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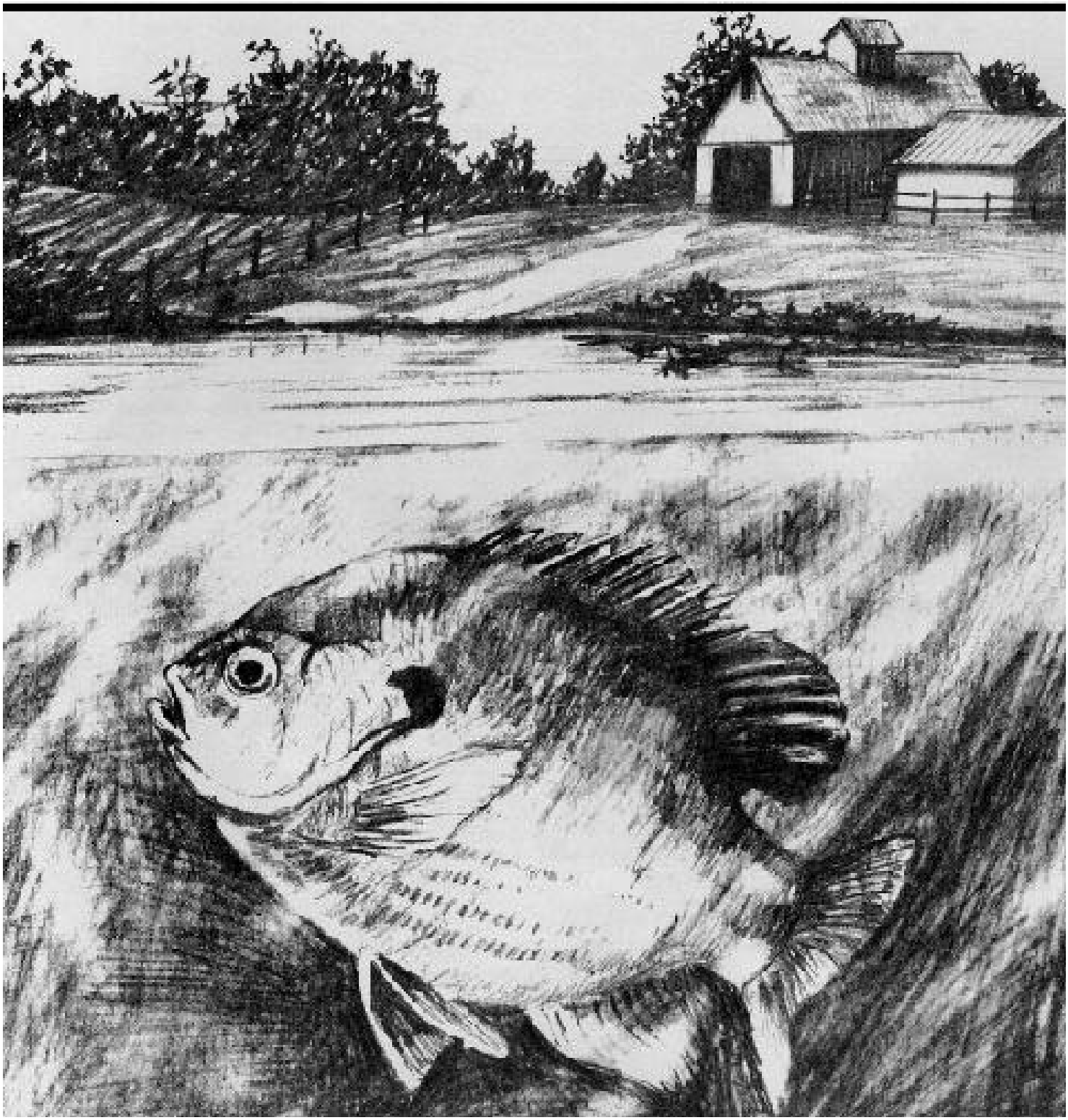
PB1231

Management of Farm Fish Ponds in Tennessee



Management of Farm Fish Ponds in Tennessee

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Farm fish ponds are a valuable resource. There are presently more than 190,000 farm ponds in Tennessee, with an average size of about one-half acre. Most of them have the potential for fish production, but good fishing in farm ponds does not just happen. It results from careful planning and management right from the start. This bulletin provides management information to help pond owners produce the best fishing possible through good management.

The Pond

Choosing the right location for the pond is a major consideration. Select a pond site with great care because economy of construction, overall usefulness and future productivity of the pond depend on its location. A suitable fish pond site needs:

1. a topography that may be converted into a pond economically;
2. a subsoil that contains enough clay to hold water; and
3. a water supply that will furnish an adequate but not excessive amount of water.

