# SEASONALITY OF FISHES ON A SOUTH FLORIDA SHORE[1]

VICTOR G. SPRINGER AND ANDREW J. McERLEAN
*Florida State Board of Conservation Marine Laboratory, St. Petersburg*

ABSTRACT

Monthly collections on a grassy shore on Matecumbe Key, Florida Keys, were made from March, 1960, through February, 1961. One hundred and six species of fishes were taken. Number of specimens, size range and average size are given for each month for each species. Numbers of species and specimens were greatest during summer and fall. Approximately one-third of the species were represented only by young.

## INTRODUCTION

Ichthyological literature on seasonal abundance of marine fishes in low latitudes is for the most part restricted to studies of only one or a few species. One reason for this can be ascribed to the difficulty of identifying the large numbers of species present in warm latitudes. Recent advances in the taxonomy of American fishes has made such studies more feasible. Reid (1954), Kilby (1955) and Springer and Woodburn (1960) have conducted seasonality studies at latitudes 27-29° N on the Florida west coast. But the complexity of the fish faunas even that far south are dwarfed by comparison with those encountered in south Florida, latitudes 24-26° N.

The present study was conducted incidental to other investigations on south Florida fishes. To avoid presently insurmountable taxonomic problems a single close shore habitat (station) was selected and sampled for fishes. The shore fishes of the area are the group best known, but even so we are uncertain of the identifications of some of the species we report.

We extend our appreciation to Walter R. Courtenay, Jr. for allowing us to use his then unpublished keys to the young of the genus *Haemulon*.

## STATION DESCRIPTION

The station chosen lies at approximately 24°51′ N. and 88°44′ W. on the Atlantic Ocean side of Lower Matecumbe Key. It is 2.8 miles south of the north end of the Key. The station occupies about one-tenth of a mile of shore line of a gently curving embayment of about 1.4 miles arc, and arbitrarily extends from the highest high tide level to approximately 100 yards offshore.

For about 20-40 feet below the highest high tide level the shore

[1]Contribution 59.

is composed of shelly debris. Below this is a well defined band of *Diplanthera* about 10-15 feet wide. The bottom on which the *Diplanthera* grows is soft and mucky. Beds of *Thalassia* extend from the *Diplanthera* for a considerable, but undetermined, distance offshore. Patches of fine calcareous sand over a rocky bottom are interspersed among the beds of *Thalassia*. During spring low tides the *Diplanthera* beds are entirely exposed, as are portions of the near shore *Thalassia* beds. Sandy bottom occupied a greater area than grasses on the southwest portion of the station, and it was primarily in this portion that sparse attached *Sargassum* was growing. Dense *Lithothamnion*-like algae were present inshore of this portion during the first several months of the study. These algae prevented seining without extensive damage to the net. Unattached algae were not abundant during the study.

A few large sponges, *Spheciospongia,* were scattered throughout the northeastern portion of the station, and at times snagged the seine.

The greatest depth encountered over the station was about four and one-half feet. The greatest depth encountered during the March collection was about ten inches, which was the shallowest for any collection.

After the September, 1960, hurricane the *Diplanthera* beds, but not the *Thalassia* beds, were altered. A number of plots were denuded and the bottom scooped out. Shallow sloughs were formed on either side of the *Diplanthera* band and these accumulated masses of decaying vegetation. By November the sloughs were clean.

Dates, salinities and temperatures at times of collections are listed in Table 1.

## Methods

Monthly collections were made from March, 1960, through February, 1961. A 100-foot bag seine, three-eighths inch stretched mesh, six feet deep, was used for seine collections. A pushnet (Strawn, 1954), its mesh of slightly less than a twenty-fifth of an inch in diameter, was used to supplement the seine collections.

Individual collections were continued until repeated sampling failed to educe additional species. The time required varied from two to three and one-half hours.

Pushnet and seine collections were preserved separately in approximately 10 per cent formalin. All fishes were retained with the exception of a few large specimens which were measured in the field and

the December collection of *Anchoa lamprotaenia* of which an estimated 50 per cent was retained. Undoubtedly some individuals of *A. mitchilli* and *A. cubana* were included in the discarded portion of the collection.

Specimens were sorted in the laboratory and standard lengths (unless otherwise noted) were measured to the nearest millimeter using a pair of needlepoint dividers which were stepped off on a millimeter ruler.

When in the case of certain seine collections a species was represented by a large number of specimens a random sample of 100 specimens was measured, except in the April collection when only 50 specimens of *Atherinomorus stipes* were measured. Examples of all but a few species were deposited in the laboratory collections. Distribution of the remaining material is anticipated, or else it will be discarded shortly after publication of this paper.

Surface salinities (Table 1) were taken at a distance of about 100 feet from shore. Densities of these were determined with a hydrometer, corrected for temperature and converted to salinity. Surface temperatures (Table 1) were taken at the same locations as salinity samples. These were made using a laboratory grade, mercury-filled thermometer. Fractions of a degree C were estimated.

At the present writing the following identifications are in doubt: *Bothus ocellatus* (C. R. Robins informs us that there are two species confused under this name; our specimens will be included in a study conducted by one of his students); *Jenkinsia* sp. (Robins informs us that our specimens represent an undescribed species differing from *J. lamprotaenia* in the development of a silvery lateral band among other characters); *Mycteroperca bonaci* (these are young specimens, but on the basis of fin counts and abundance of adults seem to belong here. These young have noticeable proportional differences from similar-sized specimens of *M. microlepis* from the Tampa Bay area); *Ogcocephalus cubifrons* (this is the same species reported by Springer and Woodburn, for the Tampa Bay area); *Pomacentrus leucostictus* (agrees with description by Rivas, 1960, but on the basis of west Florida material not seen by him our specimen may be *P. variabilis); Prionotus pectoralis* (small specimens); *Scarus croicensis* (J. E. Randall, who is studying the problem, informs us that there are two species confused under this name and means of separating small specimens are not yet known); *Sparisoma chrysopterum* (our specimens are very similar to *S. rubripinne,* but have the interradial and nasal cirri

TABLE 1

SURFACE SALINITIES AND TEMPERATURES DURING COLLECTIONS.

| | 1960 MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | 1961 JAN | FEB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | 1 | 11 | 9 | 8 | 11 | 8 | 6 | 10 | 7 | 5 | 9 | 9 |
| Salinity ppt. | 35.1 | 37.9 | 37.9 | 35.6 | 37.9 | 37.8 | 35.9 | 34.7 | 34.5 | 36.3 | 34.6 | 35.8 |
| Temperature °C. | 27.0 | 23.0 | 28.0 | 32.8 | 33.6 | 33.2 | 31.6 | 33.5 | 23.5 | 19.9 | 22.0 | 19.9 |

TABLE 2

MONTHLY OCCURRENCE OF FISHES ON A SOUTH FLORIDA SHORE. N = NUMBER OF SPECIMENS; R = SIZE RANGE, STANDARD LENGTHS, IN MILLIMETERS; A = AVERAGE SIZE; P = PUSHNET COLLECTIONS; S = SEINE COLLECTIONS.

