

OBSERVATION OF FISH ATTRACTION TO IMPROVED ARTIFICIAL MIDWATER STRUCTURES IN FRESHWATER

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Abstract: Artificial midwater structures constructed primarily with fiberglass panels and automobile tires were placed in an oligotrophic storage reservoir to determine the extent of fish association with these structures. SCUBA observations were used to evaluate the effectiveness of the structures. Comparisons were made between these and previous structures used by Reeves et al. (1977). Six species of game fish were attracted; however, Alabama spotted bass (*Micropterus punctulatus henshalli*) and bluegill sunfish (*Lepomis macrochirus*) were the predominant species. Concentrations of harvestable spotted bass were noted throughout most of the summer months.

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Working with artificial midwater structures in Lewis Smith Reservoir, Reeves et al. (1977), demonstrated that wooden structures with relatively low surface area and little cover would attract Alabama spotted bass and bluegill sunfish and suggested that midwater attractors "possibly offer a technique to improve underwater structure in storage and pump storage reservoirs where water level fluctuations limit or prohibit the use of bottom artificial attractors." Lawson (1980) found that the structures used by Reeves would attract harvestable size largemouth bass (*Micropterus salmoides*) in a fertilized community fishing lake. However, a relatively low number of fish appeared to associate with the structures in these projects. The low number of fish associated with the wooden attractors may have been due to the small size of the attractors, limited surface area, and little or no cover.

Wilbur (1974) suggested bottom fish attractors of 9.29m² approach minimum size. The wooden structures used in Lewis Smith Reservoir were only 2.88 m² and had limited surface area.

Klima and Wickham (1971) used midwater structures of a similar size to those used by Reeves in Lewis Smith Reservoir. Pelagic fishes of the Gulf of Mexico readily associated with these structures, although they offered little cover. Hammond et al. (1977) found that midwater structures off the South Carolina coast did not attract numerous bait fish and that game fish appeared to be attracted to the physical properties of the structure.

In freshwater, increased cover and surface area of fish attractors are advantageous in attracting game fish. Fish attractors of brush in the Barkley Reservoir study showed a significant increase in game fish over tires and control areas (Pierce and Hooper 1979).

The purpose of this study was to evaluate the success of a midwater structure utilizing materials which enhance surface area and hiding space for fish.

METHODS

Lewis Smith Reservoir, an 8,094-ha oligotrophic storage reservoir, located in northwest Alabama was selected as the study site. A complete description of the site was presented by Webb and Reeves (1975) and Reeves et al. (1977).

Four midwater units were constructed. Each unit consisted of a rectangular frame of 3.8 cm p.v.c. pipe which measured 287.0 cm by 139.7 cm. Two fiberglass panels which measured 66.0 cm by 304.8 cm were attached to the frame (Fig. 1). An open area of 20.3 cm between the 2 panels provided ease of installation of the structure. Twenty automobile

