

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**  
**FISHPOND MANAGEMENT**

(Ac.)

**CODE 399**

**DEFINITION**

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

**PURPOSE**

1. To provide favorable habitat for fish and other aquatic organisms.
2. To develop and maintain a desired species composition and ratio.
3. To develop and maintain a desired level of production.

**CONDITIONS WHERE PRACTICE APPLIES**

In warm and cold water ponds, lakes, and reservoirs.

**General Criteria Applicable to All Purposes**

*The West Virginia Division of Natural Resources (WVDNR) fisheries biologists may make recommendations in addition to, or in lieu of, the criteria outlined in this standard. Assistance for managing large impoundments (>2 acres) should always be sought from the WVDNR fisheries biologist and/or the state staff biologist.*

*Individual assistance is required to provide stocking rates based on impoundment size, water quality, time of stocking, and management intensity.*

*Precautions will be taken to prevent fish in the impoundment from escaping into adjoining waters. Care will be taken to prevent introduction of non-native species into adjoining waters where native species might be adversely affected.*

*No additional fertilization is needed to produce adequate plankton densities.*

*In West Virginia ponds with water having a pH range of 6.5 - 8.5 and an alkalinity 50 - 150 ppm CaCO<sub>3</sub> Equivalents is optimum for survival and reproduction of fish.*

*The site will be protected from flooding, sedimentation, and contamination. Excessive nutrients will be prevented from entering the pond. At a minimum, a dense grass/legume buffer around the edges of the impoundment will be maintained to filter nutrients and other pollutants. This buffer shall conform to WV Practice Standards 390, Riparian Herbaceous Cover; 342, Critical Area Planting; and/or 393, Filter Strip as appropriate.*

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

*Minimum depths of 75% of the total area of any type pond will be 3 feet. For cold water ponds depths will be 10-12 feet for at least 1/3 of the pond. For warm water ponds, depths will be 6-8 feet for 1/3 of the pond. Cut slopes should be 1:1 to the 3 ft depth.*

Aquatic vegetation shall be controlled to the degree that it does not interfere with pond management or fish population.

### Criteria for Pond Construction and Renovation

*Impoundments designed for fish production will be built in accordance with WV standard (378) Pond and the NRCS National Engineering Handbook (NEH), Part 650, Engineering Field Handbook Chapter 11.*

*Several features may be incorporated into pond designs that will facilitate future management and productivity. Water control devices should be designed for rapid drawdown and maintenance of drawdown to desired depths. The minimum capability will allow water levels to be drawn down to a 3 ft depth and maintained indefinitely. Refer to the EFH, Chapter 6 for types of water control structures.*

*Drainpipes may be oversized to permit rapid drainage (4 ft. within 48 hours) and maintenance of drainage.*

*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. The NEH Part 650, Engineering Field Handbook, Chapter 6 should be consulted for more information regarding these types of structures.*

*Habitat structure devices such as large rocks, stumps and artificial reefs may be placed in the impoundment. If applicable trees and tree stumps can be left or placed in part of the impoundment if the water depth will be maintained at a minimum of 3 ft. in those areas. Refer to the section of this standard entitled "Structure".*

*For new and existing impoundments, a soil test will 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.*

#### Structure

*Artificial reefs or fish shelters made from brush, tires, wood, concrete blocks, PVC, etc. are excellent ways to concentrate fish and provide cover for prey species such as bluegills where little or no natural cover exists. Unless otherwise directed by the WVDNR fisheries biologist structures are to:*

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

*Temporary structures suitable for protection of brood habitat may also be installed if required.*

### Criteria for Population Control

*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 50-100 lbs. of bluegills (particularly in the 3-4 inch range) per surface acre. Trapping should cease when catch per day is one-half of that caught when trapping started. Use 2-4 traps per acre. Success is measured by the presence of bass fry. Trap designs may be obtained from the state staff biologist.*

2. Seining. *A 1/2 - 3/4 inch mesh seine 20-50 feet in length should be used to remove 50-100 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 currently illegal to seine or trap in many instances in public waters. Check with the 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 1/4 to 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 drawdown 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 drawdown designed to control aquatic weed*

control may also increase predation of bluegill by bass.