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acanthurus bahianus* | N | | | | | 4 | | | 15 | 1 | 2 | | | 22 |
| | R | | | | | 28-33 | | | 29-50 | 43 | 50-51 | | | |
| | A | | | | | 31 | | | 41 | | 50 | | | |
| *Acanthurus chirurgus* | N | | | | | | | | 8 | 1 | 5 | | | 14 |
| | R | | | | | | | | 36-52 | 60 | 23-57 | | | |
| | A | | | | | | | | 41 | | 37 | | | |
| *Achirus inscriptus* | N | | | | | | | | | | 1 | | | 1 |
| | R | | | | | | | | | | 28 | | | |
| | A | | | | | | | | | | | | | |
| *Achirus lineatus* | N | | | | | | | 1 | | | 2 | | | 3 |
| | R | | | | | | | 30 | | | 30-31 | | | |
| | A | | | | | | | | | | 30 | | | |
| *Acyrtops beryllinus* | N | 8 | | 25 | 6 | | | | | 4 | 2 | | | 45 |
| | R | 11-19 | | 13-20 | 17-19 | | | | | | 16-18 | 16-19 | | |
| | A | 16 | | 18 | 18 | | | | | 17 | 18 | | | |

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Albula vulpes* | | | | | Seen | | | | | | | | | |
| *Allanetta harring-tonensis* | N | 2 | | | 25 | 1 | | | 1 | | 1 | | | 30 |
| | R | 43-48 | | | 62-83 | 82 | | | 82 | | 82 | | | |
| | A | 46 | | | 73 | | | | | | | | | |
| *Anchoa cubana* | N | | | | | | | | | | 62 | | | 62 |
| | R | | | | | | | | | | 32-49 | | | |
| | A | | | | | | | | | | 43 | | | |
| *Anchoa lamprotaenia* | N | | | | | | | | | 11 | 1069[1] | | | 1,080 |
| | R | | | | | | | | | 29-56 | 41-64 | | | |
| | A | | | | | | | | | 47 | 48 | | | |
| *Anchoa mitchilli* | N | | | | | | | | | 1 | | | | 1 |
| | R | | | | | | | | | 36 | | | | |
| | A | | | | | | | | | | | | | |
| *Anchoviella perfasciata* | N | | | | | | | | | | 21 | | | 21 |
| | R | | | | | | | | | | 63-85 | | | |
| | A | | | | | | | | | | 74 | | | |
| *Atherinomorus stipes* | N | 5 | 182 | 560 | 355 | 86 | 268 | 298 | | | 10 | | | 1,764 |
| | R | 40-48 | 39-51 | 40-58 | 42-57 | 24-55 | 31-50 | 32-59 | | | 35-45 | | | |
| | A | 43 | 45 | 49 | 49 | 39 | 34 | 42 | | | 41 | | | |
| *Balistes capriscus* | N | | | | | | 1 | | | | | | | 1 |
| | R | | | | | | 25 | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Barbulifer ceuthoecus* | N | 1 | | | | | | | 1 | | | | | 2 |
| | R | 17 | | | | | | | 20 | | | | | |
| | A | | | | | | | | | | | | | |
| *Bathygobius curacao* | SN | | 1 | 1 | 2 | 2 | | 1 | | 1 | 5 | 2 | | 15 |
| | SR | | 67 | 41 | 42-72 | 41-66 | | 48 | | 33 | 37-42 | 35-42 | | |
| | SA | | | | 57 | 54 | | | | | 39 | 38 | | |

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TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | | 35 | 15 | 16 | 22 | 23 | 23 | 28 | 34 | 33 | 30 | 28 | |
| | PR | 38 | 18-47 | 10-18 | 11-32 | 8-63 | 13-36 | 13-34 | 13-34 | 29-40 | 12-46 | 7-45 | 12-44 | |
| | PN | 1 | 7 | 6 | 5 | 30 | 59 | 69 | 16 | 26 | 33 | 36 | 36 | 324 |
| *Bothus* | N | 8 | 6 | 5 | 5 | | 1 | 1 | | 1 | 8 | | | 35 |
| *ocellatus* | R | 18-47 | 17-42 | 18-44 | 15-42 | | 16 | 17 | | 35 | 14-29 | | | |
| | A | 25 | 28 | 30 | 31 | | | | | | 19 | | | |
| *Calamus* | N | 4 | 4 | | 1 | | | | | | | | | 9 |
| *arctifrons* | R | 21-35 | 18-49 | | 44 | | | | | | | | | |
| | A | 26 | 34 | | | | | | | | | | | |
| *Callionymus* | N | 1 | | | | | | | | | | | | 1 |
| *calliurus* | R | 38 | | | | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Carapus*[2] | N | ? | ? | ? | ? | ? | ? | ? | ? | ? | 1 | 8 | 5 | 14 |
| *bermudensis* | R | | | | | | | | | | 79 | 63-129 | 62-123 | |
| | A | | | | | | | | | | | 89 | 87 | |
| *Caranx* | N | | | | 2 | 2 | 1 | | | | | | | 5 |
| *hippos* | R | | | | 19-26 | 18-21 | 35 | | | | | | | |
| | A | | | | 22 | 20 | | | | | | | | |
| *Chaetodipterus* | N | | | | | | | | 4 | 11 | 2 | | | 17 |
| *faber* | R | | | | | | | | 19-31 | 32-45 | 37-48 | | | |
| | A | | | | | | | | 25 | 36 | 42 | | | |
| *Chilomycterus* | N | | | | | | 1 | 2 | 1 | | 3 | | 2 | 9 |
| *schoepfi* | R | | | | | | 16 | 14 | 29 | | 49-120 | | 57-72 | |
| | A | | | | | | | 14 | | | 74 | | 64 | |
| *Citharichthys* | N | | | | 1 | | | | | | | | | 1 |
| *macrops* | R | | | | 31 | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Corythoichthys* | N | | | | | | | | 1 | | | | | 1 |
| *albirostris* | R | | | | | | | | 104 | | | | | |
| | A | | | | | | | | | | | | | |

