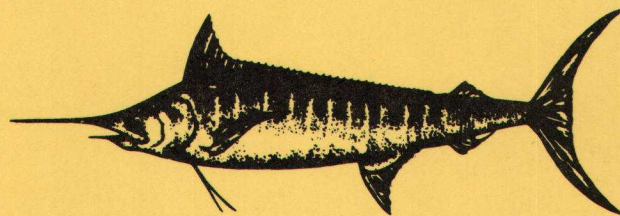


**NOAA Technical Memorandum
NMFS-SEFC-273**

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IN NORTHERN GULF OF MEXICO
DURING 1989**

**By
PAUL J. PRISTAS and ANNA M. AVRIGIAN**



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January 1991

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Exceptional support and cooperation by the recreational fishing community has been extended to the Recreational Billfishing Survey of the National Marine Fisheries Service. Recreational fishery constituents, by providing both direct and indirect assistance, have helped assure the successful outcome of this study. For this support, sincere appreciation is extended to those who helped (Table 1).

Port samplers conducted approximately 2,405 interviews during the 1989 season. For their help, I thank: Wm. "Hank" Geier, South Padre Island, TX; Richard Kersten, Destin, FL; Craig Marten, Pensacola, FL/Mobile, AL; Roy Spears and Pan Heard, Port Aransas, TX; and Joe Yurt, South Pass, LA.

INTRODUCTION

In the mid 1950s, the U.S. Bureau of Commercial Fisheries, now the National Marine Fisheries Service (NMFS), while conducting exploratory longline fishing off the Louisiana coast in the northern Gulf of Mexico, caught marlins (blue marlin, Makaira nigricans; white marlin, Tetrapturus albidus) and sailfish (Istiophorus platypterus) in abundances not previously anticipated. This discovery generated an interest in big game fishing in the northcentral Gulf that was so successful the sport quickly spread into the western and eastern north Gulf areas. Investigations were initiated from the NMFS Panama City, FL laboratory in 1970 to learn more about this fishery resource. The recreational billfishing survey was initiated to collect data for estimations of species abundance and distribution and to provide information about the biology and habitat preferences of these fishes. On-site survey methods were conducted to collect pertinent billfishing data at major ports and big game fishing events throughout the northern Gulf. In this report, data are generally listed for the three primary regions: northwestern, northcentral, and northeastern Gulf of Mexico (Fig.1). In the northwestern Gulf, Texas is divided into east Texas (Freeport, TX to the Texas-Louisiana border); central Texas (Port O'Connor to Corpus Christi); and south Texas (Port Mansfield to the Texas-Mexico border) for data management purposes.

CATCH AND EFFORT

To obtain estimates of relative billfish abundances, we relate fishing effort (i.e., hours trolling for billfishes) to catches (includes hooked and released fishes). Many factors, which may not be related to billfish abundance, can affect these measurements. Consequently, we consider our estimates as apparent relative abundances.

A total of 21,113 hours of trolling for billfishes was recorded throughout the 1989 season (Table 2). This was considerably less (18%) than the 25,675 hours recorded in 1988. This decrease could have resulted from several factors directly or indirectly related to billfishing. A large influx of sea grass, mainly Sargassum sp. occurred into the northern Gulf during most of the 1989 season. Scattered sea grasses presented such a problem to fishermen that many anglers were discouraged from fishing. During the 1989 season, funding was not available for a port sampler at Grand Isle, Louisiana, an area from which we have record 1,000 to 3,000 hours of billfishing effort in previous seasons. Not only was the recorded effort less (25%) than the previous year in the northcentral Gulf, but was also down 11% and 23% in the northeastern Gulf and northwestern Gulf,

respectively, compared to 1988. The measured decrease in all three regions suggests the decline may be related more to an actual decline in fishing activity rather than a function of sampling intensity. Trolling effort sampled during the 1989 season was 10% lower than the average amount sampled during the previous 18 years.

This survey recorded 488 billfishes caught (i.e., boated or released) while trolling for big game fishes, of which 307 (63%) were blue marlin; 123 (25%) were white marlin; 56 (11%) were sailfish; and one each swordfish, Xiphias gladius, and longbill spearfish, Tetrapturus pfluegeri, (Tables 2 and 3). A combination of state and federal laws regulating the retention of billfishes, plus an active interest by sport fishermen in the release of their catches has resulted in a majority of the catch being released. Sixty percent of the reported catches of billfishes during the 1989 season were released. This was the second year (51% in 1988) that more billfishes were reported released than boated, continuing a trend that has been increasing since 1985. By species, 63% of the blue marlin, 72% of the white marlin, and 23% of the sailfish were reported as released catches during the season (Fig. 2). Some of the releases may die as tagging mortality estimates for billfishes are not available. All three regions showed an increase over the previous year, in the percentage of catches that were released. The northcentral Gulf, again, showed the highest proportion of released fishes as 79% of the catch was released compared to 67% in 1988. In the northeastern Gulf, 63% of the catch was released vs. 50% in 1988. In the northwestern Gulf, the release rate was 43% vs. 39% in 1988.

While conducting this survey, information on driftfishing (i.e., drifting dead bait rigged for swordfish) is recorded for documentation. Because there is a change in fishing method, gear, and target species, data on driftfishing are not included in the trolling effort analyses. In 1989, 621 hours of driftfishing were reported; 232 hours more than the previous year. In conjunction with this year's reported driftfishing effort, catches of nine swordfish and two blue marlin were recorded.

RELATIVE ABUNDANCE

The measure of the numbers of fishes hooked divided by fishing effort (i.e., hours trolled) is our indicator of relative abundance. Many factors, such as a fish getting hooked more than once, random sampling errors, fishes not rising to baits, etc. can affect this measure. With these considerations, we use the number of fish hooked-per-hour-of-trolling (HPUE) as our best estimate of apparent relative abundance.

Figure 3 shows yearly apparent relative abundance estimates for marlins and sailfish during the 19 years of this study. The 1989 data showed the HPUE (0.023) for blue marlin was the lowest since 1978. After a comparatively stable 4-year period (1984-1987), the relative abundance index for blue marlin declined in the past two seasons. The 1989 rate was 12% below the 19-year average HPUE (0.026). The 1988-1989 comparisons showed declines in two of the three Gulf zones: 0.024 vs. 0.023, northeastern Gulf; 0.031 vs. 0.023, northcentral Gulf. In the northwestern Gulf, the HPUE increased from 0.017 in 1988 to 0.027 in 1989. Many factors could contribute to the overall decline, which should be closely observed for continuing trends.

After reaching the lowest level (0.022) in the duration of this study in 1988, the HPUE (0.011) for white marlin in 1989 declined even further (Fig.3). The 1989 rate was 71% below the 19-year average HPUE (0.038), basically continuing a 7-year declining trend. Compared to the 1988 season, the HPUE rate declined in all three Gulf regions in 1989: 0.031 vs. 0.014, northeastern Gulf; 0.013 vs. 0.007, northcentral region; and 0.014 vs. 0.008, northwestern region. The duration of the decline in white marlin HPUE rates suggests there has been a decrease in the availability of white marlin in the northern Gulf recreational fishery over the past several seasons.

After an encouraging increase in HPUE in 1988, the HPUE (0.003) for sailfish in 1989 was the lowest in the 19 years of this study (Fig.3). In only one year (1981) of the last 12 years has the annual HPUE been above the accumulative yearly average. The 1989 HPUE for sailfish was 80% below the 19-year average HPUE (0.015). Recreational fishermen along the northern Gulf coast have frequently remarked about the sparsity of sailfish in their catches during the past several seasons.

