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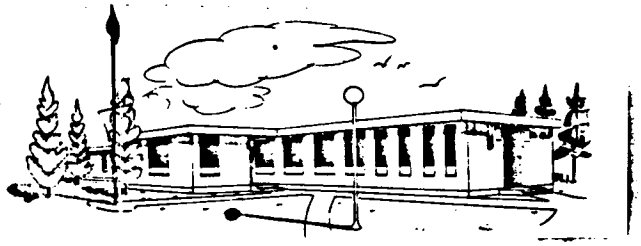
Environmental Studies of the South Texas Outer Continental Shelf 1977

A report to the Bureau of Land Management, Department of Interior, on work conducted under provisions of Interagency Agreements #AA550-IA7-3 during calendar year 1977.

Snapper/ Grouper

SOUTHEAST FISHERIES CENTER
PANAMA CITY LABORATORY



MAY 1979

PANAMA CITY, FLORIDA

ENVIRONMENTAL STUDIES OF THE SOUTH TEXAS OUTER CONTINENTAL SHELF

SNAPPER/GROUPER

By

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ABSTRACT

Two hundred ninety-nine red snapper (Lutjanus campechanus), and 793 vermilion snappers (Rhomboplites aurorubens) were tagged at six locations off the south Texas coast from May, 1977 to January, 1978. Fifty-five snapper tags were returned, providing a return rate of 5.0%. Tagged fish were free between 30 and 253 days. Only three tag returns showed movement, and these were to adjacent banks or structures. The tagged snappers at these locations were non-migratory for most of the year, and this behavior necessitates caution in altering their habitat. Any alteration could seriously affect the resident population.

ACKNOWLEDGMENT

I wish to acknowledge Dave Wilson and Don Meineke, who assisted in the tagging; Dr. Connie Arnold, and Mr. Eugene Nakamura, who formulated the plans for the research; and Marion Duzich, from whom we chartered the vessel to do this work. I especially acknowledge Jinx Martin and the captains of the "Scat Cat", who were responsible for most of the tag returns.

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INTRODUCTION

Snappers and groupers in the Gulf of Mexico are important both to commercial and recreational fishermen. Red snapper was the second most valuable finfish landed by commercial fishermen in the Gulf in 1974 (U.S. Dept. Commerce 1977), and Deuel (1973) stated that the catch by recreational fishermen exceeded the commercial catch.

The red snapper fishery developed in the 1880's off Texas, and by the turn of the century, the ports of Freeport and Brownsville were being supplied by small vessels with snapper caught on grounds already abandoned by large vessels (Camber 1955). The principal fishing grounds were off Galveston, but the banks off south Texas were also frequented.

The historical and present importance of this fishery off Texas led to studies by Moseley (1966) and Bradley and Bryan (1974) on the biology of red snapper. These publications added to the existing literature which reviewed the fishery (Jarvis 1935, Camber 1955, Carpenter 1965), but presented nothing on vermilion snapper or the groupers, or on the movements of these species.

Almost all tagging of snappers and groupers in the Western Atlantic has been conducted in Florida. High return rates of red snapper tags were reported by Topp (1963), Beaumariage (1964), Beaumariage and Wittich (1966), Moe (1966), and Beaumariage (1969), but the same researchers report no returns or very few returns on tagged vermilion snapper. Groupers tagged by these authors also provided high return rates. Grimes (1976) tagged vermilion snapper in North Carolina but he had a very low return rate.

The objectives of the present study were to determine the movements of snappers and groupers off south Texas by tagging and to add to the

existing knowledge of the distribution and abundance of these fishes in this area. Species to be studied were red snapper, (Lutjanus campechanus); vermilion snapper, (Rhomboplites aurorubens); and all groupers of the genera Epinephelus and Mycteroperca.

METHODS

A seventy-five foot shrimp boat was chartered, and 22 days were spent at sea tagging fishes. The tagging took place at the following areas: Citgo Rig A-76, Baker Bank, Aransas Bank, Hospital Bank, Southern Bank, and Dream Bank (Figure 1). Longitude and latitude, Loran A coordinates, and depth for these areas are listed in Table 1. Fishes were tagged: in the spring (May 26 - June 3, 1977) at Aransas, Hospital, and Southern Banks; in the summer (July 24-28) at Citgo Rig A-76 and Baker Bank; in the fall (October 21-25) at Dream Bank; and in the winter (January 24-28) at Southern Bank.

Three rods, each with 12-volt electric reels, were fished at each tagging location. Each reel was filled with 80-lb test monofilament line. The terminal tackle consisted of five circle hooks on a 130-lb test monofilament leader, and one to two lbs of lead. Frozen squid and fresh-cut fish were used as bait.

Vermilion snapper caught with this equipment showed no signs of swimbladder expansion. Red snapper, however, required a puncture of the abdomen to release expanded gases. This was accomplished using a hypodermic needle inserted through the abdomen.

All fishes to be tagged were unhooked and the fork length was measured to the nearest millimeter. Fish were tagged by inserting a Floy gun tag at the base of the dorsal fin, and then the fish were released over the side of the boat. Fishes in poor condition were retained as biological samples.

