

Fisheries Environmental Report No. 44

**Escape of grass carp from
the Aka Aka-Otaua
drainage system**

**Fisheries Research Division
Ministry of Agriculture and Fisheries
Christchurch**

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Escape of grass carp from the
Aka Aka-Otaua drainage system

by

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Report to: North Island Council of Acclimatisation Societies

Fisheries Research Division
N.Z. Ministry of Agriculture and Fisheries
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FISHERIES ENVIRONMENTAL REPORTS

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1. INTRODUCTION

The recent (January 1984) escape of grass carp from trials being conducted in drainage channels of the Aka Aka and Otaua Drainage Board systems to the north of the lower Waikato River is naturally a cause for concern to acclimatisation societies. No animal introduction should be undertaken lightly, and therefore the accidental escape of fish into the Waikato River is a serious matter.

There has been widespread controversy over the use of grass carp for the control of aquatic macrophyte growths and, as a result, much interest and discussion has preceded and followed the escape of the fish. There has also been, and still is, considerable confusion and misinformation about the issue.

This report is intended to provide information on the escape, and to clarify some of the confusion that has developed in recent months.

2. BACKGROUND

Grass carp were first introduced into New Zealand, by Government, in 1971 when it became evident that exotic macrophytes in lakes were an increasing problem resulting from the transfer of fertilisers and other nutrients from the land into waters. (There had been a small, earlier introduction by the Zoology Department of Auckland University in 1969.) Grass carp feed on aquatic macrophytes, and overseas studies have shown that they are capable of controlling growths of these plants in lakes and drains.

When the introduction of fish was being considered, the Freshwater Fisheries Advisory Council set up a subcommittee to consider the conditions under which such introductions should be made and the procedures to be adopted before any wild releases were made. The guidelines decided on included the following:

"Having identified a water-type which would appear to support a game fish, it would be necessary to select a specific water body suitable for introductions, with detailed studies of the fauna, flora, chemical and physical characteristics. Following this there would need to be selection of fishes appropriate for the chosen waters, a suitable quarantine period for imported fishes, and introduction of trial stocks of such fishes for controlled studies in artificial ponds. Observations on behaviour, growth, food, parasites and diseases would follow, and once these were completed, release of disease-free fishes into an isolated lake could occur, with a continuing study of the lake environment, the native biota, and the introduced fishes. Particular attention would be paid to interaction of the native and introduced faunas. Subsequently stocks would be released into a water with a trout population to examine any interactions with trout. Assuming that the candidate for release proved suitable, it would then be necessary to establish rearing-hatchery facilities and develop the technology to build up stocks of fish for release, thereby avoiding introduction of further ova or fish. Important factors that need to be considered include the ability of the fish to exist in areas beyond those contemplated for liberation, effects on existing fisheries, and effects on the native fauna."

Fisheries Research Division (FRD) attempted to adhere to these guidelines with respect to the grass carp programme.

3. PAST RESEARCH

Work on the biology and reproduction of grass carp has been going on for many years. Initial New Zealand studies involved the elimination of diseases and parasites from the original stock of imported fish (Edwards and Hine 1974). Subsequently, overseas methods were adapted for artificially stimulating reproduction and there were studies of foods of young grass carp (Edwards 1973a). Trials were conducted using grass carp in a drain in the Bay of Plenty (Edwards and Moore 1975), in a small reservoir near Waihi, and in Parkinsons Lake near Waiuku.

Initial studies focused on the impact of grass carp on lake and reservoir environments. These studies showed that grass carp can be used to eliminate weed beds, but that it is a much more difficult matter to establish weed control while allowing the retention of limited, potentially biologically valuable, weed beds (Mitchell 1980a). The studies in Parkinsons Lake showed that total weed control can have impacts on fish life (Rowe in press), but the present status of Parkinsons Lake - after weed elimination by the carp and subsequent rotenone poisoning of the fish population (rudd, tench, etc.) - suggests that the lake may be ready for re-establishment of forage fish and a trout population. Grass carp control of the excessive aquatic macrophyte beds is the initial stage in this lake restoration.

Studies to date demonstrate that grass carp are a potentially valuable and effective means of controlling excessive growth of weeds in

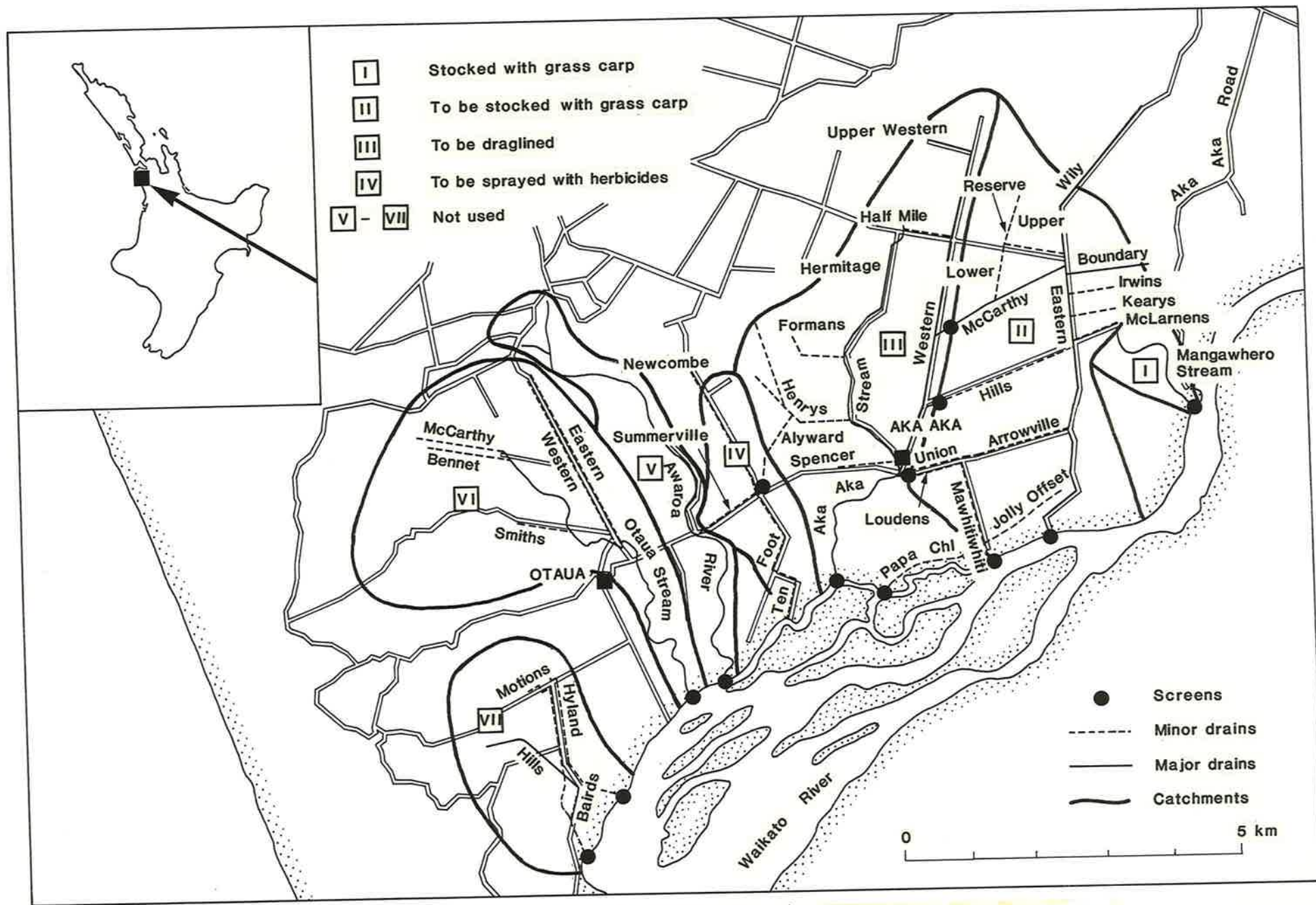


FIGURE 1. Locality of the Aka Aka and Otaua drainage system.

small ponds, dams, lakes, and drains and that they therefore have value to New Zealand (Mitchell 1977a, 1980a, Schipper 1982, 1983). Results also show that detrimental effects on fish populations and habitat from carefully planned stocking of the fish are negligible. The Wildlife Service, Department of Internal Affairs (DIA) has recently completed an investigation of the likely impacts of grass carp on wild fowl populations (Williams 1984). The study concluded that, aside from dangers to wild fowl should the fish breed and establish large populations in the Waikato River, potential harm to wild fowl is also slight.

A substantial number of publications on grass carp in New Zealand has been issued, and these are listed in Appendix I. Most of these publications are available on request from Fisheries Research Division, P.O. Box 297, Wellington.

4. CURRENT TRIALS

Trials in the Aka Aka area began in 1980 when a 2 km section of the Mangawhero Stream was stocked (area I, Fig. 1). This trial was intended to compare weed growth habits in areas with:

1. no fish present (a control situation),
2. heavy stocking to produce total weed control,
3. moderate stocking to assess fish densities needed for general control rather than total elimination of weed beds.

This trial showed that the fish were very effective in bringing about control of weed growth. Drains that formerly required to be mechanically cleared of weeds four or five times during the year have



FIGURE 2. Drains showing weed removal by grass carp (above bridge) and their condition without grass carp (below bridge).



FIGURE 3. Draglining of a drain, showing the deposition of weed debris along the banks.

been kept virtually weed free by the carp for 4 $\frac{1}{2}$ years, and published assertions by the Wildlife Service, that "the project had produced no constructive results on the advantages and disadvantages of using carp to control aquatic weeds in waterways" (Christchurch Star, 30 April 1984), are quite fallacious. Figures 2 and 3 show clearly the neatly manicured appearance of trial areas in the Mangawhero Stream where grass carp are present, in distinct contrast with the condition in areas in the stream not occupied by the fish. In addition to the likely low cost of weed control by grass carp compared with mechanical weed clearing, it needs to be remembered that mechanical methods cause much greater disturbance of the stream ecosystem, and may lead to bank destabilisation, and that the deposition of material removed is both unsightly and results in lost pasture production (Fig. 3).