The decline in each species HPUE resulted in the 1989 overall HPUE (0.037) for billfishes (i.e., marlins and sailfish) being the lowest in the history of this study (Fig.3). The 1989 HPUE rate was 53% below the 19-year average HPUE (0.079) and was the fifth consecutive year of remaining below the accumulative yearly averages. Between 1975-1978, there was a decreasing trend in the apparent abundance of billfishes. Starting in 1979, this trend was reversed for several years. However, since 1985, a declining trend has persisted until present.

WEIGHTS

In conjunction with the collection of catch-and-effort data, information on fish size (i.e., weight and length) is recorded when available. Size information is necessary for many analyses used to evaluate the management of fishery resources. Table 4 includes weight measurements recorded for fishes caught while

driftfishing and live baiting, as well as, trolling. Fluctuations in yearly average weights and the 19-year average weight are shown in Fig.4. In recent years, tournament regulations on minimum sizes and the federal Fishery Management Plan's (FMP) size regulations have had direct effect on the size of fishes brought to the dock. Consequently, current size data may not represent the actual average size in various populations of billfishes.

The heaviest (779.3 pound/353.5 kilograms) blue marlin recorded in 1989 was landed in the northeastern Gulf (Table 4). The average size (300.8 pounds/136.4 kilograms), for blue marlin in 1989 was the highest in the duration of this study (Fig.4). Over the 19-year period of this study, no increasing or decreasing trend in the average weight of blue marlin has been apparent.

In the northwestern Gulf, only one white marlin weight was recorded, which turned out to be the heaviest (70.0 pounds/31.8 kilograms) for this species in the northern Gulf (Table 4). The fish was 16.7 pounds/7.6 kilograms heavier than the average (53.3 pounds/24.2 kilograms) white marlin recorded in the study area during the season (Fig.4). Over the past five years, the yearly average weights have remained fairly close to the 19-year average weight of 53.0 pounds/24.0 kilograms.

The largest (63.0 pounds/28.6 kilograms) and smallest (24.0 pounds/10.9 kilograms) sailfish (Table 4) were reported from opposite sides of the study area: largest from central Texas (northwestern Gulf); smallest from St. Petersburg, Florida, (northeastern Gulf). During the 19-years of this survey, the yearly average size of sailfish has remained between 41 pounds/18 kilograms and 45 pounds/20 kilograms with two exceptions: 1971 and 1973 (Fig.4).

BAITS

Data on the types of bait are collected and analyzed because changes in fish baits, as well as the method of fishing them, could possibly affect catch or hook rate analyses. Prior to the late 1970s, dead, natural baits were used almost exclusively. Since that time, fast trolling with artificial baits became the predominant method of billfishing. Recently, there have been some reports of using live baits and trolling extremely slowly.

The number of fishes hooked and the amount of fishing effort recorded for the various baits and bait combinations are given for the three Gulf regions in Table 5. The use of artificial baits only was predominant, accounting for 85% of the reported effort. The next most frequent method was trolling natural and artificial baits at the same time (i.e., simultaneously), which accounted for 9% of the effort. The use of dead baits only

resulted in the highest HPUE (0.066) overall, and in two (i.e., northeastern and northwestern Gulf) of the three Gulf regions. However, when natural and artificial baits were trolled simultaneously, artificial baits produced the higher (0.021) HPUE. These results for the northern Gulf are shown in Fig.5, with dead baits accounting for 48% of the HPUE when the various baits were used independently. When natural and artificial baits were trolled simultaneously, 57% of the HPUE rates were produced by artificial baits.

TIME OF DAY

Fishing activity, as determined by HPUE, for hourly periods of the day are shown in Fig.6. The HPUE for blue marlin was highest during the 1600 hour period, with secondary peaks at 1100 and 1400 hours. White marlin appeared to have two major activity periods: 1100 and 1600 hours. Sailfish appeared to be equally active at 1100 hours and 1500 hours. For the three species combined, the 1100 hour period had the highest reported HPUE (0.052). This result is similar to the findings in previous years, when time-of-day analyses were done, consistently showing peak activity occurred between 1000 and 1200 hours.

FISHING AREAS

Anglers, while reporting on their fishing activities, often express interest in where others have fished and with what results. Summarizations of fishing activity by 10-minute latitude and longitude blocks for the three regions of the northern Gulf are given in Figs.7-9. These "fishing charts", as they have become known, contain data for blocks in which 10 or more hours of trolling occurred. In accordance with previous reports, low, mid, and high value symbols and the numbers of billfishes raised-per-hour-of-trolling are shown for blocks where billfishes were reportedly raised.

Fishermen in the northeastern Gulf (Fig.7) reported fishing over a considerably larger (26%) area in 1989 compared to 1988 (96 vs. 76 blocks). The apparently expanded effort to locate fish did not bring the anticipated results, as 25% of the fishing area did not produce fish, compared to the 14% fishless area (i.e., blank blocks) in 1988. The distribution of mid and high value blocks occurred more towards the peripheral of the fishing area than towards the center.

In the northcentral Gulf (Fig.8), a 12% (43 blocks) smaller fishing area was reported than in 1988 (49 blocks), and may well reflect reduced sampling effort in Grand Isle, Louisiana. The percentage (28%) of blank blocks was more than twice that (12%) reported in 1988. These findings support the reduction in apparent relative abundance reported earlier.

An 11% (73 blocks) larger fishing area was recorded for the northwestern Gulf (Fig.9) during the season than the area (66 blocks) recorded in 1988. The percentage of blank blocks increased from 18% (12 blocks) in 1988 to 26% (19 blocks) in 1989. The area fished north (35 blocks) and south (38 blocks) of 27°N latitude was nearly equal. All of the high value blocks and 9 of the 11 mid-value blocks were in the northern area, suggesting that better concentrations of billfishes occurred in the more northern latitudes.

RELATED CONCENTRATIONS

1. On 12 April, the first catch of a billfish was reported. A 450.0 pound/204.1 kilogram was reported landed at Grand Isle.

2. Keeping it all in the family, a new Alabama state record was set during 1989 season. On 27 May, Marcus R. Kennedy brought in a 779.3 pound/353.5 kilograms blue marlin aboard the "Kwazar", during the Mobile Big Game Fishing Club's Memorial Day Tournament. While fishing the same tournament from the same boat in 1988, Michael Kennedy (Marcus' brother) established the Alabama state record with a 687.8 pound/312.0 kilograms blue marlin.

3. In contrast to the 1988 season when two "grand slams" (i.e., catches of a blue marlin, white marlin, and sailfish on a 1-day trip) were recorded, no "grand slams" were reported during the 1989 season.

Table 1. Persons and tournament organizations that actively assisted the NMFS Recreational Billfishing Survey in the northern Gulf of Mexico during the 1989 fishing season.

Name	Location
George Ballard	Pensacola, FL
Bay Point International Tournament	Panama City, FL
Blue Marlin Classic Tournament	Perdido Key, FL
East Pass Towers Tournament	Destin, FL
Florida West Coast Championship Tournaments	Madeira Beach, FL
Fort Walton Beach Sailfish Club	Ft. Walton Beach, FL
Nancy Hanna	Pensacola, FL
Jim Hubbard	Houston, TX
Mobile Big Game Fishing Club/Ladies	Mobile, AL
New Orleans Big Game Fishing Club/Ladies	New Orleans, LA
Pensacola Big Game Fishing Club/Ladies	Pensacola, FL
Poco Bueno Tournament	Port O'Connor, TX
Donni� Rozier	Pensacola, FL
Mary Rozier	Pensacola, FL
Teresa Rutherford	Pensacola, FL
Sportsmans Blue Marlin Tournament	Orange Beach, AL
Betty Tubbs	San Benito, TX
Bonnie Yaste	Pensacola, FL

Table 2. Hours trolled and billfishes raised (R), hooked (H), and boated/released (B/R) in the northern Gulf of Mexico, 1989.