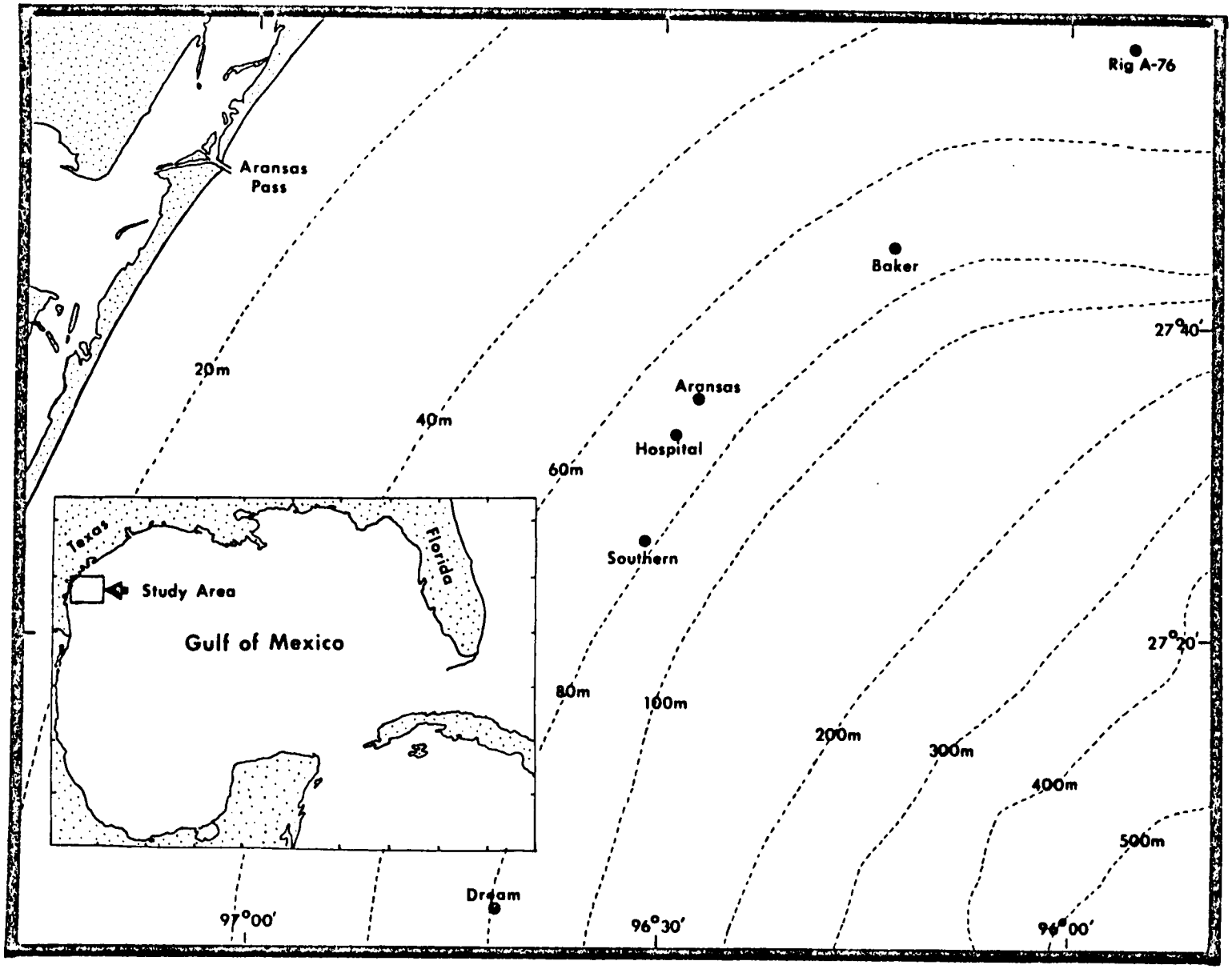

Figure 1. Locations where snappers were tagged.

Table 1. Snapper tagging locations.

Name	Latitude x Longitude	Loran A Coordinates 3H2/3H3	Fishing Depths in Meters
Citgo Rig A-76	27°58'N x 96°07'W	3922/2628	50
Baker Bank	27°45'N x 96°14'W	3916/2384	57
Aransas Bank	27°36'N x 96°27'W	3908/2202	60
Hospital Bank	27°33'N x 96°29'W	3904/2161	60
Southern Bank	27°26'N x 96°32'W	3892/2084	60
Dream Bank	27°02'N x 96°43'W	3849/1775	68

Tags were red, three inches long and had a legend reading: "Reward, NMFS, P. O. Box 1208, Port Aransas, TX." A tag number followed the legend. Rewards between $5 and $25 were offered for the return of tags. Two preselected tag numbers out of each 100 were worth $25, and five other preselected numbers out of each 100 were worth $10. All other tags (93 out of 100) were worth $5. Posters advertising the tagging program were placed at various locations around Port Aransas.

When tagged fishes were returned, fork length and condition of the fish (i.e., infection around tag, algae on tag, etc.) were recorded. If only the tag were returned, this information was received from the fishermen. All tag rewards were accompanied by a letter detailing the tagging date and location and described the movement of the fish (if any).

RESULTS AND DISCUSSION

Two hundred and ninety-nine red and 793 vermilion snappers were tagged in this study. Although we had planned to tag groupers, none were caught.

Return Rates

The return rate for red snapper was 5.6% (17 tags), and for vermilion snapper it was 4.8% (38 tags). Table 2 lists return rates from other studies. Other researchers had higher red snapper return rates (12.5-33.0%) but lower vermilion snapper return rates (0-4.1%). One explanation for the differences between return rates among these investigators may be the differences in fishing pressure. Red snapper were heavily fished in Florida, where most of the other tagging occurred, but vermilion snapper were usually considered a nuisance (Moe 1963). In Texas, and in North Carolina where Grimes (1976) tagged, both species are valued. In fact, Grimes et al. (1977) stated that the vermilion is the most frequently "angled" snapper in the Carolinas.

Table 2. Summary of other snapper tagging and returns.

Author(s)	No. Tagged	No. Returned	Return Rate
	Red Snapper		
Topp, 1963	379	65	17.2%
Beaumariage, 1964	336	111	33.0%
Beaumariage and Wittich, 1966	345	97	28.1%
Moe, 1966	24	3	12.5%
Beaumariage, 1969	312	82	26.3%
Beaumariage, 1969 (includes all above authors except Moe)	1,372	384	28.0%
	Vermilion Snapper		
Topp, 1963	117	0	0.0%
Beaumariage, 1964	218	9	4.1%
Beaumariage and Wittich, 1966	57	0	0.0%
Moe, 1966	13	0	0.0%
Beaumariage, 1969	4	0	0.0%
Grimes, 1976	455	2	0.0%

His low return rate was possibly due to insufficient publicity of the tagging program.

Movement

The returns listed in Table 3 indicate very little movement by either species. No movement was noted by any of the 48 tag returns with less than 160 days of freedom. Of the seven that were out longer than this, three showed movement to an adjacent bank or oil rig. Two vermilion snapper moved from Aransas Bank to either Hospital or Southern Bank. The fisherman was unsure of the capture location. This is a movement of either approximately 10 or 20 kilometers. The other return was a red snapper tagged at Citgo Rig A-76 and recaught at another rig in Block A-100, about 5 kilometers away.

In summarizing the red snapper tagging in Florida, Beaumariage (1969) found that fish tagged in less than 27.4 meters of water showed only limited movement, but greater movement was shown by fish released in water deeper than this. Seven of the ten returns that he discussed (which showed considerable movement) were off the Florida panhandle and moved easterly. Eight of his ten recaptured fish were free for over 240 days. Only one of the 55 recaptured fish was free this long. Apparently red snapper do move, but the fish must be free for a long period before recapture so that considerable movement can be observed.

Grimes et al. (1977) states that vermilion snapper are apparently not migratory and neither the two returns reported by him in 1976, nor the nine returns reported by Beaumariage (1964) showed any movement. Of the thirty-eight returns from this study, only two showed even slight movements. The data appear to substantiate Grimes' statement concerning the non-migratory behavior of this species.

Table 3. Data on snapper tag returns.

