitor spawning activity at these sites each season until the upper and lower limits of spawning activity are established.

Vegetation Control

In view of Charles Mitchell's comments on exotic vegetation encroachment, the control of silver poplar *Populus canadensis*, crack willow *Salix fragilis* and blackberry *Rubus fruticosus* has been undertaken to avoid smothering of desirable grasses utilised by inanga to deposit their eggs. This control work has been undertaken using the herbicide Ammate.

Favoured spawning vegetation - Clive River

Only two species of grasses have been used by inanga to deposit their eggs. Tall fescue *Festuca arundinacea* is commonly used, but creeping bent *Agrostis stolonifera* would appear to be preferable and is sought after by spawning inanga at this location. Creeping bent grows close to the mud. It forms a damp layer of stems that protect whitebait eggs from dessication.

4. TUTAEKURI RIVER SPAWNING SITE (100 METRES) (FIGURE 1)

Despite visits that coincided with spectacular spawning activity detected in the Clive River and Tukituki River systems during April and May 1993, very little inanga activity was

observed at the Tutaekuri River in 1993. During April an anchored oil absorbent boom was found below this site. This boom was heavily impregnated with oil and looked as if it had been anchored in the drain for some time (this equipment was removed in April 1993). It would appear oil pollution was the reason why inanga did not spawn here in 1993.

Further searches in the Tutaekuri River back water channel will be undertaken during the 1994 spawning runs, as it is suspected that other spawning sites may exist at this location.

Favoured spawning vegetation - Tutaekuri River

To date only two species of grasses have been used by inanga to deposit their eggs. Tall fescue is commonly used but creeping bent would appear to be preferred and sought after by spawning inanga at this location.

5. TUKITUKI RIVER SPAWNING SITES (200+ metres on true left bank, 300+ metres on true right bank) (FIGURE 1)

Tukituki River surveys during major spawning activity in April and May 1993 finally revealed exactly where these inanga spawn, which was a big thrill for me personally after all the unsuccessful surveys of past years in the Tukituki River system. Sheer bulk of inanga, eggs, milt and visual activity was a sight to behold. For those who have not witnessed this event then the best way to describe it is: "absolutely incredible".

Tukituki River - true left bank - Waipoureka Road (200 metres)

This site is a fascinating one as it is located in an old drain that inundates low lying adjacent pasture during high tides.

Large numbers of ripe inanga were finally detected on 7 May 1993 by Mr Ross Ferguson of Clive and myself, coinciding with observations of inanga spawning on the true right bank.

On Saturday 8 May 1993 I returned to observe spawning over the whole 1.8 tide cycle, but had to abandon my search due to a rather aggravated and drunk waterfowl hunter who did

not appreciate my presence or dedicated search for spawning inanga. It was decided retreat was the best course of action here. Several days later this site was revisited but sadly, it had been grazed and trampled flat by dairy cows. Although no inanga were observed spawning, I strongly suspect this did occur here. Meetings between the lessee and Regional Council were held and permission to protect this site by fencing was enthusiastically approved by all concerned.

As the site was very wet, the Hawkes Bay Regional Council works division staff rammed all posts and strainers with a mechanical rammer. This fence was completed prior to Christmas 1993 and at the time of writing, vegetation is regenerating in time for our major spawning runs in Autumn of 1994. As this fence was built within the flood plain, powerpole augers have been used to hold strainers in position during flood conditions. Only 3 wires were used as the site is only grazed by dairy cows, while the fence would be less inclined to hold up flood debris in comparison to a 7 wire fence. Batten staples were used on posts so that if debris is caught up, these will pull free. The staples become the weak link and pull out instead of wrecking the whole fence.

Of very special interest during recent months is the regular presence of two Australian Bittern feeding within our fenced off site.

Favoured spawning vegetation - Tukituki River

The Waipourea road site has dense beds of creeping bent and to a lesser extent tall fescue grass. Out of all sites fenced off for spawning purposes this site has by far the best vegetation. Monitoring of spawning activity and density of egg deposition will be observed with great interest from now on. If eggs are deposited throughout the creeping bent beds and up to the edge of this fence then it will be well worth approaching the Hawke's Bay Regional Council and lessees with regard to extending the fenced area?.

