297a

State of Florida

Game and Fresh Water Fish Commission

1983-1988

Completion Report

South Region Fisheries Management

Peace River Fish Population Monitoring and Sunshine Bass Stocking Evaluation

Project Leader: T. R. Champeau
Project Assistant: K. W. Denson
Project Assistant: K. G. Gardner
Project Assistant: R. E. Betz

Robert M. Brantly
Executive Director

Dennis E. Holcomb, Director
Division of Fisheries

R. J. Wattendorf, Assistant Director
Division of Fisheries

Tom Vaughn, Chief
Bureau of Fish Management

TABLE OF CONTENTS

Peace River Fish Population Monitoring and Sunshine Bass Evaluation.

STATE: Florida Game and Fresh Water Fish Commission

PROJECT TITLE: South Region Fisheries Management 2021

PERIOD COVERED: 1 July 1983 through 30 June 1988

STUDY TITLE: Peace River Fish Population Monitoring and Sunshine Bass Stocking Evaluation.

STUDY OBJECTIVE: Monitor Peace River fish population, evaluate the success of sunshine bass in Peace River and promote angler utilization.

BACKGROUND:

Peace River begins in Polk County at Lake Hancock, flows southwest through Hardee and DeSoto counties before discharging into Charlotte Harbor estuary in Charlotte County (Fig. 1). The river is 211 km in length, descending 30 m at an average gradient of 0.2 m/km with an average annual discharge of 32.7 m^3/s (Estevez et al. 1981). Peace River valley is a pinnate system, draining 5959 km^2.

Miocene deposits rich in phosphate ore were mined from the river bottom in the late 1800's and from lands within the valley from 1900 to the present. Most strip mine operations have occurred in the upper valley which has drastically altered natural hydrology and degraded river water quality (Estevez et al. 1981). Mining operations have caused catastrophic fish kills, most recently in 1967 and 1971 (Ware, 1969; Chapman, 1973). Release of wastewater from clay-filled settling basins caused high turbidity and resulted in high mortality of fishes and invertebrate fauna. Public outcry and legislative actions during the late 1970's resulted in stringent regulations that significantly reduced the incidence of these events.

Peace River receives a large amount of pollutants from municipal/industrial effluent and urban/agricultural runoff. Most cultural inputs occur near the headwaters and as a result, the upper end of the river exhibits poor water quality (Estevez et al. 1981; Florida Department of Environmental Regulation, 1980; Florida Board of Health, 1965). Lake Hancock is a hypereutrophic waterbody that discharges water with extremely high concentrations of blue-green algae. This effluent results in high turbidity, high biological oxygen demand and low dissolved oxygen levels. Peace Creek drains agricultural lands and many urban lakes before entering the river 4.4 km below Lake Hancock. Several studies that were compiled by Estevez et al. (1981) noted that dilution from less disturbed tributaries resulted in improved water quality downstream. Ross and Jones (1979) determined that Charlie, Joshua and Horse Creeks were least polluted of all Peace River tributaries. Major tributaries and their contribution to the river's total annual discharge are: Lake Hancock-3.2%; Peace Creek-6.2%; Bear Branch-7.0%; Bowlegs-6.1%; Whiddon-3.0%; Payne-9.0%; Little Charlie-5.7%; Troublesome-4.3%; Limestone-2.8%; Charlie-20.0%; Joshua-7.0%; and Horse-13.0% (Estevez et al. 1981).

Limited study of Peace River fishes has occurred. First collections of fish were done by Woolman (1892). During the winter of 1890-91, he collected 20 species from the river and several tributaries. The Florida Game and Fresh Water Fish Commission (1963) conducted fish sampling at irregular intervals from 1961 through 1963. Investigations of catastrophic fish kills by Ware (1969), Ware and Fish (1969) and Chapman (1973) have provided the most comprehensive information on Peace River fishes. Most recent fish collections were conducted in 1976 by Texas Instruments (1978).

Fish Population Monitoring

(This portion is reported separate from the sunshine bass evaluation since it will be submitted for publication.)

I. SUMMARY:

The fish community of the Peace River has been significantly impacted by human activities. Degraded water quality and invasion of exotic fishes has reduced the biotic integrity of the system. Effluent from headwater lakes and streams increased turbidity and biological oxygen demand in the upper 35 km section of the river and evaluation of the fish community indicated biotic instability. Pollution tolerant fishes exploited this condition and intolerant species were low in abundance. Dilution from tributaries exhibiting higher water quality resulted in improved biotic conditions downstream. High diversity, balanced community structure and the abundance of intolerant fishes indicated that biotic integrity increased between Fort Meade and Nocatee. Tidal influence on the lower river reduced flushing which caused turbidity to increase. This condition favored omnivorous fishes over insectivores and planktivores. Species diversity decreased and community structure was dominated by large piscivores.

II. OBJECTIVES:

The objective was to update the ichthyofaunal data base through a comprehensive five-year sampling program. The fish community was evaluated in order to determine the biotic integrity of the Peace River.

Biotic integrity refers to the extent that an ecosystem has been either structurally or functionally changed as a consequence of man's activities.

The advantages of using fish as indicators of environmental disturbance over water quality or other aquatic organisms were summarized by Karr (1981) and Hocutt (1981). Karr (1981) developed a biotic assessment system (index of biotic integrity or IBI) that incorporates a series of fish community attributes related to species composition and ecological structure. Metrics used to calculate IBI are regionally specific (Fausch et al, 1987) and no metrics applicable to peninsular Florida streams have yet been developed. In this study, biotic integrity was qualitatively evaluated by integrating the following parameters; fish abundance and biomass, species richness, composition and diversity.

III. PROCEDURES:

Fish collections were made from six sites along Peace River (Fig.1). Sample stations and distance from Lake Hancock were: Homeland-21 km, Fort Meade-35 km, Wauchula-70 km, Gardner-123 km, Nocatee-170 km and Fort Ogden-195 km. River width varied between 7-12 m at all stations except for Nocatee and Fort Ogden where approximate width was 30 m and 60 m, respectively. Sampling was not conducted during extreme high nor low flow periods in order to avoid anomalous results.