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Corythoichthys brachyce-phalus* | N | | | | 3 | 1 | 2 | 1 | 1 | | | | | 8 |
| | R | | | | 40-85 | 61 | 29-36 | 59 | 71 | | | | | |
| | A | | | | 56 | | 32 | | | | | | | |
| *Dactyloscopus tridigitatus* | N | | | 1 | | | | | | | | | | 1 |
| | R | | | 22 | | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Diodon holacanthus* | N | | | | | | | 1 | | | | | | 1 |
| | R | | | | | | | 42 | | | | | | |
| | A | | | | | | | | | | | | | |
| *Doratonotus megalepis* | N | | | | | | | | | | 2 | | | 2 |
| | R | | | | | | | | | | 9-22 | | | |
| | A | | | | | | | | | | 16 | | | |
| *Echeneis naucrates* | N | | | | | | | | | | | 1 | | 1 |
| | R | | | | | | | | | | | 154 | | |
| | A | | | | | | | | | | | | | |
| *Eucinostomus* sp[3] | N | | | 4 | | | | | | 2 | 1 | 1 | | 8 |
| | R | | | 12-14 | | | | | | 11-12 | 11 | 12 | | |
| | A | | | 13 | | | | | | 12 | | | | |
| *Eucinostomus argenteus* | N | 17 | | | 4 | 4 | | 8 | 3 | 3 | 13 | 11 | | 63 |
| | R | 32-56 | | | 31-70 | 58-83 | | 24-47 | 51-53 | 28-43 | 32-69 | 37-88 | | |
| | A | 44 | | | 50 | 73 | | 34 | 52 | 35 | 43 | 58 | | |
| *Eucinostomus gula* | SN | | 1 | 9 | 17 | 11 | 131 | 52 | 276 | 331 | 188 | 199 | 67 | 1,281 |
| | SR | | 64 | 59-93 | 65-87 | 29-83 | 28-55 | 32-70 | 24-69 | 28-66 | 30-72 | 35-83 | 36-62 | |
| | SA | | | 70 | 78 | 65 | 40 | 51 | 38 | 42 | 47 | 51 | 49 | |
| | PA | | | | | | | | 24 | 48 | | | | |
| | PR | | | | | | | | 21-28 | 43-53 | 42 | | | |
| | PN | | | | | | | | 8 | 2 | 1 | | | 11 |
| *Eucinostomus lefroyi* | N | 1 | 1 | 1 | 8 | 5 | 1 | 1 | | 1 | | 1 | | 20 |
| | R | 31 | 21 | 24 | 18-36 | 24-36 | 38 | 64 | | 45 | | 57 | | |
| | A | | | | 29 | 30 | | | | | | | | |

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TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Floridichthys carpio* | SN | 7 | 6 | 14 | 68 | 555 | 534 | 388 | 29 | 19 | 11 | 8 | 2 | 1,641 |
| | SR | 39-46 | 35-43 | 38-49 | 14-47 | 16-49 | 25-42 | 17-44 | 26-41 | 29-44 | 32-42 | 37-48 | 43-46 | |
| | SA | 43 | 40 | 43 | 26 | 29 | 32 | 33 | 33 | 38 | 38 | 43 | 44 | |
| | PA | | 12 | 14 | 17 | 16 | 16 | 18 | 30 | | | | | |
| | PR | | 11-12 | 11-17 | 15-19 | 10-20 | 14-18 | 14-21 | 28-34 | | | | | |
| | PN | | 2 | 10 | 3 | 29 | 4 | 3 | 3 | | | | | 54 |
| *Gobiesox strumosus* | N | 1 | | 1 | | | | | | | | | | 2 |
| | R | 13 | | 17 | | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Gobionellus boleosoma* | N | | 12 | 3 | | 1 | | 4 | 1 | 5 | 1 | 2 | 3 | 32 |
| | R | | 16-33 | 19-29 | | Lost | | 21-33 | 26 | 24-33 | 21 | 26-27 | 12-28 | |
| | A | | 26 | 25 | | | | 26 | | 29 | | 26 | 20 | |
| *Gobionellus stigmaturus* | N | | | | | | | | 7 | | 7 | | | 14 |
| | R | | | | | | | | 19-32 | | 31-36 | | | |
| | A | | | | | | | | 26 | | 33 | | | |
| *Gobiosoma robustum* | N | | | | | | | | 7 | 8 | | 3 | | 18 |
| | R | | | | | | | | 12-25 | 19-29 | | 26-31 | | |
| | A | | | | | | | | 19 | 24 | | 28 | | |
| *Haemulon flavolineatum* | N | | | | | | 13 | 2 | | | | | | 15 |
| | R | | | | | | 31-45 | 30-34 | | | | | | |
| | A | | | | | | 35 | 32 | | | | | | |
| *Haemulon parrai* | SN | | | | 16 | 54 | 67 | 8 | 5 | 3 | 1 | 2 | | 167 |
| | SR | | | | 17-40 | 25-48 | 26-61 | 26-69 | 28-37 | 34-48 | 32 | 31-36 | | |
| | SA | | | | 30 | 36 | 36 | 40 | 31 | 41 | | 34 | | |
| | PA | | | 15 | | 28 | | | | | | | | |
| | PR | | | 13-17 | | 26-31 | | | | | | | | |
| | PN | | | 4 | | 3 | | | | | | | | 7 |
| *Haemulon plumieri* | SN | | | | 5 | 73 | 227 | 46 | 255 | 38 | 65 | 57 | 1 | 767 |
| | SR | | | | 27-32 | 26-44 | 25-52 | 28-53 | 28-55 | 27-57 | 29-63 | 28-53 | 37 | |
| | SA | | | | 29 | 34 | 39 | 36 | 42 | 41 | 45 | 40 | | |

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | | | | 26 | | | 30 | 42 | 42 | 42 | 34 | | |
| | PR | | | | 26-27 | 34 | 26 | 23-35 | 40-43 | 31-56 | 35-56 | 26-43 | 44 | |
| | PN | | | | 2 | 1 | 1 | 6 | 2 | 13 | 8 | 3 | 1 | 37 |
| *Haemulon* | SN | | | | | 26 | 152 | 29 | 7 | | 2 | 2 | 2 | 220 |
| *sciurus* | SR | | | | | 24-48 | 23-50 | 27-44 | 42-63 | | 26-35 | 20-25 | 22-23 | |
| | SA | | | | | 36 | 37 | 34 | 50 | | 30 | 22 | 22 | |
| | PA | 22 | | | 23 | | | | | 15 | 12 | | | |
| | PR | 16-28 | | | 19-27 | | 26 | | | 13-19 | 9-16 | 26 | 15 | |
| | PN | 2 | | | 6 | | 1 | | | 3 | 2 | 1 | 1 | 16 |
| *Halichoeres* | N | | | | 2 | 1 | | 1 | 2 | | | | | 6 |
| *bivittatus* | R | | | | 18-76 | 44 | | 53 | 51-54 | | | | | |
| | A | | | | 47 | | | | 52 | | | | | |
| *Harengula* | N | | | | | 19 | 1 | 1 | | | 168 | | | 189 |
| *pensacolae* | R | | | | | 46-57 | 56 | 55 | | | 40-94 | | | |
| | A | | | | | 53 | | | | | 58 | | | |
| *Hemiramphus* | N | | | | | | | | | 3 | | 7 | | 10 |
| *brasiliensis* | R | | | | | | | | | 214-244 | | 193-258 | | |
| | A | | | | | | | | | 231 | | 216 | | |
| *Hippocampus* | N | 6 | 3 | | 1 | | | | | | 1 | | 1 | 12 |
| *hudsonius*[4] | R | 9.2-17.2 | 15.6-16.9 | | 10.0 | | | | | | 8.5 | | 14.0 | |
| | A | 11.6 | 16.3 | | | | | | | | | | | |
| *Hippocampus* | N | 3 | 2 | | | 1 | 1 | | | | | | | 7 |
| *zosterae*[4] | R | 7.4-8.0 | 8.4-8.9 | | | 7.4 | 8.6 | | | | | | | |
| | A | 7.7 | 8.6 | | | | | | | | | | | |
| *Histrio* | N | | | | 3 | 3 | 1 | | | | | | | 7 |
| *histrio* | R | | | | 16-21 | 14-18 | 23 | | | | | | | |
| | A | | | | 19 | 15 | | | | | | | | |
| *Jenkinsia* | N | | | | | | | | | 3 | 1 | | | 4 |
| sp. | R | | | | | | | | | 31-36 | 35 | | | |
| | A | | | | | | | | | 34 | | | | |