	Hours trolled	Blue marlin			White marlin			Sailfish			Swordfish			Spearfish			All species		
		R	H	B/R	R	H	B/R	R	H	B/R	R	H	B/R	R	H	B/R	R	H	B/R
Northeast Gulf	11,530	337	260	56/91	221	163	27/54	9	8	4/3	2	1	1/0	1	1	1/0	570	433	89/148
St. Petersburg	461	6	4	3/0	6	4	3/0	2	2	2/0	0	0	0/0	0	0	0/0	14	10	8/0
Panama City	1,905	52	36	7/11	35	15	6/1	2	2	1/0	1	0	0/0	0	0	0/0	90	53	14/12
Destin	3,159	106	63	14/26	63	37	8/18	1	0	0/0	0	0	0/0	0	0	0/0	170	100	22/44
Pensacola	3,106	89	75	21/27	79	73	3/24	3	3	1/2	1	1	1/0	1	1	1/0	173	153	27/53
Mobile	2,899	84	82	11/27	38	34	7/11	1	1	0/1	0	0	0/0	0	0	0/0	123	117	18/39
Northcentral Gulf																			
South Pass	5,873	191	130	16/55	57	39	1/19	1	1	0/1	0	0	0/0	0	0	0/0	249	170	17/75
Northwest Gulf																			
East Texas	3,710	124	99	32/37	36	28	5/13	84	53	39/8	0	0	0/0	0	0	0/0	244	180	76/58
Central Texas	172	16	16	6/9	3	3	1/1	0	0	0/0	0	0	0/0	0	0	0/0	19	19	7/10
South Texas	1,383	76	60	19/18	19	14	2/5	39	31	21/5	0	0	0/0	0	0	0/0	134	105	42/28
South Texas	2,155	32	23	7/10	14	11	2/7	45	22	18/3	0	0	0/0	0	0	0/0	91	56	27/20
Total all area	21,113	652	489	104/183	314	230	33/86	94	62	43/12	2	1	1/0	1	1	1/0	1,063	783	182/281

Table 3. Numbers of billfishes reported as boated or released (B/R) with no accompanying data on fishing hours in the northern Gulf of Mexico, 1989.

	Number					
	Blue marlin	White marlin	Sailfish	Swordfish	Spearfish	All species
Northeastern Gulf	4/5	0/3	0/1	0/0	0/0	4/9
St. Petersburg	0/0	0/0	0/0	0/0	0/0	0/0
Panama City	0/0	0/0	0/0	0/0	0/0	0/0
Destin	0/0	0/0	0/0	0/0	0/0	0/0
Pensacola	4/5	0/3	0/1	0/0	0/0	4/9
Mobile	0/0	0/0	0/0	0/0	0/0	0/0
Northcentral Gulf	2/1	1/0	0/0	0/0	0/0	3/1
South Pass	0/0	0/0	0/0	0/0	0/0	0/0
Grand Isle	1/1	0/0	0/0	0/0	0/0	1/1
Mississippi	1/0	1/0	0/0	0/0	0/0	2/0
Northwestern Gulf	5/3	0/0	0/0	0/0	0/0	5/3
East Texas	5/3	0/0	0/0	0/0	0/0	5/3
Central Texas	0/0	0/0	0/0	0/0	0/0	0/0
South Texas	0/0	0/0	0/0	0/0	0/0	0/0
Total all area	11/9	1/3	0/1	0/0	0/0	12/13

Table 4. Weights (pounds) of billfishes recorded in conjunction with fishing effort in the northern Gulf of Mexico, 1989.

	St. Petersburg	Panama City	Destin	Pensacola	Mobile	South Pass	East Texas	Central Texas	South Texas	Total combined
Blue marlin:										
# weighed	2	6	13	23	10	16	4	19	6	99
Largest	651.5	295.0	469.2	607.3	779.3	509.5	300.0	500.0	502.5	779.3
Smallest	367.0	172.3	180.0	162.5	235.3	139.2	226.5	175.0	156.0	139.2
Average	509.3	223.2	269.8	315.1	387.3	299.9	268.1	285.5	250.5	300.8
White marlin:										
# weighed	3	6	5	3	6	1	1	0	0	25
Largest	53.0	57.5	50.0	62.3	69.0	48.5	70.0	0	0	70.0
Smallest	45.0	53.0	42.0	49.3	48.9	48.5	70.0	0	0	42.0
Average	50.0	55.4	47.0	54.9	55.5	48.5	70.0	0	0	53.3
Sailfish:										
# weighed	2	1	0	1	0	0	0	18	16	38
Largest	38.5	40.0	0	53.0	0	0	0	63.0	58.5	63.0
Smallest	24.0	40.0	0	53.0	0	0	0	29.0	32.2	24.0
Average	31.3	40.0	0	53.0	0	0	0	44.5	44.1	43.7
Swordfish:										
# weighed	1	0	1	2	1	0	0	1	0	6
Largest	54.0	0	95.0	56.0	140.2	0	0	65.0	0	140.2
Smallest	54.0	0	95.0	21.3	140.2	0	0	65.0	0	21.3
Average	54.0	0	95.0	38.6	140.2	0	0	65.0	0	71.9
Spearfish:										
# weighed	0	0	0	1	0	0	0	0	0	1
Largest	0	0	0	23.0	0	0	0	0	0	23.0
Smallest	0	0	0	23.0	0	0	0	0	0	23.0
Average	0	0	0	23.0	0	0	0	0	0	23.0

Table 5. Hours trolled and number of billfishes hooked-per-hour-of-trolling (HPUE) with various baits fished in the northern Gulf of Mexico, 1989.

	<u>Dead bait only</u>		<u>Live bait only</u>		<u>Artificial bait only</u>		<u>Both simultaneously</u>		
	Hours trolled	HPUE	Hours trolled	HPUE	Hours trolled	HPUE	Hours trolled	Nat. HPUE	Art. HPUE
Northeastern Gulf	606	.054	126	.032	9,331	.037	1,466	.016	.020
Northcentral Gulf	14	.000	0	.000	5,801	.029	58	.000	.017
Northwestern Gulf	386	.085	110	.045	2,909	.044	303	.020	.026
All three areas	1,006	.066	236	.038	18,041	.035	1,827	.016	.021

