

# HIGHLIGHTS:

## Recreational Fishing

## Use of Artificial Reefs on the Texas Coast

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Artificial reefs have been used in the United States for more than a century to establish cover and habitat for fisheries. Offshore artificial reef construction began in earnest in 1935 with the sinking of four vessels and tons of other materials off Cape May, New Jersey. The initial success of the Cape May Reef and resulting publicity led many other states to become interested in constructing artificial reefs in offshore waters. The first recorded reef building effort in the Gulf of Mexico began in 1954 by the Alabama Department of Conservation and cooperating sportsmen's groups. Here automobile bodies were used to develop a series of artificial snapper banks. Soon after, the Texas Parks and Wildlife Department began developing artificial reefs in Texas bays to improve sportfishing.

With the passage of Public Law 92-402 in 1972, coastal states were allowed to apply to the Secretary of Commerce for Liberty Ships and to use them to establish artificial reefs, the ultimate purpose being to enhance the productivity of marine fisheries. Under the sponsorship of the Texas Coastal and Marine Council, the State of Texas placed 12 Liberty Ships in offshore waters from 8 to 36 miles from shore. This program was completed in June 1976.

The decision to deploy Liberty Ships as reefs was made with the specific goal of fisheries enhancement in mind. Other reef structures like oil platforms, jetties, and spoilbanks are deployed *indirectly* in that they meet other goals besides fisheries enhancement. Regardless of whether specifically or indirectly deployed, further information is needed on the extent to which artificial reef structures on the Texas coast are being used for fishing. This information is important because decision makers will insist on knowing if reefs are being used by sportfishermen and what is being done to insure that the reefs are used. The need for this information comes at a time when oil companies operating on the Outer Continental Shelf are required to remove their platforms when production ceases. We need to know the extent of fishing use of these facilities so that their recreational value, either in place or at alternative locations, can be determined. Perhaps other uses can be found for existing structures without additional cost to the public and the recreational resources available to fishermen increased.

### PROJECT PURPOSE AND OBJECTIVES

The Texas Coastal and Marine Council has funded several studies to evaluate the biological productivity of the reefs and the fisheries that utilize the reefs. This study sought to determine the extent to which the Liberty Ships were used for fishing during 1977 by

the population of fishermen residing in the eight-county area surrounding Houston and Galveston. Fishing use of other artificial reef structures as well as natural habitats was also examined to establish the extent to which various alternative fishing attractions are used by fishermen. Study objectives were as follows:

1. To study a random sample of fishermen from the Houston-Galveston area to determine their sport fishing participation patterns for 1977.
2. To determine the extent of the saltwater fishermen's offshore, bay and onshore fishing.
3. To identify the extent to which offshore manmade reef structures such as Liberty Ships and oil platforms and bay structures such as spoilbanks, channels, jetties and oil platforms were used for fishing in 1977.
4. To explore the relationships between boat and equipment characteristics and fishing patterns, including location of fishing (bay or offshore) and the distance traveled offshore.
5. To study the desirability and feasibility of using offshore oil platforms as artificial reefs after oil production has ceased and to evaluate the policy alternatives available in this regard.

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## STUDY METHODS

To identify potential users of offshore artificial reef structures, boat registration data for the eight-county study area surrounding Galveston Bay were examined. The study area is one of the major fishing and boating areas in Texas. The total number of fishing licenses and boat registrations for this area account for approximately 20 percent of those issued throughout the state.

A 1975 Texas Parks and Wildlife Department survey of finfish harvest in Galveston Bay indicated that over 90 percent of all bay anglers come from Harris, Galveston, Chambers, and Brazoria counties, all of which border Galveston Bay. These four counties, plus Fort Bend, Liberty, Montgomery and Waller counties, make up the study area addressed here. It is probable that most private boat fishing that occurs in Galveston Bay and adjacent offshore waters comes from this eight-county area.

There were 113,397 registered pleasure boats in the eight-county study area as of October 1977. A sample of 1,500 (1.34 percent) was drawn from all boats less than 26 feet long, and the entire population of 1,953 boats greater than or equal to 26 feet in length were included in this study.

