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Relationship Between Size Composition and Ex-Vessel Value of Reported Shrimp Catches From Two Gulf Coast States With Different Harvesting Strategies

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ABSTRACT—This paper describes the effect on ex-vessel value of size composition of reported catches of brown shrimp, *Penaeus aztecus*, and white shrimp, *P. setiferus*, from Texas and Louisiana, two Gulf Coast States with different shrimping regulations and harvesting strategies.

INTRODUCTION

Shrimping regulations and harvesting strategies differ appreciably between Texas and Louisiana, which together produce 75 percent of the shrimp landed from the northern half of the Gulf of Mexico. In Texas, shrimping regulations greatly restrict the catch of small shrimp, whereas in Louisiana there are few restrictions on the catch of small shrimp. The results of these regulations are that the bulk of the catch for Texas comes from an offshore fishery, mostly for large brown shrimp, *Penaeus aztecus*, with a smaller portion of the catch coming from an inshore (tidal waters landward of the Gulf) fishery, primarily for both small and large white shrimp, *P. setiferus*. In Louisiana, there is a substantial inshore fishery and an offshore fishery for both small and large brown and white shrimp.

In this paper we illustrate the effect

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of size composition of reported brown and white shrimp catches on the ex-vessel value of these catches in the two states.

BRIEF DESCRIPTION OF FISHERY AND DATA

Brown and white shrimp, the two dominant species in Texas and Louisiana, spend the juvenile and subadult phases of their life cycles in inshore waters, and the adult and larval phases in offshore waters. Harvesting of these shrimp begins when they are in the juvenile phase.

Texas state shrimping regulations include: Licenses, limits on the number and size of trawls and trawl mesh size, daily catch limits, size limits on food shrimp (not on bait shrimp), closed areas and seasons, and size limits on food shrimp during the fall open season. Size limits on food shrimp and a closed season (usually 1 June-15 July) also are applied to shrimping offshore (seaward of the beach). In addition, no nighttime shrimping is allowed in inshore waters. Louisiana state regulations on inshore shrimping include: Licenses, limits on the number and size of trawls and trawl mesh size, size limits on white shrimp, and closed seasons. There are no catch limits, and nighttime shrimping with "butterfly"

or wing nets is allowed. Size limits on white shrimp also are applied to offshore shrimping.

Numbers of vessels (5 net registry tons and larger, Fig. 1) and numbers of boats (less than 5 net registry tons, Fig. 2) differ between the two states, and the vessels in Texas average larger than those in Louisiana (Fig. 3). Texas exceeds Louisiana in number of fishermen



Figure 1.—Reported annual number (thousands) of vessels (5 net registry tons or larger) in Texas and Louisiana, 1959-73.

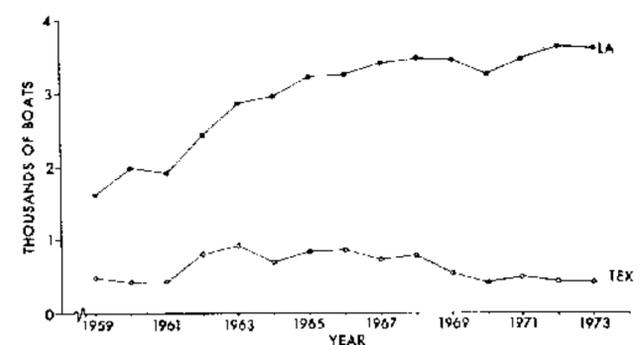


Figure 2.—Reported annual number (thousands) of boats (less than 5 net registry tons) in Texas and Louisiana, 1959-73.

operating from vessels whereas Louisiana exceeds Texas in the number operating from boats (Figs. 4 and 5).

This paper deals only with reported annual (1959-75) catches (pounds, heads-off) of brown and white shrimp from two regions: Texas coast (statistical areas 18-21) and Mississippi River to Texas (statistical areas 13-17) (Fig. 6). These zones represent the Texas coast and that part of the Louisiana coast west of the Mississippi River, respectively. Combined inshore and offshore catches were used.

Annual catches reported in the Gulf Coast Shrimp Data (Current Fisheries Statistics) represent only a portion of the total annual catches from inshore

and offshore fisheries (Fig. 7). Some of the commercial landings, discarded undersized shrimp, and landings by

sport fishermen are not sampled and therefore go unreported. The proportion of the total annual catch not reported is unknown, but we believe that the size composition of the reported catch is a reasonably good reflection of shrimp population characteristics and harvesting strategy combined. Annual summaries of reported catch (pounds,

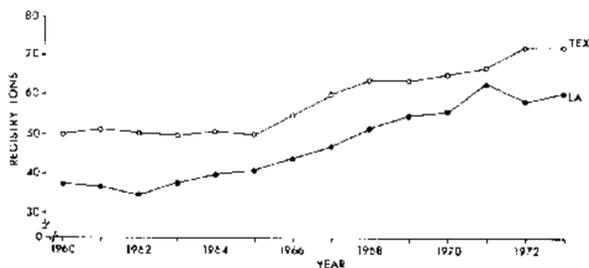


Figure 3.—Annual average reported registry tons per vessel (5 net registry tons or larger) in Texas and Louisiana, 1960-73.