Tag No.	Sp.	Tag Date	Return Date	Days Out	Tagging Location	Return Location	Km. Trav.	FL at Tagging (mm)	FL at Return (mm)	Length Change
15058	V	5-31-77	6-30-77	30	Southern	Same	0	255	255	0
15107	V	5-31-77	7-7-77	37	Southern	Same	0	230	240	+10
15215	V	6-2-77	7-9-77	37	Hospital	Same	0	290	290	0
10357	V	5-29-77	7-26-77	58	Aransas	Same	0	235	235	0
10964	V	5-28-77	7-26-77	59	Aransas	Same	0	290	290	0
10395	V	5-28-77	7-26-77	59	Aransas	Same	0	242	230	-12
10974	V	5-28-77	7-26-77	59	Aransas	Same	0	220	230	+10
15087	V	5-31-77	8-6-77	67	Southern	Same	0	250	250	0
10970	V	5-28-77	8-9-77	73	Aransas	Same	0	230	-	-
10433	V	5-28-77	8-23-77	87	Aransas	Same	0	235	220	-15
10352	V	5-28-77	8-23-77	87	Aransas	Same	0	225	265	+40
09402	V	5-29-77	8-23-77	86	Aransas	Same	0	230	225	-5
10151	V	5-30-77	8-23-77	85	Aransas	Same	0	240	240	0
10427	V	5-28-77	8-23-77	89	Aransas	Same	0	265	255	-10
09547	V	5-27-77	8-23-77	90	Aransas	Same	0	230	220	-10
10182	V	5-30-77	8-23-77	85	Aransas	Same	0	240	230	-10
10494	V	5-28-77	8-23-77	87	Aransas	Same	0	250	240	-10
10499	V	5-28-77	8-23-77	87	Aransas	Same	0	227	225	-2
09557	V	5-27-77	8-23-77	88	Aransas	Same	0	240	225	-15
10170	V	5-30-77	8-23-77	85	Aransas	Same	0	250	260	+10
09546	R	5-27-77	8-25-77	90	Aransas	Same	0	280	304	+24
09384	R	5-27-77	8-25-77	90	Aransas	Same	0	360	335	-25
09689	R	5-29-77	8-25-77	88	Aransas	Same	0	295	310	+15
10447	V	5-28-77	8-25-77	89	Aransas	Same	0	235	230	-5
10140	V	5-30-77	8-25-77	87	Aransas	Same	0	225	230	+5
09408	V	5-27-77	8-25-77	90	Aransas	Same	0	230	225	-5
10492	V	5-28-77	8-25-77	89	Aransas	Same	0	240	235	-5
10110	V	5-30-77	8-25-77	87	Aransas	Same	0	250	245	-5
10410	V	5-28-77	8-25-77	89	Aransas	Same	0	235	240	+5
09693	R	5-29-77	9-11-77	105	Aransas	Same	0	255	270	+15
10448	R	5-28-77	9-11-77	106	Aransas	Same	0	240	245	+5

Table 3. (Continued)

Tag No.	Sp.	Tag Date	Return Date	Days Out	Tagging Location	Return Location	Km. Trav.	FL at Tagging (mm)	FL at Return (mm)	Length Change
09704	V	5-29-77	9-11-77	105	Aransas	Same	0	255	255	0
10487	R	5-28-77	9-15-77	110	Aransas	Same	0	255	260	+5
10375	V	5-29-77	9-15-77	109	Aransas	Same	0	235	265	+30
10114	V	5-30-77	9-15-77	108	Aransas	Same	0	255	250	-5
10094	V	5-30-77	9-15-77	108	Aransas	Same	0	245	241	-4
10381	V	5-29-77	9-15-77	109	Aransas	Same	0	265	251	-14
09393	R	5-27-77	9-15-77	111	Aransas	Same	0	230	267	+37
15308	R	7-24-77	9-25-77	63	Baker	Same	0	295	295	0
10979	V	5-28-77	9-20-77	115	Aransas	Same	0	260	257	-3
15283	R	7-24-77	9-21-77	59	Baker	Same	0	470	-	-
15298	R	7-24-77	9-21-77	59	Baker	Same	0	350	-	-
10134	V	5-30-77	10-4-77	127	Aransas	Same	0	225	225	0
10485	R	5-28-77	10-4-77	129	Aransas	Same	0	250	260	+10
09690	R	5-29-77	10-8-77	132	Aransas	Same	0	230	240	+10
10980	R	5-28-77	10-8-77	133	Aransas	Same	0	240	255	+15
09541	V	5-27-77	10-8-77	134	Aransas	Same	0	250	250	0
10141	V	5-30-77	10-25-77	151	Aransas	Same	0	265	250	-15
10367	V	5-29-77	11-15-77	170	Aransas	Hosp./South.	10-20	235	235	0
10442	V	5-28-77	11-15-77	171	Aransas	Hosp./South	10-20	245	240	-5
09366	V	5-27-77	11-15-77	172	Aransas	Same	0	248	235	-13
09697	R	5-29-77	12-31-77	215	Aransas	Same	0	225	244	+19
15524	R	7-26-77	1-4-78	162	A-76	A-100	5	280	-	-
09558	R	5-27-77	1-7-78	224	Aransas	Same	0	240	264	+24
10989	R	5-27-77	2-4-78	253	Aransas	Same	0	250	230	-20

Abundance and Distribution

Tagging effort from this project revealed little about seasonal abundance or distribution. Bradley and Bryan (1974) stated that red snapper were taken in all months and at all sampled reefs. Their best catch per effort was in winter, but a great deal of consistent sampling would be required to determine seasonal changes at the areas fished in this study. Both species are present year round at all locations, and abundance or distribution is poorly indicated by catch. Data on food preference, fish school location on the reef, and fishing method are either variable or are lacking, so that a realistic estimate of abundance and distribution would be very difficult and expensive to obtain.

Lengths

The sizes of snappers taken in this study (Figs. 2-3) are similar to those taken on hook and line reported by Bradley and Bryan (1974). The modal size ranges for red snapper were 250 to 275 mm FL and for vermilion snapper were 225 to 250 mm FL.

The length-frequency histograms of tagged snappers at each location (Figs. 4 through 9) indicate differences in size distribution of the catch. The Citgo Rig A-76, and Aransas, Hospital, and Southern banks yielded smaller snappers than Baker and Dream banks. Red snapper at the first four locations averaged 276, 261, 290, and 273 mm FL, respectively, while those at Baker and Dream averaged 349 and 325 mm FL (Table 4). Vermilion snapper from these two banks averaged 281 and 335 mm FL, while at the other locations, the mean fork lengths were all less than 255 mm. The Citgo Rig A-76 is heavily fished by the workers living on the rig, and Aransas, Hospital, and Southern banks are frequently fished by headboats out of Port Aransas. The less heavily fished banks provided larger snappers.