Tukituki River, true right bank, 300+ metres

Approximately 200 metres of fencing has been erected on Crown land administered by the Hawkes Bay Regional Council and a further 100 metres added to this fence, on private land

owned by Mr Dick Ken.

Prior to 1993 considerable time was spent looking for spawning areas 1000 metres upstream of where these spawning inanga were finally located. I certainly do not consider these unfruitful years as a waste of time because we definitely know where not to look now, and learned a lot in the process. This site was chosen to monitor the possible monthly spawning of inanga, which was first suggested by observations in October 1993.

TABLE 1. Recorded Spawning of Inanga - Tukituki River Hawkes Bay

Tide Height	Date	Month	Year	Comments
1.8	8-11	April	1993	Main run, large no's of big fish, ie. 120+mm
1.8	8,9,10	May	1993	Heavy spawning with large no's of smaller inanga 80+mm
1.8	16	Oct	1993	Moderate spawning, heavy milt stain present
1.8	15, 18	Nov	1993	Localised, light but enough to stain water milky
1.8	14,15,16	Dec	1993	Localised, light but enough to stain water milky
1.8	3,4,5	Jan	1994	Localised, light but enough to stain water milky
1.8	1	Feb	1994	Zero spawning detected, heavy 3m sea running. Inanga may have spawned higher up in system and were not detected
1.8	28	Feb	94	Zero spawning, heavy sea running
1.8	5	Mar	1994	Site checked but no spawning detected. High water levels may have pushed inanga up in system and were not detected
1.8	30,31	Mar	1994	No sign of spawning at this site or any other fenced spawning sites in Hawke's Bay
NB: It is interesting to note that no spawning has been observed on 1.9m tides. It appears all spawning stops and resumes on the 1.8's.				

Spawning activity detected outside the autumn period is very interesting. Are these migrations of inanga the survivors of past intensive grazing? Now that permanent spawning habitat has been provided, will these runs of inanga increase? Do inanga spawn during June, July, August, September and February?

Tukituki River - island at mouth of Grange Creek

Although inanga spawned above and below this island, no inanga were observed utilising this site. The vegetation originally consisted of mature gorse. In December 1993 this was felled with a powersaw and stumps swabbed with the herbicide Animate. It would appear that gorse has suppressed desirable spawning vegetation. If what I have done here works, so much the better. If it does not we have learned something and lost nothing.

Tukituki river - vertical bank edge - seaward side of the site

Recently the Hawkes Bay Regional Council works division contacted me with regard to proposed minor drain maintenance work on the bank opposite our spawning site. It was agreed to try creating habitat by cutting the bank back on a 15 ° angle from the 1.6 high tide level and up to 1.9. Some levelling will be required with a small digger to make it desirable for spawning purposes. This will be very interesting to monitor once desirable vegetation becomes established. If it works then we can physically create spawning habitat.

6. AHURIRI ESTUARY (FIGURE 2)

Only a brief field survey during spawning tides has taken place at this location, however I suspect this site is up the Taipo Creek (NZMS 260 V21 (409831)). Only small numbers of inanga were observed, however no stock grazing occurs at this specific site. Further field work/observations are required to obtain a clearer picture of what is occurring here.

Further up the Ahuriri Estuary spawning took place on Mr Holt's property (NZMS 260 V21 GR 401888) prior to the 1931 earthquake, but it has not been detected in recent times (pers. comm K Holt). Recent broad-brush field surveys have failed to detect spawning.

7. ESK RIVER (FIGURE 3)

This spawning site has been located, but no further work undertaken due to difficulty in retaining fencelines at this location. Refer to my previous report on this site. (Rook February 1991)

8. TE NGARU STREAM - TANGOIO (FIGURE 3)

This site has been located, however further work is required to determine exactly what the upper and lower limits of spawning activity really are (Rook, January 1994). The site is not presently grazed as the land is used for horticultural purposes. It would be interesting to follow up here with further observation work during the spawning tides of April and May 1994.

9. DISCUSSION AND RECOMMENDATIONS

A great deal of personal effort has been expended to learn more about our local whitebait fishery since 1987. This has resulted in a total of 1000 metres of spawning habitat identified, fenced off and protected from grazing during the critical 1-month periods when eggs are extremely vulnerable to destruction by stock grazing. Three further spawning sites have been located, but are not threatened by grazing at this stage. Circumstantial evidence (from my own observations and comments from fishermen themselves) indicate an improvement in our fishery has been detected during the last three seasons since spawning habitat has been fenced.

