Results of Fisheries Investigation and Recommendations for Re-establishment of A Sport Fishery in the Caloosahatchee River

A Preliminary Report
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to
The Vero Beach Office
of the
Florida Game and Fresh Water Fish Commission

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Introduction

An investigation of the fish population in the Caloosahatchee River was initiated to determine how the fish population would be effected by the proposed plans to increase the capacity of Canal 43 to discharge water from Lake Okeechobee and from the canal's watershed.

The investigation was made from July 22, 1958 through January 9, 1959. The fish were sampled by electric shocker and with rotenone. The study was primarily concerned with that portion of the river below the Ortona Locks. However, a short study was also made above Ortona Locks in Novemeber 1959.

Morphology of the study areas was obtained as well as water velocities and determinations of dissolved oxygen, carbon dioxide and pH and salinities.

Sportfishing in Canal 43 for fresh water game fish is practically non-existent. Mullet fishing with cane poles is sporadic. Sharks, tarpon and snook are reported to be caught at rare intervals in the tail waters of Ortona Locks.

The Values of the Oxbows

The values of the oxbows cannot be over emphasized. They provide small habitat areas for wading birds, alligators and other forms of wildlife associated with aquatic environments. These creatures always add pleasure to a fishing or boating trip. Without these forms of wildlife the river would be of no interest or pleasure for many people.

The preservation of small and scattered areas such as oxbows is needed. Their value is steadily increasing since their numbers are progressively decreasing every year.

Because of their isolation, small scattered habitats provide protection from an epidemic or some other natural disaster that could greatly decimate a concentrated animal population. The animals living in these small scattered habitats would be likely to escape such a calamity and they would provide the means by which decimated population would make a recovery; at least a much more rapid recovery than without these areas.

The oxbows provide small areas all along the river where a fisherman could feel a bit secluded and if in a boat be protected from waves caused by large boats speeding along the main channel.

Such small scattered areas will keep some species of wading birds and other aquatic forms of wildlife as part of the every day scene.

Young people could have some nearby wildlife to enjoy and study without having to make special trips to certain preserved areas.

Sampling Methods with the Electric Shocker

A 5,000 watt generator mounted in a boat[1] shocked the fish so as to bring them to the water's surface. The fish were then dipped into a boat to be later identified, measured, weighed, marked, and released.

Eleven areas ranging from just below Ortona Locks to just below Alva were sampled with the elctric shocker. Six of these areas were in the main channel and five in old river bends which had been "cut off" by channelization.

In addition one area in an old river bend and one area in the main channel was sampled between Ortona Locks and Lake Hicpochee.

The areas below Ortona Locks were sampled from July 23, 1958 to September 4, 1958. Attempts to sample the central portion of the canal were made. The meager results with the shocker indicated the fish if present were not responding to the electric current. Therefore, sampling in this part of the canal was suspended and results of the samples not used. The data presented is that based upon 44 successful samples taken along the shores of the canal.

The captured fish were identified and measured in 1/2 inch groups as described in the Game and Fresh Water Fish Commission's report Recommended Program for Northwest Shore of Lake Okeechobee. The fish were then weighed to the nearest ounce.

Each area has a particular combination of fin clipping with which the fish captured in that area were marked. When recaptured they could then be identified as having been captured and released in a particular area. Recaptured fish were not considered when computing total of fishes taken at the sample sites.

From September 29, 1958 until October 30, 1958 concatenate samplings were made along both banks of the canal from Ortona Locks to just below Alva, these samples included all oxbows. The purpose was to recapture marked fish thus gaining some perspective of their movements and to obtain a more complete understanding of the fish population in C-43.

The sampling with the shocker in the areas above Ortona Locks was performed November 24, 1958.

[1] Timothy R. O'Connell, Jr., Experimental Electric Fishing Gear Development, D-J Project F-5-R-3, Job 1H, p-2.

Sampling Methods with Rotenone

Fish population sampling was also conducted by use of rotenone. The areas rotenoned in the main channel below Ortona Locks were divided into three rectangular one-half acre sections. One thirty foot wide section was along each shore and one thirty foot wide section was in the middle of the canal. In the oxbows one half acre rectangular samples were also taken. All the samples above Ortona Locks were one quarter of an acre samples.

In the center part of the main channel a portable Bean sprayer using a hose with 1/4" and 3/8" holes six inches apart, and weighted was used to distribute the rotenone.

First the rotenone was put out around the periphery then the area was criss-crossed so the entire section was rotenoned.

Along the shore areas, and in the oxbows, rotenone was first slowly poured into the sample side of the wake from the outboard motor as it was run along the section's periphery. Then the rotenone was spread over the remaining portion of the area being treated by slinging it in an arc from a can.

The material was applied to the sampled sections at the rate of 1 quart per acre foot.

Only a qualitative analysis of the fish was attempted. The fish were not confined within the area nor excluded from it so a reliable quantitative sample was not gotten.

Recommendations

The following recommendations are made to establish a fresh water sport fishery in the Caloosahatchee River, in conjunction with plans to increase the discharge capacity of this stream.

1. Include in the Caloosahatchee River project an underwater berm at least one hundred feet wide. The greatest water depth at the deep side of the berm to be five feet with the water at the design annual median level. Such a berm would provide the necessary buffer zone and water depths to allow vegetation to become established permanently with a water fluctuation of 4.0 feet and less. Various forms of animal life would then become established in the berms many of which would be food for game fish. The quiet, secluded waters, permanently established beds of vegetation, and fish food organisms would be salutary to warm fresh water game fish.

2. Eliminate the undesirable high spoil banks and deposit the material behind where they now are situated, thus building up the land along the canal.

3. Construct the underwater berms where the high spoil banks now are located. That would eliminate the need to obtain a right of way for the berm, since the Corps has a perpetual easement for most of the land on which these spoil banks are located[1].

4. Change the alignment of Canal 43 wherever such a change will save an oxbow or a major part thereof. The oxbows would provide small, secluded areas especially below La Belle for fish, other forms of wildlife, sportfishermen and people who just enjoy nature.

5. Discharge the water at the needed rate twenty-four hours a day instead of only eight hours a day as is the present mode of operation. The deleterious effects of the daily water fluctuation that now occur would be eliminated and the velocities in Canal 43 would be lessened, benefitting fish and plant life in the canal as well as preventing erosion of the banks.

With the modification of the design memorandum for Canal 43 herein recommended, the section of Canal 43 from La Belle to Lake Hicpochee would become excellent fresh water game fish habitat thus supporting a fine fresh water sport fishery.

Water Velocities

Table 1 shows the water velocities taken 2.5 miles above Ortona Locks during a discharge period. Note the big difference between the velocities just behind the maidencane grass and the thin vallisneria beds and the higher velocities out from shore. Fish apparently need rest areas if velocities exceed 1.0-1.5 second feet[2]. Except in or leeward of the grass all the velocities exceed this limit.

Chemical Analysis

The results of salinity tests given in Table 24 show that fresh water extends down river at least to marker 33A below Olga. When the tests were made Ortona Locks had discharged no water for 1 1/2 months. At marker 43 salinities had risen from 576 ppm Cl- Oct. 20, 1958 to 1,183 ppm Cl- November 5, 1958. The water at marker 43 is not potable; that at 33A is potable.

On September 23, 1958 the dissolved oxygen was low in area 8, an oxbow with raw sewage entering it and at the time no influx of water from

[1] Personal talk with Mr. Broadfoot in Clewiston.

[2] Recommended Program for Kissimmee River Basin, p. C-55

Table 1

Velocity Readings, September 23, 1959
Above Ortona Locks

Distance to Shore	Depth	Velocity ft./sec.
7.0 ft.[1]	1.0 ft.	0.61
25.0 ft. to right bank	4.0 ft.[2]	2.02
	2.5 ft.	1.93
	0.5 ft.	1.93
Middle	16.5 ft.[2]	1.78
	8.0 ft.	3.05
	0.5 ft.	3.05
30.0 ft. to left bank	10.0 ft.[2]	1.62
	5.0 ft.	3.00
	0.5 ft.	3.00
6.5 ft.[3]	0.5 ft.	0.09

[1]Behind outer edge of Maiden Cane grass

[2]One foot from bottom

[3]In thin Vallisneria

the main canal. This is the only instance that chemical characteristics approached a detrimental condition for fish life. At all other times, the dissolved oxygen, dissolved carbon dioxide, the pH and temperatures were salubrious to fish life.

Table 2

P.P.M. of Cl- between Ortona Locks and Marker 43 below Olga

November 5, 1958

Area	5	7	10	13	14
Depth	Sur. 12.5'	Sur. 12.0'	Sur. 12.5'	Sur.	Sur. 17.0'
Cl-	33.4 32.1	27.3 27.9	34.0 26.7	31.5	26.7 26.7

300' E. of Telegraph Creek	Just W. of Telegraph Creek	Marker 24, 900' W. of Olga Bridge
Sur.	Sur.	Sur. 22.0'
39.4	35.8	41.9 37.3

Marker 26	Marker 33A Owls Creek Area	Marker 43
Sur.	Sur.	Sur.
47.3	115.9	1,182.9

Fish Movements

Of the 628 fish marked and released 45 were recaptured. Thirty-one percent (14) of the recaptured fish had not moved from the area where they were first captured and released. Thirteen percent (6) had moved upstream and fifty-six percent (25) had moved downstream. Table 3 gives the data for the several species recaptured.

The greater percentage of recaptured gar over other species recaptured reflects the more sensitive reaction of gar to electric shock.

Figure 1 depicts the average distance these fish moved either upstream or downstream.

Table 3

Fish Movements

Species	No. Marked	No. Recapt.	% Recapt.	% Moved Downstream	% Moved Upstream	% Did Not Move
Black Bass	191	9	*4.72	11.1	11.1	77.7
Bluegill	147	4	*2.72	50.0	25.0	25.0
Redear	55	1	1.92			100.0
Channel Cat	14	1	7.14	100.0		
Gar	193	29	*15.05	72.4	13.8	13.8
Bowfin	28	1	3.57			100.0

*Probably shows the greater efficiency of electric shocking for taking gar.

Table 3 Con't.

