SHOULD MONTANA INTRODUCE GRASS CARP TO CONTROL AQUATIC WEEDS?

Talk given by George D. Holton, Montana Department of Fish and Game at Montana Academy of Sciences Meeting, Western Montana College, Dillon, 4/21/79

Positive identification has not been made, but it appears Eurasian watermilfoil has somehow established itself in Georgetown Lake. This lake, ringed with campgrounds and summer homes supports some 80,000 fisherman visits a year plus other water centered recreation, and supplies water for the Anaconda Company smelter in nearby Anaconda. Finding this plant comes as a shock, for Eurasian watermilfoil (Myriophyllum spicatum) is one of the terrors of the aquatic weed world. It looks very much like our native Myriophyllums or watermilfoils.

Inadvertently brought to the east coast about 30 years ago from Europe or Asia, Eurasian watermilfoil has been a scourge in eastern waters and recently a problem in central Washington and adjacent British Columbia. But we had no idea until a few months ago that it had reached our state.

Eurasian watermilfoil is an aquatic weed that grows from the bottom of lakes or river rapidly reaching the surface. It grows in clumps or patches and can cover an entire lake. It spreads by means of fragments which break off, float to new locations, take root and start new colonies. It is usually found in water less than 20 feet deep. When established in colonies it creates breeding environments for misquitoes, fouls propellers of motorboats, tangles fishing lines, ruins swimming and waterskiing and limits other water uses. Dense beds may even be dangerous to swimmers and waterskiiers.

Eurasian watermilfoil or not,[1/] home owners and concessionaires on Georgetown Lake are understandably concerned about the aquatic weed problem in the lake and although an in-depth study on nutrient sources and methods of reducing them has been proposed there is a push for more direct action. A house-joint resolution was introduced into the recent legislative session urging the Montana Department of Fish and Game to study the feasibility and practicability of introducing the white amur or grass carp, a weed eating Asian fish, into Georgetown Lake. The resolution did not pass, however, we in the Department of of Fish and Game feel it would be well to take a hard look at the pros and cons of the grass carp as a tool in aquatic weed control. By law the Montana Department of Fish and Game can control the use of grass carp since a state statute provide "it is unlawful for any person to transplant or introduce any fish or fish eggs into any body of water in the state . . . without first having obtained authorization from the Department".

The grass carp (Ctenopharyngodon idella) is either the largest or one of the largest members of the minnow family (family Cyprinidae) and may attain a maximum length and weight of 4 feet and 100 pounds; most are smaller - 15 to 40 pounds. They are native to river of China

1/ Determined in late spring 1979 not to be Eurasian watermilfoil but a native species.

and Siberia that drain into the Pacific Ocean - that is, they are found in latitudes equivalent to those of the 48 states, half of Mexico and part of Canada. They have been used for pond culture in a number of Asian countries and have been introduced into Israel, several European countries including Great Britain, and into New Zealand. Grass carp from Malaysia were introduced into the United States in 1963 by the U. S. Fish and Wildlife Service to the Fish Farming Experimental Station, Stuttgart, Arkansas for research in aquatic weed control. Arkansas planted them widely and private operators now offer them for sale nationwide. Although 35 states prohibit the importation and release of grass carp into their waters they are now resident in the Mississippi, Ohio and Missouri Rivers. Since they have already reproduced in Mexican rivers they are expected to do so in the Mississippi and its tributaries.

Grass carp can withstand water temperatures from 32 to over 90 degrees F. and oxygen concentrations as low as ½ ppm. Spawning generally takes place in the center of large rivers with currents 2 to 5 feet per second; usually just below extensive rapids. It takes place with a rising water level when water temperatures are above 68 degrees F. Grass carp take five to nine years to become sexually mature and a large female may contain a million eggs.

The digestive tract of the grass carp is extremely short for a principally herbivorous fish; about half the food passes through undigested. Opponents of the fish claim that this fecal material adds to the problem of overfertilization. Proponents point out it cannot be considered merely waste material since it provides food for organisms further down the food chain and in some instances has been reported to promote vigorous plankton populations. Due to the incomplete digestion grass carp must consume large quantities of food and under favorable conditions an individual will eat more than its weight of plant material in a day. This explains their effectiveness in controlling aquatic vegetation. They begin to consume plants at about 53 degrees F; intensive feeding starts at 68 degrees F. Young grass carp commence feeding on zooplankton and phytoplankton shortly after emerging from the egg. Later they add other invertebrates such as midge larva. The animal constituent of their diet is replaced by vegetation before they reach two inches in length. This change does not occur rapidly and there is some doubt as to whether it is ever complete. Nevertheless, the adult is almost exclusively vegetarian.

