

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

FISHPOND MANAGEMENT

(Ac.)

CODE 399

DEFINITION

Managing impounded aquatic habitat and water quality for the production of fish.

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.

PURPOSE

To provide favorable habitat for fish and other aquatic organisms which help sustain the fish population.

Ponds utilized for this practice must meet the requirements of conservation practice standard (378) Pond and/or (397) Aquaculture Ponds.

To develop and maintain a desired species composition and ratio.

Livestock shall be excluded from the pond.

To develop and maintain a desired level of production.

Protect the site from flooding, sedimentation, and contamination.

Control undesirable aquatic vegetation.

Conditions Where Practice Applies

In warm and cold water ponds, lakes, and reservoirs not managed for commercial aquaculture purposes.

Comply with state and local regulations when selecting species to be stocked.

Discharges from ponds, lakes, and reservoirs will meet state water quality standards.

CRITERIA

General Criteria Applicable to All Purposes

The Kentucky Department of Fish and Wildlife Resources (KDFWR) fisheries biologists may make recommendations in addition or in lieu of the criteria outlined in this standard.

Prevent the fish in the pond from escaping or being introduced into adjoining waters where native species might be adversely affected in accordance with state and local regulations.

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

The site will be protected from flooding, sedimentation, and contamination. Excessive nutrients will be prevented from entering the pond. Where this is likely to occur, 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 KY practice standards (342) Critical Area Treatment and/or (393) Filter Strip or other similar filter practice as appropriate.

Control nuisance species in compliance with state and local regulations. When appropriate, precautions should be taken to prevent fish in

Criteria for New Pond Construction and Renovation to Facilitate Management

Impoundments designed for fish production and to provide habitat will be built in accordance with KY conservation practice standard (378) Pond and the NRCS National Engineering Handbook (NEH), Part 650, Engineering Field Handbook Chapter 11. For commercial aquaculture and the criteria for design of ponds suitable for aquaculture production refer to (397) Aquaculture Ponds and the NRCS National Engineering Handbook (NEH), Part 650, Engineering Field Handbook Chapter 11.

Minimum depths of 75% of the total area of any type pond will be 3 feet. For most ponds, depths will be 6-8 feet for at least 1/3 of the pond.

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.

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 cover 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 to approach 7.0 if the test is 5.5 or below.

Structure

Artificial cover 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 KDFWR fisheries biologist structures are:

- placed in at least 4 feet of water;
- installed at a ratio of 50 sq. ft. of structure for every surface acre of water (50 sq.ft :1 surface ac.)

Criteria to Stock New or Existing Suitable Ponds

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.

Based on client objectives and local regulations, develop a pond management plan that specifies species selection, stocking rates and ratios.

Develop species selection, stocking rates, and ratios with respect to the size, depth, water temperature, and water quality of the pond to be stocked.

Only a minimum number of species are suited for stocking in Kentucky including largemouth bass, bluegill, redear sunfish and channel catfish. Redear sunfish is an optional species suitable for Kentucky farm ponds. The suggested rate is to replace 40 percent of the bluegill stocked with redear sunfish. Redear sunfish alone will not support a bass population. These fish are available through commercial

dealers. At least some aquatic vegetation is required to sustain a redear sunfish population.

Crappie (white or black) should not be stocked in farm ponds and small lakes as these fish are not adapted to small bodies of water.

Refer to the tables below for stocking rates of species or as directed by the KDFWR fisheries biologist. Landowners should be discouraged from stocking any species other than those listed below.

Table 1. Species and Stocking Rates per Surface Acre for New Kentucky Ponds

Largemouth Bass	Bluegill
120 fingerlings (per acre)	400 fingerlings * (per acre)
Channel Catfish (per acre)	
With Largemouth Bass and Bluegill	50 ea. (4 - 8")
Stocked alone with supplemental feeding of commercial food	1000 ea. (4 - 8")
Stocked alone without supplemental feeding	50 adults
Caged reared with supplemental feeding	300-600 fingerlings

NOTE: Up to 40% of the bluegill may be substituted for redear sunfish.

For most ponds, bluegills (and channel catfish) should be stocked in the fall and bass the following spring.

Larger channel catfish (6-10 inches) may be stocked only after a reproducing population of bass and bluegill are established.

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.

Criteria Applicable to Cage Culturing Channel Catfish

To be used for cage culture, a pond should be a minimum of a half-acre in surface area and shall be at least six feet deep over a majority of the pond.

Ponds utilized for this purpose shall be relatively free from aquatic vegetation.

Ponds shall not have direct access by livestock.

Stock fingerling catfish (at least 6 inches) at a rate of 300 - 600 fingerlings in a 4' by 4' cage. Space cages at least 3 feet apart.

Catfish should be fed six days a week at about the same time each day.

