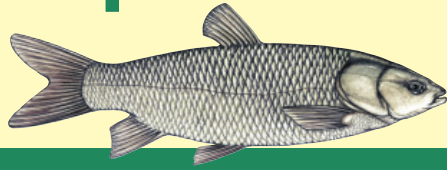


Pond Owner's Guide to the Use of Triploid Grass Carp in Pennsylvania



**By Andrew L. Shiels and Mark A. Hartle
Pennsylvania Fish & Boat Commission**

The grass carp, or white amur (*Ctenopharyngodon idella*) is a large member of the minnow family native to the lower Amur River, which flows through Siberia and rivers in China. Worldwide, grass carp have been introduced into more than 20 countries. The U. S. Fish & Wildlife Service first imported grass carp into the U.S. in 1963 for study. Since then, grass carp have been intentionally released into the waterways of at least 35 states as a means of biological aquatic vegetation control. On January 1, 1994, it became lawful to import, transport, possess, and introduce triploid grass carp into Pennsylvania waters under very specific regulations and permit procedures. It is unlawful to propagate grass carp, diploid or triploid, in Pennsylvania.

Triploid and Diploid

In 1981, researchers developed a method to create sterile, non-reproducing grass carp by exposing the fertilized eggs to heat shock. This process results in fish of both sexes having three sets of chromosomes (triploid) instead of the normal two sets of chromosomes (diploid). Thus, sterile grass carp produced by this process are referred to as "triploid grass carp." The U.S. Fish & Wildlife Service has established a testing and inspection program to ensure the integrity of triploid grass carp that are destined for importation into states like Pennsylvania that prohibit the introduction of diploid grass carp. Diploid and triploid grass carp cannot be identified by their external appearance. Determination of the fertility or sterility of grass carp occurs by analyzing a drop of blood taken from the fish. U.S. Fish & Wildlife Service inspectors conduct routine testing at the fish farmers' production sites and furnish written certification of triploid condition to the transporter and appropriate officials in each state.

Biology

Triploid grass carp resemble a large creek chub in appearance. They do not exhibit the spiny dorsal and anal fin rays or "chin" barbels that are found on common carp.

Triploid grass carp possess specially developed pharyngeal bones that perform like teeth and let them tear free and grind aquatic plants. Triploid grass carp can tolerate a wide variety of environmental conditions, however, they thrive in warm water. Generally, triploid grass carp will begin to consume aquatic vegetation whenever water temperatures exceed 52°F. Maximum aquatic vegetation consumption and triploid grass carp growth in Pennsylvania will occur during late spring through summer at water temperatures ranging from 68°F. to 90°F. Latitude, water temperature, food availability, and age determine maximum growth. Triploid grass carp are usually effective for seven to eight years and can reach weights of 25 pounds or more.



Vegetation Control

After reaching 2 inches in length, triploid grass carp feed almost exclusively on aquatic vegetation. Although they may consume many different kinds of aquatic plants, triploid grass carp prefer finer-leaved submerged aquatic vegetation and small floating plants like duckweed (*Lemna* spp.). Preferred food includes pondweeds (*Potamogeton* spp.), naiads (*Najas* spp.), common elodea (*Elodea canadensis*), coontail (*Ceratophyllum demersum*), and muskgrass (*Chara* spp.). Triploid grass carp do not prefer plants such as spatterdock (*Nuphar* spp.), cattail (*Typha* spp.), water lily (*Nymphaea*), or species of filamentous algae. They will eat algae in the absence of preferred food.

Triploid grass carp can be very effective at controlling unwanted aquatic plants. However, subsequent defecation of consumed plant material causes a recycling of nutrients in the water. Reduction in the submerged leafy plants coupled with changes in water chemistry and nutrient availability can result in phytoplankton (algae) blooms that color water green or brown. Therefore, although the larger plants may have been controlled or removed, a decrease in water clarity may occur after triploid grass carp introduction.

Aquatic herbicides may be used in combination with triploid grass carp to provide an extra measure of control when plants are extremely prolific. This chemical and biological combination should not be used routinely and it should be noted that grass carp are sensitive to copper, the most common active ingredient in algae control products. A joint Department of Environmental Protection/Fish & Boat Commission Permit for Use of an Algicide, Herbicide or Fish Control Chemical is required for use of an algicide or herbicide.