That there are demonstrable benefits from the use of grass carp in farm drainages is quite clear from the Mangawhero Stream trial. Once the effectiveness of the fish in a limited length of watercourse had been demonstrated, and before giving consideration to the wider use of the fish (for which there is considerable demand from farmers, catchment boards, drainage boards, and other local authorities), it was considered necessary to examine the management strategies required for use of the fish in larger drainage systems. Problems in the Mangawhero Stream trial, (particularly mortalities resulting from declines in water quality in the drains) raised questions about whether larger trials in more extensive drainage systems might overcome these difficulties, which were caused in part by stagnant water being flushed into the drains, and in part by toxic effluent discharges. At the same time it was regarded as valuable to compare the effectiveness, cost, and environmental implications of various methods of weed clearance: namely, grass carp, mechanical weed removal, and the use of herbicides.

The current Aka Aka trials were therefore initiated, with the co-operation of the Auckland Acclimatisation Society, Waikato Valley Authority, the Aka Aka and Otatau Drainage Boards, the Wildlife Service, the Aquatic Plants Section of Agricultural Research Division of the Ministry of Agriculture and Fisheries (MAF), and the Franklin County Council. At the initiation of these trials, no objections were raised to the choice of the trial area on the northern side of the lower Waikato River (Fig. 1).

It was FRD's plan that, once the Aka Aka trial had been completed, we would prepare a detailed environmental impact report which would be made available for public scrutiny and for discussion by relevant agencies, before any decision was made on whether or not to use the fish more widely in New Zealand waters.

5. THE ESCAPE OF FISH FROM TRIAL DRAINS

The above course of events has been disrupted by the escape of fish from one of the trial areas. The sequence of events relating to this escape is as follows:

Grass carp had been released into drains in the Aka Aka drainage system (area II, Fig. 1) from November 1983 to February 1984, releases being made as stock held at the FRD Laboratory in Rotorua reached a minimum length of 25 cm. In total about 2200 fish were released into McCarthy Drain for the trial. Before the releases, screens had been installed in the drainage system by the Aka Aka and Otatau Drainage Boards to confine the fish to the system. After installation the screens were inspected by divers to ensure their security.

On 23 January 1984 one badly mutilated, although still living, grass carp was recovered outside the trial area in another nearby drain. This fish had lost its tail and seems likely to have been taken by a shag and subsequently dropped. Following this, the screens were inspected again by divers and two screens were found to have gaps which would have allowed grass carp to move downstream into the Waikato River.

On 2 February 1984 a grass carp was captured by a fisherman from the Waikato River. It was reportedly taken in a gill net used for catching mullet. Subsequently about 26 grass carp have been taken by fishermen from the Waikato River system, 13 as far upstream as Lake Whangape. Others have been taken well down the Waikato towards the lower estuary. Captures show that the fish have spread very widely in the lower Waikato.

Subsequent investigations by FRD in the trial area revealed that very few of the grass carp originally liberated remained in the area. Examination of the screens showed scouring around one of the screens, and deficiencies in fit which created gaps through which the fish could have escaped, though these gaps were small. Recent public allegations of tampering with the screens resulting in the deliberate release of fish cannot be corroborated.

To assess the numbers of fish remaining in the trial area (and thus the number that might have escaped) FRD staff ensured the security of the screens and released a further 500 marked fish into the system; 250 were released at random and the other 250 were released into 12 separately screened areas within the trial. A population assessment of the trial drain was carried out 10 days later, when high water levels had declined sufficiently to allow the assessment to be made. It revealed that no more than 50 fish still remained in the drain, and of

those that remained more than a quarter had sustained shag damage. The missing marked fish could not have escaped from the system and are regarded as having been lost to heavy shag predation occurring over the 10 days between stocking and the population assessment, and made possible by the fact that the drains had been draglined recently, which exposed the fish to easy attack by shags. This result showed that virtually all of the originally stocked fish had escaped from the trial area.

It is possible that similar shag predation had caused extensive losses of fish released in November 1983 (194 on 10 November, 510 during 18-20 November) when the drains in the area were in a similar clean and weed free condition. It was therefore not possible to determine how many of the 2200 fish released into McCarthy Drain had escaped from the trial, and how many had been lost to shag predation. However, it seems that heavy losses were likely.

Once they had escaped from the trial area, the fish had access to a further 18 km of drains, separated from the Waikato River by further screens. One of these screens also had a gap beneath one edge which would have allowed grass carp to escape into the Waikato River. It is not known how many fish remained within these 18 km of drains and how many escaped into the Waikato River. A population assessment in the larger drainage area would be very difficult and time consuming. The fact that 27 grass carp have been captured in the Waikato River over a fairly extensive area probably indicates that substantial numbers have entered the river system (up to about 1000 of those stocked to establish the initial trial).

6. STATUS OF EXISTING TRIALS AND FUTURE ACTION

At this stage the Aka Aka trials from which escape took place are terminated. The successful Mangawhero stream trial continues.

The relatively small maximum number of grass carp at present in the Waikato River (there could be about 1500, though this is quite uncertain) is unlikely to have noticeable effects on the Waikato River ecosystem. However, these fish are long-lived (more than 15 years), are likely to be present in the river for many years, and can be expected to grow to a large size (perhaps 10-20 kg). If the view of FRD that breeding is unlikely is correct, the number of fish present will decline slowly by natural mortality and capture by fishermen, until they are too large to be meshed in mullet nets. If this view is incorrect, and breeding does take place, there would be an increase in grass carp numbers and possibly a long-term presence of the fish in the Waikato. However, results of overseas releases suggest that the development of large populations in the river is very unlikely. It is, however, a possibility that should not be ignored. Public statements (Christchurch Press, 3 May 1984) that "As many as 90% of the Chinese grass carp which escaped earlier this year into the Waikato River ... may have been recaptured" are incorrect.

Some remarks have been made seeking the poisoning of the Waikato River to eliminate grass carp. This idea is quite preposterous: it has been estimated that about 2000 t of rotenone would be needed. Financially it would probably cost many millions of dollars; in practice it would be both impossible and ineffective. Now that the fish have escaped we can only remove those taken by fishermen and monitor the situation. The fact that they seem to have spread widely in the system,

and that a substantial number have entered Lake Whangape where they will not reproduce, reduces the likelihood of breeding in the Waikato.

With the termination of the Aka Aka trials, FRD's present intention is to complete an environmental impact evaluation and to make this available for public scrutiny before a decision is made to resume the Aka Aka trials and before any further decisions are made about the use of the fish in New Zealand. This evaluation should be available by the middle of 1984. At the outset, it will be presented to the Freshwater Fisheries Advisory Council at its next meeting. Subsequent action will depend on the Council's recommendation to the Minister of Fisheries, and the Minister's decision on further action.

7. WILDLIFE SERVICE ATTITUDE TO TRIALS

Some publicity has been given to the fact that the Wildlife Service, DIA, is opposed to the grass carp trials and wishes to see them terminated. This document is not the place to present the attitude of the Wildlife Service to the trials. However, discussions between senior FRD and DIA staff in Wellington on 2 May 1984, revealed that the Wildlife Service wishes the trials to continue, to determine the economics of using grass carp to control weed in drains. This viewpoint is clearly stated in a press report of 1 May 1984 where it was stated that:

"A resumption of larger scale grass carp trials is also likely to be supported by the Wildlife Service, but only if the fish were removed to another area such as the Rangitaiki or Hauraki Plains wetlands.

A research scientist for the Service, Dr Murray Williams, yesterday confirmed his view that the wetlands of the lower Waikato were too valuable to risk the possibility of carp breeding there. However, he was adamant that the trials had to resume to assess the cost effectiveness of carp in controlling weeds, even if this meant that the Service had to help with the cost of moving them elsewhere." (N.Z. Herald, 1 May 1984)

I was advised by the Wildlife Service that Rangitaiki should have read Rangitikei, and this was corrected to read "Rangitikei Plains in the Manawatu" by the N.Z. Herald on 2 May 1984.

Attention is drawn to the Wildlife Service report by Williams (1984). The conclusions from Dr Williams's analysis are listed below (though it is strongly recommended that the entire report be studied to establish the context in which these conclusions are derived).

"From this review of information on grass carp and waterfowl in New Zealand, and the likely impact of grass carp, if introduced, on waterfowl and their habitats come the following conclusions:

1. The plant species consumed by grass carp are those also consumed by waterfowl. Direct competition for food is likely in some circumstances.
2. The impact of grass carp on the standing crop of plants in any waterway into which they are released is predictable and is a consequence of fish stocking rates, age of fish at release and water temperature.
3. The release of grass carp into some New Zealand waterways carries with it the assumption that fish will eventually find their way (naturally or aided) into others.

4. Although methods of grass carp management are still being researched, it seems likely that long-term management of carp will aim at weed elimination.
5. Where total elimination of aquatic macrophytes occurs, even in impoundments with limited flushing, the establishment of phytoplankton blooms is not a predictable or necessary consequence.
6. The presence of grass carp in some waterways will lead to a lowering of the carrying capacity of those areas for waterfowl.
7. Given the fish's documented specific spawning requirements, and the fact that MAF researchers have so far identified breeding as possible only in one river system, the widespread establishment of naturally producing grass carp seems unlikely.
8. Because of the possibility of carp breeding in the lower Waikato and because the lower Waikato wetlands are considered the most important freshwater wetland habitat for waterfowl (and other wetland-inhabiting wildlife) in New Zealand, the release of grass carp anywhere in the Waikato catchment should be opposed.
9. Because the likely impact of grass carp on waterfowl is a predictable and demonstrated consequence of the fish's abundance, there is little to be gained from any specific study of waterfowl v grass carp in New Zealand."