Their flesh contains 50 to 75 percent protein. This plus the fish's low position in the food chain makes it one of the most efficient sources of meat protein. The meat has an excellent flavor and texture but many floating rib bones. It is a well known food fish in the Far East.

If control of grass carp were to become necessary it would be difficult. They are hard to net or trap and usually jump over seines. Chemical control of undesired populations in limited areas is feasible, however, it would be expensive since tests indicate they are approximately as resistant as the common carp to Antimycin and rotenone, the usual chemicals used in fish control projects.

The advantages of stocking grass carp are: 1. When stocked in sufficient densities they may serve as an effective control of certain noxious aquatic plants. 2. Effective vegetation control, if realized, will eliminate the need for potentially hazardous chemical control. 3. Grass carp can turn problem vegetation into palatable fish flesh and may become an attractive sport fish.

Disadvantages are: 1. Young grass carp compete directly with young of game fishes since both feed primarily on invertebrates. 2. Adult grass carp may compete indirectly with native fish species by removal of aquatic vegetation needed for cover by them, their young and by invertebrate fish food organisms. 3. There is a risk of grass carp exploiting native aquatic vegetation used for food and cover by waterfowl, furbearers and other native species of wildlife. 4. Grass carp may aggravate the problem of eutrophication in many of our waters by recycling nutrients that would otherwise be bound in aquatic plants. 5. Grass carp harbor a large variety of fish parasites not now found in North American waters.

There are examples supporting both proponents and opponents: Arkansas has grass carp in over 100 lakes totalling over 50,000 acres and feels aquatic weeds are under control without detriment to sport fisheries.

Iowa has tried grass carp for weed control with good results in Red Haw Lake, a small lake. Weeds were controlled and sport fishing improved. I have heard, grass carp were overstocked in another Iowa lake and aquatic weeds were replaced with algae blooms.

A study on the use of grass carp in Florida showed a 90% reduction in shallow water fishes that was linked to the reduction in shallow water vegetation, and in another Florida lake grass carp fed on waterfowl food plants rather than the plants causing problems in navigation and sport fishing.

So where do we stand? Montana has an aquatic weed problem although not an extensive one. Control with chemicals can cause environmental problems and is expensive, often prohibitively so. Manual control with weed cutters is a solution only for small areas, for example, in swimming areas or in front of docks. And since many aquatic plants reproduce by fragmentation, cutting aquatic weeds may intensify the problem.

We biologists recommend preventative measures such as eliminating shallows and keeping nutrients out of ponds, and instead of weedicides would usually prefer biological controls. Yet the history of introductions of plants and animals into North America is filled with disasters like the common carp and the starling. We must consider, too, that Montana lies astride the Continental Divide and a fish species planted in the headwaters of the Columbia River, for example in Georgetown Lake, could move downstream into important salmon waters. It is anticipated that grass carp would spawn in the Columbia and its main tributaries.

Incidentally, grass carp are getting close to our borders for they have been planted in Spiritwood Lake, in eastern North Dakota, and Colorado State University at Fort Collins is working with them in experimental ponds.

The philosophy of department fisheries biologists has been that we should not introduce a new species unless the prospects for benefits are very high and the prospects for harm very low. We do not believe that planting sexually viable grass carp meets this criterion.

Use of monosex populations of grass carp is a promising tool but results in developing such fish are at this time too preliminary to justify stocking them in open water systems. And even with "guaranteed" monosex populations there is a possibility, however small, of spontaneous sex reversal. Even if we satisfy ourselves on this score it seems our use of grass carp would be limited, for aquatic vegetation is beneficial in many waters and many of our waters that have vegetation problems are probably too cold for grass carp to be effective in weed control.

In making a decision on grass carp there is a lot at stake for Montana and, if we were to introduce them west of the Continental Divide, for the Columbia River drainage. It seems wisest for us to stick by our "wait and see" policy a bit longer.