SNAPPERS OF THE WESTERN ATLANTIC

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This paper is based on observations obtained during 18 years (1950-68) of exploratory fishing by the U.S. Fish and Wildlife Service and the BCF Exploratory Fishing and Gear Research Base at Pascagoula, Miss. The data may be readily retrieved by the Base's UNIVAC 9200 computer.

In this study, information is presented on the geographical, depth, and temperature distributions of the 11 species of Lutjanus that occur in the western Atlantic.

L. analis	Muttonfish or mutton snapper
L. apodus	Schoolmaster
L. buccanella	Blackfin or hambone snapper
L. campechanus	Gulf red snapper
L. cyanopterus	Cubera or Cuban snapper
L. griseus	Mangrove or gray snapper
L. jocu	Dog snapper
L. mahogoni	Mahogany snapper
L. purpureus	Caribbean red snapper
L. synagris	Lane snapper
L. vivanus	Silk or yelloweye snapper

Throughout this paper the species will be referred to by common name with the word 'snapper' omitted.

For keys, descriptions, and figures serving to identify species of snappers, see Rivas (1949; 1966), Anderson (1967), and Randall (1968: 120).

The exploratory work of the Pascagoula Base extends from Cape Hatteras, N.C., to the bulge of Brazil (Fortaleza). Because these snappers are tropical and subtropical, horizontal distribution is adequately covered. Throughout this area, 2,809 stations were occupied during the 18-year period that yielded species of Lutjanus. Only the Gulf red was collected north of Cape Fear, N.C.

The species of Lutjanus are essentially bottom fishes, so we have considered only bottom-sampling gear and bottom temperatures. Bottom temperatures were not always taken this way, thus there are few or no records for some species.

The vertical coverage, which extends from 2 to 2,685 fathoms, is considered adequate, except perhaps for species such as the mangrove and cubera in the very shallow waters of estuaries. However, the mangrove was recorded from 102 stations; the cubera from only 3. Figure and Table 1 show the preferred depth for the mangrove as 17 to 27 fathoms, despite its known occurrence in estuaries. The three records for the cubera are from 23, 25, and 26 fathoms on Campeche Bank well offshore from estuarine conditions. This would seem to indicate that the cubera is a much less abundant species, rather than that vertical coverage was inadequate.

Table 1 - Depth Distribution of Eight Species of Western Atlantic Lutjanus. The Cubera, Dog, and Mahogany Are Not Included Because of Insufficient Records (See Text and Figure)

Species	Catch	Depth		
		Mean	Total Range	70% Range 1/
	No.	. . .	. . (Fathoms)	. . . . .
Mangrove	102	22	4-42	17-27
Lane	742	24	2-60	16-32
Schoolmaster	81	26	10-38	22-30
Mutton	253	27	4-47	22-32
Gulf red	1,223	29	5-80	17-41
Caribbean red	167	32	14-105	22-42
Blackfin	65	48	4-104	27-69
Silk	163	65	15-180	32-98

1/ Where 68.26% of the records occur. Obtained from one standard deviation on each side of the mean and here rounded to 70% for convenience.

Seasonal coverage is also adequate except perhaps for July and December. The 2,809 stations that yielded Lutjanus are distributed (in percent of total) by month:

Jan.	Feb.	Mar.	Apr.	May	June
9%	9%	8%	13%	15%	5%
July	Aug.	Sept.	Oct.	Nov.	Dec.
2%	5%	11%	7%	12%	4%

The lower percentage in July, compared with April and May, results from decreased