8. CONFUSION BETWEEN GRASS CARP, EUROPEAN CARP, AND KOI CARP

There is, and has long been, wide confusion in both New Zealand and the U.S. between European carp and grass carp, and this, in my view, has been the cause of much of the opposition to the use of grass carp in New Zealand. In addition, confusion about the grass carp programme has increased as a result of the recent discovery of Koi carp in the Waikato River system.

The Koi carp is a hybrid, intensively selected, colourful, and ornamental variety of the European carp (*Cyprinus carpio*). It is greatly favoured and highly valued in Japan and other parts of eastern Asia (Pullan and Little 1979).

The European carp, in the normal wild form, is regarded as a menace owing to its habit of sucking stream and lake bed detritus into its mouth, filtering out organic material, and expelling the silt and mud. This results in high water turbidity and bed disturbance and may lead to serious habitat disruption for other fish as well as to aesthetic deterioration. In the U.S. and Europe considerable expense has been incurred in trying to control or eliminate this fish. A wild strain of European carp recently spread throughout the Murray-Darling system in Australia and several million dollars were allocated to attempted controls. These efforts were a failure and were recently terminated. Thus the European carp is designated noxious in New Zealand, and with good reason. It would be capable of widespread occurrence here, and would undoubtedly be a pest.

The ornamental Koi variety has been present here for some years, mainly in ponds, but a few in dams, and now in the Whangamarino Swamp

near Hamilton (Christchurch Press, 5 April 1984). Recent captures of more than 50 fish signify that a breeding population is probably present there. Whether or not Koi are capable of breeding extensively and invading numerous habitats is uncertain. They may not be sufficiently robust (a bit like releasing angora rabbits in the wild!), but we should take no risks. I doubt, however, whether it would be practicable to exterminate the population in the Whangamarino Swamp. This would be an extremely costly exercise with little likelihood of success.

None of the harmful habits attributed to European carp has been identified for grass carp.

9. EXISTING ENVIRONMENTAL IMPACT ASSESSMENT

There has been some discussion of an already existing environmental impact evaluation of the release and use of grass carp in New Zealand. Such a report was prepared in 1982, at my request, by Mr C.P. Mitchell of the Rotorua laboratory of FRD, for the MAF standing committee on environmental policy. Owing to other priorities of the committee, and my own work load, I was never able to give the attention to the report that it needed, and so it was never completed as a final document with official Divisional status. For this reason I have hesitated to release it more widely, though a copy has been supplied by the Minister of Fisheries to the N.Z. Federation of Freshwater Anglers (FFA). My reluctance to release the report is no reflection on its quality, but indicates only that it has not, in my view, had the review such a report requires before completion and release.

10. THE GRASS CARP REPORT OF THE N.Z. FEDERATION OF FRESHWATER ANGLERS

The FFA has produced its own report on grass carp (Appendix II), based on a questionnaire it circulated among fisheries agencies in North America. I understand that the FFA report has been widely circulated. I have read the report and have also examined in detail the FFA file which contains the individual replies to the FFA's questionnaire from North American fisheries agencies. The FFA report generates a series of important concerns.

In the first instance the questionnaire has bias and is prejudicial, as its aim was explicitly stated to be "to seek information ... to prepare a submission to express our concern over possible release" of grass carp. An objective investigation would have sought information to evaluate the merit of and problems caused by grass carp, to weigh these up, and to reach a balanced assessment. In spite of this bias in intention, the questionnaire circulated by the FFA was, itself, relatively free from bias, and the coverage of the questionnaire both fair and broad.

However, and in spite of claims to the contrary (Waikato Times, 28 April 1984), the FFA abstraction of material from the replies to the questionnaire is distinctly biased. Regularly "could" is changed to "would", "might" to "will", "possible" dangers of grass carp become more certain, possible advantages become much less definite, and many statements are misinterpreted or distorted. Not infrequently statements attributed to respondents are not to be found in their replies. These biases and distortions may not have been deliberate but they nevertheless exist and have been documented. Many of the general review statements made in the FFA's "consensus" section of their report are not evident in

the FFA file. Some of them are not even evident in the report's "summary and comment" section. As elsewhere, the FFA report confuses European carp with grass carp, for example, the Wisconsin reply to the FFA questionnaire (Appendix III) refers to German (= European) carp, but the FFA report interprets this as grass carp.

As a result of inherent bias, a lack of objectivity, and inaccuracy in abstracting and reporting from the source literature, the final summation lacks credibility and cannot be taken seriously as an evaluation of either the potential values or dangers of releasing grass carp into the New Zealand aquatic environment.

The document does not, in my view, establish a sound case for termination of grass carp studies.

It should also be noted that most of the agencies which replied to the FFA questionnaire, have had no experience with grass carp (about 32 of 42 replies). Therefore their replies depended on hearsay and published literature. (No one can fairly claim this of FRD.) When the FFA questionnaire arrived at the Ontario Department of Fisheries and Wildlife in Toronto, I happened by chance to be in their office and they brought the questionnaire to me to discuss. They made it quite clear to me that they knew very little about grass carp and yet have provided a reply that is taken as authoritative. I suspect this may be true of many agencies that replied.

I have prepared an annotated copy of the FFA report in which the instances of bias, or erroneous reporting of responses to the questionnaire can be observed (Appendix II).

11. CONCLUSION

As noted above, future experimental research on grass carp and decisions on their ultimate uses in New Zealand await completion of an environmental impact evaluation. The Aka Aka-Otaua drainage system trials have been terminated and cannot resume before the coming spring/summer owing to the lack of fish of suitable size. By that time the environmental impact evaluation will have been completed, facilitating discussion of the issue and the making of a decision on the future of the fish in New Zealand.

APPENDIX I. A listing of papers on grass carp and related matters in New Zealand (* originating in Fisheries Research Division).

- Chapman, V.J., and Coffey, B.T. 1971. Experiments with grass carp in controlling exotic macrophytes in New Zealand. *Hidrobiologia* 12: 313-23.
- * Edwards, D.J. 1973a. Aquarium studies on the consumption of small animals by 0-group grass carp, *Ctenopharyngodon idella* (Val.). *Journal of Fish Biology* 5: 599-605.
- * Edwards, D.J. 1973b. The grass carp programme. In Eady, F.C., and Withell, E.C.B. (Eds.). "Aquatic weeds 1973", pp. 28-35. N.Z. Ministry of Agriculture and Fisheries.
- * Edwards, D.J. 1974a. Weed preference and growth of young grass carp in New Zealand. *N.Z. Journal of Marine and Freshwater Research* 8 (2): 341-50.
- * Edwards, D.J. 1974b. Taking a bite at the waterweed problem. *N.Z. Journal of Agriculture* 130 (1): 33-6.
- * Edwards, D.J., and Hine, P.M. 1974. Introduction, preliminary handling, and diseases of grass carp in New Zealand. *N.Z. Journal of Marine and Freshwater Research* 8 (3): 441-54.
- * Edwards, D.J., and Moore, E. 1975. Control of water weeds by grass carp in a drainage ditch in New Zealand. *N.Z. Journal of Marine and Freshwater Research* 9 (3): 283-92.
- Little, C. 1983. Research gleanings. Grass carp: another view. *N.Z. Farmer*, 104 (7): 77.

- * McDowall, R.M. 1979. Exotic fishes in New Zealand: dangers of illegal releases. *N.Z. Ministry of Agriculture and Fisheries, Fisheries Research Division Information Leaflet No. 9.* 17 p.
- * Mitchell, C.P. 1977a. The use of grass carp for submerged weed control. *Proceedings of the 30th New Zealand Weed and Pest Control Conference:* 145-8.
- * Mitchell, C.P. 1977b. Underwater agents of destruction. *Catch '77 4 (11):* 22-3.
- * Mitchell, C.P. 1978. Grass carp exported. *Freshwater Catch 1 (supplement in Catch '78 5 (12)):* 21.
- * Mitchell, C.P. 1979. Grass carp research project. *Annual Report ... 1979, Auckland Acclimatisation Society:* 38-9.
- * Mitchell, C.P. 1980a. Control of water weeds by grass carp in two small lakes. *N.Z. Journal of Marine and Freshwater Research 14 (4):* 381-90.
- * Mitchell, C.P. 1980b. Do grass carp have a future? *Freshwater Catch 9:* 10-2.
- * Mitchell, C.P. 1980c. Culture and uses of grass carp in New Zealand. *In Dinamani, P., and Hickman, R.W. (Comps.), Proceedings of the Aquaculture Conference, pp. 75-6. N.Z. Ministry of Agriculture and Fisheries, Fisheries Research Division Occasional Publication No. 27.*
- * Mitchell, C.P. 1981. Grass carp and water weed. *Soil and Water 17 (2):* 22-6.
- * Mitchell, C.P. 1982. Grass carp - par avion. *Freshwater Catch 14:* 18-9.

- * Mitchell, C.P. 1983. Search for hybrid grass carp. *Freshwater Catch* 18: 13-5.
- * Mitchell, C.P., and Rowe, D.K. 1979. Freshwater fish farming - an alternative for the smallfarmer? *The Smallfarmer*, August 1979: 29-30.
- Pullan, S.G., and Little, R.W. 1979. Koi carp a beautiful menace. *Freshwater Catch* 4: 9.
- Rennie, N. 1983. Grass carp, great drain cleaners. *N.Z. Farmer* 104 (4): 8-10.
- * Rowe, D.K. In press. Some effects of eutrophication and the removal of aquatic plants by grass carp (*Ctenopharyngodon idella*) on rainbow trout (*Salmo gairdneri*) in Lake Parkinson, New Zealand. *N.Z. Journal of Marine and Freshwater Research*.
- * Schipper, C.M. 1981. Grass carp - a panacea? *Freshwater Catch* 13: 11-2.
- * Schipper, C.M. 1982. Grass carp for aquatic weed control in agricultural drains. In Proceedings of the First National Land Drainage Seminar, pp.185-8. Massey University.
- * Schipper, C.M. 1983. Aquatic weed control and growth of grass carp in an agricultural drain. In Aquatic Weeds Seminar, 1983, pp. 61-8. Massey University.
- * Waugh, G.D. 1970. Grass carp may be the answer to the problems of water weeds. *Ammohouse Bulletin* (29): 6-8.