Species	Av. Distance Moved Downstream	Av. Distance Moved Upstream
Black Bass	1.23 mi.	3.41
Bluegill	4.64 mi.	1.23
Channel Cat	13.45 mi.	
Gar	7.46 mi.	3.12

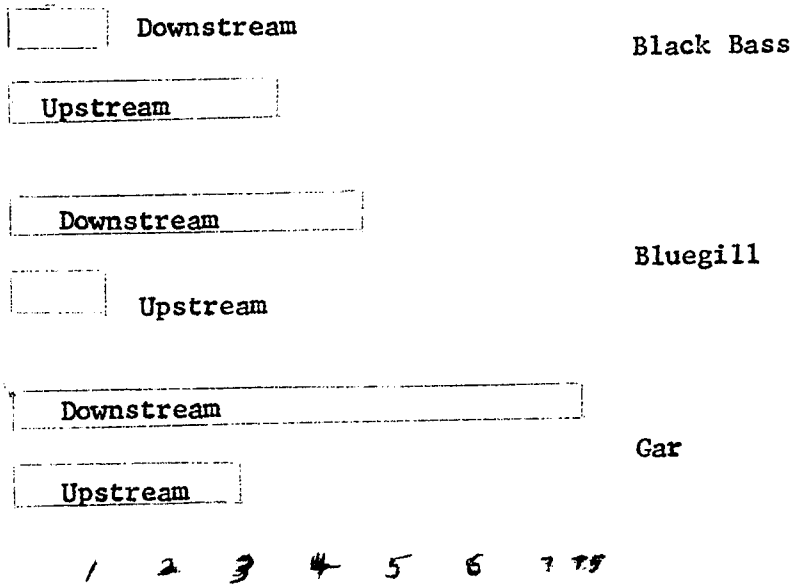


Fig. 1. Fish movements.
Av. miles traveled by fish marked and recaptured in an area other than that in which they were released.

Results of Samples With Electric Shocker

The meager catch of fresh water game fish below Ortona Locks indicated this area at present is very poor habitat for fresh water game species. Tables 7 and 8 in the appendix depict this condition.

Figures 2, 3, and 4 show the great difference between the total fresh water game fish population above Ortona Locks and below the locks.

The difference is attributed to the maidencane grass and vallisneria beds which existed above the locks. No such beds were found below the locks except in the oxbow area 6 was located in, but not in area 6 itself, and below Alva. The day to day water level stability above the locks for several months prior to sampling resulted in vegetation establishing itself in that area.

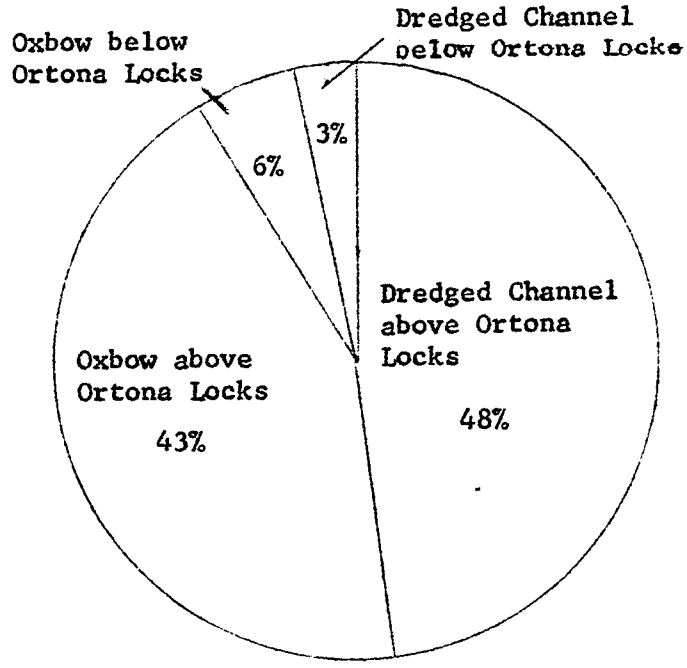
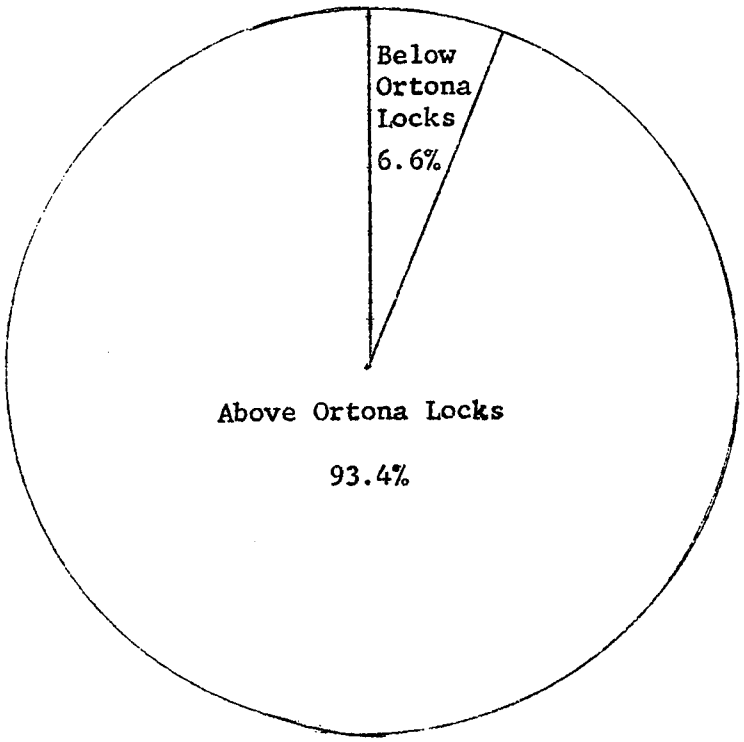


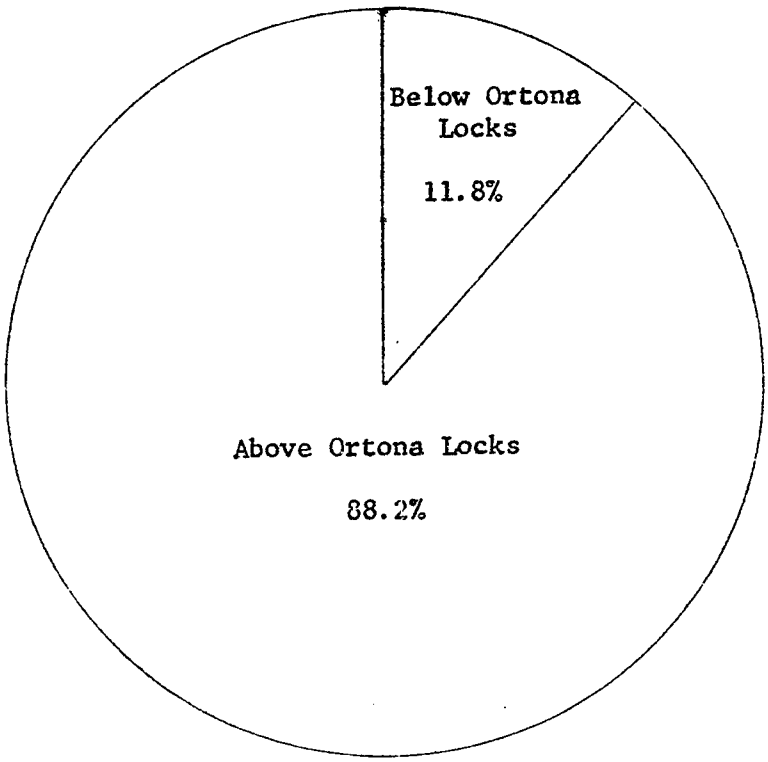
Figure 2. Relative Abundance of Fresh Water Game Fish as shown by the Electric Shocker Excluding Sweeps Where Oxbows and Dredged Channel were Combined in the Field Work.

Note: The pie diagrams for the results from the electric shocker are based on tables 7 through 14 and tables 18 and 19 in the appendix. Also see table 28.

Fig. 3 & 4. Relative Abundance of Fresh Water Game Fish Captured with the Electric Shocker.



Dredged Channel
Fig. 3



Oxbows
Fig. 4

Results of Samples

With Rotenone

The rotenone samples exhibited a difference between those taken above the locks and those taken below the locks similar to that shown by the shocker. (Figures 3, 4, 5 and 6)

Figure 7 shows how much greater the oxbow is used by fish than is the dredged channel even in the better habitat existing between Ortona Locks and Lake Hicpochee.

The differences expressed by weight are similar to the differences expressed by number of game fish recovered per unit sample (Figs. 5, 6 and 9).

A large number of game fish (Table 23) was taken along the right shore of area 10. This sample compared more with the areas above Ortona Locks than any of the other areas below the locks. The boulders and cave-like areas along this shore may be the cause for such an occurrence by providing shelter from the current similar to that provided by vegetation between Ortona Locks and Lake Hicpochee.

Similar habitat farther downstream (Area 13-Table 24) produced no fresh water game fish. All the conditions noted were the same such as time of day, chemical analysis, water current, weather conditions and proximity to oxbows. The two areas were sampled only three days apart and the samples were made equally well. The probable explanation is the river is such poor habitat for these fish that few are present in the stream. The fish recovered in Area 10 were small and probably still schooling when the area was sampled. They just happened to be in the area when it was sampled.

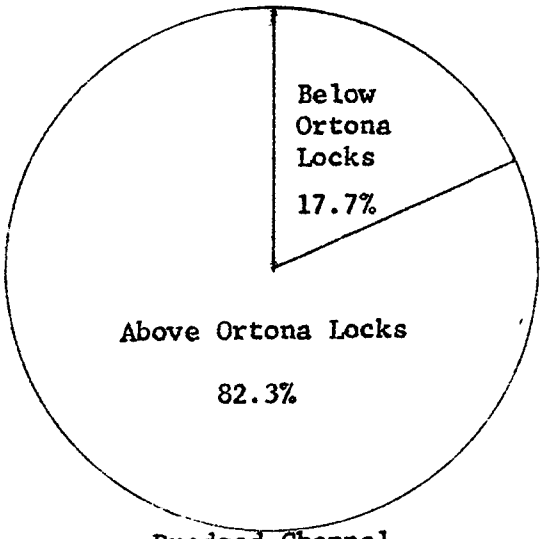
Few game fish (Table 23) were taken in an earlier mid-channel poisoning in area 10.

Area 5 (Table 21) had a shore line with a wide sandy bottom with rocks and boulders where the berm dropped off into the main dredged channel. The outside edge of the berm in this area was included in the mid-channel sample area.

