

A STUDY OF THE TEMPORAL CHANGES IN OFFSHORE MACROFAUNA IN THE NORTHERN GULF OF MEXICO DURING THE DEVELOPMENT OF THE OFFSHORE OIL INDUSTRY

by John R. Thompson

ABSTRACT

To supplement the relatively short-term trawl studies conducted by other investigators in the OEI, a longer range study was conducted using existing data available from the Bureau of Commercial Fisheries (now the National Marine Fisheries Service). Data taken in the Northern Gulf of Mexico by the M/V *Oregon* and chartered vessels during the period in which the offshore oil industry was developed in Southern Louisiana were used in an effort to detect changes in macrofauna attributable to this buildup of estuarine and offshore oil drilling and production.

INTRODUCTION

The fish in coastal waters of Louisiana have been studied since the first half of this century (Raymond 1905; Gunter 1935). Such studies became much more intensive during the 1950s. These primarily individual studies provide much useful information on the taxonomy, life history, and ecology of fish populations in this area.

The most consistent and systematic set of data obtained during the period of oil industry growth in coastal and offshore Louisiana waters was developed by the Bureau of Commercial Fisheries (now the National Marine Fisheries Service and referred to hereafter as BCF/NMFS). These

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data, covering the 1950s and 1960s, were collected in order to assess the living marine resources in the Northern Gulf of Mexico. Chartered vessels, primarily the *M/V Oregon*, were used in these surveys. The data collected are reported in two "collection reports" (Springer and Bullis 1956; Bullis and Thompson 1965).

METHODS AND MATERIALS

For this paper, only data obtained from the *Oregon* cruises off the Louisiana coastline between longitudes 89°30'W and 92°30'W were used. This area includes the outflow areas of the Mississippi and Atchafalaya River systems and, most importantly, the areas off Barataria and Timbalier Bays designated as the primary study area of the OEI.

Records covering the period 1950 to 1965 taken at 523 stations in this area by the BCF/NMFS were used. A "station" according to BCF/NMFS designation consists of a specific set of operations—trawl haul, dredge haul, longline set or similar sampling/observation unit—at a precise, but not necessarily reoccupied, position fixed by Loran. The gear most commonly used for acquisition of the data in this study were either 40-foot (opening across the mouth) shrimp trawls as described by Bullis (1951) and later workers, or fish trawls rigged New England style with rollers (Captiva and Rivers 1960).

Computer facilities (UNIVAC 9200) at the BCF/NMFS Pascagoula, Mississippi, Laboratory were used in the compilation and analysis of these data. Computer analyses covered only the dominant (by abundance or percentage of occurrence) fishes and shellfishes. Distribution densities and availability densities of these dominant species were used to identify any trends in the populations and their distributions that might be associated with oil drilling and production activity.

RESULTS

The total species complement collected and used for analysis in this study was 630 fish, 146 mollusk, and 234 crustaceans. Computer analyses revealed that eight species of fish were most abundant, with Sciaenids being the dominant group present (table 1). Offshore, blue crabs, brown shrimp, and rock shrimp were found to be the dominant crustaceans taken.

Studies of annual populations and distributions revealed no significant *trends* over the period 1960-1965. Variations in the data were well within those expected in trawl operations, and no consistent changes were evident over this time span.

Table 1. Predominant Fishes and Invertebrates in Catches from M/V OREGON Trawl Work -- 1950-65.

Fishes	
Scientific Name	Common Name
<i>Synodus foetens</i>	Lizardfish
<i>Arius felis</i>	Sea Catfish
<i>Leiostomus xanthurus</i>	Spot
<i>Micropogon undulatus</i>	Croaker
<i>Menticirrhus americanus</i>	Southern Kingfish
<i>Cynoscion nothus</i>	Silver Sea-Trout
<i>Stenotomus caprinus</i>	Longspine Porgy
<i>Trichiurus lepturus</i>	Atlantic Cutlassfish
Invertebrates	
<i>Callinectes danae</i>	Offshore blue crab
<i>Penaeus aztecus</i>	Brown shrimp
<i>Sicyonia brevirostris</i>	Rock shrimp

The seasonal variations apparent from study of the data were those well known to commercial fisherman and as reported by Russian fleets conducting exploratory operations in the area (Sal'nikov 1969). Lowest catches occurred in June and early July (though least effort was apparently expended during these months) and highest catches occurred in winter (November-March).

DISCUSSION

The BCF/NMFS data used in this study were taken in an area offshore described by Gunter (1963) as the "Fertile Fisheries Crescent." The "Crescent" extends from Pascagoula, Mississippi, to Port Arthur, Texas. It is reputed to be among the most productive fisheries areas in the world (Roithmayr 1965; Gunter 1967; Perrett et al. 1971; Juhl et al. 1973). It is estimated that 90%, by weight, of the fish species commercially harvested from the Gulf of Mexico are estuarine dependent (Gunter 1938a,

1938b). A similar estuarine dependence exists for most crustaceans including commercially important blue crabs and penaeid shrimp. Since the most sensitive period in these organisms' life cycle (eggs and larvae) is associated with the bays and sounds, any adverse effects on these environments resulting from oil drilling and production should have maximum effect on abundance and community structure.

In addition to the possible introduction of effluents from oil drilling and production (drilling mud, crude oil, etc.), these activities also introduce a physical change in the environment. It is generally accepted that artificial structures, such as oil platforms, attract and concentrate fish populations. Unless the effect of effluents is more significant, this effect on populations should be observable. Trawls studies directed to investigating this possibility were conducted under another OEI investigation by Mr. Allison Perry. Extensive studies by the Louisiana Wildlife and Fisheries Commission (Duffy 1968) concluded that sport fishing was enhanced by the artificial reef effect of the numerous oil production platforms in the coastal and offshore waters.

CONCLUSIONS

No correlations could be demonstrated between macrofauna populations and oil related activities in the time period and area covered in this study. Seasonal or "natural variability" best correlates with the data.

An offshore groundfish fishery was developed during the period of data collection (Roithmayr 1965). The dominant group of fishes supporting this industry (Sciaenids) is the same group shown to be dominant in the BCS/NMFS data. These data and groundfish catch history show that the populations of fishes offshore of the OEI study are sufficient to sustain a large-scale groundfish industry.

The value of the BCF/NMFS data for the correlations made in this study could have been improved through greater standardization and an increase in sampling density. This would enhance the statistical validity of the studies as well as provide a more comprehensive basis for the detection of either transient or consistent trends in populations and their distributions.

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