Generally whitebait spawn in small streams and drains. Where there is a large river they seem to migrate to small drains or streams close to the mouth. There they look for suitable spawning vegetation. If small streams and drains are not present, as for example in the Clive River, then inanga will utilise suitable vegetation on margins of the main river.

Presently it is "scientifically unproven" that inanga return to the waters in which they were born. I strongly suspect that they do, for if fish return haphazardly to any river system, we would have a variety of species recorded in local catches. Past research clearly demonstrates our local catch is virtually all inanga (*Galaxias maculatus*). It seems the only way we could test this theory would be by somehow marking whitebait eggs, then monitoring their return up rivers and in our whitebaiter's catch. Exactly how this could be done is beyond me, with eggs the size of a pin head! However, there is a possible DNA study topic here for a student.

To justify this spawning habitat protection work on the grounds the fish stocks will be improved may be impossible to prove scientifically. On our local rivers however, we are in a unique position, in that the fishery was virtually defunct before 1987 and was at best described as poor recreational.

Therefore, can we improve our local fishery by expanding spawning sites and carefully managing vegetation within them? Has the lack of survival of eggs on land been one of the major limiting factors here? Circumstantial evidence to date over the last three seasons tends to support this.

Whitebaiting has been very good over the past 3 years, average catches have risen from enough whitebait to make one patty per week, to catches of 2-3 pounds of whitebait over a single high tide cycle. One person caught 10 lbs of whitebait in one lift on the Clive River in 1992 season. Two, 10 lb lifts of whitebait occurred on the Ngaruroro River in 1993. One person caught 80 lbs of whitebait during the last week of our 1993 season in the Tukituki River. Catches such as these have not been reported on our local Hawke's Bay rivers for decades.

From a practical point of view our spawning habitat protection work is one of few options we have available to us for active whitebait management. We cannot undo past habitat destruction, but if fencing of inanga spawning areas results in further increases in whitebait numbers during coming seasons then some firm conclusions can be drawn.

If we are going to learn more about this species then we must continue protecting and monitoring spawning sites on our local rivers. We must also investigate the status of the adult population and its habitat requirements. More questions than answers exist with inanga as we continue this practical field work, but what we are doing now should give us some "positive indicators" and may be answers we have all been searching for.

Hawke's Bay Conservancy has 1000 metres of inanga spawning habitat identified and protected by fencing. Until recently I was unaware that we are the only conservancy in the country with as much habitat protected by fencing.

Another fact that I was also unaware of until recently was that inanga spawning during the months of October, November and December has never been officially observed or recorded in New Zealand before. (Pers comm C Mitchell). These spawning fish are an exciting find. When do their progeny return back up the rivers? Do they return 6 months later and outside the whitebait fishing season? Are they unharvested migrations of juvenile inanga? Are these the fish that local people speak of as migrating at odd times of the year i.e. Christmas, May etc? Will these specific populations increase now that we have provided a safe and permanent haven for them to return to for spawning purposes?

In view of these previously unrecorded spawning periods, it is imperative that we check the months of February, June, July, August and September 1994 for inanga spawning activity.

If we are to look at possible periodic stock grazing as a tool of habitat management when spawning sites become overgrown with vegetation, it is absolutely imperative that we know in what months inanga do and do not spawn.

It has been the experience on Bay of Plenty Rivers that after 5 years, dense beds of *Glyceria maxima* exclude inanga from penetrating through this vegetation and into desirable spawning habitat. (Pers comm. C Mitchell). This plant does not occur in Hawke's Bay waters, therefore our situation may well be different to that of the Bay of Plenty.

My prime objective when work started on locating and protecting spawning sites, was to at least halt the decline of our local whitebait fishery, or at best, attempt to enhance it by protecting and looking after habitat requirements of these special fish.

The Department of Conservation has the functional responsibility for the conservation of fresh water fish. It is my personal belief that habitat protection of our fishery is the key to inanga conservation and sustained long term management. The Hawke's Bay Conservancy has most certainly taken up this challenge and gathered a great deal of additional knowledge previously unknown on inanga.

