

FISHERMAN UTILIZATION OF *Tilapia aurea* (Steindachner) IN LAKE PARKER, LAKELAND, FLORIDA

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ABSTRACT

Tilapia aurea, blue tilapia (Smith-Vaniz, 1968) were brought to Florida in 1961. Verification of this species in Lake Parker occurred five years later. Since this time, they have reached a concentration which provides a unique fishery.

Parker, a 2,291 acre lake located in Lakeland, Florida, was creel for a year to determine fisherman utilization of blue tilapia. Harvest by baited hook was significant only three months of the period. This species comprised over 40 per cent of the total harvest six months of the year, after legalization of cast netting and snatch hooking. Success by these methods was correlated with two, seasonal factors; spring spawning activity and warm water outflow from an electrical power plant in winter months.

This does not indicate that *Tilapia aurea* is an additional sport fishery, but rather a food fish that can be significantly harvested only by special methods.

INTRODUCTION

The introduction of *T. aurea*, blue tilapia, (Smith-Vaniz, 1968) was in 1961 from Auburn University (Crittenden, 1962). A research program was initiated by the Florida Game and Fresh Water Fish Commission to evaluate the fish's potential in the state. The blue tilapia has made quite an impression in the fishery of south central Florida (Buntz and Manooch, 1968).

In the Lakeland area, this species has provided a unique fishery. Since they are not taken readily on baited hooks, a different means of harvest had to be developed. Snatch hooking and cast netting were found to be effective. These methods were extremely attractive to fishermen since numbers of large fish could be harvested quickly.

Utilization of this new species on Lake Parker has increased rapidly in the last year as indicated by a creel of the fishermen, sales of fishing equipment, and increased use of cast nets. Angler acceptance of blue tilapia has not been surpassed by any other introduced species in Florida's fresh water.

The scarcity of information concerning tilapia catchability, and the rapid spread of *T. aurea* in central Florida prompted this study. Previous results from Alabama ponds were not entirely applicable to the natural lake habitat of Parker for various ecological reasons.

Lake Parker probably supports the largest population of *T. aurea* in the United States, and provided an excellent research facility. A one year creel was conducted to evaluate catch per hour with snatch hooks and cast nets, incidental catch per hour on baited hooks, and palatability.

DESCRIPTION OF STUDY AREA

Lake Parker is a 2,291 acre lake which borders the city of Lakeland in central Florida. An irregular shoreline consisting of about 9 miles is surrounded by urban development on three sides and reclaimed phosphate mined land on the north. An electro-power plant discharges cooling water into the south-eastern portion. Aquatic vegetation is primarily marginal emergent represented by cattail, *Typha sp.*, maiden-

cane, *Panicum sp.*, and alligatorweed *Alternanthera philoxeroides*, and two floating species, water hyacinth, *Eichhornia crassipes* and water lettuce, *Pistia stratiotes*.

The lake was totally renovated in 1960 and restocked with large-mouth bass, *Micropterus salmoides*, bluegill, *Lepomis macrochirus*, and redear sunfish, *Lepomis microlophus*. Since then, eutrophic conditions have greatly accelerated the production of forage fish. Gizzard and threadfin shad, *Dorosoma cepedianum* and *Dorosoma petenense* respectively, comprise approximately 68% of the total weight (George Horel, unpublished data). In addition to the three species initially stocked, black crappie, *Pomoxis nigromaculatus*, channel catfish, *Ictalurus punctatus*, white catfish, *Ictalurus catus*, brown bullhead, *Ictalurus nebulosus*, yellow bullhead, *Ictalurus natalis* and blue tilapia, *Tilapia aurea* are utilized by sport fishermen.

CREEL CENSUS METHOD

A systematic creel survey, conducted at monthly intervals, was the design employed. Sampling days were stratified to incorporate both week days and weekend days. Two week days and one weekend day were selected at random for each month. The creel time period within each sample day was established at 4:00-6:00 p. m. to utilize maximum daily fishing pressure. Catch rates for sport fishermen possibly reflect a higher than daily average due to the optimum fishing time censured.

