# TEXAS PEACOCK BASS AND NILE PERCH: STATUS REPORT

*by*
WILLIAM P. RUTLEDGE
Heart of the Hills Fisheries Research Station
Texas Parks and Wildlife Department
Ingram, Texas 78025

and

BARRY W. LYONS
Texas Parks and Wildlife Department
San Antonio, Texas 78216

## ABSTRACT

*Texas has 37 man-made reservoirs used to cool electro-power plants and several more are in the construction and/or planning phases. Managing the sport fishery in these reservoirs is difficult because temperate predators are unable to compete with overabundant rough fish populations characteristic in the warmed water of these impoundments. Nile perch* (Lates *sp.*) *and peacock bass* (Cichla temensis) *are two tropical predators under investigation for possible introduction into power plant reservoirs. Small stocks of these fishes are being maintained in closed-recirculation systems at the Heart of the Hills Fisheries Research Station, Ingram, Texas. Fishes will be reared to sexual maturity, spawned, and the young used in temperature and salinity tolerance tests. Information gained in these tests will play a significant role in the selection of study reservoirs.*

## INTRODUCTION

The State of Texas has 37 man-made reservoirs used to cool electro-power plants, with nine additional warmed-water impoundments scheduled for completion by 1977. Managing the sport fishery in these reservoirs is complicated by large areas of water maintained at or near tropical temperatures for the entire year. Temperate predatory fish species are unable to sustain adequate populations to utilize the overabundant "rough" fishes characteristic in these heated reservoirs.

Personnel of the Texas Parks and Wildlife Department, in conjunction with Dr. Clark Hubbs of The University of Texas, began investigating the possibility of introducing tropical predatory fish species into heated reservoirs for rough fish control. Criteria used in selection of fishes for introduction were their predaceous nature, angling quality, and palatability. A list of fish considered was furnished Dr. Hubbs through his worldwide mail survey of fisheries biologists and ichthyologists. Nile perch (*Lates* sp.) and peacock bass (*Cichla temensis*) were chosen as the most likely fishes to meet the needs of Texas fishery managers and fishermen. Nile perch were investigated in their native African habitat (Lake Tanganyika, Kigoma, Tanzania) by personnel of the Texas Parks and Wildlife Department and The University of Texas (1974-75), and several species (*L. angustifrons, L. mariae,* and *L. microlepis*) were shipped to the Heart of the Hills Fisheries Research Station, Ingram, Texas, by Department biologist Barry Lyons in August, 1975. Department biologist Bob Chew transported *L. niloticus* from Lake Turkana, Kenya, September, 1975 to the Research Station. Chew had also transported to the Research Station two strains of peacock bass, one from Brazil and one from Colombia, in November and December, 1974. Nile perch and peacock bass are being maintained as brood-stock to provide offspring for laboratory and reservoir tests.

This is a status report on the stocks of Texas Nile perch and peacock bass.

## DISCUSSION

*Description of Holding Facilities*

Both peacock bass and Nile perch are being maintained in indoor closed-recirculating systems. Aquaria (114 l), circular fiberglass tanks (1.83 m and 1.22 m dia.), and 24,570 l rectangular fiberglass tanks are being used to hold the fishes. Each unit is equipped with a separate biological filter. Filters utilize a gravel substrate, and water is exchanged between filters and tanks with air-lift pumps. Water temperatures in these systems are maintained by heating room air.

*Feeding*

Peacock bass and Nile perch are being fed a variety of forage species. These consist mainly of fathead minnows, sunfish, carp, Mississippi silversides, smallmouth buffalo, and gizzard shad. Presently, eight pounds of forage per day are required to maintain 52 peacock bass and 255 Nile perch. Both fishes have voracious appetites, consuming their daily ration within seconds of its introduction into tanks. Twenty-three acres of research hatchery ponds are currently being used in forage production to maintain the present stock of Nile perch and peacock bass. This acreage requirement is expected to increase dramatically in the coming months if forage supply needs are to be met.