I accept that while a great deal of this work has not been quantified in a technical sense, it must also be accepted that when we started in 1987, there was not really a great deal we could quantify in so far as catch data was concerned anyway.

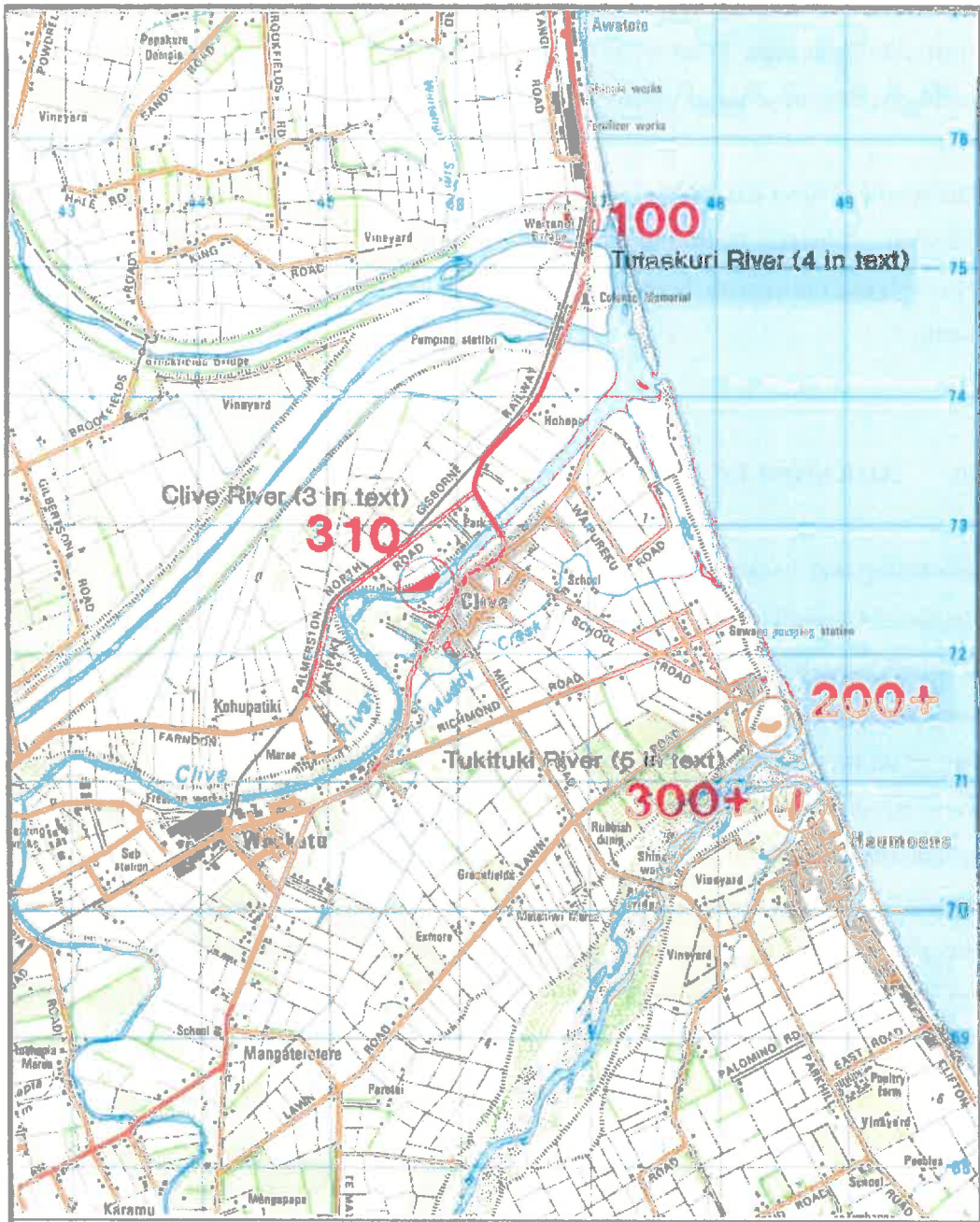
The whole project has created a great deal of positive public relations and support for the Department locally from folk who have not been even remotely involved with this work. This job then is clearly "a bread and butter project" that all of us can hang our hats on locally.