Fish were collected using a electrofishing boat, operating on pulsating direct current at 6.0-7.0 amps. Electrical output was regulated by a Smith-Root model VI-A electrofisher wired such that the aluminum boat hull was the cathode and a pair of bow-mounted boom arrays were the anode. Two people with dip nets at the bow of the boat were used to capture the stunned fish. Standardized sampling technique was used in all samples. Available habitat types at each station were sampled for a 30-60 minute time periods. Time periods were measured by the electrofisher as "pedal down time". Sampling was conducted during day (39 samples = 2320 pedal minutes) and night (18 samples = 540 pedal minutes). Dates of all 57 samples are summarized on Table 1. Fishes from six major tributaries (Peace, Whiddon, Payne, Charlie, Joshua and Horse) were sampled during April 1986, by backpack electrofishing, dip nets and 10 m seines.

Species diversity was measured by the Shannon-Weaver index, $H' = - \; p_i \ln p_i$, where pi is the proportion of a species in a sample.

IV. RESULTS:

A total of 40 species were collected in 57 samples totaling 2860 minutes of electrofishing effort. Indigenous freshwater species found in the main channel totaled 27 and represented 12 families (Table 2). Sampling of six major tributary streams yielded an additional 3 species (Table 3). Marine species (n = 7) were found at most stations and three non-native species were collected. No species of endangered or threatened status were documented. Common snook, a marine species, was the only fish collected that was of special concern status. Total number of species collected at each station ranged from 23-31 and number of species collected per sample (Table 1) varied from 9-20. Analysis of variance ($P \geq 0.10$) showed that species richness was not significantly different between stations. Richness was not correlated with species diversity indices ($R^2 = 0.43$).

Comparison of day and night samples showed that only electrofishing catch rates (CPUE) were significantly different. Biomass, species associations, richness and diversity were not significantly different between day and night.

Lower CPUE was noted when water clarity was high; however, during most samples the water exhibited high turbidity.

The relative abundance of species in the samples (Table 2) does not represent actual community structures. Small fishes and bottom dwellers were under-represented due to gear selectivity. Blue tilapia are also underestimated because of their unique resistance to the electrical field and as a result tilapia were captured at rates lower than species of equal size. Sample bias; however, does not preclude making comparisons between stations since standardized techniques were utilized in all samples.

Species associations (Table 2), diversity, CPUE and biomass (Table 1) were variable at all stations and appeared to be influenced by flow and turbidity. Mean values for these parameters indicated differences between stations (Fig. 2); however, due to high variances, there was no statistical significance. Differences between stations were influenced by variable water quality, depth, width, flow rates and habitat types. Highest mean CPUE was observed at the Homeland station (4.2 fish/minute) and lowest CPUE (1.9 fish/minute) was near the estuary at the Fort Ogden station. CPUE at the four middle stations were similar (3.4-3.7 fish/minute). Homeland and Fort Ogden had highest biomass, 1.4 and 1.5 kg/minute, respectively. Gardner station had lowest biomass, 0.8 kg/minute while the other three stations were similar, 2.1-2.6 kg/minute. Diversity was lowest at Homeland (1.87), progressively increased downstream (Fort Meade-2.09, Wauchula-2.17, Gardner-2.19) until the river became tidally influenced (Nocatee-2.09, Fort Ogden-2.02). Fishes abundant at all stations were bream (spotted sunfish, bluegill and redear sunfish), Florida spotted gar, blue tilapia and largemouth bass. Abundance of longnose gar, snook and channel catfish increased at the three downstream stations. Abundance of species intolerant to polluted aquatic environments (coastal shiner, taillight shiner and brook silverside) was low. Coastal shiners were most abundant at Fort Meade, Wauchula and Gardner. Relative abundance of brook silverside was highest at Wauchula and Gardner. Community balance evaluations corresponded to diversity indices.

V. DISCUSSION:

The freshwater fish fauna of Peace River is depauperate in species richness. This is primarily a result of the natural zoogeography of peninsular Florida (Gilbert, 1987). Review of earlier Peace River studies infers that anthropogenic influences may have reduced species richness during recent times. Records from FGFWFC (1963), Ware and Fish (1969), Chapman (1973), Texas Instruments (1978) and Layne et al.(1977) documented 11 fresh water species not collected in the main channel during this study (Appendix I). Several of these species were collected in tributaries exhibiting higher water quality than Peace River proper. It is probable that habitat requirements for these species are not currently being met in the main channel and these species have been either reduced to less impacted tributaries or extirpated from the system. A species sensitive to polluted habitats, taillight shiner, was abundant in earlier studies (Ware and Fish, 1969) but only one specimen was collected during this study. It should be noted that misidentification during earlier studies is a possible explanation for this discrepancy. Relative abundances of coastal shiner and brook silverside were good indicators of biotic disturbance. These species were associated with reduced turbidity and improved biotic integrity. Low numbers of these fish were collected when the water exhibited high turbidity.

Besides cultural degradation of aquatic habitat, human introduction of non-indigenous fishes has also affected the ichthyofauna. Historical records

(FGFWFC, 1963; Buntz and Manooch, 1968; Ware and Fish, 1969) infer that blue tilapia, an African cichlid, invaded Peace River between 1963-1967. Buntz and Manooch (1968) documented the rapid expansion of blue tilapia in several Polk County lakes from 1961-1968. Migration to the Peace River most likely occurred from these upper-basin lakes. Blue tilapia have become well established throughout the river and are a significant component of the biotic system. These omnivorous filter-feeders exploit areas of Peace River where algal and detrital biomass is high. Tilapia are capable of surviving low dissolved oxygen levels that are intolerable to most indigenous species. Dominance of blue tilapia in other Florida systems has been associated with poor water quality and low biotic integrity (Foote, 1977). The ability of blue tilapia to exploit severely polluted habitats is well-documented; however, the degree of displacement of native fishes by blue tilapia in higher quality habitats is poorly understood (Noble et al. 1975; Noble and Germany, 1985; Shafland and Pestrak, 1983; Shafland and Metzger, 1986). Competition, predation by piscivores and alteration of energy flow thereby changing trophic structure are possible impacts blue tilapia have had on the native ichthyofauna.