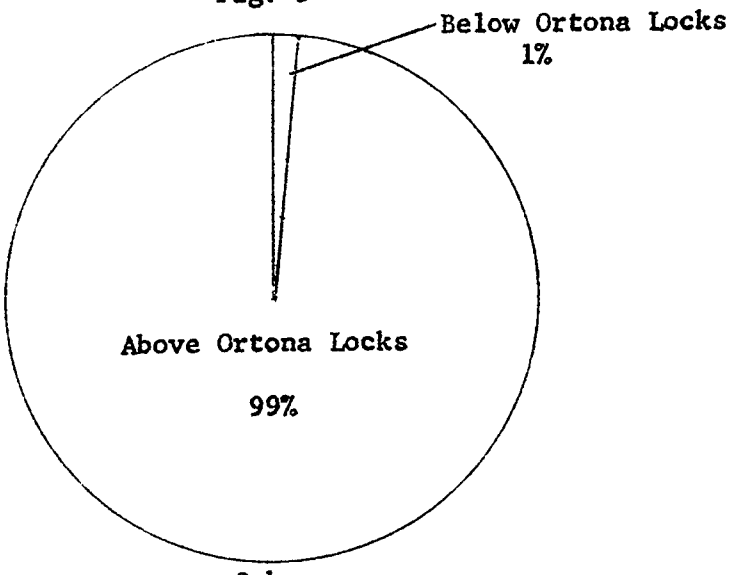
The protection afforded by the rocks and boulders along the edge of this underwater berm is believed to account for the larger fish population found here in mid-channel.

Note: The pie diagrams are based on tables 20 through 27 in the appendix.

Figs. 5 & 6. Relative Abundance of Fresh Water Game Fish Recovered from Rotenone Samples.

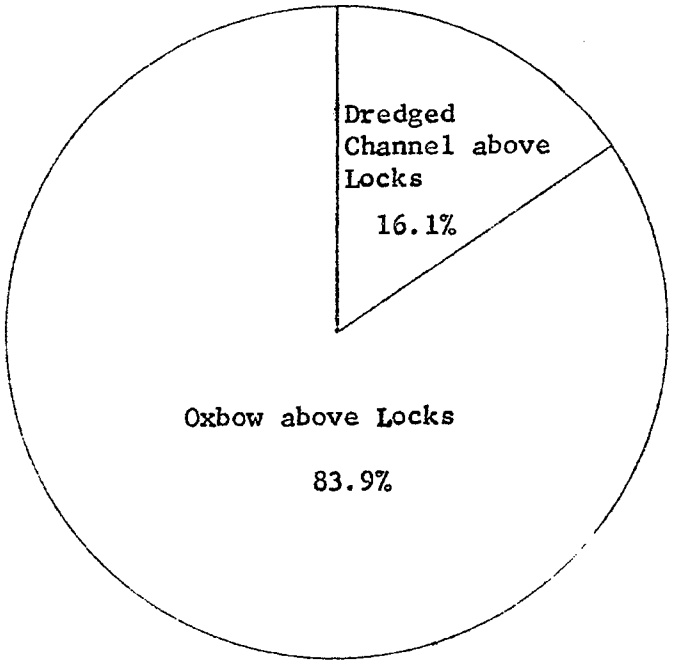


Dredged Channel
Fig. 5



Oxbow
Fig. 6

Fig. 7: Relative Abundance of Fresh Water Game Fish Recovered from Rotenone Samples.



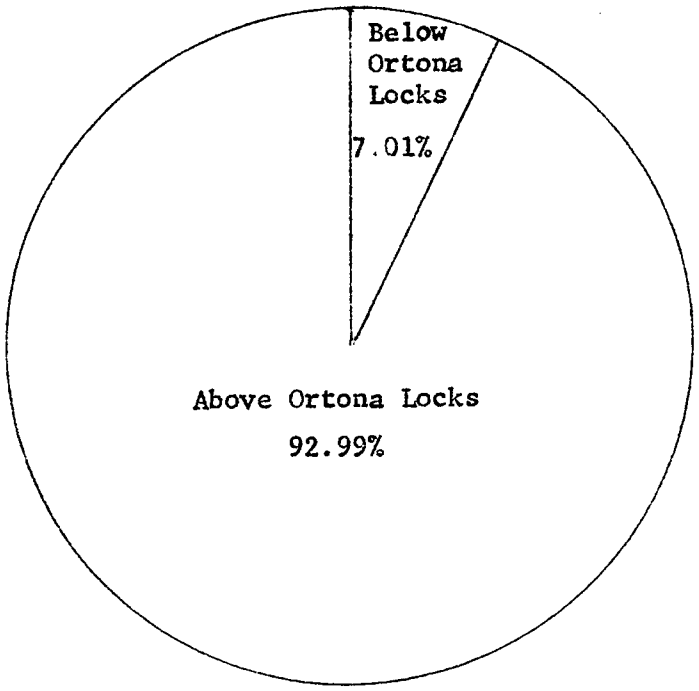


Fig. 8. Relative Weights of Fresh Water Game Fish in Dredged Channels.

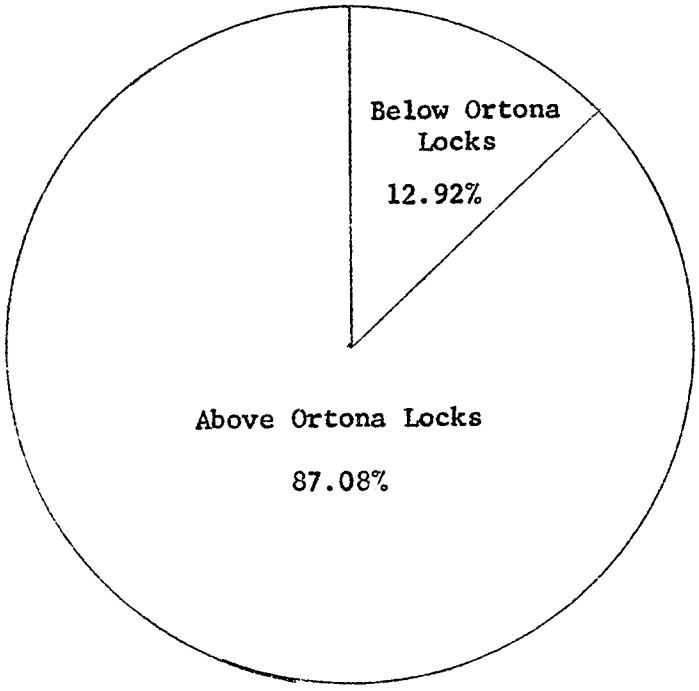


Fig. 9. Relative Weights of Salt and Fresh Water Game Fish in Dredged Channel.

Area 7 (Table 27) had a wide sandy bottom with no protection and had a very small fish population.

These varied habitats were chosen to discover if habitat requirements as observed in other rivers and streams were also operational in the Caloosahatchee River.

In the Caloosahatchee River and other streams, the mid-channels yielded fewer fish per sampling unit than did shore areas. Examples of these similar results are the Kissimmee River and Upper St. Johns River studies.

The data obtained using fish traps in the much more favorable fish habitat of the Kissimmee River showed how much more fish use shore areas than mid-channel sections of a stream. During the period of this study 78.41% of the game fish were caught in traps near shore, while 21.59% were caught in traps in mid-stream. Table 4 compares numbers of game fish captured in the Kissimmee River by traps along shore and traps in mid-stream. The data was worked from Table 43 of the Kissimmee River report. Table 5 further illustrates this fact. The three sections were sampled the same day in the same area of the Upper St. Johns River. The mid-stream section was sampled first so any bias resulting from the sampling method would be in favor of the mid-stream section. The figures for Table 5 were derived from Tables 39, 40 and 41, pages 64, 65, and 66 in the Florida Game and Fresh Water Fish Commission's report "Fishery Evaluation of the U. S. Corps of Engineers Water Storage Plan for the Upper St. Johns River."

The data bears out the conclusion that fresh warm water game fish living in streams need areas for resting and seclusion to provide a sport fisheries. In the Caloosahatchee River the rocky areas and the oxbows demonstrated this need very graphically, though it must be kept in mind that the fish population studied here does not provide a sport fishery of any note.

The only way a fresh water game fish population will be re-established in the Caloosahatchee River will be by providing areas where the habitat is not effected by sudden and severe water fluctuation and by swiftly moving water.

Such habitats could be established in the old river cut offs and by wide underwater berms.

Underwater Berm

An underwater berm would provide needed habitat along the course of the canal. Submerged and emergent vegetation would be able to exist in the middle zone of the berm, thus providing desirable habitat for game fish and give them protection from the swift water coming down the canal.

Table 4. The use value of shore versus mid-channel in the Kissimmee River as shown by fish traps.

Species	Shore Traps No.	Shore Traps %	Midstream Traps No.	Midstream Traps %	Total No.
Black Bass	8	53.3	7	46.7	15
Black Crappie	242	84.0	46	16.0	288
Bluegill	100	82.6	21	17.4	121
Redear Sunfish	9	64.3	5	35.7	14
Warmouth	22	46.8	25	53.2	47
Spotted Sunfish	4	66.7	2	33.5	6
Total All Species	385	78.41	106	21.59	491

Table 5. The use value of shore versus mid-channel in the St. Johns River as shown by rotenone samplings.

Species	Midstream				Willow Shore				Marsh Shore			
	No.	%	Wt.	%	No.	%	Wt.	%	No.	%	Wt.	%
Black Bass	0				4	40	2.3	47.9	6	60	2.5	52.1
Redfin Pickerel	0				1	100			0		0	
Black Crappie	0				0				3	100	0.5	100
Bluegill	0				13	31.7	0.4	23.5	28	68.3	1.3	76.5
Redear Sunfish	0				2	22.2	0.3	25.0	7	77.8	0.9	75.0
Warmouth	0				9	33.3	1.6	30.2	18	66.7	3.7	69.8
Spotted Sunfish	0				20	76.9	1.4	66.7	6	23.1	0.7	33.3
Total Game Fish	0				49	41.9	5.0	34.3	68	58.1	9.6	65.8

The manner the water is now regulated in the canal plus the hyacinths coming down the canal make it mandatory to have at least a 100 ft. wide berm. That would ensure a permanent vegetated zone large enough to maintain enough game fish to support a fresh water sport fishery.

The lowering of the water level during each day water is released, exposes the vallisneria beds to the killing rays of direct sunlight.

