

# West Boggs Creek Reservoir 1999

## **Fish and Wildlife Research and Management Notes**

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**Title:** Angler Survey of Fishing Pressure, Fish Harvest and Economic Value of the West Boggs Creek Reservoir Fishery

## **INTRODUCTION**

West Boggs Creek Reservoir is a 622-acre multipurpose impoundment located in Daviess County. The lake was constructed in 1971 with federal funds appropriated under Public Law 566. Operation of the reservoir and park is administered by the Martin and Daviess County Park Boards. Facilities at the park include a boat ramp, boat rental concession, boat mooring sites, shoreline fishing area, disabled fishing pier, beach, and campground. Fees are assessed both for entrance to the park and use of the boat ramp.

West Boggs provided excellent fishing for several years after impoundment. However, gizzard shad became established during the late 1970s. By the early 1980s the gizzard shad population approached its maximum level resulting in negative impacts to the sport fishery. Impacts included competition with more desirable species and diversion of largemouth bass predation away from the sunfish and carp populations. Hybrid striped bass were stocked in 1984 to help utilize a portion of the abundant gizzard shad. However, a fishery survey in 1985 suggested the stocking was only partially successful.

Another fishery survey in 1987 revealed a decline in gizzard shad relative abundance, but an increase in yellow bass and carp populations. Due to the increase in undesirable fish species and support from the public, plans were approved to renovate the watershed and lake with the target species being gizzard shad, carp, and yellow bass. To establish a qualitative measure of the fishery, a creel survey was conducted in 1989 prior to the renovation of West Boggs.

After renovating the reservoir, largemouth bass, bluegill, redear sunfish, channel catfish, and black crappie were stocked between 1994 and 1996. In 1997 another fishery survey was conducted to determine the success of the renovation. Albers and Andrews (1998) reported the renovation was successful at eliminating the once prevalent gizzard shad, carp, and yellow bass. The stocked game fish exhibited above average growth due to abundant food and space. Further evaluation of the fishery was needed to gain insight into resource usage changes by anglers. An angler survey was conducted in 1999 to acquire angler usage, fish harvest, fishing preference, and trip satisfaction information. This report is a summary of the 1999 angler survey and provides information regarding the economic benefits resulting from the renovation as well as possible recommendations for future work.

## **METHODS**

The angler survey was of the direct contact type following the guidelines established by Hudson and Shipman (1980). During April, May, June, July, August, September, and October of 1999,

the fishing day was defined as lasting 16 hours (5:00 a.m. to 9:00 p.m.). Each day was divided into an early period (6:00 a.m. to 1:30 p.m.) and a late period (1:30 p.m. to 9:00 p.m.). The creel clerk then worked during either the early or late period on seven week days and three weekend days per two-week period. The sample was stratified to include approximately equal numbers of early and late periods.

A small boat was used by the creel clerk to count anglers once every two hours. Additionally, the creel clerk attempted to interview anglers upon completion of their fishing trip. Shoreline anglers were normally interviewed when making hourly counts. During the last hour of a shift, the clerk also interviewed some of the remaining boat anglers. Interview data included; length of trip, number in party, county of residence, species sought, number and size of fish harvested, number and size of largemouth bass caught and released (over and under 14 inches), and number of channel catfish caught and released. Boat and shoreline fishing data were recorded separately as were complete and partial trip interviews. Additionally, anglers were also asked to rate the satisfaction of their fishing trip on a scale of one to five, with one being excellent and five being poor. Anglers who had responded to the management questions during previous interviews were not asked these questions again.

Weekday and weekend data were expanded separately with federal holidays considered as weekend days. The data was then combined to obtain monthly estimates of fishing pressure and harvest. Species sought, the county of residence, and responses to trip satisfaction were not expanded. Weights of fish harvested were estimated using average weights of fish at West Boggs and, when necessary, fish at other area lakes.

## **RESULTS AND DISCUSSION**

### **Fishing Pressure and Harvest Rates**

From April 1 to October 31, 1999, anglers fished an estimated 144,848 hours (232.9 hours per acre) at West Boggs. Fishing pressure was high throughout the angler survey with the highest pressure occurring in May and the lowest pressure in April (Table 1). The low fishing pressure in the months of April and October could be reflective of variable weather conditions during these two months. The overall harvest rate during the creel period was 0.75 fish per hour. This was considerably lower than the 1989 observed rate of 1.23 fish per hour (Andrews 1990). However, fishing pressure in 1999 nearly doubled compared to pressure in 1989, and while the total number and pounds of fish harvested increased substantially from the previous survey, this increase was not great enough to offset the increased angling hours. The highest harvest rates occurred in September and October, conversely, April and July had low harvest rates (Table 1).

