

# Fish In Ponds and Lakes: Making Good Management Choices

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Fish Management in New York Ponds Web Site:  
<http://pond.dnr.cornell.edu/>

Let's say that you just moved to a large place in the country that has an attractive pond. You've finished getting settled, and the kids have started to ask about fishing in that pond. Of course, you recall the real estate ads that you saw while you searched for your new rural home, each of which proclaimed, "Great Pond for Fishing!" So now you want to enjoy some of that good fishing.

When you first walk along the shoreline you see dozens of frogs leaping into the water (they remember those kids), some "weeds" and hundreds of small fish nibbling at the surface. The kids keep telling you that they've seen some "really big ones", but you begin to wonder. One evening, you catch a dozen or so small sunfish, then give up. This isn't what you had in mind. Afterwards, you remember the conversation that you had with the previous owners, who mentioned that the pond didn't contain any fish worth catching.



So what can you do to make this a "Great Pond for Fishing?"

Raising fish in New York ponds cannot be done using a "cookbook", due to the varying environmental conditions found throughout the state. Many different types of ponds are found on private property. You will also

learn that any dream of finding a pond that will provide good fishing, for many years, at a low cost, and with little management effort is unrealistic. But if you are willing to experiment a bit and can accept the challenge of managing your own aquatic ecosystem, you can satisfy your goal of successfully raising fish in a private pond. But first, you will have to determine a few things about your pond ecosystem.

## Habitat

From a fish's perspective, habitat includes all of the physical and chemical features of their aquatic environment. Habitat also includes some biological components. For example, to a fish, aquatic plants provide physical structures that define the habitat they occupy. It's important to focus on a few key habitat elements.

## Temperature

The most fundamental habitat characteristic that determines what type of fish can live in a particular New York pond is temperature. Most ponds can be categorized as either coldwater ponds (water temperatures seldom exceed 74°) or warmwater ponds (water temperatures regularly exceed 74°). This distinction is made largely to identify whether ponds can sustain various trout species. If they can, they are considered to be coldwater ponds, if not, they are generally considered to be warmwater ponds.

Water temperature is determined both by the water source and geographical location of the pond. Potential water sources for a pond include surface runoff, streams, springs, and wells. Cold water temperatures in New York ponds are usually maintained

by groundwater inputs from underground springs. Groundwater usually maintains much colder temperatures during the summer than surface water sources – such as runoff and streams – which are heated by the sun’s radiation and warm summer air. Warmwater ponds are usually isolated from groundwater sources, and are found throughout the state. Only a few locations at high elevations in the Adirondacks and Catskills are cool enough during the summer such that cold water temperatures are maintained without groundwater inputs.

### *Depth*

Ponds are usually constructed with depths between 6 and 8 feet, and with a maximum depth not greater than 10 to 12 feet. Natural ponds can be found with a wide variety of depths. An average depth of less than 6 feet greatly increases the probability of aquatic vegetation becoming established in the pond, and depths greater than 12 feet are not necessary for good fish production. Steep pond slopes help prevent the growth of nuisance aquatic vegetation, which can also become an important feature of the pond habitat. Vegetation isn’t necessarily bad for fish production. In fact, in many inland lakes vegetation provides important nursery and feeding habitat, but a pond choked full of vegetation seldom provides good fish habitat.

### *Water Quality*

Phosphorus and nitrogen are familiar nutrients that we use to fertilize gardens and house plants. These nutrients also enrich the growth of aquatic vegetation such as algae and rooted pond vegetation, thereby controlling pond productivity. Most New York ponds have enough available nutrients to support fish production, and a more common problem is the presence of excessive nutrient levels. Watershed land uses influence nutrient levels and water quality. Runoff from cropland can increase the amount of sediment reaching the pond and may cause excessive turbidity. Runoff may also contain potentially toxic agricultural chemicals, and runoff from pastures and livestock holding areas is rich in nutrients

from animal wastes. Residential, urban, and industrial runoff may contain substances (such as chemicals, oils, and sediment from construction activities) that can adversely affect a pond’s water quality.

Oxygen levels are another important aspect of pond water quality. High nutrient levels that produce algae blooms eventually result in decaying vegetation that use up available dissolved oxygen. Fish kills often result from a lack of oxygen or, under extreme circumstances, the presence of toxic algae. During hot weather most ponds have a layer of water near the bottom that contains little or no dissolved oxygen. When high winds or cold rain cause this water to mix with the upper pond water, oxygen levels often drop to levels that can kill fish.

### *Spawning Habitat*

With rare exceptions, trout will not reproduce in farm ponds. This is because most ponds lack suitable spawning habitat, which for trout consists of a gravel area through which groundwater flows during winter months. Groundwater provides over-wintering eggs with fresh oxygen-rich water and keeps them from being smothered by silt deposits.

Sunfish seldom suffer from a failure to reproduce. Instead, they have the opposite problem in farm ponds: overpopulation. Sunfish spawn in late spring over nests that are swept clean of silt and guarded by adults. These fish can reproduce in warm shallow areas to such an extent that they outstrip the pond’s ability to produce enough food to sustain steady growth, resulting in a population of “stunted” fish.



## **Fish Suitable for Farm Ponds**

### *Trout*

Various kinds of trout have been tested in central New York farm ponds, including brook, brown and rainbow trout, as well as various trout hybrids (such as brook-brown and brook-lake crosses). All of them survive equally well in farm ponds, with the possible exception of the brook-lake hybrids. Trout survival through the summer months is often the greatest challenge, due to their inability to tolerate warmer temperatures. Trout stocked as 2-inch spring fingerlings have a lower survival rate than fish stocked as 5½-inch fall fingerlings. Larger fish have higher survival rates, but these fish are also more expensive to purchase.

