Movements of King Mackerel, *Scomberomorus cavalla*, Tagged in Southeast Louisiana, 1983-85

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Introduction

The king mackerel, *Scomberomorus cavalla*, is an important sport and commercial species on the south Atlantic and Gulf of Mexico coasts of the United States and Mexico. U.S. commercial fishermen landed 2.4 million kg (5.3 million pounds) of king mackerel worth $5.4 million in 1985 and U.S. recreational fishermen landed 5.3 million kg (11.6 million pounds) in 1985 (USDOC, 1986a, b).

Because of its value and popularity, the king mackerel has been the subject of intensive research by Federal and state agencies for years. Mark-recapture studies to determine migration and movement have been an important part of this research. Results of previous mark-recapture studies were reported by Sutherland and Fable (1980) and by Williams and Godcharles.[1]

Large king mackerel have been known to occur throughout the year in the Gulf of Mexico off Louisiana, but initial efforts at tagging these fish were unsuccesful (Sutherland and Fable, 1980). The development of a commercial handline fishery off Grand Isle, La., in the winter of 1982-83, however, made it possible to acquire large numbers of these fish for tagging and increased the need for fishery managers to know the stock identity of these fish. It was known that the abundance of large king mackerel increased in winter, and that smaller fish were caught during late summer months (Trent et al., 1983). We thought this seasonal heterogeneity in fish size indicated that different groups of king mackerel occurred off Louisiana at different times of the year.

This report details the results of a cooperative mark-recapture study of king mackerel conducted off Louisiana between 1983 and 1985 by the National Marine Fisheries Service (NMFS) and the Coastal Fisheries Institute of Louisiana State University. The objectives of this study were to determine migratory patterns of king mackerel of various sizes tagged in Louisiana in winter and summer.

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[1]Williams, Roy O., and Mark F. Godcharles. 1984. Completion report, king mackerel tagging and stock assessment. Project 2-341-R. Fla. Dep. Nat. Resour. Unpubl. rep., 45 p.

ABSTRACT—King mackerel, Scomberomorus cavalla *(1,968) caught by hook and line off Grand Isle, Louisiana, were tagged with internal anchor tags and released between 1983 and 1985. Fifty-five tags were recovered, providing an overall return rate of 2.8 percent. King mackerel tagged in winter were returned in every month of the year, but always from the Grand Isle area or westward as far as Veracruz, Mexico. All but one summer-tagged fish were returned in winter months from the Grand Isle area, Key West, Florida, or from Mexico. Winter-tagged fish were mostly large and mostly remained in the northwest Gulf. Summer-tagged fish tended to stay in the northwest Gulf if they were large, or migrated to south Florida or Mexico if they were small. The data indicate that the northwest Gulf maintains resident large king mackerel year round, and that these fish mix with smaller migrants from south Florida and Mexico to some degree in warmer months.*

Materials and Methods

The Louisiana commercial fishery is centered in Grand Isle, and all tagging of winter fish was done within 48 km (30 miles) of this location. In the summer months the fishermen go farther west, sometimes all the way to Texas, but all tagged fish were released within 96 km (60 miles) of Grand Isle (Fig. 1).

All king mackerel tagged in this study were caught by handlines either on commercial or government-owned boats. This method of collecting fish for tagging was proven effective by Williams and Godcharles.[1] Fish are taken in a vigorous condition with slight opportunity to exhaust themselves such as when caught on rod and reel. Two methods were used to immobilize the fish once they were lifted onto the vessel. Early in the study, fish were held down on deck or bent into a corner of the cockpit to immobilize them. Later, as more tagging was done on commercial vessels, fish were unhooked over an unhooking bar and were then held in a V-shaped, foam-padded tagging trough. As long as the foam padding and the trough were wet, mucous and scale loss appeared minimal.