*(Continued)*

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Lactophrys quadricornis* | N | 3 | | 2 | | 2 | 1 | | 1 | | | 2 | 1 | 12 |
| | R | 31-167 | | 119-176 | | 15-148 | 129 | | 15 | | | 121-123 | 146 | |
| | A | 145 | | 147 | | 82 | | | | | | 122 | | |
| *Lactophrys trigonus* | SN | 2 | 15 | 29 | 15 | 13 | 24 | 14 | 2 | 5 | 2 | 2 | 1 | 124 |
| | SR | 8-11 | 7-215 | 8-26 | 9-33 | 11-200 | 10-40 | 9-265 | 23-26 | 22-25 | 19-20 | 27-119 | 228 | |
| | SA | 10 | 30 | 18 | 20 | 32 | 23 | 37 | 24 | 24 | 20 | 73 | | |
| | PA | | | 12 | 16 | 20 | 9 | 14 | | | | | | |
| | PR | | | 8-16 | 5-22 | 17-23 | 8-10 | 14-15 | 20 | 18 | 18 | | 7 | |
| | PN | | | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | | 1 | 15 |
| *Lagodon rhomboides* | SN | | | 25 | 20 | 2 | 12 | 6 | 7 | 11 | 20 | 3 | 5 | 111 |
| | SR | | | 26-54 | 43-64 | 66-72 | 73-94 | 78-92 | 62-86 | 67-95 | 33-144 | 87-102 | 87-104 | |
| | SA | | | 34 | 52 | 69 | 83 | 88 | 73 | 79 | 60 | 94 | 95 | |
| | PA | | 18 | | | | | | | | | 12 | | |
| | PR | | 14-23 | | | | | | | 17 | | 12 | 12 | |
| | PN | | 6 | | | | | | | 1 | | 3 | 1 | 11 |
| *Lobotes surinamensis* | N | | | | | 2 | | | | | | | | 2 |
| | R | | | | | 23-32 | | | | | | | | |
| | A | | | | | 28 | | | | | | | | |
| *Lucania parva* | N | | | | | | | | 3 | 1 | | | 9 | 13 |
| | R | | | | | | | | 22-25 | 26 | | | 30-32 | |
| | A | | | | | | | | 24 | | | | 31 | |
| *Lutjanus analis* | SN | | | | 2 | 12 | 26 | 9 | 2 | 9 | 3 | | | 63 |
| | SR | | | | 32-41 | 27-66 | 27-62 | 34-59 | 35-55 | 26-64 | 37-53 | | | |
| | SA | | | | 32 | 36 | 49 | 48 | 45 | 41 | 42 | | | |
| | PA | | | | | | | | 16 | 35 | | | | |
| | PR | | | | | | | | 16-17 | 25-45 | | | | |
| | PN | | | | | | | | 2 | 2 | | | | 4 |
| *Lutjanus apodus* | SN | | | 3 | 14 | 97 | 140 | 99 | 40 | 8 | 13 | 4 | 11 | 430 |
| | SR | | | 66-68 | 19-71 | 24-93 | 22-68 | 23-65 | 24-124 | 34-51 | 29-56 | 58-106 | 38-52 | |
| | SA | | | 67 | 36 | 35 | 43 | 42 | 40 | 40 | 42 | 83 | 43 | |

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA | | | | | 14 | 25 | 17 | | | | | | |
| | PR | | | | | 14-15 | 17-30 | 15-19 | 48 | | | 44 | | |
| | PN | | | | | 2 | 4 | 3 | 1 | | | 1 | | 11 |
| *Lutjanus griseus* | SN | | | | 4 | 3 | 34 | 20 | 60 | 9 | 14 | 6 | 4 | 154 |
| | SR | | | | 37-78 | 34-47 | 27-116 | 27-60 | 26-67 | 31-65 | 35-77 | 37-55 | 44-61 | |
| | SA | | | | 64 | 41 | 62 | 40 | 36 | 45 | 54 | 43 | 51 | |
| | PA | | | | | | 14 | 15 | | | | | | |
| | PR | | | | | | 13-16 | 14-16 | 26 | 41 | | 45 | | |
| | PN | | | | | | 5 | 3 | 1 | 1 | | 1 | | 11 |
| *Malacoctenus macropus* | N | | | | 3 | 2 | 4 | 6 | | | | | | 15 |
| | R | | | | 12-17 | 16-22 | 16-29 | 17-34 | | | | | | |
| | A | | | | 14 | 19 | 22 | 30 | | | | | | |
| *Menticirrhus focaliger* | N | 1 | | | | | | | | | | | 1 | 2 |
| | R | 37 | | | | | | | | | | | 47 | |
| | A | | | | | | | | | | | | | |
| *Micrognathus crinigerus* | N | 1 | | 1 | | | | | 1 | 8 | 5 | 2 | | 18 |
| | R | 53 | | 85 | | | | | 56 | 47-75 | 55-68 | 56-67 | | |
| | A | | | | | | | | | 58 | 61 | 62 | | |
| *Monacanthus ciliatus* | SN | | | | | | 5 | 32 | 159 | 89 | 119 | 19 | 6 | 429 |
| | SR | | | | | | 24-46 | 24-49 | 31-63 | 36-64 | 22-62 | 42-54 | 34-61 | |
| | SA | | | | | | 30 | 34 | 45 | 47 | 50 | 48 | 48 | |
| | PA | | | | | | 17 | 29 | 35 | 43 | 47 | 43 | | |
| | PR | | | | | | 11-27 | 27-34 | 15-47 | 37-50 | 42-50 | 43 | | |
| | PN | | | | | | 5 | 3 | 19 | 13 | 14 | 2 | | 56 |
| *Monacanthus hispidus* | SN | 31 | 5 | 3 | 5 | | 10 | 11 | 14 | 38 | 10 | 7 | 31 | 165 |
| | SR | 19-31 | 19-40 | 24-28 | 25-33 | | 17-36 | 17-45 | 21-57 | 24-64 | 18-52 | 15-22 | 16-42 | |
| | SA | 25 | 31 | 26 | 28 | | 29 | 32 | 38 | 45 | 39 | 19 | 22 | |
| | PA | 20 | | | | | | 19 | | | | 19 | 18 | |
| | PR | 14-26 | | | 27 | | | 18-20 | 19 | 45 | | 13-23 | 15-23 | |
| | PN | 9 | | | 1 | | | 3 | 1 | 1 | | 5 | 6 | 26 |