4. **Predator addition.** 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 of overpopulation. Stock 15 - 20, 1/2 to 1 lb. 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 WV Division of Natural Resources 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 standard or a fisheries biologist.

#### Criteria for Species Selection and Stocking Rates

Commercial fish dealers must have authorization by permit to transport fish into the state.

Only fish stock from licensed reputable dealers will be utilized in stocking or restocking ponds.

Stocking should occur only in impoundments free from "wild" fish. Remove any existing fish in an old pond prior to stocking.

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

Only a minimum number of species are suited for stocking in West Virginia ponds. Those species include:

1. Warm water- largemouth bass, bluegill and channel catfish.

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

Refer to Tables 1 and 2 for stocking rates of species. Landowners should be discouraged from stocking any species other than those listed in Tables 1 and 2.

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

Table 1. Warm Water Ponds Species and Stocking Rates per Surface Acre

Brook Trout	Rainbow Trout
300-500	

Table 2. Cold Water Pond Species and Stocking Rates per Surface Acre

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

Channel catfish fingerlings should be stocked at the same time as bass and bluegill; or 6 inch 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 temperatures 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.**

### **CONSIDERATIONS**

**Consider the potential effects of aquatic nuisances such as crayfish, turtles, muskrats and various plant species.**

**Consider amounts of water flowing through the pond during the growing season (i.e. the water is removed and recharged in less than 30 days) especially when adding substances such as lime.**

**Consider the potential for overcrowding which greatly increases the likelihood of disease and parasites.**

**Consider testing the alkalinity of the impoundment water to assure that it is not below 50 ppm CaCO<sub>3</sub> Equivalents.**

**Consider the amount of dead vegetation or other decomposing organic matter if photosynthesis is to provide sufficient oxygen levels.**

**Consider the effects of migratory and resident waterfowl usage.**

**Consider regularly testing dissolved oxygen levels so that they do not drop below 4.0 ppm. Continuous low levels may require mechanical aeration.**

**Consider the effects of seasonal turnovers, or inversions, when the oxygen deficient water at the bottom of the pond overtops the oxygenated layer at the top.**

**Consider using non-toxic dyes as opposed to chemical herbicides to shade out nuisance aquatic plants.**

**Consider the management effects on livestock when the pond is used as a water source.**

**Consider labor, expense, lifecycle and time when deciding on methods to remove aquatic nuisances.**

**Consider upstream sources of erosion and sedimentation during management activities.**

Consider alternatives to the use of pesticides in the drainage area above the site, which may have negative impacts to water quality.

**Consider downstream effects when manipulating water levels.**

**Consider the effects of surrounding vegetation (e.g. shading) on the impoundment.**

**Consider the effects on the movement of dissolved substances to ground water.**

**Consider the effects on the visual quality of water resources.**

**Consider the effects of water level manipulation on any adjacent wetlands.**

### **PLANS AND SPECIFICATIONS**

Plans and specifications for fish and other aquatic organism management will be in keeping with this standard and will describe the requirements for applying this practice to achieve its intended purpose. Specifications for this practice will be prepared for each site. Specifications will be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other documentation.

Requirements for the operation and maintenance of this practice shall be incorporated into site specifications.

**The following information as a minimum will be documented in the site specifications or conservation plan:**

- **Impoundment Size**
- **Pond Type (cold/warm water)**
- **Stocking Rate(s) and species.**
- **Method of population control and procedure to harvest excess fish.**
- **Impoundment modification (if applicable).**
- **Operation and Maintenance Plan (including but not limited to):**
  - **Harvest Management**
  - **Aquatic Plant and Animal Control**
  - **Supplemental Feeding (if applicable)**

## **OPERATION AND MAINTENANCE**

The operator will receive a plan or specifications describing the management and corrective actions that are required for the successful management of the pond, lake or reservoir.