Harvest when fish reach harvestable size. Six-inch fingerlings stocked at the middle of April typically reach an average weight of 1 pound by the middle of October.

See the Cage Culturing section in the KDFWR publication "A Guide to the Management of Farm Ponds in Kentucky" or contact the Kentucky State University Aquaculture Program for more detailed information on cage culturing catfish.

Criteria Applicable to Production Aquaculture

Contact the Kentucky State University Aquaculture program at: <http://www.ksuaquaculture.org> for more information on production aquaculture and (397) Aquaculture Ponds.

Criteria for Population Control

Common problems with fish populations include the following:

- overpopulation of small bluegills
- overpopulation of yearling bass
- or undesirable species in a pond

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:

A. 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.

B. 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.

C. Water Level Manipulation

1. 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 also increases the chance for predation by bass. A fall drawdown designed to control aquatic weed control may also increase predation of bluegill by bass.

2. When water volume is reduced, bluegills and other forage fish are concentrated. Concentrated fish are easier prey for bass, and therefore forage fish populations are generally reduced. Summer drawdowns are most effective for population reduction of forage fish, but can lead to increased weed problems. Regardless of when the pond is drawn down, the water level should be allowed to come back to the normal level by mid-February in the southern part of the state and the end of February in the rest of the state.

D. 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. Consult a KDFWR fisheries biologist prior to implementing this method.

Adult bass may also be added into an impoundment in conjunction with seining or trapping to provide control of overpopulation. Utilize 25-50 adult bass per acre between one-half pound to 2 pounds to correct overpopulations by bluegill or other undesirable forage fish.

E. Total Reclamation

Total reclamation should be performed when populations are badly unbalanced or undesirable fish species make up a significant portion of the population. 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.

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. This should only be done in accordance with all applicable federal and state laws and regulations. Landowners should contact a fisheries biologist from the Fisheries Division of the KDFWR for information concerning the use of a fish toxicant. Overcrowding by intermediate sized bluegills can often be corrected by a partial kill. This should be done with a fish toxicant in the fall. Following the elimination of all existing fish, restock the pond as per the recommendations given in this standard or as directed by the fisheries biologist.

F. Bass Removal

Removal of 25 to 50 adult bass (1/2 pound to 2 pounds) per acre can frequently correct bass overpopulations.

For more information on Correcting Unbalanced Fish Populations see the Test Seining and Undesirable Species sections of the KDFWR

publication titled "A Guide to the Management of Farm Ponds in Kentucky".

Criteria to Develop and Maintain a Desired Level of Production

Maintain the desired level of production through liming, fertilization, slot limits, harvesting, or supplemental feeding. Address any water quality conditions (e.g., dissolved oxygen level, total hardness, pH, alkalinity, phytoplankton bloom, etc.) based on local conditions using the pond management plan.

In Kentucky fertilization should be performed between May and October. Total alkalinity of pond water should be checked before a fertilization program is begun. To provide effective fertilization, the alkalinity level should be at least 20 mg per liter.

It is easiest to apply lime before a pond is filled for the first time or when it has been drained for maintenance. Unlike fertilizer, lime does best when broadcast as evenly as possible across the pond. Liming is usually not necessary in ponds with total alkalinities above 20 milligrams per liter, but the need for lime becomes more critical as total alkalinity drops below this level. Liming rates are often high (1,000-10,000 pounds per acre). Agricultural limestone or basic slag are the only materials safe to apply in such large quantities to ponds with fish. Small applications (not over 250-300 pounds/acre) of hydrated lime or calcium oxide can be applied to ponds with fish. One small application will often maintain adequate total alkalinity for several months, but frequent retreatment may be necessary.

Fertilizers should only be used in a pond to address a recognized objective such as the need to produce more fish or to help reduce aquatic vegetation. If fish removal is infrequent, fertilization may not be practical.

Ponds having surface spillways, which flow more often than every three weeks during the growing season can be impractical to fertilize. Ponds with severe weed problems should not be fertilized until the weed problems are controlled.

Fertilization of a pond should begin by mid-April when the water temperature reaches 60 to 65° F every two weeks during April and early May and applied thereafter based on desired water

transparency or clarity. Continue treatment until October and every year thereafter.

Each application should be performed by applying liquid 9-18-9 or 6-18-6 at the rate of one gallon per acre of pond; dilute with pond water (half and half) prior to applying.

Refer to the Fertilization section in the KDFWR publication "A Guide to the Management of Farm Ponds in Kentucky" for more detailed information on fertilizing ponds or using granular fertilizers.

Monitoring of Fish Populations

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

Inventories should be performed in early to mid-July after bass and bluegill have spawned.

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.

Aquatic organism health issues directly affect production levels and need to be included in the pond management plan.