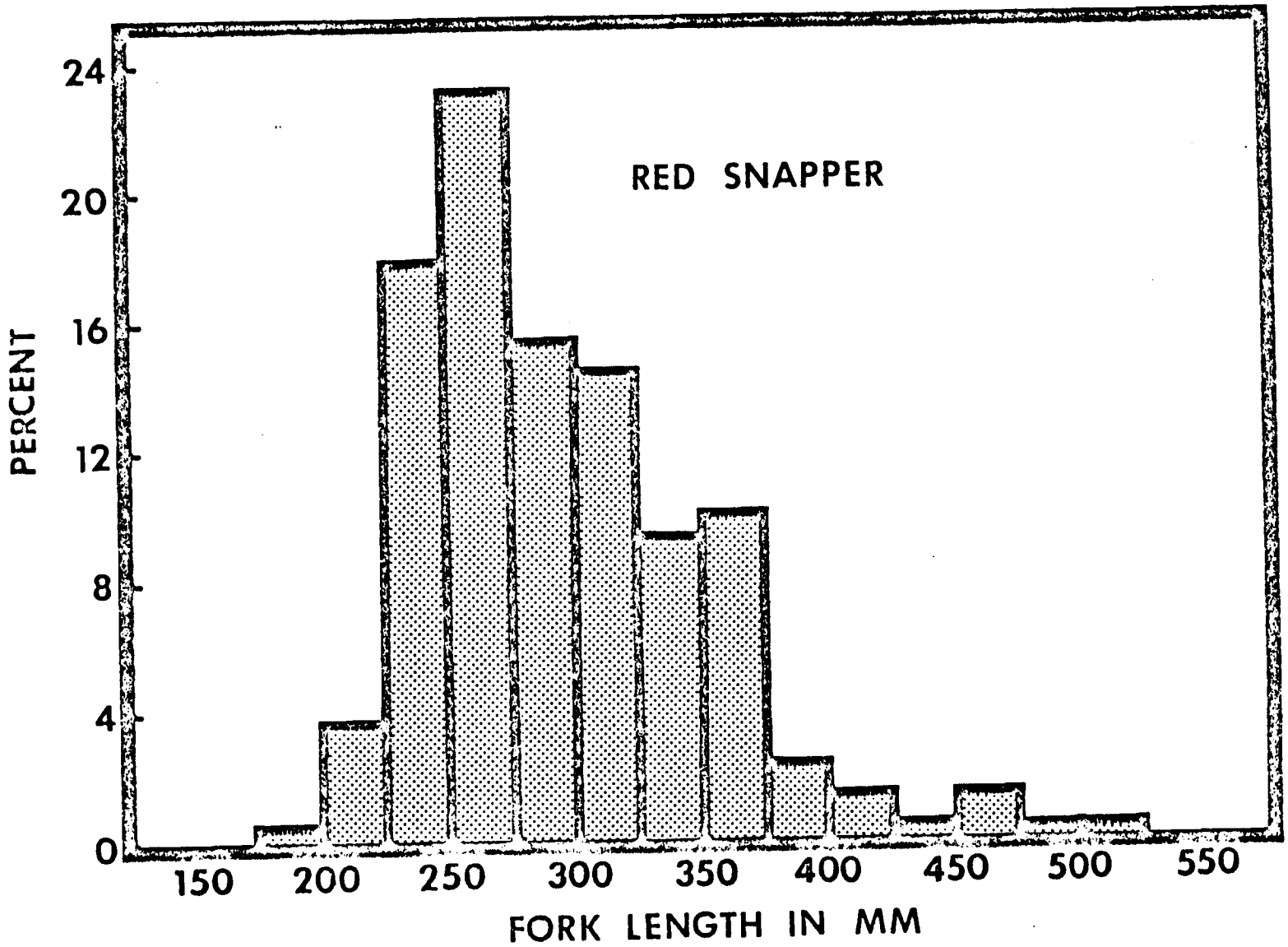

Figure 2. Length-frequency distribution of 299 tagged red snapper.