*(Continued)*

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Mugil cephalus* | N | | | | | | | | | 1 | | | | 1 |
| | R | | | | | | | | | 192 | | | | |
| | A | | | | | | | | | | | | | |
| *Mugil curema* | N | | | | | | | | | | 4 | | | 4 |
| | R | | | | | | | | | | 108-126 | | | |
| | A | | | | | | | | | | 118 | | | |
| *Mugil trichodon* | N | | | | | | | | | | 2 | | | 2 |
| | R | | | | | | | | | | 121-125 | | | |
| | A | | | | | | | | | | 123 | | | |
| *Mycteroperca bonaci* | N | | | | | | | | | | | | 2 | 2 |
| | R | | | | | | | | | | | | 20-24 | |
| | A | | | | | | | | | | | | 22 | |
| *Myrophis punctatus*[5] | N | | 2 | | | | | | | | | | 1 | 3 |
| | R | | 50-59 | | | | | | | | | | 106 | |
| | A | | 54 | | | | | | | | | | | |
| *Nicholsina usta* | N | | | | | | | | | 1 | 2 | | | 3 |
| | R | | | | | | | | | 27 | 58-86 | | | |
| | A | | | | | | | | | | 72 | | | |
| *Ocyurus chrysurus* | N | | | | | | | 1 | 2 | | | | | 3 |
| | R | | | | | | | 62 | 37-52 | | | | | |
| | A | | | | | | | | 45 | | | | | |
| *Ogcocephalus cubifrons* | N | | | | | | | 1 | | | | | | 1 |
| | R | | | | | | | 185 | | | | | | |
| | A | | | | | | | | | | | | | |
| *Opisthonema oglinum* | N | | | | | | | | 20 | | 13 | | | 33 |
| | R | | | | | | | | 21-31 | | 41-73 | | | |
| | A | | | | | | | | 26 | | 56 | | | |
| *Opsanus tau* | N | | 2 | | | | 2 | 2 | 9 | 7 | 4 | 2 | 1 | 29 |
| | R | | 62-85 | | | | 39-55 | 28-46 | 24-54 | 30-74 | 40-132 | 46-91 | 79 | |
| | A | | 74 | | | | 47 | 37 | 39 | 50 | 68 | 68 | | |

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Paraclinus fasciatus* | N | 12 | | 3 | 18 | 20 | 18 | 16 | 1 | 2 | 11 | 6 | 8 | 115 |
| | R | 25-36 | | 32-35 | 10-34 | 10-32 | 9-35 | 17-33 | 29 | 32-34 | 9-36 | 12-37 | 15-37 | |
| | A | 30 | | 33 | 19 | 19 | 24 | 25 | | 33 | 26 | 24 | 21 | |
| *Paraclinus marmoratus* | N | | | 2 | 1 | 2 | 2 | | | | | | 1 | 8 |
| | R | | | 12-16 | 20 | 21-50 | 28-41 | | | | | | 44 | |
| | A | | | 14 | | 36 | 34 | | | | | | | |
| *Paraclinus nigripinnis* | N | | | | 4 | 3 | 2 | | | 2 | 2 | 1 | 1 | 15 |
| | R | | | | 10-15 | 17-22 | 24-30 | | | 38-40 | 37-44 | 41 | 40 | |
| | A | | | | 12 | 19 | 27 | | | 39 | 40 | | | |
| *Paralichthys albigutta* | N | | 1 | 1 | | | | | | | | | | 2 |
| | R | | 223 | 50 | | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Pomacentrus leucostictus* | N | | | | | | | | | 1 | | | | 1 |
| | R | | | | | | Seen | | | 32 | | | | |
| | A | | | | | | | | | | | | | |
| *Prionotus pectoralis?* | N | 3 | | | | | | | | | | | | 3 |
| | R | 23-28 | | | | | | | | | | | | |
| | A | 25 | | | | | | | | | | | | |
| *Prionotus scitulus* | N | 1 | | | | | | | | | | | | 1 |
| | R | 32 | | | | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Prionotus tribulus* | N | | | | | | | | | | | 1 | 1 | 2 |
| | R | | | | | | | | | | | 24 | 35 | |
| | A | | | | | | | | | | | | | |
| *Pristis pectinatus*[5] | N | | | | | | | | | | | 1 | | 1 |
| | R | | | | | | | | | | | 1440 | | |
| | A | | | | | | | | | | | | | |
| *Pseudupeneus maculatus* | N | | | | | | 1 | 1 | | | | | | 2 |
| | R | | | | | | 49 | 67 | | | | | | |
| | A | | | | | | | | | | | | | |

*(Continued)*

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sardinella anchovia* | N | | | | | | | | | | 2 | | | 2 |
| | R | | | | | | | | | | 59-64 | | | |
| | A | | | | | | | | | | 62 | | | |
| *Scarus croicensis?* | N | | | | 4 | 2 | 11 | 5 | 1 | 1 | 11 | 2 | | 37 |
| | R | | | | 9-19 | 15-33 | 7-10 | 15-26 | 35 | 50 | 9-44 | 19-20 | | |
| | A | | | | 13 | 24 | 9 | 20 | | | 21 | 20 | | |
| *Scarus guacamaia* | N | | | | | | 7 | 7 | 2 | | 2 | | | 18 |
| | R | | | | | | 32-43 | 28-53 | 30-37 | | 40-42 | | | |
| | A | | | | | | 36 | 39 | 34 | | 41 | | | |
| *Scorpaena brasiliensis* | N | | | | | | | | 1 | 3 | 3 | 1 | | 8 |
| | R | | | | | | | | 51 | 42-70 | 52-81 | 58 | | |
| | A | | | | | | | | | 52 | 66 | | | |
| *Scorpaena grandicornis* | N | | | | | 1 | 3 | 6 | 1 | 1 | | | | 12 |
| | R | | | | | 36 | 48-56 | 46-65 | 73 | 93 | | | | |
| | A | | | | | | 52 | 55 | | | | | | |
| *Scorpaena plumieri* | N | | | | | 1 | | | | 1 | | | | |
| | R | | | | | 71 | | | | 80 | | | | 2 |
| | A | | | | | | | | | | | | | |
| *Selar crumenop-thalmus* | N | | | 1 | | | | | | | | | | 1 |
| | R | | | 60 | | | | | | | | | | |
| | A | | | | | | | | | | | | | |
| *Sparisoma* sp[6] | N | | 5 | 16 | 5 | 9 | 38 | 30 | 6 | 4 | 47 | 21 | 13 | 194 |
| | R | | 10-14 | 10-26 | 11-20 | 11-27 | 9-26 | 9-27 | 11-18 | 12-14 | 10-25 | 14-24 | 10-28 | |
| | A | | 12 | 17 | 15 | 15 | 14 | 16 | 14 | 13 | 15 | 18 | 18 | |
| *Sparisoma chrysop-terum* | SN | | | | | | | 30 | 8 | | 5 | 5 | | 48 |
| | SR | | | | | | | 35-75 | 33-52 | | 48-101 | 33-52 | | |
| | SA | | | | | | | 46 | 43 | | 73 | 44 | | |
| | PA | | | | 36 | | 44 | 39 | | 35 | 41 | | | |
| | PR | | | | 35-37 | | 44-45 | 34-46 | 43 | 31-38 | 37-44 | 63 | | |
| | PN | | | | 2 | | 2 | 4 | 1 | 5 | 4 | 1 | | 19 |

