NOTICE

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Edward F. Klima, Scott Nichols and John Poffenberger. 1986. Executive Summary, 1985 Texas Closure.

Background

The Gulf of Mexico Shrimp Fishery Management Plan (FMP), prepared by the Gulf of Mexico Fishery Management Council and implemented in 1981, regulates the fishing for brown shrimp in the Fishery Conservation Zone (FCZ) off the coast of Texas. This regulation prohibited shrimp fishing in the FCZ for five periods: May 22-July 15, 1981; May 26-July 14, 1982; May 27-July 15, 1983; May 16-July 6, 1984; and May 20-July 8, 1985. State of Texas regulations, implemented in 1960, prohibited shrimp fishing in the territorial sea off Texas during these same periods, except for the white shrimp fishery inside 4 fm. Thus all shrimp fishing for brown shrimp was prohibited during these periods in waters along the Texas coast, except for an incidental (illegal) catch of brown shrimp caught in the white shrimp fishery.

The management objectives of the Texas closure regulation (as specified in the FMP) were to increase the yield of shrimp and eliminate the waste of a valuable resource caused by discarding undersized shrimp caught during the period in their life cycle when they are growing rapidly. The objective of the 1960-1980 Texas territorial sea closure was to insure that a substantial portion ($\geq$50%) of the shrimp in Gulf waters had reached 65 tails/lb or 112 mm in length by season's opening. Thus, the temporary closure of the offshore fishery from mid-May to mid-July each year should provide larger shrimp to the fishery when fishing is again permitted, beginning in mid-July. The monetary benefits of this management regulation result from catching larger, more valuable shrimp, thus increasing the ex-vessel value of the fishery.

Historically, discarding of undersized shrimp resulted from lack of markets and a Texas law prohibiting fishermen from landing shrimp below a certain size. Since this law was enforced based on the percentage of the catch below this size, fishermen would often discard a portion of their catch below the legal size. Therefore, the Texas closure regulation, which was expected to increase the size of shrimp,

# EXECUTIVE SUMMARY, 1985 TEXAS CLOSURE

## INTRODUCTION

The Southeast Fisheries Center (SEFC) provides a series of detailed reports that evaluate the Texas closure management option in either December or January to the Gulf of Mexico Fishery Management Council. This year's series of final reports presented to the Gulf of Mexico Fishery Management Council in January 1986 on the 1985 Texas closure will be the fifth year that the Southeast Fisheries Center has evaluated the Texas closure management measure. This report summarizes the SEFC findings reported to the Gulf of Mexico Fishery Management in Januray 1986.

therefore, should help eliminate the need of discarding. The most effective method of eliminating the discarding problem was to delete the application of the law to the Gulf fishery, which the state of Texas did in 1981.

To assist the Gulf Council in evaluating the effectiveness of the Texas closure regulation, the National Marine Fisheries Service was requested to monitor and estimate the effects of the regulation. Data collected specifically for these evaluations were used to describe the fishery and estimate the impact of the regulation. The scientific conclusions of the first four years of the studies were presented to the Council in December 1981, December 1982, January 1984, and March 1985. Similar studies were conducted in 1985 and the conclusions from these studies were presented to the GMFC in January 1986.

## Methods

The research approach in 1985 is basically similar to that taken in previous years. The scientific analyses were based on resource survey and fishery statistical data. Fishery research vessels from federal and state fishery management agencies (SEAMAP surveys) collected data on the populations of shrimp in offshore waters before and during the closure period. These data were used to describe the species, size, and location of shrimp. The data also provide input to yield-per-recruit type models to evaluate the closure effects.

Port agents collected statistics on the catch, effort, and fishing location of shrimp vessels operating in the Gulf of Mexico. These data provide information on the species, size, and location of shrimp, as well as information on the catch rates and fishing tactics of the vessel in the fleet. The data were used as input to cohort-type models to estimate recruitment, fishing mortality, and the effects of closure on the biological yield, ex-vessel prices, and value. Price data, collected by the port agents, were incorporated into models to evaluate the economic impact of the closure.