Asian walking catfish established in the Peace River between 1973-1977, although route of initial river invasion is not clear. This species was not abundant in the samples and probably does not have a significant impact on the fish community. One specimen of grass carp was collected that probably escaped from a headwater lake where stocking was utilized in aquatic plant control.

Several marine species were found in the Peace River. Common snook and striped mullet were most common and were collected at all but the uppermost station. Hogchoker were abundant at all stations where sandy substrates existed. Snook ranged from 1-12 kg in weight and this piscivore is a competitor with largemouth bass, Florida spotted gar, longnose gar and bowfin. Predation on largemouth bass by snook was evident when a 7 kg snook regurgitated a 30 cm bass during a sample. Snook were most abundant near the delta, but were commonly collected from habitats that incorporated deep water, flow and dense cover.

Two components of degraded water quality that most strongly influenced biotic integrity by reducing fish community balance were high turbidity and unstable dissolved oxygen. High concentrations of phytoplankton in Lake Hancock effluent results in elevated levels of suspended organic matter and biological oxygen demand loading of the upper river (Estevez, 1981). Other tributaries near the headwaters also contribute poor quality water; however, empirical evidence suggests that Lake Hancock most strongly influences ichthyofaunal balance. Cultural eutrophication also changes energy flow throughout the aquatic system, disrupting the food chain and decreasing the production of many fish food organisms. This typically impairs fishes dependent on insects while favoring omnivores and detritivores. Comparisons of abundance, biomass, species diversity and the species associations of all six stations demonstrates that relative biotic integrity was related to both temporal and spatial changes in water quality.

Seasonal rainfall patterns and variable discharge from Lake Hancock resulted in fluctuations in diversity and species association; however, these data indicate a pattern of differentiated community stability from the upper to lower stations. Consistently poor water quality at the Homeland station resulted in lowest diversity; however, this area supported a high density of fish. Florida spotted gar and bowfin were dominant predators supported by a prey base consisting of blue tilapia and bream. Most bream in the area were small (< 15 cm in length). Low diversity, dominance of fishes tolerant to unstable dissolved oxygen, lack of larger insectivores and low abundance of coastal shiners and brook silversides demonstrated that water quality in the upper river reduced stability and biotic integrity was poorest of all stations.

The Fort Meade station is 35 km downstream of Lake Hancock, (14 km from Homeland station) and higher biotic integrity was evidenced by increased diversity and higher abundance of coastal shiners and largemouth bass. This area does not receive dilution from any major tributaries and it is likely that biotic conditions are often unstable. Biotic integrity at the Wauchula station (35 km downstream of Fort Meade) was consistently higher than upstream stations. Increased diversity and abundance of intolerant species indicated that fish community balance improved. Four major and several minor tributaries enter the river between Fort Meade and Wauchula. Dilution from these inputs resulted in improved water quality. Fifty-three kilometers further downstream, input of relatively unpolluted water from Charlie Creek and seven smaller tributaries resulted in the Gardner station exhibiting the highest biotic integrity of all stations. Biomass estimates indicated that carrying capacity was lowest in this area. This could be a result of changing energy flow through the fish community that prevents dominance of opportunistic species by maintaining a greater number of species.

Tidal influence on water flow at the Nocatee and Fort Ogden stations created biotic conditions less favorable than upstream. Reduced flushing increased turbidity and diversity decreased. High turbidity at the riverine-esturine interface reduced production of planktivores and insectivores while favoring omnivores. Large piscivores (longnose and Florida spotted gar, snook, and largemouth bass) that could utilize the tilapia/catfish forage base dominated the community. This decreased fish density while maintaining higher biomass. The absence of smaller predators probably resulted from the lack of required prey items.

Cultural impacts have significantly reduced the biotic integrity of Peace River system. Analysis of fish communities documented that the upper (35 km) and lower sections (35 km) were more unstable than the middle section (125 km). Dilution from less impacted tributaries considerably improved biotic conditions in the middle section. Human encroachment within the drainage basins of these streams is increasing and wise land management practices must be mandated for their future protection. Restoration of degraded headwater lakes and tributaries is necessary to improve water quality and biotic integrity of the system. Peace River fish community recovered from catastrophic events in the past (Ware and Dequine, 1967; Ware, 1969; Chapman, 1973) and responds favorably to improved water quality. A holistic, long-term solution to improve Peace River involves many factors such as ecologically-sound phosphate land reclamation, municipal and industrial wastewater management, urban and agricultural stormwater management, flood control, lake restoration and regulation of land use. Protection and enhancement of the river's fisheries resources are possible if these factors are incorporated in a comprehensive management program.

VI. RECOMMENDATIONS:

The fish community monitoring program should be continued in order to evalute changes in the Peace River. Standardized sampling of river stations should be conducted every other year during normal flow periods.

Restoration of headwater lakes, protection of tributaries, reclamation of mined lands and reduction in point and non-point pollution must be accomplished for the ecosystem to improve. The Florida Game and Fresh Water Fish Commission will aggressively pursue these concerns and provide technical assistance to responsible agencies.

REFERENCES

Buntz, J. and C.S. Manooch, III, 1969. Tilapia aurea, a rapidly spreading exotic in South Central Florida. Southeastern Assoc. of Game and Fish Comm., Proc. 22nd Ann. Conf: 495-501.