Hyacinths by shading and by mechanical action destroy the vallisneria beds and the maidencane grass. The tremendous drawdown and resurgence of the water from boats such as shrimp boats works a detrimental mechanical action against the aquatic vegetation. The proposed underwater berm would give protection from these happenings to an adequate sized area of aquatic vegetation.

The turbidity of the water would shade out and kill vegetation in the deeper zone of the berm during periods of high water.

Four feet was the deepest water where vegetation was found above Ortona Locks. The deeper zone would be the area with desirable water depths during periods of low water. Conversely the shallow water zone would support vegetative growth during periods of high water, but the vegetation would be exposed and die during period of low water. Thus the vegetation will excise from one zone to the other as the water fluctuates with changes in the rain cycle.

The inner slope does not need to be very gradual. It could drop on a 1:4 slope to the 2.5 ft. depth then slope out to the 5.0 ft. depth, a 1:36 gradient.

A more desirable construction of these berms would be to have the berm slope upward at the outer edge on a 1:3 gradient to within 1.0 ft. of the design water surface. The rise at the outer edge would prevent hyacinths from coming over the berm and tearing up the maidencane grass, and when left stranded for long periods of time over the vallisneria beds from shading out these beds. The gradients then would be 1:4 slope on the inner edge, 1:27.2 in the middle and 1:3 on the upward slope at the outer edge of the berm.

Ten ft. wide breaks every 1,000 ft. along the underwater dike would ensure the berms not being dammed from the canal except when the water drops more than five feet below the planned annual median water level.

The underwater berm need not be continuous along the canal, nor need it be on both sides of the canal. Where conditions are such that only a fifty foot wide berm could be had on both sides of the river or a 100 ft. wide berm on one side, the 100 ft. wide berm would be the berm to construct. The 100 ft. wide berm would provide a buffer zone against too low or too high water, and except in periods of very high water prevent hyacinths from penetrating very deeply into the vegetated zone.

If it should not be possible to have the berms continuous along both sides of the canal, the best locations for what could be had would be below the bends and along the bank on which the inside of the bend is located.

The berms should extend from one bend to the next one downstream and be at least behind every bend.

These berms may be feasible only above La Belle where the banks do not rise so steeply or high from the canal as they do below La Belle. The high spoil banks along one side or the other of the canal above La Belle would best be eliminated. Where they now exist, the proposed underwater berms could be built.

The material in the spoil banks as well as that to be dredged from the main channel could be deposited on the land behind the present spoil banks. The spoil could be deposited so it sloped towards the canal, and small drainage ditches built to run water from the land behind the spoil area. That would build up the land near the canal, thus being of some use to the landowners along canal 43.

A major industry of this region is raising cattle. It would be beneficial if shallow ponds were created within the spoil area as watering places for the cattle. These would be much safer for the cattle than is the canal. Four desirable objects would then be accomplished, (1) the undesirable high spoil banks would not exist, (2) the land behind the spoil banks would be built up, (3) the desired underwater berms could be made without the need of acquiring right of way, (4) erosion or damage to the project canal from secondary drainage ditches and canals would be greatly reduced if not eliminated by these drainage facilities entering the underwater berm.

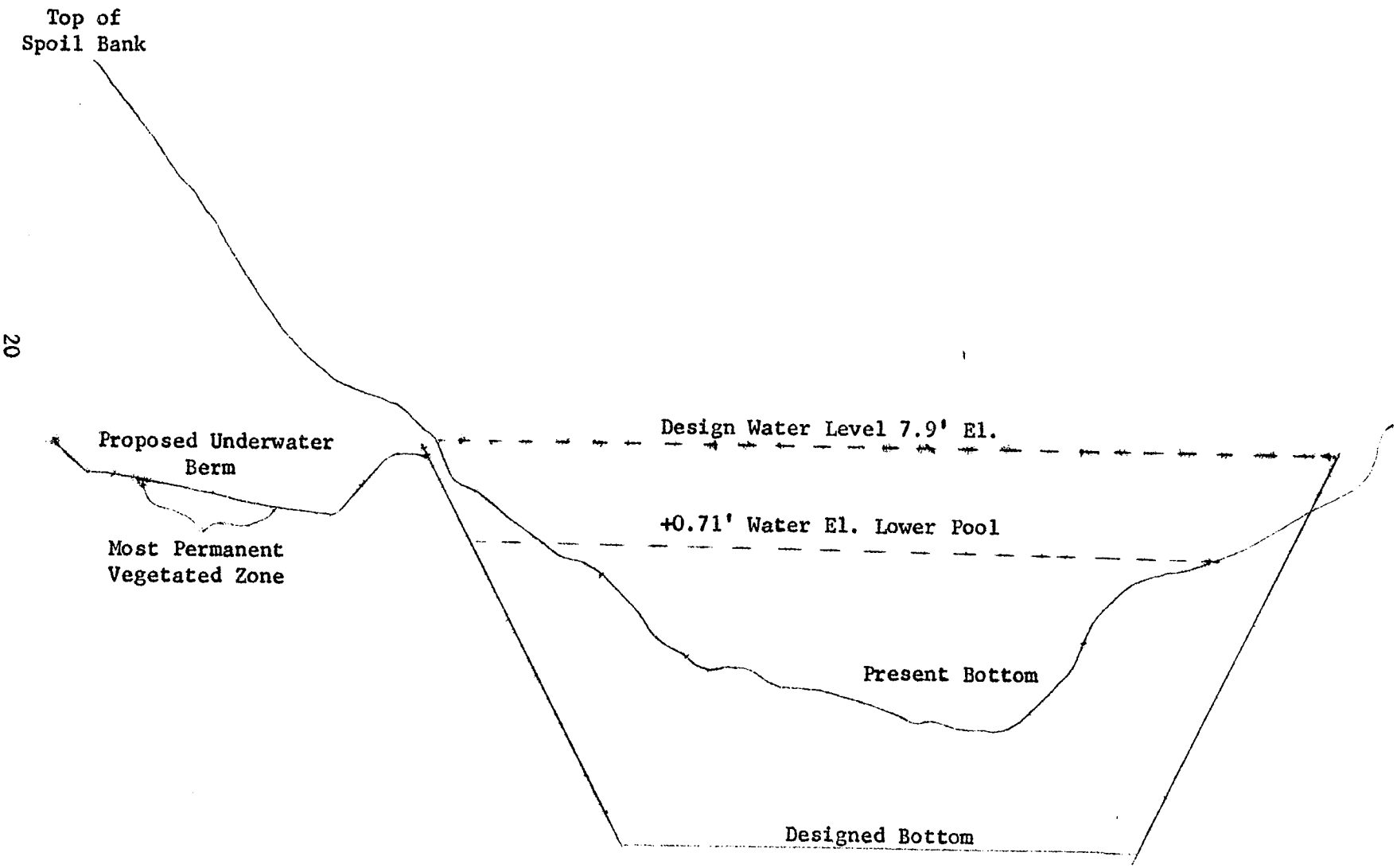
Figure 10 graphs the present profile of canal 43 at station 3 located a short way below A.C.L. RR (B-107). It also graphs the canal design at this section. The data for this design was taken from Table 30, Page 56 of the Central and Southern Florida Project-For Flood Control and Other Purposes, Part IV Lake Okeechobee and Outlets, Supplement 6.

A profile of the proposed underwater berm is shown on the left bank of this sector. The amount of excavation needed for the underwater berm is small compared with that planned for the main channel.

The dimensions for the berm are based on a water fluctuation of four feet. For no sustained length of time should the water level during the day be greater than two feet above or below the median water level.

As an example, at area 1 located about three miles above the Ortona Locks, the canal design water surface is 11.05 feet. With

Fig. 10. Area 3 profile.



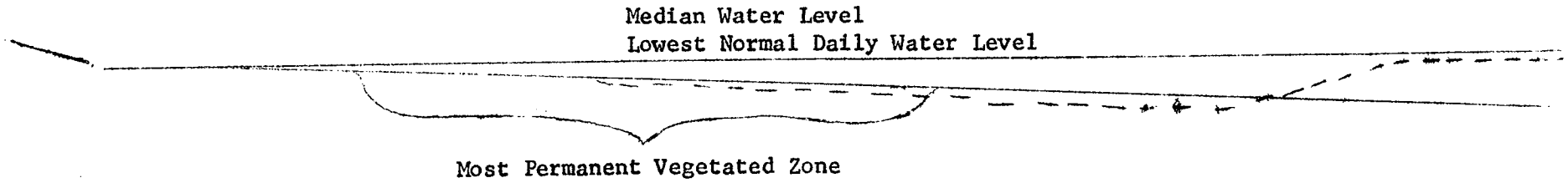


Fig. 11. Proposed berm.

this as the median water level the locks should be operated so that during the day the water level does not drop below 9.05 ft.

In the manner the locks are now operated, the water would often drop during the day lower than the desired 9.05 ft. elevation, although not necessary to have accomplish the desired discharge.

The desired discharge could be had over long periods of time without the water level going below the 9.05 ft. elevation if the water was discharged through the locks 24 hours a day instead of as is now done, for just eight hours a day. Also, the water velocity would not be so great with the water discharged in this manner.

The berm should be built at an elevation so that during the expected normal low water periods, when water is still being discharged daily, the water level will not become so low that less than three feet of water exists over the 5.0 ft. depth contour as shown in Figure 9.

As an example, the design water surface elevation at A.C.L. RR (B-107) is 7.9 feet. If the water discharge is such that during the day when water is being discharged the pool stage drops to +5.9 feet, the elevation of the berm should be +2.9 feet at the five foot depth.

The greater depth of water during the night would not be detrimental to the submerged vegetation. Shading by water turbidity would be of no consequence during the night. Water drawn too low during daylight would be detrimental to the vallisneria beds.

Before the river was canalized, fish were able to find protection along the stream where the water of the inside bend was slow and eddying. Fish food also would accumulate in these areas. When the water velocities subsided the fish were able to quickly repopulate the whole stream. The underwater berms would replace the function of the lost bends.

To construct these berms would increase the initial cost of the project. However, the additional recreational and economic benefits to be derived from these underwater berms could well compensate for the additional expenditure to create a sport fishery in Canal 43.

The Potential Value of A Fresh Water Sport Fishery in the Canal 43

The potential economic value of a fresh water sport fishery in

Canal 43 is great. The potential recreational value is even greater. The Army Corps of Engineers with their vast plans for changing the face of the land, have a responsibility to future citizens recreational and aesthetic needs as well as to their material needs.

