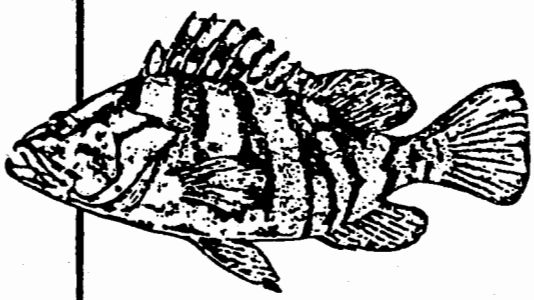
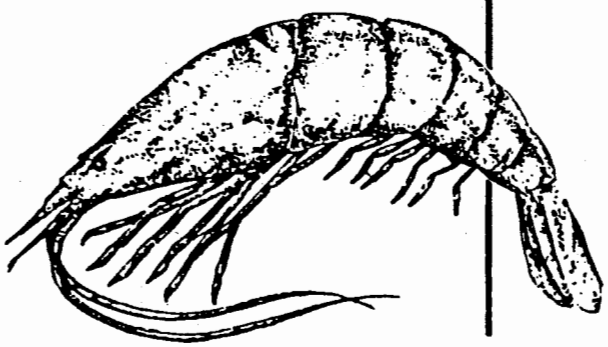
Marine Fisheries Initiative

(MARFIN)
Gulf of Mexico Phase



Proceedings:

First Annual MARFIN Conference



September 19-20, 1988
Tampa, Florida

PREFACE

The Marine Fisheries Initiative (MARFIN) Program has been funded since 1986 by Congress to develop, rejuvenate, and maintain Gulf of Mexico fisheries. Any citizen of the United States can apply for financial assistance to assist the Federal Government (NOAA Fisheries) in meeting the goals and objectives of the MARFIN Program. Each year MARFIN priorities and directions for submitting proposals are published in the Federal Register.

MARFIN is managed by the Southeast Region of the National Oceanic and Atmospheric Administration (NOAA) Fisheries, with assistance from members of the MARFIN Board. The Board is composed of eight members and alternates (plus an ex-officio member) from the following organizations:

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The Board members assist the Regional Director of the Southeast Region NOAA Fisheries to develop Gulf fishery priorities, evaluate proposals for financial assistance, and to monitor existing projects. The NOAA Fisheries (National Marine Fisheries Service - NMFS) provides a program manager to coordinate all of the MARFIN activities, and individual program officers for each of the projects. A Grants Officer in the NOAA Central Administrative Support Center (CASC) in Kansas City, Missouri administers the awarded projects with the assistance of the designated program officer.

This conference was designed to allow a free interchange of ideas among all the MARFIN cooperators, to disseminate information to fishery managers, researchers, and other interested Gulf fishery in matters, and to assist the MARFIN Board and the NOAA Fisheries in obtaining priorities for future MARFIN projects.

The MARFIN research units include:

- Shrimp
- Menhaden
- Coastal Pelagics
- Reef Fish
- Coastal Herrings
- Ocean Pelagics
- Marine Mollusks
- Crabs and Lobsters
- Bottomfish
- Estuarine Fish
- Anadromous & Catadromous Fish
- Mariculture
- Marine Mammals & Endangered Species
- Corals and Sponges

The conference sessions were organized to address most of the research units with MARFIN Board members acting as chairpersons for each of the sessions.

For further information about MARFIN please contact:

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TABLE OF CONTENTS

MARINE MAMMALS AND ENDANGERED SPECIES (continued)

COASTAL PELAGICS

GENERAL (continued)

WELCOMING REMARKS. STRUCTURE AND OBJECTIVES, AND INSTRUCTIONS

THOMAS J. MURRAY: Dr. Angelovic, if you will open the meeting.

DR. JOSEPH ANGELOVIC: Good morning, and welcome to the First Annual MARFIN Conference. I hope it is the first of many to come. I am pleased to see all of you here. The program is fantastic and I think there are going to be a lot of tired participants before this is over. I am pleased to see such attendance in light of the short notice. We put this conference together in a hurry. As you all know, this is a unique program in that it is a regional one and is directed only at the Gulf of Mexico, but the coastal states, academia and federal government are all involved in planning and carrying out the program. A lot of people have been looking very closely at this program to see what the results are and to judge whether it is a success or not. In short, that is why we are here, to look at the results of the program thus far and make adjustments as needed. A conference such as this is an excellent way for people to see what the program is accomplishing. It gives people a chance to really make an evaluation. I do not know if I am usurping Tom's rights as chairman here, but I also see it as a forum for discussion of program results. Perhaps through such discussions we will discover areas of research that we have overlooked, areas that need bolstering up so that we can plan for the future. I think this forum can be used for such discussions. As I look through the conference agenda, the subjects listed cover almost everything. It covers most species, and covers from economics to education. I noticed that you are going to have evening sessions,

because the program is so full. Given your long agenda, I am not going to waste a lot of your time. However, I am going to apologize ahead of time since I got double booked for this conference and I am not going to be able to spend as much time here as I would like. Nonetheless, I wish you well, and I will now turn it back to Tom. Thank you, Tom.

THOMAS J. MURRAY: Thank you, Joe. Again, this is a first time, so we are all going to share in the bliss of making things happen that have not happened before. We want to begin by thanking Larry Simpson and the Gulf States people for putting this together in such a short timespan. I think the fact that the number of abstracts which were received in time, and the number of people who were able to come on such a short notice is impressive. Again, thank you for coming. Don Ekberg is our MARFIN program manager, National Marine Fisheries Service. Don, would you tell us a little bit about the structure and the objectives of the conference?

DONALD R. EKBERG: This is the third year for MARFIN. We started out with the objective of trying to improve, maintain or find new fisheries in the Gulf of Mexico. We soon discovered that it was necessary to react to new problems in the Gulf of Mexico, first king mackerel and then red drum. Thus, we have developed a two pronged approach, one for fishery development and maintenance, the other to handle fishery problems as they arise. For the past two years we have produced annual reports from available quarterly, annual and final

reports. Based on information gathered from this conference, the annual report should be more extensive and timely.

Immediately following this conference, we are going to have a MARFIN Board Meeting to look at priorities for fiscal year 1989. We would hope that this meeting will provide some of those objectives.

THOMAS J. MURRAY: Thanks, Don. Again, this is an initial effort. We need to cover in excess of fifty presentations over two days. Time is going to be of the essence. We expect the participants to be concise. You all have abstracts and the use of audio visual equipment will help hasten the presentation. Let's consider these as openers. We are here to meet each other and to get to know each other better. Please hold all the questions for the individuals till the end of the panel, rather than at the end of each presentation. For those of you in the audience, please identify yourself before you ask a question.

Biological, Fishery, and Product Assessments of the Keoghfish, an Underutilized and Unmanaged Gulf of Mexico Resource

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ABSTRACT

The keoghfish or giant snake eel, Ophichthus rex, is an unexploited Gulf of Mexico resource that has the potential to become a viable component of the established offshore snapper/grouper and shark fisheries. Because of its large size, this fish could become a valuable commodity whether marketed as by-catch of existing fisheries or as a product of a directed fishery. Results of preliminary studies indicate that this species has a number of attributes that bode well for its fishery future: (1) it is readily captured using existing technology, (2) it already is frequently captured as a by-catch of two established fisheries, (3) it reaches a large size, (4) fecundity is high, (5) its flesh is nutritionally sound and free of contaminants, and (6) the product has been well-received in consumer surveys.

The current project is an 18-month cooperative study being conducted by biologists and seafood scientists from the University of Florida and University of Central Florida with Franklin F. Snelson of the University of Central Florida acting as a co-principal investigator. Objectives are: (1) characterize the habitat requirements and community associates of O. rex; (2) gather basic biological information pertinent to managed development of the fishery, including length/weight relationships, food habits, reproductive cycles, seasonal length frequencies, and age and growth characteristics; (3) document commercial harvest methods, including bait and gear choice, fishing site selection, and eel catch rates within the existing fishery as well as in a directed fishery; (4) document and test on-board and primary dockside handling methodologies; and (5) perform detailed analytical assessment of the eel flesh and evaluate potential for utilization of the skins in tannery operations. This preliminary report is based on analysis of four months of data in the ongoing study based in the north-central Gulf of Mexico.

Longline catches over mud bottom in 200-500 ft of water are composed of giant snake eels and small sharks (predominantly Atlantic sharpnose sharks) in about equal numbers. Eel catch-per-unit effort (CPUE) shows no seasonal pattern; diurnal CPUE data suggest increased catches at night and a peak in feeding activity at dawn. CPUE shows a general trend to increase with depth. Females outnumber males by

about 4 to 1 and also reach a larger size. Females average 150 cm in total length (range 101-196) and 6.3 kg in total weight (1.6-14.5), whereas males average 134 cm (83-166) and 3.9 kg (0.7-9.0). Length-frequency data suggest that larger individuals are found in deeper water. Regressions for whole weight and carcass weight (marketable portion) are presented; both relationships are logarithmic. Morphometric analysis shows that relative body girth increased with increase in total length. Otolith sectioning reveals up to 22 rings (presumptive annuli) but the correlation between size and ring number is relatively low, a finding in keeping with that for other eels. Food analysis, based on % occurrence, % volume, % number, and index of relative importance, reveals that crabs and fishes, especially other eels, are the major diet items. Comparison of diet over a three-month period suggests some seasonal changes in major food items. Gonad histology and gonosomatic indices reveal that females are gravid and males exhibit peak spermatogenesis in mid-winter. Gonads of both sexes atrophy in late spring and are inactive in summer, suggesting a single spawning period in mid-winter. Seafood analyses reveal high yields (65%), protein contents of 15-19.5%, and fat contents of 3-4%. The major marketing problem still centers around the presence of intramuscular bones in the traditional marketable product.

The Social Structure and Economics of the Charter and Party Boat Fishing Fleets in Alabama, Mississippi, Louisiana and Texas

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ABSTRACT

The purpose of this project was to provide federal and state fisheries managers with aggregated information about the charter and party boat industry in the region. Study results provide a social and economic baseline for evaluating the effects of management rules on these fisheries prior to their implementation.

Research objectives included an identification of major centers of charter and party boat activity for each state in the study area; an understanding of species utilization, importance and seasonal changes for these two fisheries; a description of business and social structure; a calculation of mean costs and gross revenues; and an examination of operators' community ties and opinions on fisheries regulations. Boat operators were interviewed by field personnel between May-August 1987. Personal interviews lasted approximately 30-40 minutes. Interviews were completed with a representative sample of 100 charter boat operators in the study region; this constituted 48% of the adjusted population of operators. Interviews were also completed with 17 of 26 party boat operators (65%).

Major activity centers for charter boats in the study area included Orange Beach (Alabama), Grand Isle - Chauvin-Cocodrie-Houma (Louisiana) and South Padre Island-Port Isabel (Texas). Speckled trout, red snapper and red drum were targeted throughout the year with peak use in late spring and early summer. King mackerel was targeted primarily in spring and summer months. Most operators did not fish commercially in 1986; about one-half chartered for tournaments. Most charter businesses were sole proprietorships with 1.71 boats/business. Mean total investment/business was about $112,000.00 (in 1986 dollars). Mean original capital investment for the charter boat and all equipment aboard was $69,244.00. This varied by state: Louisiana had the highest mean original capital investment ($129,915.00) and Texas the lowest ($40,433.00). Mean gross annual revenue/charter boat business was $31,533.00 with a median of $25,000.00. Charter operators were most supportive of current catch restrictions on red drum and king mackerel; they were least supportive of current restrictions on red snapper. Four of five operators interviewed expected to be in business in five years; they were generally optimistic about their future.

The vast majority of party boats (20 of 26) were located in Texas. Assemblages of species sought by party boats consisted mainly of red snapper and king mackerel. Red snapper was the dominant species in the industry with operators spending about 50% of their time on this species throughout the year. Most captains did not fish commercially. Most party boat businesses were corporations with 2.31 boats/business. Mean total investment/business was $476,991.00. Mean original total capital investment for the party boat and all equipment aboard was $107,540.00. Mean gross annual revenue/party boat business was $90,455.00 with a median of $105,000.00. Operators were most supportive of current catch restrictions on speckled trout, king mackerel and red drum; they were least supportive of restrictions on red snapper. Sixteen of 17 operators interviewed said they expected to be in business in five years; a strong majority saw an improved future for the industry.

The final technical report contains 327 pages, 129 tables in text, 82 tables in 8 Appendices and an executive summary of findings.

The Structure Economics of the Charter and Party Boat Fishing Fleet of the Gulf Coast of Florida

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ABSTRACT

Introduction: This is a one year project scheduled to be completed in December, 1988. The objectives of the project are: 1) To update and describe the distribution of party/charter boats by type of boat and location, (2) To describe which species the charter and party boat fisheries are utilizing by location and seasonal variation, (3) To report information on the economics and business aspects of charter/party boat operations, (4) To report captains perceptions of problems in their industry and degree of cooperation with relevant agencies, and (5) Compare 1988 results with 1978 Browder et al. charter/party boat study and report trends. This project is a complement to the study completed by Ditton, Stoll and Gill in 1988 for the central and western Gulf (i.e., Alabama, Mississippi, Louisiana and Texas).

Summary of Results: This project is still in the data analysis stage so only partial and preliminary results are available. A total of 166 captains were interviewed out of an estimated total of 800 boats on the Gulf Coast of Florida (20% sample). These captains were intercepted at 15 locations along the Gulf Coast. The sample was about 75% charter boats and 25% party boats.

The fish species which are sought by the largest number of boats are: grouper (90%), red snapper (83%), amberjack (75%), king mackerel (74%), dolphin (69%), cobia/ling (69%), shark (68%), bonito (67%) and Spanish mackerel (60%). Wahoo, barracuda, sailfish, blue marlin, white marlin and blackfin tuna were each sought by about 50% of the boats. In terms of species which were targeted for the longest proportion of time by the largest number of boats, the list includes shark, king mackerel, amberjack, sailfish, bonito, wahoo, blue marlin, and Spanish mackerel.

In the Florida Keys, the greatest number of boats are targeting dolphin, sailfish, grouper, blackfin tuna, amberjack and barracuda. Along the peninsula, the largest proportion of targeting time is aimed at: amberjack, king mackerel, Spanish mackerel, grouper, bonito and cobia. In the panhandle, the largest number of boats are targeting: king mackerel, amberjack, shark, cobia/ling, bonito, dolphin, and red and vermillion snapper.

The captains reported that 62% of their trips are full-day and 38% half-day; an average of 15% of their trips are in bay areas and

43% of their trips are nine miles or more offshore. The captains averaged 103 half-day trips per year and 100 full-day trips per year.

There was moderate support among the captains for the current catch restrictions on cobia, red snapper, and bluefin tuna but there were about an equal number of captains supporting and opposing current catch restrictions for king mackerel, Spanish mackerel and redfish.

An economic analysis of the charter and party boat business will be included in the final report.

REEF FISH SESSION SUMMARY OF COMMENTS

Keoghfish

o This giant eel is generally smoked and shipped to European and Far East markets. The handling of intramuscular bones must be solved before domestic marketing can be pursued.

o Takes about nine years to reach sexual maturity.

o Found offshore in waters of 200 feet or more from Pensacola to Campeche.

o The current sampling is off the Mississippi River in Louisiana waters.

o Lives in mud bottom, but they may be found around structures such as oil rigs where food abounds.

o Bottom longlines are being used, which produce a ratio of about one eel for every shark.

Charter and Party Boats

o The surveys were designed to eliminate problems of recall as much as possible.

o Personal interviews were extensive.

o The surveys used similar methods, so that an integrated summary of the Gulf could be obtained.

o Since the sampling universe was a list of captains obtained from NMFS, those captains who entered or left the industry since the list was obtained were not included in the survey.

- NMFS should continue to maintain as current a list as possible if surveys are to remain accurate.
- The vessel captains regard themselves as a group separate from the recreational or commercial industries, but most lean toward the recreational side.
- Party boats generally target red snapper with king mackerel as number two.
- Business climate appears good, but catch per unit effort is decreasing.
- The distribution of party and charter boats across the Gulf is not uniform in time, nor are the targeted species uniform. Thus, fishery managers should consider these differences when developing fishing regulations.

Fisheries-Independent Data on Coastal Herring, Carangids, and Red Drum from the Northern Gulf of Mexico

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ABSTRACT

This research was undertaken as a preliminary investigation of coastal pelagic herrings and carangids to fill the information void on Gulf-wide larval seasonality, distribution, abundance, spawning ecology and location. This project will also document oceanographic factors affecting survival and recruitment and provide a foundation upon which sound management of these fisheries can be based. In addition to data reported during YR 1, Joanne Lyczkowski-Shultz of the Gulf Coast Research Lab, a co-principal investigator, worked on SEAMAP collected king and Spanish mackerel data from off Mississippi-Alabama. In YRS 2 and 3, she along with Harry Blanchet of the Louisiana Department of Wildlife and Fisheries, are working red drum egg and larval data to estimate spawning biomass in the northcentral gulf. We are currently sorting and analyzing data for the 2nd of a 3 yr project focusing on Gulf-wide, SEAMAP 60-cm bongo net (0.333 mm mesh) collections. Nets were towed obliquely to with 5 m of bottom or a maximum depth of 200 m.

SEAMAP bongo net samples collected during 1982-1984 were examined for the presence of target coastal pelagic clupeid larvae. Three species: scaled sardine, Harengula jaguana, Atlantic thread herring, Opisthonema oglinum, and Spanish sardine, Sardinella aurita, were abundant over the shelf primarily at depths <40 m. All three species are found from March-October, but are most abundant during June-August. Both scaled sardine and Atlantic thread herring were widely distributed, with Spanish sardine most abundant off Florida and Texas. Spanish sardine were seldom collected in the northern Gulf between Apalachee Bay, FL, and Galveston Bay, TX. Most scaled sardine and Atlantic thread herring were collected at salinities <30 ppt ($\bar{X}$ = 28-29 ppt), whereas Spanish sardines were most abundant at >30 ppt ($\bar{X}$ = 34 ppt); all three species were most abundant at water temperatures averaging 28°C. Finally, for all cruises and stations combined during 1982-1984, larvae of Atlantic thread herring were the most abundant overall averaging ($\bar{X}$) 24/10 m², followed by Spanish sardine (22/10 m²), and then scaled sardine (9/10 m²).

Table 1. Ecology and seasonality of larvae of clupeids in U. S. Gulf of Mexico waters during 1982-1984. Salinity and water temperatures are for the surface only.

Table 2. Mean abundance (No./10 m^2) by year of clupeid larvae in U. S. Gulf of Mexico waters during 1982-1984. These data represent all cruises & stations sampled.

Table 1.

PARAMETER	SPECIES		
	H. jaguana	*O. oglinum*	*S. aurita*
Seasonality	Mar-Oct	Mar-Oct	Mar-Oct
Temp. (°C)	28.2* (20-32)	28.4 (20-32)	27.9 (21-31)
Salinity (ppt)	28.9 (10-37)	27.9 (3-37)	34.0 (13-37)
Depth (m)	28.7 (5-143)	22.6 (6-82)	32.4 (6-111)

*Mean and Range

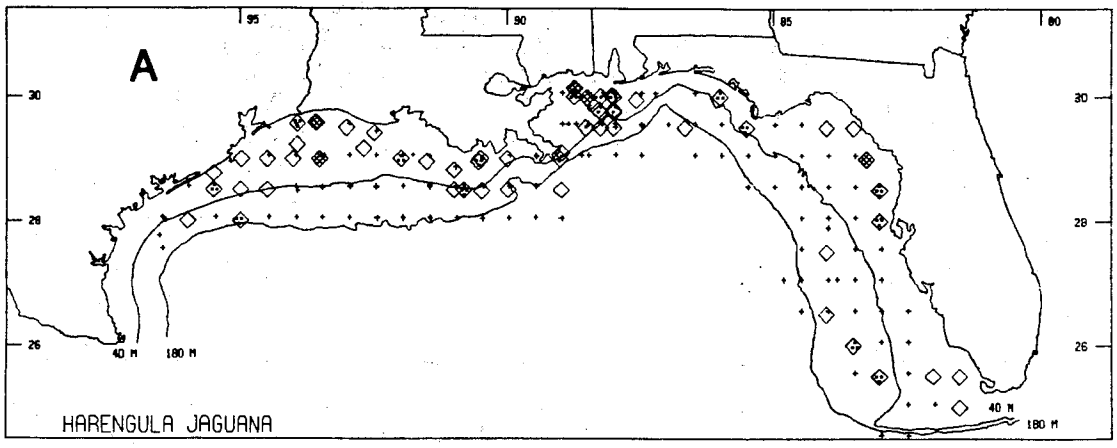
Table 2.

