

Fishpond Management



Definition

Managing impounded water for the production of fish or other aquatic organisms (non-commercial use).

Purpose

To provide favorable habitat for fish and other aquatic organisms.

To develop and maintain a desired species composition and ratio.

To develop and maintain a desired level of production.

Where Used

In warm and cold water ponds, lakes, and reservoirs. It is highly recommended that landowners consult professional biologists to get individual assistance based on the site. All ponds and waterbodies are not exactly the same. Information in this job sheet is designed to give basic management recommendations for common pond management conditions in West Virginia.

General Considerations

Precautions must be taken to prevent fish in the impoundment from escaping into adjoining waters. Use caution to prevent introduction of non-native species into adjoining waters.

Fertilization may be useful immediately after construction of new ponds. However, in West Virginia usually no additional fertilization is needed to produce adequate plankton densities for recreational purposes.

The pond site should be protected from flooding, sedimentation, and contamination. Excessive nutrients must be prevented from entering the pond. At a minimum, a dense grass/legume buffer around the edges of the impoundment should be maintained to filter nutrients and other pollutants. Refer to WV practice standards, Riparian Herbaceous Cover (390), Critical Area Planting (342), and/or Filter Strip (393) as appropriate. New ponds should be constructed using the WV conservation practice standard Pond (378).

For new impoundments, a soil test should be taken to determine the pH. Agricultural lime should be applied to bring pH levels up to 7.0 if the test is 5.5 or below.

Bottom water release structures are strongly recommended during construction of new impoundments to limit the creation of oxygen deficient zones. The impoundment bottom should be graded to provide positive drainage to the drain entrance.

Several features may be incorporated into pond designs that will facilitate future management and productivity. Water control devices should be designed for rapid draw-down (4 ft. within 48 hours). This may require the installation of oversized drain pipes. The minimum capability should allow water levels to be drawn down to a 3 ft depth and maintained indefinitely.

Measures should be designed to control agricultural pollutants when farming areas adjacent to impoundments. Facilities should not be located downstream from feedlots, barnyards, or other areas posing a risk of pollution.

The minimum depth of all areas of any type pond should be 3 feet. For cold water ponds the minimum depths should be 10-12 feet for $\frac{1}{3}$ of the pond. For warm water ponds, depths should be 6-8 feet for $\frac{1}{3}$ of the pond. Cut slopes should be 1:1 to the 3 ft depth to help control unwanted vegetation on the banks.

Aquatic vegetation must be controlled to the degree that it does not interfere with pond management or fish populations. However, some aquatic vegetation is desirable and beneficial.

A. STRUCTURE

Fish shelters made from brush, tires, wood, concrete blocks, rocks, stumps, etc. are excellent ways to concentrate fish and provide cover for prey species such as bluegills where little or no natural cover exists. In new impoundments trees and tree stumps can be left or placed in part of the impoundment.

These shelters should be placed in 4-8 feet of water. No more than 2 shelters (totaling 50 sq. ft) should be used in impoundments less than one acre. In impoundments greater than one acre use no more than 2 structures per acre.

B. POPULATION CONTROL IN EXISTING PONDS

Ponds having over-populations of panfish (with viable numbers of bass) can be brought into balance by one or a combination of the following methods:

1. Trapping

Using a bluegill trap, remove from 50 to 100 lbs. of bluegills (particularly in the 3 to 4 inch range) per surface acre. Trapping should cease when catch per day is $\frac{1}{2}$ of that caught when trapping started. Use 2 to 4 traps per acre. Success is measured by the presence of bass fry.

2. Seining

A $\frac{1}{2}$ - $\frac{3}{4}$ inch mesh seine 20 to 50 feet in length should be used to remove 50 to 100 lbs. of 3-4 inch bluegills per acre.

Trapping and seining in West Virginia do not require a permit on private impoundments or impoundments used for commercial purposes. *However, it is illegal to seine or trap in many instances in public waters. Check with the West Virginia Division of Natural Resources (WVDNR) for more information.*

3. Water Level Manipulation

Bass spawning usually begins when water temperatures reach 60-65°F (16 to 18° C). Spawning is generally complete by the end of June. Water levels should be lowered by $\frac{1}{4}$ to $\frac{1}{2}$ of normal during the summer after bass have spawned. Maintain this level throughout summer until the water cools in the fall to a temperature of less than 80° F (27° C). This draw-down will eliminate the spawning area for bluegill while preventing them from having access to vegetative cover. This increases the chance for predation by bass. A fall draw-down designed to control aquatic weeds may also increase predation of bluegill by bass.

4. Addition of Predators

Adult flathead catfish (>24 inches) can be introduced into ponds to help control over-population of bluegills. No more than two fish should be introduced into impoundments less than 1 acre in size. In impoundment greater than 1 acre no more than 4 per acre should be added.

