

POND MANAGEMENT



Stocking Fish in Indiana Ponds

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Introduction

Fish stocking in a pond is like a retirement plan — you need to have a vision of your ultimate goal. You want to start off in the right direction or your long-term investment may not pay the dividends you had hoped for. You may be able to tweak and adjust along the way, but this will cost you more to achieve your long-term goals. Depending on your pond, a poor start to your investment may not be able to be fixed down the road. The best place to start is by stocking native fish that historically thrived in the Midwest. The four fish species commonly stocked in Indiana ponds — bluegill, redear sunfish, largemouth bass, and channel catfish — provide good fishing opportunities and food for the table. Bluegill and redear also provide essential food for largemouth bass, while largemouth bass are an important predator of bluegill and redear, helping to keep their population numbers in check. It is important to keep fish populations balanced so that they don't overpopulate and become stunted. Channel catfish can be stocked on their own or in combination with the other three species. Channel catfish do not contribute strongly to the predator-prey relationship in ponds and they do not pose a major threat to growing bass and bluegill of desirable size. However, channel catfish may require periodic restocking to maintain populations due to poor reproductive success in Indiana ponds.



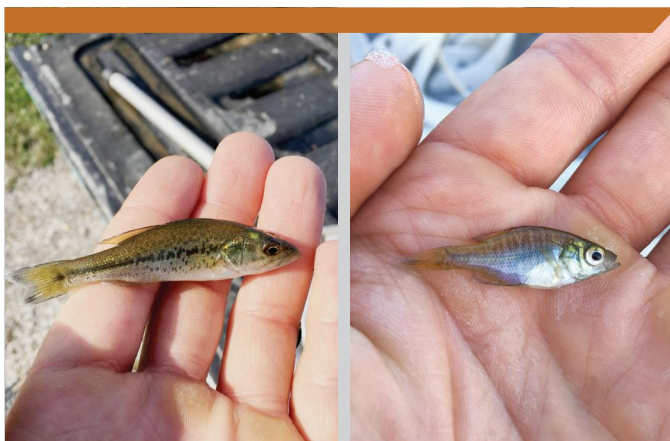
Largemouth bass (top), bluegill (middle-left), redear sunfish (middle-right), and channel catfish (bottom) are excellent species to stock in Indiana ponds. Illustrations by Duane Raver, USFWS

Balanced fish populations help prevent overcrowding and stunted fish

Newly constructed or renovated ponds without fish require a different fish stocking approach compared to ponds with existing fish populations. In newly constructed or renovated ponds, fish can be stocked as water levels in the pond reach at least 5 feet and dissolved oxygen (DO) is at least 5 ppm (parts per million). If you are concerned that water levels or DO are not entirely suitable, partially stocking fish over 2 seasons may promote better fish survival and stocking success. Ponds containing existing fish populations should first be assessed to determine the number and size of species present to determine if stocking new fish is appropriate.

Stocking new or renovated ponds with no fish present

It is recommended that new or renovated ponds containing no fish be stocked with fingerlings, which are small juvenile fish. Research has shown that stocking fingerlings rather than adults increases the likelihood of achieving a well-balanced fish population. This is because fingerlings of the four main species will grow with one another and become accustomed to pond conditions before they are sexually mature. In contrast, newly stocked adult fish can have unpredictable reproduction, which may result in unbalanced populations. For example, adult bluegill may have more successful reproduction than adult largemouth bass, leading to an overpopulation of bluegill and a pond that quickly becomes imbalanced.



A fingerling largemouth bass (left) and bluegill (right). Fingerlings should be stocked in new or renovated ponds to encourage balanced fish populations. Photo by Tevin Tomlinson

You have many options when it comes to stocking a new or renovated pond containing no fish. Most options require both largemouth bass (predator) and bluegill or redear sunfish (prey). Stocking one without the other will result in imbalanced fish populations and poor stocking success. Recommended combinations are:

1. Largemouth bass and bluegill
2. Largemouth bass, bluegill, channel catfish
3. Largemouth bass, bluegill, redear sunfish, channel catfish
4. Catfish only