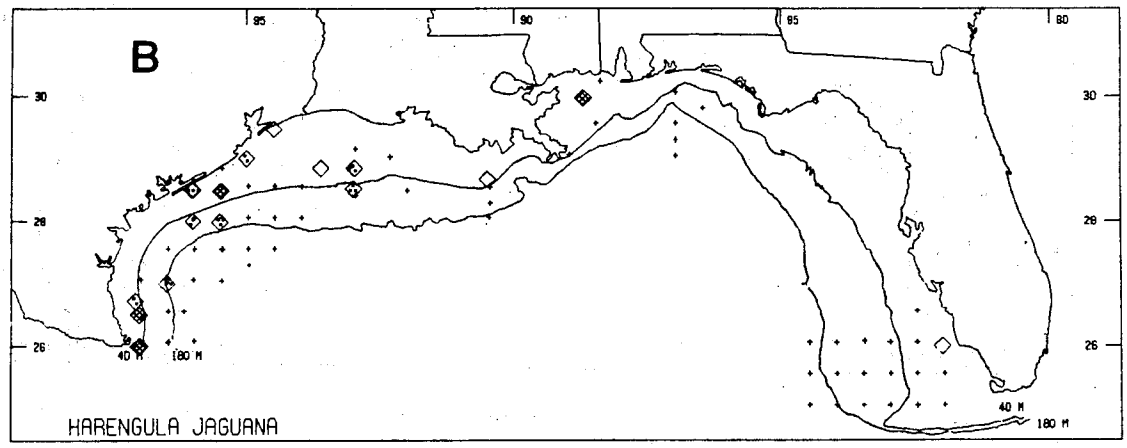
TAXA	1982	1983	1984	MEAN
H. jaguana	13.5	5.7	7.5	8.9
O. oglinum	43.6	6.4	21.8	23.9
S. aurita	25.6	34.1	5.2	21.6

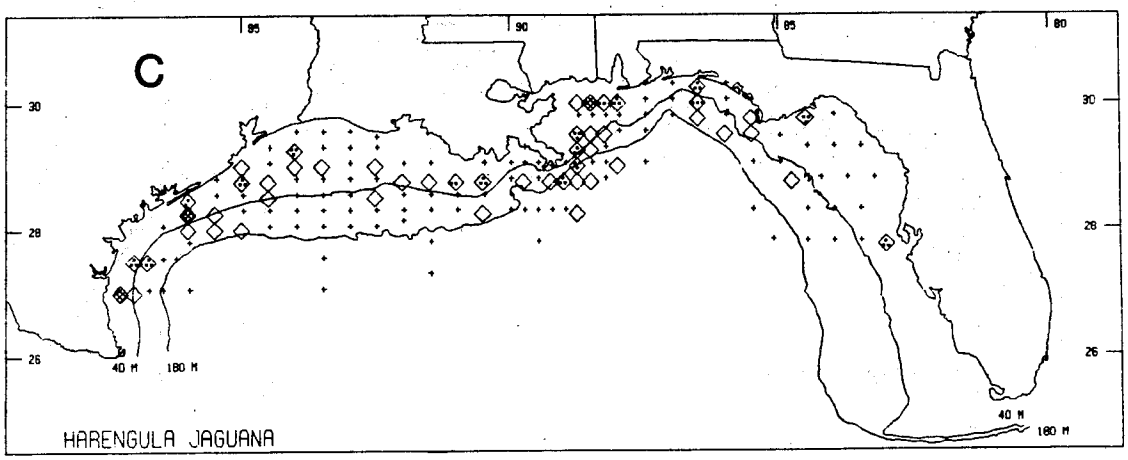
Figure 1. Distribution and abundance (No./10 m²) of scaled sardine, Harengula jaguana, during the summers of 1982-1984. A = June, B = July, C = August; years were combined by month.

Figure 2. Distribution and abundance (No./10 m²) of Atlantic thread herring, Opisthonema oglinum, during the summers of 1982-1984. A = June, B = July, C = August; years were combined by month.

Figure 3. Distribution and abundance (No./10 m²) of Spanish sardine, Sardinella aurita, during the summers of 1982-1984. A = June, B = July, C = August; years were combined by month.







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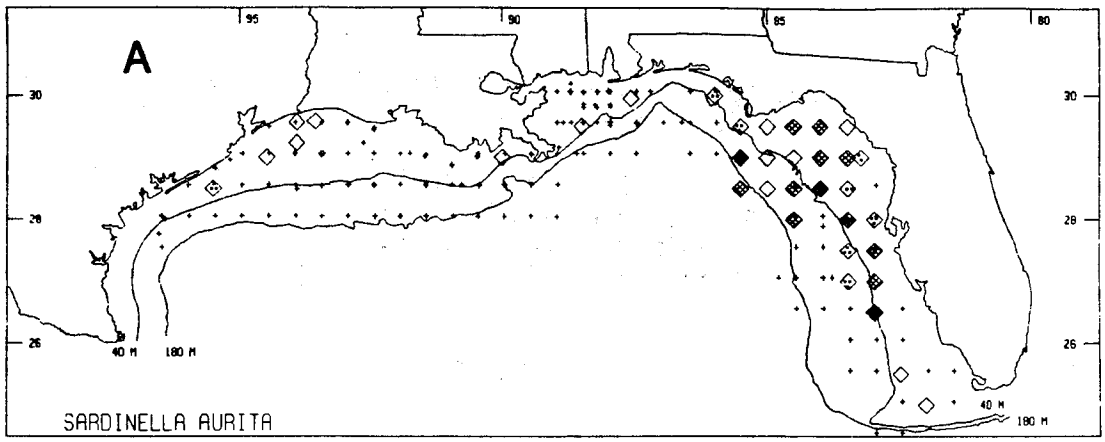

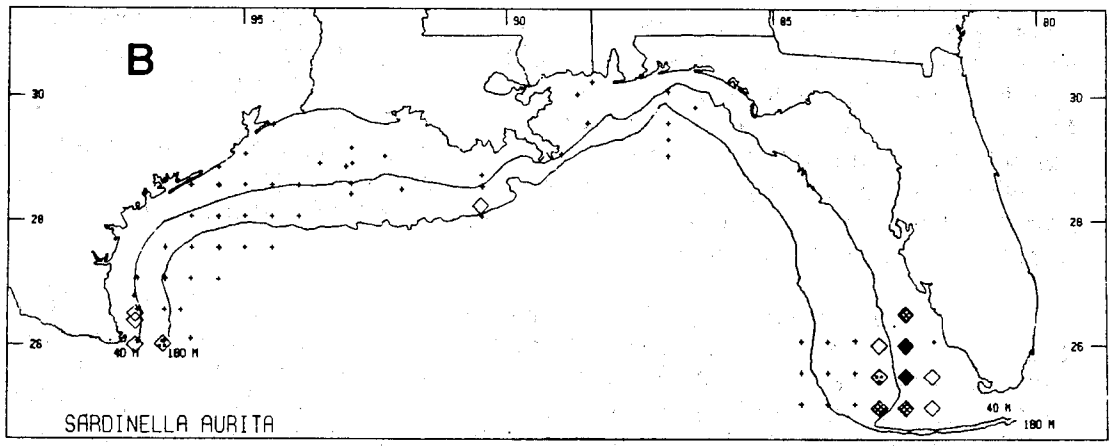

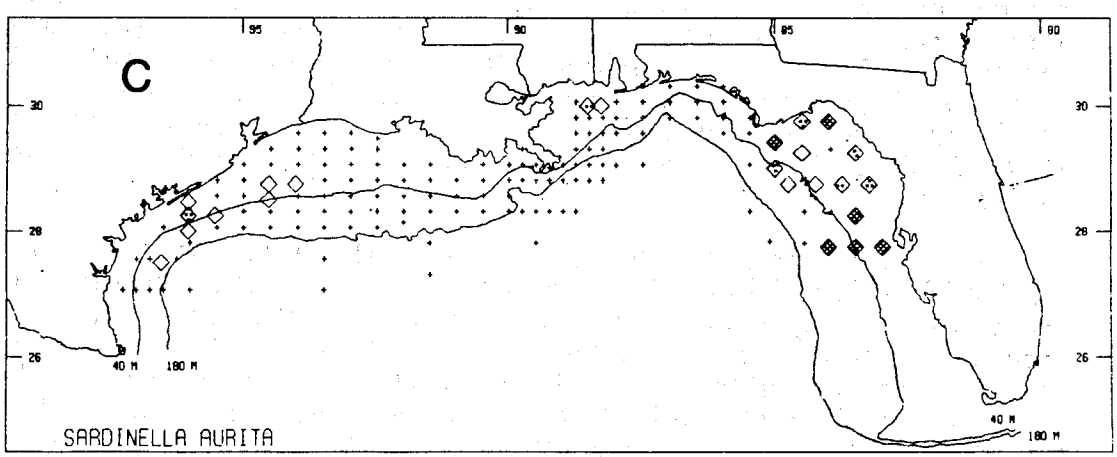

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Development of a High-Speed Pelagic Trawl for Sampling Coastal Herring

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ABSTRACT

Introduction: A one-year (10/1/87 - 9/30/88) research and development project was carried out with the goal of developing a pelagic/semi-pelagic trawl for effectively sampling fishes of the coastal herring species complex in the Gulf of Mexico. While the trawl was specifically designed for resource assessment survey operations carried out aboard a particular vessel, the NOAA Ship CHAPMAN, a secondary objective was to refine design principles that may be directly applied to gear for potential commercial fisheries targeting these species.

Based on information furnished by the Harvesting Systems Task at the Mississippi Laboratories (Pascagoula, MS), Southeast Fisheries Center, National Marine Fisheries Service, a new type of trawl was designed, constructed, and delivered to Harvesting Systems for fishing trials aboard the CHAPMAN. Nor'Eastern Trawl Systems, Inc. (NETS) was responsible for all aspects of designing and constructing the gear, with Harvesting Systems responsible for evaluating the trawl's physical performance and fishing efficiency during sea trials. This report will summarize the process by which the design was initially developed, then refined based on at-sea fishing evaluations to arrive at a final configuration that may be routinely used for resource assessment.

Summary of results: An engineering analysis was performed on the CHAPMAN's towing capabilities and was integrated with information on the behavior, physiology, and distribution of the target species to produce a trawl design optimized for these parameters. Design criteria were as follows: 1) it had to possess low towing resistance so that the CHAPMAN could tow it for prolonged periods at speeds exceeding 4 knots, significantly faster than the typical trawling speed of 3.0 - 3.25 kn; 2) it had to have a large mouth opening; and 3) it had to be effective throughout the water column in depths ranging from 20 to 100 fms or more. Meeting all of these criteria required the development of new technology.

A prototype trawl was constructed using high-strength aramid fibers of very low cross-section, thus yielding the lowest possible drag which in turn made it possible to satisfy the conflicting requirements of large mouth area and high towing speed. Other design features aimed at this goal included the use of large mesh sizes in

the front end, or "herding" region, of the net, starting with 128" mesh openings in the very front and graduating down to 3 1/2" at the codend.

Fishing trials conducted during CHAPMAN Cruise CH87-06(21) demonstrated that towing speeds of up to 4.5 kn could be sustained with the net and that the required mouth opening dimensions of 11 fms vertical by 18 fms horizontal could be obtained with suitable rigging, door, and warp length adjustments. However, these experiences also showed that the net as constructed could not be successfully fished in water depths of less than 30 to 40 fms, and that the mesh sizes in the back body of the net immediately ahead of the codend were too large to contain the fish. Following the cruise the trawl was modified to correct these shortcomings.

The principal modification carried out was to convert the net to "unbridled" configuration, in which the bridles connecting the doors to the trawl are eliminated, and the doors are connected directly to the ends of the headrope. This modification also requires that the breastlines along the side of the trawl be cut away along an arc, the footrope must be shortened, and the side and bottom leadropes must be shortened to fit. These changes allow a midwater trawl to be fished successfully at much shallower depths than would otherwise be possible. This was confirmed during CHAPMAN Cruise CH88-04(25), when the trawl was fished successfully in 20 fm depths, attaining mouth openings of 8 fms vertical by 13 fms horizontal.

The second modification tested during this cruise was the replacement of the aftmost 3 1/2" mesh section with a section of 2" netting within which a fish funnel was installed. This served two purposes: the smaller netting did a better job of containing the fish; and the fish funnel, acting like a one-way valve, prevented fish from surging forward from the codend and out of the net at the conclusion of the tow. While large concentrations of fish were not encountered during any of the tows when this net was deployed, SCUBA and remote TV observations showed that these modifications successfully contained the few fish that did enter the net.

NET SYSTEMS INC.

SCHEMATIC- UNBRIDLED VS. FULL-WING ROPE TRAWLS

DESIGNED BY	BILL WEST	DATE-	9/15/88
PRINT SCALE-	N/A	DISK TITLE	SHEET5-10

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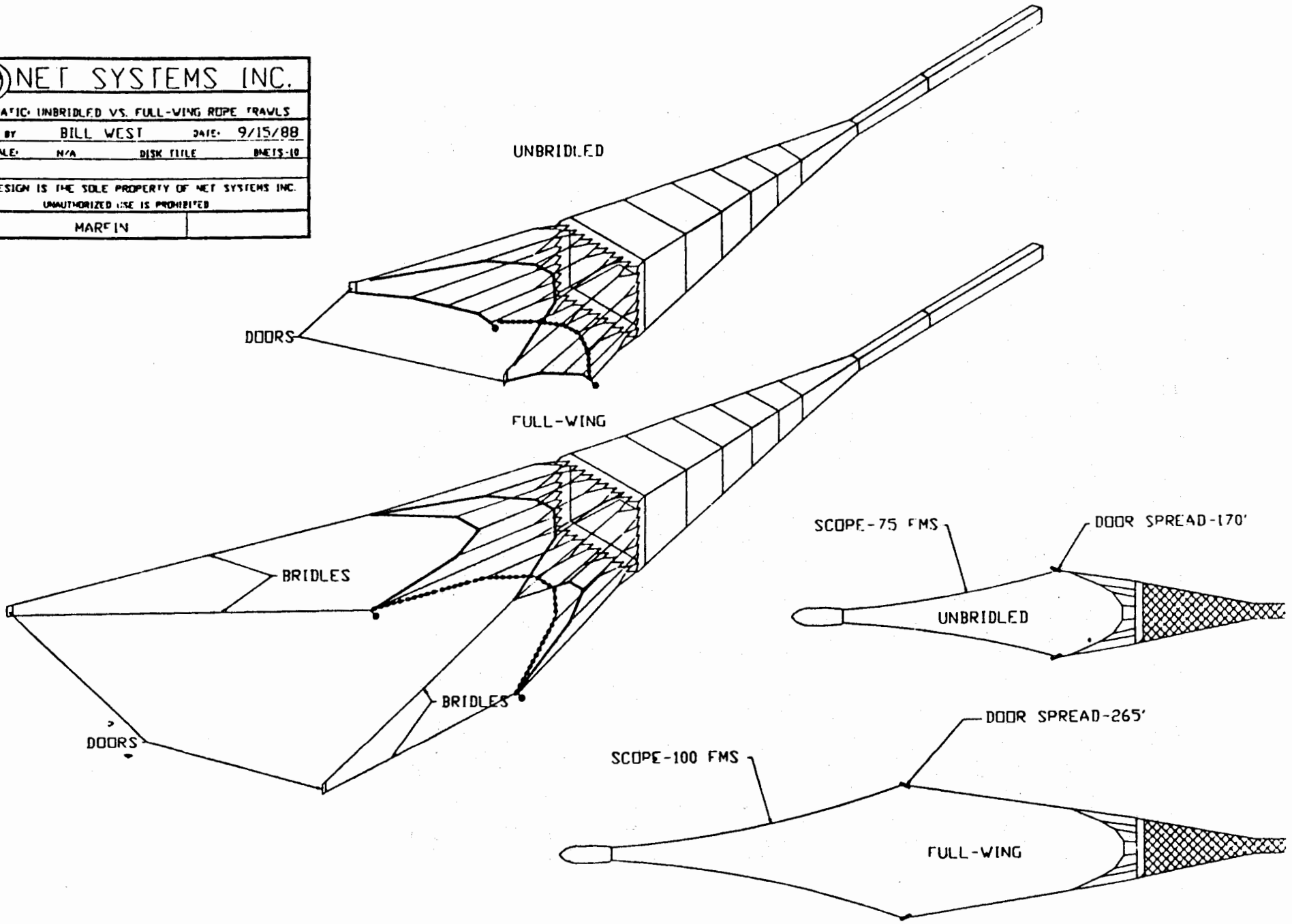
DWG NO.- MARFIN



COASTAL HERRINGS SESSION SUMMARY OF COMMENTS

Coastal Herrings

o Fisheries independent sampling of coastal herrings and carangids will require about five years of data to handle the variability for estimates of spawning stock and to make correlations of catch of adult stock with environmental parameters such as temperature and salinity that affect larvae.

o Three years of neuston data and five years of bongo net data are available.

Pelagic Trawl

o Since Kevlar is very expensive, the cost of a trawl to a private customer would be about $22 - $23,000.00. Based on data collected from the testing, the cost could get down to $16 - $17,000.00 for a vessel the size and horsepower of the CHAPMAN.

o The maximum trawling speed is about 4.5 knots.

o The present goal per net is to be able to conduct research surveys from 20 fathoms out to as deep as they encounter the fish.

Biological and Catch/Effort Data Collection from the Domestic Tuna Longline Fishery in the Northern Gulf of Mexico

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ABSTRACT

The main goal of this project was to document catch/effort and bycatch, and collect biological data from the domestic tuna longline fishery in the northern Gulf of Mexico. The principal investigator worked closely with the NMFS-Pascagoula Lab to ensure that the data would be in a form compatible with those being collected through the NMFS's observer program.

A port sampler was hired from the Empire-Venice area near the mouth of the Mississippi River in October 1987 since most of the tuna boats landing in Louisiana docked there. He was to go to sea once a month as an observer to record detailed effort information, retained and discarded bycatch, and lengths and weights from whole fish. While on land, he was to conduct intercept interviews with tuna captains and help them fill out their swordfish logbooks correctly. He would also record gutted weights of the catch and bycatch as they passed over the dock scales.

The port sampler seemed to have difficulty getting out on tuna trips and met such extreme resistance at the docks that the NMFS program officer agreed to drop dockside interviews in January and concentrate on sea days. However, only two short trips were taken during bluefin season as the boats either had no room for an observer because they were carrying extra crew, or they used that as an excuse not to carry anyone out who might observe some illegal activity.

It became apparent that this port sampler was not working out, and he resigned in March 1988. Although recruiting began immediately for two new port samplers, suitable candidates were not found until May and June. The new port samplers attended a one-day training program at the NMFS-Pascagoula Lab, and have been quite successful at getting aboard tuna boats.

From October 1987 through August 1988, LSU port samplers have been to sea aboard tuna boats 11 times for a total of 92 sea days. Thirty-two sets were made during these 11 trips for an average of 2.9 sets per trip. A total of 476 fish were caught (311 retained tuna, 38 retained bycatch, and 127 discarded bycatch). The average tuna catch per trip was 28.3 fish, and the average tuna catch per set was 9.7 fish. The average billfish (marlins and sailfish) bycatch per set was 2.7 fish, and 69.4% of the billfish were alive when discarded. A

total of 300 yellowfin tuna and 4 bigeye tuna were measured and weighed as well as 53 miscellaneous species like lancetfish, sharks, and swordfish.

OCEAN PELAGICS SESSION SUMMARY OF COMMENTS

o The mortality of billfish is about 30%, based on an overnight set of about 10 hours.

o Most of the fish are hooked in the jaw - the mortality appears to be more closely correlated with length of set than hooking location.

o In the Venice, Louisiana area there are from 50-100 fishing boats.

o For management purposes more information is needed on changing fishery practices, such as the type of bait, number of fish released alive, types of hooks, and set time.