Williams, M.J. 1984. The likely impact on waterfowl of the introduction of grass carp to New Zealand waterways. *N.Z. Wildlife Service Technical Report No. 4.* 27 p.

APPENDIX II. Annotated copy of the report of the N.Z. Federation of Freshwater Anglers.

What follows is the FFA report which resulted from their questionnaire sent to North American fisheries agencies. The report presented is as typed by FFA except that I have photocopied it onto pages sideways to allow extra marginal space for annotation. This procedure has disrupted the original pagination; however, the material is presented in the original order.

The FFA lent to FRD their extensive file resulting from the questionnaire, I have worked through this in detail, comparing the responses sent to FFA with their reports of these responses. As noted in the main text of this report, I have found substantial discrepancies which are demonstrated in the annotated copy of the FFA report which follows. Annotations are deliberately handwritten to make it obvious what part of the material is the original FFA report, and what part constitutes my additions. Generally, I have made no comment on my views of the biological validity of the statements made by respondents, but rather have concentrated on how accurately the FFA report represents the original comments. My failure to comment on this validity cannot be taken to represent my agreement with opinions expressed.



NEW ZEALAND FEDERATION
FRESHWATER ANGLERS

JOHN F. GIACON
10 GLENVEAGH DRIVE,
MT ROSKILL,
AUCKLAND, 4.

September, 3rd 1981

Dear Sir,

... Attached, please find our Federation's summary and report on *Ctenopharyngodon idella* Val (Chinese Grass Carp).

We trust you will find the information interesting and be better able to understand why our Federation has decided to adopt a policy of total opposition to this species.

We invite your comments.

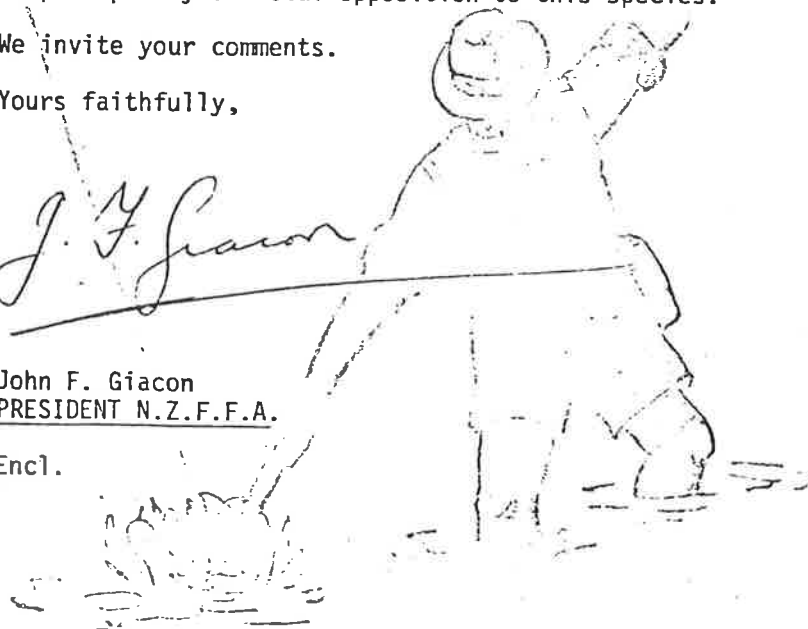
Yours faithfully,



J. F. Giacom

John F. Giacom
PRESIDENT N.Z.F.F.A.

Encl.





NEW ZEALAND FEDERATION
FRESHWATER ANGLERS

10 Glenveagh Drive,
Mt Roskill,
Auckland, 4.

COPY

June 18th 1981

Dear Sir,

This letter is to seek information to enable our Federation to prepare a submission to express our concern over the possible release of Chinese Grass Carp (*Ctenopharyngodon idella* Val) in various waterways and/or impoundments in New Zealand.

A government department study on the use of these fish for weed control, has been in process since 1966. We concede these fish could have a beneficial effect on certain weed types, but we are particularly concerned over the following matters.

1. The possibility of these fish proliferating and breeding in our waters. Please note we are informed that most of our waters would be unsuitable for breeding. However, fish have been bred in laboratory conditions.
2. Is it possible to successfully desex these fish?
3. Is it true that a dominant female in a colony of these fish can become a male, thus enabling breeding?
4. We are concerned that these fish would have a detrimental effect on our trout fisheries, e.g.
 - (a) Do these fish eat animal matter such as larvae, crustacea, snails, etc.?
 - (b) Do these fish consume the weed necessary to harbour and sustain trout food?
5. Do these fish cause erosion?
6. Do these fish seriously foul the waters they inhabit?
7. Do these fish have a recreational sporting value?
8. Once established, would it be difficult to eradicate these fish?

As you can see, we wish to build up a dossier, complete with proper references so that when the time comes a substantial submission can be made stating our case.

Cont.../2.

You are probably aware of New Zealand's superb trout fisheries, which are now being extended throughout our country. We desire to protect these for over 200,000 licensed members and our information is pitifully inadequate.

For example, some of our fisheries have been ruined by the misguided introduction of Rudd, which have proliferated beyond all belief. The same irresponsible people who spread Rudd, could just as easily catch and release carp.

Our concern and need for advice and information is very real. We are prompted to write to you, as we are informed that Chinese Grass Carp are now banned in the majority of American States because of the serious problems they engender.

Your advice and comments are solicited and any help you care to give will be very much appreciated.

Yours faithfully,

A handwritten signature in cursive script that reads "J. F. Giacon". The signature is written in dark ink and has a long, sweeping horizontal line underneath it that extends to the right.

John F. Giacon
PRESIDENT N.Z.F.F.A.

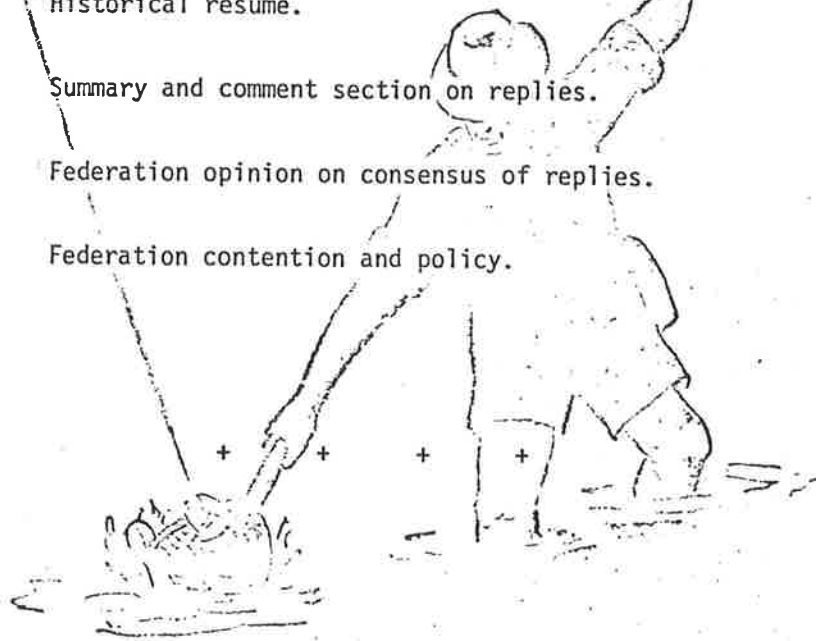


NEW ZEALAND FEDERATION
FRESHWATER ANGLERS

Subject: CTENOPHARYNGODON IDELLA VAL
(Chinese Grass Carp)

Documentation Summary

1. Introductory letter.
2. Copy of Federation questionnaire letter.
3. Historical resume.
4. Summary and comment section on replies.
5. Federation opinion on consensus of replies.
6. Federation contention and policy.





NEW ZEALAND FEDERATION
FRESHWATER ANGLERS

August 7th 1981

Report on *Ctenopharyngodon idella* Val
(Chinese grass carp)

History

Since 1977, the N.Z.F.F.A. has kept a watching brief on M.A.F. research work with the above fish species (Hereon referred to as grass carp).

Periodically, information has been forthcoming from various sources, such as M.A.F. bulletins, M.A.F. personnel in lectures or discussions with individuals, press releases and such-like.

Because of adverse reports from overseas being brought to the Federation's attention, a decision was taken in 1979 to accumulate data, with a view to the Federation being in a position to form a positive policy.

Initial work was undertaken by the Manawatu Freshwater Anglers Club on behalf of the Federation. Their report was submitted to the Manawatu Catchment Board and subsequently, to the M.A.F. Fisheries Research Division and to the Department of Internal Affairs in June 1981.

Both these departments agreed with or refuted, much of the material submitted. Unfortunately, opinions from each department conflicted to such an extent that the Federation executive decided to seek the advice of 66 American and Canadian state agencies known to us.

Therefore, this report is to record the replies received following our sending of the appended Federation letter seeking advice.

Every reply will be recorded as follows:-

1. The state or province giving information.
2. The department involved.
3. The referees name.
4. The referees position.
5. The date received.

Cont.../2.

6. A summation, possibly with comment.

Note 1. The replies are not necessarily in the order received.

Note 2. Copies of original letters and/or technical papers are available to approved organisation or persons on payment of photocopying fees and postage.

Summary

seven reasons why these fish are an undesirable species in California.