At the beginning of each survey period, the creel clerk started at a prearranged point and began interviewing fishermen. Interviews were terminated at 6:00 p. m. even if all fishermen had not been contacted. As each fisherman's creel was recorded, he was questioned to determine what he was fishing for and the bait or device used, how long he had been fishing, and comments on *Tilapia aurea* as a food fish. This information was used to differentiate between three classes of sport fishermen: largemouth bass, black crappie, and invertebrate bait fishermen (Table 1) and the more unconventional tilapia fishermen using cast nets and snatch hooks (Table 2). Catch per hour for each species was calculated according to its class and or method of harvest (Table 1 and 2).

DISCUSSION

Anglers used baited hooks, snatch hooks, and cast nets to harvest tilapia. All methods employed were generally seasonal in success, influenced by temperature, spawning, and food habits.

Approximately 1,988 fishermen were interviewed on the 36 census days between August 1, 1968 and July 31, 1969. Of the 5,934 fish enumerated, only 7.33 percent were tilapia caught on baited hook. *T. aurea* appeared as incidental catch to baited hook fishermen and harvest by the method was insignificant except for 3.5 months of the year (Table 2 and Figure 1). The highest catch rate was in August when 0.64 fish per hour were harvested (Table 1). Nearly all of the individuals caught by this means were young-of-the-year. This concurs with McBay's (1961) findings that 3 to 5 inch blue tilapia feed on insects. During October 7 and 8 inch *T. aurea* made up the majority of this species caught, indicating that their food habits may change at a larger size in Lake Parker. This group continued biting until cold weather in November, after which they were no longer significantly caught on baited hooks.

Tilapia caught by other methods made a notable contribution to the total harvest throughout the year (Table 3). The seasonal nature of the catch provide a local fishery at a time when fishing success for other species was relatively low, in November and December (Table 1 and 2). Blue tilapia comprised over 50% of the total harvest by number for four months and was the major fish caught six months of the year (Table 3).

Snatch hooking was very successful at the outflow of the electro-power plant during cold months. The warm water acted as a congre-

TABLE 1. Sport fishing catch rate per hour by class, Lake Parker 1968-1969

Class	Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
I (Invertebrate baits)	Blue tilapia	0.006	0.01	0.02	0.03	0.00	0.07	0.26	0.64	0.54	0.59	0.00	0.00	
	Bluegill	0.25	0.34	0.25	1.89	0.60	2.12	2.20	2.09	0.96	0.56	0.17	0.00	
	Redear	0.03	0.05	0.01	0.03	0.06	0.03	0.14	0.05	0.27	0.29	0.02	0.00	
	Warmouth	0.00	0.00	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	
	Bullhead	0.28	0.24	0.69	0.24	0.04	0.03	0.07	0.15	1.22	0.60	0.28	0.40	
	White cat.	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Channel cat.	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	
	Catch/hr.	0.57	0.64	0.98	2.21	0.87	2.27	2.69	2.95	3.00	2.05	0.47	0.40	
	II	Bk. crappie	1.61	2.48	2.66	**	**	**	**	**	**	**	0.00	**
	III	Catch/hr.	0.00	0.00	0.75	**	**	0.00	0.00	0.00	**	**	0.00	**
Largemouth bass		1.08	1.95	1.36	2.22	0.87	2.28	2.63	2.94	3.05	2.05	0.47	0.40	
Total catch/hr.		1.08	1.95	1.36	2.22	0.87	2.28	2.63	2.94	3.05	2.05	0.47	0.40	

TABLE 2. Comparison of conventional and unconventional catch methods of *Tilapia aurea*

	Jan.	Feb.	March	April*	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Baited hooks:												
Fisherman hrs.	105.55	73.63	198.45	225.67	83.72	73.98	216.16	257.88	229.15	125.70	98.00	44.80
Catch	1	1	3	6	0	5	57	166	123	74	0	0
Catch/hr.	0.006	0.01	0.02	0.03	0.00	0.07	0.26	0.64	0.54	0.59	0.00	0.00
Snatch hooks:												
Fisherman hrs.	70.26	86.76	141.81	82.90	4.50	3.00	1.50	0.50	**	2.08	62.59	55.33
Catch	120	82	171	63	0	0	0	1	**	12	162	75
Catch/hr.	1.71	0.94	1.20	0.76	0.00	0.00	0.00	2.00	**	5.77	2.59	1.35
Cast nets:												
Fisherman hrs.	1.50	7.63	5.25	40.69	18.67	4.50	2.50	0.50	**	0.91	8.75	4.75
Catch	16	140	59	436	180	19	17	18	**	81	45	49
Catch/hr.	10.67	18.35	11.24	10.71	9.64	4.22	6.80	36.00	**	89.01	5.14	10.31

* Started spawning.