We used internal anchor tags which have been proven effective for king mackerel by Williams and Godcharles[1]

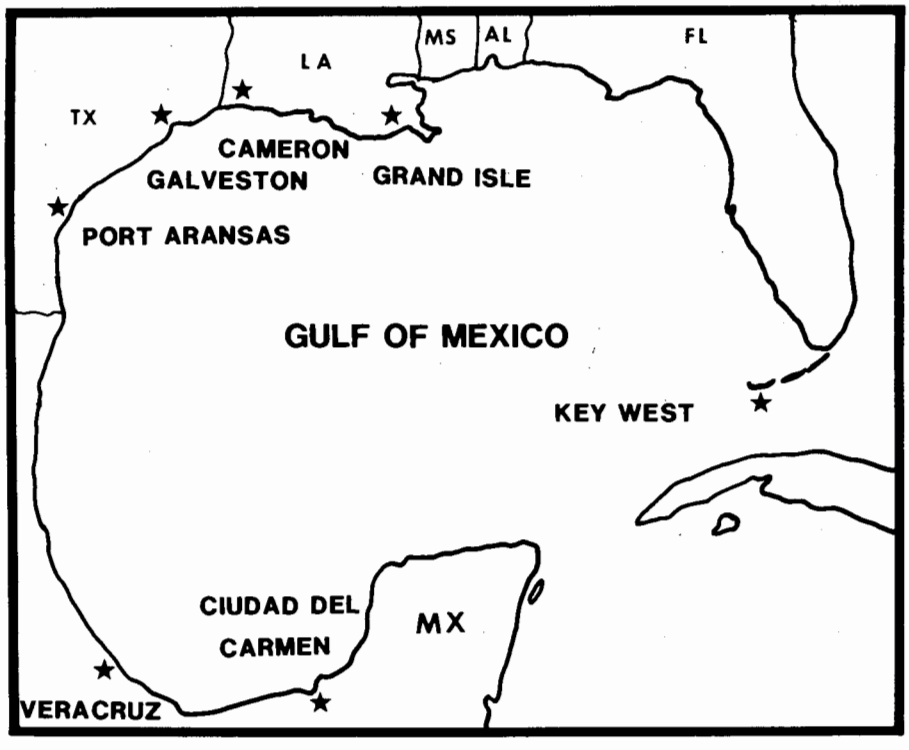


Figure 1.—Study area.

who reported tags returned from fish after more than 6 years of freedom. Our tags were international orange with a retainer disk 32 mm (1 1/4 inches) long and 8 mm 5/16 inch) wide with a 89 mm (3 1/2-inch) streamer. Each tag bore a number, and a legend indicating a return address and that a reward was offered for the tag return. We paid a $10 reward for each returned tag, and posters advertising this were distributed from Texas to south Florida by NMFS port agents and samplers, and along the Mexican Gulf coast by LSU researchers. Tags were applied in the abdominal area of the fish either by making a scalpel cut and slipping the disk end into the abdomen, or by using a special applicator, designed by the second author, which simplified tagging.

The fork length (mm) of each tagged fish was recorded before release for two reasons: It could provide information on growth if an accurate measurement was obtained at recovery, and it was used to compute the weight of the catch (after converting length to weight with published length-weight equations) so that the commercial fishermen could be paid for their mackerel catch.

Results and Discussion

Between January 1983 and November 1985, 1,968 king mackerel were tagged. Sixteen hundred and two of these were tagged in the colder six months (November through April) with the majority (1,478) tagged in December and January. During the warmer 6 months (May through October), 366 king mackerel were tagged, 300 of which were tagged in June. The fish tagged during colder months were mostly over 85 cm FL and the fish tagged during warmer months were mostly under 85 cm FL (Fig. 2).

Fifty-five tags have been recovered (Table 1), providing an overall return rate of 2.8 percent. Of the 55 recovered tags, 39 were from fish tagged from November through January, and 16 were from fish tagged from June through September. The returns from November-through-January tagged fish occurred in every month of the year, but were always from the Grand Isle area and westward as far as Veracruz, Mex. (Fig. 3). However, all but one summer-tagged fish were returned in winter months (December through February), from the Grand Isle

Table 1.—Information on tag returns for king mackerel tagged in Louisiana, 1983-85 (FL = fork length in mm).