Stocking

Ideally, triploid grass carp should be stocked at a rate that will allow a gradual decrease in aquatic plant coverage to about 25 percent of the pond's surface area. To promote the prudent use of triploid grass carp and to prevent overstocking, permits to stock triploid grass carp in a specific pond or lake will not be issued unless at least two years have passed since the last stocking.

Triploid grass carp are generally available from the fish producers in sizes ranging from 8 inches to 11 inches. Pond owners are advised to purchase triploid grass carp of no less than 8 inches in length. Loss to predation (particularly from largemouth bass) can be reduced considerably by stocking triploid grass carp at least 12 inches long. Predation by birds can also be significant in small ponds. Pond outlets must be screened to prevent triploid grass carp from escaping. An effective screen can be constructed from round steel rods placed horizontally at one-inch intervals on vertical supports. This will prevent triploid grass carp of at least 8 inches in length from escaping. A photograph of the screen or grate must accompany your permit application.

To obtain the most effective plant control, triploid grass carp should be stocked during late spring when aquatic plants begin to flourish and when

water temperatures are conducive to feeding. The stocking rate can range from one to 15 fish per acre depending on the type and density of aquatic plants. The Commission will not approve permits for stocking more than 15 triploid grass carp per surface acre of pond or lake.

Permits

Possession, importation, and transportation of triploid grass carp in Pennsylvania are regulated by a permitting process to ensure the proper use of these sterile fish. The Commission maintains a list of approved and permitted dealers of certified triploid grass carp for import into Pennsylvania. The list is available on the following page and online at www.fish.state.pa.us under forms.

Pond Owners

Pond owners who wish to stock triploid grass carp in ponds of 5 acres or less must complete and submit a **Triploid Grass Carp Pond Owner Stocking Permit Application** with the \$20 permit fee. Ponds greater than 5 acres and, in instances where there is an increased potential of adverse environmental impacts, require an Environmental Inspection Report to be completed and submitted with the Triploid Grass Carp Pond Owner Stocking Permit Application. The report must be completed by a qualified biologist, environmental scientist or environmental consulting firm. In cases where an Environmental Inspection Report must be completed, a notice of the Triploid Grass Carp Pond Owner Stocking Permit Application will be published in the *Pennsylvania Bulletin* to invite public comment. The Commission will not be conducting routine environmental inspections for the purpose of stocking triploid grass carp. However, a list of environmental inspectors who have presented their credentials to the Commission is available on request. You should allow 40 days for processing of your triploid grass carp permit application and 60 days for those permits requiring an Environmental Inspection Report and notice in the *Pennsylvania Bulletin*.

After receiving a stocking permit, a pond owner can then legally purchase and stock triploid grass carp into his or her pond. When fish are purchased, the appropriate permit copy must be completed with the number of fish purchased, date, and dealer information, and returned to the Commission within 10 days of stocking.

Pennsylvania Fish and Boat Commission

Approved Triploid Grass Carp Dealers

The following dealers have received permits from the Pennsylvania Fish & Boat Commission to import, transport, and sell triploid grass carp in Pennsylvania. Only individuals or companies pos-

sessing the proper valid permits from the Commission can transport, distribute, or sell triploid grass carp in Pennsylvania. Triploid grass carp can only be purchased from Pennsylvania Fish & Boat Commission Approved Dealers. This list is the most current information available at time of publication.

Angelo Trout Farm

John A. Angelo
181 Rogers Mill Rd.
Normalville, PA 15469
(724)455-3385

Hopper-Stephens Hatcheries

Janet M. Smith
989 Johnson Road
Lonoke, AR 72086
(501)676-2435

Mid-Atlantic Stocking, LLC

Alexander Weisz
21 East A. Street, Unit 2
Brunswick, MD 21716
(607)592-1376

B-C Bait Inc.

Kathy L. Sterling
861 Indian Hill Rd.
Lehighton, PA 18235
(610)377-5131

J. M. Malone and Sons Inc.

Jim B. Malone
P.O. Box 158, Hwy. 31 S
Lonoke, AR 72086
(501)676-2800

Musky Trout Hatchery

Vernon Mancini
279 Bloomsbury Road
Asbury, NJ 08802
(908)479-4893

Fenders Fish Hatchery LLC

Dennis E. Fender
50527 T R 220
Baltic, OH 43804
(740)622-0681

Jones Fish Hatchery & Dist., Inc.