If the pond is to be used for other purposes, such as irrigation or for stock-water, the location needs special consideration. Most ponds are built with a number of water uses in mind.

Ponds that furnish water for livestock should be fenced to limit access only in certain areas. Some ponds are designed to allow gravity flow of water through a pipe to a watering trough below the dam. Most farm ponds are dependent on surface water runoff for a water supply. The type of subsoil and the steepness of the slope around the pond will affect the amount of surface runoff, while the type of vegetation on the watershed will affect the rate of water runoff. Where grassland watersheds are used, 10 to 15 acres furnish enough runoff water for one surface acre of pond; however 20 to 30 years are necessary if the watershed is wooded. If large amounts of runoff water are expected, a diversion ditch constructed around the pond will avoid the loss of valuable pond nutrients and help prevent the escape of fish.

A well-designed farm pond will have two water outlets. For normal water flow, a trickle tube connected to the drainpipe will handle the surplus water. A sleeve over the tube which reaches to about a foot from the pond bottom will allow stagnant water to leave and help prevent an oxygen depletion. When floods produce more runoff water than is required to fill and maintain the pond, an emergency spillway is required. The spillway must be large enough to adequately handle the flood water, not only to

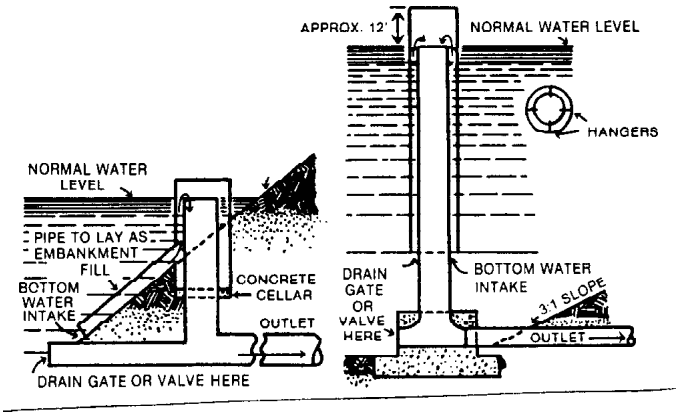

Figure 1. Both of these trickle tube designs allow stagnant bottom-water overflow. (Taken from Farmers' Bulletin 2210, USDA.)

prevent the water from overtopping the dam, but also to prevent large numbers of fish from leaving the pond. To prevent serious losses of fish, spillways should be wide enough so that water from the heaviest floods will not flow more than 3 to 4 inches deep.

It is unnecessary to build fish ponds ;in the South to an average depth of more than 4 to 6 feet. In fact, very deep ponds are likely to experience more water quality problems. Since aquatic weed control is difficult and fishing is poor in shallow water, the shore of the pond should slope as abruptly as possible to a depth of 3 feet. A deepened edge coupled with a consistent fertilization program usually prevents weed problems. Assistance with fish pond planning and management is available from the Agricultural Extension Service, Natural Resources Conservation Service, and Tennessee Wildlife Resources Agency.

The Fish

Pond management principles are based on the presence of only desirable species of fish. Many ponds are unsuited for management because the source of water is contaminated with undesirable fish. Upstream migration of such species can be checked by a 4-foot vertical fall in the emergency spillway. A concrete apron below the barrier will prevent erosion of the dam.

If wild fish such as green sunfish (Lepomis cyanellus), golden shiners (Notemigonus crysoleucas), crappie (Pomaxis sp.), or bullheads (Ictalurus sp.), are found in the pond immediately after impoundment, fish eradication must be accomplished before desirable species are stocked. A fish toxicant, rotenone, dispersed throughout the pond at the rate of 1.0 gallon of 5 percent liquid per 3 acre-feet of water or 5.0 pounds of 5 percent emulsifiable powder per acre-foot will kill these intruders. An acre-foot is one surface acre of water one foot deep. Rotenone-treated water is detoxified after 3 to 5 days at water temperatures above 70 F, but takes longer at cooler temperatures. A sure way to determine if the water is still toxic is to place a small cage in the treated water with a few bluegill (Lepomis macrochirus) or similar sunfish for about 24 hours. Detailed information about use of rotenone can be found in Publication 1103, Farm Pond Renovation, Agricultural Extension Service, The University of Tennessee.

