Eel River

Fish and Wildlife Research and Management Notes
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INTRODUCTION

The Eel River in northern Indiana flows southwest 110 miles beginning near Fort Wayne and entering the Wabash River at Logansport. Approximately 80 percent of the 814 square mile watershed is devoted to agriculture (Braun 1992). The Eel River, along with four other similar size streams throughout the state, was targeted for game fish population estimates and recreational uses. The major objective of this multi-year study was to determine the effects of the 12-inch size limit on black bass in streams. The Eel River has been under a 12-inch smallmouth bass size limit since 1986 and should provide information on long term impacts of the size limit for comparison to the other streams in this study.

METHODS

Game fish populations estimates on the Eel River were conducted at six stations on July 13, 14 and 16, 1998. Each station is referred to by river mile (RM). River mile is the number of miles from the confluence with the Wabash River. The six stations were spread out over 30 miles of stream starting at RM 3.3, located at Spencer Park in Logansport. RM 34.8 was the upper station, near the town of Stockdale.

All stations were sampled with a D.C. pulse electrofishing boat. Sampling was conducted during daylight hours at low flow conditions. Riffles and shallows acted as natural barriers at the upper and lower ends of each station. One exception was river mile 14.1, in which a block net was staked across the upper end of the station.

All game fish (black bass, rock bass, and channel catfish) were collected. Both banks and other areas of cover in the stream channel were electrofished on each run. After each run the collected fish were processed and placed in an aerated horse troug h for holding until the sampling was complete. As many as three runs per station were conducted in order to achieve declining catches of game fish. This method of estimating fish population numbers is known as the “Depletion Method.”

Processing of collected fish involved notation of total number, individual lengths to the nearest 0.1 inch and weights to the nearest 0.01 pound. Scale samples were taken for age and growth analysis. Each fish processed had a fin removed to determine recaptures for future surveys and fish movement throughout the creel survey. Fin clips for each station were: RM 3.3, left pectoral; RM 7.34, left ventral; RM 14.08 right ventral; RM 18.82, right pectoral; RM 26.8, left pectoral; RM 34.8, left ventral. Two clips were repeated to accommodate six stations. Water chemistry and available habitat were also assessed.

Angler Use and Recreational Survey

A direct contact creel/recreational use survey was conducted from May 12 to August 13, 1998. Twelve access points on the river were designated as creel stops. Five of these access sites were state or city owned public access sites, the rest were county or state highway bridge easements. A "bus route" creel was set up for this survey. The bus route creel method is described in the "American Fisheries Society Special Publication 25" (Pollock, Jones, and Brown 1994). Six stations were creeled per shift. The creel analyst would travel to each access point, creel for 50 minutes and move on to the next stop. The routes were set up in two runs, the Stockdale (Stockdale to Mexico) and Logansport (U.S. 31 to Spencer Park) runs. To reduce bias, the runs were creeled in a upstream or downstream direction. The creel survey start time was also set up in two shifts, A shift was from 8 am to 2 pm and B shift was 2 pm to 8 pm.

RESULTS

Population Estimates for Game Fish

Depletion population estimates were conducted at six sites on the Eel River. Population estimates were calculated in fish per mile. The smallmouth bass population averaged 64.5 fish per mile for the entire sampling region (Table 1). A total of 52 smallmouth bass was collected from all sites. Catch per effort (CPE) was 6.8 fish per hour for all stations. The highest electrofishing catch for smallmouth was 12.3 fish per hour at RM 3.3. The lowest catch occurred at RM 18.82 at 1.6 fish per hour. Length range was 3.4-16.0 inches and averaged 10.1 inches. 17.1 percent of the smallmouth bass collected were greater than 12 inches. 77percent of the smallmouth were ages III+ and IV+ (Table 2). Indication of poor recruitment the past two years was evident since no age I+ fish were collected and only 6 age II+ were collected. Growth rates were below average when compared to smallmouth bass growth statewide (Shipman 1997).

