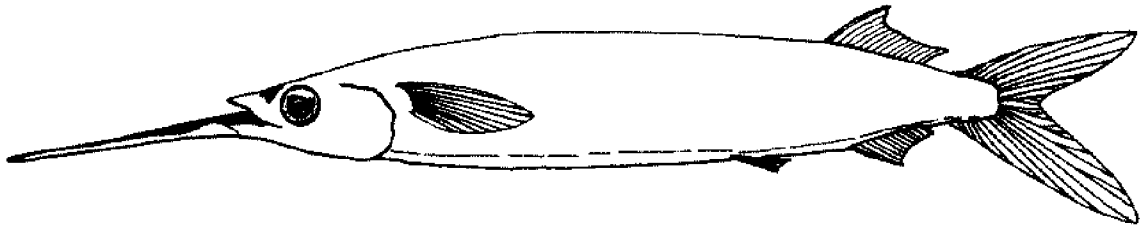
Fishery and Biology of Ballyhoo On the Southeast Florida Coast



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University of Miami Sea Grant

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FISHERY AND BIOLOGY OF BALLYHOO ON THE SOUTHEAST FLORIDA COAST

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Introduction

As sportfishermen become more numerous in South Florida and along the entire United States' coastline the demand for baitfishes steadily increases. Halfbeaks, commonly called ballyhoo, are the preferred bait for billfish, dolphin, and other offshore gamefishes in South Florida and also off the Middle Atlantic states. Two species of ballyhoo are caught commercially in Florida; they are the ballyhoo, Hemiramphus brasiliensis, and the balao, H. balao. They are the basis of a unique commercial fishery, centered in South Florida, that provides an important bait to thousands of anglers. The two commercial species are very similar in appearance and the fishery makes no distinction between them because both are equally acceptable as bait. A third, and similar, species is found in nearshore areas of South Florida; it is the halfbeak Hyporamphus unifasciatus. This species is not included in the commercial catch, and is usually unavailable to sportfishermen although it too is an excellent bait. Plates 1 and 2 show the characters that serve to distinguish H. brasiliensis from H. balao: these are color differences on the upper lobe of the caudal fin and the extent of red coloration on the underside of the beak.

Both species of ballyhoo are found on the European and American sides of the Atlantic Ocean. In the western Atlantic they are known to occur from New York to southeastern Brazil (Bohlke & Chaplin, 1968). They are not abundant on the United States coast north of Florida. In Florida, commercial ballyhoo fishing is confined almost exclusively to Dade and Monroe Counties on the southeast coast, but at times some small catches are made in other parts of the state.

Ballyhoo are schooling fishes that occur in greatest abundance between the outer, barrier reef and the inshore patch reefs, approximately 3 to 4 miles offshore. Most schools are found over or near reef structures in depths ranging from a few feet to perhaps 20 ft. Because they are found in shallow water, ballyhoo are not a usual food item for the offshore, pelagic gamefishes for which they are used as bait.

Although the commercial ballyhoo fishery is limited to a relatively small geographic area and accounts for a relatively small poundage of fish, its importance in the local economy is considerable. In 1973, a ballyhoo catch of 440,608 lbs was reported landed (Johnson, 1974). However, in Florida, fishery statistics are gathered only from dealers who handle food fish. The reported catch, therefore, does not include landings of those dealers who handle only baitfish. It is estimated that 600,000 to 700,000 lbs of ballyhoo actually were landed in 1973. At the retail level their value was approximately $800,000.

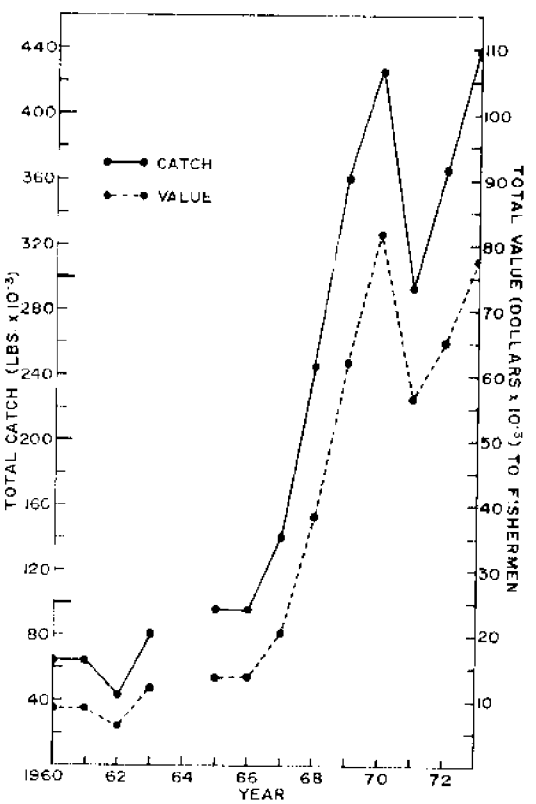


Figure 1. Reported catches and values for ballyhoo 1960-73. Both species, Hemiramphus brasiliensis and H. balao are included in catch statistics.