- a) ...
- b) ...
- c) ...
- d) ...
- e) young grass carp will compete directly with game fish for invertebrate food.
- f) could probably establish large populations in Californian waters
- g) ...

As a result of these reasons, grass carp are promoted in California.

Comment Each of these reasons could apply to N.Z.

2. WYOMING

Summary

grass carp in Wyoming are promoted. no reasons given. reference is made to likely sources of information

fighting ...

(iii) ...

(iv) ... in or around aquatic vegetation

g-fish

does not ...

...

3. WASHINGTON

Dept of Game John Ward, Manager fisheries division 9/7/81

Agency has no experience with grass carp

Summary

Grass carp are prohibited. They have biological characteristics that make the introduction of this species even on an experimental basis dangerous.

These fish while publicised as herbivore, should be more properly classified as omnivore. This places them in competition with other species.

The ability of grass carp to withstand high salinity, make it possible for them to migrate through estuarine waters to other river systems.

says: "salinities higher than those in fresh water."

Comment Here are matters not previously disclosed and reasons for concern.

4. OKLAHOMA

Dept of Wildlife Conservation Charles R. Wallace, Chief, Fish Division 8/7/81

Agency has no experience with grass carp.

Summary

We are advised that grass carp are prohibited because Oklahoma cannot get satisfactory answers to the very questions we ask. Like us, Oklahoma is concerned over conflicting reports. They supply us with information sources.

says: "don't have answers to questions you asked."

- await proof of no serious impact on wildlife and habitat

5. ALASKA

Dept Fish & Game Sondra Stanway, Librarian 10/7/81

Agency has no experience with grass carp.

Summary

Alaska has a policy of non-introduction of exotic species. Information sources are given.

6. OREGON

Dept Fish & Wildlife

Larry E. Bisbee, Staff fish biologist

10/7/81

Agency has no experience with grass carp.

Summary

Oregon have banned introduction, but know that grass carp have been introduced illegally.]

is not stated. "There is a great deal of scientists do not yet know".

Oregon state that what scientists, biologists and fish culturists do not know about grass carp outweighs what they do know.

claim" sports fish potential once accepted by public and easily taken by nets.

A special publication is being prepared by Oregon and will be sent to us later.

References for further information is supplied, plus a list of given answers to our questions. Most of the answers are in line with others, except that Oregon is not aware that these fish can be successfully desexed and that they could cause erosion.

Cont.../4.

- 4 -

Comment This reply conflicts with other replies, both for and against.

7. HAWAII

Div. of Aquatic Resources

Stan Shima, Chief Freshwater Aquatic Biologist

7/7/81

Agency has fish in area.

Summary

Grass carp have been present in Hawaii since 1967, these are in ponds. No breeding has been recorded and their presence in streams or waterways is not known.

Since 1974, grass carp have been prohibited and strict stipulations introduced to prevent escape or intentional release. These restrictions will remain in force because there is concern that they could be harmful to native flora and fauna.

this is not correct. It is on the "restricted entry list". Approvals are made with conditions that adequate safeguards

8. SOUTH CAROLINA

Dept of Marine Resources

H.J. Logan, Chief of Fisheries

7/7/81

Agency has no experience with grass carp.

Summary

South Carolina have not conducted their own research, but have relied on information from other states.

However, grass carp are banned because they will compete for zooplankton food and also eat fingerlings of other species.

They would also eat vegetation required for good waterfowl resources.

Comment A threat to duck, pukeko, heron, swan and suchlike?

in the early life stages zooplankton for a few weeks plays a major role in the food; therefore competition with fingerling striped bass is a possibility.

not stated:

"could"

9. INDIANA (I)

Fisheries Dept

Bill James, Fisheries Biologist

14/7/81

One of three papers sent.

Summary

An extremely comprehensive and informative survey. This document records reproduction in pond systems in Mexico. It also advises that grass carp have been banned in most American States.

We are told that young grass carp eat zooplankton and insects. Large fish eat mainly plant material, but do eat worms, insects and other fish. Large carp are inefficient at controlling algae. The following list of dangers are given:-

- a) It cannot be contained in any one place.
- b) It may eliminate weedbeds used for cover and spawning habitat by many other species.
- c) It poses a major threat to waterfowl habitat.

says: natural reproduction has been verified in a river and reservoir system in Mexico... reputedly does not spawn in lakes or ponds.

occasionally first

very

Fish present in area.

Cont.../5.

- d) Large numbers of these fish are required to control vegetation.
- e) They do not control vegetation in ponds when fed an artificial diet.
- f) They may create serious food competition with gamefish.
- g) Water quality may be adversely affected by the larger quantities of semi-digested organic matter excreted.

small

This particular report concludes by requesting all known locations of grass carp to be reported to authorities immediately.

Comment A serious indictment against these fish.

INDIANA (II)

A 1978 paper by Robert L. Ball, Fisheries Biologist

Subject Effects of grass carp on other species.

Summary

A 23-page booklet describing effects on large-mouth bass, bluegill and redear sunfish. This is a comprehensive report, including charts showing growth rates, weight gains and so on.

It records reproduction of grass carp in pond systems and concludes by recommending that these fish remain banned because of so many unknown factors.

It does not as far as I could determine

It does not say this. -p 22 "I feel that the most important unknown remaining before the grass carp ban should be lifted in Indiana is a determination of its likely effects on the river systems of North America"

INDIANA (III)

A 1969, 17-page summary of known literature on grass carp by Robert W. Schneider.

Summary

This report states that most known grass carp culture around the world is for food production and not for weed control.

A large number of reproduction instances in pond and waterway locations is given.)

This is incorrect. - It mentions one fluctuating reservoir plus one river in Japan + natural range.

These fish have definite discriminations for various weed types. Valued vegetation is devoured in preference to the nuisance varieties, such as hycynths and elodea.

Excreted undigested material causes fertilisation and eutrophication.

Comment

This report lists hundreds of references, and is strictly a neither for or against publication.

actually 22!

40.

10. IDAHO

Dept Fish & Game Herb Pollard, State Fishery manager 8/7/81

Agency has no experience with grass carp.

Summary

Idaho have banned grass carp because they fear the possible impact on sport species, particularly trout and salmon. Also feared, is the impact on other species of wildlife that depend on aquatic vegetation.

"including"

Other fish species have been released in Idaho waters and have caused problems. It is believed grass carp would pose an even greater danger.

Juvenile grass carp compete for zooplankton, crustacea, insects and annelids, which trout also eat. Larger grass carp eat vegetation, which support troutfood and is also important to waterfowl.

Reportedly consume

Grass carp are considered poor food value when compared to game fish.

cyprinids recommended.

believe grass carp no exception

Extreme caution regarding introduction of grass carp is urged.

Comment A direct reference to trout and salmon and again, to waterfowl.

11. NEBRASKA

Game and Parks Commission Robert E. Thomas, Chief Fisheries Div. 9/7/81

Summary

Private possession of grass carp is prohibited. These fish are being studied in four public fishing lakes. After two years, vegetation was totally eliminated in one lake, significantly reduced in another and little control evidence in the other two. It is hoped to achieve an optimum of control rather than complete eradication of vegetation.

Since Nebraska's studies started, natural reproduction of grass carp has occurred in the lower Mississippi river. Since 1975, natural spawning has been taking place in the Eudora River, Arkansas.

It is stated that reproduction of grass carp occurs in many locations around the world at extremes of the reproductive requirements for this species.

Nebraska suggests grass carp are opportunistic spawners.

It is concluded that there is concern about expanded distribution of the fish.

Comment It does appear that Nebraska's work parallels that in N.Z.

Nebraska also answered each of our questions.

1. These fish could breed in our waters.
2. It is not possible to desex this fish on a large scale.
3. The dominant female cannot change its sex.
4. A separate paper on this question was provided.
5. Can cause erosion.
6. Not through feeding.
7. Very limited.
8. Very difficult to eradicate if reproduction occurring.

Fish present in area.

not documented here or elsewhere

Note: A paper on food habits of grass carp shows that they do compete with trout for food, particularly in the fingerling stage.

12. NEW HAMPSHIRE

Dept Fish & Game Peter E. Brezosky, Supervisor, fisheries management 10/7/81

Agency has no experience with grass carp.

Summary

New Hampshire have not had any experience with grass carp. They have undertaken to seek out and forward us information.

13. COLORADO

Division of Wildlife Robin F. Knox, Wildlife Programme specialist 13/7/81

Agency has no experience with grass carp.

Summary

Grass carp are permitted in Colorado under a special permit only.

They report there is little concern to impact on coldwater trout, but that most concern is over impacts to warm-water habitats.

We are given two references for further information.

14. IOWA

Conservation Commission Larry Mitzner, Fisheries Research Biologist 14/7/81

Fish present in area.

Summary

Iowa state that they understand our concern over introduction in N.Z. The same apprehension was present in Iowa when grass carp were introduced in 1973. Since then, fears have become practically non-existent.

among fishermen, especially those who fish large mouth bass

Iowa have received articles on N.Z. work with these fish and find them enlightening.

and excellent!

Grass carp have been used in approx 60 state owned lakes and 2,000 private ponds. No adverse effects have been noted and increasing fisherman can now effectively fish from shore.

- report talks of routine use

Our questions are answered as follows:-

1. They say fish would be unlikely to reproduce in N.Z. However, in direct contradiction to Nebraska's reply, they state grass carp have not reproduced in the lower Mississippi.
2. These fish can be desexed (another direct contradiction).
3. Doubtful.
4. a) Yes b) Yes
- 5, 6 and 7 are answered simply "No".
8. Grass carp are sensitive to rotenone and formaldehyde.

} says 'no substantial record that spawning has occurred.'

to a length of 2 cm!

if stocked in trout streams they would consume the vegetation

not so! "very few... are caught"

Cont.../8.