Rock bass were collected at all stations. Population estimates averaged 67.2 fish per mile for the sample area. A total of 82 fish was collected. Length range was 3.0-8.8 inches. Average length was 6.5 inches. Average CPE was 10.35 rock bass per hour for all stations. Highest catch of rock bass was at station RM 18.82 with a CPE of 14.4 fish per hour. The lowest was RM 26.8 with four fish per hour. Rock bass also had poor recruitment in 1996 and 1997. No age I+ fish were collected and only three age II+ fish were collected. Age classes III+ to VI+ were well represented, indicating four good years of recruitment. Growth was below average when compared to statewide averages.

Channel catfish were collected at all stations. A total of 16 fish was collected. The population estimate for channel catfish averaged 21.5 fish per mile for stations RM 3.3, 7.34 and 14.08. Because the depletion method requires that more than one fish is collected, estimates could not be calculated for the remaining stations and they were not included in the mean. Length range was 18.8 to 27.4 inches. The mean length was 22.6 inches with an average weight of 5 pounds.

Seven bluegill were collected at two stations (RM 14.08 and RM 34.8). Length range was 4.1-5.6 inches.

Three largemouth bass were collected at two stations (RM 18.82 and RM 34.8). Length range was 2.6-6.6 inches. Largemouth bass are often found in riverine systems but generally concentrate in areas of lower flow. Habitat and flow in the sample areas were not conducive to largemouth bass.

Four white crappie were collected at stations RM 14.08, RM 18.82 and RM 34.8. Length range was 7.7-9.4 inches.

One 8.5 inch black crappie was collected at RM 34.8.

The latest stream survey of the Eel River (Braun 1992) also indicated low catches of largemouth bass, bluegill and crappie. Population estimates were not calculated for these species in 1998.

Available Habitat and Water Chemistry

Water temperature ranged from 72 to 74 F. (Table 3). Dissolved oxygen concentrations ranged from 8 ppm to 12 ppm. Water clarity using a secchi disk ranged from 18 to 24 inches. Average depth for all stations was 30 inches. Stream width varied from 72 to 156 feet.

The Qualitative Habitat Evaluation Index (QHEI) uses seven parameters to calculate a numeric value describing available habitat (Ohio EPA 1989). QHEI scoring is based on a 1 to 100 index. The higher the score the "better" the habitat. QHEI scores in the 60s are considered "good" habitat. Four of the six stations scored above 60. (Table 4). RM 7.34 had the high score of 77. The higher collections of smallmouth did occur at the stations with the higher QHEI scores.

RECREATIONAL USE SURVEY

Angler Effort

An estimated 369.8 angler days were spent on the lower 30.8 miles of the Eel River from May through August 1998 (Table 5). An estimated 2,402.1 anglers (78.0 anglers per mile) were on the river throughout this time. Anglers fishing on weekends and holidays, accounted for 6,145.74 hours of fishing time (64.4 percent). Weekday anglers accounted for 2,729 hours of fishing pressure.

May was the most popular month to fish during the survey. Fifty percent of the anglers fished in this month accounting for 5,958.7 hours of fishing pressure

June was a difficult month. Rain and the associated high waters reduced fishing and recreational activity. An estimated 333.26 angler fished 868 hours.

Estimates for July indicated the second highest use during the survey. An estimated 652.8 anglers fished 1,856.04 hours.

In August, Mother Nature once again hindered fishing opportunities with rain and high water. The creel analyst returned to school the week of August 13. Few interviews were conducted

during the prior weeks because of river conditions. Expanded estimates for the month were based on the interviews collected during that time. An estimated 192 anglers fished 192 hours.

Based on angler interviews, anglers fished the Eel River an average of 19.95 times per year. Fifteen individuals fished more than 20 times per year.

Anglers were asked their county of residence. Anglers from eight counties were interviewed and 76.6 percent were from counties the river passed through (Cass, Miami and Wabash counties). The rest were from neighboring counties (Clinton, Clay, Fulton, Howard, and Kosciusko counties).

When asked their angling preference, 65.1 percent were fishing for anything that would bite. 20.9 percent were fishing for smallmouth, 9.3 percent were fishing for catfish, 2.3 percent were fishing for carp and 2.3 percent were fishing for a combination of smallmouth and rock bass.