A survey questionnaire was designed and pretested on a random sample of 200 small boat owners and 100 large boat owners. The final survey was sent to the sample of 3,453 boat owners in March 1978, followed by a second mailing several weeks later. The total usable response rate for this survey was 50.3 percent. Telephone interviews were conducted with a sample of non-respondents to control for any differences that exist between those who responded to the questionnaire and those who did not. This control enables the results to be extended to the population of all boat owners in the study area.

## FISHING PATTERNS

Study findings show that not all boat owners are fishermen, but many boat owners participate in a variety of types of fishing. Figure 1 shows how fishing participation during 1977 was distributed in the population of boat owners. Saltwater fishermen made up about 34 percent of all

boat owners. This group can be divided into those that fish in the bays only, those that fish both bays and offshore, and those that fish offshore only. Thirty-three percent of all boat owners in the study fished in the bays, and 5 percent of all boat owners fished offshore during 1977.

Figure 1: Distribution of the Population of Boat Owners, By Type of Boat Fishing Activity

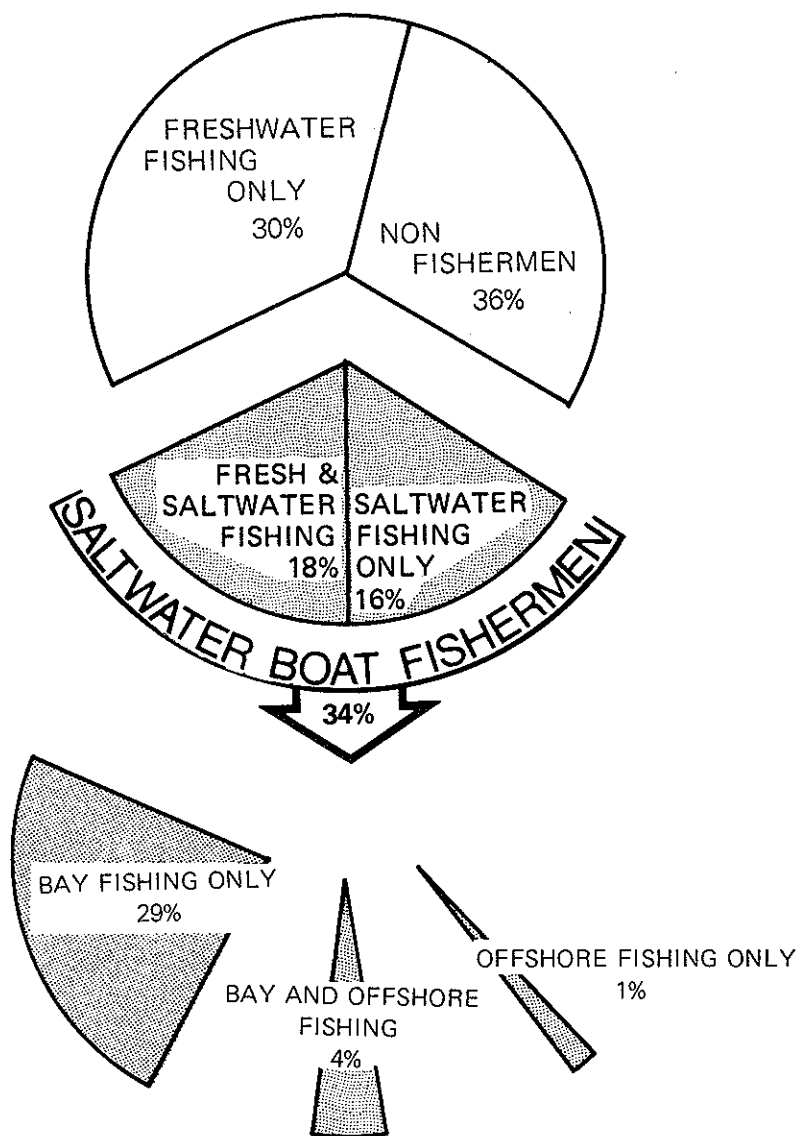
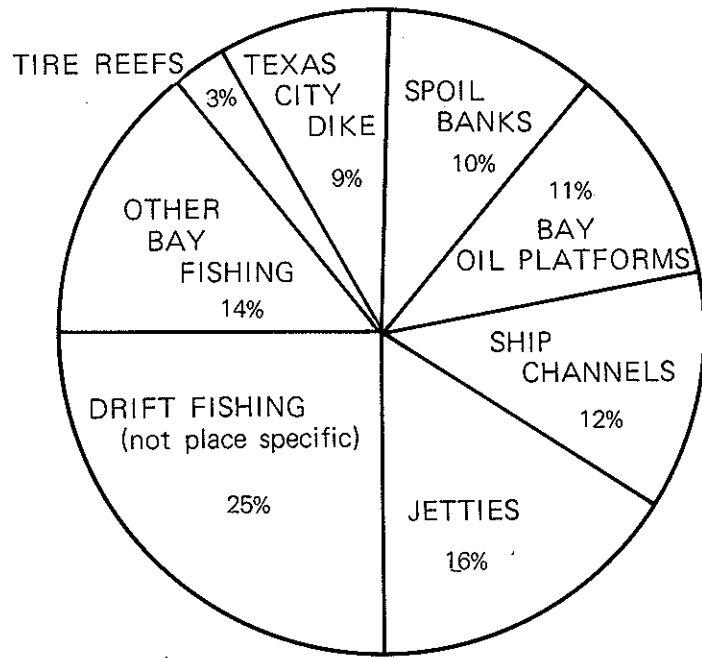