Largemouth bass (predators) and bluegill (prey) keep fish populations in balance

Once you decide on a stocking option for your pond, you can determine how many fish to purchase and stock. It is important that the correct ratio of species is stocked into a new or renovated pond to create sustainable and balanced fish populations. The recommended stocking ratio is 5 bluegill to 1 largemouth bass. The Indiana Department of Natural Resources (IDNR) recommends stocking 1,000 bluegill and 200 largemouth bass per surface acre of pond. If redear sunfish are also desired in the pond, stock 250 redear, 750 bluegill, and 200 largemouth bass per surface acre. At this stocking rate, active fish management (including some harvest) will be required to minimize overpopulation. Stocking at a rate that is higher than recommended may cause poor fish growth due to a lesser amount of food being available for each fish. Stocking at a very low rate (e.g. 250 bluegill to 50 bass per acre) may limit competition between fish and cause an unbalanced and/or overpopulated pond. Fingerlings should be obtained from a licensed fish hatchery or fish distributor.

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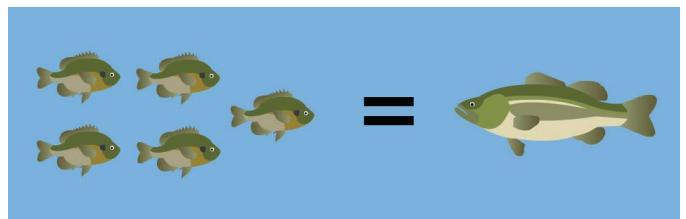


Illustration by Jade Layman



Recommended stocking numbers and sizes for new ponds			
	Fish species	Number per surface acre	Length
Stocking option 1	Bluegill	1000	1-2 inches
	Largemouth bass	200	3-4 inches
Stocking option 2	Bluegill	1000	1-2 inches
	Largemouth bass	200	3-4 inches
	Channel catfish	200	4-6 inches
Stocking option 3	Bluegill*	750	1-2 inches
	Redear sunfish*	250	1-2 inches
	Largemouth bass	200	3-4 inches
	Channel catfish	200	4-6 inches
Stocking option 4	Channel catfish	200	4-6 inches

* In stocking option 3, the number of redear stocked will depend on the number of bluegill stocked and vice-versa.

Replacing a portion of bluegill with hybrid sunfish is also common. If you wish to only stock hybrid bluegill and largemouth bass, a stocking ratio of 10 hybrid bluegill to 1 largemouth bass (10:1) is recommended. For example, you could stock 2,000 hybrid bluegill and 200 largemouth bass per surface acre. Hybrid sunfish, also known as hybrid bluegill, are a cross between green sunfish and bluegill and are often stocked because they grow larger than pure bluegill and feed more aggressively. However, hybrid sunfish require a higher stocking rate because they have lower reproductive output compared to pure bluegill. Hybrid sunfish can breed with pure bluegill if stocked with one another. Spawning between hybrid sunfish and pure bluegill may produce offspring that lack the aggressiveness and size that the hybrid sunfish originally had, making them less desirable than their hybrid parent. Management of fish populations with hybrid sunfish will prove to be more difficult over time, compared to populations of pure bluegill.

Channel catfish fingerlings should be stocked at a rate of 200 individuals per surface acre. At this rate, channel catfish will not significantly compete for food or space with bass and bluegill.

For ponds less than 1 acre in size, achieving sustainable bass and bluegill populations at sizes desirable for catching and eating can be difficult. An alternative is to stock only channel catfish for sport and food. This option is known as a “put-and-take” pond, meaning channel catfish will be grown, harvested, and replaced by other channel catfish in the future. The catfish population may require supplemental feeding to assist with growth, but otherwise, this option requires minimum management effort by the owner. Supplemental feeding may cause algal blooms in the pond, so precautions, such as not feeding during rainy and cloudy weather, should be taken to prevent overfeeding. Always follow feeding instructions on the product label.

A common misconception is that stocking 1,000 fingerling bluegill per surface acre is too many and that a lower stocking rate will decrease the chances of overpopulation. This is not true. In fact, the opposite is often true. If fewer bluegill are initially stocked, there will be less competition between bluegill, and more young will survive. These survivors will then reproduce, and another generation of young bluegill will have a greater chance of survival. With less competition for space and food, the population can rapidly increase and overpopulate a pond.



