2001 Fisheries Management Report
Big Oaks National Wildlife Refuge
Madison, Indiana

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USFWS Carterville FRO Project Leader, Chuck Surprenant, accompanied by Indiana Department of Natural Resources District Fishery Biologist, Larry Lehman and a summer aid visited Big Oaks National Wildlife Refuge (formerly U.S. Army - Jefferson Proving Ground) on 8/1/2001 to conduct fish community surveys at Refuge lake and ponds. D.C. electrofishing was used to obtain a fish sample from Old Timbers Lake and Gate 8 Pond. A survey planned for Hydes Pond was not conducted because low water levels prevented boat launching. Big Oaks National Wildlife Refuge was last visited in 1997.

OLD TIMBERS LAKE

Old Timbers Lake is a 165 surface acre impoundment located in the northeast area of the installation. Maximum depth of this impoundment is 40 feet and it has a total of 8 miles of shoreline. Standing timber is abundant in the northern portion of the lake and provides abundant cover for largemouth bass and black crappie. Submerged aquatic vegetation is present along the shoreline, but steep sloping shorelines prevent excessive expansion. The presence of some aquatic vegetation is a desirable habitat feature for littoral fish species.

Big Oaks National Wildlife staff estimated there were 1,750 fishing visits to the Refuge last year. The Refuge Manager reports most fishing pressure occurs at Old Timbers Lake. If the number of fishing trips is expanded to total hours of fishing by using a 3.0 hrs/trip factor, an estimated 5,250 hours of fishing occurred at the light rate of 32 hours per acre. The refuge should consider tracking fishing pressure by individual water body.

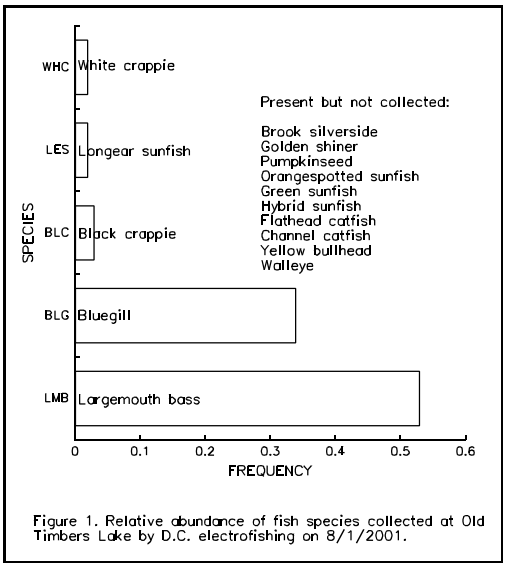

Figure 1. Relative abundance of fish species collected at Old Timbers Lake by D.C. electrofishing on 8/1/2001.

FISH COMMUNITY

On 8/1/2001, 0.77 hours of daytime D.C. electrofishing with two dippers was conducted on Old Timbers Lake (Figure 1 and Appendix 1). All fish collected were

measured in millimeters and a representative sample was weighed to the nearest gram.

Millimeters and grams were converted to inches and pounds for this analysis.

Table 1. Bluegill and Redear sunfish quality indices (Relative Stock Density[1]) for Old Timbers Lake 1982 - 2001.

YEAR	Bluegill RSD 8"	Redear RSD 9"	YEAR	Bluegill RSD 8"	Redear RSD 9"
1982	2%	19%	1990	0%	9%
1983	2%	14%	1991	0%	18%
1985	2%	20%	1993	26%	14%
1986	3%	11%	1995	5%	23%
1987	0%	0%	1997	11%	0%
1989	0%	14%	2001	4%	17%

[1]Relative Stock Density = number of fish ≥ a specified length/number of fish ≥ minimum stock length X 100.

The resulting catch was comprised of largemouth bass (53%), bluegill (34%), redear sunfish (6%), longear sunfish (2%), black crappie (3%) and white crappie (2%). Several fish species represented in previous fish samples were not collected, including channel catfish, flathead catfish and three other sunfish species. The relative abundance of the fish species collected is somewhat biased by the electrofishing gear. Largemouth bass are less abundant than indicated, while bluegill and other sunfish species are more abundant than indicated.