In addition, anglers were asked three public opinion questions. Question number one was "How would you rate the quality of fishing on the Eel River? (Improving, Staying the same, Declining or No Response)." Forty-four percent felt that fishing was improving, 27.9 percent felt it was staying the same, 25.6 percent felt it was declining and 2.3 percent had no response.

When asked if they were satisfied with their fishing trip, 88.4 percent responded with "Yes."

The last question was seeking opinion about the new black bass (largemouth bass, smallmouth bass and spotted bass) regulation for rivers (12 inch size limit with a 5 fish bag limit). 90.7 percent were fully or moderately supportive of the regulations and 9.3 percent were strongly opposed.

Angler Success

Actual game fish harvest was very low. The only game fish harvested were smallmouth bass. Five smallmouth bass were actually counted and measured. Estimated harvest for smallmouth was 131 for the month of May and 105 for July. Estimated catch and release for smallmouth bass was 2,784 (Table 6). Anglers in the month of May were the most successful with 75 percent of the smallmouth catch and release. Throughout the survey, 86.4percent of the catch and release smallmouth were from shore per wading anglers. Catch rates based on interviews averaged 0.31 bass per hour. The highest catch and release creel station for smallmouth was at Spencer park (RM 3.3) with 35 actually caught.

One largemouth bass less than 12 inches in length was caught and released.

Catch and release for rock bass was an estimated 1,223 individuals. May was also the best month to catch rock bass (59.2 percent). Anglers fishing from shore/wading were the most successful accounting for 93.1 percent of the rock bass catch and release. Mean catch rate for rock bass throughout the survey was 0.14 fish per hour

The estimate for channel catfish caught and released was 421 fish. In June, 70 percent of the channel catfish were caught. Catch rate was 0.05 fish per hour. Normally anglers target catfish when the waters are warm, during mid to late summer and also after dark. The Eel River was high and muddy during the preferred catfish time of year. In addition, the creel shifts did not cover night hours. It is likely the channel catfish harvest and catch and release numbers are underestimated.

Other species reported caught and released during the creel survey included suckers, sunfish, carp, and chubs. An estimate of the miscellaneous species that were released was not calculated.

An attempt to estimate recreational use other than fishing was conducted in conjunction with the creel. An estimated 176 parties canoed the river during the four months of the survey. June and July accounted for 63 percent of the canoeing and boating activity. Swimmers and tubers were also documented. An estimated 130 people were swimming or tubing the river. Most of the swimming activity was documented at the city park stations (Riverside and Spencer parks).

DISCUSSION

The last fisheries survey on this stretch of the Eel River was in 1992. Comparison between the two surveys is difficult due to different sampling techniques and sampling objectives. The 1992 survey was a collection of all species in one hour of electrofishing. Station length was determined by electrofishing time. In 1998, effort was depletion based and station length was determined by natural barriers (shallow water riffles). In 1998, the stations sampled were the same as 1992, with the exception of RM 34.8. This station is located near Stockdale dam. In 1992, sampling was upstream of the dam and in 1998, sampling was downstream of the dam.

Catches of smallmouth bass were much lower than anticipated although fish per mile estimates indicated similar numbers when compared to the 1992 survey. The depletion method population estimate tends to have large standard errors when declining catches are not achieved, which was the case in the 1998 survey. Braun in 1992 achieved catch rates of 38 smallmouth bass per hour electrofishing. In the same reach of river in 1998, CPE for smallmouth bass was 6.7 fish per hour.

A comparison of rock bass catch rates showed similar differences in results. In 1998, rock bass CPE was 10.35 fish per hour. In 1992, CPE for rock bass was 25.4 fish per hour.

An evaluation of population estimates verses harvest data indicate, 12.2 percent of the smallmouth bass were harvested and the remaining smallmouth were caught and released 1.64 times. The estimated 2,016 rock bass were caught and released an average of 0.61 times. No rock bass were reported harvested during the survey.

Mid-summer stream sampling proved to be disappointing to biologists statewide. All felt these surveys underestimated populations of game fish when compared to previous surveys. It was recommended by the project leader that future surveys start no earlier than September 15. Future sampling on the Eel River will be part of a larger six year project. Game fish population

estimates and community surveys will be conducted on the Eel River and four other streams throughout the state in 2000, 2002 and 2004.

