

STOCKING OF PREDATORS IN THE PREDATOR-STOCKING-EVALUATION RESERVOIRS¹

by

DAVID L. PRITCHARD
Texas Parks and Wildlife Department
Austin

OTHO D. MAY, JR.
South Carolina Wildlife and Marine
Resources Department, Saluda

LARRY RIDER
Arkansas Game and Fish Commission
Russellville

ABSTRACT

Sixteen of the 26 predator stocking evaluation (PSE) reservoirs were stocked with striped bass during 1967-71 and harvest of them by anglers was recorded in 10 reservoirs in 1972 and/or 1973. Walleye were stocked in nine of the PSE reservoirs and were harvested in six of them during the study period. Probable reasons for stocking success or failure are discussed in the accompanying PSE papers.

INTRODUCTION

Development of reservoir fishery management techniques has been rather haphazard in the past, and most have never been adequately evaluated. This is a serious situation in light of dramatic increases in fishing pressure on reservoir fisheries. Jenkins (1973) estimated 68 million angler-days were expended in southern reservoirs in 1973, and projected reservoir fishing demands may double by the end of this century. An increase of 2 million acres of new reservoirs (47% increase) may occur by the year 2000, but fishery managers cannot depend on new construction to create quality fisheries needed to meet demands. Reservoir construction is on the decrease.

Southern fishery managers, working with tight budgets and small staffs, are confronted with the necessity of increasing harvest and man-days of fishing. Many feel the best way to accomplish their objectives is with predator sport fish introductions. Inadequate culture facilities and lack of introduction cost-benefit statistics has hampered this approach to fishery management, but a large amount of stocking has taken place.

This report summarizes the predator fish introductions made in 26 southern reservoirs as part of a study to evaluate predator stocking sponsored by the Reservoir Committee, Southern Division, American Fisheries Society.

PROCEDURES

Fishery agencies participating in the predator stocking evaluation furnished stocking records for the study reservoirs. Stocking records covered a period of 26 years, beginning with the stocking of largemouth bass, *Micropterus salmoides*, stocked as fry and fingerlings in 1974 and striped bass, *Morone saxatilis*, stocked as adults in 1958. Stocking records have been summarized for the predator fishes most frequently stocked: striped bass; largemouth bass; walleye, *Stizostedion vitreum*; northern pike, *Esox lucius*; rainbow trout, *Salmo gairdneri*; muskellunge, *E. masquinongy*; and white bass, *Morone chrysops*.

In addition to the above predator fishes, others were stocked in lesser numbers or in fewer PSE reservoirs and are omitted from this summary. Brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), and splake (*S. fontinalis* x *S. namaycush*) were also stocked in Deep Creek Lake; white bass x striped bass hybrids were introduced into Lake Bastrop; Florida largemouth bass (*M. salmoides floridanus*)

¹ Basic data presented in this paper are derived from a cooperative "Predator Stocking Evaluation (PSE)," conducted under the auspices of the Reservoir Committee, Southern Division, American Fisheries Society, 1972-73.

were stocked in Lake Keystone; and blue catfish (*Ictalurus furcatus*), channel catfish (*I. punctatus*), and flathead catfish (*Pylodictis olivaris*) were stocked in various Arkansas, North Carolina, Oklahoma, and Texas PSE lakes.

RESULTS

Seven predator species were introduced into 26 reservoirs by nine states (Table 1). Eight impoundments were stocked with only one species. The remaining 18 received two or more species introductions. One reservoir received six species. Striped bass were stocked in 18 of the reservoirs, walleye and largemouth bass in 11. Fry and fingerlings were stocked by most states. Rainbow trout which can be reared economically were stocked as advanced fingerlings and/or yearlings. White bass yearlings or adults were usually collected by electrofishing and stocked in the PSE reservoirs just prior to spawning. Striped bass,

Table 1. Species and sizes of predatory fish introduced into 26 predator-stocking-evaluation reservoirs—1947-73 (common names are from Bailey et al. 1970). The key to size of predators stocked is as follows: 1 = eggs; 2 = fry; 3 = fingerlings; 4 = yearlings; 5 = adults.