Figure 2: Bay Fishing Trips

## Bay Fishing

Bay fishermen were attracted to a variety of artificial and natural habitats. Figure 2 shows where various types of fishing took place. Drift fishing, which is not place specific, was the most dominant form of fishing, and jetties were the most popular man-made fishing attraction in the bays. Other structures such as ship channels, bay oil platforms and spoil banks, in that order, also were attractive to bay fishermen. The tire reefs were fished less than any of the other structures. This could be due to the small number of reefs and general lack of knowledge about their existence or location.

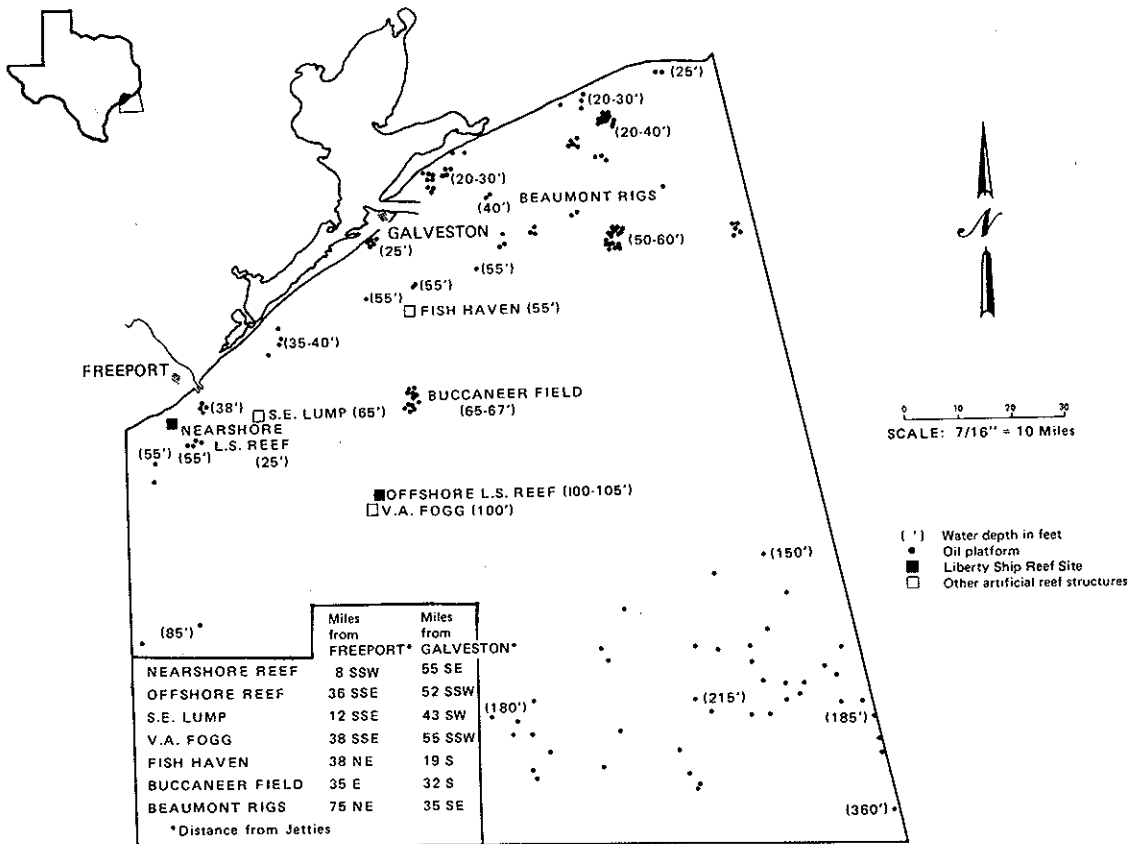
Forty-eight percent of all bay boat fishing trips took place during the summer months. About 20 percent of the trips were in the spring and 26 percent in the fall. This leaves only 6 percent of the trips during the winter months.