Fisheries Development of Deep-Sea Golden Crab, Geryon fenneri: Geographic & Seasonal Production Potential in the Gulf of Mexico

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R. Waller (GCRL), R. Erdman (USF), F. Lockhart (UF)

ABSTRACT

A sampling design involving replicate traps at each of three depths (170, 270, & 370 fms), at each of five geographic areas in the northeastern Gulf of Mexico, and during each of four consecutive seasons, revealed significant patterns in the distributions, abundances, population structures, and reproductive cycles of the golden crab, Geryon fenneri, and the red crab, Geryon quinquedens. The species were essentially segregated by depth and geographic area, with G. fenneri concentrated off peninsular Florida at upper depths, and G. quinquedens occurring only at the deepest depth in all areas but concentrated off Mississippi-Alabama. Within each species the sexes also tended to segregate. Golden crab females were concentrated at the shallowest depth while golden crab males were concentrated at the intermediate depth. However, bathymetric distributions changed seasonally such that segregation was most pronounced in fall and winter samples, and overlap was greatest during spring and summer. Shifts in bathymetric distributions of golden crab occurred first in the southeastern area, where total abundance was also greater. Larger female golden crabs tended to concentrate at the shallow depth in the more northerly station within their range, while the female proportion of the population increased significantly south to north. Red crab females were concentrated in the northwestern sampling areas, while males occurred throughout the sampling area with seasonal variation. The largest red crabs of both sexes were also found at the northwestern-most areas. Both golden crab and red crab populations displayed an essentially annual cycle of female reproduction, but with red crab spawning more protracted. For golden crabs, oogenesis progressed through spring and summer toward egg extrusion in late summer or early fall. Ovigerous golden crab females predominated in late fall, while during late winter females were releasing eggs. Depth significantly affected the proportionate size distribution of reproducing female golden crab, again with larger females shallower. For G. quinquedens, modest proportions of females were ovigerous during spring and summer, while egg remnants were found during late winter (total numbers of crabs were depressed in late fall). The northwestern areas also harbored the largest reproductive females. Fecundity increased significantly with female body size and differed between species, but was not affected by depth and geography. Differences in temperature and bottom type preferences probably account for species differences in bathymetric and geographic distributions. We further hypothesize that life history strategies of these species are adapted to major oceanographic features in the

eastern Gulf, such that population reproductive centers are shifted upward and counterclockwise within their ranges.

CRABS AND LOBSTERS SESSION SUMMARY OF COMMENTS

o The golden crab is found in numbers greater than five per hectare.

o In areas with rock outcroppings densities average 36 per hectare.

o The red crab prefers muddy bottoms.

o Since crabs do not have otoliths, it is difficult to determine age.

o The early life history of these deep water crabs is poorly known. Commercial fishermen are taking some crabs in the offshore Louisiana area and in the Belle Keys.

Coordinating, Planning and Progress-Reporting Activities of the Cooperative State-Federal Research Plan for Red Drum in the Gulf of Mexico

Tom M. Van Devender
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ABSTRACT

Historically, red drum have been an important component of both recreational and commercial fisheries in the Gulf of Mexico with both sectors of the fishery conducted primarily in the estuarine areas. Increased consumer demand in the early 1980's saw total landings increase from 8 million to 17 million pounds during the period 1979-1986, and much of the increase occurred on the offshore spawning stock. In view of the continuously expanding efforts by both commercial and recreational fishermen, an urgent need arose to manage offshore and nearshore segments of the fishery if conservation and maintenance of the resource was to be effected. However, biological information on size and age composition of offshore schools was inadequate and recruitment of red drum from the estuaries to the offshore spawning stock was thought to be dangerously low.

A meeting of state and federal fishery management agencies in May 1986 undertook to define areas of information need, devise research efforts to answer these needs, and identify the most appropriate and expeditious mechanism for securing funding and develop a research plan. It was decided to use an existing cooperative State-Federal Program, Southeast Area Monitoring and Assessment Program (SEAMAP), to coordinate planning efforts. The SEAMAP Red Drum Work Group, composed of leading university, state and federal management specialists, developed a coordinated research plan specifying objectives, tasks and sampling schemes to meet red drum management needs. This "State-Federal Cooperative Program for Red Drum Research in the Gulf of Mexico: A Three-Year Plan" (Gulf States Marine Fisheries Commission, 1986) is a comprehensive document of information needs in order to permit wise management and use of the Gulf's red drum resource. Under the umbrella three-year program, the specific objectives for this coordinating, planning and progress-reporting project are (1) to facilitate planning of cooperative activities concerning red drum research and enable evaluation of the Cooperative Program's status and progress through the SEAMAP Red Drum Work Group; and (2) to prepare and distribute information on the Program's progress to all interested persons and organizations via the newsletter Sciaenops.

Life History Studies of Red Drum Populations in Mississippi

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ABSTRACT

This project is part of the Cooperative State/Federal Plan for Red Drum Research: A Three-Year Plan.

The goal of this project is to provide scientific information necessary for the sound management of red drum resources in the Gulf. The objectives of the project are (1) to attempt to provide an estimate of escapement of red drum from nearshore waters to the offshore spawning stocks and (2) to elucidate the seasonal relative abundance and size distribution of red drum along the Mississippi Gulf Coast. The project is at the end of two years of a three-year project.

Sampling was carried out by use of bongo nets in island passes into Mississippi Sound, seines, modified Renfro beam plankton trawls, various mesh-size gill nets, and other miscellaneous gear types. Hydrographic data were collected with each biological sample.

A total of 1708 red drum have been captured. One thousand, fifty-eight were taken in gill nets, 438 in seines, 167 in BPL's, and 45 with other gear types. A total of 767 red drum were tagged and 146 fish have been recaptured for a 19 percent return rate.

Generally, catches of red drum in 1987 were lower than those taken in 1986.

Tagged fish moved from 0 to 278 miles, and 15 out of 17 fish which moved greater than 10 miles moved to the east. Fish were at-large up to 568 days.

Tagged fish that were at-large for only the winter months grew at a mean rate of 3.3 mm/month. Fish that were tagged in the winter and were recaptured by mid-summer grew at a mean rate of 21.7 mm/month.

Red Drum Tagging, Age Verification and Age at Length Studies in Alabama

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Marine Resources Division

ABSTRACT

Alabama's MARFIN red drum project was initiated to improve on life history and related information for red drum. Hatchery produced red drum were secured and transported to Alabama Marine Resource's Claude Peteet Mariculture Center as the initial phase in the production and release of tagged phase 2 fingerlings. The larvae were fed cultured rotifers (Brachionus plicatilus) for 2-4 days then acclimated to and stocked in 0.11 ha fertilized brackish water ponds. Zooplankton samples were taken 3 days per week to assess the zooplankton population for abundance and quality. Fry were stocked at rates ranging from 45,000/ha to 900,000/ha. Culture period varied from 27 to 94 days. Percent survival was most severely affected by low water temperatures encountered (< 22 C) less than one week post-stocking. Percent survival for ponds stocked at higher water temperatures averaged 19.7% and ranged from 1.9-52%. Harvested fingerlings averaging 1.2 g were restocked into brackish water ponds at densities of 30,000/ha to 50,000/ha. Presently 16,938 fingerlings have been harvested, tagged with internal tags and released. Angler reports of captured fish indicate that fish released on September 3, 1987 have attained a size of approximately 400 mm (16 inches). Tag return rate is expected to increase as more of the fish attain a size for recruitment into the fishery. Determination of age-class and size composition of purse-seine captured red drum landed in Alabama was accomplished in the summer of 1986. MRD personnel sampled 15 purse-seine catches from May to July obtaining lengths, weight and otoliths from individual fish. Otolith analysis was subcontracted to Auburn University which produced a final report in January 1987. The preponderance of purse-seine landed fish were between 7 and 13 years of age. Growth was found to be extemely rapid in the first three years of life with a gradual decline in the rate after age 5. Tagging of hatchery-reared and wild red drum in Alabama inshore waters demonstrated high levels of inshore recreational exploitation at ages 1 and 2. Of the 90 wild fish tagged since October 1987, 24 have been harvested. These fish showed little movement from release sites. A cryptic tagging effort indicated only 43% of captured tagged red drum were reported, however sample size was very small.

Tag/Recapture and Age Validation of Red Drum in Florida

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ABSTRACT

The objectives of this project are to develop a validated age determination method for adult red drum and estimate age-specific fishing mortality rates for subadults during their transition from inshore to nearshore Gulf habitats. The project is scheduled for three years of field work and is part of the Red Drum Cooperative Research Plan of the Gulf States Marine Fisheries Commission. Examination of otolith sections from 4 pond-held and 2 wild-released red drum that had been injected with oxytetracycline and recaptured after 19 months, showed opaque band deposition occurs only once each year through at least age 18. The life span of red drum on the Florida Gulf coast is therefore about 25 years. Preliminary estimates of mortality (disappearance rates) for inshore subadults was 88% between ages 2 and 5 in Apalachicola Bay and 39% between ages 6 and 14 in nearshore Gulf waters. The high observed mortality rate for inshore fish may be partially attributed to emigration of fish out of the estuary to nearshore Gulf waters. Using literature-based adjustments for tag loss, tagging mortality, and non-reporting of tag recaptures, rough estimates of age-specific exploitation were 54% at age 1, 42% at age 2, and 5% at age 3. If natural mortality is as low as generally accepted and adjusted return rates are accurate then a substantial portion of age 2 and 3 fish emigrate from the estuary to nearshore Gulf waters.

Louisiana Red Drum Research

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Louisiana Department of Wildlife and Fisheries
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Charles A. Wilson, Ph.D., Sandra J. Russell
and Richard E. Condrey, Ph.D.
Louisiana State University
Coastal Fisheries Institute, Center for Wetland Resources

ABSTRACT

"Louisiana Red Drum Research" is a cooperative coordinated effort between the Louisiana Department of Wildlife and Fisheries, Louisiana State University, National Marine Fisheries Service and the Gulf States Marine Fisheries Commission's SEAMAP Red Drum Workgroup to provide information needed to manage the red drum resource of the Gulf of Mexico. The three year project which began October 1, 1986, is part of the "Cooperative Red Drum Research Program" which outlines needed research, and provides a unique mechanism of coordinated support.

The project is composed of four separate interrelated tasks.

Task 1

To mark and release juvenile red drum in Louisiana's estuaries and provide information needed to assess estuarine escapement and offshore migration patterns.

From October 1, 1986 through August 31, 1988, 4,947 juvenile red drum have been marked with internal anchor tags and released in Louisiana coastal marshes. Three hundred forty-four returns have been reported. Of those fish tagged the first year (October 1986 - September 1987) 10.9 percent were reported recovered within one year of the date tagged. Return rates by month were highest from December 1986 at 11.8 percent through May 1987 at 22.2 percent with March 1987 being the highest at 23.8 percent. The remaining months ranged from a low of 3.2 percent in October 1986 to 8.9 percent in July 1987. Although fish tagged the second year (October 1987 - September 1988) have not been at liberty very long, return rates appear to be much lower than the initial year.

Task 2

The specific objectives for sampling commercially landed red drum in Louisiana include (1) obtaining catch and effort

data from commercial boats landing adult and juvenile red drum caught in inshore and nearshore (state) waters; and (2) collecting length and sex composition data, and otoliths from these commercial catches which will be utilized in achieving the third task.

From June 1986 through January 1987, when the commercial red drum fishery was closed, 1,088 interviews (3 haul seine, 7 purse seine, 977 inshore gill net, 10 offshore runaround gill net, 54 trammel net, 1 handline, 35 rod and reel, and 1 otter trawl) were obtained and 8,574 red drum have been measured, weighed and sexed. A total of 172 eye lenses, 3,450 otoliths, and 3,450 scales were also collected for age and growth studies.

Task 3

The specific objectives for determining the age structure and reproductive biology of red drum caught off the coast of Louisiana are to (1) continue to estimate the age structure and growth rates of red drum collected by various sources outlined under this program; and (2) continue examination of the reproductive biology of red drum including age specific reproductive development, fecundity and maturation.

A total of 1,532 red drum samples have been received since October 1986 from National Marine Fisheries Service purse seine collections. Through marginal increment analysis of otolith transverse sections we have validated that one annulus has been deposited per year in all sampling years and age groups. Opaque zones are formed during winter and spring months. Ages of offshore red drum captured by purse seine ranged from one to thirty-seven years, with significant recruitment into the population beginning at two years.

During 1987-1988 420 red drum gonads were collected, preserved and sectioned for reproductive analysis. Analysis indicates that red drum are batch spawners and their total annual fecundity may be higher than reported previously.

Task 4

See abstract entitled "Stock Assessment Information Needed to Manage Red Drum in Louisiana and in FCZ" presented by Richard Condrey, Center for Wetland Resources, Louisiana State University.

An Estimate of the Size of the Red Drum Spawning Stock Using Mark Recapture

Scott Nichols
NOAA - National Marine Fisheries
Pascagoula Laboratory

ABSTRACT

An offshore mark/recapture experiment, partially funded by MARFIN, was conducted between Fall 1986 and Fall 1987 to estimate the size of the red drum spawning stock in the Gulf of Mexico. The project was part of the Cooperative Red Drum Research Program. Every state agency and university involved in the red drum program participated in the field sampling, and the project supplied specimens for several other MARFIN projects.

Adult population size was estimated to be 90 million pounds (65-115 million pounds, 90% confidence limits) for the study area between the Florida/Alabama line and Galveston, Texas. Substantial mixing of fish within the study area was evident. Special experiments, including a pond experiment done cooperatively with the State of Alabama, estimated losses of tags and tagged fish from the population, and allowed evaluation and correction for many of the biases that plague mark/recapture experiments in the marine environment.

Combining the population estimate for the study area with Gulf-wide spatial distribution data from aerial surveys leads to a spawning stock estimate of 123 million pounds, Gulf-wide, for Fall 1987. This estimate is consistent with the stock assessment analyses currently guiding red drum management.

Establishment of a Coordinated Central Tagging Activity for Red Drum (Sciaenops ocellata) and Management of Red Drum Tagging Data for the Gulf of Mexico Area

Walter R. Nelson
Miami Laboratory, National Marine Fisheries Service

ABSTRACT

Introduction

The expansion of cooperative tagging activities, particularly for red drum in the Gulf of Mexico, has made a centralized data management system vital to ensure that data needed for analyses are readily available to all researchers. In 1987, development of the Cooperative Tagging System database (CTS) was initiated at the Miami Laboratory of the National Marine Fisheries Services's Southeast Fisheries Center (SEFC) to coordinate the management of tagging data generated by the Cooperative Red Drum Research Program. The project objectives are to: 1) develop a standardized format for data entry and archival; 2) allow user-friendly data entry and retrieval by all cooperators; 3) track tag numbers and reward payments to ensure that duplication is avoided; 4) provide periodic summaries of the data to cooperators; and 5) allow expansion of the system to include additional species.

Summary of Results

The development of CTS is in its second year. During the first year, the database design was completed and software development was initiated. The design stage was carried out in cooperation with participating researchers. We conducted a survey of potential CTS users to determine system requirements. The survey responses plus additional input from users were important factors in determining the information flow, data entry and reward payment procedures, database structure, data items, formats, and codes. The design was documented in a preliminary report distributed for review to researchers in all MARFIN tagging projects. One of the first steps in the programming stage was to put this documentation on-line. This file is the focus for CTS standardization, which will be critical when multiple users are involved.

CTS is designed as a distributed system, in which each user will be able to enter and retrieve data locally with IBM-compatible microcomputers and dBase III Plus application routines. The data will be stored in the DMS II data management system on a Burroughs 6800 computer at the SEFC.

The Data Management Division of the SEFC Economics and Statistics Office is programming CTS. It is anticipated that the microcomputer prototype will be ready for entry of red drum data in October 1988.

This will be fine-tuned before implementation of the mainframe version. The Miami Laboratory will have responsibility for administration of the database after it is fully implemented.

Update on Red Drum Stock Assessment in Louisiana

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ABSTRACT

The available data on the age-frequency distribution of that portion of the offshore stock in the primary area are examined for implications of (1) historic levels of recruitment of juvenile red drum to the adult pool, (2) historic levels of spawn, (3) current trends in recruitment of juvenile fish to the adult pool, and (4) the time available for recovery (under the Gulf of Mexico Fisheries Council's 30% escapement/20% spawning stock biomass ratio criterion).

There appears to be two levels of historic recruitment of 5-year-old red drum from the 1950 to 1983 cohorts to the spawning pool. The earlier, higher level appears to involve the 1950 to 1974 cohorts. Here annual recruitment of 5-year-olds appeared to have varied from 1.1 to 5.7 million fish, about an apparent annual average of about 3.1 million fish. The more recent, and lower, level appears to involve the 1975 to 1983 cohorts. Here annual recruitment of 5-year-old fish appears to have ranged from 0.6 to 0.2 million fish, exhibiting a rate of decline of 40,000 fish per year.

Spawning simulations suggest that if escapement had remained at 1987 levels, the fishery would be subject to recruitment failure before 1992 (under the 20% SSB/R guideline), unless something was done to reverse the 1975-1983 trend.

The results are discussed in light of the recent red drum legislation in Louisiana which is intended to provide for 30% escapement.

Stock Assessment for Red Drum

Walter R. Nelson
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ABSTRACT

Introduction

NMFS is charged with preparing an annual assessment of the status of Gulf of Mexico red drum. An initial assessment was prepared and submitted to the Gulf Council at the end of September 1987, and subsequent assessments will be provided by October 1, each year. This activity relies on an existing cooperative research program funded by MARFIN that involves university, state and federal researchers. The program objectives are to synthesize information gathered by the cooperative research program, to evaluate the effectiveness of alternative regulatory strategies in meeting management objectives, and to provide the results to the Gulf Council and the scientific community through the annual stock assessment and other communications.

Summary of Results

Analyses of various characteristics of the recreational harvest completed after the 1987 Assessment were provided to the Red Drum Stock Assessment Group in October 1987. These analyses provided estimates of escapement for several locations, and estimates of the cumulative frequency distributions of numbers of fish per angler in the harvest for each state. A model of the relation between the minimum and maximum legal size limits, fishing mortality and the escapement proportion was also developed and provided at that time. These results contributed to the Red Drum Assessment Group Report which, along with the 1987 Stock Assessment, was subsequently presented to the Scientific and Statistical Committee and to the Gulf Council.

The 1986 commercial landings estimates have been updated and the available 1987 data have been compiled and summarized (Figure 1). Recreational landings statistics from the National Marine Recreational Fisheries Statistics Survey and the Texas creel survey have been updated for 1987, along with length frequencies by state, mode, and year for the period 1979 through 1987. Existing red drum TIP data have been extracted for analysis, and cooperating state and federal researchers have provided significant additional data for inclusion in the next synthesis report.

Additional analyses of the applicability of the spawning stock goal of 20% of the unfished spawning stock biomass per recruit were conducted and support the selected level (Figure 2). Additionally,

considerable progress was made toward the completion of a comprehensive computer simulation model (FSIM) to be used both as an analytical tool to investigate the implications of alternative interpretations of observations and also as a tool for evaluating alternative management options.

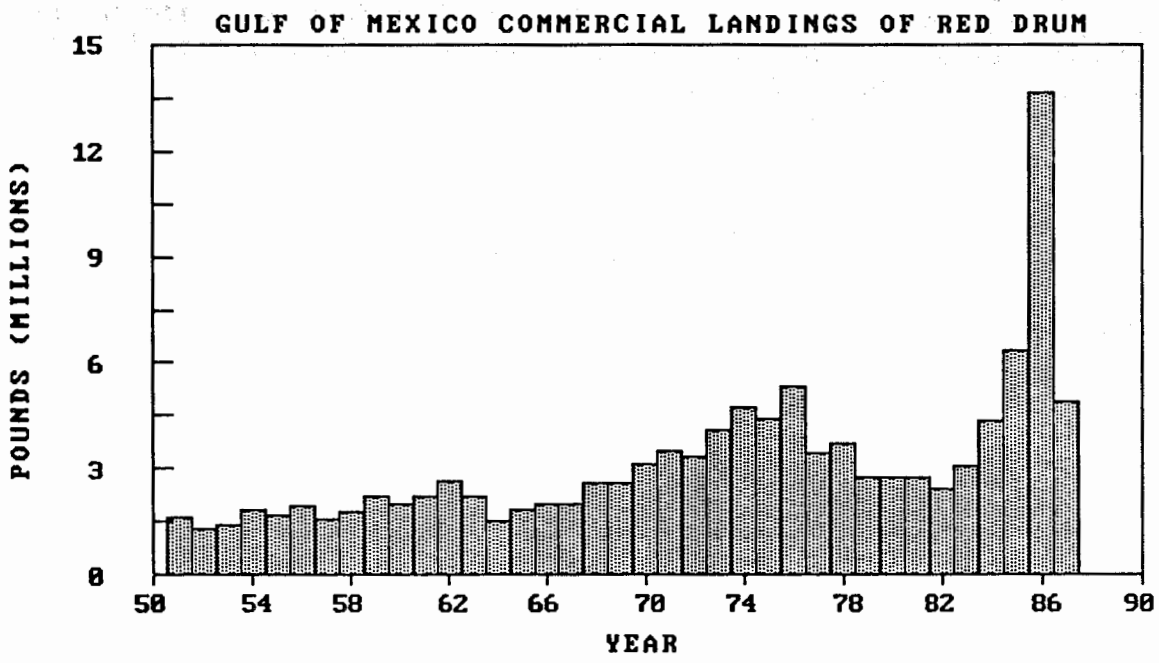

Figure 1. Reported commercial landings of red drum from the Gulf of Mexico from 1951 through 1987.