Adult bass may also be added into an impoundment in conjunction with seining or trapping to provide control. Stock 15 to 20 each, ½ to 1 lb. largemouth bass per acre.

5. Total Reclamation

Drain the impoundment completely and remove all fish. Pumping may be required if the existing drain will not completely dewater the site. In addition, a fish toxicant may also be used. *However, this should only be done in accordance with all applicable federal laws, state laws and regulations.*

Landowners should contact the WVDNR fisheries biologist for information concerning the use of a fish toxicant. Following the elimination of all existing fish, restock the pond as per the recommendations given in this job sheet or a WVDNR fisheries biologist.

C. STOCKING

Only fish stock from licensed reputable dealers should be utilized in stocking or restocking ponds. Note that commercial fish dealers must have authorization by permit to transport fish into the state.

Stocking should occur only in impoundments free from "wild" fish.

Fingerlings of any species should not be stocked where adult fish are present.

Only a few species are suited for stocking in West Virginia ponds. Those species include:

Warm water - largemouth bass, bluegill and channel catfish.

Cold water - rainbow trout and brook trout are appropriate for stocking in ponds where the surface temperature does not exceed 70° F (21° C).



Table 1. Stocking rate of species per surface acre.

Largemouth Bass	Bluegill
100 Fingerlings	500 Fingerlings
25 Adults 10" or greater	50 Adults 8" or greater
Channel Catfish	
With Largemouth Bass and Bluegill	50 ea (4 - 6")
Stocked alone with supplemental feeding of commercial food	1000 ea (4 - 6")
Stocked alone without supplemental feeding	50 Adults
Brook and Rainbow Trout	
300-500	

For warm water ponds, stock bass and bluegill fingerlings simultaneously in the fall. When this is not practical stock bluegills in the fall and bass the following spring.

Channel catfish fingerlings should be stocked at the same time as bass and bluegill; or 6 to 10 inch catfish only after a reproducing population of bass and bluegill are established.

For cold water ponds, brook and rainbow trout should be stocked in the fall in ponds managed on a biennial basis. For ponds managed on an annual basis, stock trout in the spring.

Transporting new stock to a pond in a container of pond water causes the least amount of stress on fish. At the time of stocking check the temperature of container water and pond water. Water should gradually be mixed if more than 5° F difference exists. Fish should be dispersed gradually into the release area.

D. HARVEST MANAGEMENT

Warm water ponds in West Virginia may produce from 100 to 200 lbs. of fish per acre per year depending on a number of factors. This means that the pond has the capacity to contain between 25 and 50 lbs. of predator fish (bass) per acre per year.

When harvesting newly stocked ponds, fishing for bass and bluegill should occur only after both have successfully reproduced. Trout and catfish may be harvested when they reach the desired size.

Over-harvesting of bass will result in over-production of bluegills characterized by stunting and eventually a cessation of bass spawning. This condition can be diagnosed by seining in late summer to determine if bass fry are present. If any fry are present the pond is functioning in a satisfactory manner.

For small (<1 acre) warm water impoundments, the preferred method for managing bass-bluegill populations is the "crowd bass" method. In this method no bass are removed from the pond. Bass may be caught for recreational purposes but must be carefully released, except that the occasional trophy fish may be removed. This method will produce large panfish which can be used for consumption.

Another method is a periodic reclamation alternative. If bass are removed regularly from a small impoundment, reclamation of some form will be required within a few years of the original stocking.

For larger (>1 acre) warm water impoundments, a range of 10-15 lbs. of bass may be removed without significantly altering populations. However, this requires careful and accurate record keeping to prevent over-harvest. Removal of 1 lb. of bass will necessitate the removal of 4 lbs. of bluegill to maintain a balanced population.

Channel catfish may be harvested as desired. Restocking will be necessary.

Managing for large trout does not lend itself well to good fishpond management, since only a small percentage of trout live more than 2 years in ponds.

Trout populations are best managed by fishing and, if desired, supplemental feeding. Heavy fishing may occur the first summer following stocking depending on the size desired. Restocking should occur annually to achieve the desired population levels.

E. REMOVING UNDESIRABLE AND OVERPOPULATED POPULATIONS

A fish toxicant (rotenone) may be the most practical method of eliminating undesirable fish populations. A fish toxicant may be used to harvest some or all fish from a pond as the following conditions exist:

- Fish populations are dominated by undesirable species.
- A complete kill is needed before restocking.
- Bass, bluegill, or catfish are severely unbalanced.

Toxicants should only be used by trained personnel and as prescribed by a state fisheries biologist. Contact the West Virginia Division of Natural Resources for more information.

F. SUPPLEMENTAL FEEDING

Generally, there is enough natural food in a recreational warm water fishpond to support the growth and reproduction of fish stocked at recommended rates. Therefore, artificial feeding is not necessary under these circumstances.