The diagnosis of diseases and parasites should be done by a fish pathologist. Information on fish diseases may be obtained from Kentucky State University Aquaculture Program (KSUAP). The KDFWR publication titled "A Guide to the Management of Farm Ponds in Kentucky" provides some information on fish disease. If fish diseases are suspected contact the KDFWR.

Criteria for Harvest Management

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

Largemouth bass should not be harvested from the farm pond until they are 14 or 15 inches in length. Then for every bass harvested, about 40-

50 bluegills should be harvested. A maximum of 25-30 pounds of bass should be harvested per year or as directed by the KDFWR fisheries biologist.

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) 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 should 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.

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

Criteria for Supplemental Feeding

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.

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

Criteria for Aquatic Nuisance Plant and Animal Control

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

1. Nuisance Animals

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

Snapping Turtles - Snapping turtles are rarely a problem in 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. Turtles may be removed from ponds by trapping and relocation with either commercial or homemade traps. Other methods may be effective including hunting or fishing subject to state laws and regulations.

2. Nuisance 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. KDFWR encourages the use of spillway barriers to prohibit their escape.

Triploid grass carp (sterile) must be purchased from a KDFWR certified dealer. 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 KDFWR fisheries biologist.

Table 3. Grass Carp Stocking Rates for Ponds with and without Predators (bass and catfish)

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

Rates are shown on a per acre basis

Mechanical Control - Aquatic vegetation can best be prevented by eliminating shallow areas (less than 3 feet deep) around pond edges.

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. It may be an effective weed control technique if performed in successive years. Water levels should be lowered to expose aquatic weeds in the shallow portions of the pond. Once exposed, most water weeds cannot stand freezing temperatures without damage. Strive to expose 35 to 50 percent of the pond bottom. This percentage may vary depending upon topography and design of the pond. Maximum drawdown should be accomplished by mid-November and water level should remain low through February. Caution should be used when conducting drawdowns because the soil in the pond may dry and crack resulting in a pond leak.

Placement of bales or packets of barley straw may be done to inhibit growth of filamentous algae. Control may take 30 days or longer and barley straw may need to be replaced after deterioration.

Chemical Control - An accurate identification of the plant species is critical for chemical treatments. Use herbicides as a last resort for weed control.

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

Utilize only chemicals that are cleared for use in fish culture and approved for aquatic use by the U.S. Environmental Protection Agency. Use all herbicides according to the labeled instructions.

Apply chemicals during mid to late summer and do not treat the entire pond in one treatment. Treat only 1/3 of the pond, let the vegetation decay and repeat the procedure. This will generally prevent an oxygen deficiency from developing, which could result in a fish kill.

For more information on controlling aquatic weeds, see the Aquatic Vegetation and Aquatic Plant Control sections of the Kentucky Department Fish and Wildlife Resources (KDFWR) publication titled "A Guide to the Management of Farm Ponds in Kentucky"

CONSIDERATIONS

Use native species whenever possible. Non-native game fish can escape ponds and severely affect adjacent ecosystems.

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

Consider the use nutrient and pest management practices in the watershed to maintain water quality.

Consider the effect of additional uses (e.g., livestock watering, recreation, irrigation, etc.) on the fish and/or aquatic organism population.

Consider the use of supplemental aeration equipment to improve gas transfer, water

quality, and minimize fish stress within the impoundment.

Consider providing additional fish and wildlife habitat within or around the impoundment for cover and breeding purposes. A vegetated buffer around the pond can provide multiple benefits, such as nesting and escape cover, reduced bank erosion, improved water quality, and more.

Grassy cover around the impoundment that may provide nesting habitat should not be mowed until after the primary nesting season.

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 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 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

A pond management plan will be prepared using approved specification sheets, job sheets, technical notes, narrative statements in the conservation plan, or other approved documentation.

The plan will include (as applicable):

- A location map and plan view of the site
- Statement of purpose that describes the species(s) desired and management goals
- Impoundment size
- Stocking rate(s) species and timing
- Necessary impoundment modifications

Operation and Maintenance Plan (including but not limited to):

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan that may include the following actions that are required for the successful management of the pond, lake, or reservoir:

- Harvest management method and schedule
- Aquatic plant and animal control (if applicable)
- Supplemental feeding plan (if applicable)

- Evaluation methods (observation, seining, electroshocking, harvest records, etc.) for determining the population dynamics of fish and/or other aquatic organisms;
- Permit requirements and regulations, if applicable.
- Monitoring and maintenance of desired water quality conditions (e.g., dissolved oxygen level, total hardness, pH, alkalinity, phytoplankton bloom, etc.).
- Periodic inspection and maintenance of structural components (e.g., water level control equipment).
- Operation and maintenance procedures for water treatment and escape-control mechanisms at discharge points.

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