Robert P. Jones
3433 Church Street
Newtown, OH 45244
(513)561-2615

Rainbow Head Farms

Michael Nardella
309 John St.
Clarksburg, WV 26301
(304)783-5025

Fish Haven Farm

Richard G. Musa
978 Owego Rd.
Candor, NY 13743
(607)659-3474

Keo Fish Farms, Inc.

Martha Melkovitz
P.O. Box 166, 6444 Hwy.
Keo, AR 72083
(501)842-2872

Raup Fisheries

Vaughn L. Raup
21504 N. Norrisville Road
Conneautville, PA 16406
(814)587-6090

Frey's Fish Ponds

Mark W. Frey
820 Pine Hill Road
Gulph Mills, PA 19406
(610)995-2700

Kurtz Fish Hatchery

Richard A. Kurtz
153 Isabella Road
Elverson, PA 19520
(610)286-9250

Schultz's Fish Hatchery

Kevin L. Schultz
1756 Hamlin Highway
Lake Ariel, PA 18436
(570)226-7494

Hilltop Hatcheries

George Kirik, Jr.
12150 Route 6
Corry, PA 16407
(814)664-8560

Marlows Fisheries & Pond

Mike Marlow
6340 State Route 555
Little Hocking, OH 45742
(740)989-5812

Tilly's Nursery Inc.

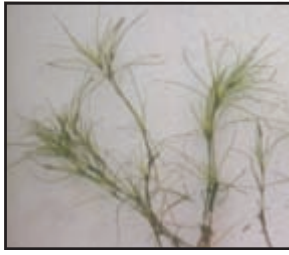
Thomas Tilley
111 E. Fairmount St.
Coopersburg, PA 18036
(610)282-4784

Plants Preferred by Grass Carp

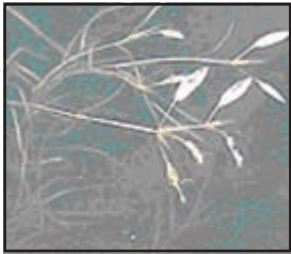
Pondweeds (*Potamogeton* spp.)
 Common elodea (*Elodea canadensis*)
 Coontail (*Ceratophyllum demersum*)
 Naiad (*Najas* spp.)
 Duckweed (*Lemna* spp.)
 Watermeal (*Wolffia* spp.)
 Chara or Muskgrass (*Chara* spp.)
 Watermilfoil (*Myriophyllum* spp.)
 Bladderwort (*Utricularia* spp.)
 Water-stargrass (*Heteranthera dubia*)



A thin-leaved pondweed



Naiad, brittle leaves in tufts



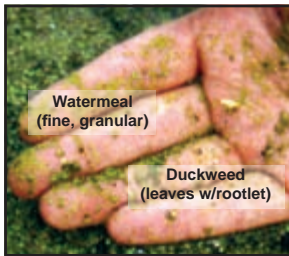
A floating-leaved pondweed



Curly-leaf pondweed



Common elodea



Watermeal & Duckweed



Coontail



Chara, a branched algae



Bladderwort, note sacs



Eurasian watermilfoil

Plants not Preferred by Grass Carp

Filamentous algae (various species)
 Large-leaf pondweed (*P. amplifolius*)
 Cattail (*Typha* spp.)
 Bulrush (*Scirpus americanus*)
 Arrowhead (*Sagittaria* spp.)
 Burreed (*Sparganium eurycarpum*)
 Watershield (*Brasenia schreberi*)
 White water lily (*Nymphaea odorata*)
 Spatterdock (*Nuphar* spp.)



Filamentous algae



Watershield



Large-leaf pondweed



White water lily



Cattail



Spatterdock





COMMONWEALTH OF PENNSYLVANIA
FISH AND BOAT COMMISSION

TRIPLOID GRASS CARP POND OWNER STOCKING PERMIT APPLICATION

(FEE = \$20.00)

Make checks payable to: "PA Fish and Boat Commission"

Submit one copy of the completed application for each water body to the Pennsylvania Fish and Boat Commission, Division of Environmental Services, 450 Robinson Lane, Bellefonte, PA 16823, Telephone (814) 359-5147. This application will be reviewed by the Pennsylvania Fish and Boat Commission (PFBC) and if acceptable, a permit will be issued under the PFBC Fishing and Boating Regulations, 58 Pa. Code, §71.7.