*At a minimum, operation and maintenance plans will provide for fish population monitoring and manipulation, fish harvesting, aquatic weed control, water quality management and shoreline vegetation maintenance.*

### **Monitoring of Fish Populations.**

*Pond fish populations will be checked on a regular basis by analyzing catches from seine hauls, trapping, observation and/or catches from sport fishing.*

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

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

*If grass carp are present, they will 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**

*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 ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) may be used at a rate of 500 lbs. per acre-foot of water. After one week if the water is still muddy apply 125 lbs. per acre foot.*

## **Criteria for Harvest Management**

*Warm water ponds in West Virginia may produce from 100 to 200 lbs. of fish per acre per year. 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-harvest 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 from larger ponds without significantly altering populations. However, this requires careful and accurate record keeping preventing over-harvest. Removal of 1 lb. of bass will necessitate the removal of 4 lbs. of bluegill to maintain a balanced population.*

*Largemouth bass - bluegill management is more likely to attain desired objectives in larger impoundments (>3 surface acres).*

*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.*

**Criteria for Removing Undesirable and Overpopulated Fish 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 dominated by undesirable species.*
- *Complete kill 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 WVDNR for more information.*

**Criteria for 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.*

*Trout - The use of commercial trout feed can increase production 10 to 20 fold. Generally, about one pound of feed produces one-half 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.*

*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.*

**Criteria for Aquatic Plant and Animal Control**

Biological, mechanical, and chemical methods can be used in combination to control aquatic plants as they develop.

**1. Animals**

*a. Muskrats - Trapping and hunting may be an effective means of controlling muskrats in impoundments. Check with 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.*

*b. Crayfish - Although most crayfish cause no harm to ponds in West Virginia, they can 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).*

*c. 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 hunting or fishing regulations.*

## 2. Plants

**BIOLOGICAL CONTROL** - *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 re-growth 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 according to Table 3 or as recommended by the WVDNR fisheries biologist.

Pond Condition	Degree of Weed Infestation		
	SLIGHT	MODERATE	HEAVY
Pond w/ predators	5 ea	10-15 ea	15-20 ea
	8-12" fish	8-12" fish	8-12" fish
Pond w/o predators	6-8 ea	12-18 ea	18-20 ea
	2-6" fish	2-6" fish	2-6" fish

Table 3. Stocking rates (number of grass carp/acre) for ponds with and without predators such as bass and catfish.

**MECHANICAL CONTROL** - *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. Manual control is most appropriate and efficient in the early stages of weed development.*

*Vegetation may be pulled or cut and removed from the pond. 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.*

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

**CHEMICAL CONTROL** - *An accurate identification of the plant species is critical for chemical treatments. Use herbicides as a last resort for weed control. Refer to the WVU Cooperative Extension Service for specific herbicides and rates for the species to be treated.*

*Avoid using herbicides in warm water ponds when air temperatures are over 90°F.*

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

### WV Internet Resources

***"Triploid Grass Carp as a Biological Control of Aquatic Vegetation"*** :

<http://www.wvu.edu/~agexten/aquaculture/triploid.htm>

***"Pond Scum Wipe-Out!! Control of Nuisance Algae in Ponds"***:

<http://www.wvu.edu/~agexten/aquaculture/pondscum.htm>

***"Sources of Live Fish in West Virginia"***:

<http://www.wvu.edu/~agexten/aquaculture/lvfish.htm>

***"Permits and Inspections Required in West Virginia"***

<http://www.wvu.edu/~agexten/aquaculture/permits.htm>

***\*Bold Italics indicate changes made or information added to the national standard by West Virginia.***

### REFERENCES

North Central Division of the American Fisheries Society, New Approaches to the Management of Small Impoundments. Dearborn, Michigan. 1976

Fish Division Oklahoma Department of Wildlife Conservation, Pond Management in Oklahoma. Oklahoma City, Oklahoma. 1981

USDA Soil Conservation Service, Trout Ponds for Recreation, Farmers Bulletin Number 2249, US Government Printing Office, Washington, D.C. 1976