

THE USE OF GRASS CARP FOR CONTROL OF AQUATIC VEGETATION IN ARKANSAS

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The grass carp (*Ctenopharyngodon idella*) is a very controversial fish in the U.S.A. for a number of reasons, primarily because it is an exotic species. A problem I'm sure many of you here in Australia understand. Unfortunately, the controversy has lingered because it has become an emotional issue rather than one based on factual information and actual experiences. The main problem stems from the fact that this fish is a member of the carp family. The European carp (*Cyprinus carpio*) was imported into the U.S.A. as a food fish in the 1800s and has become a problem from a fisheries management standpoint in many areas of the country. Even though the carp family of fishes is one of the largest and most diverse, anything named carp has become synonymous with the European carp. These two species are as biologically dissimilar as night and day.

The grass carp has become a 'popular' issue, receiving publicity in nationally circulated magazines and newspapers. The opponents of the grass carp have made many sensational claims about the possible detrimental effects of the fish. On the other hand, many of the fish's proponents have added fuel to the controversial fire by labelling it 'superfish' and articles with such quotes describing it 'As wily a game fish as the trout, as scrappy when hooked as the mighty tarpon, and as tasty when cooked as the red snapper. It also has the potential to surpass beef as a source of protein.' Those of us who have had experience with the fish know that neither of these extremes are true.

The scientific community hasn't been much better than the press in this matter. Here, also, there appeared to be two factions. Those that support the 'innocent until proven guilty' theory generally support the use of the fish and those of the 'guilty until proven innocent' opinion are generally against its use. Seemingly endless scientific studies of the grass carp can be quoted and the same findings interpreted as good or bad, usually depending on your point of view at the outset.

The fact is that after over 15 years in the U.S.A. the overriding questions about the effect of the grass carp remain unanswered; i.e., (1) will the grass carp reproduce and overpopulate the waters in this country; and (2) if it does, what will be its impact on the habitat (e.g., speeding up the eutrophication process)? The problem is, these spawning questions don't lend themselves to the cold objectivity of the classical scientific method. We can't predict future weather patterns or the subtle effects the high water years or the 100 year flood might have on the reproductive habits of these fish. Certainly not from laboratory or pond experiments. Nor can we predict their impact with complete certainty on any pond, lake or reservoir. There are so many intricate variables within any isolated aquatic system that they are difficult to enumerate, much less control and predict. Couple this with the many types of aquatic environments and complicate it further by adding in geographic location and the task becomes enormous. Yet this 100 per cent certainty is what many seem to advocate before using the fish. It is the *use* of these fish for vegetation control which I and my agency endorse.

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The Arkansas Game and Fish is a State agency whose sole charge is the stewardship of wildlife and fisheries within the State of Arkansas. The primary objective of my group within that organization, the Fisheries Division, is to *produce the optimum sustained harvest and utilization of the State's fisheries resources for the fishing public* (primarily sport fishing). Grass carp are important to the utilization of the resource by removing choking aquatic vegetation and allowing fisherman access. We found that the use of the grass carp to allow access is not at odds with our goal of managing optimum fish populations for harvest by the fishing public.

The State of Arkansas is an inland State with over 1½ million acres of public surface waters. To this date, more than 100 lakes, totalling approximately 100 000 acres, have been stocked with grass carp for aquatic vegetation control. We also have some of the best and most diversified fishing in the country.

In the late 1960s, Arkansas' experience with the grass carp began on our largest warmwater fish hatchery. Successful artificial spawning methods were developed during the first few years and the fish were used for vegetation control in hatchery ponds with excellent success. Not to say there were not some minor problems; i.e., handling the fish in a seine, but these are of little consequence when compared to attempting to harvest a fingerling or production pond choked with vegetation.

Stocking rates in hatchery ponds range from as low as 10 fish to 1000 fish per acre, depending upon the severity of the problem and the length of time available to achieve control.

After such success on the hatcheries, some very major problems in the State's fishing waters were the next objective. Obviously a lake is not like a pond and in 1969/70 the first lake in Arkansas was stocked with grass carp. This was a topographically isolated lake, man-made and shallow. Results were again excellent for vegetation control and other isolated lakes were stocked over the next couple of years. Vegetation control was achieved in these lakes and no detrimental effects on the fish populations could be determined from regular sampling. Fisherman success remained the same or better (possibly due to better access).

By 1972/73, the grass carp became a routine management tool for the control of aquatic vegetation in Arkansas' lakes and has continued to be since that time.

We have never proposed the grass carp as a sport or game fish, however, it is remarkably good eating. After the fish have reached a suitable size and vegetation is controlled, some lakes are opened to special commercial fishing seasons for removal. This has met with varied amounts of success with the grass carp as the target species. On a statewide basis, in 1976 over 50 000 pounds of grass carp were taken by commercial fishermen and entered the market, however, this is a small percentage out of a total of 6.4 million pounds of commercial fish.

A survey of over 30 lakes, totalling more than 16 000 acres, utilizing population data from five years before to five years after grass carp stocking, show fluctuations of sport fish populations to increase in some cases, decrease in others, and in most remain within the limits established prior to stocking with the grass carp. Grass carp eliminate vegetation but other factors such as water level, fertilization, and weather have a greater effect on fish populations than does the presence of the grass carp.

The only thing widely agreed upon about the grass carp is that they do eat aquatic vegetation. Our experience is that weed removal by the grass carp

produces no noticeable effect other than what would be experienced by weed removal by any other method. We also believe that a tool that can be used for vegetation control with less environmental impact and expense than chemical and other known methods and be recovered as a part of our fishery resource is a valuable asset to our program.

There are two items worthy of noting that have occurred in the U.S.A. in the last year or so concerning the grass carp:

- I. A paper has been published reporting spawning of the grass carp in the Mississippi River. It is based upon the identification of larvae less than 9 mm total length or fish less than 4 to 5 days old. While accepting the difficulty of larval fish identification to species, I am in no way disregarding the researchers' findings. However, the proof of the pudding is survival of these fishes to a size of two inches or more at which time they begin feeding on vegetation. This has not been verified. Based on my knowledge and experiences from artificially spawning these fish, I remain unconvinced that they will be successful enough at reproducing and survival so as to become a dominant species. The question of whether or not the fish will become a problem after 15 years in the wild remains unanswered.
- II. Also, we have duplicated work reported from the Hungarian literature and produced a hybrid from the female grass carp and the male bighead carp. The offspring have a triploid chromosome number and are reportedly sterile. We have only had the fish available for one year and have not fully determined their efficiency at controlling aquatic vegetation. Also, these fish must be four years old before reaching maturity. Therefore, the jury is still out on whether a sterile fish capable of controlling aquatic vegetation is available.

Granted there is much we don't know about the fish, but where does it all end? We can spend years constructing the most complete model possible that can predict with 99.9 per cent accuracy, but in the end the final step is to stock the fish and see if our predictions are correct.

It seems to me that the issue is to determine if the possible or known value of the fish outweigh the possible or known detrimental effects. That decision is further complicated and influenced by the primary use of the water involved. We have been primarily involved with sport fishing, fish production, and irrigation or drainage, but what about boating or other recreational activities, aesthetic qualities, power production, and a multitude of industrial uses? Whatever your perspective toward water use, one overriding problem that spans all uses is nuisance aquatic vegetation control and a satisfactory method of controlling it is essential.

When the decision is made to remove aquatic vegetation, it is my opinion that the grass carp provides the least detrimental impact on the environment, at the least cost, with long lasting control, and, therefore, is the method of choice.