Chapman, P. G. 1973. Pollution Investigation - Peace River and Whiddon Creek, Cities Service Company Incident, December 3, 1971. Fl. Game and Fresh Water Fish Comm., Tallahassee, Florida.

Estevez, E.D., J. Miller and J. Morris. 1981. Charlotte Harbor esturine ecosystem complex and the Peace River. Mote Marine Lab. for Southwest Fl. Reg. Planning Council. Vols. 1 and 2.

Fausch, K. D., J. R. and P. R. Yant. 1987. Regional Application of an Index of Biotic Integrity Based on Stream Fish Communities. Tran. Am. Fish. Soc. 113: 39-55.

Florida Board of Health. 1965. Interim Report: Water Quality of the Peace River 1959-1964. Tallahassee, Florida.

Florida Department of Environmental Regulation. 1980. Water Quality Inventory for the State of Florida. Tallahassee, Florida.

Florida Game and Fresh Water Fish Commission. 1963. Peace River Fish Population Survey. Lakeland, Florida.

Foote, K. J. 1977. Annual Performance Report. Blue Tilapia Investigations. Florida Game and Fresh Water Fish Comm., Tallahassee, Florida.

Gilbert, C. R. 1987. Zoogeography of the Fresh Water Fish Fauna of Southern Georgia and Peninsular Florida. Brimleyana No. 13: 25-54.

Hocutt, C. H. 1981. Fish as Indicators of Biological Integrity. Fisheries (Bethesda) 6(6):28-31.

Karr, J. R. 1981. Assessment of Biotic Integrity Using Fish Communities. Fisheries (Bethesda) 6(6):21-27.

Layne, J. N., J. A. Stallcup, G. E. Woolfenden, M. N. McCauley, and D. J. Worley. 1977. Fish and Wildlife Inventory of the Seven-County Region Included in the Central Florida Phosphate Industry Area-wide Environmental Impact Study. U.S. Department of Interior Contract No. 14-16-0009-77-005.

Noble, R. L., R. D. Germany, and C. R. Hall. 1975. Interactions of Blue Tilapia and Largemouth Bass in a Power Plant Cooling Reservoir. Southeastern Assoc. Game and Fish Comm., Proc. 29th Ann. Conf.:247-251.

Noble, R. L. and R. D. Germany. 1985. Changes in Fish Populations of Trinidad Lake, Texas, in Response to Abundance of Blue Tilapia, Tilapia aurea. Proc. Fish Culture and Mang. Symp.

Ross, L. T. and D. A. Jones. 1979. Biological Aspects of Water Quality in Florida. Pt III. Withlacoochee, Tampa Bay, Peace and Kissimmee Drainage Basins. Fl. Dept. Environ. Regul., Techn. Ser. 4 (3) : 1-291.

Shafland, P. L. and R. Metzger. 1986. Annual Performance Report. Associations of Blue Tilapia with Native Fishes. Florida Game and Fresh Water Fish Comm., Tallahassee, Florida.

Shafland, P. L. and J. M. Pestrak. 1983. Suppression of Largemouth Bass Production by Blue Tilapia in Ponds. Southeastern Assoc. Game and Fish Comm., Proc. 37th Ann. Conf.: 441-446.

Texas Instruments, Inc. 1978. Preliminary Biological Report for the Proposed DeSoto Site Development. Report to Florida Power and Light Company.

Ware, F. J. and J. F. Dequine. 1967. Joint Report on the Recovery and Current Status of the Peace River for Fishes and Other Aquatic Life. Fl. Game and Fresh Water Fish Comm., Tallahassee, Florida.

Ware, J. F. and W. V. Fish. 1969. Peace River Study : Pollution Investigation. Mobile Incident. Florida Fresh Water Fish Commission Completion Report, 67 pp.

Ware, F. J. 1969. Effects of Phosphate Clay Pollution on the Peace River, Florida Southeast. Assoc. Game and Fish Comm., Proc. 23rd Ann. Conf.: 359-373.

Woolman, A. J. 1892. Report on the rivers of central Florida tributary to the Gulf of Mexico, with lists of fish inhabiting them. Bull. U.S. Fish Comm. 10 (1890): 293-302.

Table 1. Species richness, abundance, biomass and diversity indices of 57 electrofishing samples, Peace River 1983-1988.