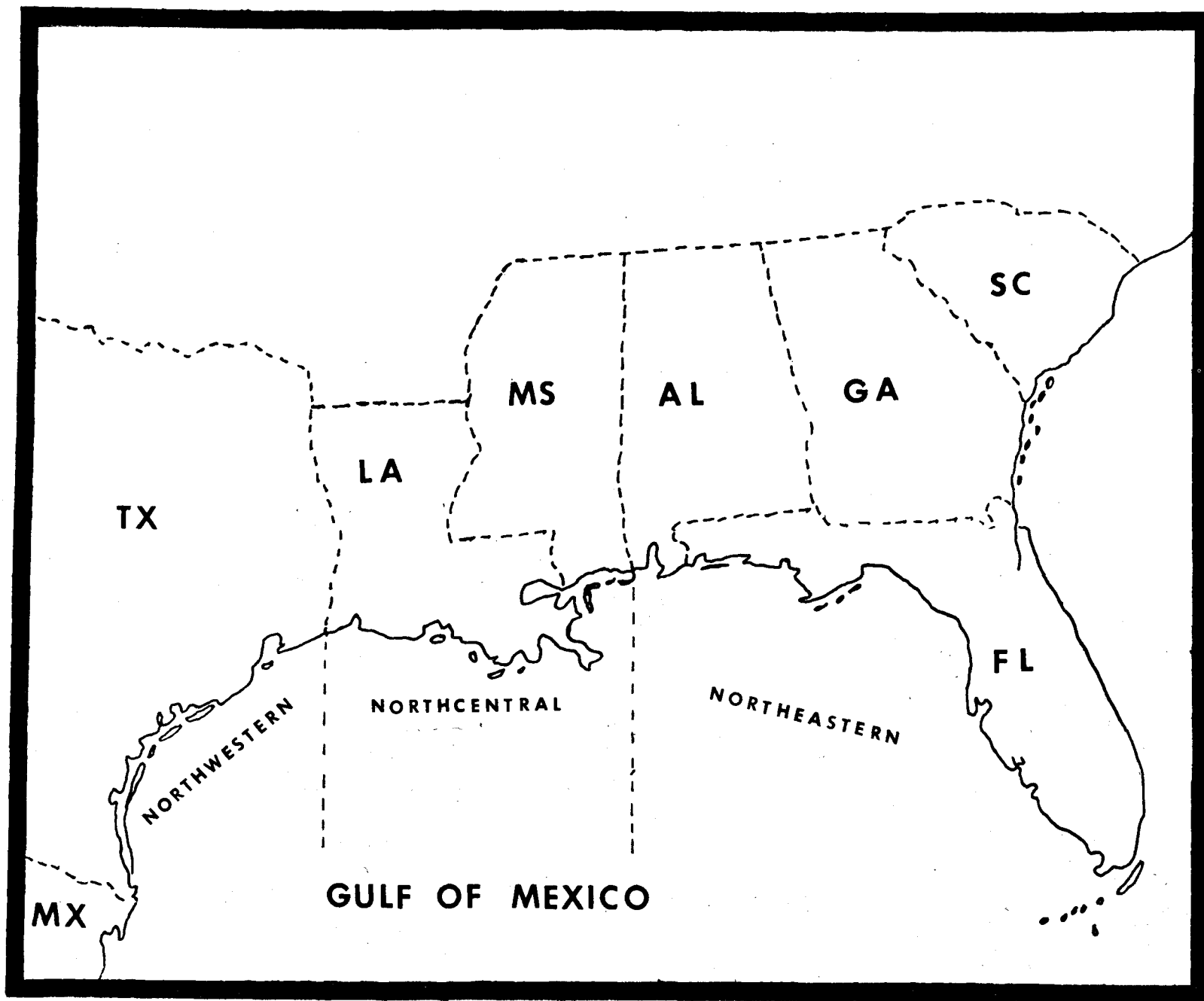
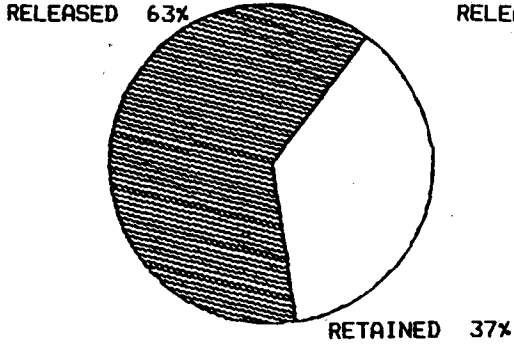


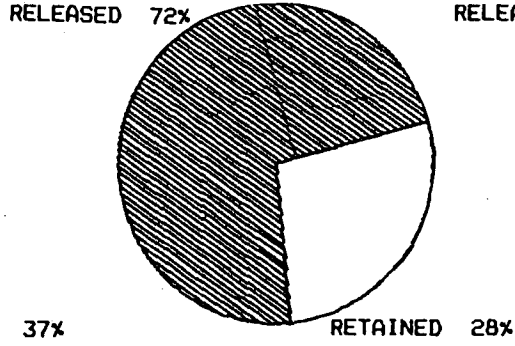
Figure 1. Three primary regions of the Recreational Billfishing Survey in the northern Gulf of Mexico.

S P E C I E S

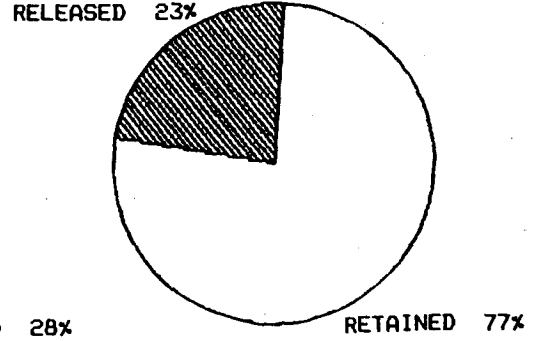
BLUE MARLIN



WHITE MARLIN

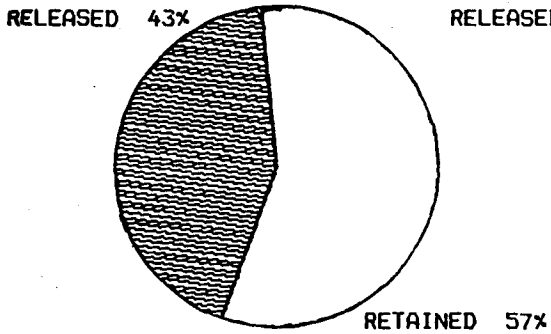


SAILFISH

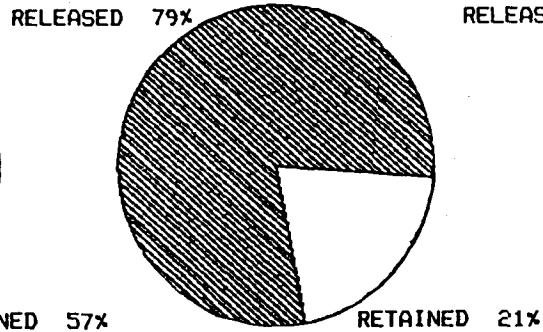


A L L B I L L F I S H E S

NORTHWESTERN GULF



NORTHCENTRAL GULF



NORTHEASTERN GULF

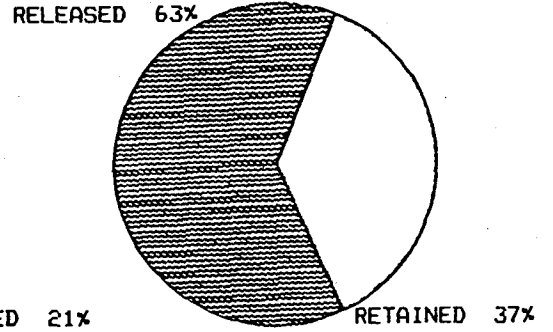


Figure 2. Percentage of billfishes released vs. retained by species and by area in the northern Gulf of Mexico, 1989

NUMBER OF FISH HOOKED--PER--HOUR--TROLLING (HPUE)

