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POTENTIALS OF THE REDEAR SUNFISH x GREEN SUNFISH HYBRID IN POND MANAGEMENT

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Childers and Bennett [*1*] reported excellent fishing by establishing a population of the male redear sunfish (*Lepomis microlophus*) and the female green sunfish (*L. cyanellus*) hybrid. The present study was undertaken to further examine the value of this hybrid in pond management.

METHODS

The ponds used in this study were free of wild fish. Populations of the hybrid were produced in four farm ponds by stocking parental fish (table 1). Parental fish were also stocked in two 1/7-acre brood ponds. F_1 hybrids were subsequently seined from these two ponds and stocked at known rates in three larger ponds. In all ponds except one in which F_1 fish were stocked, fingerling largemouth bass (*Micropterus salmoides*) were stocked at a rate of 50 per acre in late summer following spawning of the parentals or introduction of F_1 fish.

The ponds were sampled by seining, electrofishing, and angling in the fall of each year subsequent to stocking. The populations that were established by stocking parental fish were evaluated in terms of relative abundance of the first F_1 year class, evidence of subsequent annual recruitment, and weight attained by representatives of each year class. The populations established by stocking F_1 fish were evaluated on a basis of the average weights the fish attained by the fall of each year.

RESULTS

At a stocking rate as low as three males and four females per acre, numerous fingerling hybrids were produced (table 1). In all populations where parentals were stocked, F_1 fish were produced each year. No F_2 fish or backcrosses were evident in the populations. Males constituted 99 percent (based on the 1,236 hybrids examined) of the F_1 fish that were produced by stocking parental fish. Fall fish collections from the three ponds stocked with F_1 hybrids failed to reveal any F_2 hybrids, even in the one pond where bass were not stocked. With one exception, the F_1 fish attained weights of 0.4 to 0.5 pound by the fall of their third year in the ponds stocked with parentals. F_1 fish which were spawned the second and third year after stocking usually exhibited a lower rate of gain than fish spawned the first year (table 2). In one population established by stocking F_1 hybrids the fish averaged 0.7 pound by the fall of

Table 1.—Stockings used to produce populations of the redear sunfish × green sunfish hybrids

Pond	No. of acres	Parentals stocked (no./acre)		F_1 fish: 1st-year spawn or no. stocked
		Male	Female	
Ogur	3.9	6	4	Numerous
Albers	2.0	4	6	Intermediate
Dykehouse	2.0	15	10	Few
Lenore	3.9	3	4	Numerous
Pierce	0.6	None	None	1,000 per acre
Verduin	1.3	do.	do.	1,000 per acre
Erickson	0.5	do.	do.	1,000 per acre

NOTE.—This study was done in cooperation with the Illinois Department of Conservation.

Table 2.—Growth of F_1 redear sunfish × green sunfish hybrids in ponds stocked with parental fish

F_1 year class	Mean weight in the fall of—										
	1st year		2d year			3d year			4th year		
	Wt. (lb.)	No. fish	Wt. (lb.)	No. fish	SD [1]	Wt. (lb.)	No. fish	SD [1]	Wt. (lb.)	No. fish	SD [1]
Ogur Pond:											
1967	0.01	125	0.29	37	0.04	0.48	45	0.06	—	—	—
1968	.13	111	.23	42	.06	—	—	—	—	—	—
1969	.07	142	—	—	—	—	—	—	—	—	—
Albers Pond:											
1967	.08	120	.35	26	.03	.55	39	.05	—	—	—
1968	.06	212	.23	29	.06	—	—	—	—	—	—
1969	.03	106	—	—	—	—	—	—	—	—	—
Dykehouse Pond:											
1967	.10	107	.33	39	.05	.51	31	.05	—	—	—
1968	.07	160	.32	15	.06	—	—	—	—	—	—
1969	.06	63	—	—	—	—	—	—	—	—	—
Lenore Pond:											
1966	.04	74	.14	26	.05	.35	21	.04	0.50	28	0.06
1967	.07	240	.18	32	.05	.29	30	.05	—	—	—
1968	.07	85	.15	28	.03	—	—	—	—	—	—
1969	.08	93	—	—	—	—	—	—	—	—	—

[1] SD=standard deviation.