Rainbow trout are the most popular trout for pond stocking, and brook trout are also recommended. Brown trout are less popular because they are more difficult to catch, and therefore provide poor fishing. Older brown trout also prey heavily on fingerlings introduced for re-stocking.

It is reasonable to stock trout at a density of 600 fish per acre, but this number can be adjusted up or down according to pond habitat conditions, such as depth and water quality. Initially, it is probably best to stock a smaller density of fish, then adjust future stocking rates upward if you are satisfied with the results of your initial stocking experiment. One trick to being a successful pond manager is to be willing to experiment with various stocking regimes to determine what works best in your situation.

Trout can be stocked in ponds without other fish, where they will feed upon aquatic insects and other small pond crustaceans. If large trout are stocked in ponds with minnows, these forage fish will provide an additional boost to trout growth rates. It is unusual to find trout surviving into their third year after being stocked into a farm pond, so it is reasonable to harvest these fish within a year or two after stocking.

### *Bass and Bluegills*

Adult largemouth bass are predators upon smaller fish, which means that they must be

stocked in a pond that contains forage fish. Largemouth bass are popular for angling, because they put up a real battle when caught by hook and line. Farm ponds in the southern U.S. are frequently stocked with combinations of largemouth bass and bluegill sunfish, since the bluegill reproduce easily and small bluegill provide food for the larger bass. Hybrid sunfish are now sometimes used in place of bluegill. These hybrid fish are a cross between two different sunfish species, usually a bluegill and a green sunfish. Hybrid sunfish spawn less prolifically than bluegill because most of these fish are males.

Good initial stocking rates for bass and bluegill would be around 500 sunfish and 100 bass per acre. Again, these stocking rates may be adjusted as you become more familiar with your pond conditions.

Another alternative is to stock golden shiners or fathead minnows as forage for largemouth bass. In such ponds the shiners or minnows will likely disappear after several years due to predation by the bass. Though this can be an expensive alternative, good bass growth rates can be sustained by continuing to stock abundant forage fish in ponds where your goal is to produce largemouth bass for angling.

## **Determining Balance**

When is a fish population in balance? How can I determine if a balanced condition exists in my pond? These are two questions often asked by pond owners. Actually, a truly balanced condition never exists in a pond, or the balanced condition might be one that does not produce satisfactory fish for purposes of recreation. Fish populations continually change and never reach the state of equilibrium, or general stability, often referred to as balance. Fisheries biologists sometimes use the term to describe satisfactory relationships between the predator and prey populations in a pond, in which case they are usually identifying three factors as being present:

(1) Fish of harvestable size;

- (2) Annual reproduction;
- (3) A combination of fishes, including at least one predator species.

However, achieving all three factors is not easy to attain in many farm ponds. Figuring out what's possible in your pond will require a flair for experimentation, good observation, and some patience.

Good initial steps are:

- Survey the physical structure of your pond (surface area and depth profile);
- Measure pond water temperatures at a variety of depths through all seasons;
- Identify likely sources of water and nutrient inputs;
- Find out what types of fish currently live in the pond.

Based on these initial observations, you can then proceed to stock New York ponds with either trout or a bass-forage fish combination. From this point onward, you have taken on the responsibility of managing your pond. You will need to observe the abundance and growth of these fish over the next two years, then continue to adjust your management practices as you learn more, based on your observations, about what has been successful.

Good luck, and enjoy the challenge!

## **Additional Information**

### *General Information*

Cornell Cooperative Extension maintains a "Fish Management in New York Ponds" web site at:

<http://pond.dnr.cornell.edu/>

This web site contains up-to-date information about pond habitat assessment, fish stocking, fish suppliers, common pond problems, and also includes a form for submitting email questions regarding fish management in New York ponds.

### *Pond Construction*

"Ponds - Planning, Design, Construction."

This booklet is USDA Natural Resources Conservation Service (NRCS) Agriculture Handbook 590. It contains detailed information on design surveys, site selection, drainage area, pond layouts, soil analysis and spillway construction. Contact your county NRCS office to obtain a copy.

### *Permit Requirements*

For additional information on permit requirements for stocking fish in farm ponds, as well as contact information for fish suppliers, contact the nearest regional office of the New York Department of Environmental Conservation.

Regional DEC Offices:

*Region 1* Suffolk and Nassau counties (631) 444-0354

*Region 2* Manhattan, Bronx, Queens, Brooklyn and Staten Island (718) 482-4900

*Region 3* Sullivan, Ulster, Orange, Dutchess, Putnam, Rockland and Westchester counties (914) 256-3000

*Region 4* Montgomery, Otsego, Delaware, Schoharie, Schenectady, Albany, Greene, Rensselaer and Columbia counties (518) 357-2234

*Region 5* Franklin, Clinton, Essex, Hamilton, Warren, Fulton, Saratoga and Washington counties (518) 897-1200

*Region 6* Jefferson, St. Lawrence, Lewis, Oneida and Herkimer counties (315) 785-2239

*Region 7* Oswego, Cayuga, Onondaga, Madison, Tompkins, Cortland, Chenango, Tioga and Broome counties (315) 426-7400

*Region 8* Orleans, Monroe, Wayne, Genesee, Livingston, Ontario, Yates, Seneca, Steuben, Schuyler and Chemung counties (585) 226-2466

*Region 9* Niagara, Erie, Wyoming, Chautauqua, Cattaraugus and Allegany counties (716) 851-7000