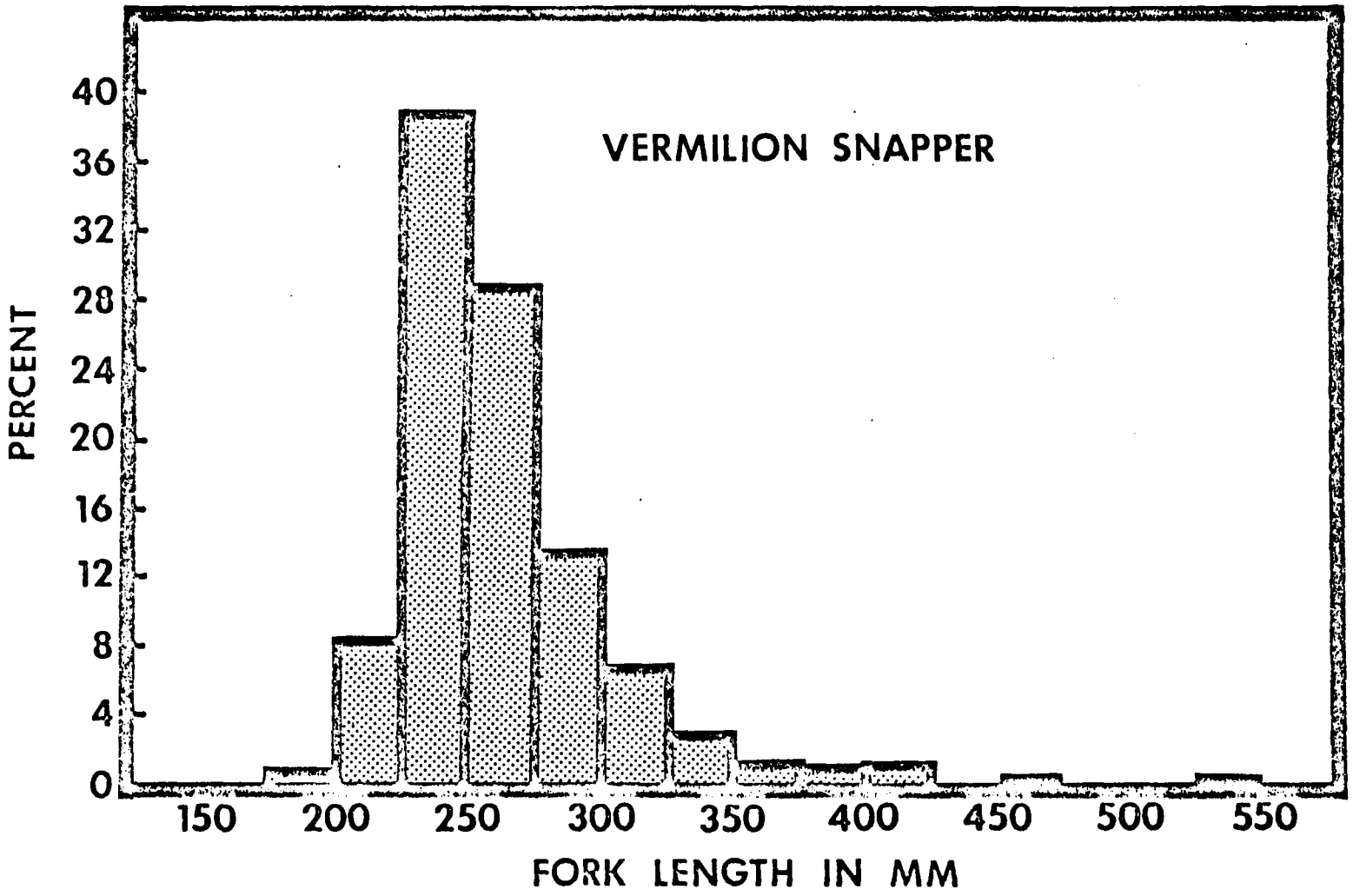

Figure 3. Length-frequency distribution of 793 tagged vermilion snapper.

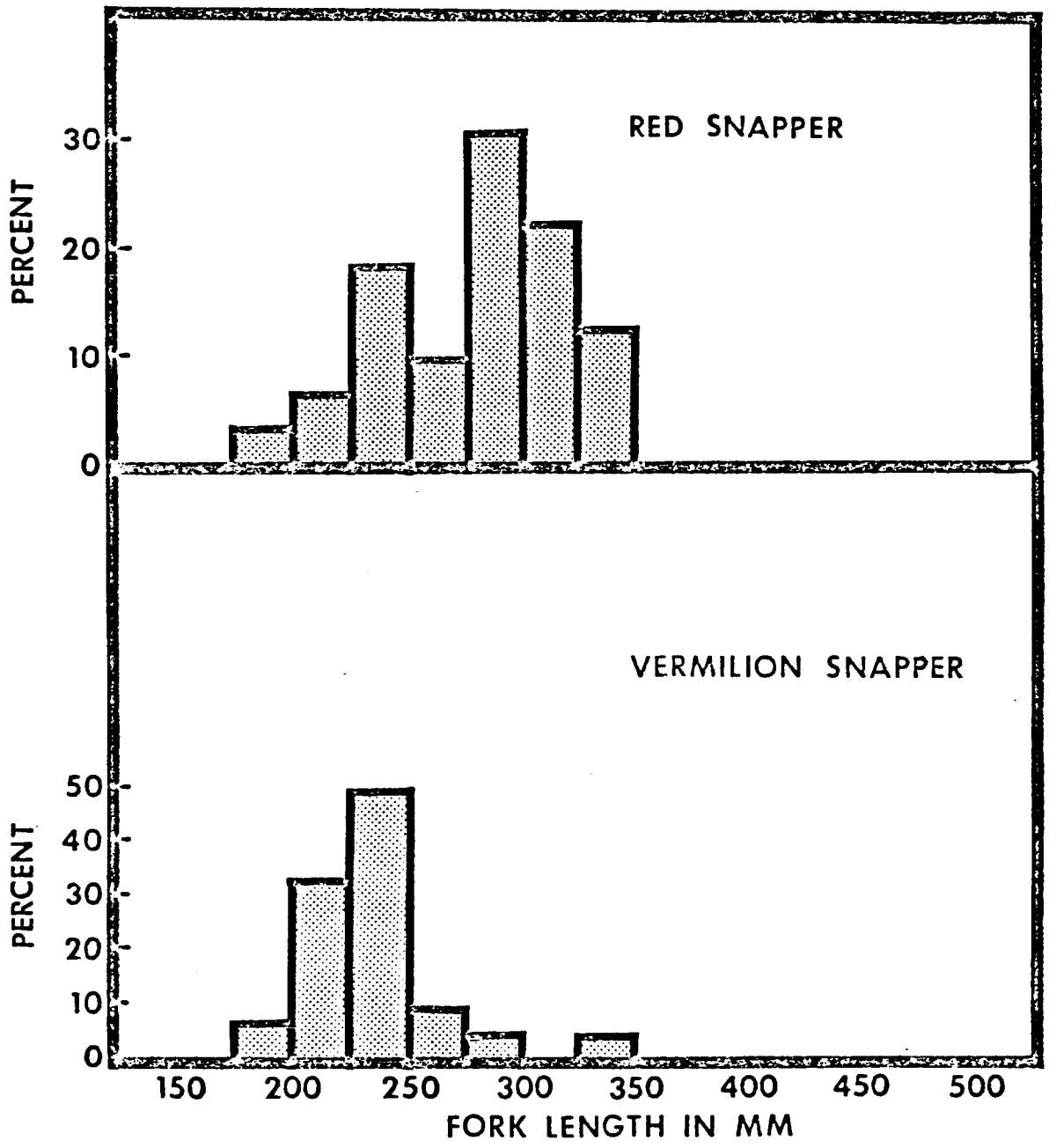

Figure 4. Length-frequency distribution of snappers tagged at Citgo Oil Rig A-76, summer, 1977.

