

# TEMPERATURE TOLERANCE OF THE PEACOCK BASS AND A POND TEST OF ITS VALUE AS A PISCIVOROUS SPECIES

By HUGH A. SWINGLE  
*Agricultural Experiment Station*  
Auburn University  
Auburn, Alabama

## ABSTRACT

Since the introduction of the peacock bass, *Cichla sp.*, into Florida in 1964, several southeastern states have considered introducing it as a new piscivorous game species. Tests show that fingerling peacock bass die at temperatures below 61°F., and, therefore, they would be unsuitable for introduction outside of tropical areas unless overwintered indoors or in heated water.

In one pond stocked with 108 peacock bass per acre, tilapia, and fathead minnows, the peacock bass appeared to be a less effective predator than the largemouth bass when stocked under similar conditions. However, growth rates were approximately the same for peacock bass and largemouth bass at the end of a six-month period.

## INTRODUCTION

A cichlid thought to be the peacock bass, *Cichla ocellaris* (Bloch and Schneider) was introduced into Southern Florida in 1964 (Ogilvie, 1965). However, there now appears to be some doubt if this fish is *Cichla ocellaris* since Ogilvie (1966) observed *C. ocellaris* in Venezuela and found it to be different from that species now in Florida. Following introduction into Florida, several other southeastern states have introduced, or are considering introducing, this cichlid as a possible new piscivorous game species. Since it is native to the tropical waters of South America, information on its temperature tolerance is needed before further attempts are made to import it into more northern regions.

Sterba (1963) reported 68°F. as lethal to *Cichla ocellaris*. Ogilvie (1966) recorded temperatures as low as 55°F. in January of 1964 with no observed mortality of the *Cichla sp.* in Southern Florida. However, during the winter of 1965 he, in addition to Georgia biologists, experienced almost complete winter kills of their peacock bass stocks.

## TEMPERATURE TOLERANCE TEST

Approximately 100 peacock bass fry were received by Auburn University in June, 1965 from Mr. Vernon Ogilvie of the Florida Game and Fish Commission. On arrival the fish were found to be infested with *Ichthyophthirius* and were subsequently treated with 0.05 ppm malachite green on three successive days. No fish died until exposed to malachite green; however, it was undetermined whether mortality was due to the parasitic infestation or to the treatment. Twenty fry survived the treatment and were stocked into a small concrete pool containing fathead minnows, *Pimephales promelas* Rafinesque. In September, 1965, only eight peacock bass were recovered and they had attained a length of three inches. No small fathead minnows were present when the pool was drained.

Four peacock bass were placed in each of two aquaria in a room with controlled temperature and photoperiod. The fish were acclimated at 83°F. for seven days, and thereafter the temperature was lowered approximately 1°F. each day. The photoperiod was kept constant at 16 hours throughout the experiment. Each aquarium containing four peacock bass received 20 small fathead minnows at 8:00 a.m. each day during the acclimation period and until the temperature reached a point at which the peacock bass ceased feeding. Initially, the minnows were eaten immediately when placed into the aquaria. When the water temperature reached 65°F., the peacock bass began to feed less voraciously.

ciously and often waited until a minnow swam very close before capturing it. At 63°F. they ceased to feed and daily feeding was stopped. The fish were sluggish and often failed to react when touched with a glass stirring rod. Four fish died at 61°F. and the remaining four after 12 hours at 60°F.

From these data it appears that fingerlings of the cichlid now in Florida will not survive the average winter in regions where the minimum water temperature is 61°F. or lower.

### RESULTS OF STOCKING ONE POND WITH PEACOCK BASS, TILAPIA, AND FATHEAD MINNOWS

In 1965 one quarter-acre pond was stocked with peacock bass, *Tilapia melanopleura*, and fathead minnows. The data on stocking and draining are summarized in Table 1 on a per-acre basis.

TABLE 1. Stocking and Draining Data for One Pond Stocked With Peacock Bass, Tilapia and Fathead Minnows.