Another aspect of the multi-year project will be to assess the effectiveness of the changes in black bass harvest regulations. Most important will be any effects they will have on the black bass population. The 12 inch size limit was in effect during the creel survey and most anglers strongly supported the new regulation.

According to the U. S. Fish and Wildlife Service (1996), the economic value of an average fishing trip in Indiana is $55.50. It was estimated that 2,402 anglers were on the Eel River throughout the survey. An estimated $133,300 was spent May though August. This total does not include people enjoying other forms of recreation along the Eel River, so the estimated dollar input to the local economy may be considerably more.

Table 1. Eel River, actual (Act.) game fish collected, population estimates, fish per mile (F/M) by station 1998.

	SMB			ROB			CCF		
Station	**Act.**	**Pop. est.**	**F/M**	**Act.**	**Pop. est.**	**F/M**	**Act.**	**Pop. est.**	**F/M**
Spencer Park RM 3.3	16	31	153.12	12	13	66.13	6	8	36.96
Adamsboro RM 7.34	12	60	*252.8	18	20	84.48	4	4	16.86
325 N. RM 14.08	12	14	47.52	10	12	42.24	4	4	10.56
Mexico RM 18.82	2	2	7.38	18	30	110.7			
Chili RM 26.8	6	18	97.68	5	6	32.56			
Stockdale RM 34.8	4	4	16.63	17	85	*311.52			
TOTALS	52		64.5	80		67.2	14		21.5

Table 2. Average Back Calculated length of rock bass and smallmouth bass collected from the Eel River, 1998.

SPECIES	Year	Number	Back Calculated Length(inches)at Each Age							
ROCK BASS	**Class**	**Aged**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Intercept = 1.0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1996	3	1.9	2.8	0.0	0.0	0.0	0.0	0.0	0.0
	1995	12	1.9	3.1	4.2	0.0	0.0	0.0	0.0	0.0
	1994	18	2.0	3.5	5.0	5.9	0.0	0.0	0.0	0.0
	1993	24	2.1	3.6	4.8	5.8	6.5	0.0	0.0	0.0
	1992	16	2.0	3.4	4.8	5.8	6.5	7.0	0.0	0.0
	1991	2	2.2	3.6	5.1	6.1	7.3	7.9	8.2	0.0
	Average Length		2.0	3.3	4.7	5.8	6.5	7.0	0.0	0.0
	Standard Deviation		0.09	0.33	0.34	0.09	0.01	0.00	0.00	0.00
	Yr. Classes Averaged		5	5	4	3	2	1	0	0

NOTE: Age groups with less than three samples are not included in year class averages or standard deviation.

	Age	Number Aged	Min. Ln.	Max. Ln.	Mean Ln.
	1	0	0.0	0.0	0.0
	2	3	3.0	4.9	4.0
	3	12	4.1	5.8	5.2
	4	18	5.3	7.7	6.4
	5	24	6.0	8.4	6.9
Sample size= 75	6	16	5.7	8.7	7.3
	7	2	8.6	8.7	8.7

SPECIES	Year	Number	Back Calculated Length(inches)at Each Age							
SMALLMOUTH BASS	**Class**	**Aged**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Intercept = 1.4	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1996	6	2.7	4.9	0.0	0.0	0.0	0.0	0.0	0.0
	1995	12	3.2	5.5	7.5	0.0	0.0	0.0	0.0	0.0
	1994	28	3.4	6.0	8.3	9.8	0.0	0.0	0.0	0.0
	1993	1	3.4	5.7	7.2	9.6	12.9	0.0	0.0	0.0

1992	3	4.5	7.3	9.5	11.8	13.9	14.8	0.0	0.0
1991	1	4.1	5.8	7.4	10.6	12.3	13.4	14.3	0.0
1990	1	4.5	6.6	7.9	10.1	12.0	13.9	14.9	15.5
Average Length		3.5	5.9	8.4	10.8	13.9	14.8	0.0	0.0
Standard Deviation		0.75	1.02	1.04	1.44	0.00	0.00	0.00	0.00
Yr. Classes Averaged		4	4	3	2	1	1	0	0

NOTE: Age groups with less than three samples are not included in year class averages or standard deviation.