Station	Date	Pedal Time (minutes)	Day or Night	Number of Species	CPUE	Biomass (kg/min)	Diversity Index H'
Homeland	12/11/83	30	Night	13	3.4	0.4	1.091
Homeland	10/04/84	60	Day	14	7.0	1.8	1.184
Homeland	10/21/85	60	Day	17	3.9	1.4	1.988
Homeland	11/12/85	30	Night	20	7.5	2.6	2.254
Homeland	10/11/86	60	Day	14	3.1	1.0	2.152
Homeland	01/06/87	30	Night	16	6.7	1.1	2.157
Homeland	10/26/87	30	Night	15	5.8	1.6	2.249
Homeland	10/27/87	60	Day	9	2.0	0.5	1.706
Homeland	05/03/88	60	Day	17	7.6	2.1	2.052
Ft. Meade	08/13/85	60	Day	18	3.4	1.3	2.319
Ft. Meade	04/07/86	60	Day	17	3.1	1.0	2.290
Ft. Meade	05/11/87	61	Day	17	4.4	0.5	1.649
Wauchula	12/11/83	30	Night	17	9.7	0.6	2.027
Wauchula	09/18/84	60	Day	10	1.0	0.6	1.781
Wauchula	10/21/84	30	Night	13	3.8	1.6	2.224
Wauchula	03/22/85	75	Day	14	3.2	0.6	1.959
Wauchula	08/13/85	60	Day	19	1.5	0.7	2.554
Wauchula	10/21/85	60	Day	15	2.7	1.1	2.176
Wauchula	11/12/85	30	Night	17	4.4	1.4	2.219
Wauchula	04/07/86	60	Day	16	3.1	1.4	2.487
Wauchula	09/09/86	45	Day	10	1.0	0.6	1.801
Wauchula	11/24/86	30	Night	20	7.9	1.3	2.266
Wauchula	05/11/87	60	Day	14	1.5	1.0	2.406
Wauchula	10/26/87	30	Night	19	5.4	1.2	2.367
Wauchula	10/27/87	60	Day	14	3.2	1.0	1.828
Wauchula	05/06/88	66	Day	16	3.4	1.9	2.260
Gardner	12/11/83	30	Night	18	7.7	0.6	2.114
Gardner	10/21/84	30	Night	10	4.1	0.9	1.409
Gardner	08/14/85	60	Day	17	2.2	0.5	2.377
Gardner	11/05/85	60	Day	16	2.0	1.0	2.490
Gardner	01/20/86	30	Night	10	4.3	0.4	1.998
Gardner	04/07/86	60	Day	19	4.0	1.2	2.552
Gardner	10/07/86	60	Day	10	1.6	0.3	2.094
Gardner	11/24/86	30	Night	16	8.7	0.7	2.363
Gardner	05/11/87	50	Day	17	2.2	0.4	2.311
Gardner	10/27/87	30	Night	10	1.4	0.7	1.965
Gardner	10/28/87	60	Day	12	1.2	1.3	2.195
Gardner	05/02/88	60	Day	14	1.9	1.3	2.377
Nocatee	12/11/83	30	Night	19	5.1	0.8	2.458
Nocatee	09/19/84	60	Day	13	1.8	1.0	2.176
Nocatee	10/21/84	30	Night	15	7.6	1.5	1.652
Nocatee	03/13/85	60	Day	11	2.0	1.0	2.032
Nocatee	08/14/85	60	Day	12	0.9	0.4	2.227
Nocatee	12/09/85	20	Night	14	5.9	1.8	2.216
Nocatee	11/24/86	30	Night	10	5.8	1.3	1.812
Nocatee	10/28/87	60	Day	14	1.6	0.7	2.164
Nocatee	05/02/88	60	Day	16	2.9	2.0	2.211
Ft. Ogden	09/25/84	60	Day	9	1.6	1.0	2.033
Ft. Ogden	10/12/84	41	Day	10	1.4	1.1	1.904
Ft. Ogden	11/14/84	60	Day	18	3.6	1.8	2.457
Ft. Ogden	11/26/84	60	Day	14	3.5	3.5	2.133
Ft. Ogden	03/12/85	60	Day	13	1.6	1.4	2.017
Ft. Ogden	05/22/85	85	Day	10	0.9	0.9	1.420
Ft. Ogden	11/05/85	60	Day	12	1.7	1.2	1.970
Ft. Ogden	04/02/86	60	Day	12	1.8	1.1	2.298
Ft. Ogden	10/07/86	60	Day	10	1.5	0.7	1.704
Ft. Ogden	04/16/87	54	Day	13	1.8	1.9	2.303

Table 2. Relative abundance of species collected in Peace River, 1983-1988.

Family	Species	Homeland	Ft. Meade	Wauchula	Gardner	Nocatee	Ft. Ogden
		Mean percent composition					
Centrarchidae	Largemouth Bass	4.4	8.7	11.9	9.4	11.4	7.7
	Bluegill	10.9	12.6	14.4	5.0	8.4	9.2
	Redear Sunfish	9.6	11.1	5.7	6.5	8.4	4.8
	Spotted Sunfish	11.4	27.5	14.2	11.8	7.8	1.4
	Dollar Sunfish	0.5	0.0	0.2	0.3	0.7	0.0
	Warmouth	0.5	0.3	0.4	0.4	0.2	0.2
	Black Crappie	1.4	0.0	0.1	0.0	0.0	0.0
Ictaluridae	Channel Catfish	0.6	0.8	2.8	9.4	8.6	12.7
	White Catfish	0.4	0.5	0.6	0.7	0.6	7.0
	Brown Bullhead	0.4	0.2	0.4	0.0	0.3	0.1
	Tadpole Madtom	0.0	0.0	< 0.1	0.0	0.0	0.0
	Yellow Bullhead	0.0	0.0	< 0.1	0.1	0.2	0.0
Lepisosteidae	Florida Spotted Gar	22.8	13.8	13.3	11.7	16.9	18.5
	Longnose Gar	0.3	0.5	1.5	1.3	2.7	14.2
Amiidae	Bowfin	3.4	1.1	1.1	0.3	1.4	1.6
Catostomidae	Lake Chubsucker	0.3	0.3	1.8	0.3	0.0	0.0
Clupeidae	Gizzard Shad	1.3	1.1	< 0.1	0.1	0.3	0.9
	Threadfin Shad	0.8	0.0	< 0.1	0.0	0.0	0.0
Poeciliidae	Sailfin Molly	1.0	0.3	0.1	0.6	0.0	0.0
	Mosquito Fish	2.3	0.1	0.2	1.5	0.1	0.7
Cyprinodontidae	Seminole Killifish	3.0	4.3	3.8	7.7	4.0	2.6
Cyprinidae	Coastal Shiner	0.7	7.7	7.8	11.4	3.3	0.2
	Tailight Shiner	< 0.1	0.0	0.0	0.0	0.0	0.0
	Golden Shiner	1.4	2.9	0.1	0.1	0.1	0.1
Atherinidae	Brook Silverside	0.5	0.7	1.8	2.8	0.6	0.5
Percidae	Swamp Darter	0.0	0.0	0.0	0.0	0.1	0.0
Aphredoderidae	Pirate Perch	0.0	0.0	0.1	< 0.1	0.0	0.0
Pleuronectidae	[a]Hogchoker	0.2	0.4	2.2	1.5	0.6	0.1
Anguillidae	[a]American Eel	0.0	0.0	0.2	0.1	0.4	0.6
Centropomidae	[a]Snook	0.0	3.4	2.9	6.3	1.5	11.61
Gobiidae	[a]Largemouth Goby	0.0	0.0	0.0	0.0	0.0	0.1
Mugilidae	[a]Striped Mullet	0.0	0.2	5.1	2.2	2.5	2.3
Clupeidae	[a]Menhaden	0.0	0.0	0.0	0.0	0.0	0.2
Gerreidae	[a]Yellowfin Mojarra	0.0	0.0	0.0	0.6	3.7	0.8
Cichlidae	[b]Tilapia	21.5	1.6	6.8	9.5	15.1	2.2
Clariidae	[b]Walking Catfish	0.3	0.0	0.1	0.0	0.3	0.0
Cyprinidae	[b]Grass Carp	0.0	0.0	0.0	0.0	0.1	0.0
	total number of species collected	27	23	31	27	28	25