SPECIES SPECIFIC INFORMATION

LARGEMOUTH BASS

Largemouth bass were collected at a rate of 147 fish/hour. Young bass were abundant at 75 fish/hour, and stock size (8 -11.9-inch) bass were collected at a rate of 64 fish per hour. Quality size (≥ 12-inch) bass comprised only 5 percent of the total bass sample and were collected at the low rate of 8 fish/hour. These catch per unit effort values are typical of electrofishing samples collected through the 1990's.

Bass condition, as reflected by mean relative weight values in the middle 80's, continue to support management strategies designed to reduce the density of small bass in Old Timbers Lake.

BLUEGILL

Four percent of the bluegill greater than stock size were 8-inches or longer total length (Table 1) Bluegill of this size fall into the “Preferred to Memorable” length category of Gablehouse 1984.

The quality of bluegill fishing has been improving since 1993 as reflected by the abundance of 8-inch and larger fish in the electrofishing samples (Table 1).

Mean condition factor “C” for bluegills ranging from 4.6 to 8.0 inches total length was 6.7 (6.0-7.5). Bennet 1970 suggested that bluegill are in normal or average condition when “C” ranges from 7.1 to 8.0, indicating Old Timbers Lake bluegill are displaying below normal condition. This may be explained by the time of sampling which occurred near post spawning season for the species.

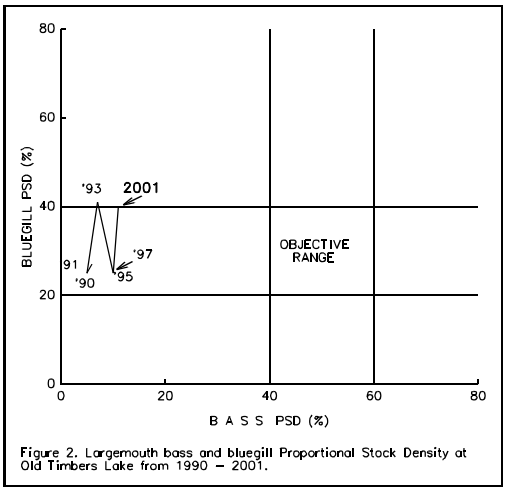

Figure 2. Largemouth bass and bluegill Proportional Stock Density at Old Timbers Lake from 1990 – 2001.

REDEAR SUNFISH

Seventeen percent of the redear sunfish collected were 9-inches or longer total length falling into the “Preferred to Memorable” length category of Gablehouse 1984.

Old Timbers Lake continues to produce quality fishing for this species, with the RSD 9 value fluctuating around a 1982-2001 mean value of 13 percent (Table 1).

WHITE CRAPPIE

Four white crappie averaging 9.4 (8.9-9.7) inches total length were collected. White crappie of this size fall into the “Quality to Preferred” range for the species according to Gablehouse 1984. A liberal harvest of white crappie should be encouraged here.

BLACK CRAPPIE

Five black crappie averaging 9.5 (9.4-9.7) inches total length were collected. Black crappie of this size fall into the “Quality to Preferred” range for the species according to Gablehouse 1984. Anglers should be encouraged to harvest black crappie.

MANAGEMENT IMPLICATIONS

The population structure of largemouth bass and bluegill is often interrelated in small impoundments due to interspecific competition. The state of this relationship over time can be described in terms which also reflect fishing quality for the species by calculating Proportional Stock Density (PSD) values for the species (Anderson 1976). PSD is defined as the proportion of the fish in the stock which are larger than quality size. Stock size fish largemouth bass are $\geq$ 8-inches and stock size bluegill are $\geq$ 3-inches total length. Quality size largemouth bass are $\geq$ 12-inches and quality size bluegill are $\geq$ 6-inches total length.

Objective ranges for both species are generally accepted by fisheries managers. The objective

range for largemouth bass (40-60%) of Reynolds and Babb (1978) is used here. The objective range for bluegill is 20-40% (Novinger and Legler 1978).

PSD values and trends for both species can be displayed graphically with the results used to track progress towards meeting management objectives (Anderson 1978). PSD values for Old Timbers Lake bass and bluegill from 1990 through 2001 are graphed in Figure 2.

PSD values for bluegill have been consistently within the range for balance fish communities since 1990. Largemouth bass PSD values have been consistently outside the range of generally accepted management objectives for the species.