Iowa concludes that they hope their information is helpful, not necessarily to build a case against grass carp. Exhaustive scientific investigations should precede introductions. This did not occur in the U.S.A. Iowa feels N.Z. has the advantage of investigations from all over the world.

plus investigation from your own country since 1966

Included in the Iowa reply is a 1978 paper by Larry Mitzner. This is an 11-page account of grass carp liberations and performance in Red Haw Lake.

Comment

This reply was the first pro-grass carp one received. Notwithstanding this, there are several conflicting statements with other replies and this conflict in itself is reason for concern.

15. WISCONSIN

Dept Natural Resources Vern Hacker Bureau of Fish Management 15/7/81

Agency has no experience with grass carp

Summary

Wisconsin are horrified that release of these fish is even being considered. They are very explicit why they won't allow these fish in their waters.

- require proof that the fish will not reproduce.

These fish move from one body of water to another and once established, it's impossible to undo the damage. They now inhabit and have destroyed millions of acres of water.

the nearest statement to the purpose of "horrified" is "I urge you to prevent their release"

We are warned we will receive two types of replies from the United States. From a dozen or so states that allow grass carp, we will receive glowing reports. We are urged to remember that these states will not dare to admit they made a mistake. The other 35 states will support Wisconsin.

this statement refers explicitly and unequivocally to "German carp" - "Cyprinus carpio". - see Appendix II.

We are urged to prevent the release of grass carp in N.Z. Wisconsin say they have heard of our great fishing and water so why break up a winning combination?

is not stated.

Comment

It certainly appears that Wisconsin's prediction on replies is happening.

Two papers on grass carp were sent by Wisconsin. One says the only certain thing about these fish is that they do eat weed. It also says that after stocking with carp, careful monitoring showed that the overall fish population in six lakes declined, while eight showed an upward trend.

"the only thing widely agreed upon"

The other paper deals with attempts to hybridize grass carp by cross breeding. This paper concludes that the reproduction of grass carp in U.S. waters is one of the chief reasons it has been banned.

"the matter of possible (many believe probable) reproduction"

16. DELAWARE

Div. Fish & Wildlife Roy W. Miller, Supervisor of Fisheries 15/7/81

Agency has no experience with grass carp.

Summary

Delaware has had no direct experience with grass carp. They have reviewed the situation and the fish are banned. They claim there is no guarantee that the fish will not spread through their river systems and into other states.

They site the Chesapeake and Delaware watersheds as possible suitable breeding habitat and do not wish to see valuable aquatic weeds consumed, especially waterfowl food.

says " Although natural reproduction in this country has not been documented ... "

They give an instance of a species of tapeworm being present not previously found in America.

" although this has not proved to be a problem .. "

They say there are too many existing uncertainties with this fish.

" Because of the existing uncertainties in possible deleterious effects ... banned ... until more is known "

17. ARKANSAS

Game & Fish Commission

Scott Henderson, Asst, Chief Fish Division

8/7/81

Fish present in area.

Summary

Mr Henderson says grass carp are an effective means of weed control. They have been used in Arkansas for over 10 years and have had beneficial results.

Mr Henderson is pro-grass carp and says the risks caused are worth the benefits. He asks us to be open-minded. He answers our questions as follows:-

says " When small they could be considered omnivorous ... After they reach 6-8" in size their diet is 100% vegetation only ingesting other organisms incidental ... "

- a) Spawning requirements virtually eliminate the possibility of widespread reproduction.
- b) Desexing is still being researched, but is not possible in large scale applications.
- c) No. Sex reversal is not possible.
- d) Small 6 to 8 inch grass carp are omnivorous.
- e) Larger fish eat a wide variety of weed, some beneficial to gamefish.
- f) The fish themselves do not cause erosion, but lack of protective weed cover helps.
- g) Proper stocking numbers do not cause water quality problems.
- h) Grass carp are hard to fish for effectively.
- i) Grass carp can be killed with low concentrations of rotenone, but in waters exceeding 100 acres, this is not practical.

not stated or implied

+ "meat white and readily accepted"

Summary

Arkansas is recognised as the State which has done the most work with grass carp. Forewarned by the Wisconsin reply, their answer is to be expected in favour of grass carp.

18. NEW MEXICO

Dept Game & Fish Warren J. McNall Ass't Chief of Fisheries 16/7/81

Agency has no experience with grass carp

Summary

Simply says that grass carp are prohibited. Give us references.

- 10 -

19. NORTH CAROLINA

Div. Inland Fisheries W. Donald Baker, Chief of Fisheries 13/7/81

Agency has no experience with grass carp.

Summary

Chinese grass carp are outlawed. They have collected information on a hybrid through crossbreeding; but do not elaborate.

20. MAINE

Fishery Research Unit John G. Stanley Ph.D. Unit Leader July 24 '81

Agency has no experience, but Stanley did before moving to Maine.

Summary

From Maine, we received Mr Stanley's letter, plus 8 papers, seven of which are by Mr Stanley himself. Over 100 pages. In his letter, Mr Stanley asks us to have confidence on our N.Z. scientists working on grass carp. He answers our questions thus:-

"N.Z. scientists working on grass carp are respected throughout the world"

1. The fish (will) breed in large rivers.
2. Monosex (all female) and sterile fish have been produced.

that have summer floods and at least 50km of free flowing water" (doesn't mention MISSISSIPPI)

3. Dominant females cannot become male.
4. Grass carp feeding is reduced in cold water. Their main effect on sportsfish will be through destruction of aquatic plants.
5. They will not cause erosion.
6. They do not foul the water.
7. They have little sport value.
8. They are highly migratory. They easily escape. They can leap from one waterway into another. They are very difficult to eradicate once established.

- has no first hand knowledge of effects on trout
says "would be unlikely to eat much in cold trout waters"

although they are fully vulnerable to fish toxicants."

Our efforts to seek advice is applauded. Maine fights vigorously to prevent grass carp and Mr Stanley fully supports this stand. Mr Stanley offers to come to N.Z. to help initiate a sex control programme.

Comments

Reading through the Maine documentation, some alarming facts come to light. Reproduction, naturalisation genetics. Papers from a grass carp conference and much valuable information is given to us. If our M.A.F. haven't got these papers in their library, then they should ensure they get them.

21. MINNESOTA

Department of Natural Resources
July 21 '81

W.J. Scidmore, Fisheries Research Supervisor

Cont.../11.

Agency has no experience with grass carp

23. TEXAS

Parks & Wildlife Dept Neil E. Carter, Research Co-ordinator 16 July 1981

*Agency has fish present
in area.*

Summary

IT appears that Texas is experimenting with these fish much the same as our M.A.F. Some small lakes have been stocked for research purposes. The Texas research programme expires on September 1 1987.

From Texas, we have been sent over 80 pages, which comprise an account of a public hearing on the introduction of these fish and also a special research report.

Comment

If ever a public hearing is held in N.Z., or better still, if we are given the opportunity to make a submission, then we already have enough evidence to put forward a powerful case.

- 12 -

24. PENNSYLVANIA

Fisheries Division Clark N. Shiffer, Herpetology and Endangered
Species Co-ordinator 22/7/81

*Agency has no experience
with grass carp.*

Summary

After weighing up all the considerable evidence available, Pennsylvania bans grass carp. Fortunately, Pennsylvania have sent us some excellent material, which deals with grass carp problems on a nationwide basis.

Another document is entitled "Carp is a four letter word". This paper claims that grass carp could prove to be a greater pest than German carp, which are themselves a scourge worldwide.

Comments

Here again, is a telling documentation against these fish.

25. GEORGIA

Dept Natural Resources

Randall D. Quintrell, Fisheries Biologist
31/7/81

*Agency has no experience
with grass carp.*

Summary

Georgia advise that they share the same concerns as our Federation. There is pressure from some members of the public to introduce grass carp into Georgia. They want the answers to the questions we ask.

*Fish allowed by permit;
none issued recently.*

26. OHIO

(Private)

Dr James L. Corbin

5/8/81

"My God, don't let them get grass carp started. We've had a local pond where they were stocked illegally and had to kill off the entire fish population. This pond hasn't been worth a damn since."

*How can one logically
evaluate such a statement.
It probably refers to
European carp.*

27. LOUISIANA

Dept Wildlife & Fisheries

Janice S. Hughes, Fish Biologist

5.8.81

Fish present in area

Summary

This reply sticks to answering our questionnaire.

1. Amongst their answers they advise that grass carp are spawning in the Mississippi and Atchafalaya Rivers. Large volumes of water at relatively high temperatures are conducive to spawning.
2. They have no knowledge of successful desexing.
3. Doubt if it is biologically possible.
4. a) Grass carp do consume animal matter.
b) No trout in Louisiana.
5. Slight erosion has been noted.

*No. "I understand that it is, but
have had no experience in this
area.*

*"In the process of feeding on vegetation
these fish also consume some animals"
"Where the fish browsed 6-8" out of
water in a hatchery situation
- never noticed erosion in lakes.
where fish stocked.*

Cont.../13.

- 6. When stocked at 2-15 fish per acre, no water fouling was evident.
- 7. No recreational fishing value.
- 8. It would be impossible to eradicate this fish from a river or lake, except by poisoning. That would, of course, kill other species also.

know of very few fish caught.

28. WEST VIRGINIA

Dept of Natural Resources

Benard F. Dowler, Fish Management
Administrator 4/8/81

Fish present in area but agency has no experience.

Summary

Grass carp are banned, but West Virginia are quite certain that these fish have been illegally brought into the State. They concede that grass carp can reduce weed and in fact, eliminate it. They have preferences for certain weed species. With the decline in aquatic vegetation, an associated decline in benthic invertebrates also occurs. This has a profound effect on the food chain and is detrimental to other fish species.

{ due to ignorance of long term effects.

"could be".

West Virginia maintains a ban on these fish, however, they are researching for the U.S. Wildlife Service with a hybrid grass carp.