Season and area of recovery	Date tagged	FL at tagging	Date recovered	Days out
Returns from winter tagging				
Nov.-April				
Grand Isle	1-14-83	1,100	2-2-83	19
	12-10-83	930	11-25-84	351
	12-13-83	975	12-8-84	361
	12-10-83	1,022	12-16-84	372
	11-25-84	895	12-20-84	25
	12-10-83	1,000	1-20-85	407
	11-25-84	950	4-5-85	131
	1-6-85	950	11-28-85	326
	12-10-83	990	12-9-85	730
	12-15-83	989	1-4-86	751
	1-6-85	1,015	1-11-86	370
	12-10-83	968	4-26-86	868
	12-13-83	1,020	1-28-86	777
Veracruz	12-13-83	1,100	3-13-84	91
May-Oct.				
Grand Isle	1-7-83	998	7-10-83	184
	1-7-83	1,025	8-7-83	212
	1-7-83	1,000	10-10-84	642
	12-31-84	900	5-10-85	130
	11-25-84	1,090	6-25-85	212
	1-6-85	835	7-11-85	186
	12-9-83	945	7-19-85	588
	12-9-83	850	10-14-85	675
	12-13-83	966	10-24-85	681
Cameron	12-13-83	917	5-25-85	529
	12-10-83	985	6-24-86	928
Galveston	12-10-83	950	7-18-84	221
	12-10-83	982	7-21-84	224
	12-13-83	900	8-19-84	250
	12-10-83	925	7-20-85	588
	12-13-83	960	7-20-85	585
	12-13-83	965	7-21-85	586
	12-10-83	885	8-7-85	606
Port Aransas	1-9-83	1,010	6-17-83	159
	1-14-83	980	8-7-83	205
	1-6-83	1,007	8-22-83	228
	1-7-83	1,015	8-20-84	591
	12-15-83	990	9-1-84	261
	12-10-83	830	5-25-85	532
	12-10-83	902	8-6-85	605
Returns from summer tagging				
Nov.-April				
Grand Isle	6-25-85	700	12-1-85	159
	6-24-85	890	12-4-85	163
	6-24-85	920	12-17-85	176
	6-25-85	820	1-28-86	217
	8-9-85	1,170	1-28-86	172
	6-26-85	1,140	1-29-86	217
	6-24-85	830	2-4-86	225
Key West	9-26-85	920	1-15-86	111
	6-24-85	800	2-3-86	224
	6-25-85	795	2-9-86	229
	6-26-85	715	2-9-86	228
	6-26-85	755	2-9-86	228
	6-25-85	600	2-16-86	236
	6-26-85	710	2-16-86	235
Ciudad del Carmen	6-25-85	725	2-15-86	235
May-Oct.				
Galveston	6-25-85	880	6-15-86	358

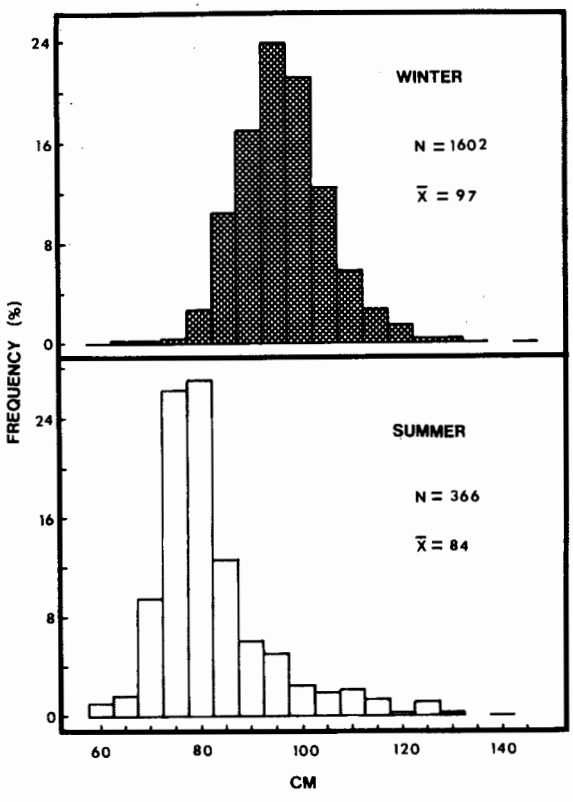


Figure 2.—Fork lengths (cm) of winter- and summer-tagged king mackerel.

area, from Key West, Florida or from Mexico (Fig. 3). The only summer-tagged fish recovered in the summer was from Texas.