** No effort.

gating factor (Buntz and Manooch, 1968) and made the *T. aurea* prone to snatch hookers. This harvest method was successful six to seven months of the year (Table 2 and Figure 1).

Cast netting proved to be the most effective technique. The species was susceptible to this device nearly the entire year but there was a peak harvest period related to spawning activities and the warm water affluent (Table 2 and Figure 1).

The percentage of total fishermen fishing exclusively for *Tilapia aurea* were generally associated with congregating factors. Two pressure peaks, one occurring during spring spawning season and the warm water effluent in winter, resulted from efforts of cast netters and snatch hookers (Table 4 and Figure 2).

Near Lake Parker, two fishing tackle shops' sales of treble hooks increased 189 gross in the last year as a result of blue tilapia. Repair work and sales of rods and reels increased five times. Castnetting was legalized for taking the species July 1968. Permits, from the Florida Game and Fresh Water Fish Commission, were required to use this device; the year before none were issued. In the fiscal year of 1968-1969, 1264 permits were released for taking tilapia. Sales of cast nets increased from six to 36 annually at one local tackle shop. Net repairs increased 400 percent over last year's business.

Fishing pressure and catch rate for largemouth bass had an extremely low yearly average (Table 1). Eutrophic conditions have contributed to a poor bass population (George Horel, unpublished data) making the lake unattractive to bass fishermen.

Black crappie fishing was correlated to spawning activity. Success by crappie fishermen was confined to three months with the highest catch rate of 2.66 fish per hour recorded in March (Table 1).

Invertebrate bait fishermen were successful nearly the entire year. *Tilapia aurea* were incidental catches to these anglers but seldom sought by this method. Bluegill and bullheads occurred most frequently and generally constituted the highest monthly catch rates of this class.

CONCLUSIONS

The dense *Tilapia aurea* population of Lake Parker is relatively unavailable to sport fishermen for 9 months of the year. Success during 3 months is significant when indexed with catch rates for comparable species during the creel periods. Harvest by baited hook appeared to be correlated with a preference for invertebrates shown only by young-of-the-year fish.

Two unconventional devices, cast nets and snatch hooks, proved successful and were generally associated with spring spawning activity and winter concentrations at an electro-power plant's heated outflow. Using these methods, *T. aurea* was the predominant species harvested six months of the year. The unique methods employed, size and number of fish caught, and palatability makes tilapia one of the most sought after fishes in the Lakeland area. Success of the fishery was largely due to the congregating effect produced by the warm outflow of the hydroelectric plant. Other Florida lakes with *T. aurea* populations, have not produced similar fisheries.

It is evident that *Tilapia aurea* are here to stay in Florida. The species has a possibility as a commercial fishery because it is palatable and can be harvested in large numbers. A sport fishery has not been added under present definitions.

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TABLE 3. Percent of total catch by species

Species	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Blue tilapia	30.85	34.36	41.42	50.45	70.87	12.70	12.31	23.66	17.62	47.58	81.50	87.32
Largemouth bass	0.00	0.00	0.53	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bluegill	8.78	5.24	9.31	42.66	19.68	83.07	79.20	68.80	31.52	20.23	6.69	0.00
Pedear	0.68	0.62	0.85	0.70	2.36	1.06	5.16	1.79	8.88	10.26	0.79	0.00
Black crappie	52.03	56.86	23.90	0.10	0.00	1.06	0.00	0.38	1.57	0.28	0.00	0.00
Channel catfish	0.00	0.00	0.00	0.00	0.79	0.53	0.50	0.25	0.00	0.00	0.00	0.00
White catfish	0.00	0.00	0.00	0.00	5.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bullhead	7.43	2.77	24.43	5.49	1.18	1.06	2.66	4.86	40.11	21.37	11.02	12.68
Warmouth	0.22	0.15	0.35	0.50	0.00	0.53	0.17	0.25	0.29	0.28	0.00	0.00
Total percent	99.99	100.00	99.99	100.00	100.00	100.01	99.99	99.99	99.99	100.00	100.00	100.00
No. of fish	444	649	569	1000	254	189	601	782	638	851	254	142
No. of fishermen	174	240	279	268	106	88	147	226	170	97	114	79

