

Delaware Division of Fish & Wildlife

Policy on the Use of Grass Carp for Aquatic Weed Control

Background

An over-abundance of aquatic weeds has become the most serious problem in Delaware's ponds. Most public ponds have been classified as highly eutrophic (high levels of nitrates and phosphates) indicating that aquatic weed abundance will be a long-term problem (Ritter 1981). Owners of private ponds have also reported problems with aquatic weeds and advice on weed control has become the most common request for technical assistance.

Three types of aquatic weed control are available to the pond owner: physical, chemical, and biological. Each method has both advantages and disadvantages that must be evaluated prior to selecting the most appropriate method for controlling aquatic weeds in any pond. Mechanical or physical removal of plants from a pond has the advantage of removing those nutrients bound in the plant material. However, it can be physically demanding to hand-pull plant material and is only practical in small ponds. The Division has a large aquatic weed harvester used in the public ponds, but it is relatively slow and most effective on floating mats of filamentous algae. A water level drawdown during the winter or partial draining of a pond to freeze and dry out plant material are useful forms of control for some species. However, these methods can be labor intensive, slow to achieve control, and often do not permanently remove the plant species. The use of herbicides is generally the quickest way to control aquatic weeds, but there are limited products on the market and each controls only specific aquatic weeds. Herbicide treatments are often short-term, expensive, and can limit other uses of a pond such as irrigation, livestock watering, or swimming.

Biological controls have some advantages over the use of other methods: longevity of the method once it has become established, constant cropping of the problem weed, minimal impact on non-target organisms, and lower cost. The development of the triploid grass carp (*Ctenopharyngodon idella*), a functionally

sterile form of a plant-eating fish, encouraged many states to allow use of this species for aquatic weed control. However, this method also has some disadvantages. The species has preferred food items, control often takes 18 months or more after stocking, and removal of plant species can adversely affect the habitat of typical pond fishes such as bluegill and largemouth bass. Occasionally removal of the target plant species results in a change in the plant community to algae blooms or a rooted aquatic plant that grass carp will not eat. Therefore, this plant-eating fish is one tool for weed control that can be useful in certain ponds.

The Division has allowed possession of grass carp for weed control since a permitting procedure was established in January 1990. Permits have been granted to pond owners whose ponds meet specific criteria developed by the Division following a review of scientific research and an evaluation of the species in Delaware waters. Permits have been and will continue to be granted only for triploid (functionally sterile) grass carp, certified as such by the U.S. Fish and Wildlife Service or by another agency approved by the Division.

Policy Guidelines

Permits for the possession of triploid grass carp will be granted to private pond owners whose ponds meet all of the following criteria:

1. The target aquatic plant is abundant over at least 40% of the pond's area and the target plant species has been documented as being consumed by grass carp (Table 1).
2. The pond is not a stormwater management basin. Stormwater basins are designed to hold water following storm events and improve water quality prior to release into any waterway. Triploid grass carp will not be allowed in any stormwater retention pond as their presence may adversely affect the designated function of these water control features. In the event that vegetation causes problems within these basins, the owner(s) of the basin shall work with personnel from the Division of Soil and Water Conservation (302-739-9921) to address the situation.

3. The emigration of grass carp from the pond can be prevented by acceptable physical barriers (openings no larger than one inch) which are in place prior to stocking. Any barrier required as part of a permit to possess grass carp must be regularly maintained to prevent the build-up of plant material or other detritus that could endanger the integrity of the structure.
4. For any pond larger than 10 surface acres, this barrier will have to be a permanent addition to the water control structure with the ability to remain intact during periods of high flow such as a 100-year flood. It must be constructed of materials with a life span of structural integrity of a least three years and openings no larger than one inch. Written permission for the installation of a fish barrier that may impact roads and/or bridges downstream of any pond must be obtained from DeIDOT and included with the application for a grass carp permit.
5. Division personnel shall be granted access to the pond, upon request, to evaluate the effectiveness of the grass carp stocking.
6. The Division will not permit the stocking of any grass carp into any areas known to contain rare, threatened, or endangered plants or animals on Federal or Delaware lists; any designated natural area; or any freshwater marsh or legally defined wetland.
7. As a signatory to the Chesapeake Bay Policy for the introduction of non-indigenous aquatic species, the Delaware Division of Fish & Wildlife modified its grass carp policy in October, 1995 to address concerns of those groups, including the Maryland Department of Natural Resources, promoting the re-establishment of submerged aquatic vegetation in the Chesapeake Bay. Amendments to the grass policy include:
 - a) There will be a moratorium on the introduction of triploid grass carp into systems that drain directly into Chesapeake Bay tributaries.
 - b) For ponds that are within the floodplain, but have no direct connection to the Chesapeake Bay Drainage streams, a triploidy check of 100% of all grass carp stocked will be required.

c) For New Castle County ponds having a direct connection to Delaware River streams, a 100% triploidy check will be required.

d) Triploid grass carp stocked into Kent and Sussex County ponds within the Delaware River drainage are subject to the standard certification procedures of the U.S. Fish and Wildlife Service (120 fish checked per shipment). New Castle County ponds having no direct connection to Delaware River streams will also be subject to the standard certification procedures of the U.S. FWS.

e) Any additional charges resulting from the 100% triploidy checks of grass carp shall be the responsibility of the permit-holder.