When utilizing supplemental feeding, potential problems exist with excessive waste-water and decomposing feed. Care should be exercised so discharges do not exceed water quality standards in adjacent water bodies. State water quality certification may be required.

1. Trout

The use of commercial trout feed can increase production 10 to 20 fold. Generally, about one pound of feed produces ½ pound of trout. Young trout should be fed three times a day, if fast growth is desired. Feed only what fish will eat in 15 minutes without overfeeding.

Trout should not be fed when surface water temperature exceeds 65°F.

2. Channel Catfish

Commercial floating catfish feed (32 percent protein) may be fed 2 - 3 days per week when surface water temperature is between 70° and 90°F.

G. PEST AND NUISANCE CONTROLS

1. Muskrat

Trapping and hunting may be the most effective and inexpensive means of controlling muskrats in established impoundments. Consult the WV Division of Natural Resources for laws governing hunting and trapping of muskrats.

A heavy gauge hardware cloth or similar material may be attached across the face of the fill. Extend one foot above and 3 to 4 feet

below the normal water line and bury one foot below the soil surface.

Rip-rap placed along the dam one foot above and 3 feet below the water line will also eliminate muskrat burrowing. These methods are best implemented during construction of new ponds. Once the pond is established it is often difficult to implement this control strategy.

2. Crayfish

Although most crayfish cause no harm to ponds in West Virginia, they may cause problems when they actively burrow into the fill material. There are several methods of fumigation of the holes including chloride of lime, soap, turpentine and lye (NaOH). However, these methods are not proven widely successful.

3. Turtles

Snapping turtles are rarely a problem in West Virginia ponds and pose very little risk of impacting fish populations. However, turtles may pose a problem with young waterfowl using fishponds or in ponds that are frequently used for swimming.

Snappers can be removed from ponds by trapping and relocation with either commercial or homemade traps. Other methods may be acceptable including hunting or fishing subject to state laws and regulations.

4. Weeds

a. Biological control of plants is the recommended method of controlling undesirable weeds in ponds. White Amur or "Grass Carp" can provide long term control on certain plants and may be stocked in ponds to control undesirable aquatic vegetation. However, they are less efficient at controlling weeds as they reach seven pounds. Grass carp prefer submerged succulent plants to fibrous plants.

If grass carp are used in conjunction with herbicides or mechanical methods, they should be stocked after the effects of these treatments have been achieved and before regrowth of the plants. Otherwise, cooler months of the year are the best time for moving and handling grass carp because fish are less susceptible to injury and disease.

Stocking rates should be based on the amount of vegetation (e.g. number of fish per vegetated acre) rather than using the size of the water body as a determining factor.

Use only certified sterile stock (triploid chromosome fish). Stock grass carp according to Table 2 below or as recommended by a WVDNR fisheries biologist.

Pond Condition	Degree of Weed Infestation		
	Slight	Moderate	Heavy
Pond with predators	5 ea 8-12" fish	10-15 ea 8-12" fish	15-20 ea 8-12" fish
Pond without predators	6-8 ea 2-6" fish	12-18 ea 2-6" fish	18-20 ea 2-6" fish

Table 2. Stocking rates (number of grass carp/acre) for ponds with and without predators such as bass and catfish.

For information on recreational pond management and obtaining grass carp, contact the Division of Natural Resources district fisheries biologist in your area.

The WVDNR allows the importation of certified triploid grass carp, providing the following procedures are followed:

1. You must first contact the WVDNR District Fisheries Biologist responsible for the area of the state where the pond is located. The district fisheries biologist may advise as to whether triploid grass carp may help control aquatic weed problems. If they are advisable, he or she will also suggest the number of fish to stock.
2. If the decision is made to stock triploid grass carp, a permit must be obtained from one of the approved commercial fish vendors. Currently there is only one West Virginia based business that imports grass carp.
3. When arrangements have been made to purchase certified triploid grass carp from an approved vendor, fill out the application for a triploid grass carp importation permit. The permit is found on the website listed at the end of this document. An importation permit will then be issued to the vendor outlining certification and notification procedures and the landowner will receive notification from WVDNR that this document has been mailed to the vendor.

b. Mechanical control may also be utilized to control weeds. Depending on available labor and equipment, weeds may be removed by pulling, raking, netting, seining, and pulling a dragline or chain across the pond bottom. Rooted emergent and floating vegetation can be controlled by repeated cutting below the water level. Emergent plants cannot create energy reserves if they are not allowed to reach the surface.

Mechanical control is most appropriate and efficient in the early stages of weed development on small impoundments.