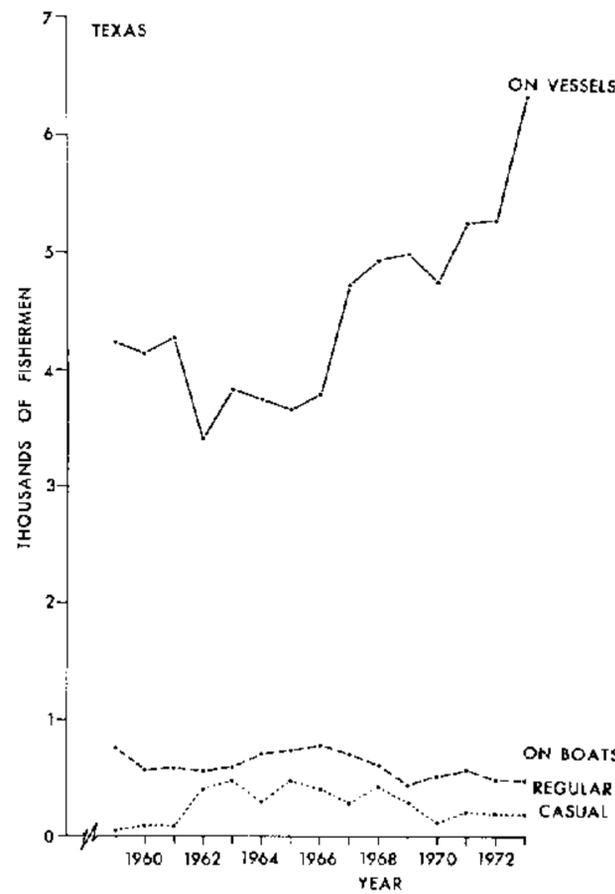


Figure 4.—Reported annual number (thousands) of Texas fishermen who shrimped on vessels (5 net registry tons or larger) and boats (less than 5 registry tons), 1959-73.

