

## BARKLEY LAKE SYMPOSIUM

### FISH STANDING CROP COMPARISONS OF TIRE AND BRUSH FISH ATTRACTORS IN BARKLEY LAKE, KENTUCKY

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*Abstract:* Tire and brush fish attractors were sampled during the Barkley Lake Rotenone Study. Standing crop comparisons were made between tire and brush attractors and control areas. Channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and white crappie (*Pomoxis annularis*) were effectively concentrated by both types of attractors, although brush exceeded tires in concentrating all 4 species. Fish attractors were particularly effective in concentrating harvestable-sized fish.

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Fisheries workers and anglers have long recognized the effectiveness of structure in attracting fish. In the absence of adequate natural structure, placement of artificial structure is often employed to concentrate some fish species into target areas for improved fishing success. Investigative efforts by professional fishery workers on fish attractors commenced in the 1930's. The effectiveness of fish attractors was recognized in these early studies and recent attention has been directed to their design, construction, costs and benefits. Wilbur (1974) and Prince et al. (1977) prepared comprehensive bulletins on the history and effectiveness of fish attractors, with illustrated instructions for constructing various types of attractors.

The Barkley Lake Rotenone Study, conducted by the Reservoir Committee, Southern Division, American Fisheries Society (Summers and Axon 1979), afforded an excellent opportunity to evaluate fish attractors.

#### MATERIALS AND METHODS

Six 0.4 ha areas were selected in the open water of Crooked Creek embayment to evaluate tire and brush fish attractors (Fig. 1). The selected areas were adjacent to the old creek channel for maximum depth (3 m). Open-water sections OW<sup>2</sup> and OW<sup>3</sup> each contained a tire structure (TR), a brush shelter (BR), and a control area (BN) for replication in comparative analysis.

Tire and brush attractors were constructed during April 4-7, 1978. Each brush structure consisted of 43 units of brush (50% hardwood and 50% cedar) wedged in concrete blocks and strapped in a bundle on top. Tires were split in half, holes punched in the sidewall, and 3 halves strapped together to form triangle-shaped units. Ninety-two such units comprised each tire structure. Weighted buoys, with fish attractor decals, were placed at the 4 corners of each fish attractor site.

Each of the six 0.4 ha areas was enclosed with open-water block nets on September 25, and the entire Crooked Creek embayment (85 ha) was treated with rotenone the following day. Fish were recovered and processed for a 3-day period as described by Summers and Axon (1979).

Data were compiled and summarized by members of the Reservoir and Pollution Committees, with assistance from the Southeast Cooperative Fish and Game Statistics Project at North Carolina State University. Data reduction and computer analysis were conducted by the National Reservoir Research Program at Fayetteville, Arkansas. A

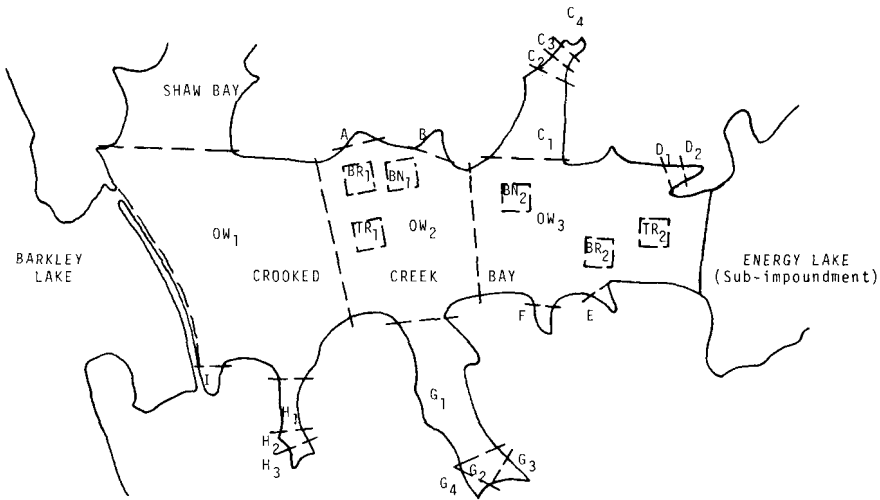


Fig. 1. Sampling areas for Barkley Lake Rotenone Study.

one-way analysis of variance, with unequal subclass size, was used to compare treatments.

Arrays of mean numbers and weights were ran for ten major species collected in the brush and tire attractors. Comparisons were made between tire and brush attractors, control enclosures, adjacent open-water areas ( $OW^2$  and  $OW^3$ ), small coves (approximate 0.4 ha), and the entire Crooked Creek embayment.

## RESULTS AND DISCUSSION

Brush attractors, tire attractors, and control enclosures yielded mean standing crops of 2,418, 993 and 733 kg/ha, respectively. Adjacent open-water averaged 1119 kg/ha, small coves 519 kg/ha, and the entire Crooked Creek embayment 991 kg/ha. It was evident that fish attractors effectively concentrated 4 game fish species: channel catfish, bluegill, largemouth bass, and white crappie. Only these 4 species are addressed herein, although complete species data are available from all segments of the study, if needed for future reference.