Figure 1 shows the trend in catches of ballyhoo and values to the fishermen since 1960. It can be seen that the general trend has been one of increasing catches. Ballyhoo shortages have occurred in past years, and in view of the continuing population increase in South Florida they could occur with increasing frequency in the future. As demand increases, the possibility for overexploitation of the ballyhoo stock also will increase. To insure a continuing supply of this valuable resource,

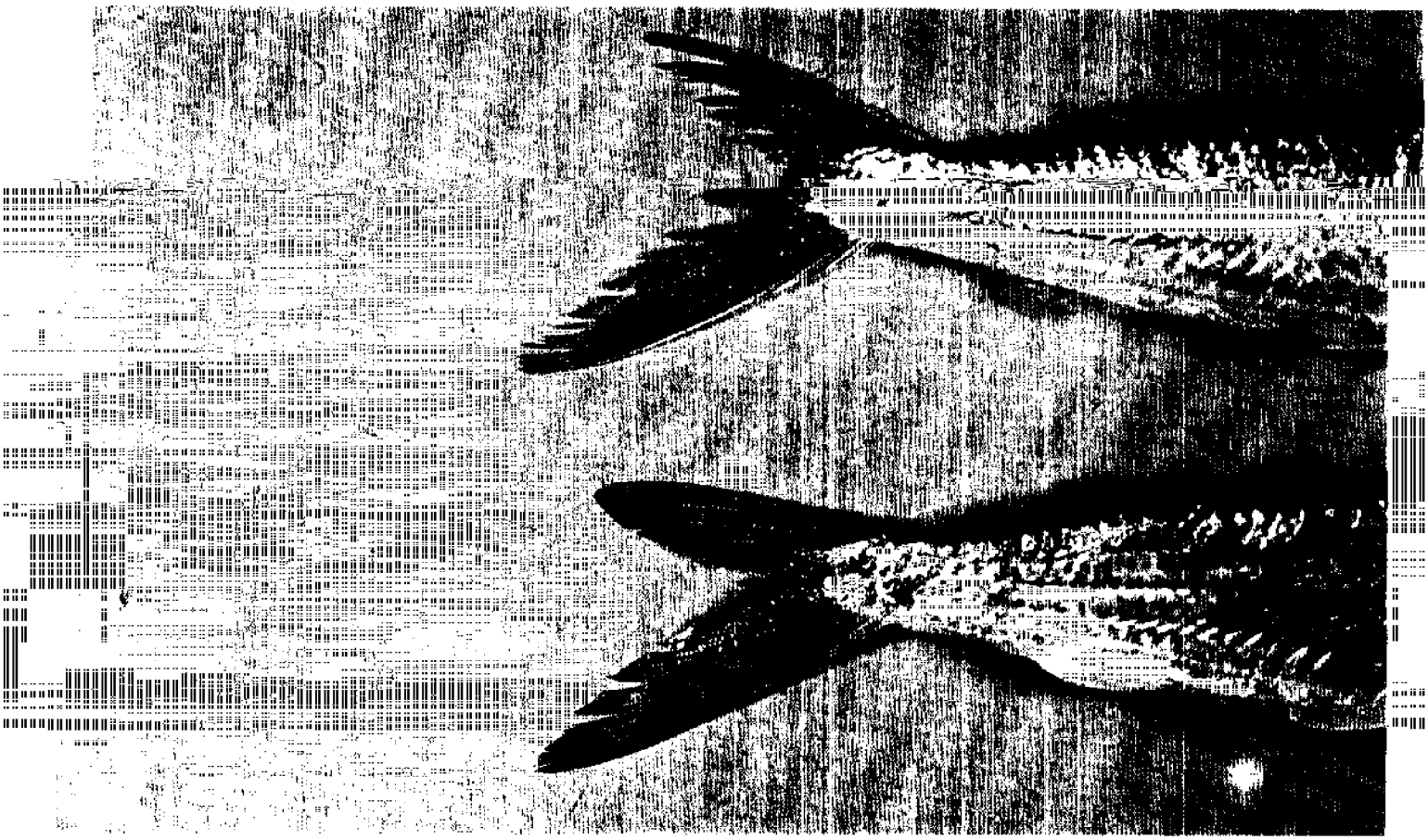


Plate 1. Caudal fins of Hemiramphus balao (top) and H. brasiliensis (bottom), showing faint rose coloration of upper lobe of caudal fin in H. balao and yellow-orange in H. brasiliensis.