State and Reservoir	Striped bass				Walleye				Largemouth bass				Northern pike				Rainbow trout				Muskel-lunge				White bass				
	1	2	3	4	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Alabama																													
Jordan				3																									
Mitchell				3																									
Arkansas																													
Beaver				3	4		2	3					3	5															4
Bull Shoals				3				3																					4
Greeson				3	5		1	2	3																				4
Georgia																													
Jackson				3	4								3																5
Sinclair				3																									5
Maryland																													
Deep Creek					5		2	3	5			5	1	2	3	5													2
Mississippi																													
Ross Barnett				3	4								3	4															5
Enid								2	3																				5
Grenada				3																									
Okatibbee				3									3	5															
Sardis				3																									
North Carolina																													
Badin				3																									
Gaston					1								3	5															5
Oklahoma																													
Canton				2	3								2	3															
Eucha								2																					
Keystone				2	3	4	5																						
Spavinaw								2																					
Tennessee																													
Cherokee				2	3																								
Dale Hollow																													
Wautauga								2																					
Woods																													
Texas																													
Bastrop																													
Cypress Springs																													
Spence				3	4																								

walleye, black basses, northern pike, and white x striped bass hybrids were stocked either as eggs, fry or fingerlings. Bailey (1974) reported that fingerling striped bass stocking was far more effective than stocking adults and fry. Survival of two-inch fingerling striped bass was generally good. Keith (1969) reported that Arkansas had nursery ponds in operation near five major reservoirs which had been used to stock striped bass, walleye, largemouth bass, northern pike, muskellunge, and channel catfish. In 1968, the Arkansas Game and Fish Commission completed a 20-acre nursery pond on 7,200-acre Lake Greeson, and during the period 1968-73, 84,500 striped bass from 3 to 6 inches in length were stocked (Keith, 1969). The reestablishment of a walleye fishery in Bull Shoals Lake, Arkansas was a result of nursery pond releases of 2-3 inch walleye according to Keith (1969).

Keystone Lake in Oklahoma was stocked with 2 million striped bass fry in spring 1965, and 80 adults in late fall. Striped bass fingerlings were stocked again in 1966, 1967, 1968, and 1969. Five years after the first introduction (1970), natural reproduction of striped bass occurred in Keystone Reservoir.

A walleye population was established in Wautauga Lake, Tennessee, following a stocking of 4.5 million fry (700 fry per acre) in 1965. Canton Lake in Oklahoma was stocked with walleye fry in 1961 (107 fry per acre), in 1962 (91 fry per acre), and in 1963 (33 fry per acre), and walleye spawned in the lake in 1965.

In recent years, striped bass and walleye have received most attention as desirable predators as indicated by the stocking densities presented in Table 2. Sixteen PSE reservoirs have been stocked with striped bass since 1967, 10 of which produced angler harvests during 1972 and/or 1973 (Campbell, et al. 1977). However, two of the reservoirs stocked (Gaston and Canton) did not have creel surveys and the success of striped bass in those is uncertain. Nine PSE reservoirs have been stocked with walleye since 1967, and six of those have produced angler harvests in 1972 and/or 1973. In addition, Wautauga Lake, showed significant angler harvests of walleye in 1972 and 1973 only after one stocking in 1965.

Table 2. Annual stocking densities for striped bass and/or walleye in 20 predator-stocking-evaluation reservoirs, 1967-1973.

<i>State and Reservoir</i>	<i>Year Stocked</i>	<i>Size Stocked</i>	<i>Number Stocked/Acre</i>	
			<i>Striped bass</i>	<i>Walleye</i>
Alabama				
Jordan	1969	fingerlings	1.0	
	1973	fingerlings	5.3	
Mitchell	1969	fingerlings	0.5	
	1973	fingerlings	5.4	
Arkansas				
Beaver	1968	yearlings	0.5	
	1970	yearlings	0.5	
	1970	fingerlings		7.2
	1970	yearlings		t
	1972	fry		5.3
	1972	fingerlings		3.6
	1973	yearlings	0.7	
Bull Shoals	1967	fingerlings		7.2
	1968	yearlings		0.2
	1969	fingerlings		1.8
	1970	yearlings	0.2	
	1971	fingerlings		3.6
	1972	fingerlings		6.6
	1973	fingerlings	1.6	
Greeson	1967	fingerlings	1.1	
	1968	fingerlings	2.7	