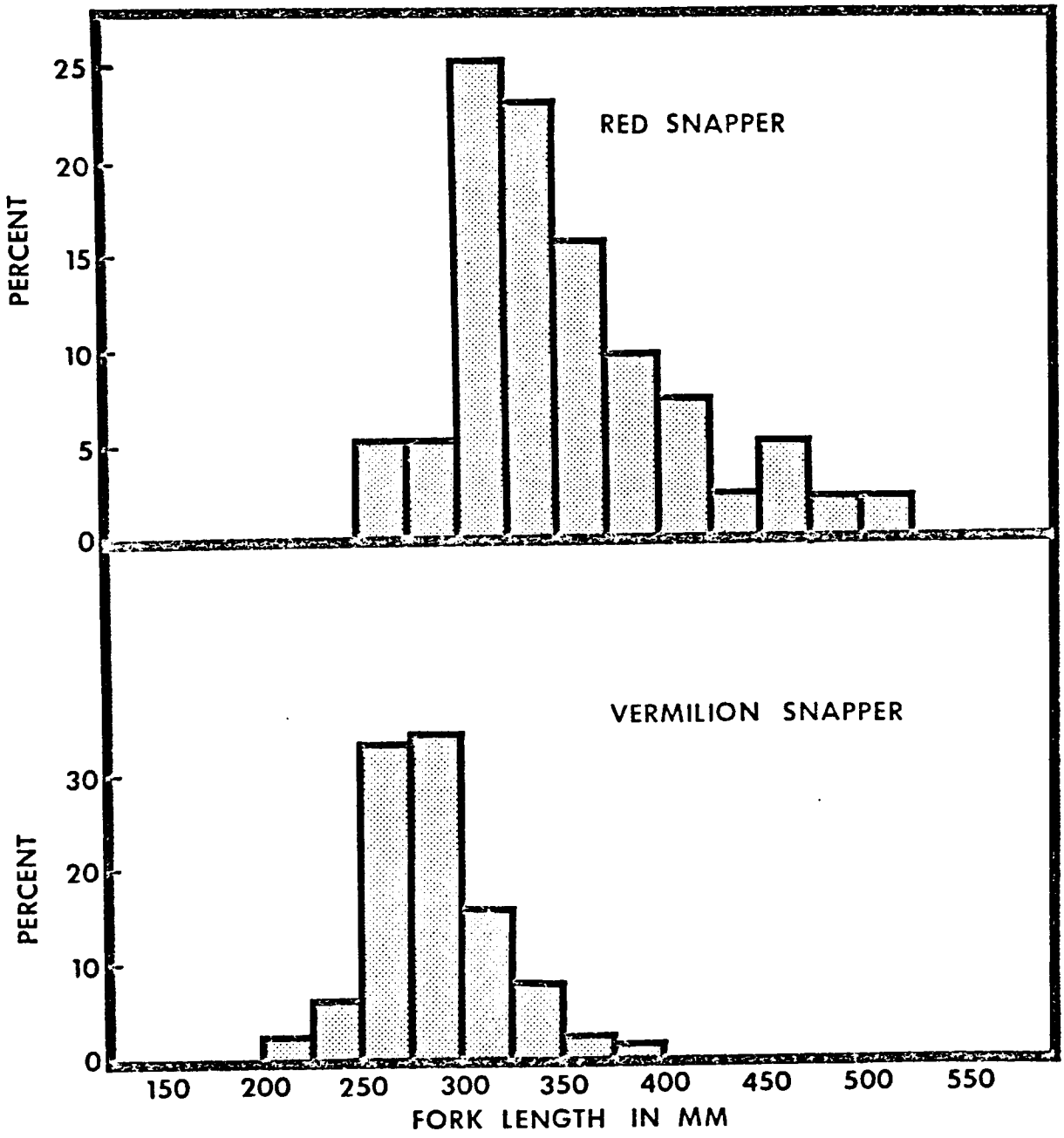

Figure 5. Length-frequency distribution of snappers tagged at Baker Bank, summer, 1977.

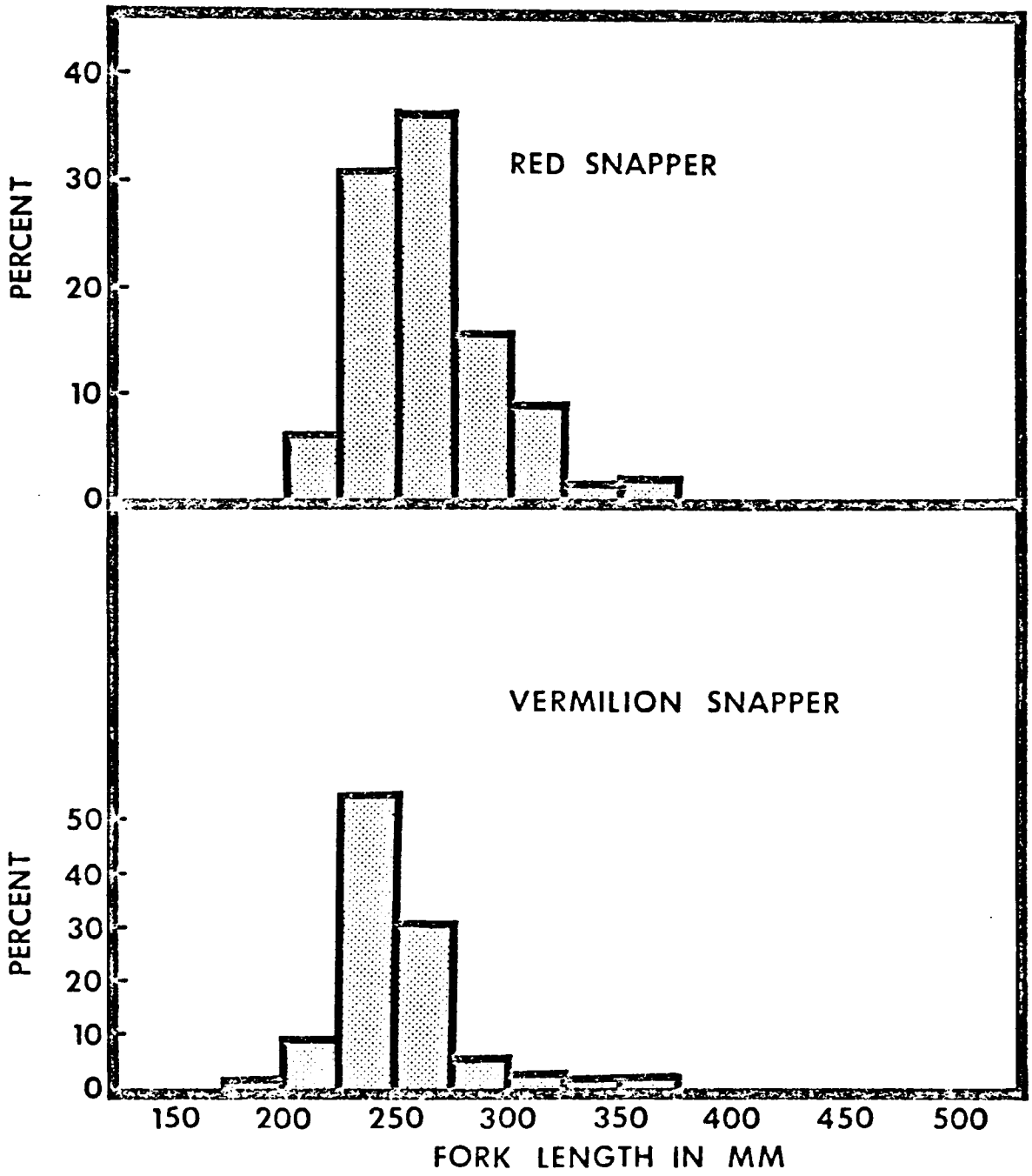

Figure 6. Length-frequency distribution of snappers tagged at Aransas Bank, spring, 1977.