The current 12 to15- inch protected size range is designed to encourage the harvest of stock size bass, reduce intra-specific competition and make additional food resources available for improved bass growth. An improved growth rate for largemouth bass and protection of 12 to 15-inch fish could shift the largemouth bass population into the objective range.

Anglers will need to harvest bass smaller than 12-inches in order to achieve this objective. It should be noted light fishing pressure and the growing reluctance for anglers to harvest small bass may hinder this management approach. Panfish quality is predicted to remain constant or slightly improve under this management regime.

RECOMMENDATIONS

1. Continue the present 12-15-inch protected size range on largemouth bass.

2. Encourage the harvest of bass smaller than the protected size range.

3. Resample Old Timbers Lake during 2004.

4. Consider collecting and reporting fishing information separately by water body during public use surveys.

GATE 8 POND

Gate 8 Pond is located in the northern region of the Proving Ground and comprises 3.0 surface acres. The pond is fairly deep with sharp drop offs indicating this pond was once a rock quarry. The maximum depth recorded was 21 ft when the pond was last sampled in 1994.

Daytime D.C. electrofishing was employed in 2001 on Gate 8 Pond totaling 0.26 hours. The catch per unit of effort was low at 146 fish/hour. The sample of 38 fish was composed of 12 largemouth bass (32%), 25 bluegill (66%), and 1 black crappie (3%). Catch details are provided in Appendix 2. White suckers, longear sunfish and channel catfish were also collected here in 1994.

Analysis of the data collected shows that the Proportional Stock Density (PSD) for largemouth bass is 43%, slightly higher than in 1994. The PSD for bluegill is 6%, also slightly higher than when the pond was last sampled.

Largemouth bass relative weight for 8.0-11.9-inch total length fish was 89 which indicate there is a problem with food or feeding for this size group ofbass. Relative weight for fish $\geq$ 12.0-inch total length fish was 81, also sub optimum.

MANAGEMENT IMPLICATIONS

The presence of white suckers in Gate 8 Pond indicates an occasional connection to a stream system, an attribute which usually precludes intensive management for recreational fishing. However, in its present condition the fish community is capable of sustaining light fishing pressure and could provide average quality recreational fishing for bluegill and largemouth bass.

Crappie are not desirable in ponds of this size, although the present crappie population indicates no serious concerns and could provide additional fishing opportunities. Future management might stress controlled low levels of public use and conservative harvest strategies.

References

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Appendix 1. Fish collected from Old Timbers Lake on Big Oaks NWR by 0.77 hours of D.C. Electrofishing on 8/1/9001.

SPECIES (SIZE RANGE)	NUMBER	PERCENT COMPOSITION*	CATCH/ EFFORT	MEAN RELATIVE WEIGHT**
Largemouth bass				
0.0 - 7.9	58	51%	75	
8.0 - 11.9	49	43%	64	88
12.0+	6	5%	8	87
Total	113	(53%)	147	
Bluegill sunfish				
0.0 - 2.9	18	11%	23	
3.0 - 5.9	33	66%	43	
6.0+	22	23%	29	
Total	73	(34%)	95	
Longear sunfish	4	(2%)	6	
Redear sunfish	12	(6%)	18	
White crappie	4	(2%)	6	
Black crappie	6	(3%)	9	
Grand Total	212	(100%)	275	

*Parenthesis indicate percent composition of the total number of fish. Other values indicate percent composition of the total
for the species.
**Relative weight = Actual weight/Standard Weight

Appendix 2. Fish collected from Gate 8 Pond on Big Oaks NWR by 0.26 hours of D.C. electrofishing on 8/1/2001.

SPECIES (SIZE RANGE)	NUMBER	PERCENT COMPOSITION*	CATCH/ EFFORT (fish/hour)	MEAN RELATIVE WEIGHT**
Largemouth bass				
0.0 - 7.9	5	42%	19	
8.0 - 11.9	4	33%	15	89
12.0+	3	25%	12	81
Total	12	(32%)	46	
Bluegill sunfish				
0.0 - 2.9	8	32%	31	
3.0 - 5.9	16	64%	62	
6.0+	1	4%	4	
Total	25	(66%)	96	
Black crappie (all)	1	(3%)	4	
Grand Total	38	(100%)	146	

*Parenthesis indicate percent composition of the total number of fish.
Other values indicate percent composition of the total for the species.

**Relative weight = Actual weight/Standard Weight