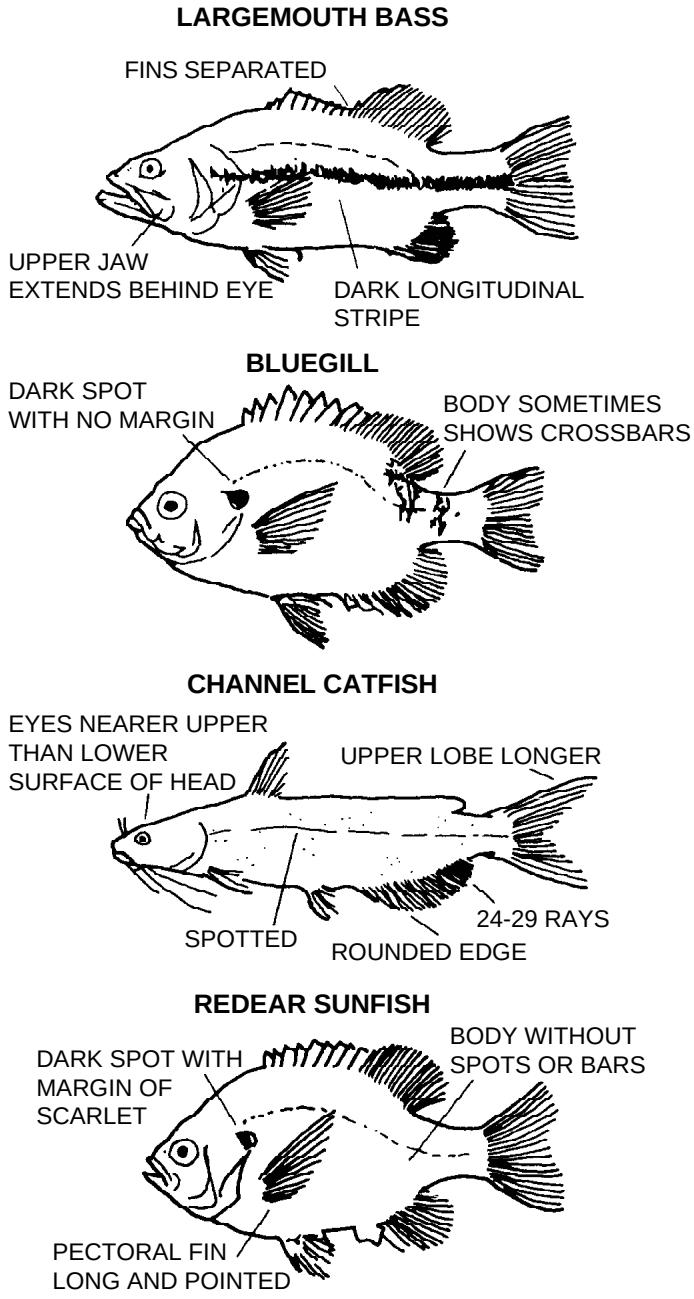

Figure 2. These are the kinds of fish to stock for good fishing in warmwater farm ponds. (Adapted from Management of Southeastern Sportsfishing Ponds, University of Georgia.)

In Tennessee and other states in the southeast with similar climates, largemouth bass (Micropterus salmoides) as the predator in combination with bluegill and redear sunfish (Lepomis microlophus) as forage species have been used successfully for many years to establish balanced fish populations in farm ponds. Fingerling fish to establish farm pond populations of this type may be obtained by application through the Tennessee Wildlife Resources Agency. Also, limited numbers (up to 100 per acre) of channel catfish (Ictalurus punctatus) may be stocked without fear of upsetting the population balance.

Table 1
Recommended Fish and Stocking RatesPer Surface Acre for Warmwater Farm Ponds

Kind of Fish	Rate for Fertilized Pond	Rate for Unfertilized Pond
Sunfish		
(Bluegill 70%)	525-700	350
(Redear-30%)	225-300	150
Largemouth bass	100	50
Channel catfish	100	50
Chinese grass carp	10 15	10-15

The number of fish stocked in a pond is based on the anticipated supply of fish which is a function of the pond's fertility. The decision to fertilize or not fertilize must be made before the fish are ordered. Ponds to be fertilized receive 750-1,000 sunfish (70 percent bluegill and 30 percent redear) in the fall, 50-100 channel catfish in the fall (optional) and 100 largemouth bass the following June per surface acre. Unfertilized ponds are stocked with about one- half these numbers. Additionally, an accurate measurement of the pond acreage is needed when ordering the fish. If the pond area is overestimated, too many fish will be stocked for the available food supply. Poor growth of the fish will result and the proper fish population balance will not be established.