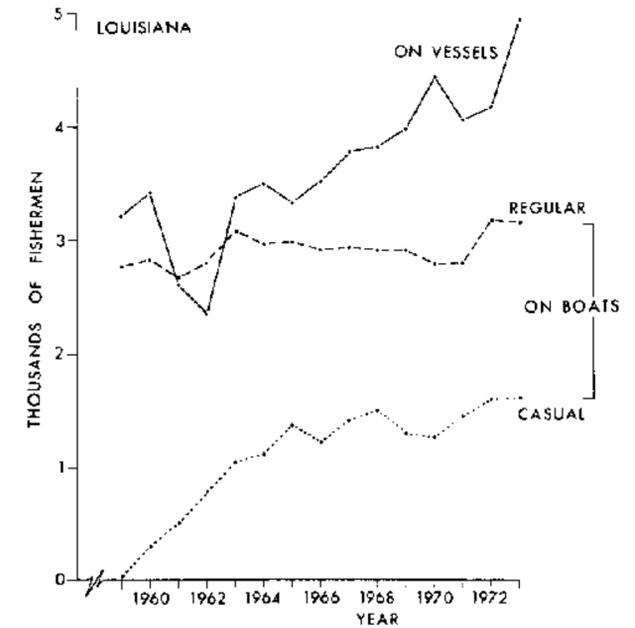
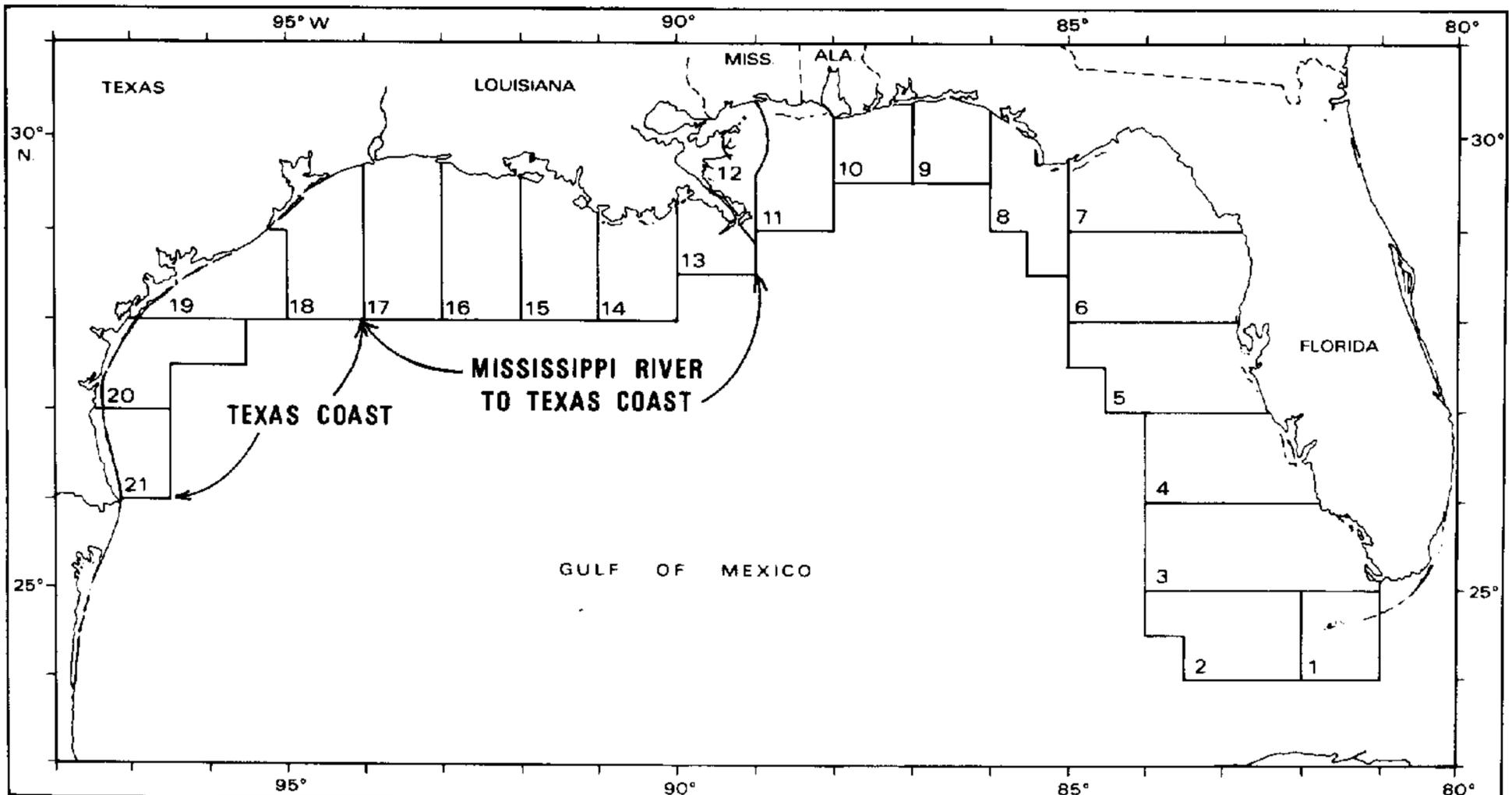


Figure 5.—Reported annual number (thousands) of Louisiana fishermen who shrimped on vessels (5 net registry tons or larger) and boats (less than 5 net registry tons), 1959-73.

Figure 6.—Statistical areas used in reporting gulf coast shrimp data.