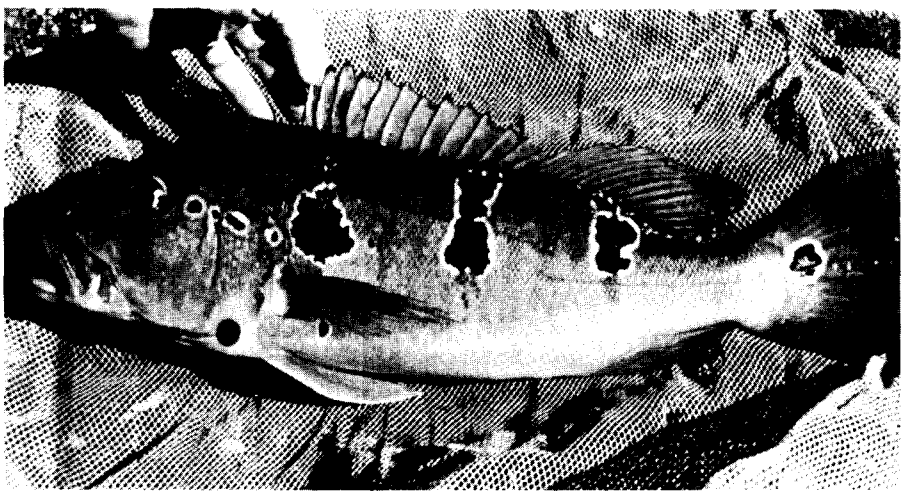

Figure 1. Peacock bass, *Cichla temensis*, from Lima Campos Hatchery in northeastern Brazil. (Note postoccipital hump indicating a male in breeding condition.)

*Peacock Bass (Brazilian Strain)*

The Brazilian strain of peacock bass (Fig. 1) was received as 50 mm fingerlings November 17, 1974. One hundred fish were obtained from the Lima Campos Hatchery in northeastern Brazil. Growth in TL for the first six months (range from 13 to 61 mm/month) was affected by crowded conditions in the holding tanks. By May 27, 1975, fish had an average length and weight of 218 mm and 105 g (range from 196 to 221 mm and 92 to 112 g). At this time 63 peacock bass were stocked into a 0.69 ha hatchery pond to accelerate their growth to sexual maturity. In late summer (September 19), water from the hatchery pond was pumped into an adjoining pond. All 63 peacock bass were recovered and returned to wet lab facilities. No evidence of reproduction was noted, but all pond waters were treated with rotenone as a precautionary measure. Peacock bass had grown to approximately 298 mm TL and weighed 334 g (length and weight data based on measurements from one dead fish). Weight had tripled during the three months fish were in the pond. Peacock bass have been maintained in a large fiberglass tank ever since the 1975 pond stocking. They now weigh around 1134 to 1814 g (visual estimates). Visual length and weight estimates and measurements from dead fish are now being made in an attempt to keep handling stresses at a minimum.

Fifty peacock bass have died from various causes since arriving at the Research Station. Disease outbreaks (*Ichthyophthirius multifillis* and *Aeromonas liquefaciens*) were responsible for the majority of fish losses. In most cases, peacock bass developed heavy infestations of "Ich" on the gill filaments. Infestations developed rapidly in the 26.7 C tank water, reaching epidemic proportions in two to three days. These disease outbreaks were probably compounded by bacterial infections in latter stages. *Aeromonas* attacks

usually resulted when fish were subjected to stress such as crowding, handling, biological filter failure, etc.

A temperature tolerance test was conducted on one specimen (76.6 mm TL; 4.3 g). Temperature was dropped 1.0 C/day from 26.7 C and the fish died at 16.0C. Some peacock bass were exposed to pond temperatures as low as 15.0 C during the September, 1975 hatchery pond draining operation. These fish had lost their equilibrium but recovered quickly when tempered rapidly to 21.1 C.

Fontenelle (1950) reports peacock bass reach sexual maturity between 11 and 12 months of age at approximately 340 mm TL. To date, Texas peacock bass have not spawned, but ovaries from 16 females (TL ranged from 310 to 364 mm) that had died during a disease outbreak in October, 1975 had ripening eggs. No male fish have died and their sexual development is unknown. However, male peacock bass do develop a noticeable postoccipital hump prior to spawning (Fontenelle 1950), and this condition has not been observed on any Texas specimens.