10. ACKNOWLEDGEMENTS

It is fitting that I acknowledge the magnificent help I have received from the Hawke's Bay Regional Council particularly Mike Healy's works group staff. I would like to thank the Hastings periodic detention group who have been involved in fence building. There has also been considerable assistance and co-operation from a large number of whitebaiters who have passed on invaluable pieces of information and "local knowledge". Without the help of all these people very little would have been achieved. To all these folk, I owe a lot. A very special thank you must go to Charles Mitchell for his encouragement and enthusiasm for this project. It must be a real pleasure for him to see Department of Conservation staff pursuing the whitebait management work that he has been advocating for a long time. Lastly, but certainly not least I wish to thank Field Centre Manager Mr Ken Hunt for his back up, support and patience, for without these attributes I could not have obtained the results obtained so far.

REFERENCES

- Rook, H 7.2.1991 Whitebait spawning areas - local Hawkes Bay rivers ANI 283/DOC
Napier
- 15.4.1993 Whitebait spawning data ANI 283/DOC Napier
- 17.5.1993 Output-inanga spawning survey ANI 283/DOC Napier
- 14.1.1994 Output-inanga spawning survey ANI 283/DOC Napier



**Locations of Spawning Sites
with their length in metres
FIGURE 1**

HAWKE'S BAY LAND DISTRICT

LOCAL AUTHORITY: Hastings District & Napier City

SCALE 1 : 50 000

PREPARED BY
P Taunton

DATE
9 June 1994

DOSLI FILE
6475-C2000

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570068

REFERENCES :
INFOMAP 280 V21



Hawke's Bay whitebait fishery

Contact information

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Descriptors: Freshwater, recreation, habitat restoration, partnerships, iwi, local government, agriculture.

Overview

Whitebait catches in the Hawke's Bay had been poor since the 1950s, and by 1987, says Biodiversity Ranger Hans Rook, the fishery was "in an abysmal state".

Hans Rook, from the Hawke's Bay Area Office, went to fishery stakeholders with a proposal to better protect and restore the habitat, with the concept that "the fishery was owned by the local people".

Together with the regional council, iwi and other fishers, Hans identified the threats to spawning and feeding habitat along the Tukituki, Tutakuri, Clive and other local rivers. They worked together to reconnect vital wetlands to the rivers, and fenced riparian margins to keep out wandering stock.

The fishery has rebounded.

Driver(s)

By 1987, after decades of poor whitebait catches, Hans recalls that "a week of whitebaiting wouldn't have given you enough for a fritter.

"It made no sense," he says, "as we had good rivers that should have had healthy populations of fish."

Investigation showed that important habitat had been lost as wetlands were severed from the rivers by flood control works.

Furthermore, cattle were free to graze and trample river berms, destroying the riverside vegetation whitebait needed to lay their eggs in. "The spawning sites were a mess," says Hans.

Over the last decade, catches have also been declining further south in the Porangahau catchment, and a similar restoration programme has begun there.

Outcome(s)

More than three kilometres of fence now protects key whitebait spawning sites, and wetlands have been reconnected with rivers to allow fish back to feed.

"This is the first time for decades that they've had a safe site to breed," says Hans. "We're getting much more recruitment of fish coming back.

"We're now getting 12 pound (5.5 kilogram) lifts; one guy's got 600 pounds (270 kilograms) of whitebait in the freezer; they're giving it away to the pensioners."

There have been other benefits; hunters are happier with bigger bags of ducks, says Hans.

"Ninety per cent of waterfowl production comes out of rank grass," he says. "The fenced-off areas are crawling with duck nests."

Hans says Hawke's Bay Regional Council policy has changed, to discourage riparian grazing and encourage more fencing.

Unemployed people were invited to join the restoration project, and now, says Hans, "they're better off coming down to the river to get a feed for their families than sitting around at home."

And native biodiversity has also benefitted; Hans observes wryly that, with more secure habitat, "I've now got all these bitterns knocking off my breeding whitebait."

A lot more is also known about Hawke's Bay whitebait now, thanks to the intensive monitoring that backed up the project. "They always thought whitebait only laid eggs in the autumn," says Hans, "but nobody had ever bothered to check outside the season. We've seen them breeding from September right through to June."