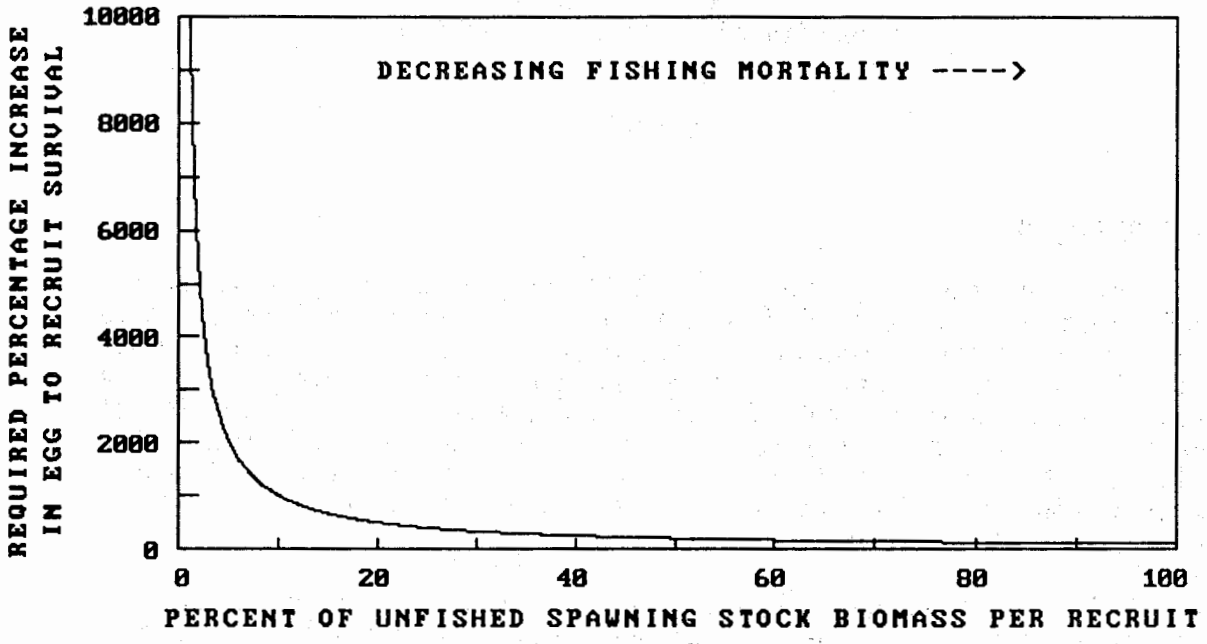

Figure 2. Required compensatory increase in red drum egg to recruit survival in the fished vs unfished population as a function of the ratio of the fished to unfished spawning stock biomass (the Spawning Stock Ratio). If the actual egg to recruit survival in the fished population does not increase to the required level, both stock and recruiment will decline toward extinction. The decline will continue until fishing mortality is reduced. The rapid rise in required egg to recruit survival below about 20% SSR signifies the importance of maintaining SSR above this level.

Empirical Red Drum Catch Rate Elasticities for Recreational Anglers in the Gulf of Mexico

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ABSTRACT

Introduction

This research is a one year MARFIN project under the egis of the NMFS Southeast Regional Office through the state-federal cooperative Red Drum research program. Specific goals include the following: (1) Socioeconomic angler profiles, (2) pooled site and multiple site sport fishing demand models for Gulf target anglers, (3) estimation of Redfish catch rate elasticity of demand, (4) net benefit values of a fishing site in its Redfish use, (5) economic values of sport caught Redfish, and (6) spending patterns and economic impacts attributable to Red Drum sport angling.

A larger, more general objective is to gauge the importance of catching Redfish on the recreational angler's decision to take a fishing trip. Such information is needed to formulate short run policy that changes fish allocations, either in terms of quotas or reallocations to other sectors.

Summary of Results

The descriptive phase of the research establishes profiles of Redfish angler participation patterns and socioeconomic characteristics. No expenditure data is available in the 1986 MRFSS, but the 1981 Socioeconomic Survey (S/E) data can be analyzed for expenditure impacts. In general, Red Drum anglers spend slightly less than the average per trip, but tend to take more annual trips. Direct spending impacts attributable to an average Red Drum angler total over $800.00 per year.

Pooled site Red Drum sport fishing demand models have been estimated using the 1981 S/E data. This type of travel cost model asks two questions: (1) does a Gulf sportfisherman target the Red Drum as a preference and (2) if he does, how many trips does he take. The first question involves the discreet participation choice. The second question involves the continuous decision of how frequently to participate. Ex ante catch per unit effort for each site/wave is modelled exogenously with one equation. Ex post actual catch is modelled endogenously with two equations. Project goals are accomplished by isolating statistically the influence of Red Drum catch on both choice decisions.

This discreet/continuous choice is estimated with Heckman and

censored Tobit techniques to address the sample selection bias that occurs when the Redfish subgroup is extracted for anlaysis from the relevant angling population. Care is taken to include the value of recreation time in the price variable.

Tentative results suggest that Red Drum catch positively influences both the participation and frequency decision in the short run, i.e., the cross section catch rate elasticity of demand is significantly positive, though inelastic. Elasticity magnitudes range from .2 in single equation models to as high as .6 in multiple equation models. The economic use value of a typical "pooled" Gulf recreational Redfish site ranges between $45.00 and $150.00 per trip. Use value is thus greater than actual expenditure value. Recreational net benefits per fish range between $15.00 and $40.00, more than the 1981 market retail value per pound. Tentative multiple site models indicate that high elasticity in Florida drives much of these results, confirming the efficacy of Florida's recent gamefish ruling.

Age Structure, Growth Rates, and Reproductive Biology of Black Drum in the Northern Gulf of Mexico off Louisiana

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ABSTRACT

Objectives of this project included: validation of black drum age determinations using otoliths; estimation of age (years) of black drum obtained through commercial and recreational fisheries to determine year-class structure and growth parameters; determination of spawning duration, timing, and frequency, and batch fecundity (number of eggs spawned); determination of age and size at maturity. This is a one year project, though another year of MARFIN funding has been awarded to continue work.

Otoliths (sagittae) of black drum from Louisiana Gulf of Mexico estuarine and coastal waters formed distinct annuli which were validated for accurate age estimation. There was low variability in age estimates made independently by three readers. One annulus was formed per year during winter and spring months in all age classes. Maximum age observed was 43 years. Separate growth curves for early (generally immature) and late (generally mature) life stages provided the best model of black drum growth. The transition to slower growth rates was observed at approximately four to five years age. Von Bertalanffy growth equations by length were:

early growth: $L_t = 1745\ [1 - e^{-0.0884\ (t + 1.140)}]$;

late growth: $L_t = 1745\ [1 - e^{-0.0110\ (t + 36.68)}]$.

Age-frequency distributions of mature black drum were obtained by random sampling of the least selective fishery gears. These distributions indicated large variation in year-class strengths, with relatively few age-classes dominating samples. Strong and weak year-classes were similar for samples obtained by different gears and in two successive years, suggesting that distributions were representative of the spawning population.

The onset of spawning was noted histologically as early as December 12. Gonosomatic indices (G. S. I.) and histological examinations indicated primary spawning activity in February, March, and April. Cessation of spawning was observed histologically by mid-April.

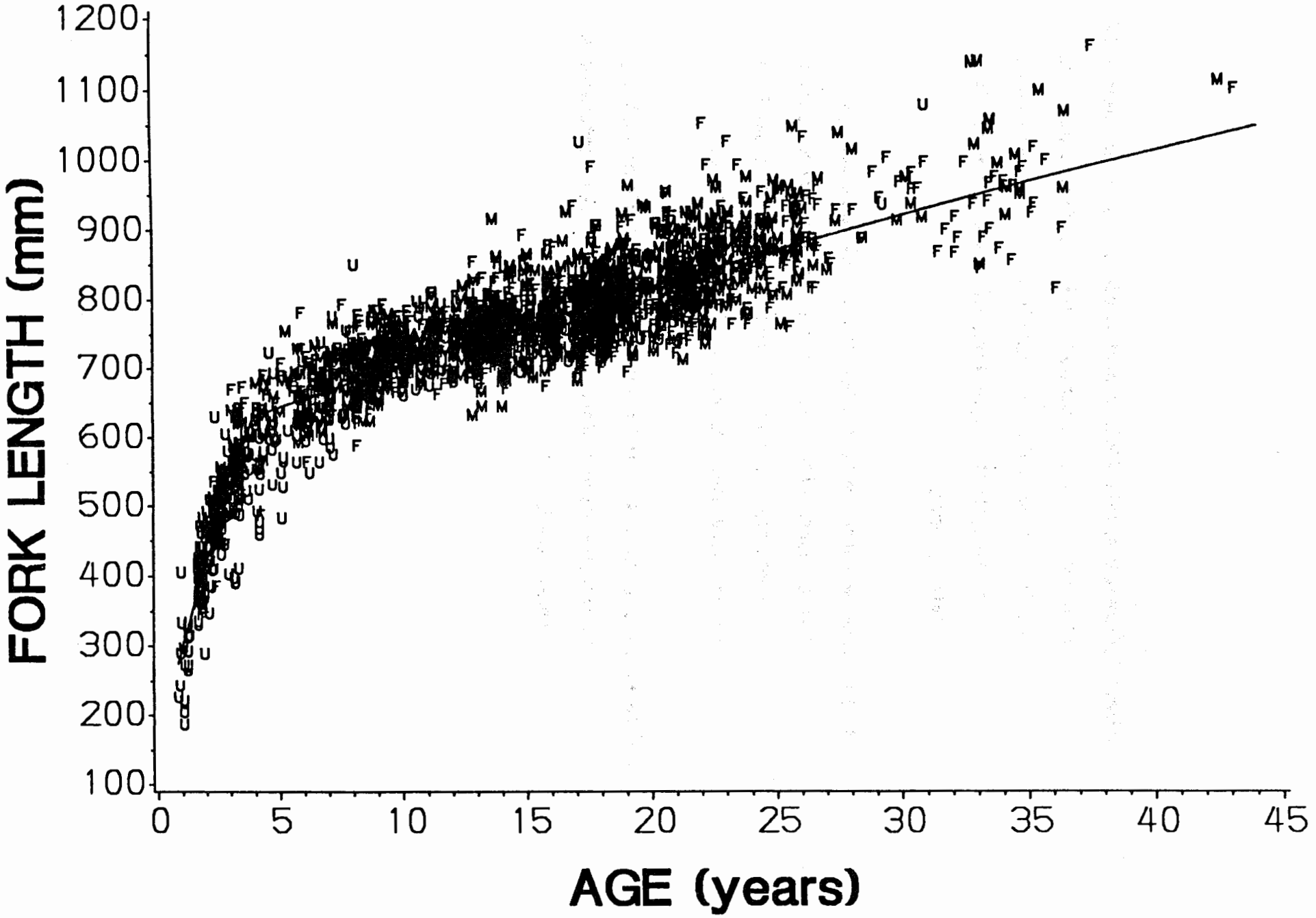
Black drum are multiple spawners. While spawning frequency is not known, preliminary estimates are to be refined with further sampling. Preliminary batch fecundity estimates ranged from 600,000 to 3 million eggs.

Figure 1. Growth models for black drum captured in northern Gulf of Mexico waters. Letters indicate individual males (M) and females (F). Separate curves are indicated for early (primarily immature) and late (primarily mature) growth.

Figure 2. Age-frequency distributions for black drum sampled from purse seine, haul seine, and trawl catches from the northern Gulf of Mexico. Note shift of dominant age-classes by one year from 1987 to 1988.

Figure 3. Mean gonosomatic indices (gonad weight/body weight) for black drum males and females. Peaks indicate peak spawning period.

FIGURE 1


FORK LENGTH (mm)
1200
1100
1000
900
800
700
600
500
400
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100
0
5
10
15
20
25
30
35
40
45
AGE (years)

FIGURE 2

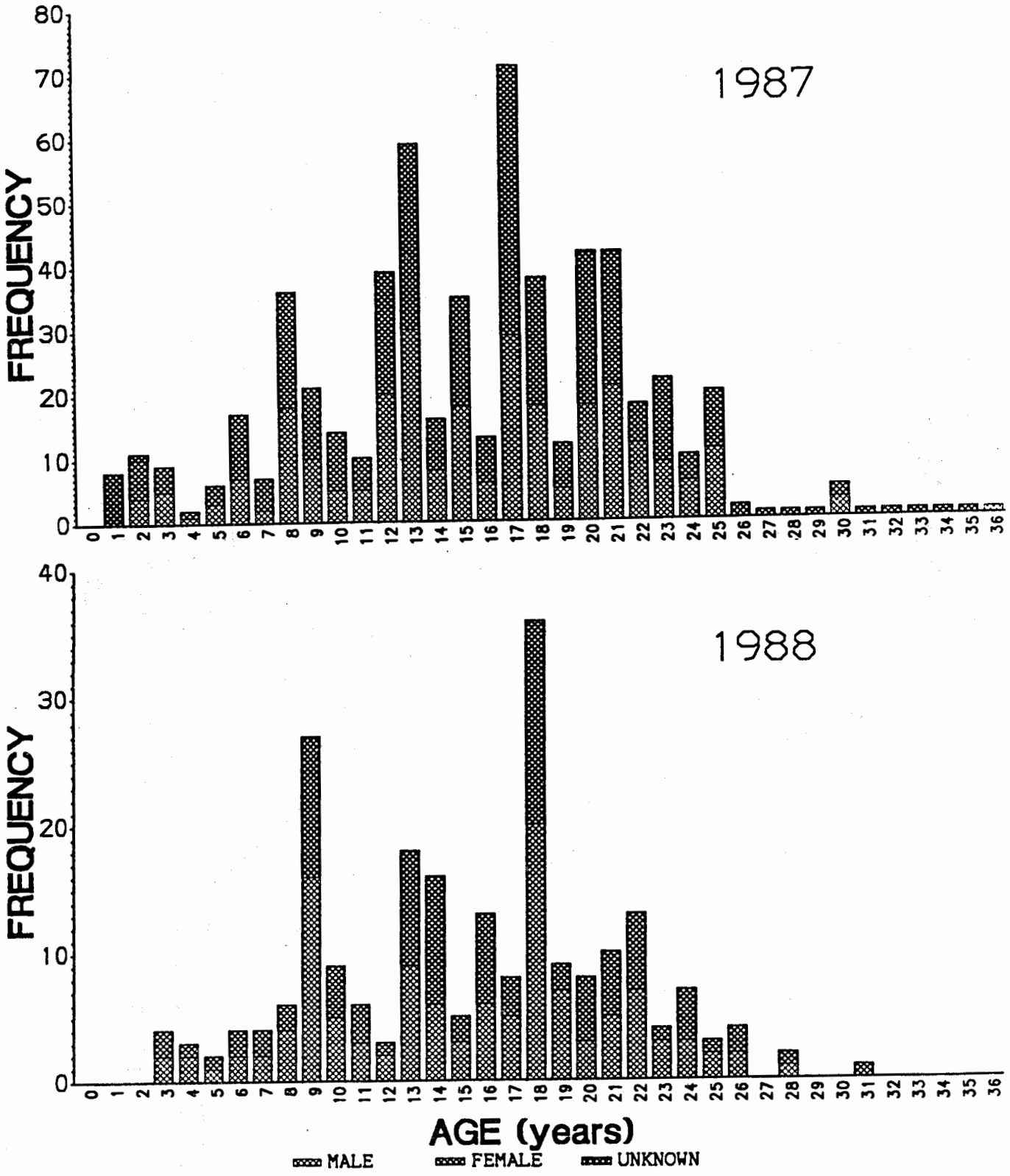
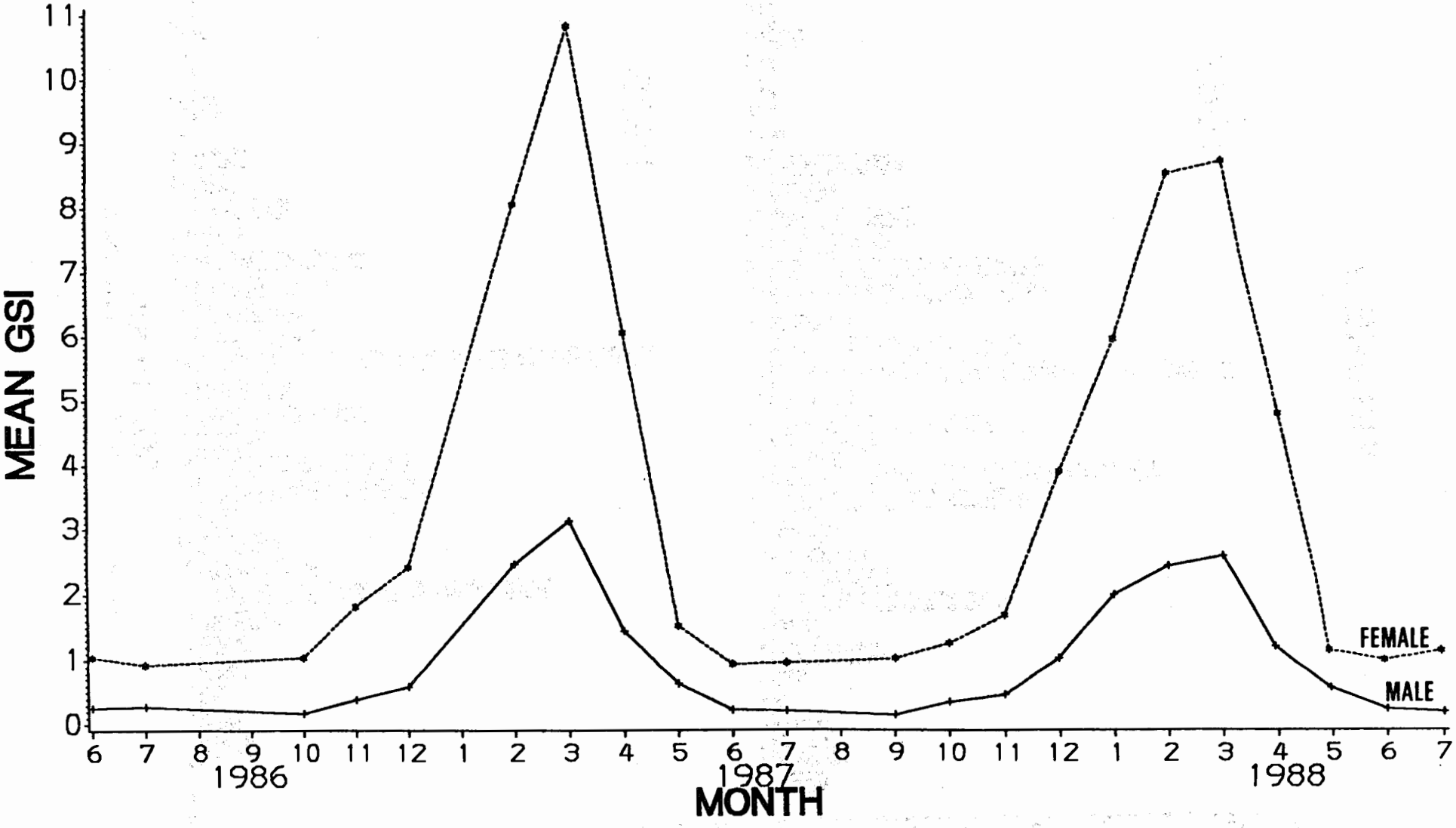


FIGURE 3


MEAN GSI
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1986
1987
1988
MONTH
FEMALE
MALE

Assessment of Mullet Landings and Identification of Essential Indicators and Economic Data Base Towards Establishment of MSY in the FCZ, Gulf of Mexico

Walter M. Tatum
Alabama Department of Conservation & Natural Resources
Marine Resources Division

and

Brian Perkins
Sea Grant Extension Service
Alabama/Mississippi Sea Grant Consortium

ABSTRACT

The roe-mullet industry in Alabama has come under quite a lot of criticism in recent years. Data produced by this MARFIN initiative has provided a viable data base to address these criticisms. Mullet samples were taken on 26 and 51 occasions during 1986 and 1987 during which 4,450 and 9,082 individual mullet were biologically sampled, respectively. Mullet were sampled at roe-mullet houses in Mobile and Baldwin counties and length, weight, and roe weight measured and otoliths and scales were removed from 310 and 160 specimens during 1986 and 1987, respectively. Otoliths were determined to be the most reliable method for aging mullet during both 1986 and 1987.