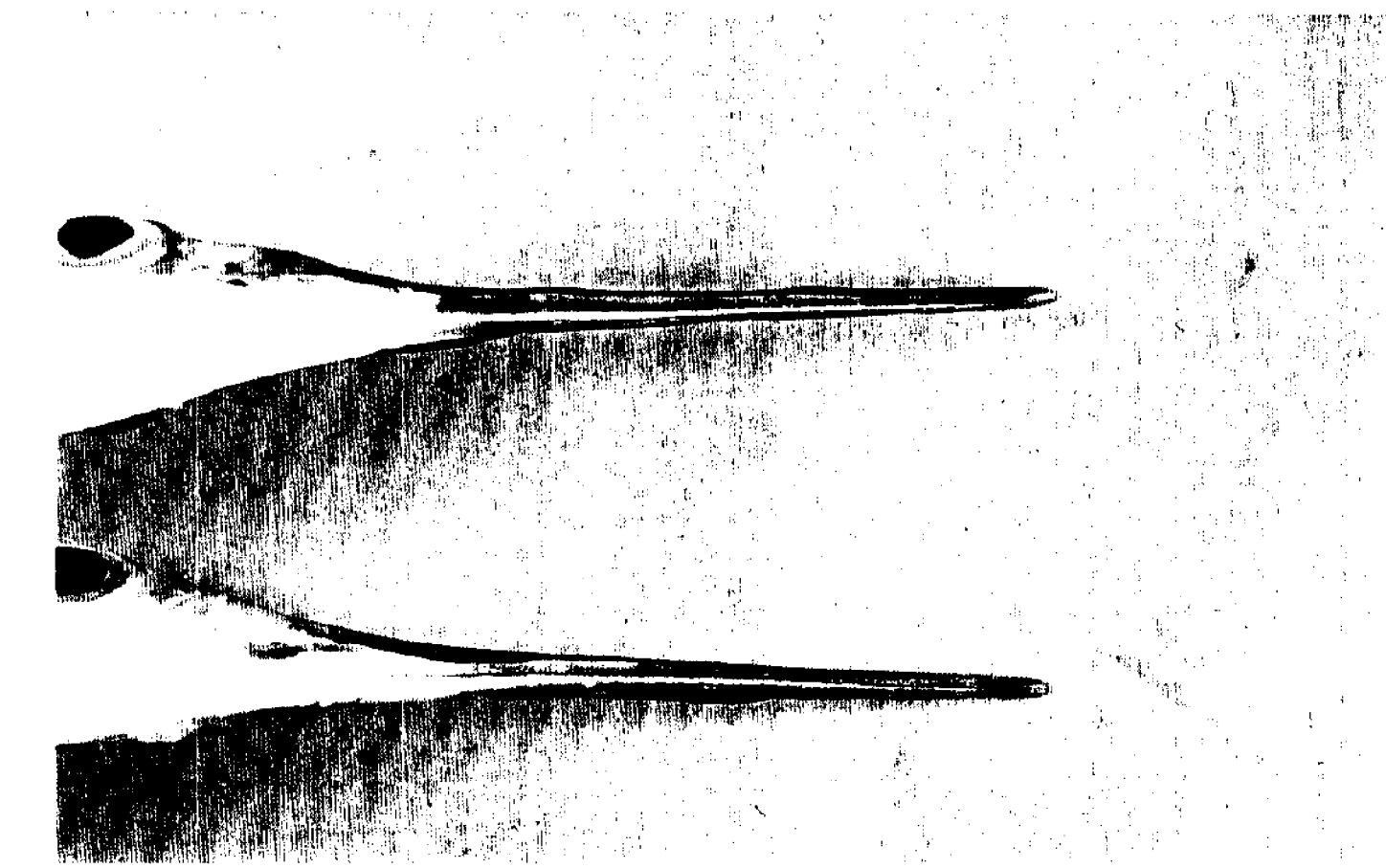


Plate 2. Close-up of underside of beaks of Hemiramphus balao (top) and H. brasiliensis (bottom) showing greater extent of red pigmentation in H. balao.

knowledge of both the biology and fishery for ballyhoo is essential. This report is a summary of knowledge gained during the past 18 months. University of Miami biologists are continuing their research on ballyhoo and other baitfish stocks in South Florida waters.

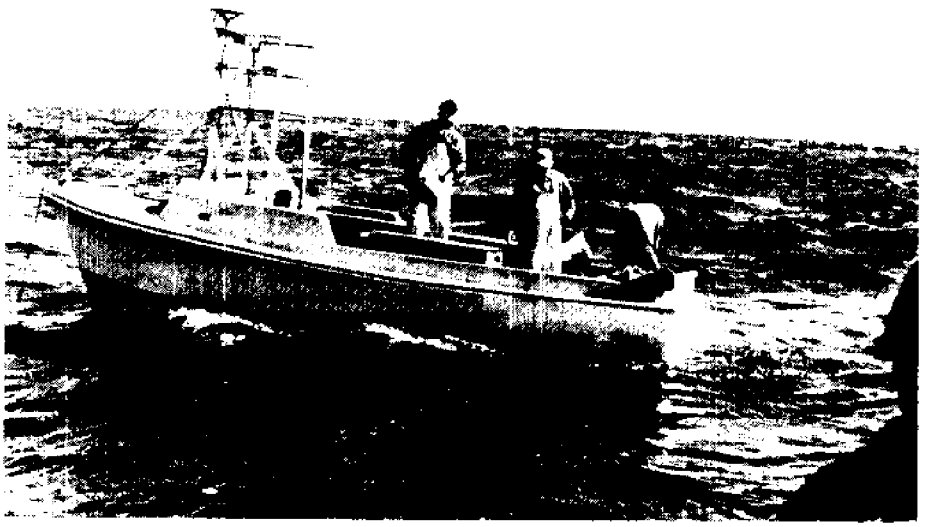


Plate 3. Typical ballyhoo fishing boat. Overall length is 25 feet. Power is a 325 H.P. gasoline engine.

The Fishery

A typical ballyhoo fishing boat is 24 to 26 feet in length, powered by a single 250-350 horsepower gasoline engine (Plate 3). The crew consists of 2 or 3 men. Fish are captured in a modified lampara net, which is a straight-walled net that hangs 6 to 8 ft deep. The nets are from 400 to 650 yards long, with a pocket 25 to 30 yards in length at one end that can be closed much like a purse seine. The mesh in the pocket is 3/4 or 1 inch stretch mesh. Schools of ballyhoo are "herded" by running the boat at high speed in circles around the fish until they "ball up" into a tight school; the net is then set over the stern and quickly run around the school, thus completely encircling the fish. The end of the net that went over first (the end with the pocket) is then tied

to the boat. With the boat moving slowly in reverse, the net is hauled in. When the pocket is reached, the bag is pursed, entrapping the fish which are then brailed out with a dip net. Plates 4 to 6 show the sequence of setting the net, hauling, and pursing the bag. The entire capture procedure usually takes about 30 minutes.

Plate 4. Ballyhoo net being set around a school of ballyhoo.

Plate 5. Ballyhoo net being hauled after having encircled a school of fish.