[a] marine species
[b] exotic species

Table 3. Summary of fish collected from tributary streams of the Peace River, April 1986.

SPECIES	PEACE	WHIDDEN	PAYNE	CHARLIE	JOSHUA	HORSE
Largemouth bass			0	0		
Bluegill		0	R	C	0	0
Redear sunfish			0			
Spotted sunfish		C	A	A	C	A
Brown bullhead		R				
Florida gar	C					
Blue tilapia	0		0			
Seminole killifish				C	C	A
Coastal shiner		C	A	C	A	0
Brook silverside			C		0	
Sailfin molly	C			C	C	C
Least killifish	A		R		R	
Gambusia	A	0	C	C	A	C
Hogchoker	0	0	0		C	C
Golden topminnow			C	C		C
Bluefin killifish			0			C
Total species collected	6	6	12	8	9	9

A = abundant
C = common
0 = occasional
R = rare

Figure 1. Location of Peace River sample stations (H-Homeland, FM-Fort Meade, W-Wauchula, G-Gardner, N-Nocatee, FO-Fort Ogden) and tributary sampling sites (*).

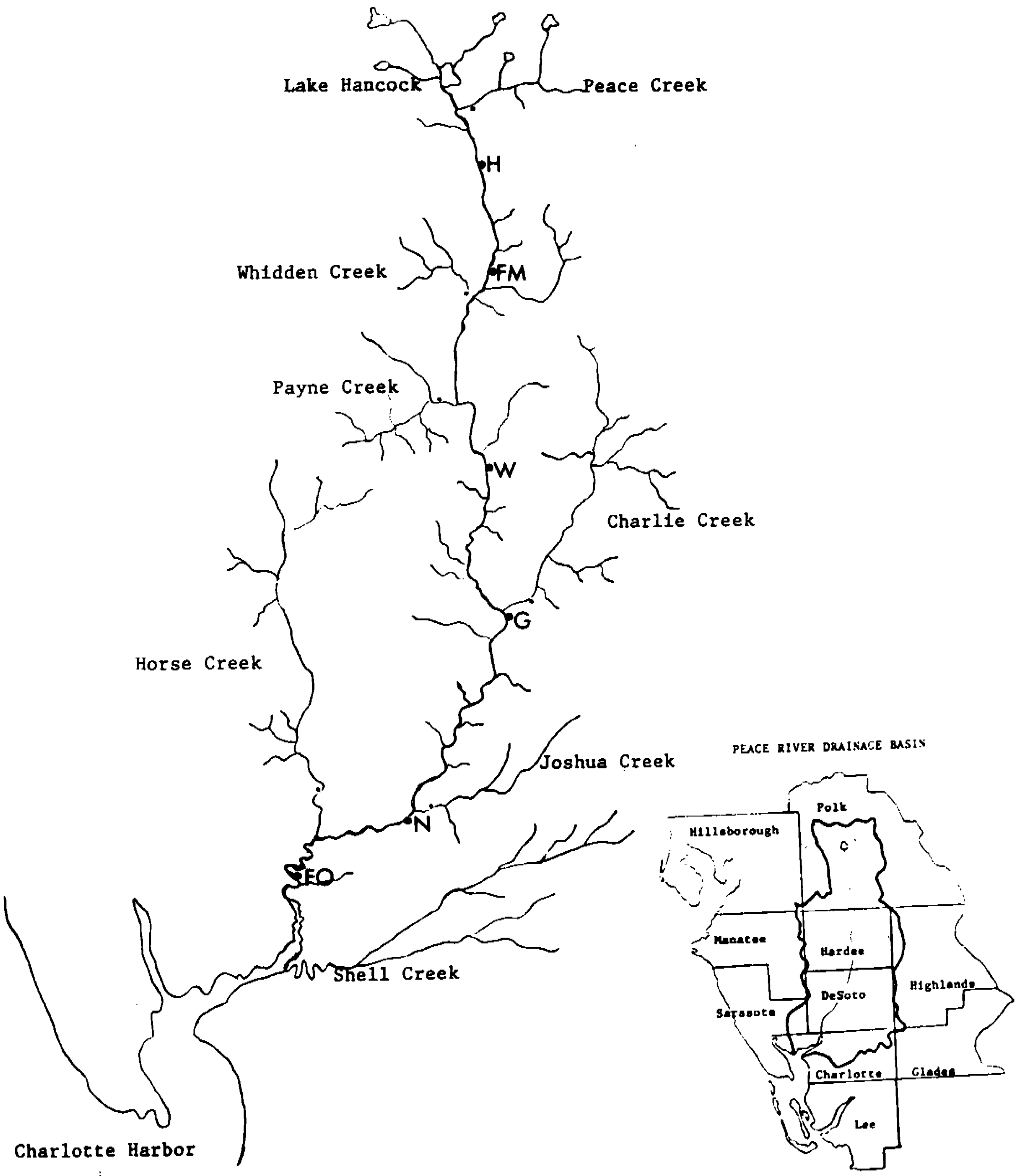
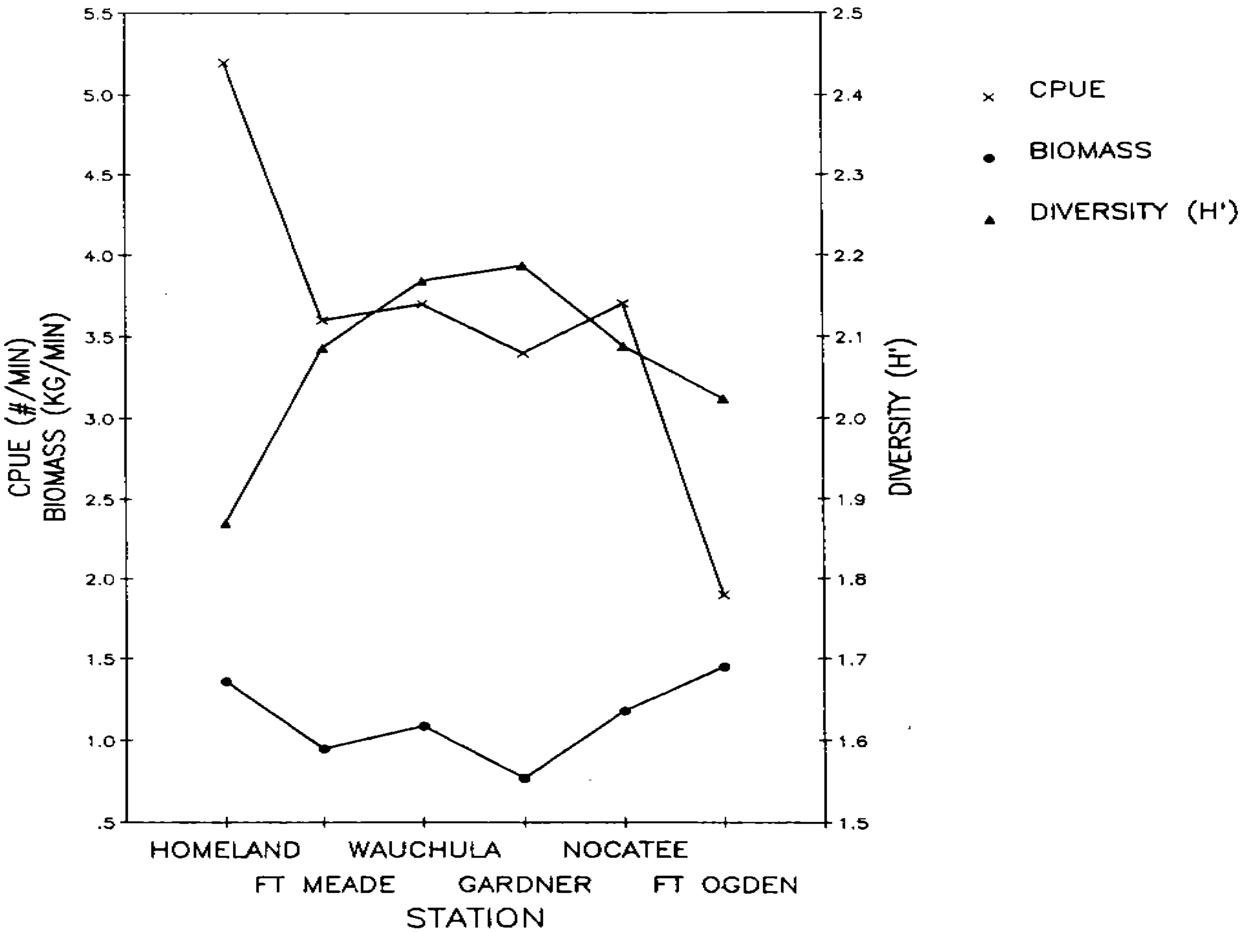


