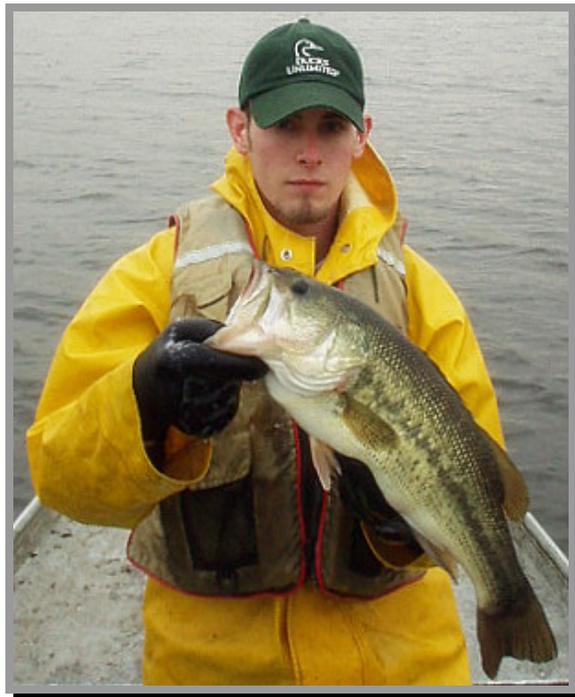


# Bass Fishing on the Beds: *An Indiana Perspective*

A summary presented to the  
Indiana Lakes Management Work Group



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## **Bass fishing on the beds – An Indiana perspective?**

To fish – or not to fish – during the largemouth bass spawning season in spring is one of the most persistent controversies among Hoosier anglers, especially in the natural lakes region in the northern part of the state. Although Michigan has some restrictions on spring bass fishing, current Indiana rules allow bass fishing year-round.

Anglers who fish for largemouth bass during the spawning season do not think that it hurts bass reproduction or harms fishing quality, nor do they believe it is unethical. Anglers who do not fish for bass during spring think it ought to be illegal. They say taking bass off the beds hurts bass reproduction, harms fishing quality, and is unethical. Fisheries biologists, faced with the challenge of balancing resource protection with maximizing fishing opportunities, are caught in the middle of the controversy. As scientists, their role is to gather technical information to address the issue and provide recommendations to advisory boards, policy-makers, and ultimately regulatory agencies.

To focus attention on the issue, the Biology Subcommittee of the Indiana Lakes Management Work Group requested in 2007 that the Indiana Division of Fish and Wildlife summarize the best available scientific data on the status of largemouth bass populations in Indiana natural lakes and, specifically, re-evaluate the need for a bass closed season during spring. In doing so the Work Group encouraged the Division to address the following questions:

### **LAKE MANAGEMENT WORK GROUP QUESTIONS:**

- 1. What are the current regulations on bass fishing during the spawning period in neighboring states and what is the contribution of out-of-state anglers in bass tournaments in northern Indiana during restrictive periods in other states?*

Many states, including Indiana, enacted closed seasons to protect spawning bass in the late 1800s. As early as 1889, Indiana University ichthyologist David Jordan recommended that Hoosier bass be protected by a closed season. By the mid-1900s, however, most states lifted their bans on spring fishing based on studies that indicated fishing mortality (the percentage of fish taken by anglers) was low. At the time, more fish died from natural causes than fishing. As a result, Indiana dropped its closed season on panfish in 1948 but retained a May 1 to June 15 closed season on bass until the 1950s. Likewise, Illinois and Ohio lifted their bass seasons in 1951 and 1952.

Michigan and Wisconsin continue to limit spring bass fishing to some degree out of tradition and scientific uncertainty.

After an exhaustive review and public policy discussion, Michigan relaxed its closed season in 2006 in the southern part of the state and now allows a month-long immediate catch-and-release period from the last Saturday in April to the regular opening on Friday before Memorial Day. The state still has a closed season from January 1 to the last Saturday in April.

Wisconsin has a closed season in the southern part of the state from the first Sunday in March to the first Saturday in May and a catch-and-release season in the northern part.

New York, another state with a large number of natural lakes, also removed its closed season in 2006 and opted for spring catch-and-release fishing. Minnesota is currently the only state with a statewide closed season on bass even though an advisory council recently recommended moving toward a catch-and-release season at a few lakes on an experimental basis.

No state, however, has gone from an open season to a catch-and-release or closed season.