TABLE 4. Percent of anglers fishing for *Tilapia aurea* (cast netters and snatch hookers)

Type of angler	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tilapia fishermen	61	95	125	134	36	5	5	3	0	6	50	47
Other fishermen	113	145	154	134	70	83	142	223	170	91	64	32
Total fishermen	174	240	279	268	106	88	147	226	170	97	114	79
Percent of total, tilapia fishermen	34.48	39.58	44.80	50.00	33.96	5.68	3.40	1.33	0.00	6.18	43.86	59.49

FIGURE 1. Tilapia aurea catch by all methods

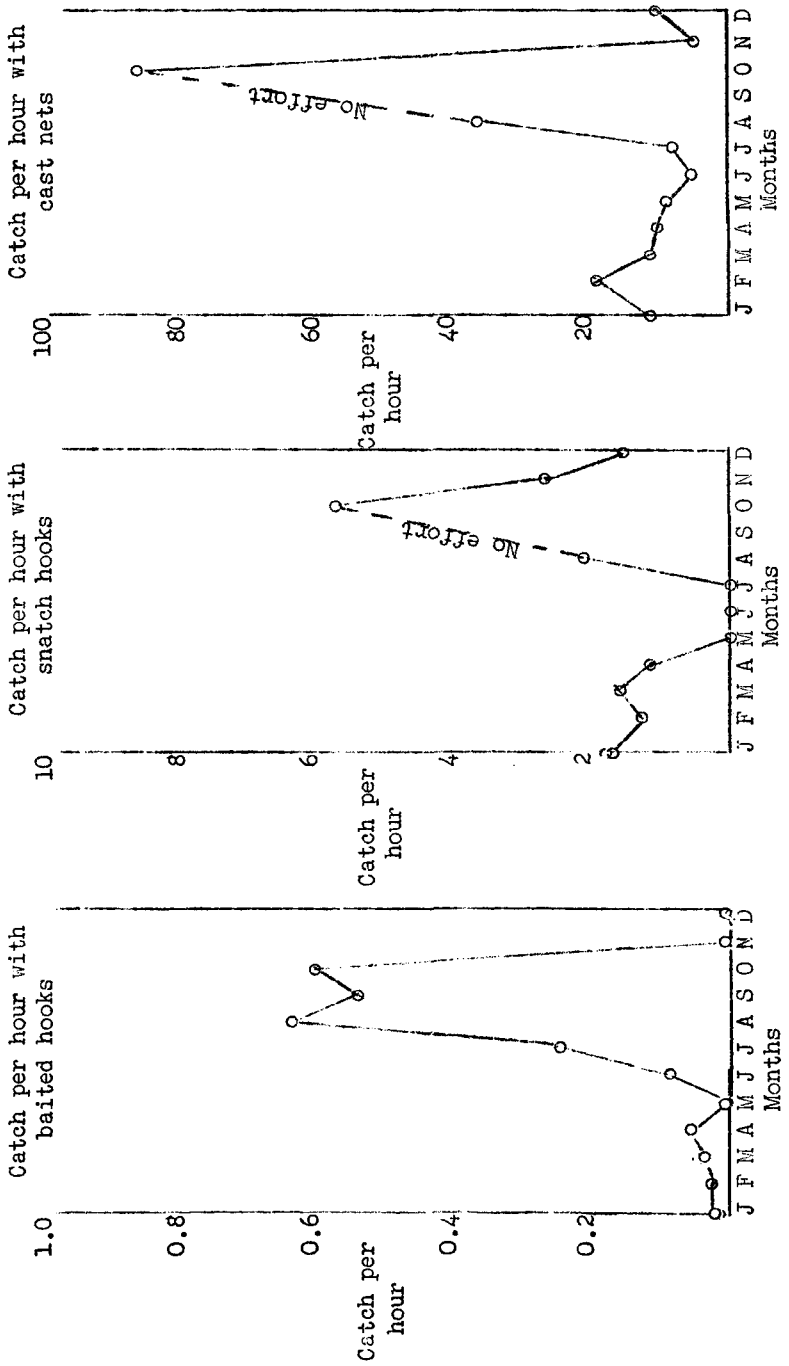


FIGURE 2. Percent of anglers fishing for Tilapia aurea (cast netters and snatch hookers)