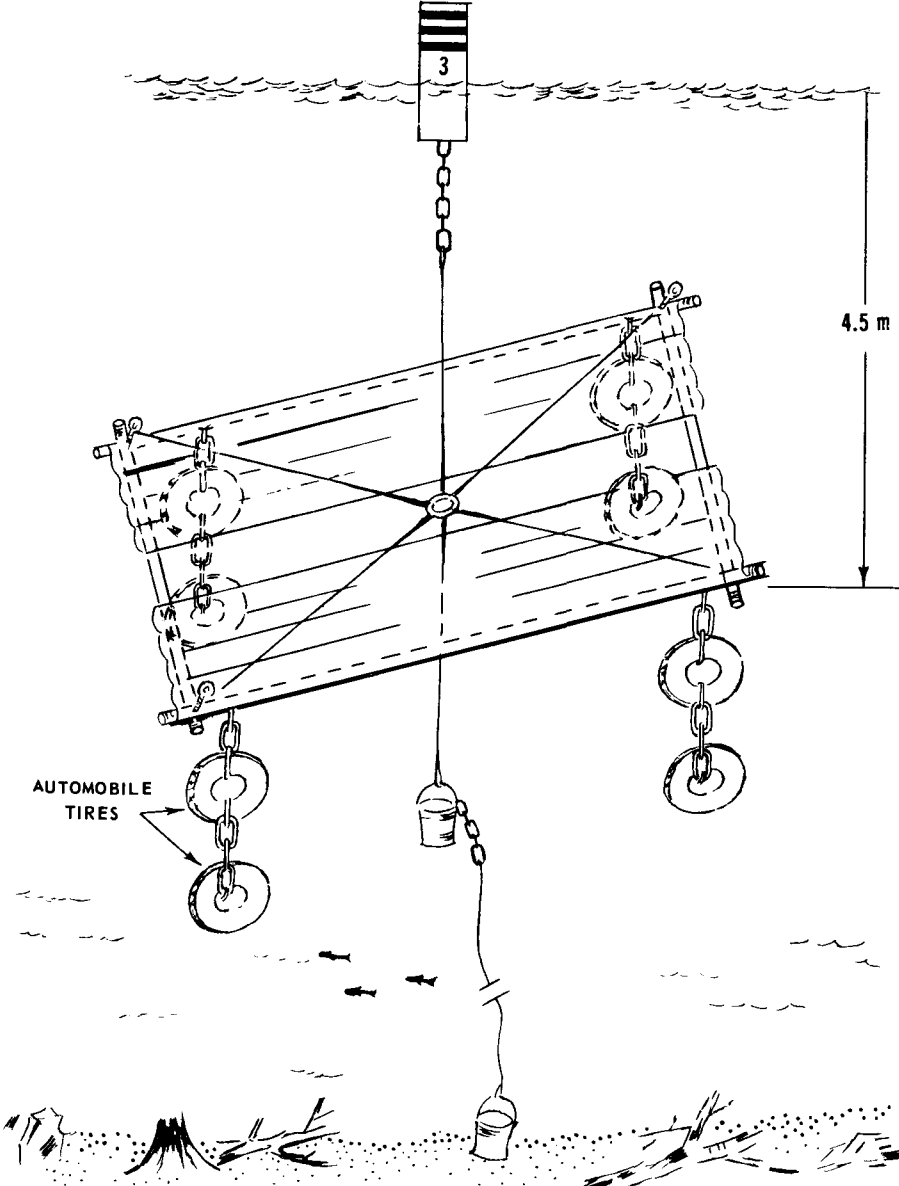


Fig. 1. Basic design of the attractor unit not to scale (actual unit had 10 two-tire droppers).

tires were suspended from each unit in 10 groups of 2 tires each. A polyethylene line was attached to opposing corners of the frame. Total cost per unit was approximately \$40. The unit was suspended in open water between a floating station buoy and a 48 kg weight. The unit was then tethered with sufficient polyethylene line to allow for water level fluctuation. Each unit was approximately 1.3 to 1.5 m in vertical depth. The horizontal surface of the unit was suspended 4.5 m below the water surface. The bottom of the unit was therefore above the thermocline which was normally 8 m deep.

Two units were placed on points and anchored at a depth of approximately 20 m, and 2 units were placed in coves and anchored at a depth of approximately 35 m in a manner similar to that described by Reeves et al. (1977) for comparison to that study.

Installation of the units began on 28 July 1978 and was completed on 17 August 1978. SCUBA observation was initiated on 1 August 1978 with the first observation of all 4 units being on 31 August 1978. Diving observations were concluded on 15 October 1979. No observations were made between 9 November 1978 and 29 May 1979 due to low water temperature and flood conditions. A total of 15 dive trips were made during which each of the 4 attractors were observed.

RESULTS AND DISCUSSION

A total of 52,134 fish, which included 6 species, were observed associated with the midwater units during the study period. Of this total, 51,776 were fry. Ninety-three adult and fingerling fish, observed on 29 June 1979, was the largest number of fish observed on the 4 midwater units on any single occasion. Species observed included Alabama spotted bass, bluegill sunfish, white crappie (*Pomoxis annularis*), white bass (*Morone chrysops*), redear sunfish (*Lepomis microlophus*), and largemouth bass. Spotted bass and bluegill were the dominant species observed.

Spotted bass and bluegill sunfish were associated with the midwater units of this study in larger numbers than with the previous study of Reeves et al. (1977). A total of 57 fingerling and adult spotted bass and bluegill sunfish were observed on the previous study compared to 351 fingerling and adults on this study. Again, spotted bass was the predominant species of adult fish observed. Four additional species noted on this study were white crappie, white bass, redear sunfish, and largemouth bass. These species were present in low numbers, however. A greater percentage of the 5 species observed, with the exception of white crappie, was found to be present below the horizontal fiberglass sheets of the units. Those fish first observed above the attractor appeared to leave the unit as divers approached or to join fish under the attractor between the walls of tires. Most fish seemed to occupy the area beneath the horizontal sheets, where they remained suspended or swam back and forth through the tires going in and out of the attractor. Table 1 presents a chronologic summary of the total number of fish by species and size groupings and the percentage of fish observed above and below the units during the study.