**Table 1. Monthly estimated fishing pressure and harvest rates at West Boggs Creek Reservoir, April 1 to October 31, 1999.**

<b>Month</b>	<b>Fishing Pressure (hours)</b>	<b>Harvest Rate (fish per hour)</b>
<b>April</b>	12,624	0.59
<b>May</b>	31,551	0.63
<b>June</b>	26,124	0.77
<b>July</b>	19,161	0.58
<b>August</b>	18,953	0.79
<b>September</b>	20,332	1.02
<b>October</b>	16,103	0.90
<b>TOTAL</b>	144,848	0.75

### **Angler Preference**

Anglers at West Boggs preferred to fish mainly for largemouth bass, followed by bluegill, anything, bluegill combined with crappie, and crappie alone (Table 2). Anglers targeting largemouth bass and bluegill combined for nearly 75 percent of angler effort. In the 1989 angler survey Andrews (1990) reported bluegill (19.0 percent) to be the most sought species followed by anything (18.2 percent), crappie (13.8 percent), and largemouth bass (12.4 percent). There was an increase of over 27 percent in the amount of anglers targeting largemouth bass exclusively compared to the 1989 survey. Anglers fishing for bluegill and per or crappie in 1989 accounted for 46.1 percent of the fishing effort. Although channel catfish were once a popular species sought by anglers, the 1999 creel survey revealed a very small percentage of anglers pursuing this species. Poor survival of the initial stocking of channel catfish may be a probable explanation for the decline in anglers targeting this species. The availability of fishable populations of other game species may also account for the decline in anglers targeting channel catfish.

**Table 2. Species sought by anglers fishing at West Boggs Creek Reservoir, April 1 to October 31, 1999.**

<b>Species</b>	<b>Percentage of anglers</b>
Largemouth Bass	39.8
Bluegill	33.9
Bluegill per crappie	8.1
Crappie	3.7
Largemouth bass per panfish*	3.1
Bluegill per redear sunfish	0.4
Channel catfish	0.1
Channel catfish per other	0.1
Anything	10.7

\* Includes either crappie, bluegill, or redear

### Fish Harvest

In 1999 West Boggs anglers harvested an estimated 108,905 fish (175.0 fish per acre) weighing a total of 52,416 pounds (84.3 pounds per acre). This was almost double the yield from 1989 when an estimated 27,108 pounds (43.6 pounds per acre) of fish was harvested (Table 5). Bluegill accounted for the bulk of the harvest by number, followed by crappie, largemouth bass, redear sunfish, and channel catfish (Table 4). Bluegill also comprised the bulk of the harvest by weight, preceded by largemouth bass, crappie, channel catfish, and redear sunfish.

An estimated 86,123 bluegill were harvested at a rate of 0.60 fish per hour (Table 3). Bluegill comprised 79.1 percent of the harvest by number and 64.0 percent by weight (Table 4). The average length of bluegill harvested was 7.6 inches (range of 6.0 to 10.5). The bluegill harvest rate in 1999 (0.60 fish per hour) was relatively lower than 1989 harvest rate of 0.84 fish per hour. However, the mean size was over one inch larger than the 1989 mean of 6.5 inches and yield increased from 17.6 lbs. per acre in 1989 to 54.0 lbs. per acre in 1999.

Crappie harvest was estimated to be 13,389 fish and comprised 12.3 percent of the total harvest by number and 11.8 percent by weight. Crappie were harvested at a rate of 0.09 fish per hour, which is considerably lower than the 1989 rate of 0.27 fish per hour. Harvested crappie ranged from 6.0 to 14.0 inches in length. As with the bluegill, the mean length increased from 1989 to 1999 by 1.5 inches. Yield (lbs. per acre) of crappie harvest increased by more than two pounds per acre compared to the 1989 survey, indicating that fishing quality and per or angler effort has increased considerably since the renovation.