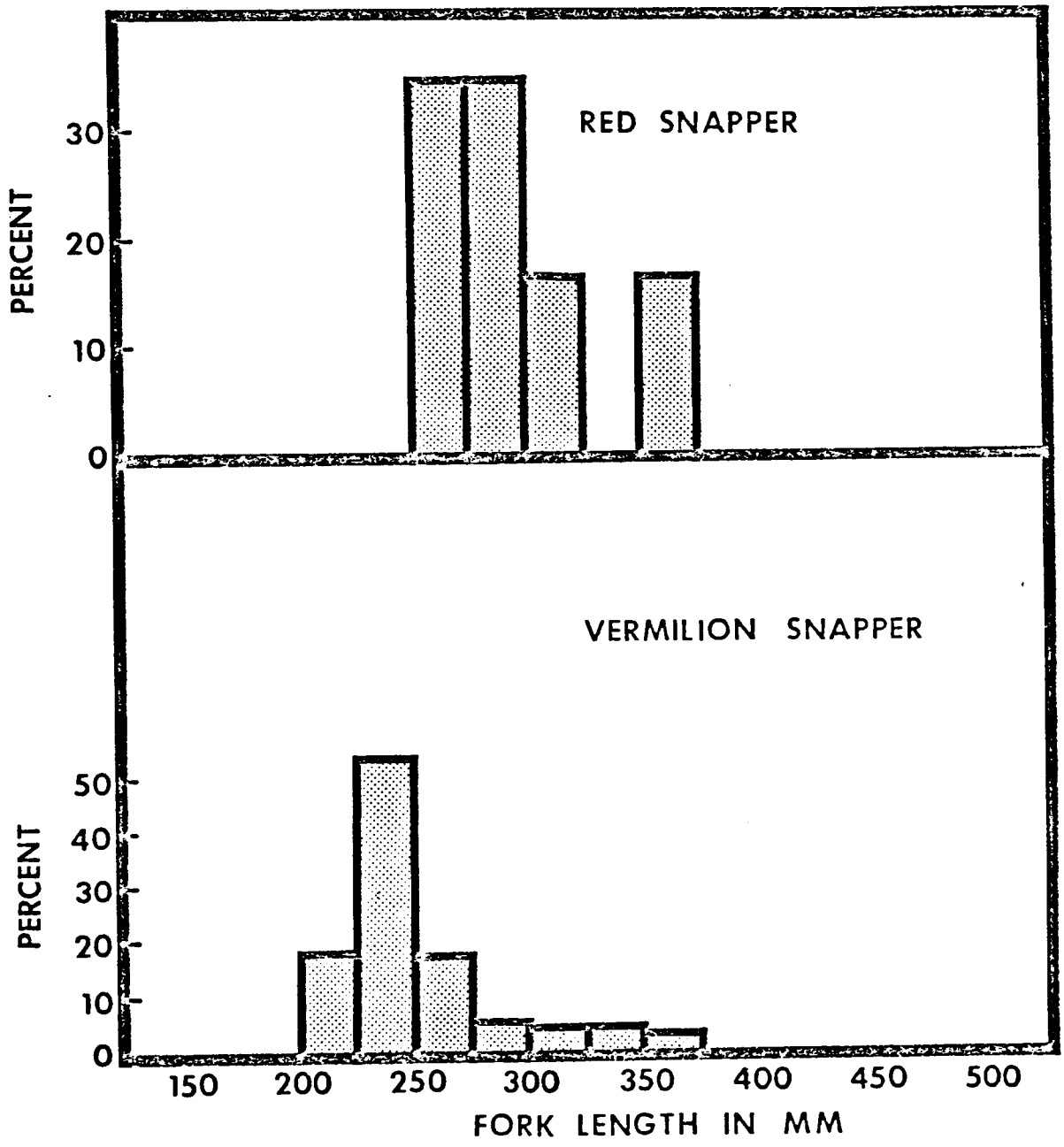

Figure 7. Length-frequency distribution of snappers tagged at Hospital Bank, spring, 1977.

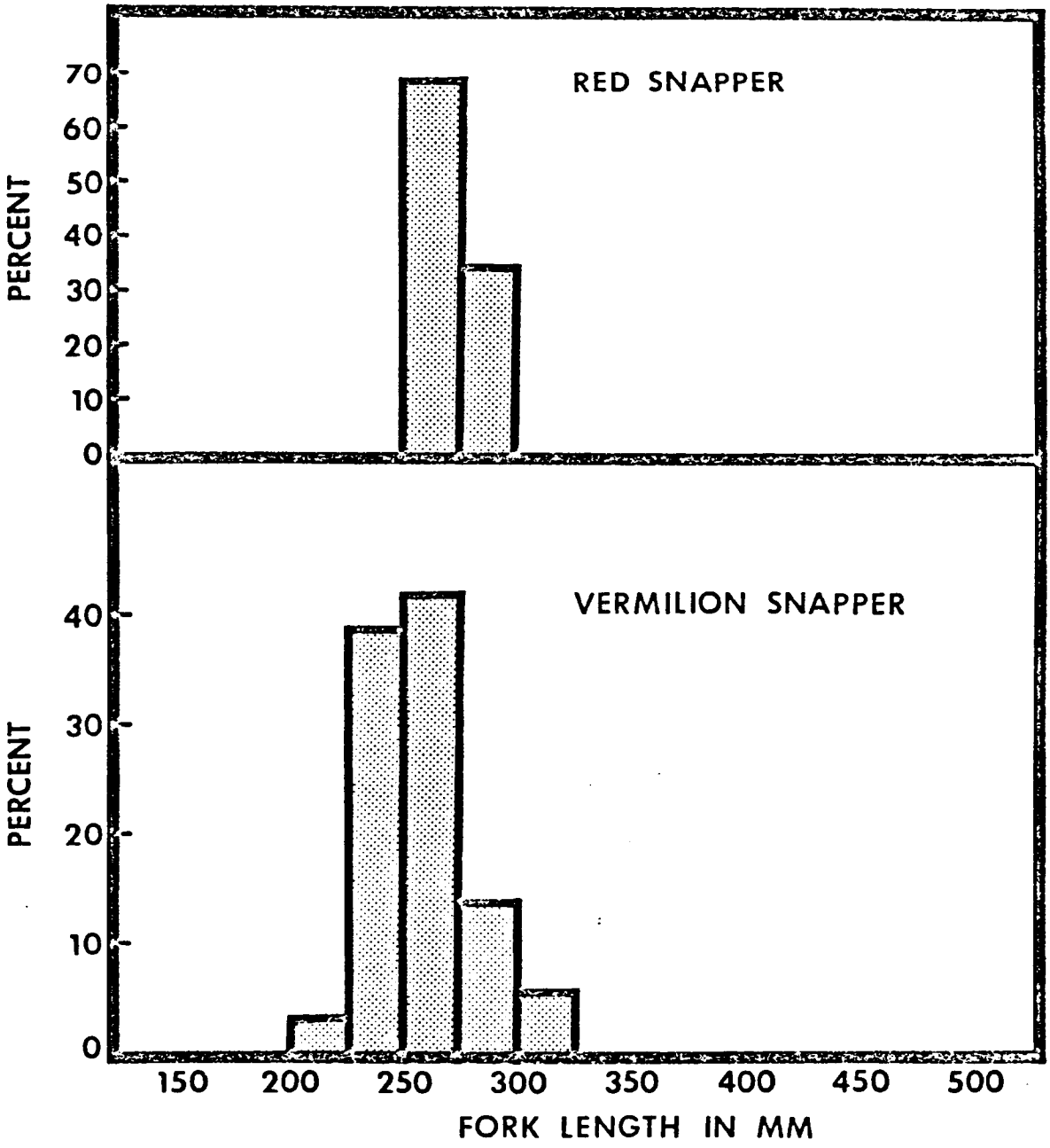

Figure 8. Length-frequency distribution of snappers tagged at Southern Bank, spring, 1977.