29. RHODE ISLAND

Division of Fish and Wildlife

John M. Cronan, Chief Fisheries
Officer 31/7/81

Agency has no experience with grass carp.

Summary

Rhode Island Policy is not to grant permits for the importation or stocking of grass carp.

30. SASKATCHEWAN

Dept Tourism & Renewable Resources P.C. Naftel Chief, Fisheries Branch
9.9.81

Saskatchewan has banned the introduction of grass carp.

*Agency has no experience
with grass carp*

31. ALBERTA

Fish & Wildlife Division Nick Musa - Fisheries Administrator
8/9/81

This state does not allow grass carp and has no first-hand knowledge of them. They supply us with no fewer than 35 handwritten references for gaining further information.

*Agency has no experience with
grass carp.*

This is not stated.

Cont.../14.

- 14 -

32. MANITOBA

Fisheries Branch J.F. O'Connor - Chief, Biological Services 9/9/81

Manitoba gives the importation of European Carp (*Cyprinus carpio*) as the greatest mistake ever made by North American legislators. This breed is so widespread, they have precluded the development of other species.

Manitoba's experience with European Carp is but one of many reasons why Chinese Carp are banned.

A copy of Manitoba legislation banning grass carp is appended.

*Agency has no experience with
grass carp*

33. ONTARIO

Ministry of Natural Resources A.A. Wainio - Fisheries Branch Specialist
9/9/81

Ontario also ban grass carp and state they are aware of the potential dangers of these fish. They also provide a copy of their preventative legislation.

They have sent us an alarming account of how one third of Arizona's grass carp had to be destroyed. These were special hybrid grass carp specially bred to prevent reproduction when they were released into Arizona waters.

The problem was, that contrary to expectations, it was discovered that they could, in fact, breed.

Worse, despite special precautions such as disinfecting the rearing ponds before stocking, the hybrids also developed an outbreak of parasitic protozoan, Chilodonella.

Because of the dual threat of reproduction and the disease, it was considered that the whole of the State's trout production was at risk. The entire stock of hybrids was therefore destroyed.

Comment

It was claimed we were placing too much emphasis on disease in trout farms before the whirling disease outbreak at Silverstream. Dare we site this instance as a possible future threat in N.Z.?

34. YUKON

Wildlife Branch Barney Smith - Biologist 8/9/81

Yukons reply in full - "Dear John, we have no information on Chinese Grass Carp (even weeds grow slowly up here).

Comment

I would love to meet this guy!

Agency has no experience with grass carp.

Ontario actually bans introduction of all live fish, including trout, without a permit. There is no mention of an explicit ban on grass carp.

"could be able to"

Chilodonella is already present in N.Z.

by whom?

Agency has no experience with grass carp.

35. NEW JERSEY

Division of Fish & Wildlife Walter S. Murawski - Asst Chief Freshwater Fisheries 21/7/81

New Jersey is free of these fish and they are banned.

Agency has no experience of grass carp.

"relatively" - policy to "not approve stockings"

36. U.S.A. DEPARTMENT OF THE INTERIOR

Fish & Wildlife Service Harry K. Dupree Director 20/9/81

The U.S.D.I. reply by answering each of our questions in some detail. They also supply reprints where possible, to illustrate each point.

All told, there is over 100 pages of research material. Much of this, repeats material received from other states, however, there is much new material, some of which is controversial. Just about every aspect of this species is covered. Again, we have for and against material.

We can summarise U.S.D.I. answers as follows:-

1. Wherever "some suitable waters" are available, there is little reason to think these fish will not spawn.
2. Researchers are not in agreement on the successful desexing of these fish and hybrids will not necessarily control weed the same as grass carp.
3. Sex reversal is not considered possible.
4. Grass carp will eat weeds and prefer certain types. If these types are beneficial to trout, then they would be harmful.
5. Large stockings will cause erosion. The key is proper management.
6. Under some conditions, any animal can "foul" the environment.
7. These fish are not often taken.
8. Yes, these fish once established, would be difficult to eradicate. However, so would trout which also are a non-native to N.Z.

- says that they have been produced and have been under test for 5 years

*doesn't state this at all
/ in hatchery ponds*

because the population is generally small

Comment

As in the Trout Farming survey, Mr Dupree gives a very full and common-sense set of answers backed up by much reference material.

37. OHIO

Division of Wildlife Jack Ericson - Staff Biologist 31/7/81

Ohio advise that they believe that the spawning requirements of grass carp are much broader than at first proposed.

Ohio bans all stocking of grass carp and hybrids of the species.

38. ALABAMA

Game & Fish Division Barry W. Smith - Asst Chief 19/8/81

Grass Carp are not banned in Alabama where they are bred for use in hatcheries and for weed control in state owned lakes of 45 to 180 surface acres. Alabama does not stock or advocate stocking grass carp in public waters.

Alabama state that grass carp have not been detrimental when stocked with other warm-water species. No turbidity has been noticed when stocked at 10 to 20 per acre. Grass carp are sensitive to Rotenone and can be killed at concentrations of 0.1 ppm. These fish can be caught on hook and line using grass for bait and also redworms.

Alabama suggest N.Z. explore the efficiency at which these fish will consume weed in conditions suitable to support trout fisheries!

39. KENTUCKY

Dept Fish & Wildlife Resources Peter W. Pfeiffer - Director Fisheries 29/8/81

Because of the control of aquatic vegetation is attractive, Kentucky hope to mount their own limited amount of research on this species.

Comment

Perhaps we can send them ours.

Agency has no experience with grass carp.

Fish present in area.

✓ or fertility

Agency has no experience with grass carp

At least NZ for one disease free!

40. MISSOURI

Dept of Conservation

Lawrence C. Belusz - Fisheries Extension
Biologist 10/7/81

This species has migrated into the Missouri and Mississippi rivers and throughout streams and watersheds in what amounts to one third of North America's freshwater.

A ban did exist, however, the movement and reproduction of grass carp have proved impossible to document. There was little reason to continue the ban, so it was lifted on January 1st 1980.

Grass carp are now reproducing in Missouri, Mississippi, Arkansas, Iowa, and Kansas. They have spawned in areas considered outside their natural range.

Comment

Mr Mitchell M.A.F. F.R.D. Rotorua is on record as saying these fish could possibly breed in the Waikato, say below Karapiro. If so, then they could spread into the Waipa, Maniatutu, Punui, Little Waipa and so on. A quarter of the North Island's waterways could be overrun by these fish. These same waters contain New Zealand's largest eel fishery.

Fish present in area but no research.

Reber says nothing like this but that they have access to all major watersheds but movement has not been documented (i.e. observed!).

doesn't say this at all - i.e. they haven't moved there!

not in report and not true for Iowa, Kansas, Missouri (?) possibly true Mississippi & Arkansas

Attachment (1979) states "Natural reproduction of grass carp in the United States has not been documented" Also that "By 1974 grass carp were widely distributed in the Missouri, Mississippi and St Francis Rivers

41. GUAM

Dept of Agriculture Wayne Kruckenberg Fisheries Biologist 16/10/81

*Agency has no experience
with grass carp*

Guam reply to our questions in much the same light as others. They do not have any programme involving these fish. Some facts quoted are as follows:-

1. Grass Carp eggs need a sufficiently fast current to keep them in suspension for two days for hatching purposes. The ideal water temperature is between 68^oF and 80^oF.
2. Triploid Grass Carp hybrids can be created, these fish are thought to be sterile.
3. By clearing weed, Grass Carp could be the means of inducing faster currents which would reduce temperatures and therefore be beneficial to trout.
4. They may cause erosion.
5. Low stocking should not create water fouling, however, high stocking could provide nutrients which in turn, would lead to phytoplankton and 200 plankton blooms resulting.
6. They have the potential to become a sporting and commercially attractive food fish.
7. They are susceptible to toxicants.

*..and increase productivity
of stream organisms
used for trout food.*

*could
200!*

*Fish/ and appears to be an
easy fish to control"*

42. NEW YORK

Inland Fisheries Section Eli L. Dietsch Aquatic Biologist

New York presently bans Grass Carp and have sent us a comprehensive 1975 official document, setting out their reasons.

Contrary to many claims, New York says that Grass Carp in fact speed up eutrophication and premature aging of lakes.

This whole paper is an indictment against grass carp and would be a prime example of why these fish must be undesirable in N.Z.

However, New York is considering an experimental introduction of sterile Hybrid Cross Grass Carp and Big Head Carp in a small lake in South Eastern New York.

As well, New York sent us about 50 pages of material, much of which we have previously been sent.

THIS SECTION OF THE REPORT WAS CLOSED ON 31/9/81
AS SUFFICIENT REPLIES HAVE BEEN RECEIVED AND PROCESSED
FOR OUR NEEDS.

*Agency has no experience with
grass carp.*

*— a 2 page press release designed
to discourage releases".*

~~FRS~~ II
~~40 /~~ II
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~~IN 1988~~ II
~~ANIXSIA~~ II
~~NY 2019~~ II
~~---~~ II
FFA II

NEW ZEALAND FEDERATION
 FRESHWATER ANGLERS

FEDERATION OPINION ON CONSENSUS OF DEPTIES ON STEPHENHARDSON
 IDELLA VAL - (CHINESE GRASS CARP)

answers to the eight basic questions the Federation asked of overseas agencies.

Notwithstanding the answers to our questions a great deal of further information was forthcoming and we have felt it is necessary to also

1. The possibility of Grass Carp in N.Z. Waters

breeding?

A great degree of conflict is obvious in the replies received. Some back up M.A.F. contentions that breeding is not likely in N.Z., due to no waters of a similar nature to their natural environment.

The pro-carp factions admit equivalent waters will induce breeding, but claim that there is no record of these fish spawning outside their natural range. These same factions, claim that the few fish that do exist outside release locations have obviously escaped from ponds. These factions also claim these fish cannot breed in ponds or lakes.