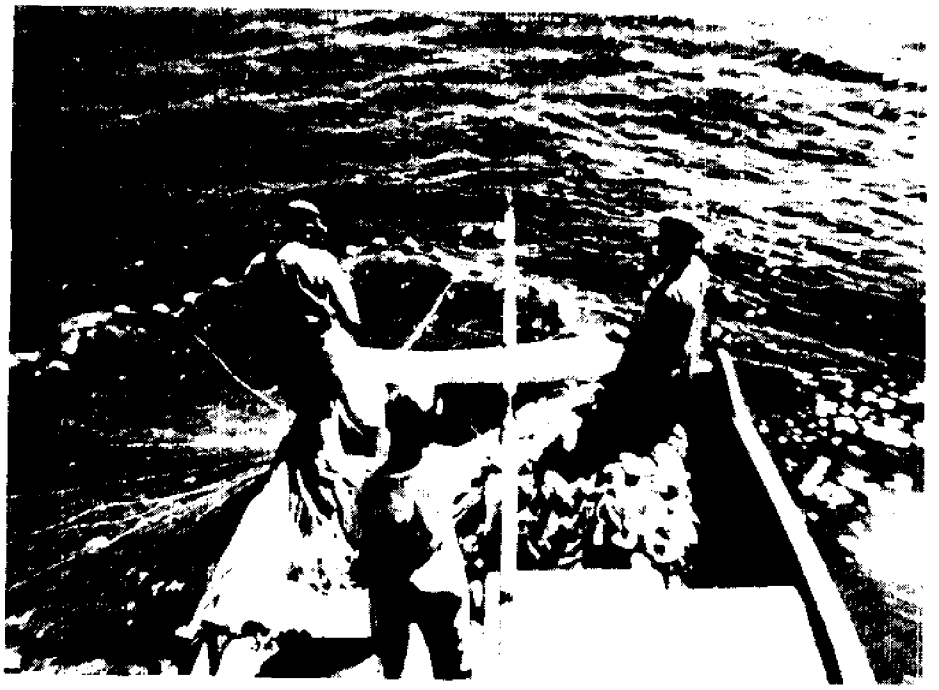


Plate 6. The bag at the end of the net has been pursed, entrapping the fish.

The capacity of the vessel is about 14,000 fish, and that is considered a good day's catch. But catches that large are uncommon. During 1974 the average daily catch per boat was 4900 fish in Dade County. Only three boats in Dade and Monroe Counties fished regularly for ballyhoo in 1974, but at least eight others participated on a part-time basis.

The gear used in the ballyhoo fishery is highly selective. With the exception of a few houndfish (needlefish) and flyingfish, only ballyhoo are caught in this gear.

The quality of fresh ballyhoo can deteriorate rapidly. They must be handled carefully if they are to be useable as bait. Ballyhoo boats carry four boxes measuring 4' x 2' x 2' two of which are filled with crushed ice. As soon as the ballyhoo are brought aboard, they are placed in the boxes in alternating layers of fish and ice. Saltwater is then added to further lower the temperature.

Wholesale bait dealers in Dade County grade the catch into four size groups: small [less than 185 mm (7.5 inches) fork length]; medium [185 to 235 mm (9.25 inches) fork length]; large [235 to 265 mm (10.5 inches) fork length]; jumbo [265 to

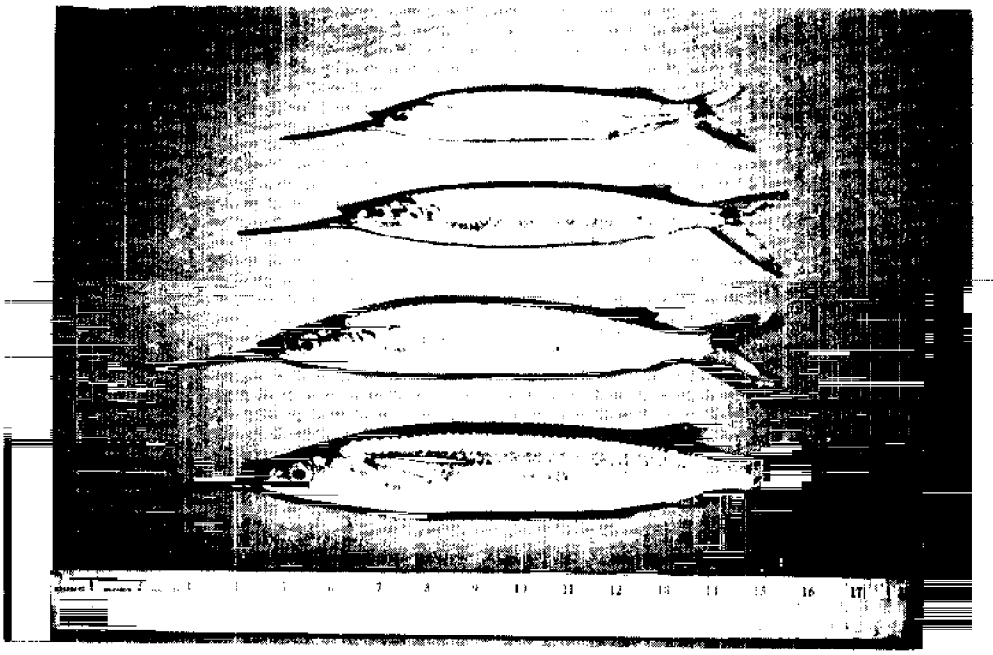
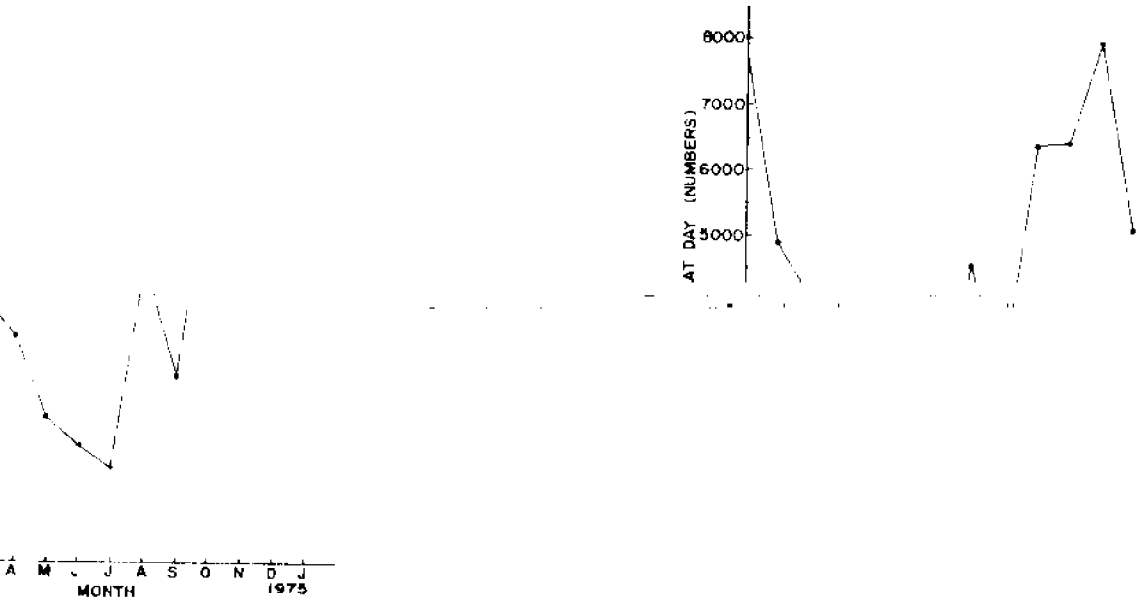