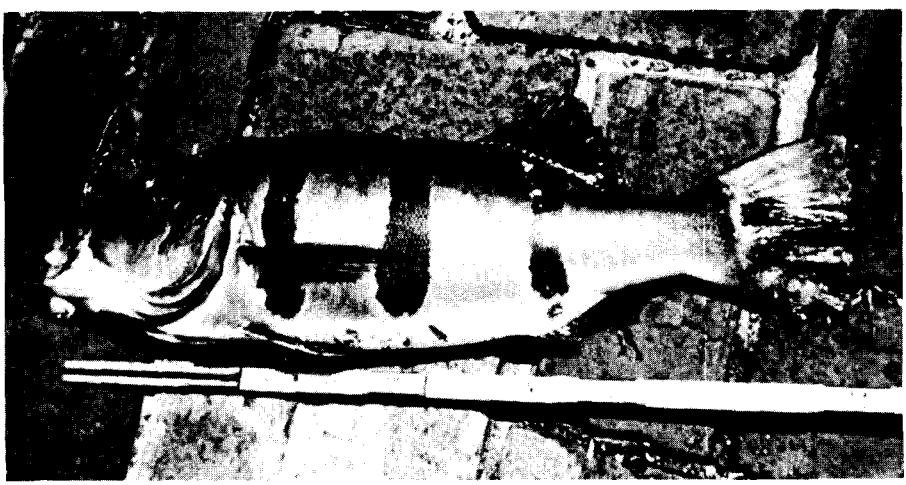

Figure 2. Peacock bass, *Cichla temensis*, from the Vaupes River near Miraflores, Colombia.

*Peacock Bass (Colombian Strain)*

Eggs of the Colombian strain of peacock bass (Fig. 2) were collected on December 12, 1974 from the Vaupes River, 30 miles below Miraflores, Colombia. Approximately 300 eggs attached to seven small pieces of tree bark were received at the Research Station 57 h after their collection. Hatching began on the third day after egg arrival at a water temperature of 28.5 C. Approximately 90% of the eggs hatched. Fontenelle (1950) reported *C. temensis* eggs from Brazil hatch in 68 h at water temperatures ranging from 27.2 to 28.9 C. The Texas eggs were subjected to a water temperature of 18.4 C during shipment, and this probably was responsible for their longer incubation period. Yolk sac absorption began 24 h after hatching, and at 96 h fry were swimming freely. Fry began feeding on brine shrimp nauplii on Day 5. They averaged 28 mm TL (range from 27 to 30 mm; 5 fish) and were feeding on large *Daphnia magna* at Day 34. Fry began feeding on small minnows 54 days after hatching. Fish averaged 60 mm TL (range from 55 to 66 mm; 5 fish) at the end of 64 days. Bass averaged 176 mm TL (range from 170 to 191 mm; 5 fish) and 55 g (range from 50 to 64 g) 97 days after hatching. These fish were stocked in a hatchery pond for the summer (1975). All bass were recovered in late summer and moved indoors for overwintering. No estimates on their length and weight were made at this time. All of the Colombian strain of peacock bass died October 24, 1975. Their average length and weight was 287 mm (range from 366 to 301 mm; 9 fish) and 294 g (range from 150 to 341 g).

Mortalities of peacock bass fry occurred at a rate of one to two deaths per day up to 64 days of age. These deaths were attributed to some fry not accepting live food. Juvenile peacock bass were highly susceptible to attacks of "Ich" and *Aeromonas*. Aeromonas was a particular problem after the handling of these fishes.

A temperature tolerance test was conducted on one specimen (134 mm TL; 24 g) in April, 1975. The fish was acclimated from 26.7 to 20.5 C over a 4-day period. After three days of stabilization at 20.5 C, water temperature was lowered 1.0 C/day. All feeding activity ceased at 19.0 C, and the fish lost equilibrium at 16.0 C. Although the temperature was returned to 23.0 C, the fish died two days later.