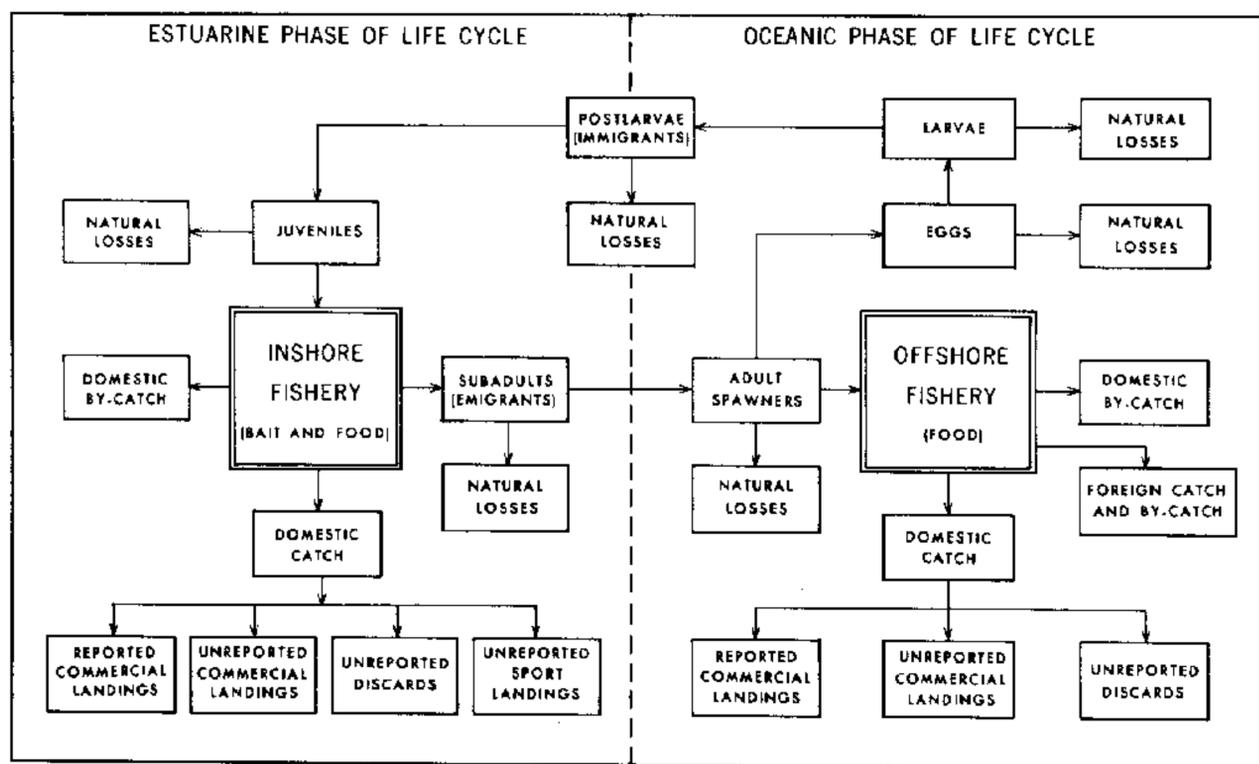


Figure 7.—Relationship between inshore and offshore shrimp fisheries and estuarine and oceanic phases of the brown and white shrimp life cycle.

heads-off) are made by eight size categories (number of shrimp per pound: 68 and over, 51-67, 41-50, 31-40, 26-30, 21-25, 15-20, and under 15) in the Gulf Coast Shrimp Data.

Species composition of the reported catches has been rather stable in Texas, but in Louisiana there has been some variation from year to year, the catch being dominated alternately by brown or white shrimp (Fig. 8). Size composition of the reported catches of brown and white shrimp has remained remarkably constant (except for 1959) within the two states despite wide variation in annual catch from year to year in response to fluctuation in recruitment (Figs. 9-12). In recent years, however,

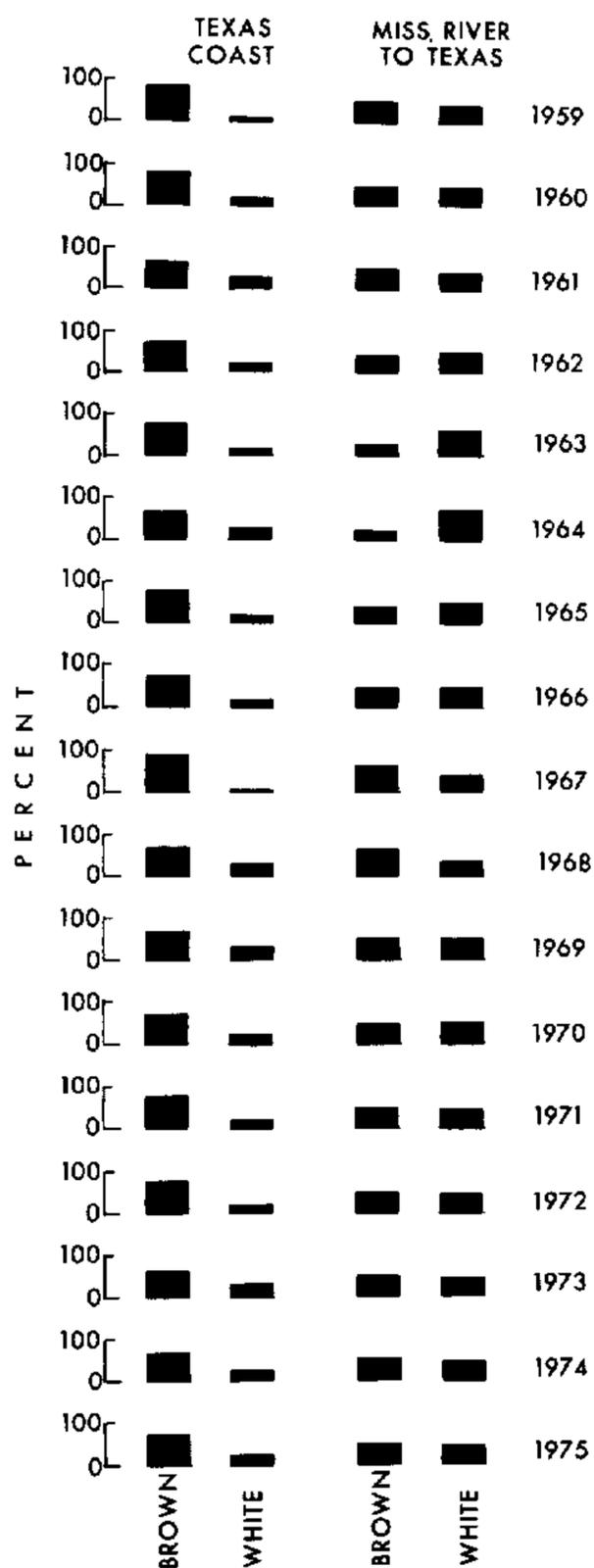


Figure 8.—Species composition (percent, by weight, heads-off) of reported annual catches of shrimp from Texas coast (statistical areas 18-21) and Mississippi River to Texas (statistical areas 13-17), 1959-75.