The three species of fish most sought after by bay fishermen were speckled trout (*Cynoscion nebulosus*), redfish (*Sciaenops ocellata*), and flounder

(*Paralichthys lethostigma*), in that order. Speckled trout, croaker, and redfish were the three most commonly caught fish.

Figure 3: Map of the Offshore Area Adjacent to the Galveston Bay System



## Offshore Fishing

The offshore area adjacent to the Galveston Bay System includes a wide variety of artificial fishing attractions in addition to the natural reefs and banks that occur in the area (see Figure 3). Figure 4 illustrates the extent to which offshore fishermen fished at various attractions during 1977. Oil platforms attracted more fishing than any other type of feature, natural or artificial — 87 percent of the boats that fished offshore used oil platforms. One-half of all offshore fishing trips were to oil platforms. Buccaneer Field alone accounted for more than one-fifth of all fishing trips made offshore.

Besides oil platforms, natural reefs attracted more fishermen than any other specific artificial structures considered. Collectively, however, the rest of the artificial structures accounted for about as much use as natural reefs. The Liberty Ship reefs only accounted for about 5 percent of all trips made into the Gulf by residents of the study area.

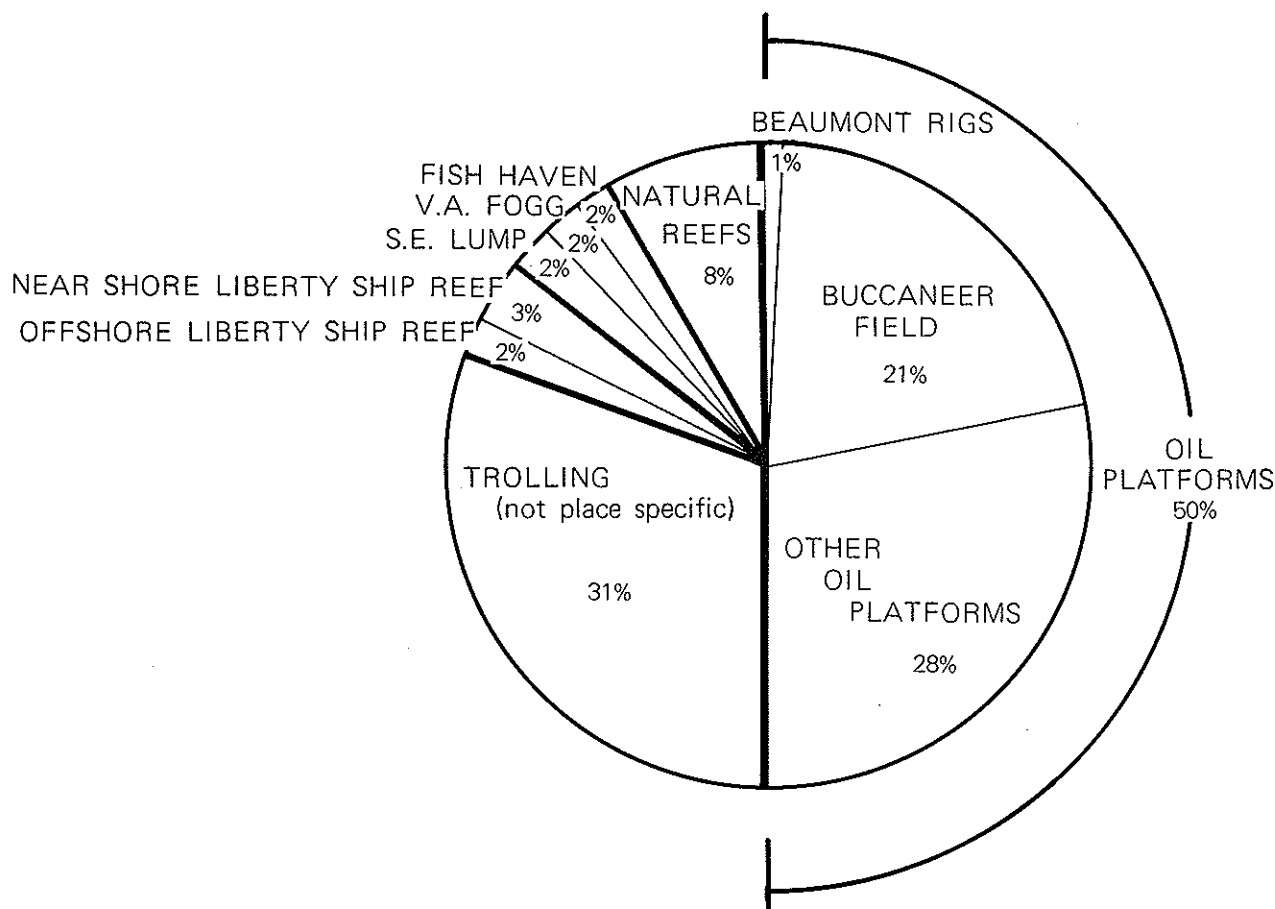
Trolling was second to fishing around oil platforms as the type of fishing most often participated in.

As did bay fishermen, nearly all offshore fishermen fished during the summer. During the spring and fall, participation dropped off considera-

bly from summer levels. With 60 percent of offshore oil platform fishing trips occurring during the summer, it would appear that oil platform fishing is even more heavily concentrated in the summer than is bay fishing.

The three species of fish most sought after by offshore fishermen were kingfish (*Scomberomorus cavalla*), ling (*Rachycentron canadum*) and red snapper (*Lutjanus campechanus*), in that order. These are the same species that were reported caught most often.