Water levels may also be reduced exposing problem weed beds in early fall and maintained through early winter.

c. Chemical control is also an acceptable method of controlling aquatic weeds; however their use should be a last resort. An accurate identification of the plant species is critical for chemical treatments. Avoid using herbicides in warm water ponds when the air temperature is over 90°F. Refer to the WVU Cooperative Extension Service for specific herbicides and rates for the species to be treated.

Use only herbicides approved for aquatic use by the US Environmental Protection Agency. Use all herbicides according to the labeled instructions.

Operation and Maintenance

Operation and maintenance strategies provide for ongoing management practices to monitor and maintain the desired levels of production in the pond.

MONITORING OF FISH POPULATIONS

Pond fish populations should be checked on a regular basis by analyzing catches from seine hauls, trapping, observation and/or catches from sport fishing. It is important to maintain good accurate records and allow regular fishing of the impoundment.

In warm water ponds, inventories should be performed in early to mid-July after bass and bluegill have spawned.

Trout and channel catfish populations should be checked by analyzing catches from fishing. As trout and catfish populations decrease, managers should decide when to restock.

If grass carp are present, they should be checked by observing the results of their feeding on aquatic plants. Restock as needed based on plant growth and the number of carp attaining sizes at which they are less efficient at weed control.

WATER QUALITY MANAGEMENT

In West Virginia, ponds with water having a pH range of 6.5 - 8.5 and an alkalinity 50 -150 ppm CaCO₂ Equivalents is optimum for survival and reproduction of fish. Water testing should occur at regular intervals at least every two years.

When pond water pH tests less than 6.0 apply 800 lbs. of finely ground agricultural lime at one-week intervals until the water pH is 6.5 or higher. If needed add more lime at one week intervals. For chronic areas, check monthly and apply when the pH tests below 6.0.

In instances where pond water is continuously muddy, check the watershed for critical sediment producing areas and for the presence of bullhead catfish or common carp and correct those situations.

Agricultural gypsum (CaSO₄·2H₂O) may be used at a rate of 500 lbs. per acre-foot of water. If after one week if the water is still muddy, apply 125 lbs. per acre foot.

OTHER RESOURCES

West Virginia University Extension website on Aquaculture at:
<http://www.wvu.edu/%7Eagexten/aquaculture/index.htm>

This website contains information on:

- Fee Fishing
- Farm Ponds
- Fish Vendors and Distributors
- Triploid Grass Carp Info and Permits
- Other Permits and Laws
- Research

Specifications

Fishpond Management – Job Sheet

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide. Information in this jobsheet is considered to be part of the conservation plan.

Client:	Farm #:
Field(s):	Tract #:
Designed By:	Date:

Purpose (check all that apply)	
<input type="checkbox"/> Provide favorable habitat for fish and other aquatic organisms	<input type="checkbox"/> Develop and maintain a desired level of production
<input type="checkbox"/> Develop and maintain a desired species composition and ratio	<input type="checkbox"/> Other (specify):

Layout (complete as applicable)	Pond 1	Pond 2	Pond 3
Field			
Existing or Planned Pond			
Pond Type			
Size (surface acres)			
No. of Habitat Structure(s) (per surface acre)			
Removal of Undesirable Species or Overpopulated Conditions Necessary			
Method of Removal ¹			
Fish Species to Stock or Re-stock			
Rate (per surface acre)			
Stocking Date(s)			
Fish Species to Stock or Re-stock			
Rate (per surface acre)			
Stocking Date(s)			
Fish Species to Stock or Re-stock			
Rate (per surface acre)			
Stocking Date(s)			
Planned Harvest Management Method ²			
Supplemental Feeding			
Pest and Nuisance Control Required			
Target Pest (plant or animal)			
Method of Pest Control ³			
Grass Carp Biological Control (size and rate per affected surface acre) ⁴			

1 Method of Removal – Identify the method to be used to control the population and/or to re-establish a “balance” as: **Trapping, Seining, Water Level Manipulation** (lowering or draining), **Predator Addition**, and **Chemical Reclamation**. Note: Toxicants or similar chemicals should only be used by trained personnel and in consultation with a WVDNR Fisheries biologist. Use toxicants as indicated by the label.

2 Planned Harvest Management Method – Identify the harvest management method to be utilized as: **Crowd Bass Method, Periodic Reclamation** and **Harvest-Periodic Restock**. Landowner must maintain good harvest records to ensure a balanced population.

3 Method of Pest Control – Identify the method of pest control as: **Fumigation, HTR** (hunting/trapping/removal), **Grass Carp, Mechanical, Chemical** or **Water Level Manipulation** (specify timing and intensity in the “Additional Specifications” section of this document).

4 Grass Carp Biological Control – List the size and stocking rate of triploid grass carp. Rates should be based on the acreage of weed infestation only. Refer to Table 2 of this document and/or the WVU Extension Service for more information.