Fertilization

Fish recommended for farm ponds feed mainly on microscopic water animals (zooplankton), aquatic insects, and small fish. Most of these small animals use microscopic plants (phytoplankton) either directly or indirectly for food. These plants are so small that they cannot be seen unless highly magnified and usually go unnoticed in the water. In a properly fertilized pond, plankton grows and multiplies so rapidly the water appears green or sometimes brown. The dominant type of plankton determines the color. The capacity of a pond to produce fish is increased from about 100 pounds per acre per year when unfertilized to about 400 pounds when properly fertilized, of which one-half, in either case, will reach harvestable size.

Along with increased fish production, there are several other advantages for fertilizing ponds. Weed control results because dense growth of microscopic algae in the upper water shades the pond bottom where rooted vegetation growth begins. Where pond weeds are absent, largemouth bass can seek out and devour the small bluegill helping maintain proper fish population balance. Unless their numbers are continuously reduced, they are unable to grow to a desirable size and, with subsequent overcrowding, poor fishing results. Additionally, fertilization greatly reduces mosquito populations because the weeds that harbor mosquito larvae from the fish are eliminated.

Table 2
Recommended Fertilizers and Application Schedule for a One Acre Farm Pond

Date[1]	8-8-2[2]	20-20-5[2]	10-34 0[3]	13-38-0[3]
April 1	100 lbs.	40 lbs.	7 qts.	6 qts.
April 15	100 lbs.	40 lbs.	7 qts.	6 qts.
May 1	100 lbs.	40 lbs.	7 qts.	6 qts.
June 1	100 lbs.	40 lbs.	7 qts.	6 qts.
July 1	100 lbs.	40 lbs.	7 qts.	6 qts.
Aug. 1	100 lbs.	40 lbs.	7 qts.	6 qts.
Sept. 1	100 lbs.	40 lbs.	7 qts.	6 qts.
Oct. 1	100 lbs.	40 lbs.	7 qts.	6 qts.

[1]Start when water temperature reaches 60 F. This may be earlier or later than April 1. Use the 16-18 inch visibility test to determine fertilizer application dates. Ponds may or may not need fertilization monthly.
[2] These are granular fertilizers.
[3] These are liquid fertilizers.

Triploid Chinese grass carp (*Ctenopharyngodon idellus*) are legal by permit in Tennessee and are useful for biological control of aquatic weeds and algae. Stocking 10 to 15 grass carp per surface acre will control weed problems in most ponds. Even so, there may be times when specific herbicides for specific weeds will be required.

A pond fertilization program is started in early spring after the water temperature reaches 60 F. Research has shown that fertilizers high in phosphate with some nitrogen get best results in most ponds. Ponds in some areas require potash so it is included in the mixtures. Such fertilizers as 8-8-2 or 20-20-5 can usually be found at farm supply stores. Apply 100 pounds of 8-8-2 or 40 pounds of 20-20-5 per acre per application until proper color develops in the pond water. Liquid fertilizers like 10-34-0 and 13-38-0 have been shown to give good results. Usually, two consecutive applications of fertilizer at two-week intervals at the start and one per month thereafter through October will establish and maintain a good plankton bloom.

Water color can be used as an indicator to determine the need for fertilization. A good test for proper water color is to submerge a bright object fastened to the end of a stick. Visibility of the object 18 inches below the surface indicates the need for fertilizer. If the object disappears at 16-18 inches, no fertilizer is needed.

The most efficient method of granular fertilizer application is to place it on a submerged platform 12 to 18 inches under water. Wind and wave action distribute the nutrients into the water. The fertilizer required annually is reduced 20-40 percent because a lesser amount becomes tied up in the soil than occurs when it is distributed on the bottom of the pond from the bank or a boat. A single platform can supply fertilizer to a pond up to 15 acres. Since it is heavier than water, liquid fertilizer should be diluted with water at a 1:10 ratio and scattered on the pond surface. About 7 quarts of 10-34-0 per application will be required.

To grow plankton efficiently in a pond, adequate lime must be maintained. If a satisfactory plankton bloom has not developed after three fertilizer applications, the pond water hardness should be checked. Analysis of a pond bottom soil sample will determine the need for lime. If needed, agricultural lime should be broadcast over the pond during the winter.

Fishing

The goal of pond management is good fishing. Fish removal is necessary if fish population balance is to be maintained, but sensible, controlled harvest is very important. Each species serves a special purpose in a farm pond. Bass 8 to 12 inches are the key to maintaining the correct fish population balance and should not be removed. A maximum harvest of 30 to 55 pounds of bass per fertilized acre each year coupled with proper removal of sunfish is recommended.