During 1986 and 1987 over 1.5 million pounds and 2.7 million pounds of mullet were consumed in the roe-mullet industry in Alabama, respectively. Over 300,000 pounds of mullet roe were produced during both 1986 and 1987. State of origin for roe-mullet produced in Alabama during 1986 were: Louisiana, 44%; Alabama, 31%; Florida, 23%; and Mississippi, 2%.

One plus and two plus age classes dominated the mullet fishery during 1986; whereas, 3+ and 4+ age classes dominated the catch in 1987. Samples of purse-seine caught mullet from the EEZ in 1987 showed a wider age class exploitation rate and a strong harvest of younger age classes than roe-mullet gill net fishery. The Graham-Shaefer curve for the Gulf of Mexico mullet fishery indicated the 1986 mullet harvest to be slightly over MSY; whereas, the 1987 harvest was slightly below MSY. The Alabama roe-mullet industry during 1987-88 provided employment for 208 Gulf Coast fishermen and 115 Alabama processing plant employees.

Fishery Independent Characterization of Population Dynamics and Life History of Striped Mullet in Louisiana

Bruce A. Thompson, Jeffrey H. Render, and Robert L. Allen
Coastal Fisheries Institute, Louisiana State University

ABSTRACT

The striped mullet fishery in Louisiana has undergone rapid expansion over the past 13 years growing from an annual harvest of 0.2 million lbs. in 1975 to present levels over 3 million lbs. The area presently fished (east of the Mississippi River delta) and the number of major processors (one) indicate the strong potential for further expansion and development. To keep pace with the expanding industry and to increase our knowledge of the species, this fishery independent study was undertaken with the cooperation of the Louisiana Department of Wildlife and Fisheries, Finfish Section (LDWF) to examine the life history and population dynamics of striped mullet in Coastal Louisiana.

This begins our second year of a three year study on all size classes of striped mullet (Mugil cephalus) in Louisiana. Monthly samples are obtained from LDWF ongoing coastal survey program using gill nets, trammel nets, and bag seines. Our analyses will determine (1) an age and growth structure for striped mullet in Louisiana; (2) an age validation standard using otoliths and scales; (3) reproductive relationships including sex ratios, fecundity, timing and location of gonad development, size and age at maturity, and size and age when the species becomes vulnerable to the fishery; and (4) population genetics to determine any racial differences among spawning stocks along Louisiana's coastal zone.

During year one, 990 mullet were processed (see sampling protocol; Table 1) ranging in size from 41 mm to 616 mm total length (Figure 1). Our samples have shown a sex ratio skewed toward females accounting for 86% of the total. The ageing and age validation analyses are progressing nicely with good results from the otolith method. Ring structure formations have ranged from 0 to 7 with preliminary indications of a single annulus forming yearly in late winter to early spring.

Regression analyses were conducted to determine body shape relationships and difference between sexes. A regression equation, log-transformed (base 10), was calculated to predict weight (W) from length (L). The curvilinear relationship (Figure 2) and resultant equation was not found to be significantly different between sexes and yielded the following equation:

$$W = 2.09 \times 10^{-5} (L)^{2.94} \quad \text{both sexes} \quad r^2=0.99.$$

A highly significant ($P>0.001$) difference was found between sexes when weight (W) and girth (G) were compared. Resultant equations were:

$$W = -425.69\ (G) + 4.54 \quad \text{for males} \quad r^2=0.84;$$

$$W = -1416.96\ (G) + 10.50 \quad \text{for females} \quad r^2=0.92.$$

Other relationships are summarized in Table 2.

The genetic relationships among Louisiana populations of striped mullet are being investigated by means of starch gel electrophoresis and histological staining of enzymes. An array of 34 gene loci producing enzymes expressed in skeletal muscle, liver, or eye tissue have been chosen for examination.

Among the loci showing the greatest degrees of allelic variation are MDH-2, ME-2, ADH, and G-6-PDH. While variations at these loci appear to be random among populations, examination of additional specimens and statistical analyses of allele frequencies among populations may reveal patterns of interpopulational heterogeneity not apparent to the naked eye. The remaining gene loci being investigated, 22 have been found to be monomorphic, 8 can not be clearly resolved.

Table 1. Sampling protocol for striped mullet study along coastal Louisiana.

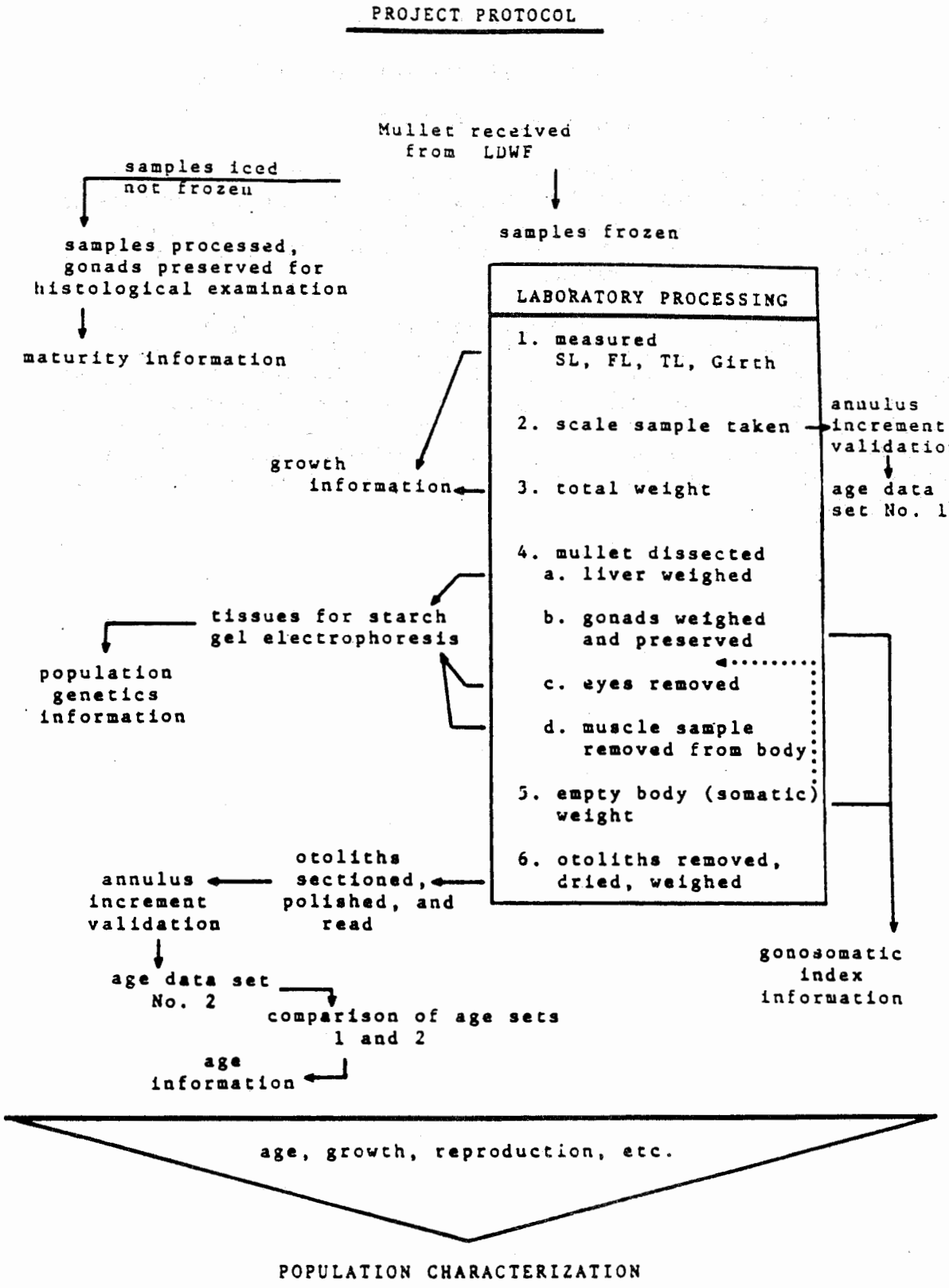


Table 2. Body shape relationships in Louisiana striped mullet, Mugil cephalus population.

RELATIONSHIP	EQUATION	R-SQUARE
Weight(W)=Otolith Weight(OW)	W=-24.84(OW)+7.24 for males	0.70
	W=-555.89(OW)+17.4 for females	0.74
Empty Body Weight(EBW)=Otolith Weight(OW)		
	EBW=-28.59(OW)+6.29 for males	0.72
	EBW=-394.33(OW)+13.21 for females	0.76
Length(L)=Otolith Weight(OW)	L=131.10(OW)+2.86 both sexes	0.89

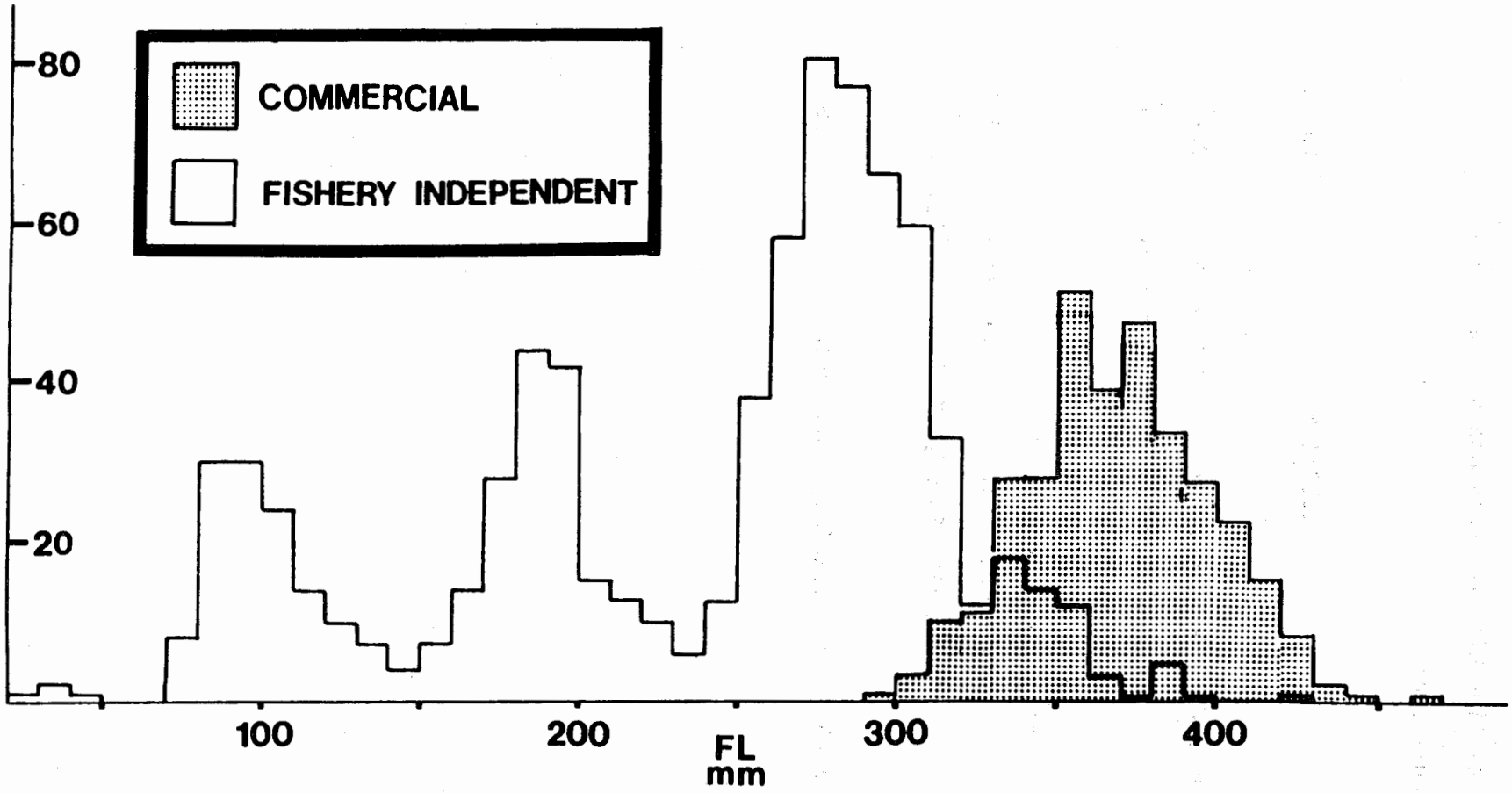


Figure 1. Size distribution of striped mullet (Mugil cephalus) sampled during 1987-88 along coastal Louisiana.

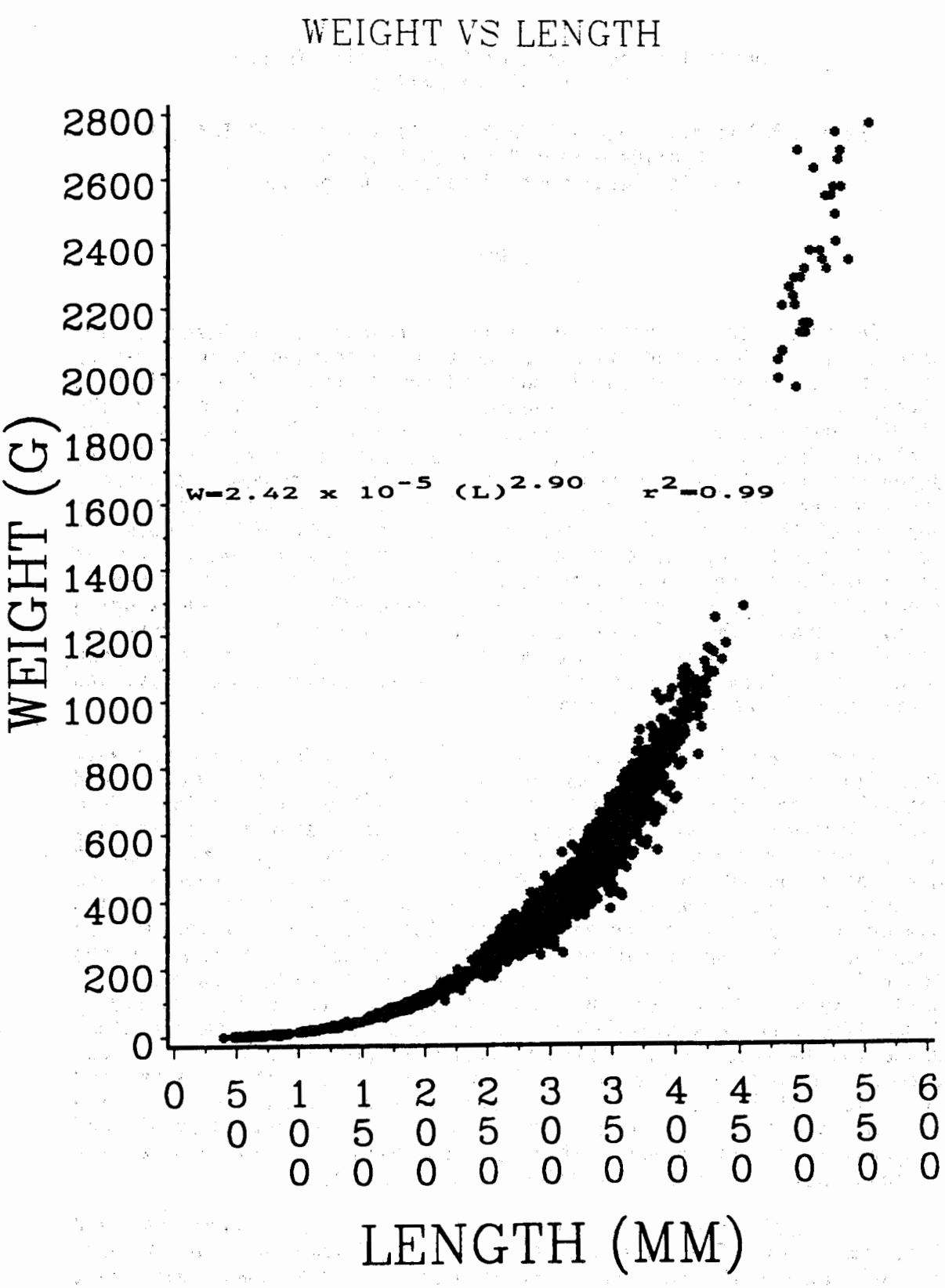


Figure 2. Length/weight relationship in Louisiana's striped mullet population.

Population Assessment of Black Mullet in the Eastern Gulf of Mexico

Behzad Mahmoudi, Frederick Sutter, III and Michael Tringali
Florida Marine Research Institute
Florida Department of Natural Resources

ABSTRACT

In order to determine the varying responses of black mullet population abundance and fishery production to changes in exploitation patterns, socio-economic conditions, and environmental fluctuations, a five-year interdisciplinary research program was planned by the Florida Department of Natural Resources (FDNR). This research plan included four major projects; stock assessment based on fishery dependent and fishery independent surveys, socio-economic analyses, and environmental monitoring. The MARFIN program has funded a major portion of the black mullet research; beginning 1986/1987, studies of age and growth, reproduction and spawning, and genetic composition of black mullet along the west coast of Florida were initiated. MARFIN funds also supported portions of the hydroacoustic survey and tagging study. Funds from FDNR were used to conduct larval/juvenile surveys, aerial survey, data collection on size composition and gear selectivity study, data analysis of catch and effort statistics, and environmental monitoring program.

Weekly aerial surveys (with an average of 15 hr. flying per week from October to December 1986) provided information on temporal and spatial distribution of mullet populations in Tampa Bay region. From early October to late November, prior to peak spawning migration, mullet schools appeared to be scattered and small in size. Mullet were distributed in inshore waters, canal systems, bayous, and tributaries along the east and west portions of Tampa Bay. Size and number of the schools increased after late November to the end of December. After mid-December, most of the schools were found in the lower Tampa Bay, Manatee River System and coastal inshore waters. The aerial survey indicated that mullet schools could be positively indentified, perhaps classified in size, and separated from the other schooling pelagic fish. However, accurate quantification of school biomass was not possible in the Tampa Bay due to water clarity and logistic difficulties of photogrammetric measurements. The information collected from aerial survey regarding spatial and temporal distribution were later used to design sampling program for hydroacoustic and tagging experiments in Tampa Bay region.

The application of various hydroacoustic techniques and instruments in different habitats and depths of Tampa Bay during Phase I, indicated that the Manatee River System in the lower Tampa Bay, could be used as a suitable system for the application of both fixed or mobile type surveys. The Manatee River System is also one of the

major production areas for black mullet, therefore hydroacoustic population measurements from this system could be used as an index of Tampa Bay region.

During Phase II, the application of the fixed aspect of hydroacoustic survey in the Manatee River generated continuous hourly measurements of black mullet population densities for the period of November 15 to December 31 of 1987. Four major spawning migration runs were recorded which were associated directly with the passage of cold fronts, changes in barometric pressure, and high winds. Catch, effort, and catch per effort in the mullet gill net fishery increased significantly during the periods of observed high densities from hydroacoustic survey. The hydroacoustic study also provided information regarding behavior and daily migration and movement of black mullet.