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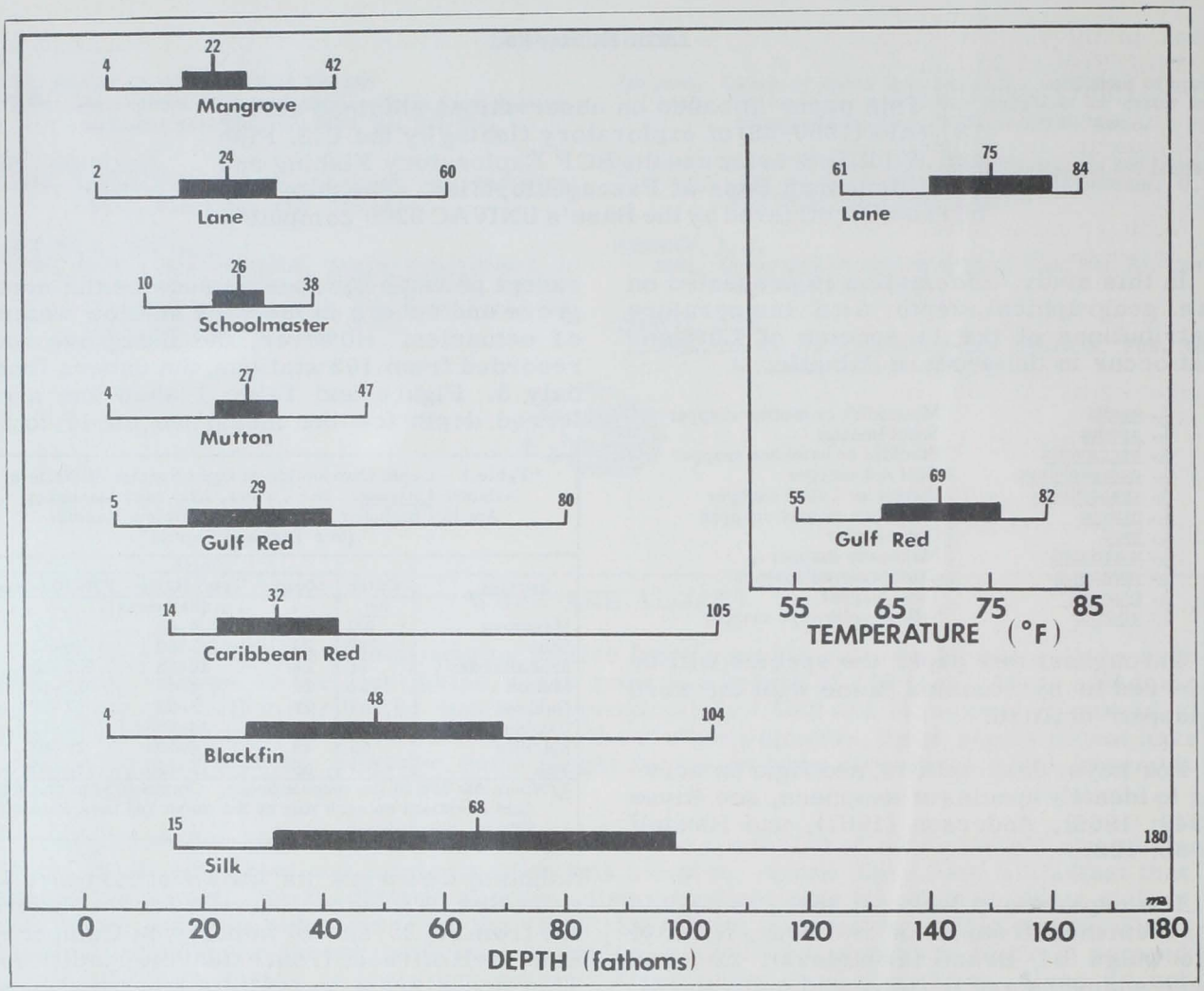

(Figure) Depth and temperature distributions of species of western Atlantic Lutjanus. Black bar indicates 68.26% of the records, obtained from one standard deviation on each side of the mean and rounded to 70% for convenience. Some species are not included because of insufficient records (see text and tables 1 and 2).

fishing effort; it is not to be interpreted as a change in seasonal abundance. When the monthly percentages on page 41 are combined by seasons, the coverage for spring is 33 percent, summer 18 percent, fall 23 percent, and winter 26 percent.

GEOGRAPHICAL DISTRIBUTION

The Gulf red and Caribbean red have separate geographic ranges, but the other species occupy about the same range, and the Gulf red and Caribbean red each occur with them.

Our data show the Gulf red is the species occurring farthest north. It was collected from Cape Hatteras southward and, apparently, is restricted to southeastern United States and the Gulf of Mexico. Mutton, mangrove, blackfin, lane, and silk do not occur north of Cape Fear, except perhaps as stragglers. The schoolmaster was not taken north of Jacksonville, Fla., and the Caribbean red apparently is confined to the Caribbean and southward to Brazil. Our data do not show any records north of the Honduran Banks for the Caribbean red, but records (Rivas, 1966) indicate that it occurs along Cuba's south coast. The data for cubera, dog, and mahogany are not sufficient to outline their distribution. All three records available for the cubera are from Campeche Bank. The five records for the dog are from off British Honduras and the coast of Colombia; however, it is known to occur as far north as south Florida and the Bahamas. There are only three records for mahogany--one from off Jupiter Inlet, Fla., another from Serrana

Bank in the central Caribbean, and a third from off French Guiana. In view of the extensive exploratory effort, it would seem that the few records for cubera, dog, and mahogany indicate less abundance rather than inadequate geographical coverage.