*Nile Perch (Lake Tanganyika, Tanzania)*

Three species of fingerling Nile perch from Lake Tanganyika were received by air freight August 11, 1975. Only nine fish (range from 80 to 160 mm TL) died during the 3-day trip. These were the largest of the fishes shipped. Received were 19 *L. microlepis* (Fig. 3), a pelagic feeder with a maximum weight of around 9.08 kg; 5 *L. angustifrons* (Fig. 4), a fish

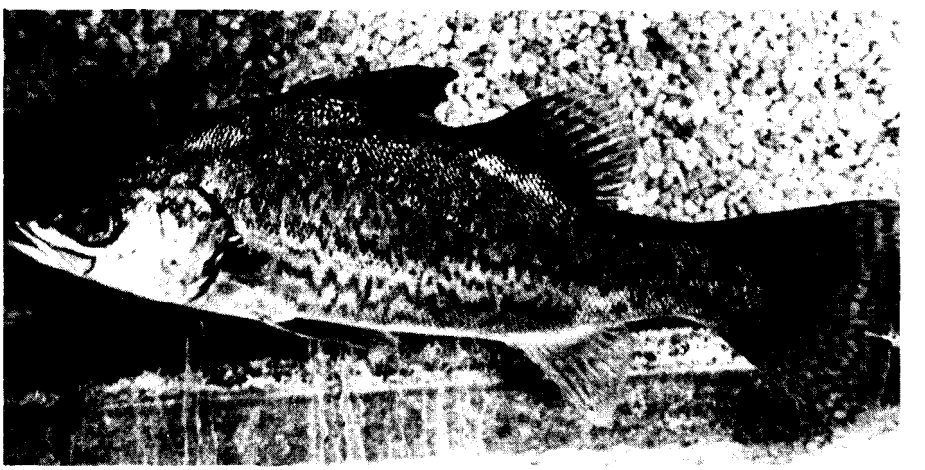

Figure 3. Nile perch, *Lates microlepis,* from Lake Tanganyika, Tanzania.

Figure 4. Nile perch, *Lates angustifrons,* from Lake Tanganyika, Tanzania.

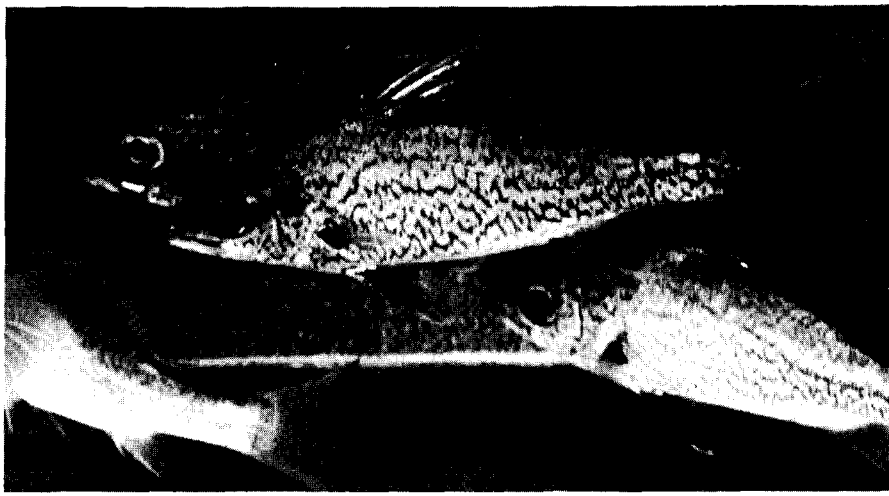

Figure 5. Nile perch, *Lates mariae,* from Lake Tanganyika, Tanzania.