The Corps has a plan to provide recreational facilities for the public at Ortona Locks. Would it not be feasible to expand the project and increase the project's value by providing fresh water game fishing for the enjoyment of the people using the Corps' planned recreational facilities?

Summary

1. The fish ecology of the Caloosahatchee River was studied from July 22, 1958 through January 9, 1959.

2. Two sampling methods were employed, shocking the fish with an electric current and killing them with rotenone.

3. Fish recovered were measured and weighed. Those gotten by shocking were also fin clipped and then released.

4. All the oxbows possible should be retained to preserve interesting forms of aquatic wildlife along the canal.

5. One hundred foot wide underwater berms would re-establish a fresh water game fish population that would provide good sport fishing.

6. Water velocities taken at various points along the canal showed the greatest proportion of the canal to be unsuitable for fresh water game fish.

7. Chemical analysis of the water in Canal 43 showed these factors to be non-detrimental to fish life.

8. Fish were found to have moved both upstream and downstream with most movement downstream.

Conclusions

The small game fish population that now exists in the Caloosahatchee River between Alva and Lake Hicpochee provides very little sport fishing. The construction of 100 ft. wide berms from La Belle eastward would create the needed habitat to provide an excellent sport fishery for fresh water game fish along Canal 43.

Appendix

Table 7 . Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Dredged channel Date: July 23-Sept. 4, 1958 Location: Areas 1, 3, 5, 7, 10 & 13, right shore Total sample length: 26,200 feet				Dredged channel Sept. 29-Oct. 16, 1958 Areas 1, 3, 5, 7, 10 & 13, right shore 10,600 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	3.7	23.2	1.1	16.4	3.5	24.2	1.8	15.6
Chain Pickerel					0.1	0.7	0.2	2.0
Black Crappie								
Bluegill	2.5	15.4	0.3	4.4	0.9	6.5	0.1	1.2
Redear Sunfish	0.8	5.0	0.1	1.9	1.5	10.5	0.2	1.8
Warmouth	0.0	0.2						
Spotted Sunfish								
Channel Catfish	0.1	0.9	0.1	1.2	0.1	0.6	0.1	0.9
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar								
Spotted Gar	3.2	19.6	1.5	23.1	2.9	20.3	3.1	27.1
Bowfin	0.2	1.4	5.2	8.0	0.7	4.6	1.5	13.3
Gizzard Shad	0.0	0.2	0.0	0.4				
Lake Chubsucker					0.1	0.6	0.0	0.3
Golden Shiner	0.0	0.2						
Threadfin Shad	2.9	18.2						
Snook	0.2	1.2	1.2	18.3	0.5	3.3	2.0	17.6
Patao	0.2	1.2	0.1	1.9	0.2	1.3	0.1	0.9
Mojarra					1.2	8.5		
Sheepshead								
American Eel	0.3	1.7			0.2	1.9		
Mullet	0.6	4.0	1.4	21.8	1.2	8.5	2.2	18.9
Needlefish	0.0	0.2	0.0	0.1	0.5	3.3	0.0	0.4
White Sea Trout								
Ladyfish	0.8	4.7	0.1	1.0				
Tarpon	0.0	0.2	0.1	1.3				
Total Game Fish	8.3	51.1	2.9	45.2	7.1	49.7	4.5	39.5
" Food Fish	1.1	6.6	1.5	23.0	1.5	11.0	2.3	19.9
" Rough Fish	6.4	40.0	2.1	31.6	4.9	34.0	4.6	40.7
" Forage Fish	0.4	2.4			0.7	5.2		
Grand Total	16.2	100.1	6.5	99.8	14.2	99.9	11.4	100.1

Table 8 . Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Dredged channel Date: July 23-Sept. 4, 1958 Location: Areas 1, 3, 5, 7, 10 & 13, left shore Total sample length: 26,200 feet				Dredged channel Sept. 29-Oct. 10, 1958 Areas 1, 3, 5, 7, 10 & 13, left shore 10,642 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	2.3	21.4	0.6	11.2	2.7	35.2	1.3	20.2
Chain Pickerel					0.1	1.3	0.1	1.2
Black Crappie								
Bluegill	1.3	12.1	0.2	3.2	1.2	15.7	0.3	4.4
Redear Sunfish	0.7	6.8	0.1	2.6	0.3	3.9	0.1	1.1
Warmouth								
Spotted Sunfish								
Channel Catfish	0.1	0.7	0.1	2.2	0.3	3.9	0.5	7.2
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar					0.1	1.3	0.0	0.2
Spotted Gar	1.8	16.7	2.0	35.8	1.6	20.9	1.5	23.3
Bowfin	0.1	0.7	0.2	3.3	0.2	2.6	1.1	17.1
Gizzard Shad	0.1	1.4	0.1	2.4				
Lake Chubsucker								
Golden Shiner	0.0	0.3						
Threadfin Shiner	1.9	18.1						
Snook	0.2	1.8	1.5	26.5	0.2	2.6	0.5	8.4
Patao	0.2	3.2	0.3	3.7				
Mojarra					0.1	1.3		
Sheepshead								
American Eel	0.3	2.5			0.1	1.3		
Mullet	0.4	3.9	0.5	8.1	0.7	8.6	1.1	17.1
Needlefish	0.0	0.3						
White Sea Trout								
Ladyfish	0.7	6.4	0.1	0.8				
Tarpon								
Total Game Fish	5.5	51.7	2.8	48.0	4.5	58.7	3.0	35.3
" Food Fish	0.8	7.1	0.6	10.3	1.1	12.5	1.5	24.3
" Rough Fish	4.0	37.6	2.3	41.5	2.0	27.4	2.7	40.6
" Forage Fish	0.4	3.6			0.1	1.3		
Grand Total	10.7	100.0	5.7	99.8	7.7	99.9	7.2	100.2

Table 9. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Oxbow Date: Aug. 6 & Sept. 4, 1958 Location: Area 6 Total sample length: 2620 feet				Oxbow Oct. 3, 1958 Area 6 1310 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	6.9	23.7	2.2	25.2	1.5	6.5	0.5	3.7
Chain Pickerel								
Black Crappie								
Bluegill	7.6	26.3	0.9	10.2	3.8	16.1	0.6	5.0
Redear Sunfish	3.4	11.9	0.6	6.6	2.3	9.7	0.4	3.1
Warmouth	0.4	1.3						
Spotted Sunfish								
Channel Catfish	0.4	1.3	0.1	0.9				
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar								
Spotted Gar	3.8	13.2	3.3	37.6	6.9	29.0	4.1	33.8
Bowfin					0.8	3.2	2.7	22.3
Gizzard Shad								
Lake Chubsucker	0.8	2.6	0.1	0.9				
Golden Shiner	2.7	9.2						
Threadfin Shad								
Snook								
Pompano								
Mojarra								
Sheepshead								
American Eel								
Mullet	1.5	5.2	1.6	18.6	4.6	19.4	3.9	31.9
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	18.3	63.2	3.6	42.0	7.6	32.3	1.5	11.8
" Food Fish	1.9	6.5	1.7	19.5	4.6	19.4	3.9	31.9
" Rough Fish	7.3	25.0	3.3	38.5	7.7	32.2	6.9	56.3
" Forage Fish	1.5	5.2			3.8	16.1		
Grand Total	29.0	99.9	8.6	100.0	23.7	100.0	12.3	100.0

Table 10. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Oxbow Date: Aug. 1, 13 & 30, 1958 Location: Area 8 Total Sample Length: 2700 feet				Oxbow Oct. 7, 1958 Area 8 900 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	5.9	3.0	1.9	1.9				
Chain Pickerel								
Black Crappie								
Bluegill	7.4	3.7	1.7	1.7	3.3	2.3	0.2	0.9
Redear Sunfish	3.3	1.7	1.0	1.0	1.1	0.8	0.4	1.9
Warmouth	1.1	0.5	0.4	0.4				
Spotted Sunfish								
Channel Catfish	1.5	0.7	0.8	0.8				
White Catfish								
Brown Bullhead	18.5	9.3	11.6	11.9				
Yellow Bullhead								
Longnose Gar	0.4	0.2	0.2	0.2				
Spotted Gar	10.7	5.4	6.1	6.1	13.3	9.4	4.1	17.2
Bowfin	5.2	2.6	14.7	15.0	2.2	1.6	4.7	19.5
Gizzard Shad	33.7	16.9	9.6	9.8	14.4	10.1	5.2	21.9
Lake Chubsucker	2.2	1.1	4.1	4.2				
Golden Shiner					1.1	0.8	0.2	0.9
Threadfin Shad	93.3	46.7	1.3	1.3	100.1	71.1		
Snook	1.1	0.5	1.1	1.1				
Patao	2.2	1.1	2.9	3.0				
Mojarra								
Sheepshead								
American Eel								
Mullet	11.5	5.8	40.1	41.0	4.4	3.1	9.0	37.7
Needlefish	0.4	0.2	0.2	0.2				
White Sea Trout								
Ladyfish	0.7	0.4						
Tarpon								
Total Game Fish	21.7	10.9	9.0	9.1	4.4	3.1	0.7	2.8
" Food Fish	31.5	15.8	52.5	53.7	4.4	3.1	9.0	37.7
" Rough Fish	145.9	73.1	36.2	36.8	135.5	93.0	14.2	59.5
" Forage Fish	0.4	0.2			1.1	0.8		
Grand Total	199.5	99.8	97.7	99.6	145.4	100.0	23.9	100.0