Table 1 provides mean numbers and weights per hectare for the 2 types of attractors and control areas. Table 2 gives similar information for harvestable-sized fish, as defined in the Reservoir Committee's Suggested Standard Reporting Methods (Surber 1960). Table 3 contains direct-ratio comparisons of mean standing crops between the 2 types of attractors, and between attractors and other sampling areas.

Channel catfish, bluegill, largemouth bass, and white crappie were concentrated at both brush and tire attractors in comparison with control areas in adjacent open water. Brush and tire attractors both contained higher mean numbers and weights per hectare areas of all 4 species, than any of the other sampling areas, with 2 exceptions: (1) Largemouth bass numbers were highest in coves due to the abundance of young bass. Total weight of largemouth bass, however, was greater at the fish attractors, reflecting a concentration of larger-sized bass at the attractors. (2) Largemouth bass numbers were slightly higher in open-water areas than at tire attractors, although their mean weight was substantially higher at the tire attractors. The abundance of young largemouth bass in coves was also reflected in the mean number per hectare for the entire arm, which equaled the mean

TABLE 1. Mean numbers and weights per hectare of 4 fish species in selected areas of Crooked Creek Arm, Barkley Lake, Kentucky.

	Brush		Tire		Control		Open		0.4 ha		Entire	
	Attractors		Attractors		Enclosures		Water		Coves		Arm	
	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg
Channel catfish	1,436	226	524	89	184	23	242	52	42	9	217	48
Bluegill	7,386	415	1,782	102	126	7	430	20	1,36	24	588	23
Largemouth bass	47	40	22	23	5	1	25	5	321	22	47	6
White crappie	3,778	498	2,390	161	788	11	924	40	40	5	815	41

TABLE 2. Mean numbers and weights per hectare for harvestable-sized fish only, in selected areas of Crooked Creek Arm, Barkley Lake, Kentucky.

	Brush		Tire		Control		Open		0.4 ha		Entire	
	Attractors		Attractors		Enclosures		Water		Coves		Arm	
	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg	No.	kg
Channel catfish ( $\geq 10''$ )	581	169	200	68	59	17	119	45	22	8	106	41
Bluegill ( $\geq 6''$ )	3,882	303	1,003	74	62	5	200	15	166	12	208	16
Largemouth bass ( $\geq 10''$ )	37	39	17	23	2	1	5	5	22	15	7	5
White crappie ( $\geq 8''$ )	1,922	436	558	125	22	5	114	24	17	5	109	24

TABLE 3. Ratio comparisons of mean standing crops of fish at attractors and various other sampling areas in Barkley Lake, Kentucky.

	Brush: Controls	Tires: Controls	Brush: Tires	Brush: Open Water	Tires: Open Water	Brush: Coves	Tires: Coves	Brush: Entire Arm	Tires: Entire Arm
Channel catfish	10.0:1	3.9:1	2.6:1	4.3:1	1.7:1	24.9:1	9.8:1	4.7:1	1.9:1
Bluegill	61.0:1	15.0:1	4.1:1	20.3:1	5.0:1	17.4:1	4.3:1	18.3:1	4.5:1
Largemouth bass	35.0:1	20.0:1	1.8:1	8.8:1	5.0:1	1.8:1	1.1:1	7.0:1	4.0:1
White crappie	43.8:1	14.2:1	3.1:1	12.5:1	4.1:1	109.5:1	35.5:1	12.2:1	3.9:1

number at brush attractors and exceeded that of tire attractors. Here again, mean weight of largemouth bass at both brush and tire attractors greatly exceeded that of the entire arm.

The combined weight of the 4 species per hectare was: 1180 kg/ha at brush attractors, 375 kg/ha at tire attractors, 42 kg/ha at control areas, 117 kg/ha in adjacent open water, 59 kg/ha in 0.4 hectare coves, and 117 kg/ha for the entire Crooked Creek embayment.

Fish attractors were particularly effective in concentration of harvestable-sized fish. The relative proportion of harvestable-sized fish inhabiting attractors was higher for all 4 species than at control areas in adjacent open water. Harvestable-sized fish of all four species were more abundant at brush and tire attractors than any of the other sampling areas except small coves, where the number of harvestable largemouth bass exceeded that of tire attractors. Total weight of harvestable-sized largemouth bass at tire attractors, however, was greater than in small coves.

In comparing the 2 attractor materials, brush substantially exceeded tires in concentrating all four species. By weight, tire attractors contained 4 times more channel catfish, 15 times more bluegill, 20 times more largemouth bass, and 14 times more white crappie than control areas. Brush attractors were even more effective, holding 3 times

more channel catfish, 4 times more bluegill, 2 times more largemouth bass, and 3 times more white crappie than tire attractors.

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