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sparisoma radians* | N | | | | 1 | | 1 | 1 | | 2 | 1 | | | 6 |
| | R | | | | 30 | | 58 | 55 | | 28-44 | 56 | | | |
| | A | | | | | | | | | 36 | | | | |
| *Sparisoma rubripinne* | SN | | | | | 5 | 16 | 46 | 56 | 44 | 32 | 8 | | 207 |
| | SR | | | | | 49-54 | 31-75 | 31-90 | 32-77 | 42-93 | 43-101 | 31-82 | | |
| | SA | | | | | 51 | 43 | 47 | 46 | 57 | 62 | 59 | | |
| | PA | | | | 36 | 36 | 46 | 33 | 46 | 47 | 38 | 39 | 35 | |
| | PR | | | 31 | 35-37 | 30-45 | 45-47 | 30-34 | 36-66 | 24-74 | 33-42 | 24-57 | 31-39 | |
| | PN | | | 1 | 2 | 3 | 3 | 5 | 5 | 7 | 4 | 4 | 3 | 37 |
| *Sparisoma viride* | N | | | | | | | | | 1 | | | | 1 |
| | R | | | | | | | | | 55 | | | | |
| | A | | | | | | | | | | | | | |
| *Sphaeroides nephelus* | N | 7 | 3 | 1 | 1 | | 1 | | | 1 | 3 | 2 | 3 | 22 |
| | R | 21-34 | 42-62 | 36 | 44 | | 24 | | | 48 | 68-146 | 22-44 | 42-195 | |
| | A | 28 | 51 | | | | | | | | 98 | 33 | 137 | |
| *Sphaeroides spengleri* | N | 4 | 1 | 5 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 25 |
| | R | 21-26 | 44 | 16-53 | 37-54 | 56 | 31 | 24-71 | 55-82 | 48-52 | 46-68 | 61 | 20 | |
| | A | 24 | | 36 | 44 | | | 48 | 68 | 50 | 57 | | | |
| *Sphyraena barracuda* | N | 2 | | 2 | 2 | 6 | 10 | 8 | 15 | 21 | 8 | 15 | 6 | 95 |
| | R | 239-269 | | 28-312 | 73-106 | 34-140 | 72-191 | 23-224 | 63-263 | 20-271 | 80-209 | 112-323 | 182-283 | |
| | A | 254 | | 170 | 90 | 87 | 108 | 132 | 116 | 128 | 129 | 253 | 232 | |
| *Strongylura notata* | N | | 1 | 5 | 3 | 20 | 21 | 15 | 3 | 3 | | 12 | | 83 |
| | R | | 174 | 82-278 | 134-200 | 115-302 | 117-289 | 131-302 | 112-194 | 251-348 | | 91-357 | | |
| | A | | | 195 | 162 | 159 | 162 | 169 | 152 | 304 | | 289 | | |
| *Strongylura raphidoma* | N | | | | | | 2 | 2 | | 4 | 1 | 30 | | 39 |
| | R | | | | | | 213-221 | 179-217 | | 305-414 | 407 | 365-469 | | |
| | A | | | | | | 217 | 198 | | 377 | | 417 | | |
| *Strongylura timucu?* | N | | | | | | 1 | | | 1 | | | | 2 |
| | R | | | | | | 290 | | | 203 | | | | |
| | A | | | | | | | | | | | | | |

*(Continued)*

TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Symphurus plagiusa* | N | | | 1 | | | 1 | | | | 4 | 4 | 2 | 12 |
| | R | | | 36 | | | 60 | | | | 42-55 | 26-57 | 21-41 | |
| | A | | | | | | | | | | 48 | 37 | 31 | |
| *Syngnathus dunkeri* | N | | | | | | | | | 1 | | | | 1 |
| | R | | | | | | | | | 90 | | | | |
| | A | | | | | | | | | | | | | |
| *Syngnathus floridae* | SN | 1 | 1 | 3 | 1 | | | 3 | | 3 | 2 | 4 | 2 | 20 |
| | SR | 181 | 153 | 145-187 | 144 | | | 143-182 | | 75-188 | 116-157 | 154-203 | 167-169 | |
| | SA | | | 159 | | | | 158 | | 142 | 136 | 178 | 168 | |
| | PA | 67 | 133 | | 119 | | 78 | 104 | 109 | | | 174 | 65 | |
| | PR | 47-96 | 110-159 | 113 | 117-121 | 182 | 37-116 | 86-122 | 79-143 | 156 | | 171-176 | 59-71 | |
| | PN | 15 | 3 | 1 | 2 | 1 | 8 | 2 | 4 | 1 | | 2 | 2 | 41 |
| *Syngnathus louisianae* | N | 8 | 4 | 5 | 2 | | 1 | | 1 | | | | 1 | 22 |
| | R | 52-179 | 59-108 | 165-196 | 114-159 | | 102 | | 89 | | | | 102 | |
| | A | 116 | 80 | 178 | 136 | | | | | | | | | |
| *Syngnathus scovelli* | SN | 3 | 2 | 12 | 14 | 4 | 12 | 13 | | | 5 | 10 | 16 | 91 |
| | SR | 117-127 | 88-108 | 94-125 | 103-125 | 104-131 | 97-122 | 108-118 | | | 93-116 | 102-124 | 96-136 | |
| | SA | 121 | 98 | 110 | 115 | 115 | 113 | 113 | | | 103 | 110 | 114 | |
| | PA | 108 | 110 | 96 | 81 | 99 | | | 68 | 85 | 88 | | 87 | |
| | PR | 100-117 | 103-120 | 63-124 | 43-119 | 81-118 | 100 | | 48-103 | 71-109 | 82-93 | 97 | 69-101 | |
| | PN | 2 | 7 | 3 | 6 | 8 | 1 | | 6 | 4 | 2 | 1 | 3 | 43 |
| *Synodus foetens* | N | 3 | 1 | 1 | 4 | | | | | 2 | | | | 11 |
| | R | 36-40 | 32 | 80 | 72-102 | | | | | 87-131 | | | | |
| | A | 37 | | | 83 | | | | | 109 | | | | |