Figure 9.—Size (number per pound, heads-off) composition (percent, by weight) of reported annual catches of brown shrimp from Texas coast (statistical areas 18-21), 1959-75.

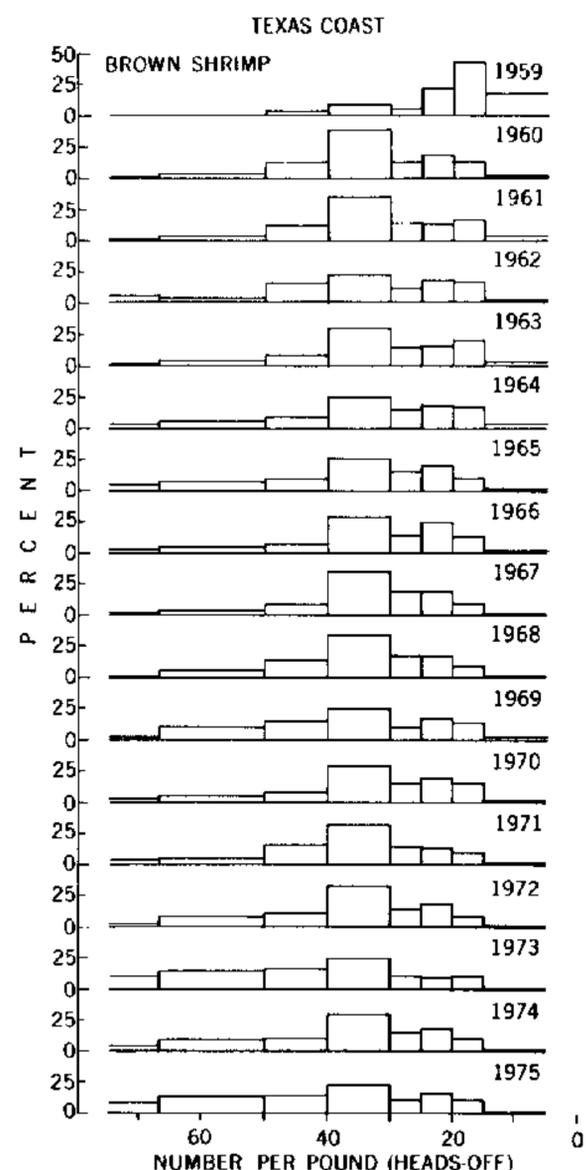
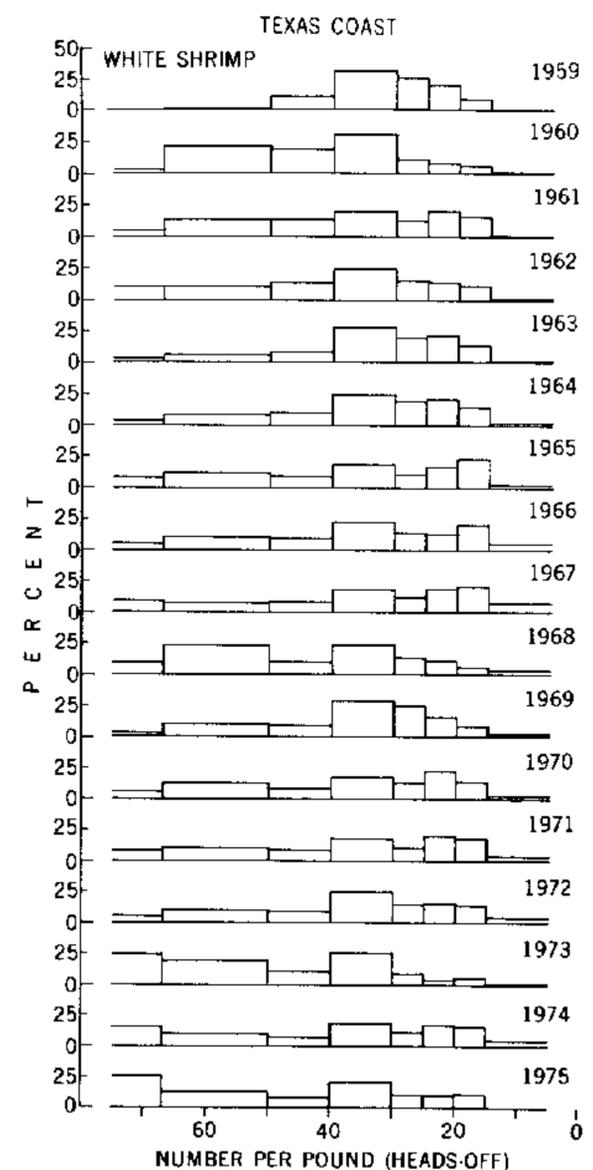


Figure 10.—Size (number per pound, heads-off) composition (percent, by weight) of reported annual catches of white shrimp from Texas coast (statistical areas 18-21), 1959-75.