Assessment of ponds with existing fish populations

It is essential to assess ponds with existing fish populations before deciding on future management, including supplemental fish stocking. Pond assessment can help determine what species of fish currently exist in a pond and the relative population sizes of these species. Pond assessment can be conducted by pond owners by simply going fishing and keeping good records. Alternatively, pond owners can work with private consultants to conduct more comprehensive pond assessments.

Supplemental stocking should be considered only after a pond assessment

The vast majority of ponds do not need supplemental stocking. Many pond owners are unsatisfied with the number of fish at a desirable size (e.g., bluegill larger than 6 inches, bass larger than 12 inches). This problem is almost always due to overpopulation, which can be helped through increasing harvest of certain fish species and sizes. Harvesting more fish can decrease competition, which allows for more available food and better growth of the remaining fish. Supplemental stocking has the reverse effect and will actually make an overpopulation problem worse. Supplemental stocking should be considered only after a pond assessment and is typically needed only after a major fish kill event.

Northern strain largemouth bass

There are two main strains of largemouth bass: a northern strain and a Florida strain. Florida strain largemouth bass grow faster and larger at warm water temperatures and are stocked in many reservoirs in the southern region of the U.S. While it may be tempting to stock Florida strain largemouth bass to have trophy-size fish, Florida strain bass are less tolerant of low temperatures and do not survive well in northern parts of the U.S. In northern ponds, temperatures can cool faster, reach a lower temperature, and stay at lower temperatures in ponds for a longer period of time compared to large reservoirs. As such, Florida strain largemouth should not be stocked in Indiana ponds. Though northern strain largemouth do not grow as fast, they can still grow to weigh as much as 10 pounds — a desirable trophy size for many anglers. Northern strain largemouth bass are recommended in Indiana ponds.

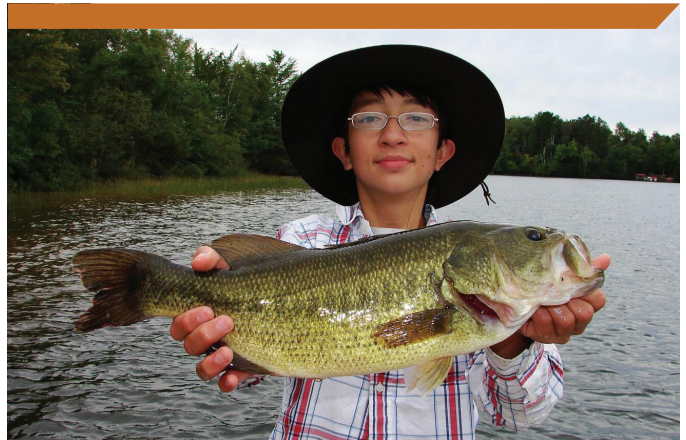


Photo by Jason Jaworski



Northern strain largemouth bass can reach over 10 pounds and are recommended for Indiana ponds. Photo by Mitchell Zischke

Stocking fathead minnows

Fathead minnows can be stocked in a pond to provide a supplemental food source to promote strong early growth of largemouth bass. Fatheads are frequently stocked in ponds before other species are introduced. The recommended stocking rate of fathead minnows is 3 pounds (750-1000 fish) per surface acre. Unlike other baitfish species, such as shiners and shad, fathead minnows never reach a size that is too large to be consumed by largemouth bass. This means that they are unlikely to overpopulate a pond, but it also means that fathead populations may persist for only a year or two in the presence of bass. Stocking fathead minnows into an established fish population is not advised because they will be consumed quickly, serving only as expensive fish food for a short period of time. To maintain a fathead minnow population in a pond, fatheads may need to be constantly restocked.



Fathead minnows consume mostly plant material; therefore, competition between fatheads and bluegill should not be a problem. Fathead minnows breed and reproduce many times during the summer and deposit their eggs on the underside of structure or vegetation.



Stocking fathead minnows can promote strong early growth of predatory fish, such as largemouth bass.

Illustration by Duane Raver, USFWS

To give fatheads greater surface area for egg deposition and promote more successful reproduction, pond owners can place floating wood or foam boards in the pond. This can help to increase overall number of fatheads in the pond, help the pond owner maximize the value of their monetary investment on fathead minnows, and provide more forage for predatory fish, like largemouth bass.