Phase I of larval survey indicated that 1) both neuston and plankton nets captured mullet larvae, 2) mullet larvae were caught in all stations, except those from shallow water areas (<20 fathoms), 3) standard length was negatively correlated with station depth, and 4) mullet occurred more often in day than night collections. Appearance of black mullet larvae at every station beyond 20 fathom line, and especially high concentrations at stations along 50 fathoms and 100 fathoms, indicated long distance spawning migration to offshore waters along the central west coast of Florida. Shoreline sampling of mullet fry using modified neuston net/channel net proved fairly successful. Black mullet fry were collected from January until April, peaking in January through March. Monthly size distribution of juvenile black mullet showed that the mean size increased from 22 mm in January to 23.7 mm in February, 37.7mm in April, 92.1mm in July, and 113.7mm in September.

Black mullet were marked with internal anchor tags, generally releasing at least 200 fish/month in each of the four study areas; Charlotte Harbor, Tampa Bay, Apalachicola, and Pensacola. Before the beginning of the 1987 roe fishery, 1000+ fish were released over a short period of time (1 to 2 weeks), in each system to examine exploitation rates. Since the inception of this project, 4540 mullet have been released in the Charlotte Harbor study area, with 475 returns (10.46% return rate); 6713 released in Tampa Bay area, with 393 returns (5.85%); 3504 in Apalachicola area, with 193 returns (5.51%); and 3867 releases in the Pensacola area, with 250 returns (6.46%). Tag-recapture matrices have been constructed, by area, to calculate seasonal survival rates. Monthly tagging efforts have defined intra and inter-system movement patterns. In general, mullet move into an area after spawning (late winter or spring), moving into shallow, protected waters during the summer where they feed and grow (some over 100 mm in length from May to October). As water temperatures lower during the fall, mullet begin to gather into large schools, moving towards the more open waters, finally leaving the system to spawn from October to at least January.

Mean back-calculated length (FL) at age, by sex, for black mullet taken in south Florida, was: (female) I-231 mm, II-291 mm, III-334 mm, IV-367 mm, V-396 mm, VI-423 mm, VII-431 mm; and (male) I-225 mm, II-281 mm, III-314 mm, IV-339 mm, V-345 mm, VI-348 mm. Von Bertalanffy growth parameters were calculated using non-linear regression techniques, giving L_∞, t_0, and K values, respectively, as follows: Charlotte Harbor - 471 mm, 1.7 years, 0.24; Tampa Bay - 502 mm, 1.17 years, 0.23; Apalachicola - 374 mm, 0.14 years, 0.62; and Pensacola - 366 mm, 0.17 years and 0.59. Using the age-length key approach, the age composition of mullet sampled from non-selective gears, was determined by area. Populations from south Florida are dominated by ages 3, 4 and 5, while those in northwest Florida are mainly 2 and 3 years old.

Size at first maturity was determined for each of the four study areas. No trend, by sex or area, was noted, with fish maturing, generally, at sizes of 260 to 300 mm. Results from ovary staging indicated that gravid females were collected from September to February in south Florida waters.

No major divergence has been determined between Gulf and Atlantic populations of black mullet based on starch gel electrophoresis. A total of 30 loci were detected, with 16 being polymorphic, however, not all polymorphic loci were scored in all areas. More samples are needed to define populational variations.

ESTUARINE FISH SESSION SUMMARY OF COMMENTS

Red Drum

o The average weight of red drum caught in the EEZ off Florida is about 3½ pounds. Off Louisiana the average is even smaller, 2 to 2½ pounds. These averages appear small and may be a function of sample sizes.

o Studies still needed include inshore tagging, aging, size-frequency, and mortality rates. Offshore studies should cover size-frequency and age structure research.

o Complete banning of red drum catch would rebuild the spawning stock more rapidly than the current options. This option is in effect in the EEZ, but not for all the coastal states.

Black Drum

o More information is needed on the inshore and net fishery.

o Most of the inshore catch appears to be of two and three year old fish.

o The '75, '76, and '77 year classes showed a drop similar to red drum. These decreases may have been due to an environmental fluctuation or increased fishing pressure.

Mullet

o After the roe and gizzard are extracted from roe mullet the carcasses may be used in the fresh domestic market, for bait, and for feed.

o The production of mullet appears to have declined over the past 20 - 30 years. This decline may be attributed to a decrease in

habitat, restriction of fishing areas, and a shift in fishing gear from haul seines to gill nets.

- Mullet tend to school up in rough weather and move offshore, i. e., out of the bay system.
- About 75% of the mullet harvested is in Florida waters.
- Most of the mullet are taken in state waters - probably 95% or more. In Alabama 99% of the catch is in state waters.
- The mullet fishery in Alabama probably has been preserved due to data available from the MARFIN studies showing it to be a valuable non-polluting industry.

A Survey of Seaturtles in Louisiana Waters

Philip Bowman and Conrad Juneau
Louisiana Department of Wildlife and Fisheries

ABSTRACT

Endangered and threatened seaturtles are known to occur in Louisiana waters and strandings of these turtles have been observed along portions of the Louisiana coast. The frequency and rate of seaturtle strandings along the Louisiana coast is, however, poorly understood. The objective of this project is to determine the stranding rate for seaturtles along the Louisiana coast west of the Mississippi River from the Mermentau River to the Mississippi River. Field work on this project is scheduled to end September 30, 1988.

A minimum of two miles of beach in six different locations along the Louisiana coast between the Mermentau River and the Mississippi River are patrolled semi-monthly. The surveys are conducted on foot and cover the exposed beach area from the waterline to the top of the dune. Stranded seaturtles are identified, measured and marked. Any seaturtle crawls which are encountered are also noted.

A total of thirty-four seaturtle remains were observed. Of these, twenty-seven observations were old bones; i. e., ribs and sections of carapace, two observations were skulls and ten were seaturtle carcasses. The highest occurrence (29%) of seaturtle remains was observed during December and 33% of all carcasses were observed during June. The largest number of seaturtle carcasses (4) were observed in Coastal Study Area IV, the Terrebonne - Timbalier Bay area. No live turtles or crawls were observed within the study area.

Estimation of Total Mortality from Systematic Sampling for Stranded Turtles

J. Alan Huff
Florida Department of Natural Resources

ABSTRACT

Introduction

The objective of this project is to standardize effort in the examination of sea turtle carcasses in National Marine Fisheries Service (NMFS) statistical zones four and five (SW Florida). In addition, necropsies are performed on selected fresh sea turtle carcasses to document pathology through histological examination of tissues. Project duration, October 1987 - September 1989.

Summary of Results

Weekly Aerial Surveys - Weekly aerial surveys were conducted from the first week of November to the present (14 September 1988). The local volunteer network works so well that most carcasses are responded to within a few hours of a stranding event. Seven carcasses have been observed during the aerial surveys.

Beach Patrols - All coastal beaches and inlets are patrolled by weekly aerial surveys. Most of the area is patrolled daily during the sea turtle nesting season, therefore, beaches are patrolled on a more frequent basis during this season. Participants in existing stranding and salvage network (Table 1) assist in responding to stranding events that are accessible from the mainland. Fresh carcasses are reported to FDNR for immediate necropsy.

One hundred and twelve stranding reports were received for NMFS statistical zones four and five between 1 November 1987 and present. This included 89 loggerheads (*Caretta caretta*), eleven green turtles (*Chelonia mydas*), and eight Kemp's ridleys (*Lepidochelys kempi*). Most of the strandings occurred in Pinellas County and the fewest in Collier County.

Necropsies - Necropsies in the northern end of the study area (Pinellas through Charlotte counties) are conducted by FDNR personnel at the St. Petersburg Research Laboratory. Necropsies for the southern end of the study area (Lee and Collier counties) are conducted by FDNR personnel from the Ft. Myers field station at the Ding Darling Wildlife Refuge or in the field. All necropsies follow the guidelines of Wolke and George (1981). Tissues from "fresh" carcasses are sampled for histopathological examination in cooperation with Dr. Greg Bossart, Miami Seaquarium.

Gross examinations were made of all carcasses but necropsies were performed only on fresh carcasses (because of tissue damage resulting from autolysis) and selected moderately decomposed carcasses. Thirteen necropsies were performed with the following presented as an example of the results.

C. caretta 1/12/87 Emaciated, heavy parasite load. Liver - heteropathy moderate to severe, cholangitis chronic, focal. Esophagus - esophagitis, inflammation, chronic active, diffuse. Large intestine - colitis, chronic. Spleen - splenitis, granulomatous, chronic, parasitic, multifocal, mild; congestion, multifocal, moderate. Heart - carditis, chronic, mild to moderate. Urinary bladder - cystitis, chronic, diffuse, mild. Tongue - glossitis, chronic, multifocal, mild. Lung - hemmorhage, multifocal, mild. From the tissues examined the cause of the sea turtle's death could not be determined. There was, however, probably a degree of hepatic and to a lesser extent myocardial compromise. The etiology of the hepatic changes could not be determined. The intracellular accumulation of lipid in the liver may in any of several situations that interfere with the transport or metabolism of fat or in special instances synthesis of protein. These include processes such as starvation or other metabolic disorders or intoxications.

Table 1: List of STSSN personnel assisting in weekly beach patrols.

Name	Patrol Area
Alan & Donna Foley	Clearwater Beach - Indian Rocks
Tony Lozon	Indian Rocks - Gulfport
Bruno Falkenstein	St. Petersburg Beach
Edwin Callen	Anna Maria - Bradenton Beach
Orville Clayton	Longboat Key North
Vickie Wiese & Sue Hoffman	Longboat Key South
Belinda Perry	Sarasota County Beaches
FDNR Park Personnel	Cayo Costa State Park
Charles LeBuff	Captiva and Sanibel Islands
FDNR Park Personnel	Delanor Wiggins Pass S. R. A.
Ron Menezies	Naples and Keywaydin Beaches

Continuation of the Expanded and Improved Sea Turtle Stranding and Salvage Network (STSSN) in Shrimp Statistical Subareas 17-21, Southwest Louisiana and Texas

Dr. Edward F. Klima, Director
NMFS SEFC Galveston Laboratory
4700 Avenue U
Galveston, Texas 77551-5997

ABSTRACT

Introduction

This report capsulizes the Galveston Laboratory's participation in the STSSN. We are presently in the first 6 months of a two year project terminating 30 September 1989. The primary objective of the project is to quantify and establish the temporal and spatial distribution of sea turtle strandings in Texas and southwest Louisiana.

Secondary objectives include a source of sea turtle carcasses for necropsy/curation and an opportunity to find, rehabilitate and release live-stranded animals. Ten part-time graduate students survey designated areas between Brownsville, Texas and the Mermentau River in Louisiana (except for the National Seashore at Padre Island) at least twice monthly (Fig. 1). Standard STSSN stranding forms are completed for each sea turtle found. After data are entered into the Galveston Laboratory's PC system, forms are forwarded through STSSN channels. Live stranded animals, when found, are carried to designated rehabilitation facilities. Cooperators in the project include the U. S. Fish and Wildlife Service, Texas Parks and Wildlife, Pan American University, McNeese State University, Texas A&M University and the University of Texas Marine Science Institute in Port Aransas, Texas.

Results

Since its inception in March 1986, the Galveston based project has documented 625 sea turtle strandings. With a general increase in activity in March, strandings have peaked in April and May; remained high to moderate during the summer months; and fallen to minimal values by November. Strandings have remained low throughout the winter months.

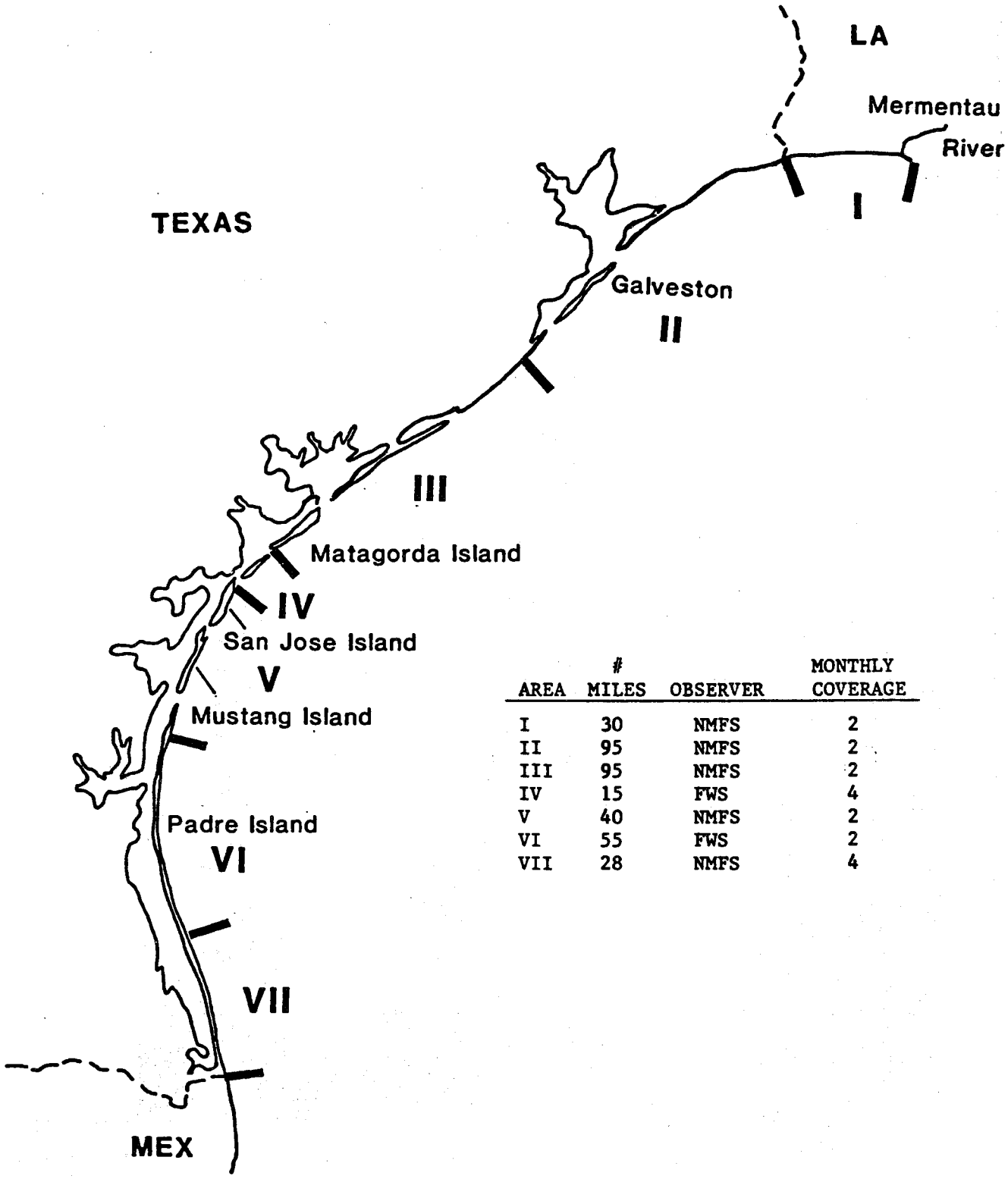
The central Texas counties of Aransas, Calhoun and Nueces (shrimp statistical subareas 19 and 20) continue to yield the highest number of stranded sea turtles. These areas were not sampled in 1986, but 45% and 49% of all strandings were reported from these areas respectively in 1987 and 1988.

In the period 1 October 1987 to 1 September 1988, beach surveyors

have documented 172 sea turtle strandings in 198 survey trips. All species of sea turtle inhabiting the western Gulf have been found in the study area. The most frequently found species were loggerheads (51%) followed by Kemp's ridley (30%) and unknown (10%). Greens, leatherbacks and hawksbills represented 5, 3 and 2% of the total, respectively.

Although adult and sub-adult individuals have stranded on these beaches, length frequency data suggests that the majority of strandings involve much younger animals. Mean length of stranded loggerheads and Kemp's ridleys are 64 and 35 cm respectively.

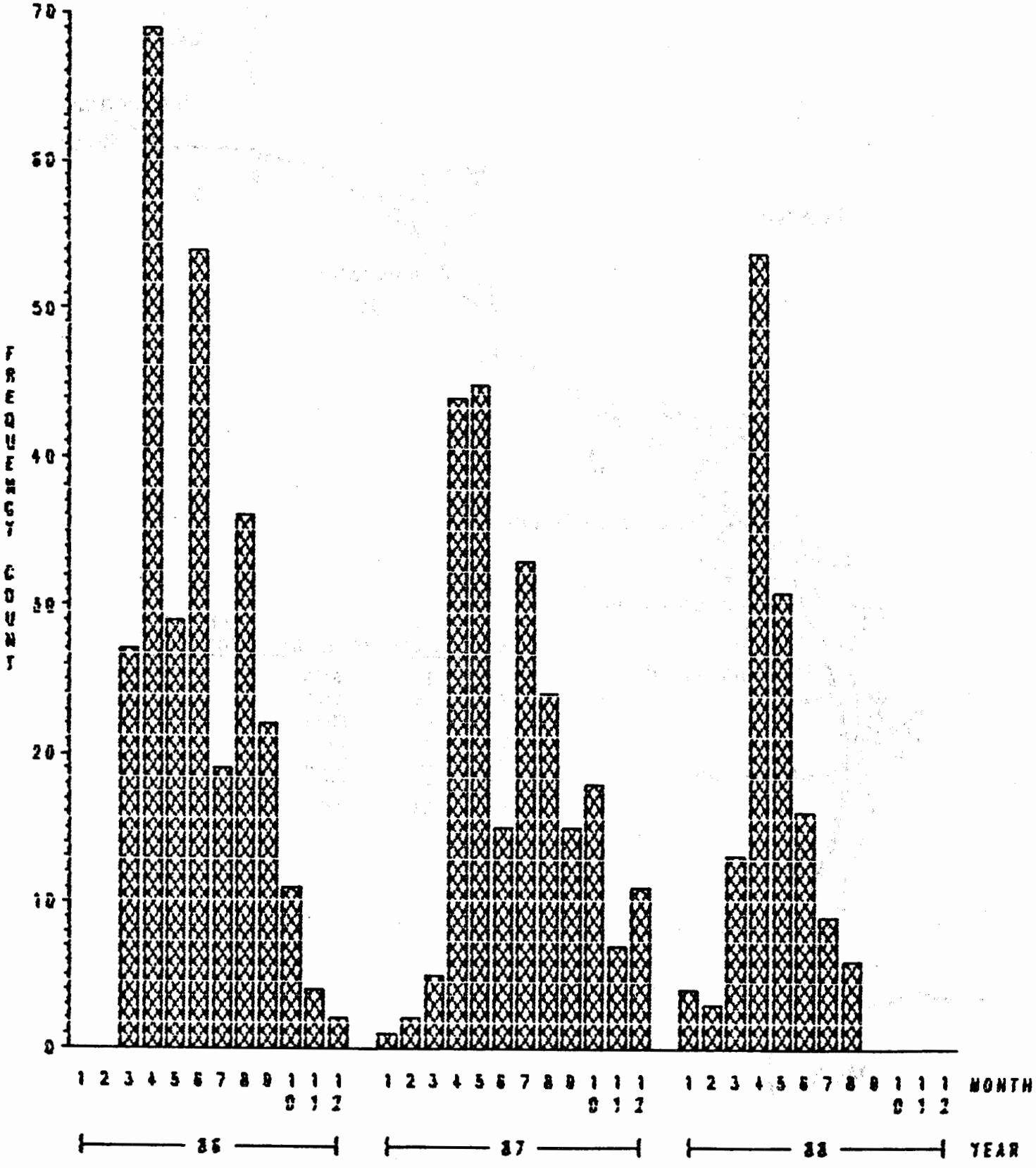
NMFS GALVESTON LABORATORY
SEA TURTLE STRANDING AND SALVAGE NETWORK AREAS



AREA	# MILES	OBSERVER	MONTHLY COVERAGE
I	30	NMFS	2
II	95	NMFS	2
III	95	NMFS	2
IV	15	FWS	4
V	40	NMFS	2
VI	55	FWS	2
VII	28	NMFS	4