Anti-grass carp factions however, claim these fish are thriving from Mexico to Canada. Therefore, there must be N.Z. waters that will accommodate breeding for these fish. Grass carp are spreading in U.S. waters not previously thought suitable. Where breeding has occurred, they have become the dominant species. It is on record that these fish have reproduced in eleven locations considered outside their natural range.

This is not true of the papers received, not true in fact

This is quite false and without documentary support

Where is this recorded?

Many replies indicate that grass carp are opportunistic spawners. What is more, spawning has taken place in many locations at the extremes of the reproductive requirements of the species, including ponds and lakes.

A great majority of replies indicate that these fish escape easily. They do establish breeding populations and have spread to millions of acres of water.

Neither statement has any substantial support

in the F.F.A file

As with all fish, there can be no guarantee they will not escape, there is no guarantee they can be safely contained, especially from mischievous intent. There is no guarantee they will not adapt and acclimatise to the detriment of our fisheries.

At a recent Auckland Acclimatisation sponsored seminar, Dr C. Mitchell, M.A.F. F.R.D., stated there was a possibility of these fish breeding in the Lower Waikato River, particularly below Karapiro.

At the same meeting, Mr P. Howard gave a paper on how the Waikato/Waipā watershed had the potential to become one of New Zealand's finest brown trout fisheries!

Surely here, is a paradox that must confuse the angler. If grass carp did ever get into this particular watershed, we could have 20% of the North Island's waterways overrun. This has happened in the Mississippi and Missouri watershed, which is reputedly the fourth biggest in the world.

We contend this example fully illustrates the risk involved.

2. Desexing

The main consensus on this question indicates that desexing is difficult but possible. Desexing on a large scale is not yet viable. Monosex fish and hybrids have been produced, but sterility is not yet guaranteed.

Referring to the Ontario reply, we are disturbed to learn that in fact, hybrid grass carp in fact did breed. Worse, hybrid grass carp apparently do not inherit the weed eating capacity of the original fish.

This is not true. None of the reports seems to actually document any spawning in the Mississippi. Stanley (1976) predicted it by 1978-79. The Florida report (not included here) claims large numbers of grass carp in the Mississippi but the Minnesota report says "no verified instances of reproduction in the weed in the U.S" altho' known in Mexico.

3. Sex Reversal

Here at least, there is little contradiction, only two replies said spontaneous sex reversal was feasible. Every other reply said this was not possible.

4a. Do Grass Carp eat animal matter?

Several replies claim that these fish are described as herbivore, when they should more properly be described as omnivore. Only one reply claimed they did not eat animal matter, the rest ranged from only as fingerlings while eating weed, to being direct competitors with trout.

We contend that the consensus shows that these fish must have a detrimental effect on other species.

There is very little evidence that carp eat animals at a size above a few cm length and no explicit suggestions of competition with trout.

4b. Do they eat weed needed to sustain trout food?

Every single reply had to say yes. In retrospect, considering the claims made about grass carps weed eating capacity, the answer had to be obvious.

However, many replies claim that these fish do seriously upset aquatic ecosystems. More, the destruction of vegetation will affect the ecological needs of all other species.

Not true. Nor is there any evidence in N.Z. that trout depend on foods inhabiting weed beds.

In many instances, we are advised that insufficient research has taken place with cold water species such as trout, although several replies advise that grass carp have been detrimental to trout and other species.

Most references were to interference with warm water game fish like bass.

Cont.../3.

What cold water species are referred to here?

not true

3. DO THEY CAUSE EROSION:

Only one reply said no. Another claimed only slight erosion was noticed. It is easy to summarize replies by saying that the removal of weeds exposes the banks to erosion, particularly from wind and wave action. The same type protection given by weeds is eliminated. 90% of replies indicate that yes, erosion does occur.

4. DO THEY CAUSE FOULING:

A great contradiction exists in answers to this question. 50% say yes, is evident however, medium stocking produces cloudy conditions and overstocking creates serious fouling.

Several allegations are made that these fish create a dense mat of harmful seeds and then supplying the nutrients needed to make further weed growth flourish. This does appear likely, as several agencies state that 50%

stocking rates appear to be the answer to this problem and from figures rate and water quality is adversely affected.

5. DO THEY CAUSE A RECREATIONAL HAZARD:

Answers range from doubtful to yes, if accepted by the public. However, 90% say no. Again, an area of very little contradiction.

8. Is it difficult to eradicate these fish?

Answers range from extremely difficult, to impossible. There is not one single reply indicating easy elimination. These fish are described as masters of escape and once they do, it is impossible to undo the damage. Rotenone poisoning is mentioned and it is pointed out that this method also kills other species. Many agencies claim Rotenone poisoning is not practical in areas exceeding 100 acres.

General

We include these observations, as we believe that apart from the question answers, these statements on other aspects of grass carp were unsolicited and therefore, freely given. In themselves, they are a serious indictment against grass carp.

1. It has been established that 37 States or provinces ban these fish. Nearly all have legislation that discoveries of this fish must be reported immediately. Heavy penalties are incurred for illegal transportation.

not evident in F.F.A file. Very few states included legislation in submissions, beyond mention of ban.

Some states, e.g. Missouri, had originally banned grass carp, but were powerless to stop them spreading. Infestation became so prevalent that bans were lifted.

2. A large number of replies claim that waterfowl, particularly duck habitats, are seriously affected by Grass Carp. The effect in some locations, is described as devastating. One claim has it that as a waterweed eradicator these fish create more problems than they solve, especially regarding waterfowl.

not so, no-one mentioned "infestation", one or two "spread" from adjoining states

Cont.../4.

Again, we must refer to the Lower Waikato/Waipā watershed. Surely this is one of New Zealand's best duck shooting areas, as well as supplying sustenance to a great many other species of wild fowl, both native and introduced.

3. There are conflicting claims on the effects of Grass Carp on other fish species. It is generally claimed that Grass Carp are dangerous to nature, fish and wildlife. Others claim trout and bass have suffered adverse effects. One state claims a 10 fold increase in fish product, while yet another claims a 90% reduction in other fish species.
4. Several agencies claim that after weed clearing by these fish, algae blooms occur. These are described as evil smelling and in fact, the weed conditions are to be preferred.
5. A type of tapeworm carried by Grass Carp is mentioned several times.

This is untrue. None of the material abstracted in the F.F.A report supports this statement.

— Was present in N.Z. import but successfully eradicated in the early years

FEDERATION CONTENTION AND POLICY

It is obvious, that despite exhaustive scientific examination, not enough is known about these fish. Uncertainty and conflicting research findings cloud the whole issue. Our M.A.F. is treading on dangerous ground. There is no question that these fish do consume weed, but to claim they can be confined to ponds or drains is ridiculous. Floods or illegal shifting will lead to their spread (remember rudd). No one can guarantee confinement even under ideal conditions. Apparently, birds can accidentally transport these fish. In fact, this means is cited as the reason for the mysterious appearance of these fish in waters where they have never been stocked.

— this is always possible

Many American and Canadian States advise they are searching for the same answers as our Federation. We are advised that millions of dollars have been spent in the U.S.A. trying to eliminate these fish. Unfortunately, they are now in the U.S.A. to stay.

This is quite untrue and refers to European carp.

We contend that the M.A.F. and Acclimatisation could be placing our Trout Fisheries at a grave risk. Trout for example, are not a native to New Zealand. Their proliferation could be paralleled by Grass Carp and of course, have been by rudd already.

To conclude then, our Federation contends that further experimentation with these fish should be ceased forthwith and than on no account should they be released into or kept in any N.Z. waterway be it pond, river or lake.

We strongly recommend that present stocks be destroyed to eliminate what in view of the information we have received, must be considered a very grave risk to our fisheries.

For the N.Z. Federation of Freshwater Anglers.



APPENDIX III. The reply of the State of Wisconsin Department of Natural Resources to the questionnaire of the N.Z. Federation of Freshwater Anglers.

State of Wisconsin / DEPARTMENT OF NATURAL RESOURCES
P. O. Box 2565
Oshkosh, WI 54903, USA

Carroll D. Besadny
Secretary

July 15, 1981

File Ref: 3600

Mr. John F. Giacon, President
New Zealand Federation Freshwater Anglers
10 Glenveagh Drive
Mt. Roskill, Auckland, 4
New Zealand

Dear Mr. Giacon:

Your letter to the Madison office of the Wisconsin Department of Natural Resources regarding the possible release of Chinese Grass Carp, Ctenopharyngodon idella into New Zealand waters has been referred to me for reply.

Your letter contained a series of questions relating to the grass carp. Because Wisconsin is one of 35 of the United States that ban the species, I cannot answer your questions from actual observations. I am sending along several photocopies of articles taken from the Sport Fishing Institute Bulletin that may assist you in your decision.

Wisconsin will not allow introduction of the species until conclusive proof exists that they will not reproduce except in the hatchery or laboratory. I'm sure it seemed like a good idea at the time when German carp were imported into the United States - now, they inhabit and have destroyed many millions of acres of water, and that's the major point I'd like to make: If we could stock a fish, and tell it not to leave that particular body of water - and have it comply, there would be no problem. Unfortunately, they do not accept orders, and move from one body of water to another, and once they are established, it's impossible to undo the damage.

I expect that you will receive two types of letters from the United States. From the dozen or so states that allow stocking of grass carp, you'll receive glowing reports, but remember that they dare not admit that they made a mistake. From the other 35 I suspect that the tone of their letters will be somewhat comparable to mine. Unfortunately, fish do not recognize state lines, and ultimately I'm afraid we'll all have them.

I hope I've been of some help to you. I urge you and your organization to prevent their release into New Zealand waters. If you have outstanding fishing, as I have heard, why break up a winning combination?

Sincerely,
Bureau of Fish Management

(Carroll D. Besadny)
Vern Hacker
Fish Control Specialist

VAH:aep
Enc.

done 9/11