Table 11. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Natural oxbow Date: Aug. 4, 1958 Location: Area 9 Total Sample Length: 1900 feet				Natural oxbow Oct. 8, 1958 Area 9 950 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	1.1	2.7	0.7	1.9				
Chain Pickerel								
Black Crappie								
Bluegill	1.1	2.7	0.3	0.8	7.4	16.3	0.6	3.7
Redear Sunfish	0.5	1.4	0.1	0.3	7.4	16.3	0.4	2.5
Warmouth								
Spotted Sunfish								
Channel Catfish					1.1	2.3	0.2	1.2
White Catfish								
Brown Bullhead	0.5	1.4	0.2	0.4				
Yellow Bullhead								
Longnose Gar								
Spotted Gar	8.4	21.9	5.4	14.0	23.2	51.2	9.6	56.5
Bowfin	4.2	11.0	18.9	49.2	1.1	2.3	4.7	28.0
Gizzard Shad	10.5	27.4	6.2	16.2	1.1	2.3	0.8	5.0
Lake Chubsucker								
Golden Shiner								
Threadfin Shad								
Snook	0.5	1.4	0.3	0.7				
Patao	0.5	1.4	0.2	0.4	1.1	2.3	0.5	3.1
Mojarra								
Sheepshead								
American Eel					1.1	2.3		
Mullet	6.3	16.4	6.2	16.0				
Needlefish								
White Sea Trout								
Ladyfish	1.6	4.1	0.1	0.1				
Tarpon								
Total Game Fish	5.3	13.7	1.6	4.2	15.9	34.9	1.6	9.3
" Food Fish	6.8	17.8	6.3	16.4	2.1	4.6	0.2	1.2
" Rough Fish	23.1	60.3	30.5	79.4	25.3	55.8	15.4	89.5
" Forage Fish	3.1	8.2			2.1	4.6		
Grand Total	38.3	100.0	38.4	100.0	45.4	99.9	17.2	100.0

Table 12. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Oxbow Date: Aug. 29, 1958 Location: Area 12 Total sample length: 600 feet				Oxbow Oct. 16, 1958 Area 12 600 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass								
Chain Pickerel								
Black Crappie								
Bluegill	1.7	1.9			1.7	1.0		
Redear Sunfish								
Warmouth								
Spotted Sunfish								
Channel Catfish	1.7	1.9	0.7	2.3				
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar								
Spotted Gar	8.3	9.8	22.7	77.7	18.4	11.0	26.5	60.4
Bowfin								
Gizzard Shad	1.7	1.9	2.2	7.4	1.7	1.0	0.2	0.4
Lake Chubsucker								
Golden Shiner								
Threadfin Shad	31.7	37.3			1.5	0.9	0.2	0.4
Snook	1.7	1.9	0.8	2.9				
Patao					0.7	0.4	3.5	8.0
Mojarra					0.5	0.3		
Sheepshead								
American Eel								
Mullet	3.3	3.9	2.8	9.7	9.4	5.6	13.5	30.8
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	3.3	3.8	0.8	2.9	2.4	1.4		8.0
" Food Fish	5.0	5.8	3.5	12.0	9.4	5.6	13.5	30.8
" Rough Fish	41.7	49.0	24.8	85.1	22.1	13.2	26.8	61.2
" Forage Fish	35.0	41.2			133.2	79.7		
Grand Total	85.0	99.8	29.1	101.0	167.1	99.9	40.3	100.0

Table 13. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

Stream bed origin:	Dredged channel	Dredged channel
Date:	Sept. 29 & 30, 1958	Oct. 1 & 2, 1958
Location:	Between Areas 3 & 5, right shore	Between Areas 3 & 5, left shore
Total sample length:		

Species	Per 1000 feet				Per 1000 feet			
	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	2.1	23.4	0.9	13.8	1.4	15.6	0.6	10.1
Chain Pickerel								
Black Crappie								
Bluegill	1.9	12.1	0.2	2.8	0.4	4.7	0.1	1.4
Redear Sunfish	0.1	1.6	0.0	0.5	0.1	0.8	0.0	0.2
Warmouth								
Spotted Sunfish								
Channel Catfish	0.2	2.3	0.0	0.4	0.0	0.4	0.0	0.2
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar								
Spotted Gar	2.4	26.2	1.8	26.8	5.0	55.2	3.8	64.8
Bowfin	0.1	0.8	0.3	3.9	0.1	0.8	0.1	2.3
Gizzard Shad					0.1	0.8	0.0	0.5
Lake Chubsucker								
Golden Shiner								
Threadfin Shad								
Snook	0.2	2.7	1.1	15.4	0.0	0.4	0.0	0.4
Patao	0.1	0.8	0.1	0.7	0.1	1.5	0.1	1.5
Mojarra								
Sheepshead								
American Eel	0.0	0.4			0.0	0.4		
Mullet	2.1	23.8	23.2	33.6	1.0	10.9	1.0	17.7
Needlefish								
White Sea Trout								
Ladyfish	0.5	5.1	0.1	0.9	0.4	4.7	0.1	0.8
Tarpon	0.0	0.4	0.1	1.2				
Total Game Fish	4.9	46.1	2.4	35.3	2.5	28.1	0.8	13.8
" Food Fish	2.4	26.5	2.3	34.0	1.0	11.2	1.0	17.2
" Rough Fish	2.5	27.0	2.1	30.7	5.1	57.3	4.0	69.0
" Forage Fish	0.0	0.4			0.3	3.4	0.0	
Grand Total	9.8	100.0	6.8	100.0	8.9	100.0	5.8	100.0

Table 14. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

Stream bed origin:	Dredged channel	Dredged channel
Date:	Oct. 3, 1958	Oct. 7, 1958
Location:	Between Areas 5 & 7, right shore	Between Areas 5 & 7, left shore
Total sample length:	10,325 feet	10,450 feet

Species	Per 1000 feet				Per 1000 feet			
	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	3.3	43.6	0.8	24.2	4.8	36.0	1.4	26.4
Chain Pickerel					0.1	0.7	0.1	1.4
Black Crappie								
Bluegill	1.4	17.9	0.1	4.6	3.3	24.5	0.5	9.3
Redear Sunfish	0.4	5.1	0.0	1.1	1.1	7.9	0.1	2.1
Warmouth								
Spotted Sunfish								
Channel Catfish	0.1	1.3	0.5	13.7	0.1	0.7	0.2	3.2
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar					0.1	0.7	0.0	0.1
Spotted Gar	1.7	21.8	1.1	31.1	1.6	12.2	1.3	23.9
Bowfin	0.1	1.3	0.1	3.4				
Gizzard Shad								
Lake Chubsucker								
Golden Shiner								
Threadfin Shad								
Snook					0.5	3.6	0.2	4.0
Patao								
Mojarra					0.2	1.4	0.0	0.2
Sheepshead								
American Eel					0.1	0.7		
Mullet	0.4	5.1	0.5	15.1	1.1	7.9	1.5	27.9
Needlefish								
White Sea Trout								
Ladyfish	0.2	2.6	0.0	1.1	0.4	2.9	0.7	1.2
Tarpon	0.1	1.3	0.2	5.7				
Total Game Fish	5.3	70.7	1.2	35.3	10.2	76.7	3.0	50.0
" Food Fish	0.5	6.7	1.0	29.4	1.3	9.8	1.7	28.3
" Rough Fish	1.7	22.7	1.2	35.3	1.7	12.8	1.3	21.7
" Forage Fish					0.1	0.7	0.0	
Grand Total	7.5	100.1	3.4	100.0	13.3	100.0	6.0	100.0

Table 15. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

Stream bed origin:	Dredged channel	Dredged channel
Date:	Oct. 6, 1958	Oct. 8, 1958
Location:	Between Areas 7 & 10, right shore	Between Areas 7 & 10, left shore
Total sample length:	14,062 feet	13,500 feet

Species	Per 1000 feet				Per 1000 feet			
	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	3.1	25.7	0.8	6.8	1.9	26.0	0.4	8.9
Chain Pickerel								
Black Crappie								
Bluegill	1.3	11.4	0.2	1.4	0.6	8.0	0.1	2.5
Redear Sunfish	1.1	9.0	0.1	1.0	1.4	19.0	0.1	2.7
Warmouth								
Spotted Sunfish	0.1	0.6	0.0	0.1				
Channel Catfish	0.1	0.6	0.3	2.7	0.1	2.0	0.3	6.3
White Catfish								
Brown Bullhead								
Yellow Bullhead								
Longnose Gar								
Spotted Gar	3.2	26.9	3.5	30.3	1.3	18.0	0.8	19.6
Bowfin	0.9	7.8	3.8	33.3	0.1	1.0	0.3	8.1
Gizzard Shad					0.1	1.0	0.1	1.3
Lake Chubsucker								
Golden Shiner								
Threadfin Shad								
Snook					0.1	1.0	0.0	0.7
Patao	0.3	2.4			0.2	3.0	0.1	2.4
Mojarra					0.4	5.0	0.0	0.2
Sheepshead								
American Eel	0.1	0.6						
Mullet	1.7	14.4	2.8	24.4	1.2	16.0	1.9	47.3
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	5.8	49.1	1.1	9.3	4.2	57.0	0.7	17.2
" Food Fish	1.9	15.6	3.1	27.1	1.3	18.0	2.2	53.6
" Rough Fish	4.1	34.7	7.3	63.6	1.8	25.0	1.2	5.2
" Forage Fish	0.1	0.6						
Grand Total	11.9	100.0	11.5	100.0	7.3	100.0	4.1	76.0

Table 16. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Oxbows & dredged channel Date: Oct. 9 & 10, 1958 Location: Between Areas 10 & 13, left shore Total sample length: 29,440 feet				Oxbows & dredged channel Oct. 15, 1958 Between Areas 10 & 13, right shore 17,770 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	0.6	3.1	0.2	1.9	1.7	11.6	0.3	3.3
Chain Pickerel								
Black Crappie								
Bluegill	1.4	6.8	0.2	1.9	2.8	19.0	0.3	3.4
Redear Sunfish	0.5	2.3	0.1	0.5	2.1	14.4	0.2	2.0
Warmouth					0.1	0.3	0.0	0.1
Spotted Sunfish					0.1	0.6	0.0	0.1
Channel Catfish	0.4	1.9	0.3	2.8	0.2	1.5	0.1	1.4
White Catfish					0.2	1.2	0.0	0.3
Brown Bullhead	0.5	2.4	0.1	1.2				
Yellow Bullhead	0.1	0.3	0.0	0.2	0.1	0.3	0.0	0.1
Longnose Gar								
Spotted Gar	5.1	24.6	5.9	57.0	3.7	25.1	4.5	46.6
Bowfin	0.1	0.3	0.4	3.8	0.1	0.6	0.7	7.0
Gizzard Shad	0.1	0.6	0.1	1.2				
Lake Chubsucker								
Golden Shiner								
Threadfin Shad	0.3	1.6						
Snook	0.4	1.9	1.0	9.5	0.4	2.4	0.7	7.0
Patao	0.2	0.8	0.1	1.1	0.3	2.0	0.2	0.2
Mojarra					0.2	1.5	0.0	0.1
Sheepshead								
American Eel	0.1	0.3			0.2	1.2		
Mullet	1.2	4.9	1.9	18.6	1.2	8.3	2.6	26.7
Needlefish								
White Sea Trout								
Ladyfish	0.0	1.0	0.0	0.3	0.1	0.3	0.0	0.1
Tarpon								
Total Game Fish	3.1	15.9	2.6	22.8	7.5	50.6	1.7	17.9
" Food Fish	2.3	9.9	2.4	21.1	1.9	12.5	2.7	28.5
" Rough Fish	5.7	27.2	6.4	56.1	4.0	27.2	5.2	53.7
" Forage Fish	9.8	47.1			1.5	9.8		
Grand Total	20.9	100.1	11.4	100.0	14.9	100.1	9.6	100.1