8. The stocking rate for triploid grass carp is limited to fifteen fish (8 to 11 inch) per surface acre of pond. It is recommended that grass carp no smaller than 10 inches be stocked into ponds with established populations of largemouth bass and/or chain pickerel to limit predation on the stocked fish.

Permitting Procedures

Upon receipt of the original request from a landowner or legal representative, an informational packet will be provided containing the grass carp policy, the grass carp briefing report, and a permit application. Following return of the signed application, signifying agreement with the policy and the desire to proceed with the application process, a site inspection of the pond will be made by a Division biologist to determine if the aquatic weed species and coverage meet the policy guidelines. The inspection also will determine if any modifications to the water control structure are necessary to prevent the escape of grass carp. If the pond meets the above criteria, a permit for a specific number of grass carp will be granted and signed by the Director of the Division of Fish and Wildlife, contingent upon the necessary modifications to the water control structure. A follow-up inspection may be required to verify the completion of any alterations prior to ordering, shipment, and stocking of the triploid grass carp.

The Division must be notified prior to any shipment of triploid grass carp to Delaware by the permittee or vendor. Each permit-holder will be furnished with a list of approved triploid grass carp dealers and should contact an approved dealer to determine the shipping date and verify certification of the shipment by the U.S. Fish and Wildlife Service. A copy of the Certificate of Triploidy and the shipping invoice must be forwarded to the Division for inclusion with the permit application file. The Division may seize any shipment of fish not accompanied by a Certificate of Triploidy from the U.S. Fish and Wildlife Service. The fish dealer shall ship the triploid grass carp directly to the buyer according to the arrangements agreed upon between the dealer and the permittee. The Division will assume no responsibility for guaranteeing live transport and delivery, survival at stocking, or effectiveness of the stocked fish.

Special Considerations with Grass Carp

It is important to remember that aquatic vegetation control with triploid grass carp is not guaranteed and may take an extended period of time. If the desired result (weed coverage reduced to less than 40%) is not achieved following two growing seasons, a permit for supplemental stocking may be granted by the Division via the same process as for the original stocking or the use of another control method may be recommended. Although some types of floating plants are on the approved list (Table 1), control is generally less successful. Control of algae has also been variable depending on the species involved. Occasionally, control of the target aquatic weed by the grass carp allows another plant species, less desirable to grass carp, to take over the plant community in the pond (Cassani 1996).

Triploid grass carp will live for many years in a pond. However, restocking may be advisable in five to seven years as their feeding efficiency declines with age. Division personnel have learned that once grass carp are stocked, they are very difficult to capture. The only totally effective method for removal of grass carp is to rotenone (poison) the entire pond. This fact alone necessitates a cautious, well-planned approach to stocking. Observations at several Division

research ponds have indicated that predation on grass carp by birds and other predators can be a problem in maintaining adequate numbers of fish to provide weed control. Please remember that fish-eating migratory birds such as herons, ospreys, and eagles are protected by Federal and State laws.

Results with grass carp have been variable, ranging from no control to total eradication of aquatic vegetation. It is important to realize that total elimination of aquatic weeds can adversely affect gamefish populations. Therefore, it is the Division's policy to promote weed control practices that achieve a desired level of control short of total eradication. The stocking guidelines herein are based on our current state of knowledge, but may be adjusted as we gain more experience with the use of these herbivorous fish as a form of biological control of nuisance aquatic weeds.

May 2005

Literature Cited

- Cassani, J.R., editor. 1996. Managing aquatic vegetation with grass carp, A Guide for Water Resources Managers. American Fisheries Society, Bethesda, MD.
- Clugston, J.P. and J.V. Shireman. 1987. Triploid grass carp for aquatic plant Control. U.S. Fish & Wildlife Service Leaflet 8. Washington, D.C.
- Ritter, W.F. 1981. Survey and classification of Delaware's public lakes. University of Delaware for Division of Fish & Wildlife (EPA). Newark, DE.
- Wiley, M.J. and R. W. Gorden. 1984. Biological control of aquatic macrophytes by herbivorous carp. Part 1. Executive Summary. Final Report Federal Aid Project F-37-R. Illinois Natural History Survey, Aquatic Biology Technical Report 1984 (10).

Table 1. List of plant species Consumed by grass carp.

Algae	Floating Plants (limited control)
<i>Cladophora</i>	Duckweed (<i>Lemna</i> sp)
<i>Pithophora</i>	Watermeal (<i>Wolffia</i> spp)
<i>Chara & Nitella</i>	
<i>Rhizoclonium</i>	
<i>Spirogyra</i> (mixed results)	

Submerged plants

- Coontail (*Ceratophyllum* spp)
- Pondweeds (*Potamogeton* spp)
- Naiad (*Najas* spp)
- Watermilfoil (*Myriophyllum* some species)
- Waterweed (*Elodea* spp or *Egeria densa*)
- Hydrilla (*Hydrilla verticillata*)
- Eelgrass or wild celery (*Vallisneria americana*)
- Widgeon grass (*Ruppia maritima*)
- Liverwort (*Riccia* spp)

From: Clugston and Shireman 1987
Wiley and Gorden 1984
Grass carp permit files (Delaware 1990 to 2005)