Our returns from summer tagging off Grand Isle indicate that some mackerel from this area winter in south Florida and Mexico, but some apparently remain in the northern Gulf through the winter months. We know from tagging in the 1970's by Sutherland and Fable (1980) and Williams and Godcharles[1] that some (6) king mackerel tagged off Texas in the summer were recovered off south Florida in winter, and vice versa (43). Our data seem to indicate that, for the most part, the smaller fish migrate to south Florida or Mexico, and the larger fish remain behind. From our sixteen returns from summer-tagged fish, the fork lengths at tagging for fish (8) recovered at Key West or Mexico ranged from 600 to 920 mm and averaged 752 mm, while the lengths for fish (8) recovered in Louisiana or Texas ranged from 700 to 1,170 mm and averaged 919 mm.

King mackerel from the Louisiana winter fishery are larger on the average than those from any other area of the southeast U.S. (Trent et al., 1983). The mean fork length at tagging for recovered winter tagged fish was 967 mm. The fact that smaller fish presumably migrate through this area, yet larger fish remain, suggests that the northwest Gulf of Mexico may acquire resident larger fish that previously migrated through the region.

Our data suggests that king mackerel found off Grand Isle in the winter either remain in the northwestern gulf, or move southwestward into Mexico. We feel that the distribution of these fish along the Texas-Louisiana coast in summer (Fig. 3) also occurs to some extent in winter, but fishing effort in winter is very limited except off Grand Isle.

Interpretation of tag return information is difficult when fishing effort varies by season and location. In winter in the Gulf of Mexico, the heaviest fishing pressure on king mackerel occurs in the Key West area, and also off Grand Isle. Moderate fishing effort is expended in Mexican waters at this time of year. In the summer months fishing increases in the northern gulf, especially off northwest Florida and the Texas coast, and decreases in Mexico.

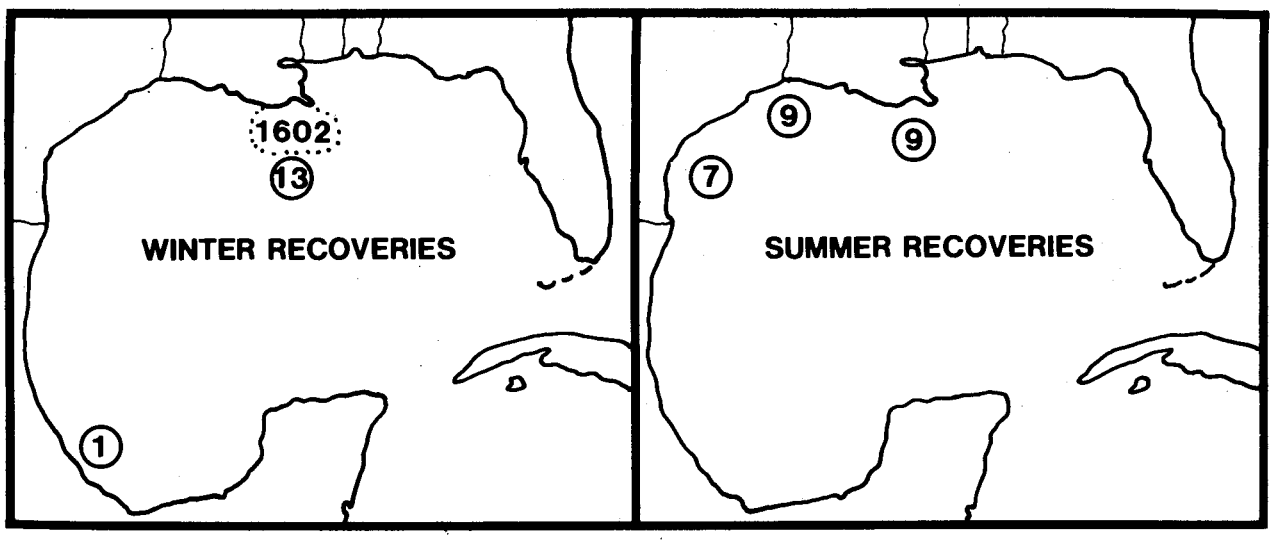
Our tag returns suggest the link with south Florida, but there are indications of a link with Mexico, also. The migration from south Florida to the northwest Gulf is well documented by tag returns. Not well documented by tagging, but known to fishermen and mentioned over 40 years ago by Baughman (1941), is the spring migration of fish up the Texas coast from Mexcio, and the return in the fall.