Plate 7. Four size classes of ballyhoo into which Dade County wholesalers grade the catch.

310+ mm (12.25 inches) fork length] (Plate 7). Some of the catch is sold fresh locally, but most is packed in plastic bags and frozen. These may be shipped throughout Florida, to the middle Atlantic states, Bermuda, Mexico, Central America, the Bahamas, and several Caribbean islands. It was estimated that the Dade County charter boat fleet of approximately 62 boats used between 400,000 and 500,000 ballyhoo in 1974. This was 10 to 15% of the total Dade County catch.

Athough the ballyhoo fishery continues year round, fish are abundant only from September or October through March. The seasonality of the successful fishing can be seen in Figure 2. The mean catch per boat day is an index of seasonal availability and relative abundance of ballyhoo. During the period of abundance the seasonal price remains about the same (2½-3½¢/fish). The beginning of the period of abundance coincides with recruitment of young-of-the-year fish. The fishery is sustained almost entirely by fish one year old and younger and because the mortality rate is high, catches begin to decline shortly after the year class is fully recruited. By early spring catches are substantially reduced and the price begins to increase. By



boat day of ballyhoo in Dade County,

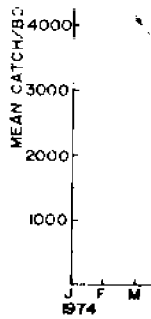
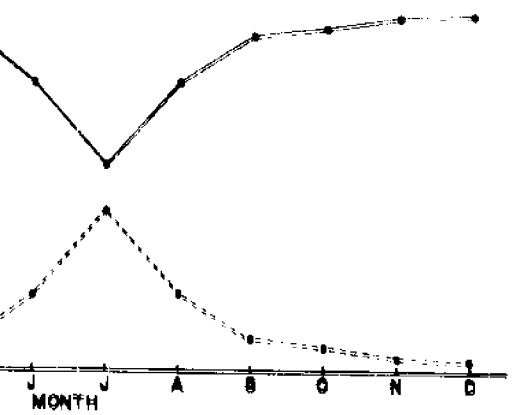


Figure 2. Mean catch per
January 1974 - January 1975

may rise as high as 8¢ per fish. At present,
e from about $1.75 to $3.00 per dozen. The
as well as labor, handling, and refrigeration

summer the ex-vessel price of ballyhoo
retail prices of ballyhoo in Miami rang
retail price reflects seasonal availability
and freezing costs.



tion of ballyhoo catches landed

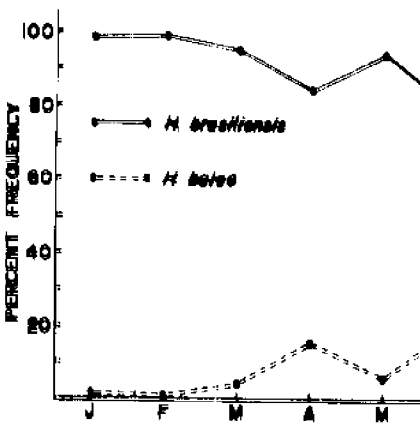


Figure 3. Species compos
in Dade County, 1974.

Biology

Relative Abundance

Although two species of ballyhoo are caught in Dade County, Hemiramphus brasiliensis is always more abundant than H. balao. In 1974, monthly percentages of H. balao in catches ranged from a low of 1.1% in January to 33.9% for a small sample taken in July (Fig. 3). The increase in summer may be related to northward migrations that occurred, because H. balao apparently is more abundant south of Dade County.