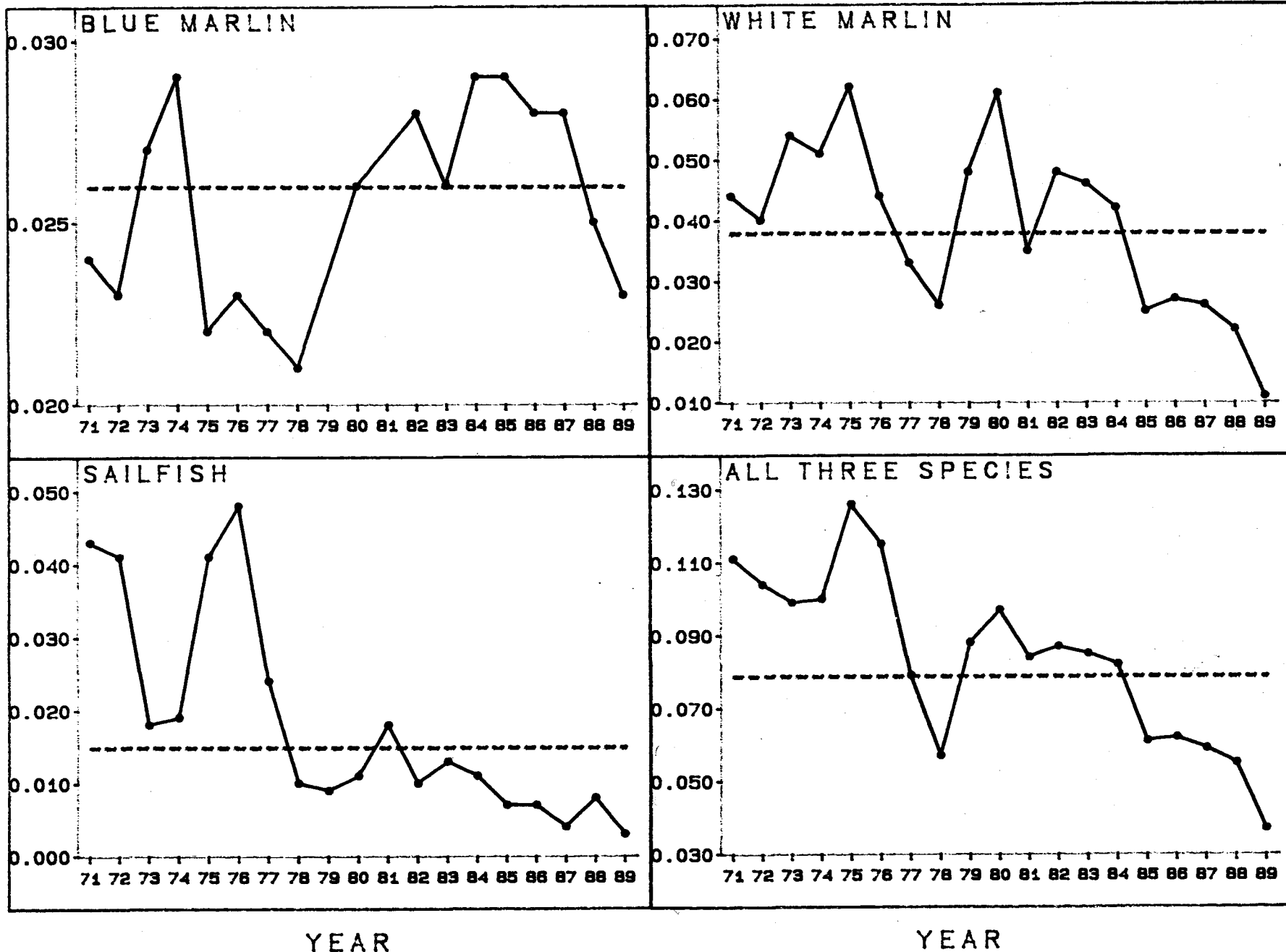


Figure 3. Numbers of billfishes hooked--per--hour--of--trolling (HPUE) in northern Gulf of Mexico, 1971-1989. Dashed line indicates 19-year averages of each category.

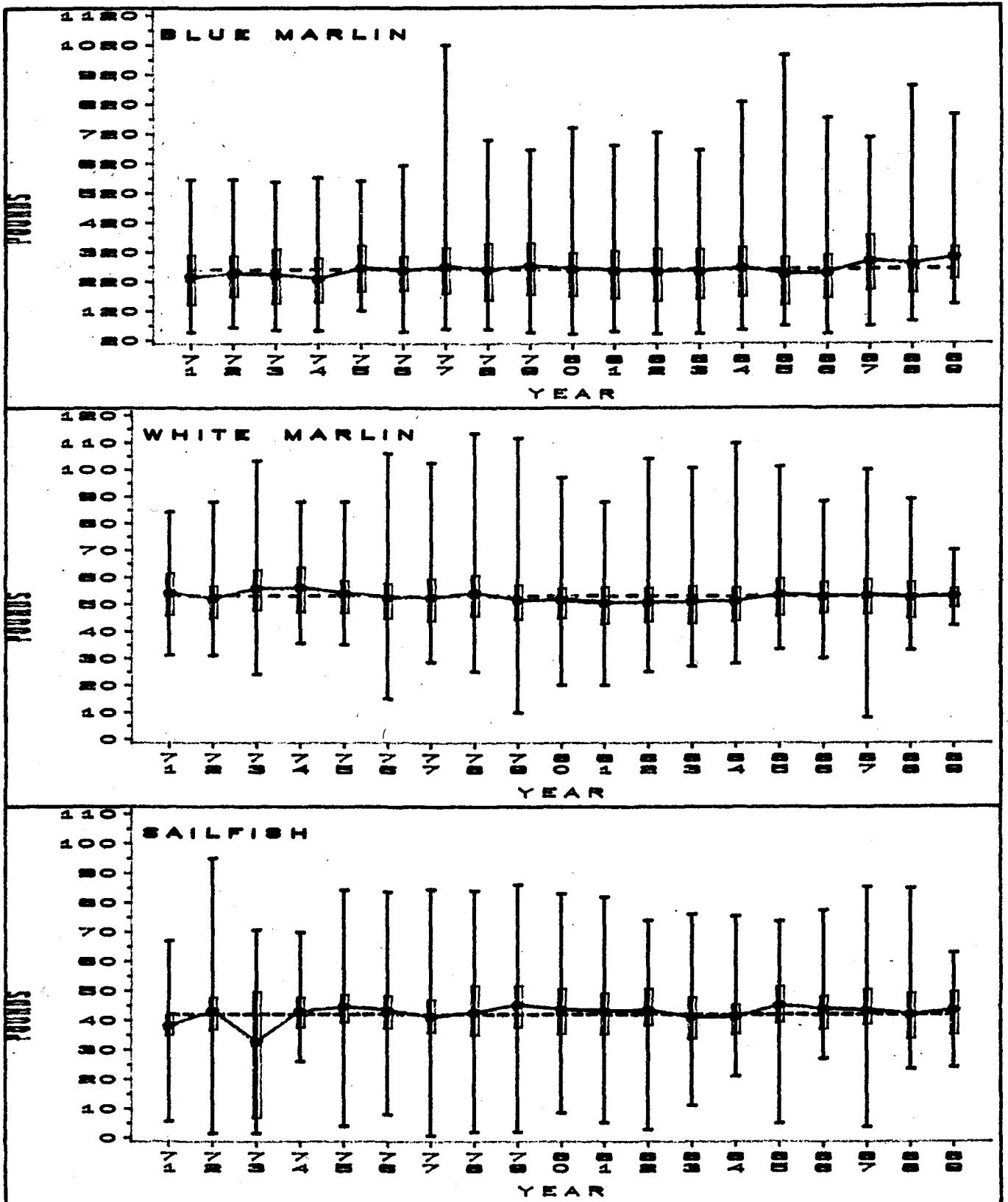
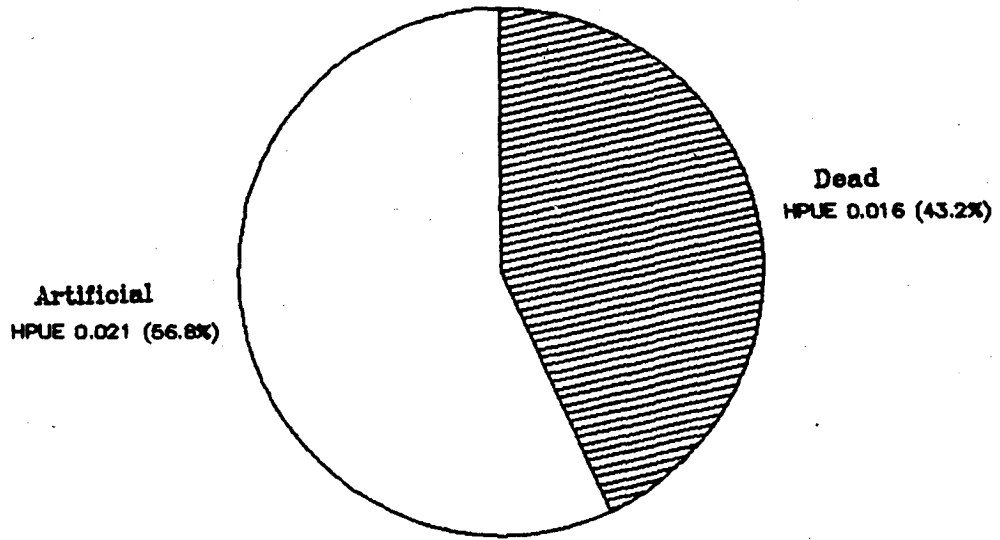