***What about other bass fishing rules in neighboring states?***

Largemouth bass size limits and daily creel limits in Indiana are similar to, and in some cases more restrictive than, limits in adjacent states. For example, Indiana, Michigan, and Wisconsin have a general 14-inch minimum size limit on bass, but Illinois and Ohio have no widespread size limit. Indiana, along with Michigan, Ohio, and Wisconsin, has a daily creel limit of five bass, while Illinois has a six-bass daily limit. Indiana, like other states, has also imposed special size and catch limit regulations on specific waters on a case-by-case basis.

***What is the contribution of out-of-state anglers in northern Indiana tournaments during restrictive periods in other states?***

Prior to 2006, when spring bass fishing was previously closed in Michigan, few Michigan anglers conducted tournaments in Indiana to avoid their closed season. For example, only two out of 28 tournaments (7%) were conducted by Michigan clubs at Lake Wawasee in 1997. At Lake James in 2000, only two out of 30 tournaments (7%) were conducted by Michigan clubs.

Therefore, there is little evidence to suggest that a large percentage of tournaments held at northern Indiana lakes in the spring were conducted by Michigan anglers. In addition, bass fishing tournaments are now held in Michigan during their catch-and-release season and the state imposes no specific fishing restrictions on them.

The Indiana Lakes Management Work Group has already addressed the concern that out-of-state tournament organizers come to Indiana to fish during their state's closed season.

The LMWG recommended that the Indiana non-resident fishing license fee be increased. But more importantly, the LMWG also recommended that local communities be given the opportunity to petition the Indiana Natural Resources

Commission to regulate group activities at Indiana lakes, including the placement of restrictions on fishing tournaments involving 15 or more boats. Both recommendations involved statutory changes and were implemented in 2000.

Since 2000, only two lake communities (Lake Wawasee and Sylvan Lake) have filed petitions to manage tournaments. Thirty tournament permits were issued at Lake Wawasee and 24 permits were issued at Sylvan Lake in 2007. None of these permits were issued to out-of-state organizers.

***2. How does bass fishing (i.e. taking bass off the nests either by harvest or catch-and-release) during the spawning period affect the overall number of bass?***

The overall number of bass in a lake depends primarily on habitat and the number of bass that survive from year to year. Productive lakes usually contain more bass than unproductive lakes. Lakes with good water quality, ample food, and natural characteristics are better bass producers than lakes with poor water quality, scarce food, and damaged habitat.

Few studies have shown a correlation between the number of adult spawning bass and the number of age-1 bass present a year later. The overall number of bass in a lake, and therefore the quality of bass fishing, depends more on how many bass stay healthy, grow fast enough, and survive long enough to reach large size.

Bass fishing during the spawning period, or during any period, is only harmful when anglers take more than a lake can replace. It makes little difference when individual bass are removed, whether during the spring, summer, fall, or winter if the overall number of bass taken by anglers is too high.

Biologists generally believe bass over-harvest occurs when more than 40% of the

population is annually taken by anglers regardless of the time of year. Even when over 40% are taken, bass reproduction is more than adequate to replace the missing adults with new recruits. The current 14-inch limit, as long as anglers comply with the law, in theory protects 100% of the bass, including many sexually-mature bass, up to 14 inches long.

**3. *Does removing a female bass ripe with eggs in the spring reduce egg production and does catch-and-release fishing of females, either through immediate or delayed mortality, reduce egg production?***

No. Female largemouth bass begin egg development in the fall and continue to direct energy into egg production throughout the winter up until the time of spawning. During spawning they are not involved in nest construction, maintenance, or protection of the eggs or newly-hatched fry. That role falls upon male bass. Therefore, catching and removing any specific individual female bass at any time during the year has the same effect on egg production. Eggs that are carried in a female bass caught and kept by an angler in the fall or winter are lost from production just as if the female had been taken during spawning. Likewise, removing any female right after spawning or during summer also removes her potential to produce eggs the following year.

Female bass mature sexually at about 10 inches long (age-3) and do not reach 14 inches long until age-5, so they have at least two years in northern Indiana to reproduce prior to reaching legal size. A typical female bass in southern Michigan produces 30,000 eggs per pound and successful nests contain 5,000 to 43,000 eggs, so only a few nests are needed to provide more than enough young bass to replenish the population. Based on this, no state imposes a seasonal restriction on largemouth bass fishing during the spawning period for the sole purpose of protecting female bass to boost reproduction.

**4. *Does removing a female bass affect the adult bass population in terms of reducing the number of adults per acre or bass abundance?***

No, at least no more so than removing male bass.