Age and Growth

The age of both species of ballyhoo was determined from annular marks on scales. Plates 8 & 9 show scales from a one year old and a two year old ballyhoo. From the relationship between scale size and fish length, the length of the fish at the time each annual mark was formed was calculated. It was determined that at one

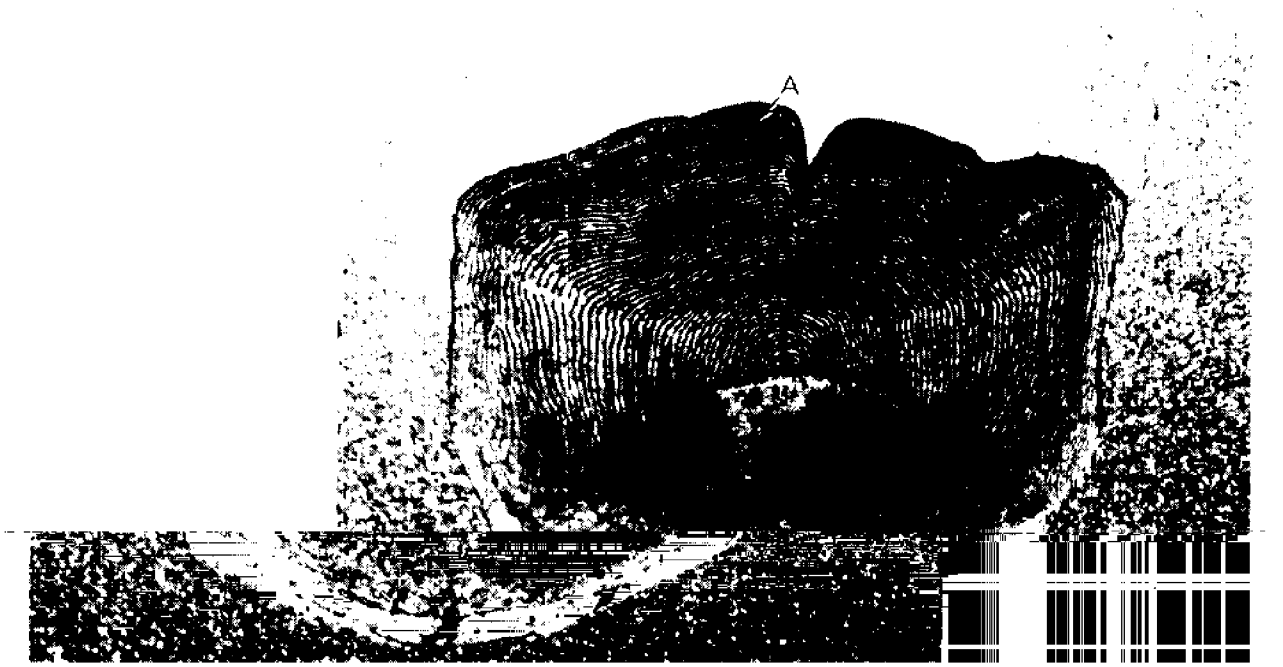


Plate 8. Scale from one year old Hemiramphus brasiliensis, showing annual mark (A).

Plate 9. Scale from a two year old Hemiramphus brasiliensis showing two annual marks (A).

year of age, H. brasiliensis average 220 mm (8.7 inches) in length[1]. However, there was considerable variation in growth among individual fish, the length at age one ranging from 180 mm (7.1 inches) to 270 mm (10.6 inches). At two years of age, H. brasiliensis averaged 264 mm (10.4 inches) with a range from 240 mm (9.4 inches) to 290 mm (11.4 inches). Although the oldest observed H. brasiliensis was between two and three years of age, it seems probable that the maximum age attained by this species is at least three years.

The average length of H. balao at one year of age was 209 mm (8.2 inches) and ranged between 170 (6.7 inches) and 265 mm (10.4 inches). No age two H. balao were observed during this study, but they likely attain a maximum age of at least two years.

The average length of the more common species, H. brasiliensis, was plotted against age in months (Fig. 4) based on specimens from our samples of the com-

[1]Length was measured from the tip of the upper jaw (snout) to the fork of the tail.

mercial catch during 1974. Ballyhoo grow very rapidly during their first 4 months of life and most ballyhoo used for bait (those less than 225 mm) are less than one year of age.

Survival

Annual survival rate of H. brasiliensis was estimated to be 14% between age one and age two. This is relatively low, as expected in a fast-growing, short-lived species such as ballyhoo.

Spawning

Both species of ballyhoo spawn during spring and summer in South Florida. In 1974, H. brasiliensis began spawning in April and ended in July. The spawning season of H. balao is much the same but begins a little earlier and ends a little later. Both species mature in their first year.

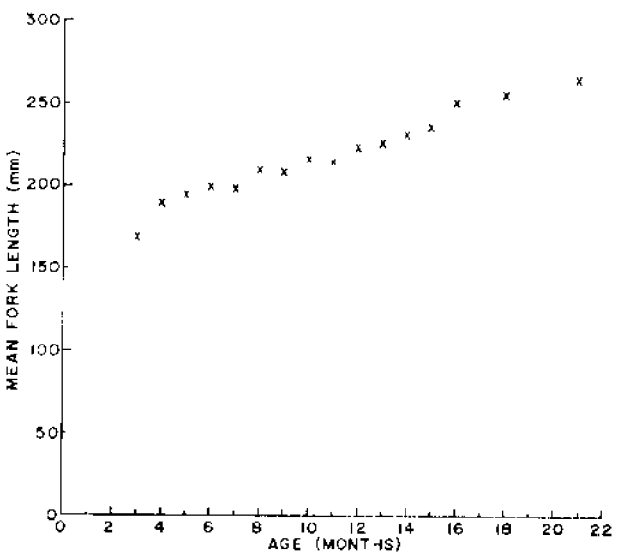
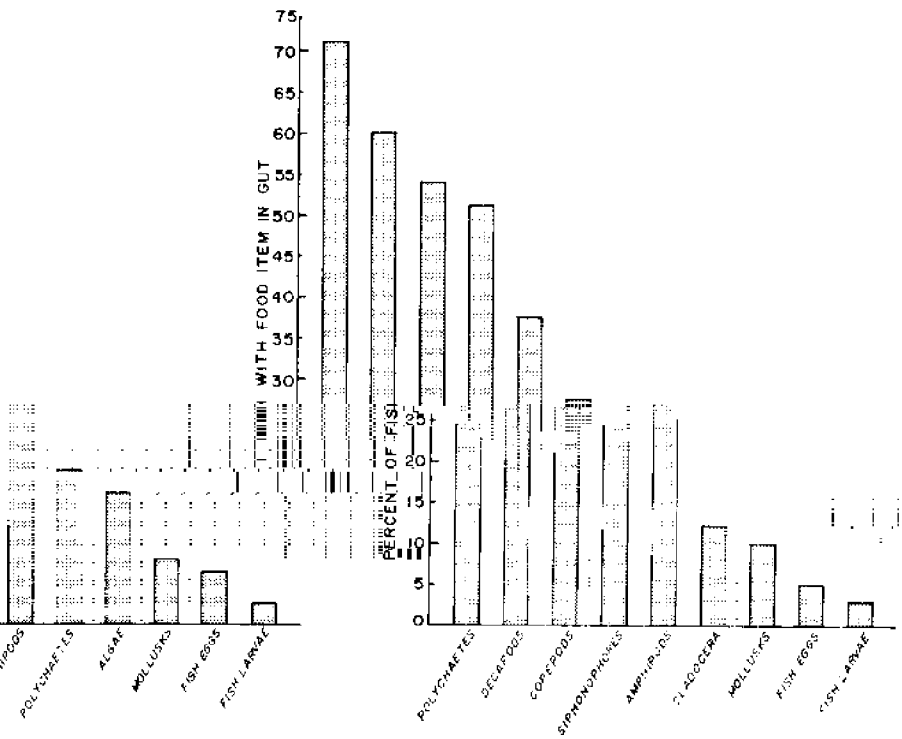