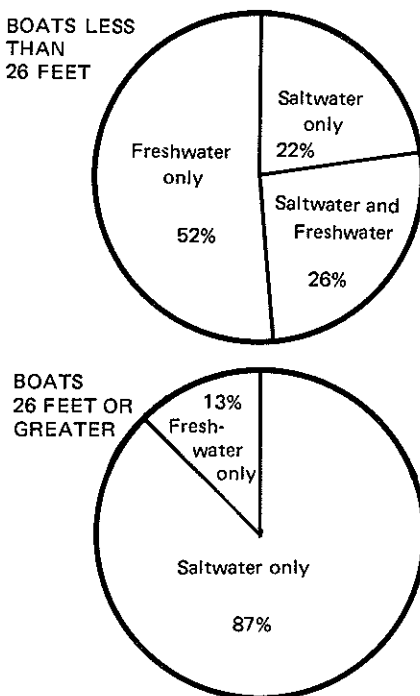
Figure 4. Offshore Fishing Trips



## RELATIONSHIP BETWEEN BOAT CHARACTERISTICS AND FISHING PARTICIPATION

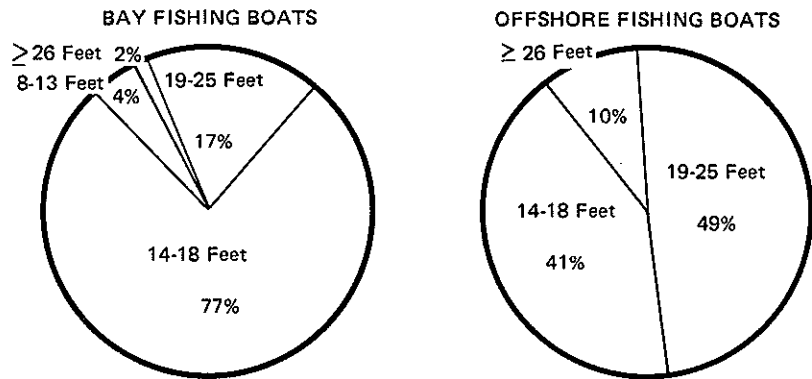
When fishing boats less than 26 feet and those 26 feet or longer are compared, several differences in fishing participation appear (Figure 5). Very few of the larger boats fished in both saltwater and freshwater. There was a strong preference for saltwater fishing among owners of the larger boats. Among the small boats, on the other hand, 26 percent fished both saltwater and freshwater. This is likely due to the greater mobility of small trailerable boats. The small boats also differed from the large boats by showing a preference for freshwater fishing.

Figure 5. Distribution of Saltwater and Freshwater Fishing by Boat Size



Comparison of boat lengths and fishing locations revealed several interesting differences. Most notably, the fleet of bay fishing boats was found to be quite different than the fleet of offshore fishing boats (Figure 6). About 75 percent of bay boats were 14 to 18 feet long and another 20 percent were between 19 and 25 feet long. Conversely, about 40 percent of offshore boats were 14 to 18 feet

Figure 6. Distribution of Boat Lengths in the Population of Bay and Offshore Fishermen



long and about 50 percent were between 19 and 25 feet long. In addition, about 10 percent of offshore fishing boats were 26 feet or longer, although boats in this length class made up less than 2 percent of the total population of boats.

Examining boat length categories in relation to distance travelled offshore identified the constituencies associated with various offshore distance ranges (Table 1). Distance was measured in terms of fishermen's perceptions of how far they actually travelled (one-way) on their farthest fishing trip and as a normal operating distance during 1977. The normal distance distribution is probably a better indicator of extent of fishing by distance range, but maximum distance is also useful in identifying the extent to which fishermen will stretch their range.

Fishing within 10 miles of shore was normally practiced by boats less than 19 feet long, with few larger boats fishing at this close range. This zone shows a sizable, yet narrow, constituency. The tendency of boats longer than 18 feet to travel further offshore than 10 miles suggests that variables other than distance are considered by offshore fishermen in selecting fishing locations. Considerations of water depth as it relates to species of fish sought, for example, probably draw many fishermen beyond the 10 mile zone.

The 11 to 20 mile normal distance zone attracted a complete cross section of boat lengths, and thus serves the largest and broadest constituency.

Since a substantial proportion of boats of all lengths preferred to fish this zone, it can be reasoned that water depth and other environmental conditions begin to reach desirable states within 20 miles.

A sizable constituency is maintained between 21 and 40 miles offshore by the propensity of 19 to 25 foot boats to fish in this zone. This distance range, however, shows the loss of most 14 to 18 foot boats, so it represents a narrower constituency than the 11 to 20 mile normal distance zone.

Almost all boats *normally* stayed within 40 miles of shore, although the largest boats did show a tendency to travel a *maximum* distance much greater than this.

Considering boat and equipment variables other than boat length as possible limiting factors to offshore fishing at varying distances revealed boats less than 26 feet are constrained to a considerable degree by their fuel capacity and whether or not they are equipped with a two-way radio and compass. Carrying a radio was the most important variable affecting *maximum* distance travelled offshore by boats less than 26 feet. Boats travelled an average of 12 miles farther when equipped with a radio. Fuel capacity was the single best predictor of *normal* offshore distance for these boats. Sixty-two percent of the variance in *maximum* distance and forty-seven percent of the variance in normal distance for boats less than 26 feet were explained by these boat and equipment variables.