<i>State and Reservoir</i>	<i>Year Stocked</i>	<i>Size Stocked</i>	<i>Number Stocked/Acre</i>		
			<i>Striped bass</i>	<i>Walleye</i>	
Georgia	1969	fingerlings		42.0	
	1970	fingerlings	3.1		
	1971	fingerlings		48.0	
	1973	fingerlings	6.3		
Jackson	1969	fingerlings	1.9		
	1970	fingerlings	5.9		
Sinclair	1970	yearlings	1.8		
	1971	fingerlings	3.5		
	1972	fingerlings	5.6		
	1973	fingerlings	16.8		
	1969	fingerlings	1.9		
	1970	fingerlings	5.9		
	1970	yearlings	1.8		
Maryland	1971	fingerlings	3.5		
	1972	fingerlings	5.6		
	1973	fingerlings	16.8		
	Deep Creek	1969	fingerlings		19.2
		1970	fingerlings		25.6
1972		fingerlings		25.6	
Mississippi	Ross Barnett	1968	fingerlings	t	
		1969	fingerlings	3.7	
		1969	yearlings	t	
		1970	fingerlings	3.2	
		1971	fingerlings	2.4	
		1972	fingerlings	0.3	
	Enid	1973	fingerlings	3.6	
		1971	fry		53.0
		1972	fry		41.5
		1973	fingerlings		3.9
Okatibbee	1969	fingerlings	0.4		
	1970	fingerlings	0.3		
	1971	fingerlings	0.3		
	1972	fingerlings	10.9		
	1973	fingerlings	5.3		
Sardis	1970	fingerlings	0.2		
	1971	fingerlings	0.2		
	1973	fingerlings	1.4		
North Carolina	Badin	1971	fingerlings	18.3	
		1972	fingerlings	7.4	
		1973	fingerlings	10.6	
	Gaston	1967	eggs	22.7	
1968	eggs	23.9			
1969	eggs	29.5			
1971	eggs	11.4			
1972	eggs	45.5			
Oklahoma	Canton	1969	fry	7.5	
		1969	fingerlings	1.8	

State and Reservoir	Year Stocked	Size Stocked	Number Stocked/Acre	
			Striped bass	Walleye
Eucha Keystone	1970	fry	5.9	
	1971	fry	6.9	
	1973	fingerlings	10.1	
	1973	fry		100.0
	1967	fingerlings	6.8	
	1967	fry		45.6
	1968	fingerlings	10.1	
	1969	fry	66.5	
	1969	fingerlings	11.2	
	1967	fry		45.8
Spavinaw Tennessee Cherokee	1967	fry	9.9	
	1967	fingerlings	0.7	
	1968	fry	16.6	
	1968	fingerlings	3.4	
	1969	fingerlings	3.3	
	1970	fry	1.3	
	1970	fingerlings	2.1	
	1971	fry	3.3	
	1971	fingerlings	0.7	
	1972	fingerlings	4.2	
Texas Cypress Springs	1971	fry		5,195.0
	1972	fingerlings		28.6
Spence	1969	fingerlings	42.1	
	1970	fingerlings	2.2	
	1971	fingerlings	19.4	
	1971	yearlings	1.0	
	1972	fingerlings	10.9	
	1973	fingerlings	12.1	

t = less than 0.1

DISCUSSION

The trend in reservoir management appears to be toward increasing predator diversity. Diversification is an attempt by fishery agencies to make efficient use of available food in reservoirs, provide additional sport and food fishes for harvest, and spread fishing pressure among more species.

Fry and fingerling stockings were predominant in the early 1960's and through these stockings several significant introduced predator populations were established in the early 1970's. Fry stockings of walleye have led to establishments of measurable populations in reservoirs in Tennessee, Oklahoma, and Texas. Several of these stockings were made during the early impoundment period.

Pond culture techniques continue to be improved in an attempt to supply the demand for fingerling striped bass. The larger the fingerlings stocked, the better the chances of survival, but the losses incurred while rearing them to the larger size may outweigh that advantage. Arkansas has been successful in using nursery ponds to rear fish from fry to fingerling size or larger, then draining them directly into an adjacent reservoir, and establishing measurable populations of desirable fishes.

Cage culture is still another practice in the experimental stages which may be used as a future predator production technique. Species such as rainbow trout may be reared economically in large cages during the winter months for release in two-story reservoirs.

Trout may be fed during the winter periods in selected reservoirs, and once the fish reach a desirable size they may be towed to a release site or simply released from the cages at the rearing site. This technique can also be used to rear catfishes (*Ictalurus* sp.) to a desirable size during the summer.

Fishery managers should be cautious in entering into full-scale predator stocking programs. Favorable cost/benefit ratios are essential to justification.

LITERATURE CITED

- Bailey, R. M., J. E. Fitch, E. S. Herald, E. A. Lachner, C. C. Lindsey, C. R. Robins, and W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada (Third Ed.). Amer. Fish. Soc., Spec. Publ. 6: 1-149.
- Bailey, William M. 1974. An evaluation of striped bass introduction in the Southeastern United States. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 28: 54-68.
- Campbell, W. J., E. J. Hayes, W. R. Chapman, and W. Seawall. 1977. Angling pressure and sport fish harvest in the predator-stocking evaluation reservoirs. Submitted for publication in 30 Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm.
- Jenkins, Robert M. 1973. Reservoir management prognosis: Migraines or miracles. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 27: 374-385.
- Keith, William E. 1969. Preliminary results in the use of a nursery pond as a tool in fishery management. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 23: 501-511.