Table 3.—Growth of redear sunfish × green sunfish hybrids stocked at a rate of 1,000 F_1 per acre

Pond	Mean weight in the fall of—										
	1st year		2d year			3d year			4th year		
	Wt. (lb.)	No. fish	Wt. (lb.)	No. fish	SD [1]	Wt. (lb.)	No. fish	SD [1]	Wt. (lb.)	No. fish	SD [1]
Pierce	0.07	34	0.23	21	0.03	0.70	26	0.05	1.40	18	0 10
Erickson	.08	85	.30	42	.04	.56	35	.04	—	—	—
Verduin	.10	21	[2] .27	23	.02	—	—	—	—	—	—

[1] SD=standard deviation.
[2] Sample taken in June; population subsequently lost as a result of orchard spraying.

Table 4.—Growth of largemouth bass stocked as fingerlings with redear sunfish × green sunfish hybrids

Pond	Mean weight in the fall of—										
	1st year		2d year			3d year			4th year		
	Wt. (lb.)	No. fish	Wt. (lb.)	No. fish	SD [1]	Wt. (lb.)	No. fish	SD [1]	Wt. (lb.)	No. fish	SD [1]
Lenore	—	—	1.04	17	0.11	1.80	16	0.15	3.00	13	0 23
Pierce	0.07	19	.33	12	.09	1.05	17	.16	1.50	12	25
Ogur	.14	41	1.36	20	.20	2.82	10	.30	—	—	—
Albers	.03	26	.76	24	.11	1.15	25	.11	—	—	—
Dykehouse	.24	10	.36	14	.10	.72	12	.07	—	—	—
Verduin	.03	21	[2] .38	18	.07	—	—	—	—	—	—
Erickson [3]	—	—	—	—	—	—	—	—	—	—	—

[1] SD=Standard deviation.
[2] Sample taken in June; population subsequently lost as a result of orchard spraying.
[3] Bass were not stocked.

their third year, while fish of a second population attained a weight of 0.6 pound (table 3).

The largemouth bass that were stocked with the hybrids spawned in all ponds by the third summer after being stocked. The fish that were initially stocked attained average weights of 0.7 to 2.8 pounds by the fall of their third year (table 4). In the ponds where parental fish were stocked, the size attained by the bass shows a positive correlation with the relative abundance of the F_1 fish produced the first year. Thus, there is evidence that they utilized some of the F_1 fish as food.

DISCUSSION

One of the most desirable characteristics of a species used in either fish management or culture is that its reproduction can be controlled. If this criterion is met, then growth rate and approximate size of the individual fish can be controlled.

There are basically two types of populations with respect to their reproductive potential. Type 1, exemplified by largemouth bass-bluegill sunfish populations, theoretically reproduce geometrically, whereas type 2, illustrated by redear $\times$ green sunfish F_1 populations, reproduce arithmetically.

Under the conditions of this study there was annual recruitment of F_1 hybrids which appeared to neither interbreed nor backcross. Thus, annual recruitment within broad limits is controlled by the number of parental fish stocked.

In this study the control of annual recruitment was sufficient to result in rapid growth of the fish. If we assume that recruitment was the same for each of the three year classes, a minimum of 33 percent of the population would be of acceptable size (one-third pound) by fall of the third year. When such a population is subjected to angling, more rapid growth of younger year classes should result, and fish should continuously enter the fishery.

Hybrids in populations produced by stocking F_1 fish grew faster than those in the populations produced by stocking parental fish (tables 2 and 3). Nevertheless, the use of parental fish is more attractive for farm pond management. One significant feature of using parental fish is that the F_1 hybrids would probably be produced each year for at least a 4-year period. Also, since the F_1's are from different year classes, the population is made up of various size fish. This type of population utilizes the natural food more efficiently than a population that consists of one size class.

Largemouth bass populations were successfully produced in combination with the hybrid populations. It thus appears that a population of rapidly growing fish with annual recruitment of F_1 hybrids for at least 3 or 4 years will result, if male redear sunfish and female green sunfish are stocked at a rate of approximately 5 pairs per acre, but never less than 5 pairs per pond, and fingerling bass are stocked subsequent to the first spawning of these fish.

REFERENCE

1. CHILDERS, WILLIAM F., and GEORGE W. BENNETT. 1967. Hook-and-line yield of largemouth bass and redear $\times$ green sunfish in a one-acre pond. Progressive Fish-Culturist, vol. 29, no. 1, p. 27–35.