The surveys have also collected valuable information on lampreys and giant bullies, two other freshwater fishes.

Hans says whitebaiters in general have taken a much broader interest in freshwater habitat as a whole, rather than simply focusing on the size of whitebait catches.

He's taken local school children down to the Tukituki to watch whitebait spawning ("there were eggs for Africa"), to instil a sense of ongoing stewardship.

Relation- ships

A key partner is the Hawke's Bay Regional Council, and Hans - a Bay resident for more than 30 years - says that long-standing relationships and trusted personalities are a real strength, as is the deep institutional and local knowledge people carry.

When salt marsh mosquito was discovered in the Bay in 1998, various agencies such as the Regional Council, the Ministry of Health and DOC readily got together to co-ordinate the response. Hans says the incursion was a valuable lesson for those agencies and others. "We realised that if we could work together on the mossie, we could work together on anything."

Some whitebaiters were sceptical about his restoration plan, and of government in general. "Until then, the only management response had been ever-stricter enforcement, which achieved very little."

He began by making it clear that he had no self-interest in the fishery; "I'm not even a whitebaiter," and took an informal, plain-language approach. "I threw the 'public service manual' out the window," he recalls.

Iwi, however, instantly recognised that Hans' plan was based on the ethic of kaitiakitanga and lent their support.

Periodic detention groups were invited to join the fencing work, and, says Hans, iwi quickly saw the value of involving those groups in a positive project they could identify with.

"Relationships have always been good here", he says, "because the place is small enough to keep them personal, but they've strengthened still further through this project."

The Hawke's Bay Regional Council has met the cost of fencing materials, while all the labour has been voluntary.

Process followed

A previous strategy of simply tightening enforcement had only stirred up resentment, says Hans, a former Wildlife Service Field Officer. "There was a lot of frustration with the state of the fishery, and they gave us a hard time. 1987 was the worst year; we held a public meeting and they all came over from the Clive pub; it was the fiercest meeting I've ever been at."

His suggestion was that the whitebaiters themselves appoint a delegate, responsible for each river, and that, he says, was a critical element in the project's success. "We had a clear line of communication that sidestepped a lingering distrust of officialdom. Now, I liaise directly with each delegate."

It was agreed to hold pre-season meetings each year, to discuss the priorities and direction of work, and to assess the state of each fishery.

"The only management hitherto had been enforcement," says Hans. "Now, it's research by management, and management by research."

For Hans, that can mean "grabbing all the noisy aggressive bastards and

dragging them out of bed at 5.00 in the morning to watch the whitebait spawning. Once they saw that happening, and the catches started to improve... well, it would be a brave man that criticised the project now."

Local farmers were supportive from the start, says Hans, because "they had been losing stock in the mud anyway, and we were only asking for a metre-wide riparian strip, so it was a benefit to them."

Challenges and pitfalls

A historical suspicion of government was Hans' biggest hurdle, but, he says, the answer was "a matter of communication. Sit down and talk... it was just a matter of putting our case on the table and explaining what we wanted to achieve."

Judgements made

Hans has made a point of engaging directly with even the most troublesome of opponents, sometimes taking them down to the river to see spawning fish in the early hours of the dawn.

"You do the work when it needs doing," he says, "not just in office hours. I threw the book away and went with gut instinct."

Critical success factors

Appointing whitebaiters' delegates for each river was a key element of success, says Hans. "You need that personal relationship, and clear lines of communication. Once you light that fire, you can't go wrong."

Local knowledge provided a strong platform for management decisions. We had great support from the old Wildlife Service and Regional Council guys; some of them would know more than any fisheries scientist," says Hans. "Collectively, there are centuries of experience round here."

Iwi support, too, was invaluable; "They knew what we were talking about - our approach was a good fit with them - and their old people helped us out with the spawning surveys. We couldn't have done it without their support."

What we learnt

"Enforcement alone doesn't cut the mustard," says Hans. "It's just one tool, but without habitat, it achieves very little. You've got to impress the importance, the relevance, of habitat to the stakeholders."

He wants to see the lessons learnt in Hawke's Bay applied nationally, and consistently.

"We need to push for the same environmental standards everywhere; otherwise all these lessons get buried, and people are doomed to go on reinventing the wheel, over and over."



Department of Conservation
Te Papa Atawhai