**Table 3. Harvest rates and lengths of fish harvested at West Boggs Creek Reservoir, April 1 to October 31, 1999.**

Species	Harvest Rate (Fish per Hour)	Length (In.)	
		Mean	Range
Bluegill	0.60	7.6	6.0-10.5
Crappie	0.09	9.4	6.0-14.0
Largemouth bass	0.04	14.7	13.5-21.5
Redear sunfish	0.02	8.6	6.0-12.0
Channel catfish	0.01	17.9	12.0-28.0
Bullhead	*	11.1	9.0-13.0
Other sunfish**	*	7.3	7.0-7.5

\*Less than 0.01 fish per hour.

\*\* Includes green sunfish and warmouth.

Largemouth bass harvest was ranked third at 4.7 percent of total harvest by number but comprised 15.2 percent of the total harvest by weight. Largemouth bass were harvested at a rate

of 0.04 fish per hour, which was higher than the 1989 rate of less than 0.01 fish per hour. Harvest of largemouth bass increased from one pound per acre in 1989 to almost 13 pounds per acre. Unlike bluegill and crappie, the average size of harvested largemouth bass decreased by 2.3 inches from 1989 to 1999. Harvested largemouth bass ranged from 13.5 to 21.5 inches in length.

The renovation of West Boggs has provided an outstanding fisheries for largemouth bass. When comparing 1989 data to 1999 data for largemouth bass, harvest rate, yield rate, and catch and release yields of both legal and sublegal fish increases tremendously (Table 5). The number of fish harvested increased from less than one bass per acre in 1989 to over 12 bass per acre in 1999. Largemouth bass catch and release information indicated an even greater improvement. An estimated 153,096 largemouth bass were released by anglers during the seven month creel period. Of bass released, 12,661 (eight percent) were of legal harvestable size. During the 1989 creel survey, 5,544 bass were released of which only 556 were of harvestable size. The catch rate for all bass combined (harvested and released) was 1.09 bass per hour compared to 0.07 bass per hour prior to the renovation. In 1999, both legal and sublegal largemouth bass catch rates increased by more than 1,100 percent over 1989 data, indicating more largemouth bass were present after the renovation.

Redear sunfish accounted for 2.5 percent of the harvest by number and 3.1 percent by weight. The harvest rate for redear was 0.02 fish per hour. Harvested redear ranged from 6.0 to 12.0 inches in length and averaged 8.6 inches. Redear were virtually nonexistent prior to the renovation.

**Table 4. Estimated number and weight of fish harvested at West Boggs Creek Reservoir, April 1 to October 31, 1999.**

Species	Harvest		Yield (lbs.)	
	Number	Percent	Weight	Percent
Bluegill	86,123	79.1	33,568	64.0
Crappie	13,389	12.3	6,182	11.8
Largemouth bass	5,156	4.7	7,985	15.2
Redear sunfish	2,711	2.5	1,604	3.1
Channel catfish	948	0.9	2,609	5.0
Bullhead	439	0.4	445	0.9
Other sunfish*	122	**	23	**
<b>TOTALS</b>	<b>108,888</b>		<b>52,416</b>	

\*Includes green sunfish and warmouth.

\*\*Less than 0.1 percent.

Channel catfish harvest accounted for less than 1 percent of the total harvest by number, but comprised five percent of harvest by weight. The harvest rate of channel catfish was very low at 0.01 fish per hour. Channel catfish harvest was 4.2 pounds per acre and fish up to 28 inches were caught. Channel catfish were stocked at West Boggs in 1994 (178 fish), 1995 (6,220 fish), and 1997 (3,110 fish), but overall abundance was considerably lower in 1999 than prior to the

renovation. In a fisheries survey of West Boggs in 1997, channel catfish contributed less than one percent of the total catch (15 fish). Poor initial survival of stocked fish may be a possible reason.

Other fish harvested at West Boggs included an estimated 439 bullheads, 51 warmouth, and 67 green sunfish. Bullhead average length at harvest increased from 8.9 inches in 1989 to 11.1 inches in 1999. The combined contribution of these fish to the harvest was less than one percent by both number and weight.