Figure 4. Yearly average weights (lbs) of billfishes with range (vertical line) and 50% grouping (rectangle) around mean weight. Dash d lin indicates 19-year average weight, 1971-1989.

BAITS USED SIMULTANEOUSLY



BAITS USED INDEPENDENTLY

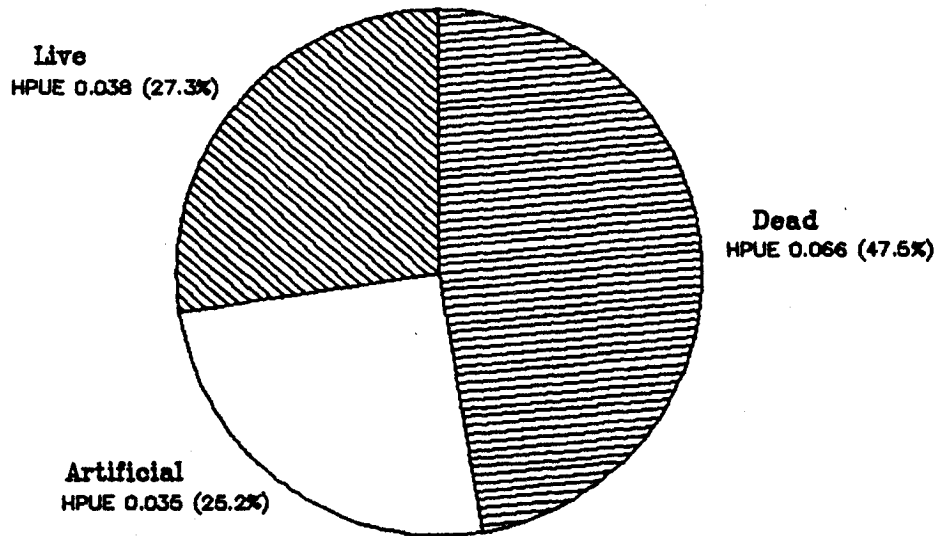


Figure 5. Numbers of billfishes hooked--per--hour--trawling (HPUE) and percent of HPUE for various baits fished in the northern Gulf of Mexico, 1989.

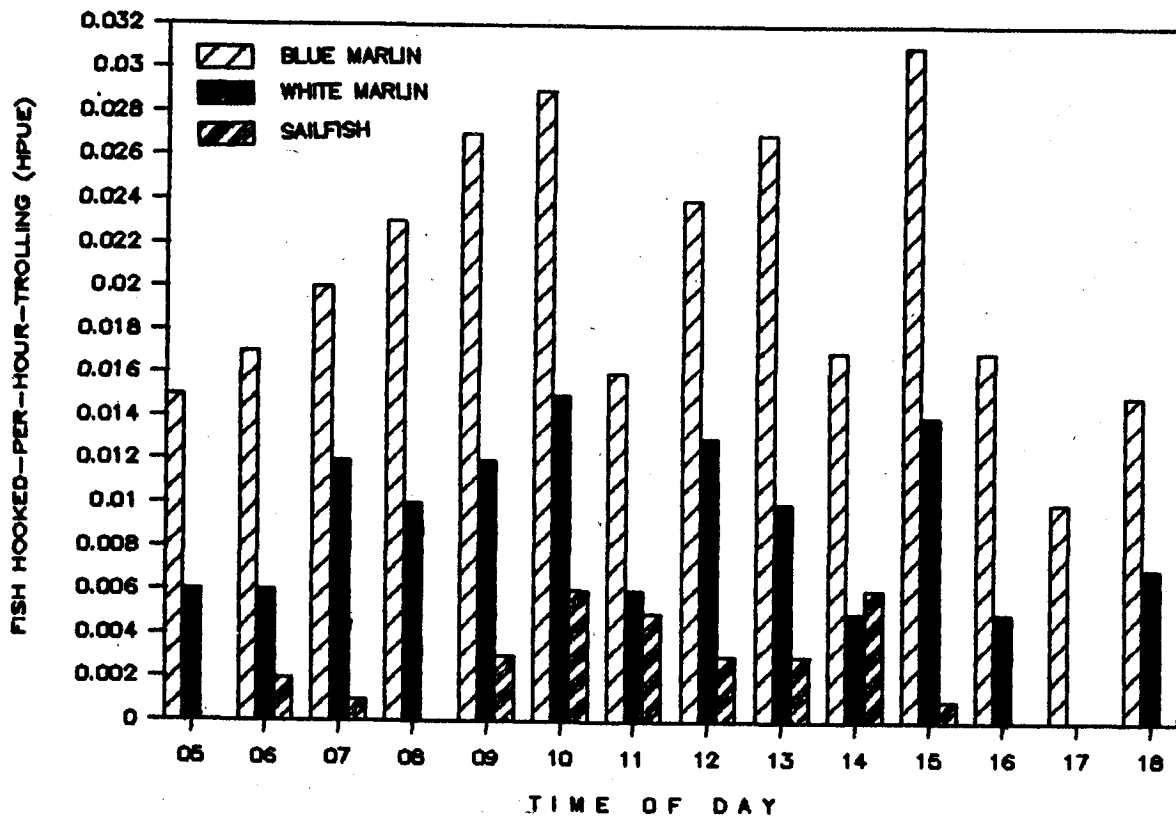
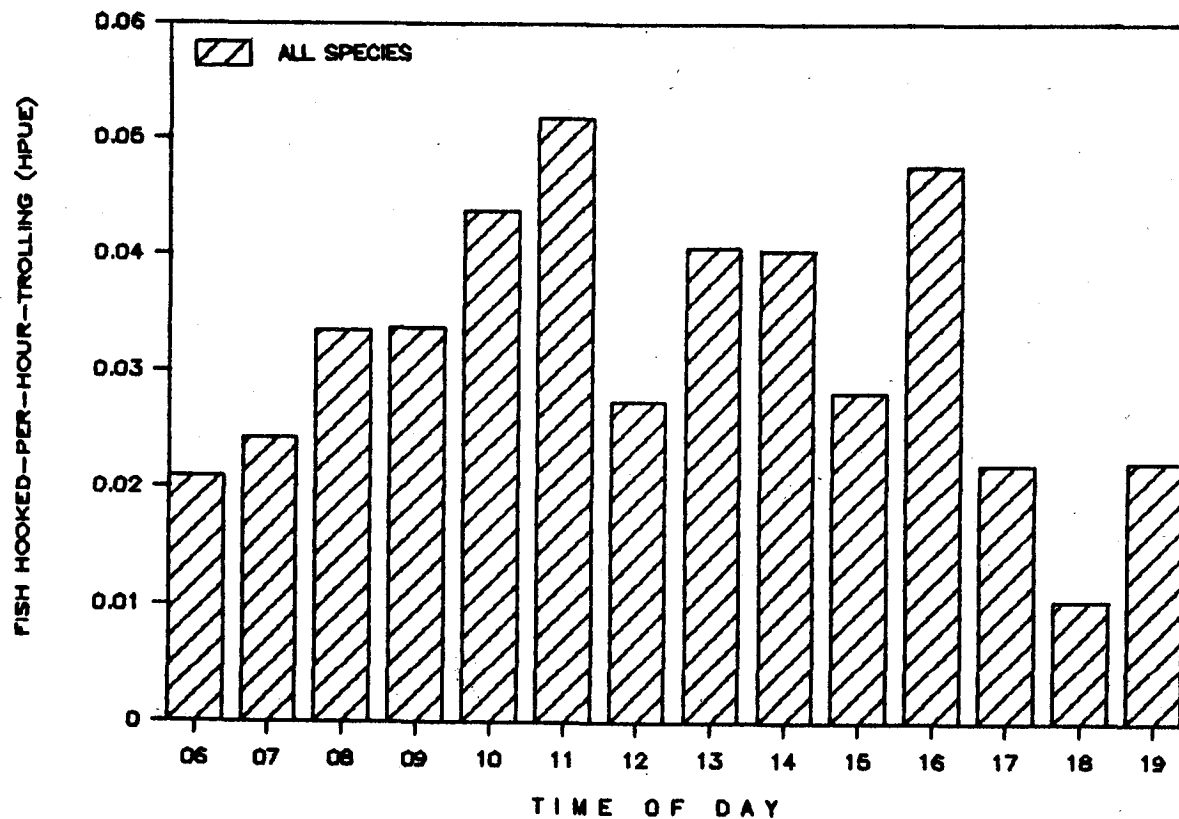