Estimates of the density (number per acre) of 8-inch and larger bass in Indiana natural lakes average 24 per acre. Of these, nearly half (47%) are 12 inches or longer. Assuming these figures include a 50:50 sex ratio, a typical Indiana natural lake likely has at least six sexually-mature female bass per acre. Even if half of these female bass spawn in a given year, average annual egg production would be nearly 100,000 eggs per acre. That represents one million eggs in a 10-acre lake, 10 million eggs in a 100-acre lake, and 100 million eggs in a 1,000-acre lake. Furthermore, bass populations with as few as six adults per acre have been shown to produce excessive numbers of bass fingerlings.

If fishing during the spring spawning period is reducing bass numbers in Indiana, population size should theoretically be lower than states that prohibit spring fishing. Unfortunately few estimates of largemouth bass population density were available from Michigan lakes when their closed season was in effect. Recent estimates of bass densities in Wisconsin where spring fishing is limited averaged only 7 bass per acre. That is less than one-third as many bass now present in Indiana natural lakes.

Likewise, bass densities in Indiana natural lakes are comparable to other states, including several states located south of Indiana. The number of 8-inch and larger bass captured by Indiana biologists during electrofishing surveys averages 123 per hour. In Minnesota's Lake Minnetonka, bass electrofishing catch rates are less than 50 per hour. In Ohio, Missouri, and South Carolina, bass catch rates average 57 to 74 per hour. Oklahoma biologists consider catch rates of 60 per hour indicative of high quality bass

populations, while productive reservoirs in Tennessee provide catch rates from 50 to 100 per hour. In Connecticut, catch rates of 12-inch and larger bass average 54 per hour, very similar to the average catch rate of 57 per hour in Indiana.

Current bass densities and electrofishing catch rates in Indiana natural lakes, therefore, suggest more than enough bass are present to maintain population densities and fishing quality.

**5. Does removing male or female bass reduce the number of successful bass nests?**

Theoretically yes, but not at the population level.

Just as studies have failed to show a correlation between the number of adult spawning bass and the number of age-1 bass present a year later, there is a general consensus among states that the number of bass nests and the number of successful nests have little bearing on the number of age-1 bass. What is fundamentally important is the overall number of bass taken by anglers from the population throughout the year and whether enough bass are still present above a minimum threshold to ensure adequate reproduction.

As explained in *Question #4*, Indiana natural lakes typically have more than enough adult, sexually-mature bass to produce sufficient numbers of young and these adult fish have ample opportunities to spawn before they reach legal size. Habitat characteristics and weather are more important in determining spawning success than the number of nests.

Although taking female has nothing to do with nest success, removing a male bass that is actively guarding the nest or a school of fry usually results in nest failure. Eggs and fry are vulnerable to predation. But after a point, or at high bass densities, male bass cannibalize their own young.

**6. Does the number of successful nests affect the adult population?**

No, see the answer to *Question #5*.

**7. What are the short-term and long-term mortality rates of bass caught-and-released during the spawning season?**

Estimates are that immediate (initial) fishing mortality rates of bass caught-and-released during the spring months, or during any season for that matter, are typically low and are usually less than 10%. However, long-term (delayed) mortality rates of caught-and-released bass can be much higher (up to 30% or more) depending on a variety of factors.

Post-release survival depends on how healthy the bass is originally, how big the bass is, how much the bass is harmed and played while hooked, how well the bass is handled, how soon the bass is released, where the bass is released, what the water temperature is at the time, and conditions present within live-wells or other holding facilities used before release. Because tournament anglers typically catch-and-hold bass prior to release much longer than non-tournament anglers, the observation is that delayed fishing mortality can be greater among tournament-caught fish.

Seasonal stress, whether caused by spawning activity in the spring or during warm water temperatures (>77F) in the summer, especially where largemouth bass virus LMBV is present, can contribute to delayed mortality of caught-and-released bass.

Years ago, initial mortality of bass caught-and-released in tournaments was high. As many as 60% of the bass caught-and-released in some tournaments in the 1970s died. The average was 15% but declined to an average of 6% in the 1980s and less than 2% in the 1990s as equipment and handling procedures improved.

At four tournaments at Lake Wawasee monitored by Division of Fish and Wildlife biologists in 1997, less than 1% of the bass brought to weigh-ins were dead. Only 1.4% of 783 bass brought to weigh-ins during 20 tournaments at 16 northern Indiana lakes monitored in 2001 and 2002 could not be released.