Bluegill and redear provide most of the harvestable fish from a farm pond. When fishing is begun in a new pond, the stocked sunfish will average about one-fourth pound. Unless they are harvested, a static population will result. Ponds with the best fishing need 4 to 5 pounds of bluegill removed for each pound of bass. In fact, a good procedure is to remove every bluegill that is caught, since they reproduce quite rapidly.

It is very difficult to have outstanding fishing of both bluegill and bass in the same pond. Slightly crowded bass reduce the bluegill population and more food is available for each survivor. As a result, the bluegill grow to a larger size. When bluegill are crowded, larger bass may result, but the bluegill will be smaller because less food per fish is available.

Table 3
Recommended Annual Harvest Per Acre from a Fertilized Farm Pond

Kind of Fish	Number	Average Weight (lbs.)	Total Weight (lbs.)
Largemouth bass	30	1.5	45
Sunfish (bluegill and redear)	400	0.3	120
Channel catfish	30	1.5	45
Total Harvest			210

The harvest of fish needs to be extended throughout the year. A large harvest, particularly of bass, during a short period of time in early summer, can result in population imbalance. Delay of fish harvest until early June after bass have spawned is a very good management practice. The most favorable situation for maintaining fish population balance results when fish are harvested regularly and moderately at about the same rate that they are being produced. Sunfish and bass in good condition and a variety of sizes taken in the catch are indicators that the fish population is balanced.

Fish population balance can be determined for certain from seine samples taken with a 10 ft x 4 ft minnow seine during the summer. An average of two fingerling largemouth bass and recent bluegill reproduction indicates the fish population is balanced. No recent reproduction and many stunted bluegill indicate an unbalanced population. Stunted bluegill typically have thin bodies and eyes that appear too large for their body size. Pond renovation is the recommended practice in such instances.

Farm pond management takes both time and money, but the benefits are rewarding. Nothing is more aesthetically pleasing than a well managed pond on the landscape. Nothing provides more excitement and thrill than the pull of a fish on a line. And just think, bass and bluegill are excellent food fish. How many other enterprises do you have on the farm which provide as much food and fun?

Table 4
Fish Population Analysis from Fishermen Catch

Situation	Catch	Population Condition
1	Largemouth bass-all sizes being caught, (average 1 to 2 pounds), bluegill—various sizes being caught (6-inches and larger)	Balanced
2	Largemouth bass—mostly less than a pound, bluegill various sizes (average 0.3 pound or larger)	Temporary balance, bass heavy
3	Largemouth bass—very few and large (average over 2 pounds), bluegill—many 3 to 5 inches	Unbalanced, overcrowded bluegill
4	Small crappie, various sunfish, bullheads, shiners, carp, suckers	Unbalanced, species competition for food supply of bass and bluegill

Table 5
Fish Population Analysis from Seine[a] Samples

Situation	Seine Content	Population Condition
1	No young largemouth bass, many recently hatched bluegill, very few intermediate bluegill	Temporary balance, bass either overcrowded or too small to spawn
2	No young largemouth bass, no recent hatch of bluegill, many intermediate bluegill	Unbalanced, bluegill overcrowded, bass few but larger than 1.5 pound each
3	No young largemouth bass, no recent hatch of bluegill, many intermediate blueglil, plus many tadpoles, minnows or crayfish	Unbalanced, bluegill overcrowded, very few or possibly no large bass
4	No young largemouth bass, no recent hatch of bluegill, few intermediate bluegill	Unbalanced, crowding by other species like shad, bullheads, shiners, carp, crappie or suckers
5	No young largemouth bass, no recent hatch of bluegill, no intermediate bluegill	Water may be too cold for bass spawning or the silt load in the water may be too great
6	Young largemouth bass present, many recently hatched bluegill, few intermediate bluegill	Balanced
7	Young largemouth bass present, many recently hatched bluegill very few or no intermediate bluegill	Temporary balance, but bass overcrowded
8	Young largemouth bass present, no recent hatch of bluegill, few intermediate bluegill	Over abundance of bass after spawning. May result when pond was fertilized last year unfertilized in current year. Sometimes due to overcrowding by other fish species that reached a competitive size in late spring or early summer
9	Young largemouth bass present no recent hatch of bluegill, no intermediate bluegill	Bluegill absent from the pond or unable to reproduce. Water may be too cold
10	Young largemouth bass present no recent hatch of bluegill, many intermediate bluegill	Unbalanced. Not overcrowded with bluegill as badly as in situation 2

[a]For use in ponds during the second and subsequent summers after stocking with largemouth bass and bluegill. Use a 4 ft x 10 ft minnow seine with 1/8 inch mesh to take samples from several areas around the pond.

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PB1231-1M-10/99 (Rep) E12-2015-00-152-00

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