Keep in mind there are 58 species of minnows in Indiana. Collecting "minnows" from a lake or stream or even buying minnows from a bait store to supplement forage in your pond is very risky and may cause severe problems in your pond. Also, largemouth bass predation is important for controlling bluegill populations and you want bass to eat bluegill of all sizes. Stocking fathead minnows may divert bass feeding habits away from eating bluegill and cause imbalanced populations. Fathead minnows should be obtained from a licensed fish hatchery or distributor.

Stocking fish to control vegetation

Grass carp and tilapia are two species that can be stocked in ponds to help control aquatic vegetation. Grass carp eat rooted, submergent plants and can help control certain species of pondweed. They will not eat emergent plants like cattails or floating plants like duckweed. Grass carp can live for a long time, but they become less effective at controlling pondweeds after about 5-7 years and may require restocking. Grass carp must be obtained from a licensed fish hatchery. The recommended stocking rate is 10-15 grass carp per acre of vegetation.

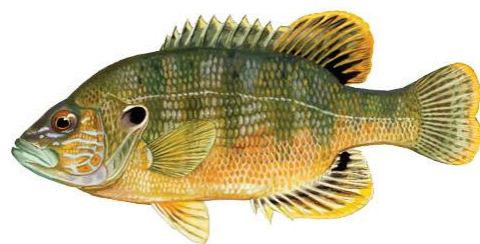
Tilapia eat floating plants like duckweed and watermeal, as well as filamentous algae. They do not eat emergent plants and may only occasionally eat pondweeds. Tilapia cannot tolerate the cold and will die at water temperatures below 55°F. This means that tilapia are an annual fish in Indiana ponds:

They require restocking in the spring each year. In the fall, tilapia should be harvested from a pond before they die as the decomposition of dead fish will lower dissolved oxygen and may result in a fish kill. The recommended stocking rate is 15-20 pounds of tilapia (~100-200 fish) per surface acre.

Other species

The species best-suited for Indiana ponds are largemouth bass, bluegill, redear sunfish, and channel catfish. While some pond owners may wish to stock other species, this should be avoided unless working with a pond consultant. Most other species can cause problems such as overpopulation, competition with desirable fish species, and destruction of habitat. For example, popular sport fish such as crappie and yellow perch are best-suited to large water bodies greater than 10 acres in size (e.g. lakes and reservoirs). Both crappie and yellow perch have very high reproductive rates and can quickly overpopulate a pond, resulting in small, stunted fish. These species also compete with largemouth bass and bluegill for food. At the juvenile stage, yellow perch and crappie will compete with bluegill by consuming zooplankton, and at the adult stage, yellow perch and crappie will compete with largemouth bass by consuming small fish.

Other examples of fish species that should not be introduced into ponds are green sunfish, pumpkinseed, warmouth, longear sunfish, gizzard shad, golden shiners, common carp, and bullhead catfish. These fish species can easily overpopulate, outcompete desirable species and cause an imbalanced pond.



Green sunfish (top) and yellow bullhead (bottom) are two examples of species that can cause major problems and should not be stocked into Indiana ponds. Illustrations by Duane Raver, USFWS

Dissolved oxygen – fish need it to live

All fish require certain levels of dissolved oxygen (DO) in the water to survive. Therefore, it is important to consider the DO levels in your pond before stocking fish. Dissolved oxygen fluctuates based on the time of day, time of year, temperature, amount of submerged vegetation, and water level of a pond. Water at lower temperatures will have more DO than water at higher temperatures; therefore, ponds typically have higher DO in spring and fall than during the summer. Submerged vegetation, such as algae and pondweeds, add DO to water via photosynthesis; therefore, maintaining a healthy amount of aquatic vegetation is important for DO as well as fish habitat. And because photosynthesis does not occur at night, DO levels are typically the lowest right before sunrise and highest at sunset.

Stock fish when dissolved oxygen is high to reduce stress to fish

While fish can be stocked into a pond anytime from spring to fall, it is recommended that the high temperatures, low dissolved oxygen levels, and lower water levels of summer be avoided. Remember that fish are an investment and you don't want to risk losing that investment due to a poor or failed fish stocking. There will always be a spring and fall, so there is no reason to risk your investment by stocking fish when weather conditions are unsuitable. However, the timing of fish stocking may depend on fingerling availability from hatcheries. If stocking fish in summer is unavoidable, it is recommended that you stock fish in the evenings on relatively cooler days. This will assist in decreasing some stress and increase the likelihood of survival.