The only tag returns from the winter in Louisiana that originated outside of the northwest gulf were one return from south Florida to the Grand Isle area after 4 years of freedom, reported by Williams and Godcharles[1], and one return from Panama City, Fla., to the Grand Isle area from tagging done by the first two authors in 1983. Panama City king mackerel have well documented migrations to south Florida (Sutherland and Fable, 1980) and presumably this fish was from that migratory group. We have no tagging evidence for recruitment into the Louisiana winter fishery from Mexico, except what can be implied from two king mackerel that were tagged off Veracruz and recovered off Texas, (Williams and Godcharles[1] and data on file at the NMFS Panama City Laboratory).

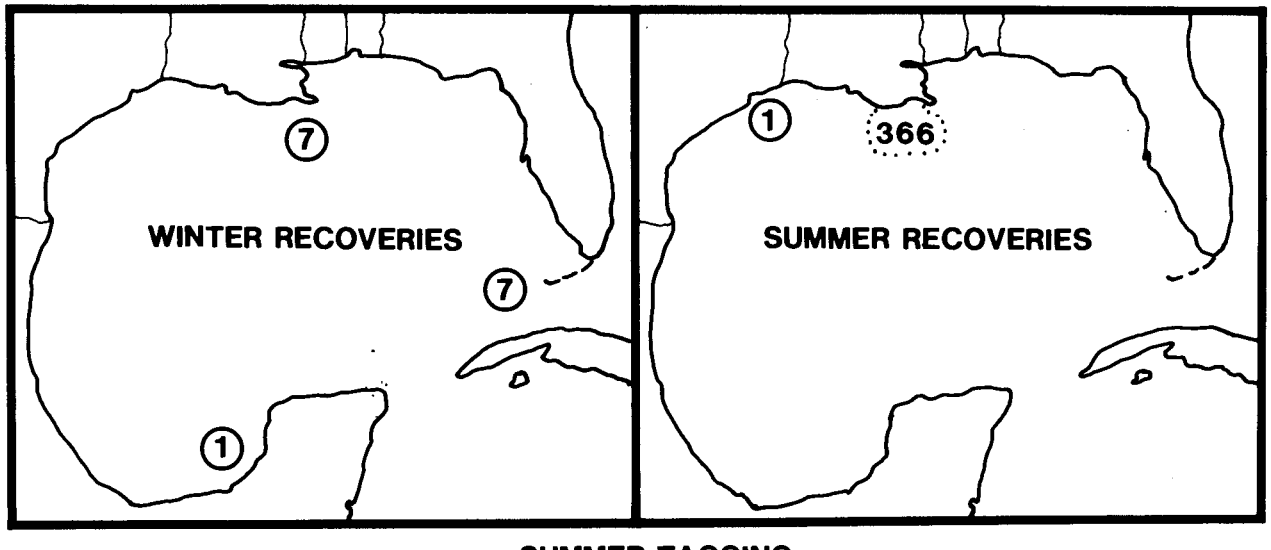
Conclusions

King mackerel tagged off Grand Isle, La., in the winter months were mostly large fish (over about 850 mm FL), and they mostly remained in the northwest Gulf. King mackerel tagged off Grand Isle in the summer months tended to stay in the northwest Gulf if they were larger than about 800 mm FL, or migrated to south Florida or Mexico if they were smaller than that.

We feel the data indicate that the northwest Gulf maintains a resident population of larger king mackerel year round, which may move into Mexico to some extent, and that this group mixes to some degree in the warmer months with



WINTER TAGGING



SUMMER TAGGING

Figure 3.—Numbers of tagged king mackerel (in dots) and recovered king mackerel (in circles) by time period.

smaller migrants from south Florida and Mexico. Some of these smaller migrant fish may become year round residents of the northwest gulf as they grow larger.

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