Figure 2. Mean abundance (CPUE), biomass and species diversity indicies for Peace River sample stations, 1983-88.



Appendix I

Previously reported species from Peace River that were not collected during 1983-88.

SOURCE	SPECIES
Ware and Fish (1969)	Bluespotted sunfish Redfin pickerel Flagfish *Bluefin killifish *Least killifish
Layne et al. (1977)	Ironcolor shiner Sailfin shiner *Golden topminnow Redbreasted sunfish Everglades pygmy sunfish
Texas Instruments (1978)	Pugnose minnow

*Species collected in tributaries but not in main channel.

Sunshine Bass Evaluation

I. SUMMARY:

A sunshine bass fishery did not develop in the Peace River. From 1984 through 1987, 500,000 phase I and 2828 phase II hybrids were stocked at various areas of the river. Gill net and electrofishing sampling yielded only three fish during the five year study. A spring creel survey did not document any catches and repeated surveys of bait shops and fish camps resulted in very few reports of angler catches. One report of two tagged fish was received. Commercial fisherman that extensively worked gill nets in the estuary did not observe any by-catch of sunshine bass. The stocking program was extensively advertised through a slide show given to sportsmen groups, six news releases, posters displayed at boat ramps and contacts with fish camp operators and bait and tackle stores.

II. OBJECTIVES:

To introduce sunshine bass in Peace River and monitor their growth, survival, food habits and distribution.

III. PROCEDURES:

Stocking record of sunshine bass in Peace River from 1984 through 1987 summarized on Table 1. Approximately 500,000 phase I fingerlings (25-50 mm) and 2828 phase II fish (200-400 mm) were stocked. Of the phase II fish, 518 were tagged with internal anchor tags and 1300 were fin clipped (secondary dorsal). Various stocking strategies were utilized to increase survival. The

1984 year class (phase I) was stocked into Lake Hancock, an over-enriched system that supports a tremendous shad population. Phase I fish were stocked during 1985 and 1986 at the middle river (Gardner and Arcadia) where biotic disturbance was lowest. Fingerlings were also stocked during 1986 at Horse Creek, a major tributary that is relatively undisturbed. The 1987 year class (phase I) was stocked at the riverine-estuarine interface near Liverpool. Phase II hybrids were stocked during 1985 and 1986 at middle sections and at the delta.