Figure 4. Estimated growth of Hemiramphus brasiliensis based on specimens from our samples of the commercial catch during 1974.

Fecundity (no. of eggs spawned in a year) for both species is low, ranging from 620 to 3620, averaging 1440 for H. brasiliensis, and from 1480 to 9450, averaging 4950 for H. balao. For H. brasiliensis 48% of the observed specimens were males and 52% females. For H. balao the ratio was 53% male to 47% female. In neither species was the sex ratio determined to be significantly different from 1:1.

Early Life History

Both species have relatively large eggs, and when ripe, individual eggs (2-2.5 mm diameter) can be seen easily with the naked eye. Threadlike filaments cover the surface of the eggs which allow attachment of fertilized eggs to grass or weeds. Although the hatching time of eggs of H. brasiliensis and H. balao is not known, eggs of a similar species from the Pacific Ocean hatched in five days (Delsman, 1972). The larvae are relatively well-developed and grow quickly. By late summer, some fish that were hatched in early spring are already large enough to be caught in the commercial fishery. By September or October these fish dominate the commercial catches.



6. Percentage of stomachs containing major food items ed by Hemiramphus brasiliensis.

Figure consum

6. Percentage of stomachs containing major food items ed by Hemiramphus balao.

Figure consum

Food

The major food and the percentage of stomachs in which they occurred for H. brasiliensis and H. balao are shown in Figures 5 and 6. Manatee grass (Syringodium filiforme) which is a major constituent of the diet of H. brasiliensis, is apparently not consumed by H. balao. It is also evident that polychaete worms, which were infrequently found in H. brasiliensis, are the most frequently occurring food item in H. balao stomachs. The bulk of the food for both species consisted of various types of microcrustaceans (decapods, copepods, amphipods, cladocera), although manatee grass frequently is the dominant food of large H. brasiliensis.

Parasites

Two parasites that were commonly observed on H. brasiliensis were isopods and copepods (Plates 10 & 11), both of which are found attached inside the mouths of ballyhoo. The large isopod parasite is often noticed by sportfishermen when it is forced out of the ballyhoo's mouth during the bait rigging procedure. A third type of parasite, encysted digenetic trematodes (Plate 12) appear as black spots under the skin of infested fish.

Although parasitic isopods appear to block the esophagus, parasitized fish had amounts of food in the gut comparable to unparasitized fish and apparently were able to feed successfully. From 10-20% of the H. brasiliensis in monthly Dade County samples were found to have the isopods present. No obvious damage was suffered by fish infested with any of the parasites. It is interesting that none of these parasites was ever found to occur in H. balao.

Predators

As previously mentioned, the two species of ballyhoo caught commercially for sportfishing bait are coastal species; and as such are not usually consumed by the offshore, pelagic game fishes. Among the natural predators of ballyhoo are barracuda, jacks, mackerels, and various sea birds.