Species	Stocked			Drained October 13, 1965		
	Inch group	Number	Pounds	Inch group	Number	Pounds
Fathead minnow <sup>1</sup>	2	4,000	5.6	1-3	102,060	135.6
Peacock bass <sup>2</sup>	6	4	0.4	2-3	1,628	7.8
	7	44	7.2	10	12	8.0
	8	48	10.0	11	60	42.8
	9	4	1.6	12	4	4.0
	10	8	3.6			
Total Bass		108	22.8		1,704	62.6
<i>Tilapia melanopleura</i> <sup>3</sup>	2-4	260	6.0	2-3	25,888	290.4
				4-5	1,200	46.0
				6-7	112	28.0
				8-9	68	26.4
Total tilapia		260	6.0		27,268	390.8
Grand total			34.4			589.0

<sup>1</sup> Stocked January 7, 1965

<sup>2</sup> Stocked April 26, 1965

<sup>3</sup> Stocked May 10, 1965

The pond was fertilized with a total of 165 pounds of triple super-phosphate per acre from January to September. In addition, 640 pounds of Auburn No. 2 supplemental feed was used per acre between April 6 and October 11 at rates varying from five to 16 pounds per acre per day.

Of the 589.0 pounds of fish present when the pond was drained, only 109.2 pounds, or 18.5%, were of harvestable size. For each pound of peacock bass present, there were 6.8 pounds of small forage fish (minnows and 2-3 inch tilapia). These two values,  $A_T = 18.5$  and  $Y/C = 6.8$ , classify this population as unbalanced with overcrowded small forage fish (Swingle, 1950). Unbalance may often result from too few or an inefficient predator species. A  $Y/C$  value of 6.8 is more than twice the desirable ratio as given by Swingle (1950). Had the number of peacock bass been increased to 200 per acre, perhaps the number of small fish would have been decreased by predation, allowing more food available for growth of the remaining tilapia. This could have increased the percentage of harvestable fish from 18.5% to a more desirable figure. Ogilvie (1965) mentioned one pond in Georgia that contained "large numbers" of one-half to four-inch tilapia. Twelve days after adding 212 yearling peacock bass per acre all the tilapia, except those one-half inch long, had been eliminated. No data were given on the numbers of tilapia stocked or present when the pond was drained. Of 20 peacock bass from sunfish populations examined by Ogilvie (1965), only one was found that had eaten a bluegill. Tests in aquaria indicate

that the peacock bass prefers a slender, minnow-like fish to a fish such as the bluegill. This is similar to the food preference of the largemouth bass as reported by Snow (1961), and Lewis et al. (1961).

From April to October the average weight of the peacock bass increased from 0.21 to 0.72 pounds when stocked with tilapia and fathead minnows. Largemouth bass, when stocked with tilapia, have shown average weight gains ranging from 0.3 to 0.7 pounds during the same length growing period (Auburn University, Fisheries Annual Report 1959-1964).

## SUMMARY AND CONCLUSIONS

The minimum lethal temperature of 61°F. for fingerling peacock bass will drastically limit their distribution in the United States. Although peacock bass were able to survive the winter of 1964 in the most southern part of Florida, all those in Georgia and most of those in Florida died during the winter of 1965. If peacock bass are proved to be a highly desirable species, they could be overwintered in warm springs or heated water and stocked in ponds in the spring, such as is done with tilapia in many areas. Feeding these fish during the winter would require holding large numbers of small forage fish unless they could be fed pelleted food.

When stocked in one pond with tilapia and fathead minnows, the peacock bass appeared to be a less effective piscivorous species than the largemouth bass. The growth rate of the peacock bass in this pond was similar to that which could be expected from largemouth bass under similar conditions.

Before a final conclusion can, or should, be made on the value of the peacock bass, more information is definitely needed.

## LITERATURE CITED

- Lewis, W. M., E. Gunning, Edward Lyles, and W. Bridges. 1961. Food choice of the largemouth bass as a function of availability and vulnerability of food items. *Trans. Amer. Fish. Soc.* 90(3): 277-280.
- Ogilvie, Vernon E. 1965. The peacock bass, *Cichla ocellaris* in Florida. Preliminary report to the Florida Game and Freshwater Fish Commission.
- . 1966. Report on the peacock bass project, including Venezuelan trip report, and a description of five *Cichla* species. Report to the Florida Game and Freshwater Fish Commission.
- Snow, J. R. 1961. Forage fish preference and growth rate of the largemouth bass fingerlings under experimental conditions. *Proc. of the Fifteenth Annual Conf. S. E. Assoc. of Game and Fish Comm.* (1961): 303-313.
- Sterba, Gunther. 1963. *Freshwater fishes of the World.* The Viking Press, Inc. New York. p. 690.
- Swingle, H. S. 1950. Relationships and dynamics of balanced and unbalanced fish populations. *Bull. No. 274. Ag. Expt. Station, Auburn, Alabama.*