A. Applicant Information (if completing on behalf of a corporation, association or club, that entity is the applicant)
1. Name of Applicant (owner or lessee):
2. Daytime Telephone:
3. Home Telephone:
4. Address - Street:
City: State: Zip code:

B. Water Body Information
5. Name of Water Body: Type of pond/lake: [] Natural [] Man-made
6. Location: County (name) Municipality (name):
7. Is the applicant the owner or lessee of all the land on which this water body is located? [] Yes or [] No
8. Surface area of lake or pond: acres Maximum depth: feet Average depth: feet
9. Is your pond or lake created by a dam that is regulated by DEP? [] Yes or [] No
10. Water source (check one): [] Runoff [] Well [] Spring [] Stream (name): [] Other (specify): Outlet: [] None [] Spillway [] Standpipe
11. Name of the nearest water body that would receive water flowing from your lake or pond.
12. Principal water body uses:
13. Have grass carp been stocked in this water body in the past? [] Yes or [] No
14. Describe the measures or devices that will be used to prevent the escape of triploid grass carp.
15. Required -- Attach a sketch map and directions from a named or numbered road so we can locate the water body.

C. Aquatic Vegetation Information
16. Describe plant problems:
17. List plant species and their respective % surface coverage:
18. Describe other methods of aquatic plant or algae control employed in the past:

D. Applicant Certification
19. The applicant: (a) understands that the Fish and Boat Commission makes no representations as to the effectiveness of Triploid Grass Carp in any particular situation and that the applicant is responsible for consequences of such use, (b) understands that if a permit is issued, the permittee must obtain triploid (sterile) grass carp from a PFBC approved source of supply, and(c) certifies the truth of the above statements.
Applicant Signature: Date:
Name (print):
Title (if applicable):

CHECKLIST AND INSTRUCTIONS FOR TRIPLOID GRASS CARP POND OWNER STOCKING PERMIT APPLICATION

General Instructions

These instructions will improve your ability to submit an application that is clear and complete. The Fish and Boat Commission encourages you to work through the checklist first, and then contact us at (814) 359-5147 if you have any questions. We will review your application to determine if triploid grass carp are an appropriate means to control vegetation and how many may be stocked. A permit will be mailed to you within approximately 40 days after receipt of an acceptable application.

A complete permit application consists of the following items. Incomplete or unclear applications will be returned.

- 1) One completed permit application form for each water body in which you intend to stock triploid grass carp.
- 2) A check or money order for \$20.00 payable to "PA Fish and Boat Commission" for each permit application.
- 3) A photograph of the pond showing a detail of the installed containment device.
- 4) Directions and a map so that we can locate your pond.

Specific item instructions and checklist (Numbers correspond to numbered items on the application form)

Section A. Application Information

- ___1. Indicate the name of the person or group responsible for the water body where stocking of triploid grass carp is proposed. You must own, lease, or have legal authorization from the owner(s) to request a permit.
- ___2. Provide a daytime telephone number where a responsible person may be contacted.
- ___3. Provide a home telephone number or a second contact if no one is available at the daytime telephone number.
- ___4. Provide the legal address where you may be contacted and where you would like the permit to be sent.

Section B. Water Body Information

- ___5. What is the name of your water body? If unnamed, simply indicate "Your last name Pond". Check the box for *Natural* or *Man-made* (i.e., a dam) lake or pond.
- ___6. Write in the county and municipality where the water body is located. We realize this may differ from your address.
- ___7. Check *Yes* or *No* to indicate if the water body is entirely within the applicant's property boundaries. If the answer is "No", then all other landowners must complete sections A and D of an application copy. These copies must accompany the permit application. No additional fee required.
- ___8. What is the total surface area, in acres? This is an important measurement that directly affects the number of triploid grass carp that may be stocked. Do not provide a range or indicate an approximate measurement. If your pond/lake is over five surface acres, additional requirements apply – see "Additional Information" below.