Gill nets (770 net-hours) and electrofishing (45 pedal down-hours) were utilized to sample sunshines. Sampling was conducted throughout the system with gill net effort concentrated at the riverine-estuarine interface.

An access point creel survey was implemented on the Peace River, from February to May 1986. The lower section was selected because it receives the highest amount of fishing pressure and was the portion of the river were highest concentrations of sunshines were expected. Access points were the boat ramps at Lettuce Lake Park, Liverpool Landing and DeSoto Marina. Each of these points are located in DeSoto County. In addition, bait and tackle stores, fish camps and guides were regularly contacted to gather catch information.

The stocking program was promoted by the distribution of posters at boat ramps and bait shops, news releases (n=6), feature articles and presentations to sportsmen groups.

IV. RESULTS AND DISCUSSION:

A fishery for sunshine bass did not develop in the Peace River. Sampling yielded only three fish from the river (Table 2). Fingerlings stocked in Lake

Hancock survived and grew extremely well but were not collected in the river. Phase I and phase II fish stocked at various portions of the river and in Horse Creek did not establish. One angler reported catching two tagged fish that were released at Gardner and caught near Fort Ogden, a migration of 70 km in 40 days.

Sunshine bass harvest was not documented during the creel survey. Creel clerks were instructed to ask each angler if they had caught sunshines in previous trips. Positive responses were provided by only a few anglers, although many anglers were aware that sunshines had been stocked.

Angler interviews (n=329) yielded 1754 hours of effort data for an overall success rate of 0.13 fish/hour (Table 3). Snook fishermen accounted for 57 percent of all effort; however, the success rate for snook was only 0.02 fish/hour. Bass fishing drew 27 percent of the effort and resulted in 0.06 bass/hour. Bream anglers had the highest success rate of 0.73 but they accounted for only 2.3 percent of the total effort. Catfish success was 0.30, and catfish often entered the creel as incidental catches.

Surveys of bait shops and fish camps throughout the Peace River valley resulted in very few reports of angler catches of sunshine bass. Positive reports were from the Fort Ogden area and several fishermen reported catches from below the dam at Shell Creek. Anglers fishing in Charlotte Harbor were interviewed on several occasions. Many fishermen used live shrimp and fished for sea trout, redfish and whiting near bridges, piers and tidal creeks. No reports of sunshine bass catches were made. The sunshine bass program was well publicized. Poor success of the fishery resulted from the failure of sunshine bass to establish in the river.

No specific cause for fishery failure can be determined from available data. Rapid migration of phase II hybrids into Charlotte Harbor possibly occurred. Similar migration of stocked fingerlings is doubtful and failure of these fish to establish was probably a result of poor survival. Heavy predation and a lack of food items required by young sunshines was evident in the analysis of ichthyofauna (Job 1). Low abundance of planktivorous forage fishes (threadfin and gizzard shad, menhaden and bay anchovy) especially at the lower river resulted from high turbidity which limited phytoplankton production. The absence of this forage base apparently precluded recruitment of sunshine bass. Piscivorous fishes (snook, gar and largemouth bass) collected were of large size, capable of utilizing the abundant larger omnivores (tilapia and catfish) that exploited the lower river.

V. RECOMMENDATIONS:

Discontinue efforts to establish a sunshine bass fishery in Peace River.

Table 1. Stocking record of sunshine bass in Peace River, 1984-87.

DATE STOCKED	NUMBER-PHASE *	LOCATION
May 1984	50,000 - I	Lake Hancock
May 1985	250,000 - I	Gardner
August 1985	75 (tagged) - II	Nocatee
August 1985	61 (tagged) - II	Wauchula
December 1985	392 (tagged) - II	Gardner
February 1986	1300 (fin clipped) - II	Gardner
May 1986	75,000 - I	Horse Creek
May 1986	25,000 - I	Arcadia
June 1986	1000 - II	Fort Ogden
May 1987	100,000 - I	Liverpool

* Phase I : 25-50 mm total length

Phase II: 200-400 mm total length

Table 2. Length, weight and condition factors of sunshine bass collected from Peace River system, 1984-87.

DATE	AGE (MONTHS)	NUMBER	TOTAL LENGTH RANGE (MM)	MEAN LENGTH (MM)	WEIGHT RANGE (g)	MEAN WEIGHT (g)	MEAN K-FACTOR*	PREDOMINANT STOMACH ITEMS
Lake Hancock								
8-19-84	4	12	167-230	201.8	63.5-173.2	120.5	2.94	Bluegill, fish
1-10-85	9	11	253-326	293.2	182.0-402.0	305.5	2.67	Grass shrimp, fish
3-1-85	11	7	295-315	307.0	322.0-349.0	336.1	2.60	Grass shrimp
4-22-85	13	10	300-365	322.5	312.6-552.2	399.6	2.60	Shad
Peace River (Gardner)								
1-20-86	10	1	-	260.0	-	194.0	2.32	Coastal shiners
Peace River (Ft. Ogden)								
2-15-87	11	1	-	294.0	-	296.0	2.04	Empty
	23	1	-	350.0	-	330.0	2.10	Empty

* Calculated using standard length.

Table 3. Summary of Peace River creel survey data, February - May 1986.

SPECIES	EFFORT-HOURS	CATCH	FISHED FOR SUCCESS
Total	1754.00	232	0.13
Snook	1012.50	22	0.02
Largemouth bass	474.75	29	0.06
Bream	41.00	30	0.73
Sunshine bass	0.00	0	0.00
Black crappie	5.00	0	0.00
Catfish	130.25	*94	0.30
Misc. species **	95.50	57	0.60

* Includes many incidental catches

** Redfish, sea catfish, gar, trout, sea bream and bowfin