Figure 6. Numbers of billfishes hooked-per-hour-trolling (HPUE) by hour of day in the northern Gulf of Mexico, 1989.

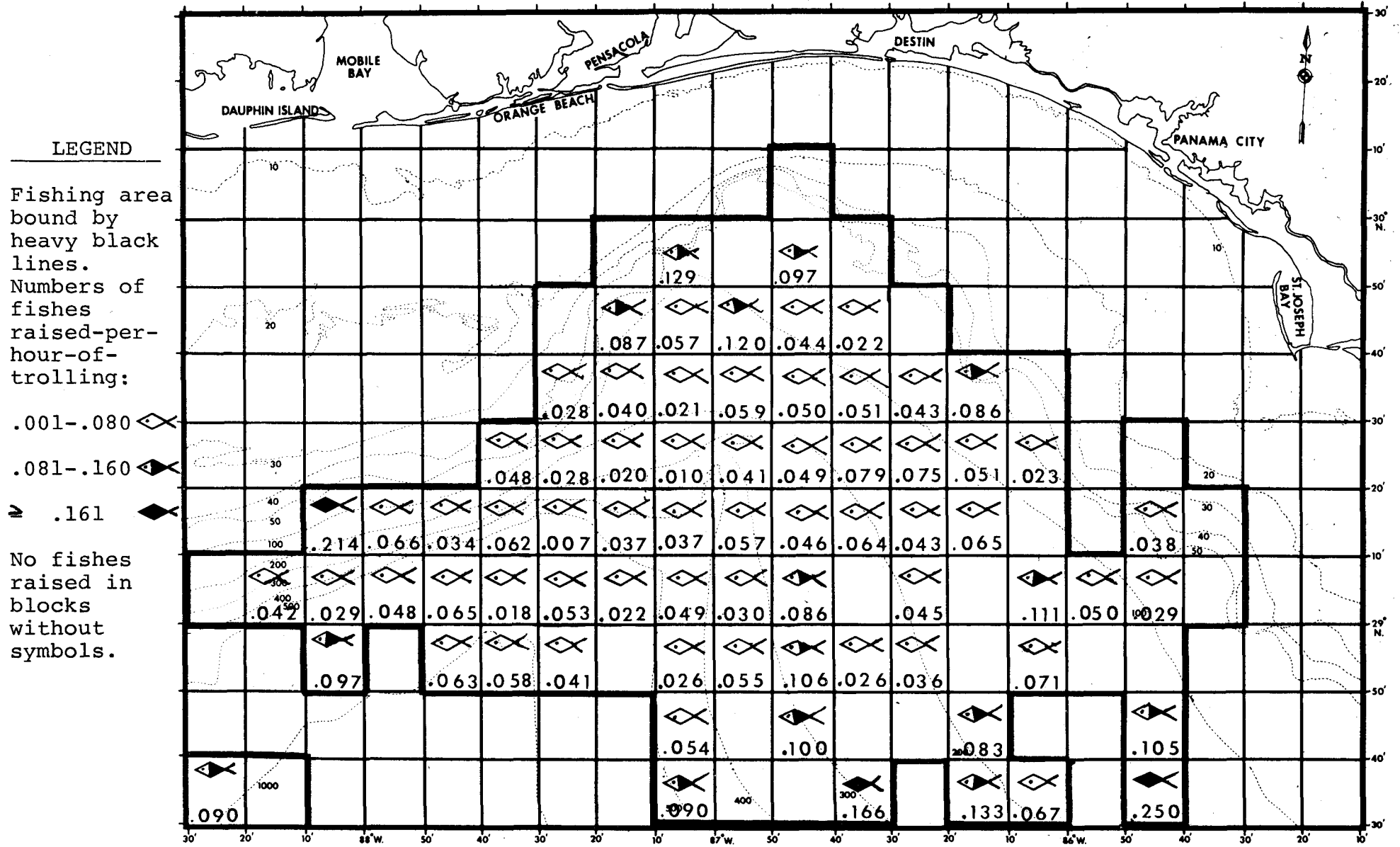


Figure 7. Numbers of billfishes raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min. blocks, 1989.