Fish were observed on the first unit on 1 August 1978 4 days after it was installed. At that time, 5,000 white bass fry and fingerlings and 6 spotted bass ranging in size from 20.3 to 30.5 cm were present. Wickham and Ogren (1973) also found large concentrations of fish the first day following structure placement with no significant increase in fish with an increase in soak time. Fish were observed on all units on every dive, except on 9 November 1978.

Lewis Smith Reservoir water level is lowered approximately 7 m during the period of September and October of each year. Filling of the reservoir to summer pool level usually begins in April. When the lake is lowered during the fall, treetops from standing timber are present above the thermocline and offer large areas of cover. The number of fish utilizing the attractors began to decline in the fall, as was observed by Reeves et al. (1977). Klima and Wickham (1971) concluded that midwater structures provided spatial references to

Table 1. Chronologic summary of fish observed on midwater units by size groupings within species.

Date	Species Observed																Total Per Day
	Spotted Bass				Bluegill				White Bass				White Crappie				
	Fry		Fingerlings		Adults		Fry		Fingerlings		Adults		Fingerlings		Adults		
	A ¹	B ²	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
August 31, 1978			3	0	8	4	0	50,000									50,015
September 13, 1978			2	5	4	1	0	550									562
September 27, 1978			1	4	0	1	0	500									506
October 12, 1978			0	3	8	4	0	0									15
October 23, 1978			0	4	0	1	0	0									5
November 9, 1978			0	0	0	0	0	0									0
May 29, 1979			3	0	1	0	0	0	3	0	3	4				5	19
June 18, 1979	0	25	0	23	0	8	0	0	0	3	0	3	500				562
June 29, 1979			0	75	0	10	0	0	0	1	0	7					93
July 18, 1979			1	1	1	11	0	0	0	0	0	4					18
August 1, 1979			0	3	2	17	200	0	0	1	0	2					225
August 16, 1979			1	18	0	21	0	0	0	0	0	1	5				46
August 30, 1979			0	4	9	27	0	0	0	0	0	6					46
September 28, 1979			0	0	5	0	0	0	0	0	0	4	1				10
October 15, 1979			1	0	4	2	0	0	0	0	0	1	2				10
Subtotals	0	25	12	140	42	107	200	51,050	3	5	9	34	0	500	5	0	52,132
Totals	25	152	149	51,250	8	43	500										5
Percent Above	0	7.9	28.2	0.4	37.5	20.9	0										100
Percent Below	100.0	92.1	71.8	99.6	62.5	79.1	100.0										0

¹Fish observed above unit. ²Fish observed below unit.

which fish could orient in an otherwise unstructured environment. Highest fish association with midwater structures occurred during the time when the open lake epilimnetic water was otherwise unstructured.

Reeves et al. (1977) reported that valid comparisons between cove and point units for total number of fish could not be made. However, adult spotted bass tended to occur in greater numbers on points rather than coves. Data obtained during this study also indicated a greater utilization of units placed over points rather than in coves. Over the entire study period, 70.4 percent of the spotted bass fingerlings and adults were observed on the point units; and 29.6 percent, on the cove units. Fifty-eight percent of the bluegill sunfish fingerlings and adults were on the point units, and 42 percent were on the cove units. Of the total number of spotted bass and bluegill sunfish, fingerlings and adults, 68.7 percent were seen on the point units and 31.3 percent on the cove units. Table 2 presents a chronologic summary of point and cove units for total numbers and size groupings of spotted bass and bluegill sunfish.

Total numbers of harvestable fish associated with these midwater units were relatively high in comparison with the previously designed midwater structures. The authors observed that the midwater structures attracted harvestable-size spotted bass equal to or

Table 2. Chronologic Comparison of Point Vs. Cove Units for Total Numbers of Fry, Fingerling, and Adult Spotted Bass and Bluegill

Date	Species Observed			
	Spotted Bass		Bluegill	
	Points	Coves	Points	Coves
8-31-78	11	4	0	50,000 ¹
9-13-78	11	1	550a	1 ¹
9-27-78	3	3	500a	0
10-12-78	12	3	0	0
10-23-78	4	1	0	0
11-9-78	0	0	0	0
5-29-79	2	2	4	6
6-18-79	25 ¹	18	3	3
	13			
6-29-79	50	35	5	3
7-18-79	8	6	3	1
8-1-79	20	2	2	200 ¹
				1
8-16-79	35	5	4	1
8-30-79	31	9	3	3
9-28-79	5	0	2	0
10-15-79	7	0	3	0
TOTAL	212	89	29	21

¹Fry, not included in total.

greater than a comparable area of natural shoreline structure in Lewis Smith Reservoir. It was evident that these units effectively concentrated 2 game fish species, spotted bass and bluegill.

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