(TABLE 2 (Continued)

| | | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Urophycis floridanus* | N | | | | | | | | | | | | 3 | 3 |
| | R | | | | | | | | | | | | 31-50 | |
| | A | | | | | | | | | | | | 38 | |
| *Xyrichthys* sp. | N | | | | 1 | | 1 | | | | | | | 2 |
| | R | | | | 20 | | 11 | | | | | | | |
| | A | | | | | | | | | | | | | |
| Total specimens | | 175 | 286 | 783 | 683 | 1135 | 1905 | 1334 | 1111 | 810 | 2077 | 538 | 268 | 11,105 |
| Total species | | 30 | 24 | 31 | 43 | 38 | 49 | 43 | 45 | 51 | 56 | 39 | 34 | 106 |

[1]Approximately 50 percent of total specimens retained and counted.

[2]Total length. Holothurians not checked for specimens from March-November.

[3]Includes small unidentifiable specimens, most probably *E. gula* or *E. argenteus.*

[4]Head lengths.

[5]Total length.

[6]Includes small unidentifiable specimens, most probably *S. chrysopterum, S. radians* and *S. rubripinne.*

as described by Schultz (1958) for *S. chrysopterum;* however, they lack dark saddles on the pectoral bases); *Strongylura timucu* (we are unable to distinguish this species from *S. marina; Xyrichthys* sp., *Sparisoma sp.* and *Eucinostomus* sp. (too small to identify). We know of no valid reason to separate *Opsanus tau* and *O. beta.* Our specimens are quite similar to those from the upper Gulf.

## Results

Most of our findings are embodied in Table 2. The number of specimens collected, their size range and average size are listed. In some instances pushnet collections are reported separately from seine collections to indicate size selectivity of the gear. Monthly length-frequency curves for many species were graphed, but most of these added little, or not at all to the information obtainable from the Table. A few graphs which enhance the Table are presented.

The largest numbers of species and specimens occurred during the summer and fall. The December collection was highest in both while the April collection contained the fewest species and the March collection the fewest specimens.

Approximately one third of the species, including all grunts, snappers, filefishes and parrotfishes, occurred only as young indicating that the shore area serves as a nursery ground. The grass beds for much of their distance offshore are probably also nursery grounds.

## Species notes

All specimens of *Floridichthys carpio* and almost all gobies were taken from the *Diplanthera* beds, and only during the last two months of the study were any numbers of gobies collected from the *Thalassia* beds. Except for both specimens of *Barbulifer ceuthoecus,* no goby was taken more than about fifty yards from the edge of shore.

Pushnetting over exposed *Diplanthera* educed few to no specimens of *Floridichthys carpio* or *Bathygobius curacao.* Within minutes after inundation of these beds both species were readily taken. We conclude that these forms burrow when the grass is exposed.

All flatfish and at least *Dactyloscopus tridigitatus* were taken over sandy bottom. Some specimens of *Opsanus tau* and large *Bathygobius curacao* were taken from dead *Strombus* shells. Most other species occurred over the grass beds.

In December a holothurian returned to the laboratory was cut open and a specimen of *Carapus bermudensis* was found in it. In

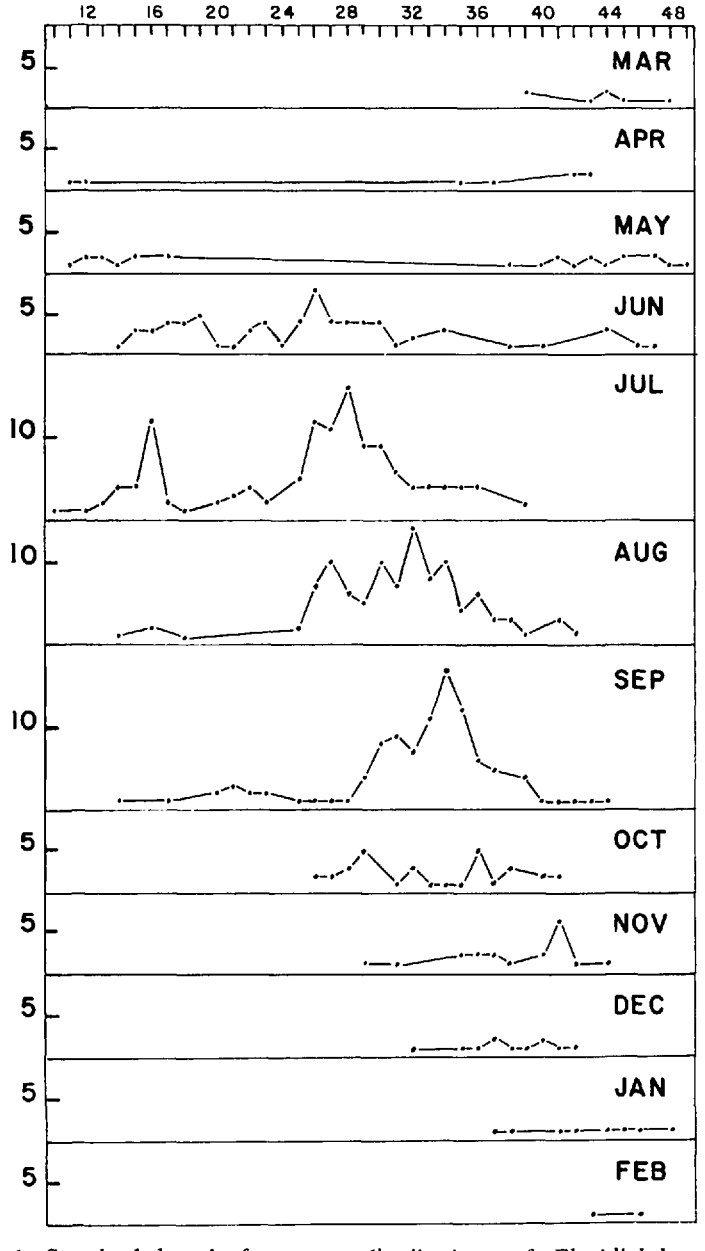


FIGURE 1. Standard length frequency distributions of *Floridichthys carpio*. Ordinate is standard length in millimeters; abscissa is frequency.