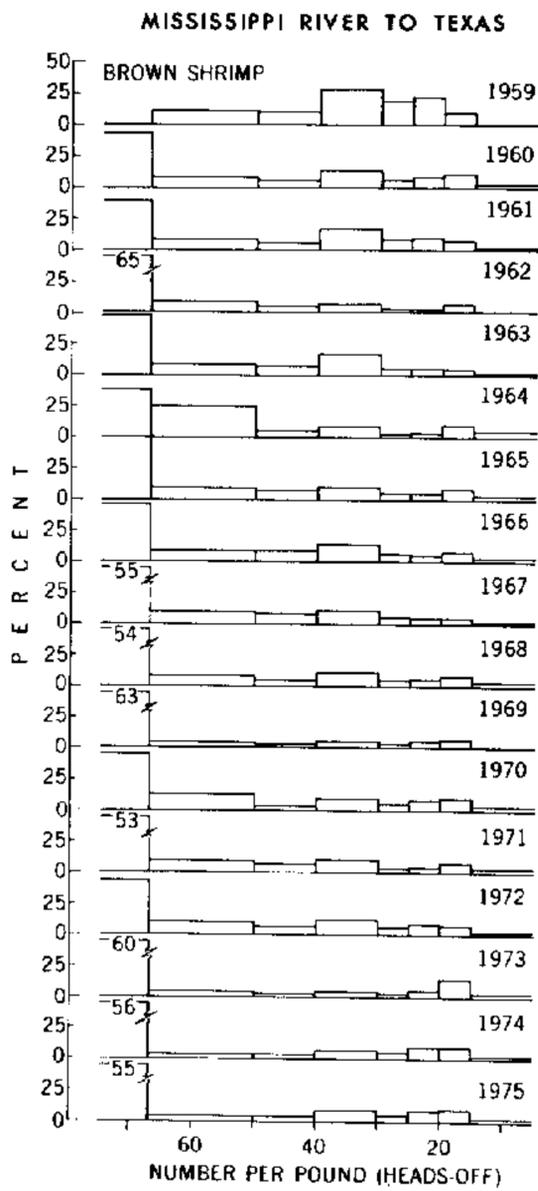


Figure 11.—Size (number per pound, heads-off) composition (percent, by weight) of reported annual catches of brown shrimp from Mississippi River to Texas (statistical areas 13-17), 1959-75.

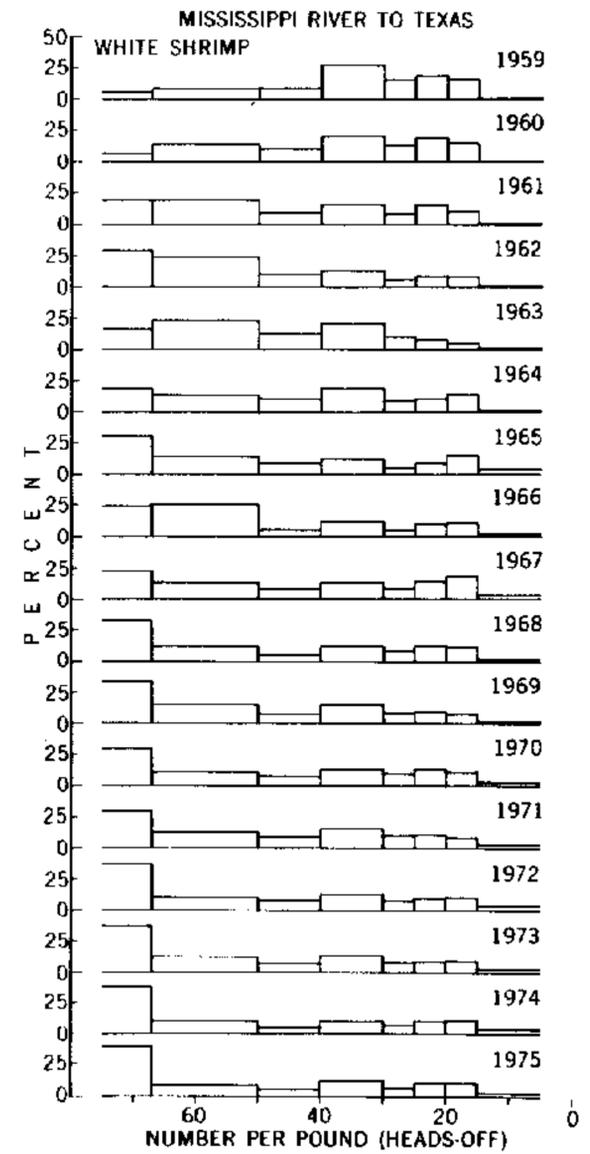


Figure 12.—Size (number per pound, heads-off) composition (percent, by weight) of reported annual catches of white shrimp from Mississippi River to Texas (statistical areas 13-17), 1959-75.