Table 18. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Oxbow Date: Nov. 24, 1958 Location: Area A-2 Total sample length: 990 feet				Oxbow Nov. 24, 1958 Area A-3 530 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	34.0	16.0	6.2*		28.3	16.5	7.1*	
Chain Pickerel	3.0	1.4			3.8	2.2		
Black Crappie								
Bluegill	9.0	4.2			15.1	8.8		
Redear Sunfish	25.0	11.7			11.3	6.6		
Warmouth	4.0	1.9						
Spotted Sunfish								
Channel Catfish								
White Catfish								
Brown Bullhead	3.0	1.4			3.8	2.2		
Yellow Bullhead	1.0	0.5						
Longnose Gar	1.0	0.5						
Spotted Gar	72.0	33.8			62.3	36.3		
Bowfin	3.0	1.4						
Gizzard Shad								
Lake Chubsucker	8.0	3.8			17.0	9.9		
Golden Shiner	48.0	22.5			18.9	10.9		
Threadfin Shad								
Snook								
Patao								
Mojarra								
Sheepshead								
American Eel								
Mullet	2.0	0.9			5.7	3.3		
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	75.0	35.2			58.5	34.1		
" Food Fish	6.0	2.8			9.5	5.5		
" Rough Fish	132.0	62.0			98.2	57.1		
" Forage Fish					5.7	3.3		
Grand Total	213.0	100.0			171.9	100.0		

*Estimated from length-weight relationship of bass collected with rotenone above Ortona.

Table 17. Species Composition of Electric Shocker Samples in th Caloosahatchee River, on a 1000-foot Unit Effort Basis

Stream bed origin:	Oxbows & dredged channel	Oxbows & dredged channel
Date:	Oct. 22, 1958	Oct. 24 & Oct. 27, 1958
Location:	From Area 13 to Cypress Creek, right shore	From Area 13 to Cypress Creek, left shore
Total sample length:	29,850 feet	37,950 feet

	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	0.8	7.1	0.3	2.2	2.5	4.1	0.7	1.3
Chain Pickerel								
Black Crappie								
Bluegill	0.6	5.1	0.1	0.7	4.9	7.8	0.5	0.8
Redear Sunfish	0.4	3.4	0.0		1.7	2.8	0.2	0.3
Warmouth	0.0	0.1	0.0		0.1	0.2	0.0	
Spotted Sunfish	0.0	0.3	0.0		0.1	0.2	0.0	
Channel Catfish	0.2	1.7	0.1	0.7	0.4	0.7	0.6	1.0
White Catfish	0.1	1.4	0.0		0.4	0.7	0.2	0.4
Brown Bullhead					2.4	3.9	1.0	1.7
Yellow Bullhead	0.1	0.1	0.0					
Longnose Gar	0.0	0.3	0.0					
Spotted Gar	0.2	20.6	2.7	20.1	26.6	43.3	32.3	56.2
Bowfin					0.9	1.4	3.4	5.9
Gizzard Shad	0.0	0.3	0.0		0.6	1.0	0.2	0.3
Lake Chubsucker	0.0	0.1	0.0		0.0	0.1	0.0	
Golden Shiner	0.2	1.6	0.0		0.9	1.5	0.1	0.2
Threadfin Shad	0.8	0.7	0.0		0.4	0.6	0.0	
Snook	0.4	3.4	1.3	9.7	1.9	3.1	4.1	7.1
Patao	0.3	2.6	0.2	1.5	0.7	1.2	0.4	0.7
Mojarra	0.7	6.3	0.1	0.7	2.3	3.7	0.1	0.1
Sheepshead	0.1	0.1	0.1	0.7	0.0	0.1	0.0	0.1
American Eel	0.5	0.4			0.4	0.6		
Mullet	4.6	38.8	8.3	61.9	8.5	13.4	13.6	23.7
Needlefish								
White Sea Trout								
Ladyfish	0.8	0.7	0.1	0.7	0.5	0.9	0.1	0.2
Tarpon	0.0	0.3	0.1	0.7				
Atlantic Stingray		0.1	0.0					
Ocean Goby					0.0	0.1	0.0	
Sea Catfish					0.1	0.1	0.0	
Total Game Fish		23.1	2.2	16.2	12.4	20.4	6.0	10.5
" Food Fish		42.0	8.4	62.6	11.7	18.7	15.4	26.8
" Rough Fish		30.4	2.7	20.8	29.9	52.4	36.1	62.7
" Forage Fish	0.5	4.5			5.4	8.6		
Grand Total		100.0	13.4	99.6	59.4	100.1	57.5	100.0

Table 19. Species Composition of Electric Shocker Samples in the Caloosahatchee River, on a 1000-foot Unit Effort Basis

	Stream bed origin: Dredged channel Date: Nov. 24, 1958 Location: Area A-1, left shore Total sample length: 845 feet				Dredged channel Nov. 24, 1958 Area A-1, right shore 845 feet			
	Per 1000 feet				Per 1000 feet			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	5.8	29.3	10.2*		36.7	13.7	8.0*	
Chain Pickerel					1.2	0.4		
Black Crappie								
Bluegill	9.5	4.8			8.3	3.1		
Redear Sunfish	23.7	12.0			61.5	23.0		
Warmouth								
Spotted Sunfish					1.2	0.4		
Channel Catfish								
White Catfish	1.2	0.6						
Brown Bullhead	1.2	0.6						
Yellow Bullhead								
Longnose Gar								
Spotted Gar	55.6	28.1			54.4	20.4		
Bowfin	1.2	0.6			3.6	1.3		
Gizzard Shad								
Lake Chubsucker	4.7	2.4			4.7	1.8		
Golden Shiner	8.3	4.2			81.7	30.5		
Threadfin Shad								
Snook								
Patao								
Mojarra								
Sheepshead								
American Eel					1.2	0.4		
Mullet								
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	39.0 91.2	46.1			108.9	40.6		
" Food Fish	2.4	1.2			1.2			
" Rough Fish	69.8	35.3			144.4	54.4		
" Forage Fish	34.3	17.3			13.0	4.9		
Grand Total	145.5 197.7	99.9			267.5	99.9		

*Estimated from length-weight relationship of bass collected with rotenone above Ortona.

Table 20. Species Composition of Rotenone Samples in the Caloosahatchee River

Stream bed origin: Dredged channel
Date: Nov. 17, 1958
Location: Area 3, mid-channel
Sample size: 0.50 acre

Species	No.	%	Pounds	%
Largemouth Black Bass	3	2.1	1.5	9.3
Chain Pickerel				
Black Crappie				
Bluegill	36	25.4	0.1	0.6
Redear Sunfish				
Warmouth	1	0.7		
Spotted Sunfish				
Channel Catfish	42	29.6	6.5	40.4
White Catfish				
Brown Bullhead				
Yellow Bullhead				
Longnose Gar				
Spotted Gar				
Bowfin				
Gizzard Shad	4	2.8	3.1	19.3
Lake Chubsucker				
Golden Shiner				
Threadfin Shad	6	4.2	0.1	0.6
Snook	2	1.4	1.2	7.5
Patao				
Mojarra				
Sheepshead				
American Eel				
Mullet				
Needlefish	2	1.4		
White Sea Trout				
Ladyfish				
Tarpon				
Sea Catfish	6	4.2	3.6	22.4
Total Game Fish	42	29.6	2.8	17.4
" Food Fish	42	29.6	6.5	40.4
" Rough Fish	18	12.7	6.8	42.2
" Forage Fish	40	28.2		
Grand Total	142	100.1	16.1	100.0

Table 21. Species Composition of Rotenone Samples in the Caloosahatchee River

	Stream bed origin: Dredged channel Date: Nov. 11, 1958 Location: Area 5, mid-channel Sample size: 0.50 acre				Dredged channel Nov. 20, 1958 Area 5, right shore 0.50 acre			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass					8	1.6	1.0	2.2
Chain Pickerel								
Black Crappie								
Bluegill	102	14.7	0.6	0.9	110	22.0	1.2	2.6
Redear Sunfish								
Warmouth					14	2.8	0.6	1.3
Spotted Sunfish								
Channel Catfish	442	63.7	30.0	46.9	200	40.0	21.0	47.9
White Catfish					2	0.4		
Brown Bullhead					1	0.2		
Yellow Bullhead								
Longnose Gar								
Spotted Gar								
Bowfin								
Gizzard Shad	15	2.2	7.6	11.9	32	6.4	13.5	29.7
Lake Chubsucker								
Golden Shiner								
Threadfin Shad	34	4.9	0.2	0.3	3	0.6		
Snook	1	0.1	0.6	0.9	1	0.2	1.1	2.4
Patao	1	0.1	0.9	1.4				
Mojarra	1	0.1			1	0.2		
Sheepshead								
American Eel					4	0.8		
Mullet								
Needlefish								
White Sea Trout	28	4.0	0.1	0.2	7	1.4		
Ladyfish								
Tarpon								
Sea Catfish	66	9.5	21.1	33.0	20	4.0	6.3	13.8
Gafftopsail Catfish	1	0.1	2.9	4.5				
Total Game Fish	132	19.0	2.2	3.4	140	28.0	3.9	10.2
" Food Fish	442	63.7	30.0	46.9	207	41.4	21.0	54.7
" Rough Fish	117	16.8	31.8	49.7	56	11.2	13.5	35.2
" Forage Fish	3	0.4			97	19.4		
Grand Total	694	99.9	64.0	100.0	500	100.0	38.4	100.1

Table 22. Species Composition of Rotenone Samples in the Caloosahatchee River

Stream bed origin: Dredged channel
Date: Nov. 19, 1958
Location: Area 7, right shore
Sample size: 0.50 acre