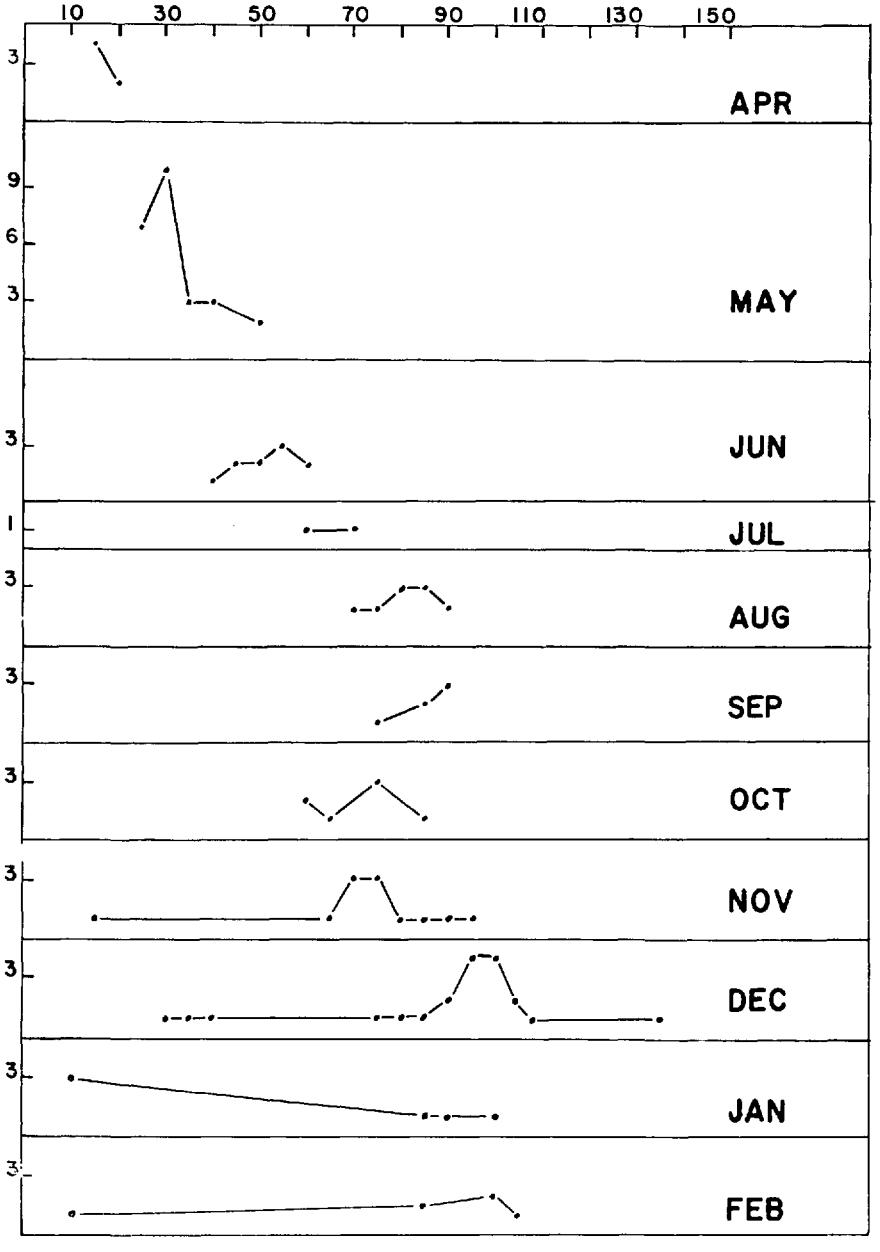


FIGURE 2. Standard length frequency distributions of *Lagodon rhomboides*. Ordinate is standard length class in millimeters (10-14, 15-19, etc.); abscissa is frequency.

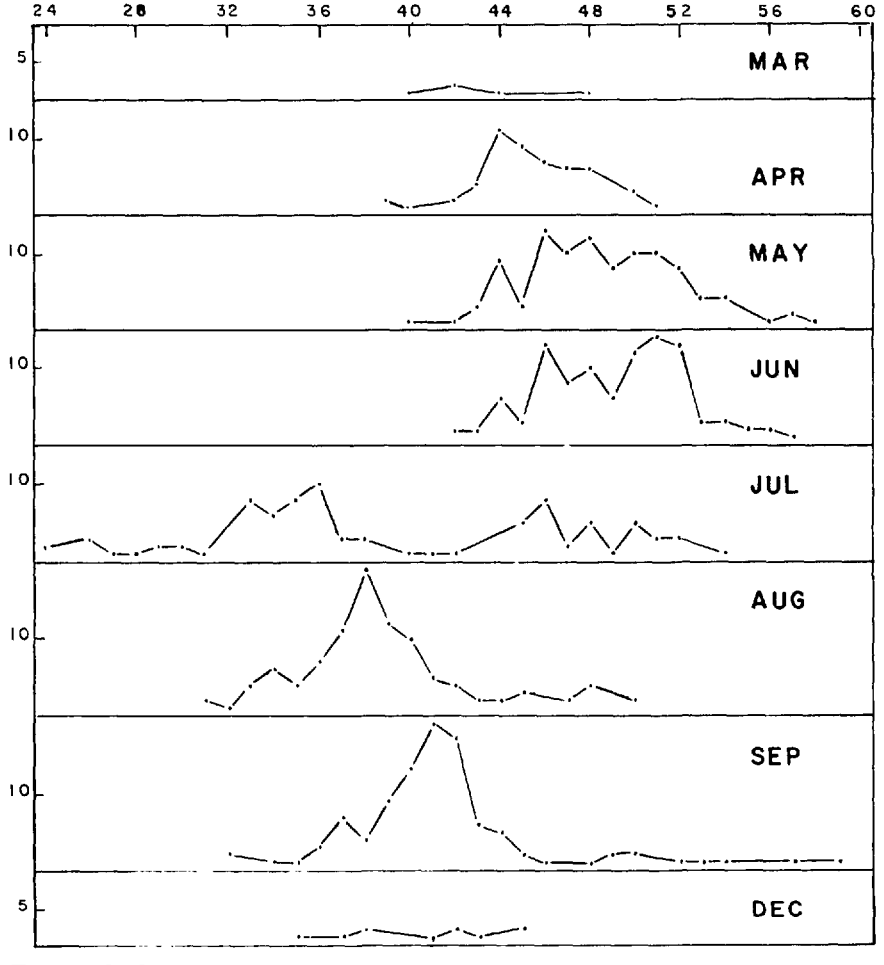


FIGURE 3. Standard length frequency distributions of *Atherinomorus stipes*. Ordinate is standard length in millimeters; abscissa is frequency.

the January and February collections we made our only efforts to obtain this species. Eight of 13 holothurians examined in January and five of seven in February each contained a single *C. bermudensis*.

Of zoogeographic interest is the fact that one-third of the species collected from this single station have never been reported from the Tampa Bay area, only three degrees latitude farther north.

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