### **Angler Response to Management Questions**

The angler survey asked fishing parties to rate their satisfaction with their fishing trip on a scale of one to five, with one being excellent and five being poor. Only 8.3 percent of the parties rated trip satisfaction as being excellent while 19.9 percent rated it as poor (Table 6). The mean rating was 3.27, which indicates that most fishing parties felt their trip satisfaction was below “average”. In 1989, the trip satisfaction was ranked as “better than average”. A possible reason for the low rating in 1999 may be that since the renovation, anglers are anticipating a greater catch rate for their target species. The fishery at West Boggs has been widely publicized in the popular print as being excellent.

**Table 5. Summary and comparison of fish harvest information from West Boggs Creek Reservoir during 1989 and 1999. Data from 1989 taken from Andrews 1990.**

Fish Harvest Parameters	Creel Year		Percent increase or decrease (-)
	1989	1999	
<b>All Species</b>			
Fishing pressure (hours per acre)	124.8	232.9	86.6
Harvest (no. per acre)	154	175	13.6
Yield (lbs. per acre)	43.6	84.3	93.3
Harvest rate (fish per hour)	1.23	0.75	-39
<b>Bluegill</b>			
Angler preference (percent)	19	33.9	78.4
Harvest (no. per acre)	104.2	138.5	32.9
Yield (lbs. per acre)	17.6	54.0	206.8
Harvest rate (fish per hour)	0.84	0.60	-28.6
Mean length (in.)	6.5	7.6	16.9
<b>Crappie</b>			
Angler preference (percent)	13.8	3.7	-73.2
Harvest (no. per acre)	33.8	21.5	-36.4
Yield (lbs. per acre)	7.8	9.9	26.9
Harvest rate (fish per hour)	0.27	0.09	-66.7
Mean length (in.)	7.9	9.4	19.0
<b>Largemouth bass</b>			
Angler preference (percent)	12.4	39.8	221.0
Harvest (no. per acre)	0.31	8.2	2,545.2
Yield (lbs. per acre)	1.0	12.8	1,180.0
Harvest rate (fish per hour)	*	0.04	53.8
Mean length (in.)	17.5	14.7	-16.0
Catch & release yield <14 in. (fish per acre)	8.0	225.8	2,722.5
Catch & release yield >14 in. (fish per acre)	0.9	20.4	2,166.7
Catch & release rate <14 in. (fish per hour)	0.06	0.97	1,516.7
Catch & release rate >14 in. (fish per hour)	*	0.09	1,150.0

\*Less than 0.01 fish per hour.

Anglers may have unrealistic expectations regarding their success based on these reports. Also, even though anglers are catching more quality size fish, overall numbers of fish harvested per angler may have decreased, resulting in disappointed anglers. The changes in the fishery after the

renovation have also attracted new anglers with high expectations to West Boggs Reservoir. Only 1.2 percent of the fishing parties did not respond to the management question.

**Table 6. Management question responses from fishing parties being interviewed for the first time.**

<b>Management Question</b>	<b>Number of Times Recorded</b>	<b>Fishing Party Responses (percent)</b>
1 (excellent)	153	8.3
2	313	17.0
3	613	33.4
4	371	20.2
5 (poor)	366	19.9
6 (no response)	22	1.2
<b>TOTAL</b>	<b>1,838</b>	

### **Origins of the Anglers**

Anglers fishing at West Boggs came from 88 different Indiana counties as well as out of state. Martin County accounted for 13.1 percent of the total anglers followed by Lawrence (6.6 percent), Greene (5.7 percent), Clay (5.6 percent), and Daviess (5.1 percent). Other counties with frequent usage included Marion, Monroe, Knox, Allen, and Whitley. Out of state anglers accounted for only 1.5 percent of the total. Bass fishing tournaments and camping facilities may be plausible explanations for anglers from so many different counties utilizing the West Boggs fishery. Additionally, since the renovation, West Boggs has received a lot of publicity in the popular press. Interviews with lake residents were difficult to obtain due to limited accessibility.

### **Economic Value of the Fishery**

Anglers fishing at West Boggs made an estimated 30,778 fishing trips during the survey period. Based on data from the U.S. Department of Interior, Fish and Wildlife Service (1998), anglers in Indiana spent an average of \$50 for each day of fishing during 1996. Expenditures included food, lodging, transportation, equipment, licenses, and other fishing related items. Using the estimated cost of \$50 for each day of fishing, the estimated economic value of the West Boggs fishery from April 1 to October 31, 1999 was \$1,538,900.