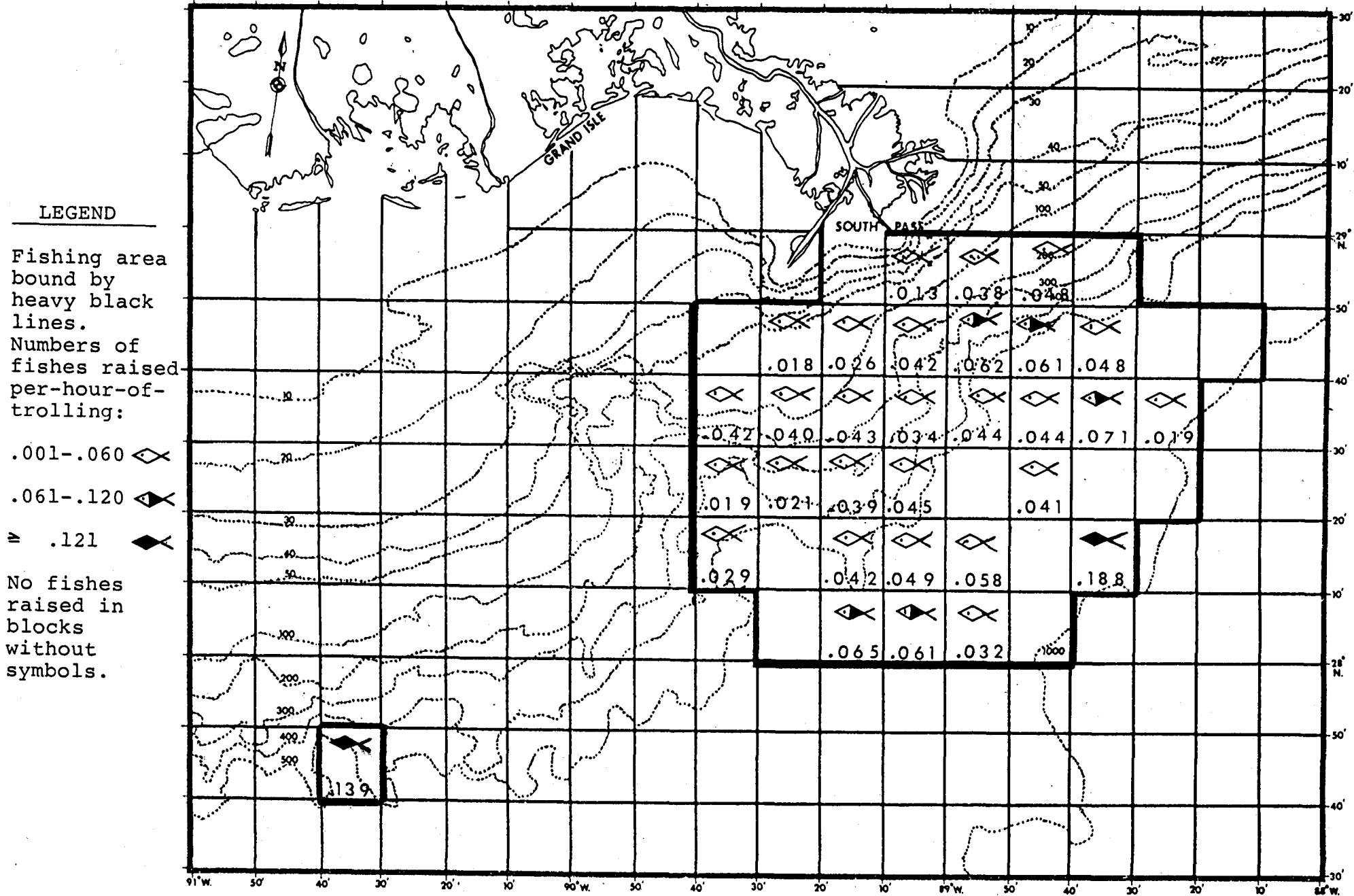
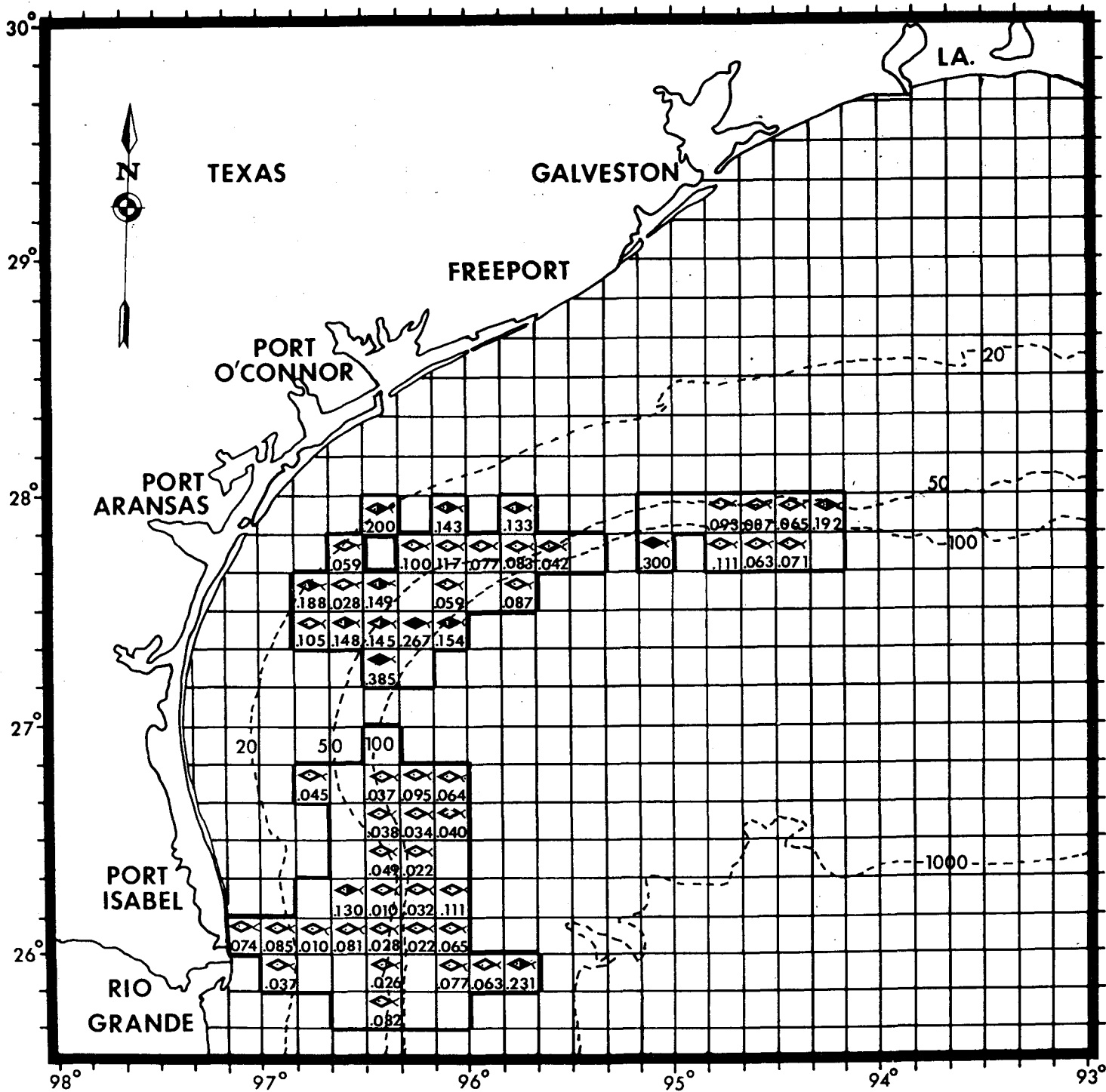


Figure 8. Numbers of billfishes raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min. blocks, 1989.



- | | | |
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| L
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D | <p>Fishing area bound by heavy black lines.</p> <p>No fish raised in squares without symbols.</p> | <p> .001-.120 fishes raised-per-hour-trolling.</p> <p> .121-.240 fishes raised-per-hour-trolling.</p> <p> ≥ .241 fishes raised-per-hour-trolling.</p> |
|----------------------------|---|---|

Figure 9. Numbers of billfishes raised-per-hour-trolling in the northwestern Gulf of Mexico by 10-min. blocks, 1989.