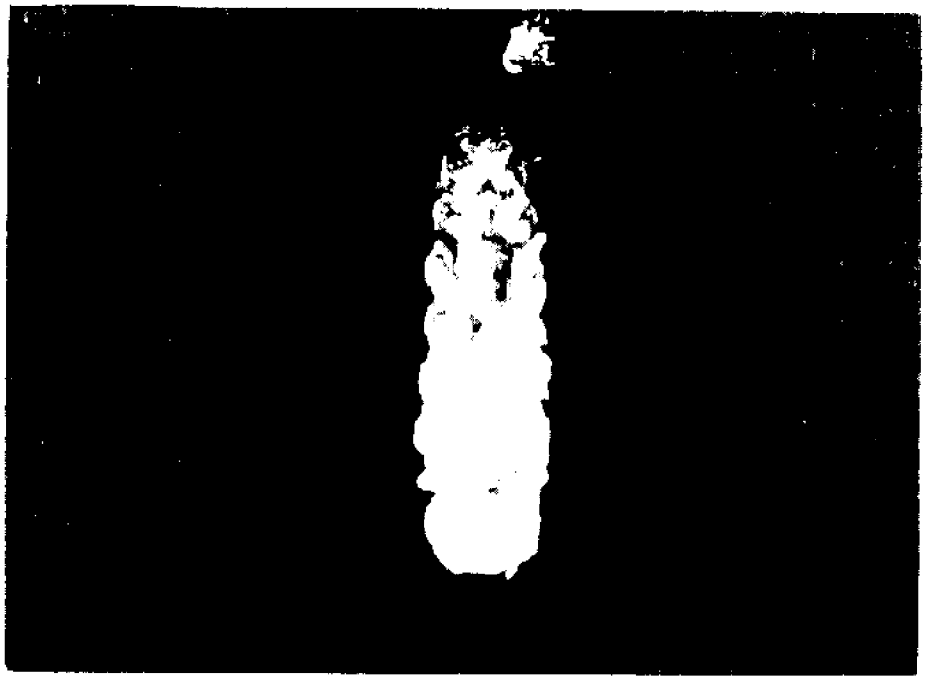


Plate 10. Parasitic isopod from mouth of Hemiramphus brasiliensis.

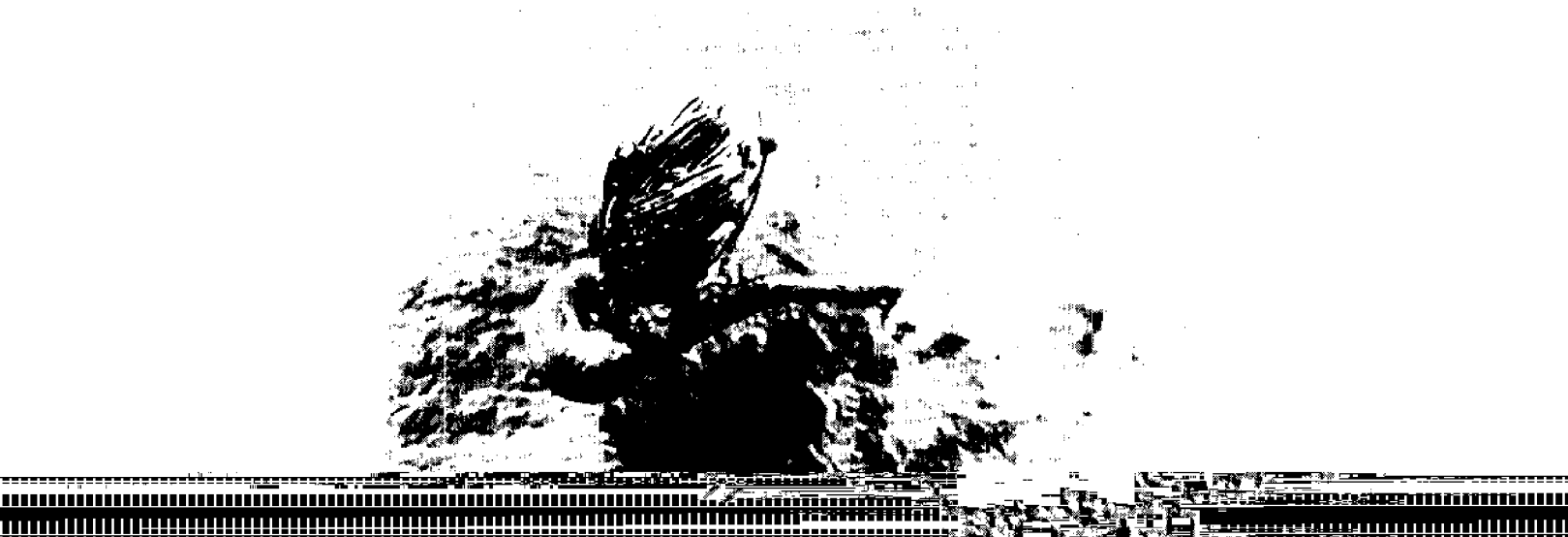


Plate 11. Parasitic copepod from mouth of Hemiramphus brasiliensis.

Summary and Conclusions

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Although the gamefish for which ballyhoo are used as bait ar

inaccessible to most recreational fishermen, this is not the case in South Flo

Gulf Stream is in close proximity and big game fishing is available to tho

small boat anglers. Consequently, baits such as ballyhoo are in demand by a large number of recreational anglers. Presently, the stocks of ballyhoo do not appear to be overfished. The trend in catches during the past 15 years has been one of increasing production, a reflection of the increasing demand. Natural fluctuations in year class strength and weather conditions during the peak fishing season (fall and winter) probably are major causes of yearly fluctuations in landings. Evidence to date suggests that ballyhoo grow rapidly and suffer a high natural mortality, and that relatively few ballyhoo live much beyond one year of age. Under these circumstances, the most efficient use of the resource would be to fish intensively as soon as ballyhoo reach acceptable size, thus diverting some of the future natural mortality into fishermen's catches.

Although there is no evidence of overfishing to date, the demand for ballyhoo probably will continue to increase, and fishing pressure on them presumably will increase to meet this demand. Should intensive fishing adversely affect the ballyhoo stocks, thus creating a need for management, knowledge that has been gained through our research will help in formulating a management plan before the stocks are badly depleted.

Plate 12. Encysted digenetic trematodes (black spots) under skin of Hemiramphus brasiliensis.

Acknowledgements

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References

Bohlke, J. E. and C. G. Chaplin. 1968. Fishes of the Bahamas and adjacent tropical waters. Livingston Publishing Co., Wynnewood, Pa. 771 p.

Delsman, H. C. 1972. Fish eggs and larvae from the Java Sea. Linnaeus Press, Amsterdam, Holland. 225 p.

Johnson, L. E. 1974. Fisheries of Florida, 1973. In: Summary of Florida Commercial Marine Landings, 1973. Florida Department of Natural Resources.