Initial mortality rates of tournament-caught bass of only 1-2% were reported in Minnesota. Maine tournaments averaged only 2%. Figures were 5-7% in Idaho and averaged 9% in Alabama. Estimates of initial mortality at six professional tournaments in Wisconsin were less than 3%. However delayed fishing mortality of tournament-caught bass held in pens for five days in Wisconsin was as high as 44%.

To date, no studies of delayed mortality of tournament-caught bass have been conducted at Indiana lakes. However, because warm water temperature is consistently the most significant variable related to initial and delayed mortality, a closed season or catch-and-release season during spring would be no more effective in reducing mortality than a closed season or catch-and-release season during warm summer months.

***8. Do tournament anglers catch more bass during Indiana's spring bass spawning period than non-tournament anglers?***

No. The average catch rate of 14- to 17.5-inch bass brought to weigh-ins at 20 tournaments monitored in northern Indiana in 2001 and 2002 was one bass per 9.9 hours of fishing and was 40% less than the average of one bass per 5.9 hours in June and July. The average catch rate of 18-inch and larger bass brought to weigh-ins in May was one bass per 200 hours of fishing and was 38% less than the average of one bass per 125 hours in June and July.

Overall angler catch rates of bass brought to northern Indiana tournament weigh-ins averaged one bass per 7.2 hours

of fishing. Catch rates varied from one bass per 2.5 hours at Winona to one bass per 48 hours at Wawasee. Tournament anglers brought an average of only 1.1 bass per person.

In a comparison of tournament and non-tournament anglers at Lake James in 2000, the catch rate by tournament anglers, including bass less than 14 inches long that were too small to be taken to the weigh-ins, was one bass per 1.3 hours of fishing. Non-tournament anglers caught bass at a slightly better rate of one bass per 1.2 hours of fishing. The Lake James comparison did not take into account whether there were seasonal differences between the two groups, but given the similarity in overall bass catch rates, it is unlikely that differences occurred during the spring.

***9. What percent of the bass taken from a lake are caught by fishermen during the spring spawning season?***

First, let's look at overall bass harvest. Based on 29 angler surveys at Indiana natural lakes from 1980 through 2007 where monthly figures were tabulated, the combined harvest of bass in April and May ranged from 0% of the yearly harvest at Ball, Big Long, Engle, and Old lakes up to 100% at Lake-of-the-Woods. Spring harvest averaged 22% of the total. Even though 100% of the bass taken from Lake-of-the-Woods were removed in April and May, the actual number was only nine bass. So, excluding results at Lake-of-the-Woods, harvest during April and May at Indiana natural lakes ranges from 0% to 54% and averages 19% of the open-water annual total.

Based on these same creel surveys over the past 27 years, fishermen typically removed 39% of the total number of 14-inch and larger bass each year at Indiana natural lakes. Therefore, bass harvest during the months of April and May represents an average of only 7% of the overall number of legal bass in the lake (19% of 39%).

Assuming a lake contains 1,000 bass that are legal-size, anglers are likely to remove 390 bass during the year, including 70 bass taken during the spring (19% of 390).

Prohibiting the taking of those 70 bass during April and May would, theoretically, reduce harvest by 18% (70/390) but 22 of them (32% of 70) would probably be removed later in the year. Those 22 bass, plus the other 320 bass taken during summer (390 - 70) would likely bring the annual harvest total to 344 bass (320 + 22), 34% instead of 39%.

That leaves 48 bass out of a population of 1,000 that could be potentially “saved” by a closed season. Of course some of these 48 bass would probably die from natural causes. If annual natural mortality is low (10%), 43 might be present a year later. If natural mortality is moderate (25%), 36 might be present a year later. And if natural mortality is high (40%), only 29 bass out of an original population of 1,000 legal-size bass might be saved by a closed season and still be present a year later.

***10. Have bass populations in our lakes decreased, increased or stayed the same over the past 25 years?***

The Division of Fish and Wildlife has gathered a large amount of data to address this question.

Based on 59 standard population assessments and 52 angler creel surveys conducted from 1980 through 2007, largemouth bass are now more abundant than ever before in Indiana natural lakes (Figures 1 and 2). Bass in Indiana natural lakes now exhibit better size structure, with 14-inch and larger bass making up larger percentages of the adult population (Figure 3). Indiana natural lakes now also provide greater angler catch rates of bass (Figure 4).