Low dissolved oxygen is the most common cause of fish kills in ponds. Photo by Ron Bedwell

Fish health

An important factor to consider when stocking fish in a pond is the overall health of the fish being stocked. Fish should be handled carefully so that as little stress is caused to them as possible. If stocking fish yourself, careful hauling and handling is important. Quickly moving fish from a supplier to your pond is essential. The longer the fish are in transport the greater the chance of oxygen depletion in the hauling container. Using aeration systems to sustain dissolved oxygen levels in your hauling container is highly recommended. Fish distributors may also place fish in bags filled partially with water and oxygen for deliveries.

Acclimating fish to pond water is important to reduce stocking stress

Fish that are stocked into a pond have to make many adjustments to their new home. The larger these adjustments are, the more "stocking stress" fish will experience. Reducing stocking stress as much as possible will result in better fish survival rates and a greater return on investment. The best method for reducing stocking stress is by acclimating fish prior to release into a pond. Acclimation can be achieved by adding small amounts of pond water to the stocking container over a 30-minute period. If fish are in



Slowly adding pond water to a fish-hauling container will acclimatize fish to their new environment and reduce stocking stress. Photo by Tevin Tomlinson

plastic bags, these bags can be placed in a shaded area of the pond for a 30-minute period. Acclimating the fish to the pond water temperature will reduce the likelihood of death due to shock. Releasing fish with less than a 5°F temperature difference between the stocking container and pond water is recommended to reduce the chance of stress. After at least 30 minutes of acclimation, it is time to slowly and gently release the fish into the pond.



Photo by Dan Cox, USFWS

Fish should be sourced from a high-quality, reliable distributor

Ponds should be stocked with fish sourced from a licensed fish hatchery to ensure reliable and healthy populations. It may seem easier to obtain wild fish from other ponds, lakes, or creeks rather than from a reliable fish distributor, but there are many problems that may be detrimental to your pond if this technique is used. First, it may be difficult to catch the right size and number of fish for stocking a pond, which could result in unbalanced populations. Also, wild-caught fish may have diseases that can be transferred to your pond. Fish species identification may be difficult, and problem species, like bullheads or sunfishes, may be mistakenly stocked in place of channel catfish and bluegill, which may cause many problems in your pond. Rectifying disease or problem-fish issues may require complete draining of a pond and restocking.

Conclusion

Properly stocking your pond with the correct number of the recommended species at the right size are all important steps in creating a healthy and well-balanced pond that will provide good fishing into the future. For more information on pond management go to extension.purdue.edu/pondwildlife or contact Dr. Mitchell Zischke at mzischke@purdue.edu.

Publications cited

Fathead Minnows in New Ponds and Lakes. Missouri Department of Conservation – Fish and Other Aquatic Life, 2pp.
How to Assess Your Fish Population, Kentucky Department of Fish & Wildlife Resources, 2014.

Indiana Fish Pond Management, Indiana Division of Fish and Wildlife, Indiana Department of Natural Resources, 24pp.
Managing Mississippi Ponds and Small Lakes: A Landowners Guide. Fifth edition revised by W. Neal, D. Riecke & G. Clardy, 2015. Mississippi State University Extension Publication 1428, 50 pp.
Missouri Pond Handbook. Authored by K. Perry, D. Jayne, M. Smith & A. Branson, 2015. Missouri Department of Conservation, 69pp.
Ohio Pond Management Handbook: A Guide to Managing Ponds for Fishing and Attracting Wildlife. Authored by M. Austin, H. Devine, L. Goedde, M. Greenlee, T. Hall, L. Johnson & P. Moser, 2015. Ohio Department of Natural Resources, Division of Wildlife, 42pp.
Pond Measurements: Area, Volume and Residence Time, Penn State Extension, Pennsylvania State University, 2017.
Producing Fish and Wildlife from Kansas Ponds: 4th Edition. Authored by D. Gabelhouse, Jr., R. Hager, H. Klaasen, R. Schultz & D. Teasley, 2004. Kansas Department of Wildlife and Parks, Natural Resources Conservation Service, Kansas State University, 55pp.
Sport Fish Management in Ponds. Authored by G. Burtle & G. Lewis, 2014. University of Georgia Extension, 15 pp.

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Photo by Ryan Hagerty, USFWS

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