Conclusions

1. Size Composition of Shrimp during the Closure

Female shrimp predominated (59:41) in the FCZ in 1985, and these females were smaller than observed in 1983 and 1984. The less abundant male shrimp were generally larger than those observed in previous years. (Unbalanced sex ratios have been noted in previous years - female shrimp also predominated in 1981.)

2. Recruitment to Texas Offshore Waters

Recruitment of brown shrimp to Texas offshore waters in 1985 appears to have been higher than in 1982-1984, but significantly lower than in 1981. We predicted the 1985 annual offshore yield to be 29 million pounds with a range from 19 to 39 million pounds, slightly above the average (long-term) production of 27 million pounds. This prediction was based on data collected from the Galveston Bay bait shrimp fishery during May and early June.

Other estimates of recruitment, although less quantifiable, are based on a smaller data base than the prediction made from the bait shrimp index, also indicated higher recruitment in 1985 than in 1982, 1983 and 1984. The estimates were based on the catches of postlarval brown shrimp in Galveston Bay, the catches of juvenile shrimp with a drop sampler at Galveston Island State Park and in a secondary bay of Galveston Bay, and catch rates of the Texas inshore brown shrimp fishery, which opened on May 15.

3. Commercial Fishing Results

The Texas offshore brown shrimp catch in July and August 1985 was 14 million pounds compared to 15.3 in 1984, 9.8 million pounds in 1983, 13 million pounds in 1982, and 25 million pounds in 1981. Considerable discarding of small shrimp was encountered in 1985 with an estimated 1.1 million pounds being discarded in the first six weeks of the open

season. Previous studies have shown that an average of 33% of the number of shrimp caught between May-August are discarded off the Texas coast. The July-August 1985 catch off Louisiana amounted to 6.1 million pounds compared to 6.6 million pounds in 1984.

The CPUE off Texas in 1985 was 918 lbs/day, compared to 819 lbs/day in 1984, 962 and 922 lbs/day in 1983 and 1982, respectively. However, the catch and CPUE were over 2.3 and 1.5 times higher in Texas than Louisiana during July-August 1985 (Table 2).

The difference in the offshore catches between offshore Texas and Louisiana is assumed to be attributed to more and larger shrimp being present off Texas, which we believe is due to the Texas closure management measure. The average size of shrimp in July and August off Louisiana was 58.2 and 44.2 per pound, whereas off Texas the average count was 46 in July and 39.1 in August 1985. The lower catch and CPUE off Louisiana may be due to the extensive Louisiana inshore and nearshore fisheries, which harvest predominantly large amounts of small shrimp in May and June.

In 1985 the total Louisiana May-August catch was 10% lower than in 1984 and in Texas the total catch was 15% lower than in 1984. Both states recorded lower landings in 1985 than 1984. The inshore fisheries share of the total landings decreased to 34% from 52% in Louisiana and to 27% from 30% in Texas. The decrease in the inshore landings are due to an exodus of small shrimp to the offshore water in May in Louisiana and to small shrimp and poor prices in Texas.

The Louisiana inshore brown shrimp fishery produced 14.9 million pounds in 1984 compared with 12.1 million pounds in 1983, but only 8.8 million pounds in 1985. The inshore catch was predominated by shrimp in the 116-count or larger size categories with an average size of 132- and 120-count per pound in May and June, respectively. Texas inshore fisheries accounted for approximately 7.1 million pounds of brown shrimp in 1984, 5.9 million pounds in 1983, but only 5:4 million pounds in 1985. The inshore catch in 1985 was predominated

also by shrimp of 116-count or larger size groups, with the average size count of 123 and 120 in May and June, respectively.

The size composition of the 1985 offshore brown shrimp catch in Texas waters was different than other closure years with the average size of about 46 count compared to 40-43 count since 1981.

Overall, small shrimp were prevalent throughout the bays in May and June, resulting in small shrimp available to the Texas offshore fishery in July and August.