With the exception of the Gulf red, the other western Atlantic species of Lutjanus have been reported as occurring as far south as Brazil. Because our exploratory coverage in Brazil has so far extended only to off Fortaleza, the southern limits of distribution cannot be established from our records.

VERTICAL DISTRIBUTION

Vertical distribution of the eight most common western Atlantic species of Lutjanus is summarized in Table 1 and Figure. Because of insufficient records, cubera, dog, and mahogany are not included. The three records for cubera are from 23, 25, and 26 fathoms. Of the five records for the dog, two are from 5 fathoms, and three from 13 fathoms. The three records for mahogany are from 1, 14, and 16 fathoms.

The depth distribution of the lane, mutton, Gulf red, blackfin, and silk herein recorded agree with the findings of Camber (1955: 23) and Carpenter (1965: 8).

Table 1 and Figure show the depth range greater in the deeper occurring species, and that the blackfin and silk occur at significantly greater depths than the others. A study of catch composition shows that the mangrove, lane, schoolmaster, mutton, Gulf red, and Caribbean red--with mean depths of 22 to 32 fathoms--are often taken together; these are seldom taken with the blackfin and the silk, with mean depths of 48 and 65 fathoms, which are often taken together.

The relation of fish size to depth of occurrence indicates that in most, if not all, species, the juveniles and young occur shallower than the mean depth, and the larger adults deeper than the mean depth. For example, in the Gulf red, fish weighing less than $\frac{1}{4}$ to 2 pounds occur at 5 to 29 fathoms; 2- to 20-pound fish, at 30 to 34 fathoms; and 20- to 35-pound fish, at 35 to 80 fathoms. This relation agrees with findings by Caldwell (1955) for the longspined porgy, Stenotomus caprinus, and by Caldwell (1957) for the pinfish, Lagodon rhomboides.

TEMPERATURES OF OCCURRENCE

Despite few records of bottom temperatures, the data available suggest trends at least for some species. Here, only depth records with bottom temperature records are considered.

The seven records for the blackfin range from 64° to 77° F., with a mean of 71.1° F. at a mean depth of 64 fathoms; this is 16 fathoms deeper than the mean depth for the species (figure; table 1).

The eight records for the mangrove range from 65° to 81° F., with a mean of 70.8° F. at a mean depth of 18 fathoms; this is 4 fathoms shallower than the mean depth for the species (figure; table 1).

The 11 records for the mutton range from 66° to 82° F., with a mean of 76.6° F. at a mean depth of 27.5 fathoms--practically the mean depth for the species (figure; table 1).

The 15 records for the Caribbean red range from 64° to 84° F., with a mean of 78.4° F. corresponding to a mean depth of 35 fathoms; this is 3 fathoms deeper than the mean depth for this species (figure; table 1).

The 38 records for the silk range from 56° to 81° F., with a mean of 68.9° F. corresponding to a mean depth of 84 fathoms--19 fathoms deeper than the mean depth for this species (figure; table 1).

The 100 records for the lane (table 2) include all seasons and practically the species' entire geographical range. Bottom temperatures range from 61° to 84° F., with a mean of 75.2° F. at a mean depth of 23 fathoms; this is nearly the same as the mean depth for this species, 24 fathoms (figure; table 1).

The 268 records for the Gulf red (table 2) may be subdivided into three subregions that

Table 2 - Temperature Distribution of Two Species of Western Atlantic Lutjanus. The Other Nine Species Are Not Included Because of Insufficient Records (See Text and Figure)

Species	Catch[1]	Temperature		
		Mean	Total Range	70% Range[2]
	No.	F.	F.	F.
Lane	100	75°	61°-84°	68°-82°
Gulf red	268	69°	55°-82°	62°-76°

1/Catches for which bottom temperature records are available.
2/Where 68.26% of the records occur. Obtained from one standard deviation on each side of the mean and here rounded to 70% for convenience.