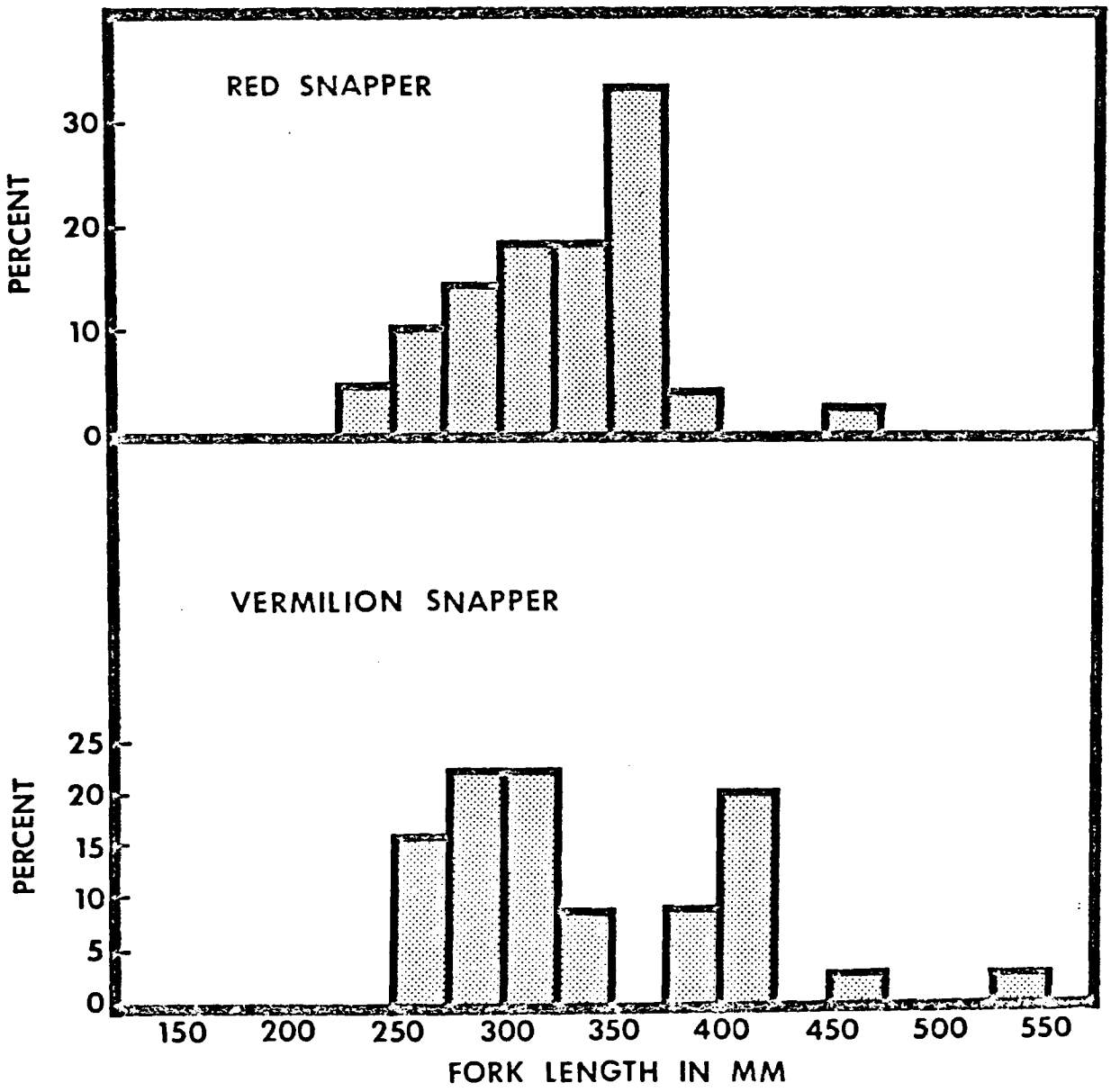

Figure 9. Length-frequency distribution of snappers tagged at Dream Bank, autumn, 1977.

Table 4. Numbers and fork lengths (mm) of tagged snappers.

Location	Red Snapper No.	Red Snapper FL range	Red Snapper $\bar{X}$	Vermilion Snapper No.	Vermilion Snapper FL range	Vermilion Snapper $\bar{X}$
Citgo Rig A-76	33	175-335	276	35	175-335	230
Baker Bank	61	260-520	350	175	215-380	281
Aransas Bank	148	210-360	261	314	195-350	242
Hospital Bank	6	250-350	290	91	210-360	245
Southern Bank	3	260-290	273	127	215-310	254
Dream Bank	52	235-470	326	37	260-535	335

There is a great variation in the change in length of returned snappers (Table 3). Even the red snapper with the longest period of freedom decreased in length. One explanation for this phenomenon was given by Topp (1963), who concluded that shrinkage caused by drying and freezing upon recapture, and the adverse effects of tags on the activities of fishes makes short term returns misleading in regards to actual growth.

Predation

Predation by larger fishes was a severe problem in at least two instances. At Southern Bank, amberjacks (Seriola dumerili) were observed to be schooling under the vessel and feeding on released snappers. Tagging was terminated there after this was observed. At Citgo Rig A-76, snappers had to be released immediately adjacent to the structure so that they would be less vulnerable to predation by barracudas (Sphyraena barracuda). In all cases, the amount of predation below the surface layers of the water column was unknown, and may have been considerable. Topp (1963) discussed this problem and others, and concludes that it will be a persistent concern in deep water tagging.

CONCLUSIONS

Results indicate that snappers of the sizes tagged are non-migratory for most of the year when tagged on the more prominent snapper banks off south Texas. Longer periods of freedom are required to document any possible long term movements. The groupers appear to be absent from these areas. Considerably more consistent sampling must be done before any meaningful indications of abundance or distribution can be determined.

The apparently non-migratory nature of these species at the size tagged requires that caution be used in any action which may alter

their habitat because any alteration may seriously affect the resident snapper population.

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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.