Species	No.	%	Pounds	%
Largemouth Black Bass				
Chain Pickerel				
Black Crappie				
Bluegill				
Redear Sunfish	7	9.1		
Warmouth				
Spotted Sunfish				
Channel Catfish	21	27.3	5.2	100.0
White Catfish				
Brown Bullhead				
Yellow Bullhead				
Longnose Gar				
Spotted Gar				
Bowfin				
Gizzard Shad				
Lake Chubsucker				
Golden Shiner				
Threadfin Shad				
Snook				
Patao				
Mojarra				
Sheepshead				
American Eel				
Mullet				
Needlefish				
White Sea Trout				
Ladyfish				
Tarpon				
Total Game Fish	7	9.1		
" Food Fish	21	27.3	5.2	100.0
" Rough Fish	0			
" Forage Fish	49	63.6		
Grand Total	77	100.0	5.2	100.0

Table 23. Species Composition of Rotenone Samples in the Caloosahatchee River

	Stream bed origin: Dredged channel Date: Nov. 14, 1958 Location: Area 10, mid-channel Sample size: 0.50 acre				Dredged channel Nov. 21, 1958 Area 10, right shore 0.50 acre			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass					7	0.5	1.1	3.5
Chain Pickerel								
Black Crappie								
Bluegill					571	40.7	4.4	13.9
Redear Sunfish					8	0.6	0.2	0.6
Warmouth					112	8.0	1.4	4.4
Spotted Sunfish					14	1.0	0.4	1.2
Channel Catfish	75	61.0	3.7	21.1	130	9.3	12.1	38.3
White Catfish					21	1.5	0.7	2.2
Brown Bullhead					1	0.1	0.1	0.3
Yellow Bullhead								
Longnose Gar								
Spotted Gar								
Bowfin								
Gizzard Shad	14	11.4	12.5	71.4	1	0.1	0.6	1.9
Lake Chubsucker								
Golden Shiner								
Threadfin Shad	3	2.4			12	0.8		
Snook	1	0.8	1.1	6.3	2	0.1	8.0	25.3
Patao					1	0.1	0.7	2.2
Mojarra								
Sheepshead								
American Eel					1	0.1	0.5	0.6
Mullet								
Needlefish								
White Sea Trout	5	4.1			1	0.1		
Ladyfish								
Tarpon								
Sea Catfish	1	0.8	0.2	1.1	4	0.3	1.4	4.4
Total Game Fish	6	4.9	1.1	6.3	716	51.1	16.2	51.3
" Food Fish	75	61.0	3.7	21.1	153	10.9	13.4	42.4
" Rough Fish	18	14.6	12.7	72.6	17	1.2	2.0	6.3
" Forage Fish	24	19.5			516	36.8		
Grand Total	123	100.0	17.5	100.0	1402	100.0	31.6	100.0

Table 24. Species Composition of Rotenone Samples in the Caloosahatchee River

Stream bed origin:	Dredged channel				Dredged channel			
Date:	Nov. 18, 1958				Oct. 18, 1958			
Location:	Area 13, middle & shore				Area 14			
Sample size:	0.50 acre				0.50 acre			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass					2	3.2		
Chain Pickerel								
Black Crappie								
Bluegill					10	15.9		
Redear Sunfish								
Warmouth					3	4.8		
Spotted Sunfish					1	1.6		
Channel Catfish	583	92.2	37.9	61.4	19	30.1		
White Catfish					5	7.9		
Brown Bullhead								
Yellow Bullhead								
Longnose Gar								
Spotted Gar								
Bowfin					1	1.6		
Gizzard Shad	9	1.4	7.3	11.8				
Lake Chubsucker								
Golden Shiner								
Threadfin Shad	2	0.3						
Snook								
Patao					1	1.6		
Mojarra								
Sheepshead								
American Eel					2	3.2		
Mullet								
Needlefish								
White Sea Trout	21	3.3						
Ladyfish								
Tarpon								
Sea Catfish	12	1.9	5.2	8.4				
Gafftopsail Catfish	5	0.8	11.3	18.3				
Total Game Fish	21	3.3	37.9	61.4	17	27.0		
" Food Fish	583	92.2	23.8	38.6	26	41.3		
" Rough Fish	28	4.4			1	1.6		
" Forage Fish	0				19	30.1		
Grand Total	632	99.9	61.7	100.0	63	100.0		

Table 25. Species Composition of Rotenone Samples in the Caloosahatchee River

Stream bed origin: Oxbow
Date: Oct. 23, 1958
Location: Area 15
Sample size: 0.50 acre

Species	No.	%	Pounds	%
Largemouth Black Bass	2	1.5	0.6	8.8
Chain Pickerel				
Black Crappie				
Bluegill	22	17.3		
Redear Sunfish	3	2.4		
Warmouth	4	3.2	0.2	2.9
Spotted Sunfish				
Channel Catfish	12	9.4	2.6	38.2
White Catfish	4	3.2	0.1	1.5
Brown Bullhead				
Yellow Bullhead				
Longnose Gar				
Spotted Gar	1	0.8	0.2	2.9
Bowfin	1	0.8	3.0	44.1
Gizzard Shad				
Lake Chubsucker	1	0.8	0.1	1.5
Golden Shiner				
Threadfin Shad				
Snook				
Patao				
Mojarra				
Sheepshead				
American Eel				
Mullet				
Needlefish				
White Sea Trout				
Ladyfish				
Tarpon				
Total Game Fish	31	24.4	0.8	11.8
" Food Fish	16	12.6	2.7	39.7
" Rough Fish	3	2.4	3.3	48.5
" Forage Fish	77	60.6		
Grand Total	127	100.0	6.8	100.0

Table 26. Species Composition of Rotenone Samples in the Caloosahatchee River

Stream bed origin:	Dredged channel	Oxbow
Date:	Dec. 6, 1958	Nov. 25, 1958
Location:	Area A-1, right shore	Area A-2
Sample size:	0.25 acre	0.25 acre

Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	30	3.6	4.7	14.6	84	2.8	6.9	7.3
Chain Pickerel	1	0.1	1.5	4.7				
Black Crappie					11	0.4	1.4	1.5
Bluegill	198	23.5	5.2	16.1	661	22.3	6.7	7.1
Redear Sunfish	86	10.2	4.2	13.0	455	15.3	14.3	15.1
Warmouth	144	17.1	1.4	4.3	287	9.7	2.0	2.1
Spotted Sunfish	22	2.6	0.7	2.2	30	1.0		
Channel Catfish	9	1.1	6.2	19.3	3	0.1	3.1	3.3
White Catfish	1	0.1	0.2	0.6				
Brown Bullhead	1	0.1	0.1	0.3	63	2.1	10.0	10.5
Yellow Bullhead	2	0.2	1.0	3.1	6	0.2	1.8	1.9
Longnose Gar								
Spotted Gar	3	0.3	0.6	1.9	27	0.9	3.9	4.1
Bowfin	3	0.3	4.7	14.6	25	0.8	10.8	11.4
Gizzard Shad								
Lake Chubsucker	3	0.3	0.8	2.5	33	1.1	10.3	10.8
Golden Shiner	48	5.7	0.9	2.8	350	11.8	18.9	19.9
Threadfin Shad	11	1.3						
Snook								
Patao								
Mojarra								
Sheepshead								
American Eel								
Mullet					2	0.1	4.8	5.0
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	481	57.1	17.7	55.0	1528	51.5	31.3	33.1
" Food Fish	13	1.5	7.5	23.3	74	2.5	19.7	20.7
" Rough Fish	68	8.1	7.0	21.7	435	14.7	43.9	46.2
" Forage Fish	281	33.3			930	31.3		
Grand Total	843	100.0	32.2	100.0	2967	100.0	94.9	100.0

Table 27. Species Composition of Rotenone Samples in the Caloosahatchee River

	Stream bed origin: Dredged channel Date: Dec. 5, 1958 Location: Area A-1, mid-channel Sample size: 0.25 acre				Dredged channel Dec. 15, 1958 Area A-1, left shore 0.25 acre			
Species	No.	%	Pounds	%	No.	%	Pounds	%
Largemouth Black Bass	6	0.8	3.2	8.9	2	1.1	4.1	20.2
Chain Pickerel								
Black Crappie								
Bluegill	241	31.2	5.6	15.5	47	27.0	5.1	25.1
Redear Sunfish	12	1.5	0.4	1.1	8	4.6	0.9	4.4
Warmouth	49	6.3			31	17.8	0.6	3.0
Spotted Sunfish					1	0.6	0.2	1.0
Channel Catfish	46	6.1	10.1	28.1	4	2.3	2.4	11.8
White Catfish	10	1.3	1.6	4.4	13	7.5	3.2	15.8
Brown Bullhead	1	0.1	0.1	0.3	5	2.9	1.6	7.9
Yellow Bullhead								
Longnose Gar								
Spotted Gar					6	3.4	1.4	6.9
Bowfin	2	0.3	2.4	6.7				
Gizzard Shad	12	1.5	11.5	31.9				
Lake Chubsucker	6	0.8	1.1	3.1	4	2.3	0.7	3.4
Golden Shiner	4	0.6			1	0.6	0.9	0.5
Threadfin Shad	6	0.8			1	0.6		
Snook								
Patao								
Mojarra								
Sheepshead								
American Eel								
Mullet								
Needlefish								
White Sea Trout								
Ladyfish								
Tarpon								
Total Game Fish	308	39.9	9.2	25.5	89	51.1	10.9	53.7
" Food Fish	57	7.4	11.8	32.8	22	12.6	7.2	35.5
" Rough Fish	30	3.9	15.0	41.7	12	6.9	3.0	10.8
" Forage Fish	376	48.8			51	29.3		
Grand Total	771	100.0	36.0	100.0	174	99.9	21.1	100.0

Table 28. The totals and percentages of all fresh water game fish captured per 1,000 feet of shoreline with the electric shocker.

Dredged Channel Above Ortona Locks		Dredged Channel Below Ortona Locks		Oxbow Above Locks		Oxbow Below Locks		Total	
No.	%	No.	%	No.	%	No.	%	No.	%
74	48	5	3	67	43	9	6	155	100

Oxbow Above Locks		Oxbow Below Locks		Total	
No.	%	No.	%	No.	%
67	88.2	9	11.8	76	100

Dredged Channel Above Ortona Locks		Dredged Channel Below Ortona Locks		Total	
No.	%	No.	%	No.	%
74	94	5	6	79	100

Canal 43
The numerals correspond to the sample areas