All of these improvements have occurred despite the fact that Indiana has no closed season for bass. Instead, they are associated with a 27-year trend that involved the imposition of increasingly restrictive minimum size limits and promotion of voluntary catch-and-release fishing. As a result, bass harvest has been cut by 99% since 1980. Fishing mortality of 14-inch and larger bass, while averaging 39% over the years under various size limits, has also now decreased to 28%.

In turn, average bass density of 8-inch and larger bass in Indiana natural lakes has increased from 13 bass per acre in 1980 to 24 bass per acre in 2007. The average number of 8-inch and larger bass captured during sampling with shocker boats increased from 78 to 123 per hour over the same time period. Meanwhile, the level of bass fishing interest among anglers and the amount of angler effort targeted at bass have remained steady.

***Conclusion***

There is no evidence to suggest bass reproduction or recruitment declined during the past 27 years at Indiana natural lakes, given the overall increase in the number of bass now present. The 14-inch minimum size limit currently protects a substantial percentage of the adult population from fishing, including sexually mature male and female bass.

Figure 1. *Number per acre of largemouth bass ( $\geq 8$ -inch) at Indiana natural lakes from 1980 through 2007.*  
 ( $F = 10.56, df = 1,158, p < 0.01$ )

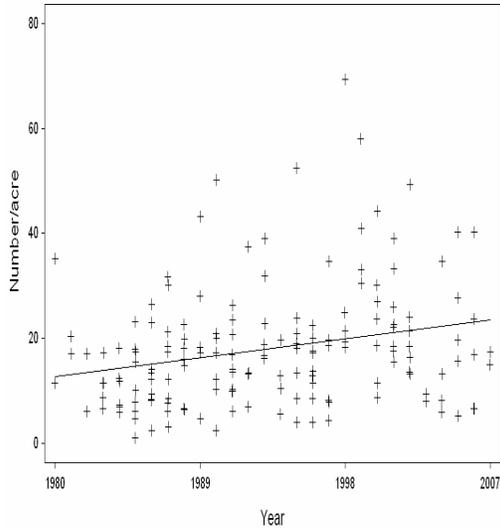


Figure 3. *Percentage of 14-inch and larger bass of all 8-inch and larger bass from 1980 through 2007.*  
 ( $F = 8.44, df = 1,169, p < 0.01$ )

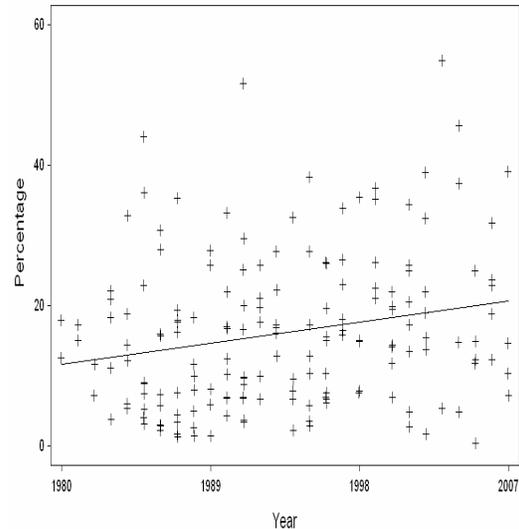


Figure 2. *Electrofishing catch rates (catch/hour) of largemouth bass ( $\geq 8$ -inch) at Indiana natural lakes from 1980 through 2007.*  
 ( $F = 7.50, df = 1,169, p < 0.01$ )

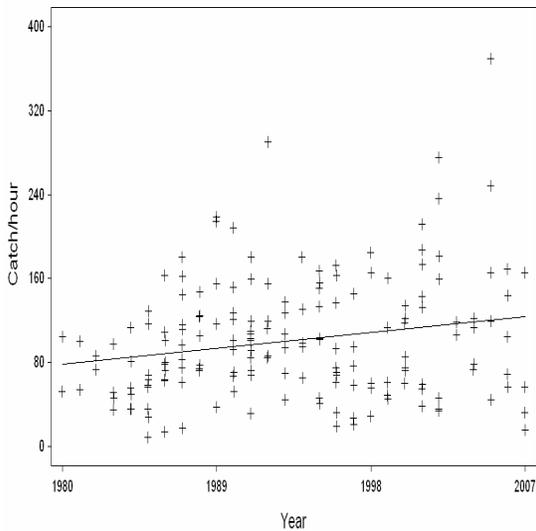


Figure 4. *Number of largemouth bass caught (harvested and released) by anglers per 100 hours of bass fishing from 1980 through 2007.*  
 ( $F = 14.05, df = 1,90, p < 0.01$ )