Helpful hints: 43,560 square feet = 1 acre. Area of circle = $3.14 (\text{radius})^2$, Area of rectangle = Length X Width, Area of triangle = $0.5 \times \text{base} \times \text{height}$ (base is usually the distance across the dam, height is the pond length).

Enter the maximum depth and the average depth of your pond/lake in feet. Depth measurements may be necessary.

- ___9. Is your pond/lake regulated by the Department of Environmental Protection under the Dam Safety and Encroachments Act, phone DEP's Dam Safety Division at (717) 787-8568 for information, or visit www.dep.state.pa.us, keyword: Dam Safety, before ANY device is installed on a dam or its outlet.
- ___10. What is the source of water for your lake or pond? Choose as many as applicable from the selections named. If you select "stream", enter its name. If you select "other", describe the water source in the space provided. Indicate the type of outlet (s) where water leaves the pond or lake, even if only during very wet conditions.
- ___11. Name the stream that will directly or eventually receive water from your lake or pond, even if it is only during the most severe storm. If the stream is unnamed, indicate, "Unnamed tributary to next stream with name Creek". Our intent first is to

determine where grass carp would go if they escape, second, to help locate your pond, and third, to examine characteristics of downstream waters. Even if the water soaks into the ground, name the watershed in which your pond is located.

- ___12. Indicate the primary use of your water body.
- ___13. Indicate (Yes or No) if triploid grass carp have been stocked previously. If "Yes", write in the permit number, if known, the year triploid grass carp were stocked. Indicate how many of the carp that were stocked remain, to the best of your knowledge.
- ___14. What measures or devices will be used to prevent escape of triploid grass carp? **Containment of triploid grass carp is our primary concern.** It is the policy of the Fish and Boat Commission that waters leaving the pond or lake must be screened to prevent escape of triploid grass carp. The screen is to be constructed of bars or grating with one inch vertical spacing. Any device installed on a regulated dam or its outlet structure must be approved by DEP BEFORE installation. Attach a copy of DEP's approval letter with this application, if applicable. Provide a detailed description of the device that will contain fish during high flows, and include a picture of the device installed. The photo is very helpful to us and is required even if you have obtained a permit before. If your pond never overflows, you must provide information that supports this claim and a photo of the pond looking toward the low point in the landscape.
- ___15. Provide directions and map so that we can locate your water body. Hand drawn, photocopied or computer generated maps are acceptable. Providing a latitude & longitude would help us accurately locate your water body. This can be found on an internet site such as <http://terraserver-usa.com/>

Section C. Aquatic Vegetation Information

- ___16. Describe the plant problems you are experiencing in your lake or pond. Briefly indicate how plants are affecting use and enjoyment of your pond or lake.
- ___17. List plant species and their abundance in terms of percent surface coverage. Common or scientific names are acceptable. Avoid use of terms such as moss, scum, seaweed, and generalized names that do not indicate to us if plants will be eaten by triploid grass carp. **We want to be sure use of grass carp is appropriate.** The Penn State/PFBC pond website listed below is helpful for plant identification. <http://water.cas.psu.edu/ponds.htm>
- ___18. Describe methods of control employed to date. Aquatic herbicide use requires a Fish and Boat Commission/DEP permit. Physical or mechanical control methods should be identified if used. If grass carp were stocked previously and this application is for restocking your pond, please indicate past failure or success.

Section D. Applicant Certification

- ___19. Read the applicant certification. Provide your signature or signature of an authorized agent for your company, association or club. Print your name. Date the application.

Additional Information

- Permits are valid for the number of triploid grass carp and time period specified. We determine the appropriate number of triploid grass carp using the information you provide. We do not guarantee positive results or survival of triploid grass carp.
- Future stocking requests must be made with a new application. Our policy is that pond owners must wait two years before submitting an additional Triploid Grass Carp Pond Owner Stocking Permit Application. The waiting period provides an opportunity for triploid grass carp to achieve control, and allows identification of any problems unique to your pond.
- Applications for ponds or lakes over 5 surface acres require an Environmental Inspection Report completed by a qualified individual. These applications are published in the Pennsylvania Bulletin for public comment, which significantly increases review time. An Environmental Inspection Report form is available online at www.fish.state.pa.us. Select "Forms" from the website homepage menu.