**Table 1. Distance Travelled Offshore by Boat Length Categories**  
Percent of Boats Travelling Different Maximum Offshore Distances,  
by Boat Length Categories\*

Distance (miles)	Boat Length (feet)					
	14-18 (n=24)	19-25 (n=28)	26-29 (n=116)	30-34 (n=110)	35-39 (n=53)	40 or greater (n=27)
1-10	50%	4%	3%	3%	6%	4%
11-20	33	11	22	9	17	4
21-30	8	29	22	21	25	7
31-40	8	43	22	27	26	22
41-50		11	19	16	11	7
51-60		4	5	10	2	11
61-70			2	3	6	7
71-80			2	5	0	4
81-90			0	1	0	4
> 90			3	6	8	30

**Percent of Boats Travelling Different Normal Offshore Distances,  
by Boat Length Categories\***

Distance (miles)	Boat Length (feet)					
	14-18 (n=22)	19-25 (n=28)	26-29 (n=115)	30-34 (n=110)	35-39 (n=52)	40 or greater (n=27)
1-10	64%	7%	16%	6%	8%	7%
11-20	27	36	36	32	35	19
21-30	5	43	30	29	31	30
31-40	5	14	15	24	14	33
41-50			3	6	12	4
51-60			0	1	0	4
61-70			0	1	2	0
71-80			1	0	0	4
81-90			0	0	0	0
> 90			1	2	0	0

\*Some percentages do not add up to exactly 100% because of rounding.

Considerably less variance in the distances travelled offshore by boats 26 feet or longer was explained by boat characteristics, despite a much greater range in both equipment and distance variables. Virtually all of these boats are well equipped and able to travel great distances. Consequently, distance travelled offshore by these boats is more a matter of individual preferences of boat owners than it is related to equipment constraints. There was a tendency, however, for better equipped boats within this size class to travel greater distances offshore. The presence of LORAN navigation equipment added an average of 18 miles to the maximum distance travelled by these boats, and, in conjunction with fuel capacity, accounted for 30 per-

cent of the variance in maximum distance. These same variables explained even less of the variance in normal operating distance of boats 26 feet or longer.

#### **OIL PLATFORMS AS ARTIFICIAL REEFS**

Since oil platforms are used by approximately 87 percent of all offshore fishermen in the study area, there should be strong interest in sustaining these resources to complement other existing reef areas.

Currently, the Outer Continental Shelf Lands Act (OCSLA) and the Geneva Convention on the Continental Shelf require that production platforms be removed after production ceases. Our study found that these re-

quirements are not impossible to overcome.

An amendment to the OCSLA and a modification of the Geneva Convention on the Continental Shelf could make it possible for specified platforms to remain standing after production ceases for the enhancement of the fishery resource. Also, new legislation is needed to allow public agencies or private entities to manage the water column below and adjacent to offshore platforms. This could be accomplished through an amendment to an existing law such as the Fishery Conservation and Management Act or the proposed Artificial Marine Reef Fishing Act.

Three approaches for perpetuating platform benefits were determined and analyzed with regard to feasibility. First, it is possible that some federal agency could manage obsolete platforms as fishing reefs. Second, oil companies or other private entities might manage platforms as reefs when production ceases. Lastly, the oil companies could be released from their lease after making a payment equal to a percentage of assessed removal costs to some perpetual fund that would enable a public agency to manage the platform as a reef.

Of the three approaches, the latter one in which the public and private sectors interacted to their mutual benefit was considered the most viable. The fishermen who use the platforms as artificial fishing havens would continue to enjoy the benefits they have had in the past and the oil companies would not have to incur the full expense of removing the platforms.

The cost of removing the platforms is extremely high--in some instances \$5 million--so oil companies should be willing to enter into a cooperative agreement with a public agency that would release them from lease responsibilities. The result could be a system of well located platform reefs in the Gulf or even nationwide. The three approaches mentioned in this study provide a basis for advocacy by groups interested in the future use of platforms.

This report was derived from a technical report entitled, "Recreational Fishing Use of Artificial Reefs on the Texas Coast," by Robert B. Ditton and Alan R. Graefe, Department of Recreation and Parks, Texas A&M University, prepared under Interagency Contract (77-79) 0805 for the Texas Coastal and Marine Council, Austin, Texas, September, 1978.