FREQUENCY OF SEA TURTLE STRANDINGS

BY MONTH AND YEAR
ON THE TEXAS AND SW LOUISIANA GULF COASTS

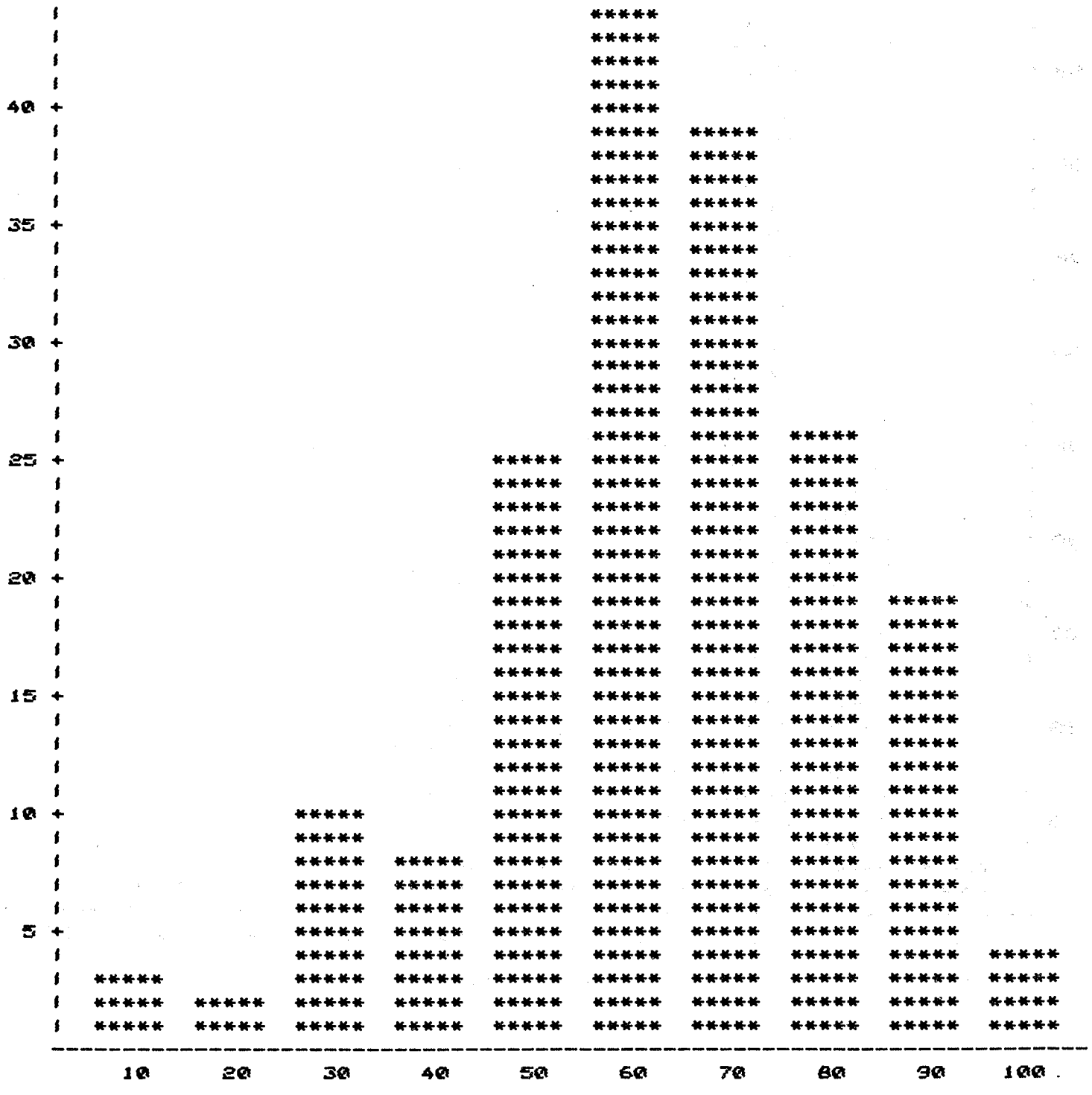


STRANDINGS OF KEMPS RIDLEY AND LOGGERHEAD SEA TURTLES
BY STRAIGHT LINE CARAPACE LENGTH (CM)
TEXAS AND LOUISIANA - 1986-88

18:26 Tuesday, August 30, 1988

SPECIES=CC

FREQUENCY OF LENGTH

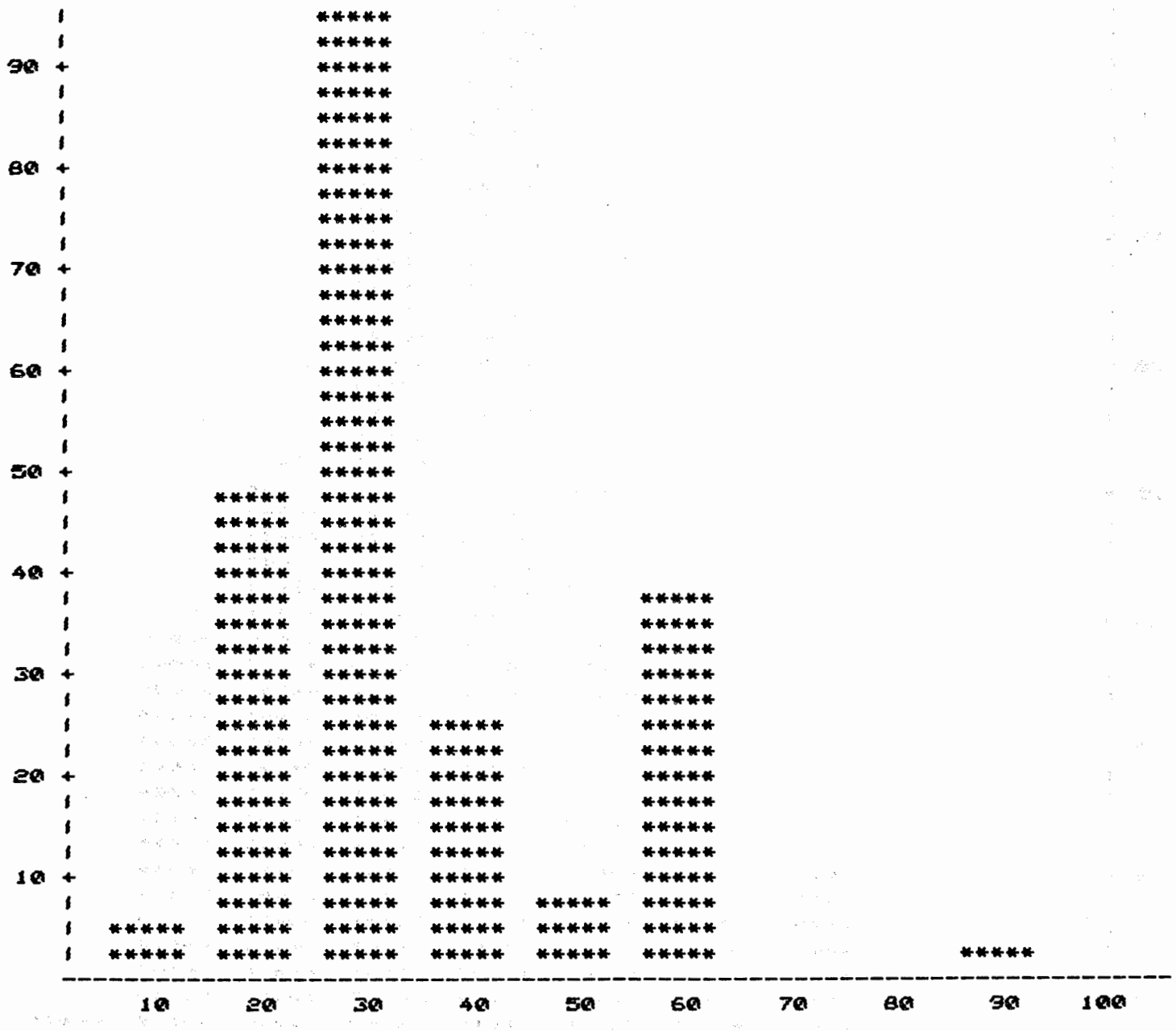


STRANDINGS OF KEMPS RIDLEY AND LOGGERHEAD SEA TURTLES
BY STRAIGHT LINE CARAPACE LENGTH (CM)
TEXAS AND LOUISIANA - 1986-88

18:26 Tuesday, August 30, 1988

SPECIES=LK

FREQUENCY OF LENGTH



Extension of Sea Turtle Stranding and Salvage Network

Robert L. Shipp
University of South Alabama

and

Larry Ogren
National Marine Fisheries Service

ABSTRACT

During 1987, the Alabama Sea Turtle Stranding Network was expanded to more comprehensively monitor strandings along the Alabama coastline. This is a continuing program, scheduled to extend through 1989. It follows several years of a strictly volunteer network that was passive in approach, and which had recorded very few strandings. The expanded program initiated periodic monitoring of the coastline by personnel from the Dauphin Island Sea Lab, the Marine Resources Division of the Alabama Department of Conservation, and the University of South Alabama.

In addition to the observations by beach walk and boat observers, this program also initiated monitoring by use of ultra-light aircraft. These aircraft can cover approximately 20 miles of coastline during individual flyovers, and are able to view beaches from about twenty feet. This capability allows visual recording of even young juvenile turtles, which are then followed up by water borne personnel to take appropriate information.

During the four year period 1983-1986 only three strandings were recorded. All these were during 1984, and all were loggerheads. During the first year of the expanded program (1987) 36 loggerheads, 5 Kemp's Ridleys, and 1 green turtle were recorded. Through August 1988, 6 loggerheads, 1 Kemp's Ridley, 1 leatherback, and 1 green were taken. Both greens, and the 1988 Ridley were released with little or no harm evident.

A similar program for the Mississippi coastline, but without the involvement of ultra-light aircraft is presently being organized.

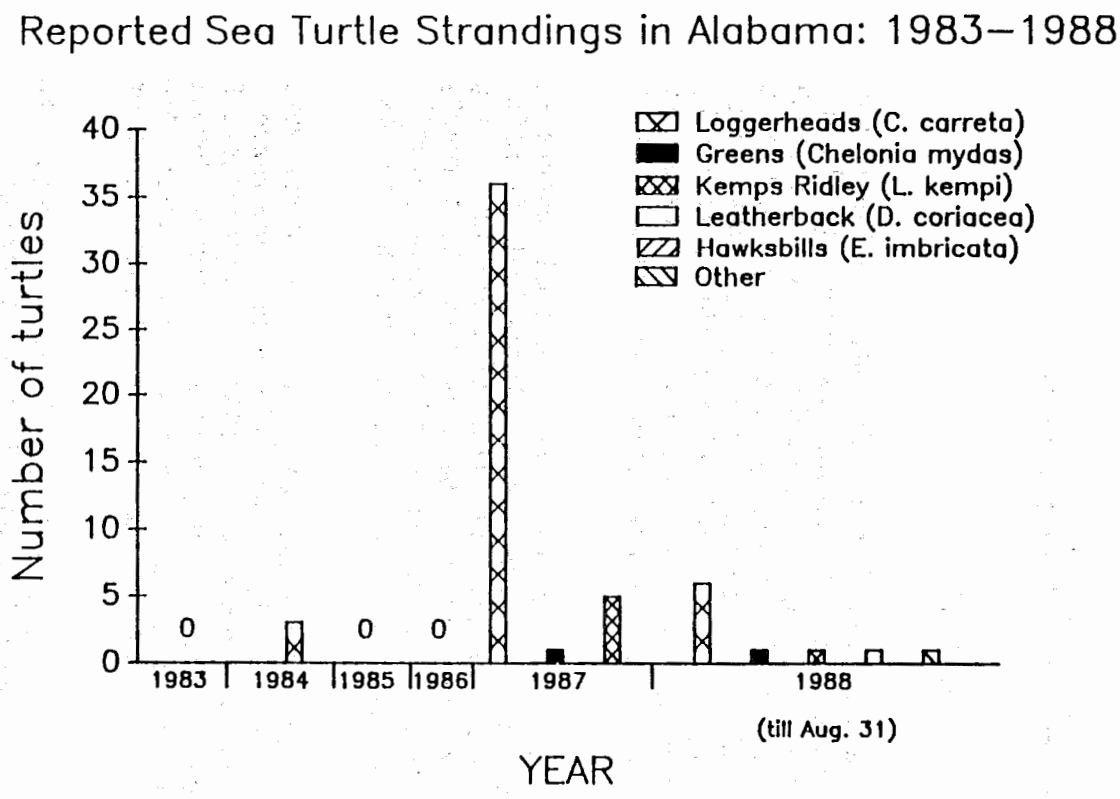


Figure 1. Reported Sea Turtle Strandings in Alabama: 1983-1988

Causes of Death Among Stranded Sea Turtles

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Galveston, Texas 77551-5997

ABSTRACT

Introduction

An opportunity to retrieve stranded sea turtles and identify causes of death arose at the Galveston Laboratory with the institution of regular beach surveys to find stranded animals. Necropsies of a large enough number of the carcasses found might suggest the primary cause of sea turtle strandings. In addition, necropsies could provide valuable life history information on feeding habits, length/width relationships, age and population characteristics.

Cooperators in the project included Texas A&M University at Galveston, and the Texas Veterinary and Medical Diagnostic Laboratory system.

Summary of Results

Of 222 carcasses found in the study period, 122 were necropsied. Logistical and transport considerations made it impossible to retrieve all the carcasses found.

Necropsy procedures emphasized external signs of trauma/mutilation, heart or lung damage, presence of fish hooks or ingested debris. Gastrointestinal tracts were removed for food habit studies. Attempts to link these findings with a definitive cause of death were for the most part inconclusive. The reasons are twofold.

First of all, turtles found on the beach have been dead several days to 2 or 3 weeks. The internal organs of these animals are in an advanced state of decomposition, which disguises any trauma the animal may have experienced. Diagnosing a cause of death in these instances is impossible even for qualified veterinarians. Secondly, histopathology of normal sea turtle tissues is virtually non-existent since it requires the sacrifice of healthy animals. Hence, even in the fresher specimens, it can be difficult to distinguish healthy and abnormal tissues.

Causes of death, therefore, in stranded sea turtles can only be hypothesized, and then only in a small number of cases. For example, no cause of death could be established in 106 (87%) of the necropsies performed in this study. Pulmonary edema (excessive water in the lungs) killed 4 (3%). Two of the animals necropsied were found dead

in shrimp trawls. One of these animals had pulmonary edema, the second appeared normal in all aspects. Predator attacks, infections, ruptured hearts, fish hooks and propeller collision each accounted for 2% of the animals necropsied. Continuation of this project, solely to establish causes of death in stranded sea turtles is not recommended.

Expansion of Head Starting Kemp's Ridley Sea Turtles

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ABSTRACT

Introduction

The objective of this one year project was to provide additional facilities/space for head starting the Kemp's ridley sea turtle. Each year, the NMFS SEFC Galveston Laboratory receives up to 1800 hatchling turtles for head starting. Plans are now in place to increase this number to 3000 annually. Construction provided by the MARFIN grant allows for the accomodation of these additional Kemp's ridley sea turtle hatchlings.

Summary of Results

Completion of construction: Construction of the sea turtle head start facility was completed on 10 Feb 1988. Included in the construction was the installation of two ancillary seawater reservoirs, one seawater delivery pump, eight fiberglass raceways, two large titanium immersion heater systems, two gas-fired heaters, two greenhouse exhaust fans, and associated plumbing and electrical wiring. Additionally, a sea turtle exercise/recycled seawater system was constructed within the new facility.

Purchase of equipment: An Okidata Microline 193 printer and software packages including Word Perfect, dBase III, and SAS (statistical analysis system) for the Life Studies Division's PC's Limited 286 personal computer were purchased. Also, 100 PIT (passive integrated transponder) tags, tag applicator, and electronic detecting device were purchased.

Initiation of Use: On 16 Feb 1988, head started Kemp's ridley sea turtles were transferred into the new sea turtle facility. As of 30 Aug 1988, there are 235 head start Kemp's ridley, 2 head start loggerhead, and 2 wild rehabilitated (1 hawksbill; 1 Kemp's ridley) sea turtles being maintained in this facility. Further, the facility is being used to test methods to improve the conditioning of 100 Ridley sea turtles.

ENDANGERED SPECIES SESSION SUMMARY OF COMMENTS

Head Starting

o Although the ridley head starting program has not resulted in producing nesting females, there is evidence that the program has introduced viable animals into the wild that behave in a normal fashion.

Necropsies

o Necropsies on dead sea turtles have given little information concerning the causes of death. This is generally due to the fact that the turtles were in a decomposed state when recovered.

o Necropsies should be performed only on animals that have died recently or are moribund.

Strandings

o There is a good correlation of sea turtle strandings with shrimping activity in some, but not all, areas.

o Short of expensive aerial and sea programs, stranding data can give useful information concerning the compliance of shrimpers in the use of TEDs.

o The data must be interpreted carefully. Other cases of death, such as oil rig destruction, tar balls, and plastics should be considered.

Summary of MARFIN Supported Research on King and Spanish Mackerels in the Southeast United States, FY-87

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ABSTRACT

Much of the accomplishments of research on mackerels concerned stock identification in the Gulf of Mexico and the assessment of the status of stocks. Major results were obtained from MARFIN supported work on electrophoretic analyses, tagging, and CPUE studies. These results together with those from early life history studies (non-MARFIN) indicated the existence of an eastern gulf stock and a western gulf stock with mixing of these two stocks in the northern gulf during the warm months. Substantial increases in the quantity of vital statistics for king and Spanish mackerel were attained, thereby strengthening the computations on the status of stocks.

Several other accomplishments were attained. The enlistment of 21 cooperators into a network of statistical and biological samplers in the gulf enabled us to obtain much more length data, sex data, otoliths, and muscle tissues than in previous years. Significant improvements were made in the compilation and computerized management of data bases used in stock assessments. Approximately 700 Spanish mackerel were tagged in northwest Florida in spring, recoveries from which indicated westward movement as far west as Dauphin Island, Alabama. Tagging of over 400 king mackerel indicated the superiority of the internal anchor tag over the dart tag. All past tagging studies on king mackerel were summarized, methods and techniques reviewed, and recaptures analyzed.

Four reports and three manuscripts were prepared from these MARFIN supported projects. The four reports were on electrophoresis, tagging, charterboat CPUE, and age-length keys and were submitted to the Mackerel Stock Assessment Panel for their deliberations. The three manuscripts were on: (1) relative abundance of king mackerel as interpreted from charterboat CPUEs; (2) relative abundance of Spanish mackerel as interpreted from charterboat CPUEs; and (3) a summary of past tagging studies. These three manuscripts were submitted for publication.

King Mackerel Tagging and Muscle Tissue Collection off the Louisiana Coast

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Seafood Division, Finfish Section

ABSTRACT

The project is a cooperative effort between the Louisiana Department of Wildlife and Fisheries, Seafood Division's Finfish Section and National Marine Fisheries Service, Panama City Laboratory to provide information regarding the distinct identity of one or more migratory groups of king mackerel in the Gulf of Mexico. Our specific objectives are to tag and release 900 fish and to obtain muscle tissue samples from 400 fish annually off the Louisiana coast. Tagging data and tissue samples are shipped to National Marine Fisheries Service, Panama City Laboratory for analysis.

To date 477 king mackerel have been tagged and 228 tissue samples collected. Three fish have been reported recaptured. Two fish were recaptured off of Louisiana, one tagged in May 1987 and caught in August 1988 and another tagged in September 1987 and caught in June 1988. The third fish was tagged in August 1987 and traveled to Fort Myers, Florida where it was recaptured in December 1987.

Expanded King Mackerel and Reef Fish Bioprofile and Catch and Effort Data Collection and Analysis Program in Louisiana

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ABSTRACT

Louisiana State University has been gathering catch/effort information and length and sex composition data from the king mackerel and reef fish fisheries in Louisiana since 1983 under the auspices of the State/Federal Cooperative Fishery Statistics Program. Around 1985, the state/federal funding was reduced and the port samplers we had left were increasingly forced to focus more on collecting landings statistics than on conducting trip interviews. Also at this time, concern arose over the apparently overexploited king mackerel fishery in the Gulf, and the Gulf Council expressed a need for more individual trip and catch data. Thus, our expanded king mackerel sampling program was funded by the MARFIN Board in 1986 for three years. The scope of this project was broadened in 1987 to include reef fish since the red snapper fishery is also in trouble.

Thus, the current objectives of this study are to expand the catch and effort, and sex, length, and age composition data collection from the recreational and commercial king mackerel and reef fish fisheries in Louisiana beyond that already being gathered by the State/Federal Cooperative Fishery Statistics Program, and to determine whole weight to gutted weight conversion factors for these species.