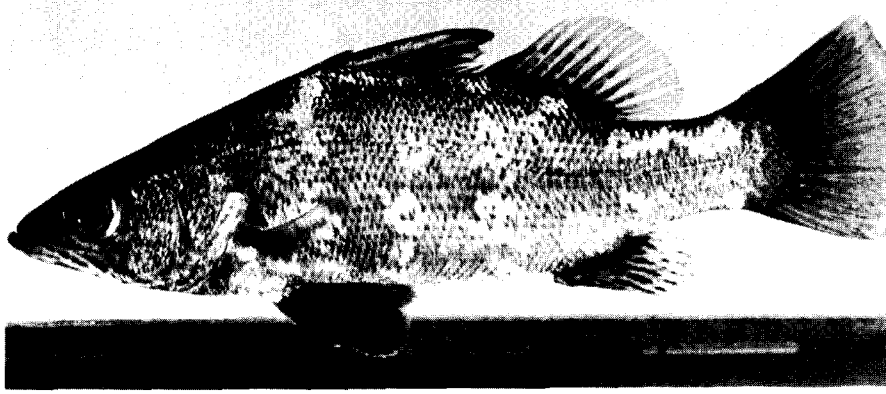

Figure 6. Nile perch, *Lates niloticus,* from Lake Turkana, Kenya.

found from the shoreline out to depths of 200 m that reaches maximum weights of 3.18 to 4.54 kg; and 15 *L. mariae* (Fig. 5), which are found from the shoreline out to depths of 200 m and have a maximum weight near 0.45 kg. Length and weight data are not being collected presently from the Texas fishes in an effort to minimize handling stresses.

All mortalities of Nile perch at the Research Station (5 fish) have been accidental. One fish died when it choked on a large minnow, two died from cannibalism, and two ran into the side of the aquarium while chasing minnows. No disease-related mortalities have occurred.

Parasite examination of one specimen was performed by Dr. David Huffman of Southwest Texas State University. Several calcified cestode cysts were found, but definitive identification could not be made.

Temperature tolerance tests for all three species of Nile perch were conducted on site in Africa by University of Texas and Department biologists (Thompson, Hubbs, and Lyons 1976). They found upper and lower limits of 38 and 11 C for these fishes.

The first spawn of the Texas Nile perch from Lake Tanganyika is not expected until 1980 or 1981. Midgley (1968) reported the three species of Lake Tanganyika Nile perch reach sexual maturity at lengths of 44 to 57 cm, or in 4 to 4½ years of age. Growth rates of Texas fish held in closed systems are probably slower than those reported by Midgley.

*Nile Perch (Lake Turkana, Kenya)*

On September 9, 1975, 267 *L. niloticus* (Fig. 6), collected from Lake Turkana, arrived air freight at the Research Station. The fish ranged from 20 to 80 mm TL (visual estimate). Only one fish was lost in transit. Some specimens have reached total lengths of 180 mm in nine months, but growth rates have varied significantly because of crowding in aquaria and tanks.

*Gyrodactylus* sp. and *Henneguya* sp. have been found on the Texas *L. niloticus* by Department biologists. Dr. Huffman has also found several sporazoan cysts (presumably *Henneguya* sp.) on the gills of a preserved specimen that had died during shipment from Africa. Cestode cysts were also found in the gut, intestinal tract, and the cranial cavity.

Temperature tolerance tests have not been conducted on the *L. niloticus* being held at the Research Station, but Midgley (1968) found that juveniles of this species from Kabaka's Lake, Kampala could not survive temperatures below 15 C. Hopson (1972) reported *L. niloticus* surviving in 13 C water. Jensen (1975) has indicated they can withstand a 12 C water temperature. Further tests to determine the lower lethal temperature for this species will be conducted as soon as offspring from Texas fish are available.

*L. niloticus* in Lake Turkana are reported to reach sexual maturity at lengths ranging from 70 to 90 cm TL, or three to five years (Hopson, 1975). It will probably be 1980 or 1981 before the Texas fish spawn for the first time.

*Future Plans*

Both the peacock bass and Nile perch will be maintained in closed systems until they spawn. Progeny from these first spawns will be subjected to temperature and salinity tolerance tests for basic data needed in selection of experimental waters where they can be introduced, controlled, and evaluated as sport fishes and biological controls of undesirable fishes.

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