In 1989 anglers made an estimated 17,895 trips to West Boggs, using the same cost per trip, an estimated \$894,750 was spent. The increase of angler usage from before the renovation (1989) too after the renovation (1999) results in an increase of \$644,100 per year. The cost of the renovation was about \$139,000. The West Boggs' fishery should remain healthy for at least 10 years. The cost to benefit ratio would be 1:46.3, therefore, every dollar that was spent on the renovation of West Boggs resulted in a forty-six dollar return to the economy.

### **CONCLUSION**

Results from this creel survey generally confirm those from the 1997 fisheries management survey at West Boggs. The renovation was successful at eradicating the carp, gizzard shad, and yellow bass populations. Growth rates of stocked species (largemouth bass, bluegill, redear sunfish, crappie and channel catfish) are good, with anglers harvesting virtually all fish species at a much greater quantity and quality than before the renovation.

The angler fishing preference from 1989 to 1999 has shifted from a broad range of species sought to a dual species fishery, with almost 74 percent of anglers exclusively fishing for bluegill or largemouth bass. Prior to the renovation, anglers were far less selective in their fishing preference with “anything” recorded as one of the most frequent responses. Anglers at West Boggs were, for the most part, successful in harvesting their target species during the survey. Largemouth bass, the most preferred species, ranked third in harvest but accounted for an additional 153,096 fish released. While the vast majority of the bass released were sublegal fish, the number of legal bass released was over 20 times greater than in the 1989 survey. Bluegill, the second most preferred species, ranked first in harvest with an estimated yield of 54 lbs per acre. While the number of crappie harvested was almost half the 1989 harvest, the yield or total weight of fish harvested was slightly greater than in 1989. This means that each harvested crappie was almost twice as heavy as a crappie harvested by anglers during the 1989 survey. Redear sunfish and channel catfish each made modest contributions to the fish harvest. Survival of the initial stocking of channel catfish fingerlings following the renovation appears to have been limited. Several subsequent stockings have taken place which should begin providing a productive channel catfish fishery at West Boggs. However, harvest rates from the creel survey were very low for channel catfish and catch and release data was limited. Angler preference for channel catfish was also extremely low compared to the 1989 survey. It is difficult to determine if anglers are not fishing for channel catfish because the population is reduced or if anglers prefer other species that are readily available now that the renovation is complete. Regardless, to maintain a fishable population of channel catfish, it is recommended that the current stocking program be continued. A fisheries survey scheduled for 2000 should provide greater insight into the status of the channel catfish population at West Boggs.

Anglers appear to be responding positively to the changes in the fishery following the renovation. Anglers continue to flock to West Boggs based on the extremely high fishing pressure observed during the survey. Anglers fished an estimated 233 hours per acre which is nearly double the fishing pressure observed in the 1989 survey. Although most anglers rated their trip slightly below average, other factors besides the quality of the fish harvested could be responsible for this. West Boggs Creek Reservoir has received widespread publicity for its tremendous fishery in the popular press since the renovation project. The number of anglers from distant counties attest to the draw the fishery has. The lake has also become extremely popular with bass tournament anglers. There were a total of 43 registered bass tournaments held at West Boggs during the 1999 fishing season. The opportunity for competition among users certainly exist with such high fishing pressure. This competition may be one reason for the low trip satisfaction expressed by so many anglers. Another possible explanation for the low rating may be a different group of anglers utilizing the resource. The change in the makeup of the fishery since the renovation may have brought in a different group of anglers with different expectations. Prior to the renovation, anglers were satisfied catching anything, now anglers have high expectations and are not as easily satisfied.

Despite the lower than expected rating by anglers, no one can argue that the fishery renovation was not a resounding success. More and better quality fish are being harvested than ever before. Angler use has increased dramatically. The fishery is bringing in an estimated \$1.5 million to the local economy. The 1989 fishery in today's dollars would only be contributing \$0.89 million. The West Boggs fishery should continue to provide quality fishing opportunities into the foreseeable future. The cost benefit ratio for the project, using a conservative 10 years as the project life-span, is 46 dollars returned for every dollar that was spent on the renovation.

To further monitor the resource, a fisheries management survey is scheduled for 2000 at West Boggs Creek Reservoir. This survey will provide additional insight into the fish population dynamics at West Boggs and allow biologists to properly manage the resource.

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