Sample size= 52

Age	Number Aged	Min. Ln.	Max. Ln.	Mean Ln.
1	0	0.0	0.0	0.0
2	6	3.4	7.9	6.2
3	12	7.5	10.5	8.5
4	28	8.3	13.4	10.5
5	1	13.9	13.9	13.9
6	3	13.9	16.0	15.1
7	1	14.5	14.5	14.5
8	1	15.8	15.8	15.8

Table 3. Water quality and stream measurements of the Eel Riverby River Mile (RM), 1998

Station (RM)	3.3	7.34	14.08	18.82	26.8	34.8
Ph	-	8.5	8.5	7	8.5	8.5
DO (ppm)	9.8	10	9	12	8	9.5
H2O Temp(F)	72	74	74	74	72	74
Secchi (in)	21	-	24	18	24	24
Alkal. (ppm CA)	-	256.5	136.8	256.5	307.8	-
Ave width (ft)	154.5	156.3	122.6	72	82	98.7
Ave Depth (in)	27.3	27	29.9	35	35	31.6
Max depth (in)	41	50	55	50	58	55
St. length (ft)	1,038	1,253	1,480	1,431	973	1,444

Table 4. Qualitative Habitat Evaluation Index (QHEI) metric scores forthe Eel River by RM, 1998.

Habitat Metric	Station					
Station (RM)	3.3	7.34	14.08	18.82	26.8	34.8
Substrate	17	20	14	7	15	8
Cover	9	11	10	14	15	15
Channel	11	13	12	10	10	10
Riparian	6	7.5	8	5.5	6	9
Pool	7	11	11	10	11	11
Riffle	6	5	0	0	0	0
Gradient	10	10	10	8	8	6
QHEI Total	66	77.5	65	54.5	65	59

Table 5. Estimated angling hours and number of anglers for the Eel River, 1998.

Month	Weekend Anglers	Weekday Anglers	Totals Anglers
May	950.4	273.6	1224
June	16.46	316.8	333.26
July	388.8	264	652.8
August	192	none	192
Total	1547.66	854.4	2402.06

Month	Weekend hours	Weekday hours	Totals Hours
May	4941.2	1017.5	5958.7
June	82.3	785.7	868
July	930.24	925.8	1856.04
August	192	none	192
Total	6145.74	2729	8874.74

Table 6. Observed and estimated catch and release game fish for the Eel River, 1998.

SMALLMOUTH BASS	May	June	July	August	Total	Percent shore per boat
Observed shore catch and release	40	10	6	1	57	86.4% shore
Observed boat catch and release	8	0	1	0	9	13.5% boat
Observed total catch and release	48	10	7	1	66	
Catch and release Catch Rates	0.35	0.29	0.20	0.25	0.31	
Estimated catch and release	2091.03	250.99	371.21	48.00	2784.34	

CHANNEL CATFISH	May	June	July	August	Total	Percent shore per boat
Observed shore catch and release	1	7	2	0	10	100.0% shore
Observed boat catch and release	0	0	0	0	0	0.0% boat
Observed total catch and release	1	7	2	0	10	
Catch and release Catch Rates	0.01	0.20	0.06	0.00	0.05	
Estimated catch and release	43.56	175.69	106.06	0.00	421.87	

ROCK BASS	May	June	July	August	Total	Percent shore per boat
Observed shore catch and release	16	6	3	2	27	93.1% shore
Observed boat catch and release	2	0	0	0	2	6.9% boat
Observed total catch and release	18	6	3	2	29	
Catch and release Catch Rates	0.13	0.17	0.09	0.50	0.14	
Estimated catch and release	784.14	150.59	159.09	96.00	1223.42	

TOTAL	May	June	July	August	Total	Percent shore per boat
Observed shore catch and release	57	23	11	3	94	89.5% shore
Observed boat catch and release	10	0	1	0	11	10.5% boat
Observed total catch and release	67	23	12	3	105	
Catch and release Catch Rates	0.49	0.67	0.34	0.75	0.50	
Estimated catch and release	2918.72	577.27	636.36	144.00	4429.64	

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