Figure 13 (Below, left).—Relationship between estimated ex-vessel value (millions of dollars in 1975 units) of reported annual catches (millions of pounds, heads-off) of brown shrimp from Texas coast (statistical areas 18-21) and Mississippi River to Texas (statistical areas 13-17), 1959-75.

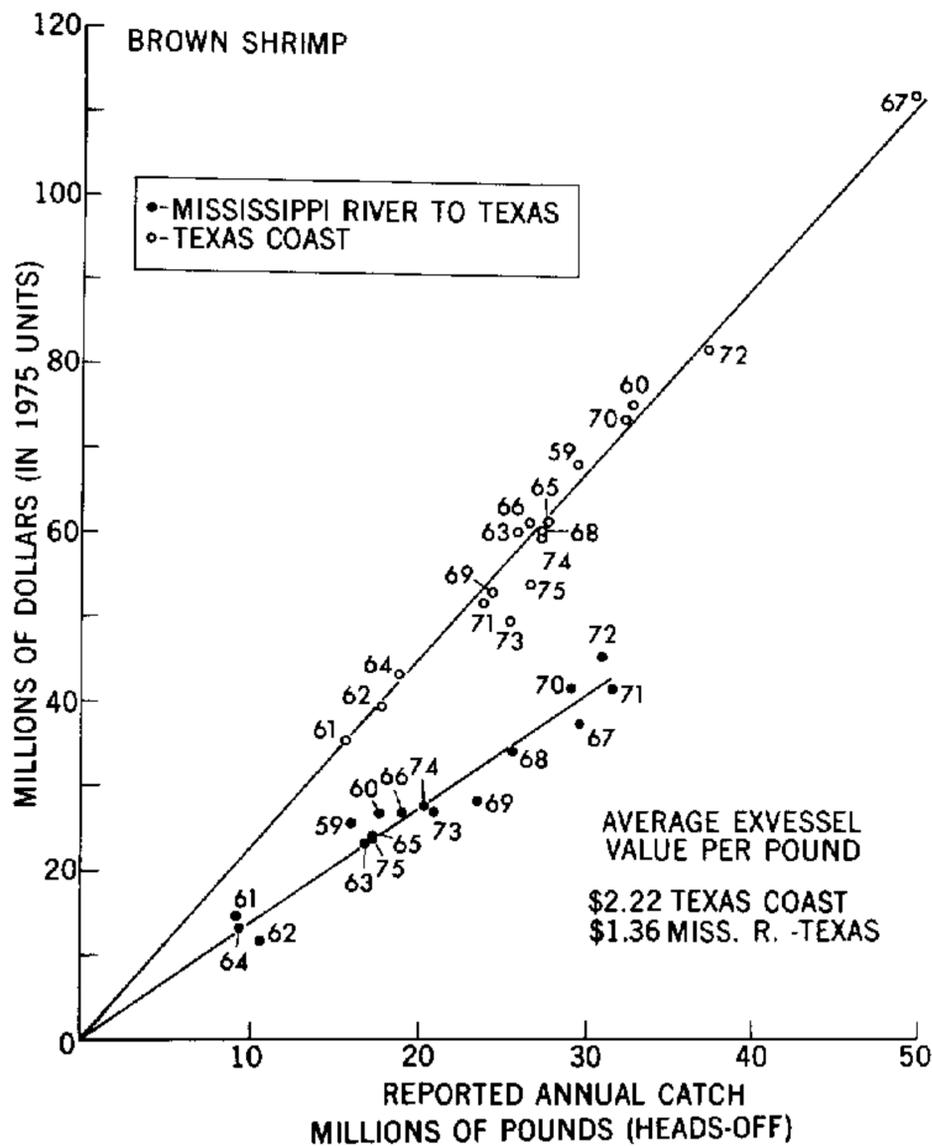
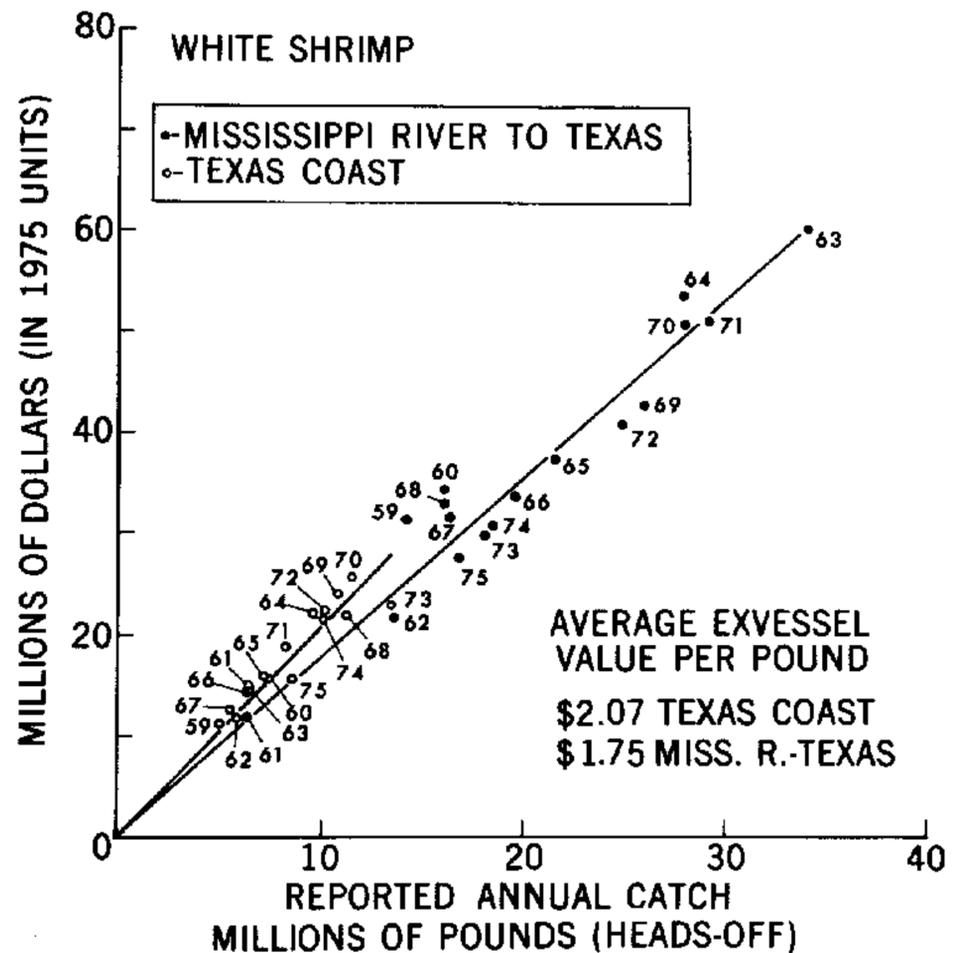