4. Vessel Activity

The ratio of June:August effort remained below the levels of pre-closure years, as has been the case since 1982. A low ratio suggests that much of the potential effort displaced by the closure dropped out, rather than fishing elsewhere, during the closed period. (Only about 25% of the total Gulf effort in years just prior to closure took place off Texas.) The 1985 fraction of Gulf-wide effort fishing off Texas in August was higher than in 1983 and 1984, but lower than in 1981 and 1982. This higher fraction for 1985 suggests that more effort was exerted off Texas than would have appeared had there been no closure, but that the shift was less than that which occurred in 1981 and 1982.

5. Impacts of the FCZ Closure on CPUE, Yield, and Ex-vessel Value

The benefits of closing the FCZ area in 1985 were probably smaller than in 1981 and 1984, perhaps more comparable to 1983. The CPUE ratio was lower than all previous closure years and even fell below the long-term pre-closure average in August. Yield per recruit analyses indicated a percentage benefit comparable to 1981 and 1984 from shrimp present in the FCZ at the time of sampling. However, July landings produced an abundance of small shrimp, and there was evidence of a brief period of extensive discarding (1.1 million pounds with an estimated value of $1.6 million). Simulation models of

the total fishery indicate a small decrease in pounds and a small increase in value during the May-August period with a projection for virtually no change in pounds for the entire (May-April) year. Dollar increases are not projected for the entire year until the final report next year, but an increase seems certain.

The best explanation for the results, in aggregate, is that a benefit (i.e., gross ex-vessel value) was achieved from shrimp protected during the closure. However, an influx of recruitment apparently occurred late in the closed period. Due to the short period of protection, little or no enhancement of yield was gained from shrimp in this influx, and thus the percentage gain estimated from closure was diluted.

A summary of CPUE ratios, yield per recruit results, and estimated changes in pounds and dollars for 1981-1985 is presented in Table 3.

6. Impacts of the Combined Closure of the Territorial Sea and FCZ on Yield and Ex-vessel Value

As expected, the combined closures have produced a much larger benefit than the FCZ closure alone. The effects of the combined closures for 1984 (May 1984 through April 1985) are estimated to have increased ladnings by 5.1 (6%) million pounds. This increase in overall brown shrimp landings includes increased landings of larger shrimp. Thus, the ex-vessel value of the brown shrimp fishery is estimated to have increased about 37.4 (18%) million dollars. As percentages, the gains from the combined closure in 1984 were comparable to those achieved in 1982 and 1983 for both pounds and dollars.

7. Problems

Several problems were identified as follows:

1. Some Texas shrimpers object to too many out-of-state vessels fishing off Texas during the open season leaving few shrimp during the remainder of the fishing season. (Based on comments made at TSA-meetings.)

2. Loss of migrating shrimp to Mexico during the closure period.

3. Lack of a closure throughout the entire northern Gulf.

4. Complaints of short notice for the 1984 season's opening (few, if any, complaints were noted in 1985).

Summary

The goals of the Fishery Management Plan were partially achieved in 1985. Small emigrating brown shrimp were protected and allowed to grow to an average size of 46-count. Discarding resulted in a loss to the fishery of about 1.1 million pounds with an estimated dockside value of $1.6 million.

The 1984 Texas closure regulation resulted in an estimated increase in landings of 1.4 million pounds and a $18.7 million increase in ex-vessel value due to closing the FCZ from mid to May through mid-July. The brown shrimp fishery had reported landings of 83.5 million pounds valued at $210.5 million from May 1984-April 1985. Comparatively, the revenue would have been $18.7 million lower if the closure had not been in effect. The preliminary estimates for May through August of 1985 indicate a slight decrease in total landing, 0.8 million pounds, but an increase in ex-vessel value of $0.8 million, as a result of the closing of the FCZ.

The effects of the simultaneous closing of the Texas Territorial Sea and the Fishery Conservation Zone were estimated at an increase of 5.1 million pounds over what would have been caught and an increase of $37.4 million over the projected earnings with closure for the 1984-1985 season.

Without a prohibition on trawling during the period of brown shrimp emigration, it is anticipated that large quantities of small shrimp would have been caught, resulting in wastage and a lower yield to the fishery.