constitute the entire known geographical range of the species. The 53 records from Cape Hatteras to Cape Kennedy, Fla., range from 55° to 80° F.; the mean is 68.2° F., corresponding to a mean depth of 24 fathoms; this is 5 fathoms shallower than the mean depth of 29 fathoms for the species (figure; table 1). The 160 records for the northern Gulf of Mexico--from Cape Sable to the mouth of the Rio Grande--range from 59° to 80° F., with a mean of 67.5° F. corresponding to a mean depth of 31 fathoms; the mean is only 2 fathoms deeper than the mean depth for this species (figure; table 1). The 55 records from Cape Kennedy to Cape Sable, Fla., including the Florida Keys and the southern Gulf of Mexico to the mouth of the Rio Grande, range from 59° to 83° F. The mean is 71.7° F., corresponding to a mean depth of 27 fathoms, only 2 fathoms shallower than the mean depth for this species (table 1). As would be expected, the area from Cape Hatteras to Cape Kennedy and the northern Gulf of Mexico have about the same mean temperature--about 4° F. lower than that of the southern Gulf and south Florida. The similar and wide ranges of temperature variation in the three subregions indicate that the Gulf red is able to tolerate 55° to 82° F.

Bottom temperature records are absent or insufficient for schoolmaster, cubera, dog, and mahogany; as shown above, the records are weak for the remaining species, except the lane and Gulf red. Depth distribution within the same geographic range is similar, so temperature distribution for mangrove and schoolmaster may be inferred from the lane--and for mutton from that of the Gulf red, at least for the area in which both occur together.

The temperature variations discussed in this section may be attributed to season as well as depth.

HABITAT

Optimal bottom temperatures and depths are not necessarily indicative of snapper abundance unless they are associated with suitable bottoms. Camber (1955: 22) and Carpenter (1965: 8) reported that snappers prefer hard bottoms of broken relief covered with coral heads and outcrops of rocks. This bottom type is described and called "live-bottom habitat" by Struhsaker (1969: 272). According to Smiley (1885: 92), the Gulf red is almost certain to be found in the northern Gulf of Mexico where there is coral rock or gravel.

These comments apply to species of snapper that occur on the Continental Shelf to depths of about 100 fathoms, but mostly at depths below 70 fathoms. This would partly exclude the silk, which abounds also along the shelf edge or even on the upper Continental Slope. In this region, described and called "lower-shelf habitat" by Struhsaker (1969: 273), smooth mud bottom predominates. Apparently the silk may be found on this type of bottom, although it is not suitable for the other species.

LITERATURE CITED

ANDERSON, WILLIAM D., JR.
1967. Field guide to the snappers (Lutjanidae) of the western Atlantic. U.S. Fish Wildl. Serv., Circ. 252, iii + 14 pp.

CALDWELL, DAVID K.
1955. Distribution of the longspined porgy, Stenotomus caprinus. Bull. Mar. Sci. 5(3): 230-239.

1957. The biology and systematics of the pinfish, Lagodon rhomboides (Linnaeus). Bull. Fla. State Mus. 2(6): 77-173.

CAMBER, C. ISAAC
1955. A survey of the red snapper fishery of the Gulf of Mexico, with special reference to the Campeche Banks. Fla. State Bd. Conserv. Tech. Ser. No. 12, 63 pp.

CARPENTER, JAMES S.
1965. A review of the Gulf of Mexico red snapper fishery. U.S. Fish Wildl. Serv., Circ. 208, iv + 35 pp.

RANDALL, JOHN E.
1968. Caribbean reef fishes. T.F.H. Publications, Inc., Jersey City, N.J., 318 pp.

RIVAS, LUIS RENE
1949. A record of lutjanid fish (Lutjanus cyanopterus) for the Atlantic coast of the United States, with note on related species of the genus. Copeia 1949(2): 150-152.

1966. Review of the Lutjanus campechanus complex of red snappers. Quart. J. Fla. Acad. Sci. 29(2): 117-136.

SMILEY, CHAS. W. (Compiler)
1885. Notes upon fish and the fisheries. Bull. U.S. Fish Comm. 5: 65-112.

STRUHSAKER, PAUL
1969. Demersal fish resources: Composition, distribution, and commercial potential of the Continental Shelf stocks off southeastern United States. U.S. Fish Wildl. Serv., Fish. Ind. Res. 4(7): 261-300.