Figure 14.—Relationship between estimated ex-vessel value (millions of dollars in 1975 units) of reported annual catches (millions of pounds, heads-off) of white shrimp from Texas coast (statistical areas 18-21) and Mississippi River to Texas (statistical areas 13-17), 1959-75.



there is evidence of increase in the proportion of reported white shrimp catches in the 68-and-over size category.

METHODS

To illustrate the effect of size composition on the ex-vessel value of the reported catches of both species in both regions, average value per pound (heads-off) was calculated from annual total dollars and pounds by size category (for the entire U.S. gulf coast) as reported in "Shrimp Landings, Annual Summary 1975" (Current Fisheries Statistics No. 6924). These averages were then multiplied by the annual total reported catches to obtain value (in 1975 units) of these catches by size category, species, and region. Summation over size categories provided total annual value (in 1975 units) of these catches by species and region. Data from 1975 were used because there is considerable time lapse between collection and reporting of such fisheries

statistics. Similar methods could be applied as more current statistics become available.

RESULTS

Annual value of the catches is plotted against weight of the catches for brown shrimp (Fig. 13) and white shrimp (Fig. 14). Least squares regression lines were fitted to the data points and through the origin for each species and each region to estimate average value per pound (the slope of the line). The points fall remarkably close to the lines in all cases, further demonstrating the stability in size composition of the catches over the 17-year period. For brown shrimp, the average ex-vessel value per pound for the Texas coast was 1.6 times that for the Mississippi River-to-Texas region. For white shrimp, the average ex-vessel value per pound for the Texas coast was 1.2 times that for the Mississippi River-to-Texas region. White shrimp spend a greater portion of their life cycle in inshore waters than do

brown shrimp. This, coupled with the concentration of fishing for white shrimp in inshore waters, contributes to the smaller difference in average value per pound of white shrimp between Texas coast and Mississippi River-to-Texas areas, as compared with brown shrimp.

MANAGEMENT IMPLICATIONS

It is clear that the ex-vessel value of the shrimp catch, harvested at smaller sizes from the Mississippi River-to-Texas region, is lower in that region than for the Texas coast, a result that many who are familiar with these fisheries are acutely aware of. Apart from the differences in value of the catches to the fishermen, however, there are considerations to be given to social and other economic impacts of shrimp harvesting strategies used in Texas and Louisiana. This paper merely stresses the need to investigate socioeconomic impacts of alternative shrimp harvesting strategies.

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