## Texas Closure Reports

Titles of reports on the Texas closure submitted to the Gulf Council in January 1986.

Impacts of the Texas closure on brown shrimp yields. Final report for 1984. Preliminary report for 1985. Scott Nichols.

Estimated impacts of Texas closure regulation on ex-vessel prices and value, 1984 and 1985. John R. Poffenberger.

Review of the 1985 Texas closure for the shrimp fishery off Texas and Louisiana. Edward F. Klima, Neal Baxter, Peter F. Sheridan, Frank J. Patella and Geoffrey A. Matthews.

Analysis of alternative closures for improving brown shrimp yield in the Gulf of Mexico. Scott Nichols and John Poffenberger.

Table 1. Summary of commercial catch statistics and resource survey results for the Gulf of Mexico brown shrimp fishery.

July-August brown shrimp catch in millions of pounds, fishing effort 000's days and catch per trip

| | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|
| Texas Offshore | | | | | |
| Catch | 25.0 | 13.0 | 9.8 | 15.3 | 14.0 |
| Effort | 14.8 | 15.7 | 10.3 | 18.6 | 15.2 |
| CPUE | 1,895 | 922 | 962 | 819 | 918 |
| Louisiana Offshore | | | | | |
| Catch | 10.5 | 5.1 | 4.9 | 6.6 | 6.1 |
| Effort | 11.9 | 9.8 | 11.2 | 11.2 | 9.7 |
| CPUE | 863 | 524 | 439 | 587 | 625 |

May-August brown shrimp catch in millions of pounds

| | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|
| Texas-Inshore | 4.2 | 4.1 | 5.9 | 7.1 | 5.4 |
| Offshore | 25.3 | 13.9 | 10.5 | 16.1 | 14.5 |
| Total | 29.5 | 18.0 | 16.4 | 23.5 | 19.9 |
| Louisiana-Inshore | 15.2 | 15.1 | 12.1 | 14.9 | 8.8 |
| Offshore | 23.1 | 13.7 | 8.8 | 13.6 | 16.9 |
| Total | 38.3 | 26.8 | 20.9 | 28.5 | 25.7 |

Table 2. Summary of analytical results of the Texas closure shrimp fishery management measure, 1981-1985. Values shown are the statistics used to measure the effects of the closure for the FCZ alone and for the Territorial sea and FCZ combined.

| Statistic | Year 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|
| FCZ Closure | | | | | |
| CPUE ratio Texas:elsewhere[1] | | | | | |
| July | 2.26 | 2.06 | 2.34 | 1.86 | 1.69 |
| August | 1.56 | 1.35 | 1.40 | 1.34 | 0.95 |
| Increase in Y/R at F=1.0 (M=0.15 to 0.28) | +14 to 37% | -10 to +10% | +12 to +33% | +15 to +33% | +14 to |
| Change in Gulf-wide Yield | | | | | |
| (May-Aug) (million | +4.0 (5%) | +0.7 (1%) | -0.5 (1%) | -0.6 (1%) | -0.8 (1%) |
| (May-Apr) pounds) | +4.2 (4%) | +1.4 (2%) | +0.4 (1%) | +1.4 (2%) | 2/ |
| Change in Gulf-wide Value | | | | | |
| (May-Aug) (million | +10.4 (7%) | +5.3 (3%) | +2.1 (2%) | +8.5 (6%) | +0.8 (1%) |
| (May-Apr) dollars) | +9.7 (4%) | +6.0 (3%) | +6.7 (3%) | 18.7 (9%) | 2/ |
| Combined Closures (FCZ and Terr. Sea) | | | | | |
| Change in Gulf-wide Yield (May-Apr) (million pounds) | +9.8 (10%) | +4.9 (7%) | +3.5 (6%) | +5.1 (6%) | 2/ |
| Change in Gulf-wide Value (May-Apr) (million dollars) | +59.5 (25%) | +43.2 (19%) | +31.7 (16%) | +37.4 (18%) | 2/ |

1/Long-term average CPUE ratios (Texas:elsewhere) for 1960-80 are: July, 1.27; August, 1.06.

2/Data required for estimate not yet available.