In November 1986, a port sampler was hired to interview boat captains and measure subsamples of their catches in the Grand Isle and Venice port areas. His job was expanded in October 1987 to include going to sea aboard reef fish vessels once a month, if possible, to obtain whole weights and gutted weights from a wide size range of snappers and groupers. These are to be used in updating the NMFS conversion factors which come into play during quota monitoring time. All data collected during this project is computerized at LSU, taped, and sent to the Southeast Fisheries Center in Miami for incorporation into its TIP data base.

From November 1986 through June 1988, LSU port samplers have conducted 306 interviews from commercial vessels representing nine gear types. They've measured 5,614 fish of 36 species, 2,437 of which were king mackerel, and 1,512 of which were red snapper. At the request of the NMFS-Panama City Lab, they have collected 60 eye lenses, 603 muscle tissue samples, 30 gonad sets, and 215 otoliths as

needed at various times for electrophoretic, reproductive, and age and growth studies. Whole Spanish mackerel are obtained several times a year and shipped a hundred or so at a time to the Lab. The port sampler has been to sea aboard reef fish boats 5 times since October 1987 and has obtained live/gutted weights on snappers, groupers and tilefish.

MS/NMFS King and Spanish Mackerel Sampling Program

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Mississippi Department of Wildlife Conservation

ABSTRACT

The collection of king and Spanish mackerel biological data for the NMFS by the Bureau of Marine Resources is in its third year. The information supplements king and Spanish mackerel biological data collected Gulf-wide and is used to form fisheries management decisions for the mackerel stocks in the Gulf of Mexico.

King and Spanish mackerel biological data was obtained from fish houses, tournaments, charter boats and private fishermen. Individual fish were measured to the nearest centimeter, and if possible the sex was determined and the heads removed for otolith and tissue samples. The heads were labeled, frozen and sent to the NMFS Panama City lab for further analysis.

A total of 276 Spanish mackerel were measured and 252 otolith and tissue samples were obtained. A total of 82 king mackerel were measured and 80 otolith and tissue samples were collected from April through September 1988.

Supplemental Collection of Vital Statistics of Recreationally Caught King Mackerel and Spanish Mackerel Landed in Alabama

Henry G. "Skip" Lazauski, Ph.D.
Alabama Marine Resources Division

ABSTRACT

During the years 1986 and 1987 Alabama's Marine Resources Division participated in the collection of vital statistics on recreationally caught king and Spanish Mackerel. The statistics collected included the removal of otoliths from selected size groups, length frequencies, weight measurements, sex, determination if caught in the federal zone and angler effort. For Spanish mackerel 0 and 110 heads were collected for otolith removal in 1986 and 1987, respectively. Heads collected for king mackerel otoliths in 1986 and 1987 totaled 153 and 244, respectively. The mean weight for male king mackerel was 8.46 lbs in 1986 and 4.96 lbs in 1987. For female king mackerel the mean weight in 1986 was 15.32 lbs and in 1987 it was 14.07 lbs. For male Spanish mackerel the mean weight in 1986 was 0.79 lbs and in 1987 it was 0.52 lbs. In 1986 the mean weight for female Spanish mackerel was 1.47 lbs and in 1987 it was 1.33 lbs. The sex ratio was not accurate as fish were selected on the basis of length before they were sexed. The vast majority of the king mackerel collected were caught in the EEZ with the opposite being true for Spanish mackerel. Insufficient data on effort was collected to feel comfortable in giving a CPUE in fish/angler hour.

King and Spanish Mackerel Migration and Stock Assessment Study in the Southern Gulf of Mexico

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ABSTRACT

Introduction:

Objectives:

1) To determine the movement and migration of king and Spanish mackerel in the southern Gulf of Mexico.

2) To obtain Length/Frequency and C.P.U.E. data for king and Spanish mackerel captured in Mexican waters.

3) To acquire the Mexican Historical Landings Data for king and Spanish mackerel for the southern Gulf of Mexico.

4) To procure king and Spanish mackerel specimens for electrophoretic studies.

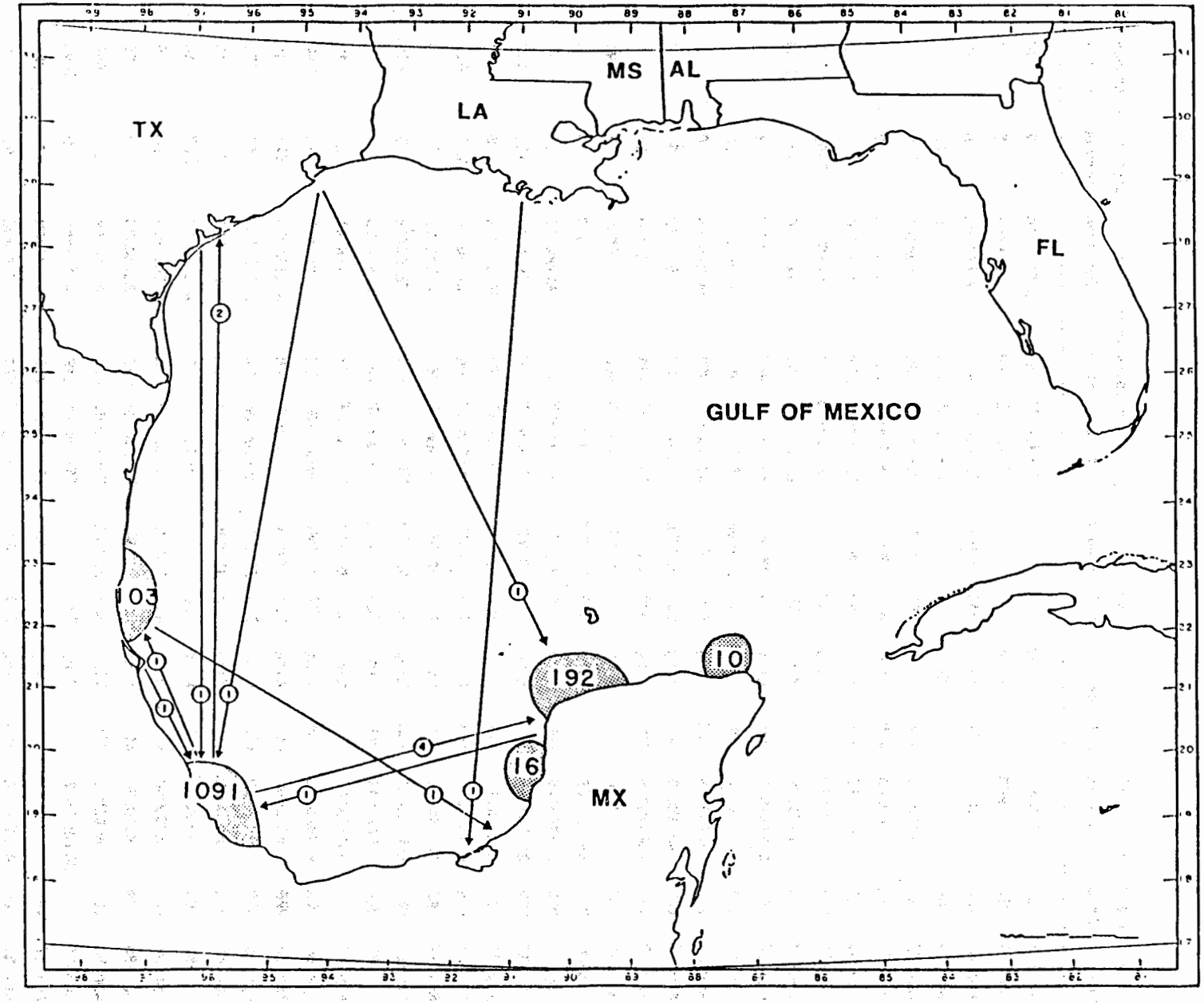
Schedule:

This project is of one year duration. However, it is the third consecutive year that Mote Marine Laboratory (MML) has conducted this research in cooperation with the National Marine Fisheries Service (NMFS)-Panama City Laboratory and the Mexican Instituto Nacional de la Pesca (INP) under the auspices of the MEXUS-GULF Agreement.

Summary of Results:

To determine movement and migration patterns for king (Scomberomorus cavalla) and Spanish (Scomberomorus maculatus) mackerel during 1988 in the southern Gulf of Mexico, 541 king (KM) and 32 Spanish (SM) mackerel were tagged off Mexico. These results increase the 3-year tally to 1,308 king and 104 Spanish mackerel tagged. Tagging efforts occurred off the Yucatan Peninsula in winter (Jan. 6-Feb. 25), off Veracruz in spring (Apr. 11-May 30) and off Tamaulipas during summer (July 1-Sept. 30). From Jan. 1-Sept. 1988, 83 tags (79 KM, 4 SM) have been recovered. In three years, 111 tags (106 KM, 5 SM) have been recovered under MML's Rapid Reward System. MML's tag return rate is 6.9%. Length/frequency measurements for king (5,009) and Spanish (1,115) mackerel were recorded during 1988 making a total

of 10,038 king and 1,864 Spanish mackerel measurements for the past three years. In 1988, 648 C.P.U.E. data were obtained, providing a 3-year total of 1,249. Historical Landings Data (1982-1986) for both species from all Mexican Gulf Coast States, have been obtained and sent to NMFS-Panama City. Data are reported by year, month, state, port, and weight (in thousands of pounds). The 1987 Landings Data have been requested. In 1988, 300 adult mackerel samples (200 king and 100 cero) have been sent to NMFS-Panama City for electrophoretic studies. A 3-year total of 1,177 mackerel samples (577 king, 200 Spanish, 100 cero and 300 juvenile king) have been sent to NMFS-Panama City for electrophoresis. Although not part of the contract, otoliths from adult king mackerel (68 pair from Yucatan; 18 pair from Veracruz) were collected during 1988. Right otoliths were sent to NMFS-Panama City, the left to INP-Mexico City. The 1988 values and 3-year totals are not final as work is continuing in Mexico through December, 1988.



Tag-recaptures of mackerel from Mexico in the Gulf of Mexico (1986-88); shaded areas indicate tagging areas. Numbers in shaded areas indicate number of tagged fish. Arrows and encircled numbers indicate recoveries away from release sites.

KING AND SPANISH MACKEREL TAG RETURN DATA FROM MEXICO

(1985-1988)

Collected by MML under the MEXUS-Gulf Agreement

	Release					FL		Capture			Days of	Distance
Tag #	Date	Area	Sub-Area	Depth	Species	(mm)	Tagger	Date	Area	Sub-Area	Freedom	(miles)
10002	18-Apr-85	VER	MOCOMBO		King			27-May-85	VER	B.DEL RIO	39	10
10050	20-Apr-85	VER	MOCOMBO		King			25-May-85	VER	XALAPA	35	20
10071	19-Apr-85	VER	MOCOMBO	40M	King	830	NMFS	15-May-85	VER	VERACRUZ	26	10
10085	19-Apr-85	VER			King			17-May-85	VER	UNK	28	5
10381	02-May-85	VER	MOCOMBO	40M	King	750	NMFS	06-May-86	VER	CHACHA	369	20
10417	05-May-85	VER	MOCOMBO	40M	King	675	NMFS	13-May-85	VER	B.DEL RIO	8	5
10422	05-May-85	VER	MOCOMBO	40M	King	650	NMFS	10-Apr-86	VER	A.LIZARDO	340	5
10426	05-May-85	VER	MOCOMBO	15M	King	1200		12-May-88	VER	VERACRUZ	1103	5
10729	24-Jun-87	TEX	GALVESTON		King	635		21-Oct-87	YUC	TELCHAC	119	1200
11064	28-May-87	VER	BARRANCAS	20M	King	620	RM/MML	30-May-87	VER	ALVARADO	2	50
11073	29-May-87	VER	BARRANCAS	40M	King	690	AI/VER	03-Aug-87	VER	BARRANCAS	66	15
11074	29-May-87	VER	BARRANCAS	40M	King	650	AI/VER	08-Jun-87	VER	BARRANCAS	10	0
11081	29-May-87	VER	BARRANCAS	40M	King	830	AI/VER	27-Jul-87	VER	B.DEL RIO	59	15
11082	29-May-87	VER	BARRANCAS	40M	King	690	AI/VER	16-Jun-87	VER	A.LIZARDO	18	10
11150	07-Mar-86	YUC	CELESTUN		King	840	PC/YUC	25-Aug-86	VER	BEGA	171	UNK
11235	03-Feb-86	YUC	SAN FELIPE		King	680	PC/YUC	08-Apr-86	YUC	ELCUYO	64	60
11442	21-May-87	VER	BARRANCAS	20M	King	625	RB/VER	02-Jun-87	VER	ALVARADO	12	50
11450	21-May-87	VER	BARRANCAS	14M	King	830	RB/VER	18-Sep-87	YUC	TELCHAC	121	450
11455	22-May-87	VER	BARRANCAS	14M	King	605	RB/VER	30-May-87	VER	BARRANCAS	8	0
11469	22-May-87	VER	BARRANCAS	14M	King	705	RB/VER	18-Feb-88	YUC	CHUBURNA	272	450
11472	22-May-87	VER	BARRANCAS	14M	King	740	RB/VER	12-Jun-87	VER	ALVARADO	21	40
11473	22-May-87	VER	BARRANCAS	14M	King	720	RB/VER	23-Dec-87	YUC	CELESTUN	215	450
11481	21-May-87	VER	BARRANCAS	20M	King	720	RB/VER	25-May-87	VER	ALVARADO	4	40
11493	22-May-87	VER	BARRANCAS	14M	King	620	RB/VER	15-Jun-87	VER	ANBOLI	24	15
11806	16-Apr-86	VER	BARRANCAS	20M	King	777	BF/MML	30-Apr-86	VER	SANTIA	14	UNK
11816	18-Apr-86	VER	MOCOMBO	40M	King	802	BF/MML	30-Apr-87	VER	A.LIZARDO	377	15
11904	24-Apr-86	VER	MOCOMBO	40M	King	780	BF/MML	20-Jun-86	TEX	P.ARANSAS	57	550
11909	30-Apr-86	VER	MOCOMBO	15M	King	550	BF/MML	31-Mar-88	VER	BARRANCAS	701	15
11912	30-Apr-86	VER	MOCOMBO	40M	King	570		03-Mar-87	VER	A.LIZARDO	307	10
11947	24-Apr-86	VER	MOCOMBO	40M	Spanish	450	BF/MML	22-May-86	VER	B.DEL RIO	28	5
11977	30-Apr-86	VER	MOCOMBO	40M	King	655	BF/MML	21-Jun-86	VER	ALVARADO	52	50
11991	30-Apr-86	VER	MOCOMBO	40M	King	839	BF/MML	02-Dec-86	YUC	P.PALMAR	216	450
12099	25-Jun-85	LA	GRAND ISLE		King	725		15-Feb-86	CAM	C.CARMEN	235	1340
12425	29-Aug-87	TEX			King		/FTI	09-Dec-87	VER	ALVARADO	102	UNK
13252	20-May-87	VER	A.LIZARDO	40M	King	680	VER	20-Aug-87	VER	VERACRUZ	92	20
13292	12-May-87	VER	A.LIZARDO		King	700	AI/VER	20-May-87	VER	ALVARADO	8	40

KING AND SPANISH MACKEREL TAG RETURN DATA FROM MEXICO

CONTINUED.

13317	02-May-87	VER	A.LIZARDO	40M	King	810	BF/MML	31-Aug-87	TAM	TAMPAC	121	260
13329	04-May-87	VER	A.LIZARDO		King	700	AS/VER	23-Dec-87	VER	ALVARADO	233	50
13471	15-May-87	VER	BARRANCAS	40M	King	770	RB/VER	16-May-87	VER	UNK	1	40
13489	16-May-87	VER	BARRANCAS	40M	King	680	RM/MML	16-Jun-87	VER	ALVARADO	31	40
13723	29-Apr-87	TAM	TAMPICO	18M	King	636	CD/TAM	04-Feb-88	CAM	ISLA AGUADA	281	560
13820	18-May-87	TAM	TAMPICO	28M	King	709	CD/TAM	06-Dec-87	VER	ALVARADO	202	300
14479	18-Aug-86	TEX	P.ARANSAS		King			10-Feb-87	VER	VERACRUZ	176	640
15513								21-May-88	VER	ALVARADO		
15972								09-Apr-88	VER	ALVARADO		
15990	09-Oct-87	TEX	P.ISABEL	15M	Spanish	442		30-Nov-87	VER	ARBOLI	52	750
16383								20-Apr-88	VER	VERACRUZ		
24525	02-May-88	VER	BARRANCAS	40M	King	740	BF/MML	19-May-88	VER	ALVARADO	17	40
24529	04-May-88	VER	BARRANCAS	15M	King	710	RB/VER	06-May-88	VER	ALVARADO	2	40
24531	04-May-88	VER	BARRANCAS	18M	King	574	RB/VER	22-May-88	VER	ALVARADO	18	40
24545	05-May-88	VER	BARRANCAS	30M	King	640	RL/YUC	07-Jun-88	VER	ALVARDO	33	40
24546	05-May-88	VER	BARRANCAS	18M	King	600	RL/YUC	17-May-88	VER	ALVARADO	12	40
24553	06-May-88	VER	BARRANCAS	36M	King	670	BF/MML	17-May-88	VER	ALVARADO	11	40
24555	06-May-88	VER	BARRANCAS	36M	King	660	BF/MML	17-May-88	VER	ALVARADO	11	40
24557	06-May-88	VER	BARRANCAS	36M	King	690	BF/MML	17-May-88	VER	ALVARADO	11	40
24562	06-May-88	VER	BARRANCAS	36M	King	740	BF/MML	14-May-88	VER	ALVARADO	8	40
24565	06-May-88	VER	BARRANCAS	36M	King	620	BF/MML	18-May-88	VER	ALVARADO	12	40
24567	06-May-88	VER	BARRANCAS	36M	King	670	BF/MML	18-May-88	VER	ALVARADO	12	40
24588	17-May-88	VER	BARRANCAS	30M	King	660	AT/VER	09-Jun-88	VER	ALVARDO	23	40
24591	17-May-88	VER	BARRANCAS	30M	King	670	AT/VER	02-Jun-88	VER	ALVARDO	16	40
24596	17-May-88	VER	BARRANCAS	30M	King	560	AT/VER	18-May-88	VER	ALVARADO	1	40
24617	02-Feb-88	YUC	SISAL	5M	Spanish	630	CD/TAM	19-Feb-88	YUC	SISAL	0	10
24625	03-Feb-88	YUC	SISAL	5M	Spanish	500	BF/MML	18-Feb-88	YUC	TELCHAC	0	10
24626	03-Feb-88	YUC	P.P/SISAL	5M	Spanish	57	CD/TAM	23-May-88	YUC	SISAL	110	0
24634	03-May-88	VER	BARRANCAS	15M	King	690	BF/MML	07-Jun-88	VER	ALVARDO	35	40
24635	03-May-88	VER	BARRANCAS	15M	King	590	BF/MML	17-May-88	VER	ALVARADO	14	40
24647	04-May-88	VER	BARRANCAS	40M	King	680	RL/YUC	19-May-88	VER	ALVARADO	15	40
24759	07-May-88	VER	BARRANCAS	36M	King	657	RB/VER	11-May-88	VER	ALVARADO	4	40
24762	07-May-88	VER	BARRANCAS	36M	King	628	RB/VER	28-Jun-88	VER		52	
24763	07-May-88	VER	BARRANCAS	36M	King	610	RB/VER	09-Jun-88	VER	B.DEL RIO	33	10
24840	17-May-88	VER	BARRANCAS	30M	King	600	JR/VER	26-May-88	VER	ALVARADO	9	40
24845	19-May-88	VER	B.DEL RIO	20M	King	710	JV/MEX	28-May-88	VER	ALVARDO	9	50
24895	05-May-88	VER	B.DEL RIO	40M	King	720	BF/MML	17-May-88	VER	ALVARADO	12	40
24903	02-May-88	VER	BARRANCAS	15M	King	560	RB/VER	18-May-88	VER	ALVARADO	16	40
24917	04-May-88	VER	BARRANCAS	40M	King	685	CS/VER	06-Jun-88	VER	BARRANCAS	33	0
24919	05-May-88	VER	BARRANCAS	18M	King	510	RL/YUC	25-May-88	VER	ALVARADO	20	40

KING AND SPANISH MACKEREL TAG RETURN DATA FROM MEXICO

CONTINUED.

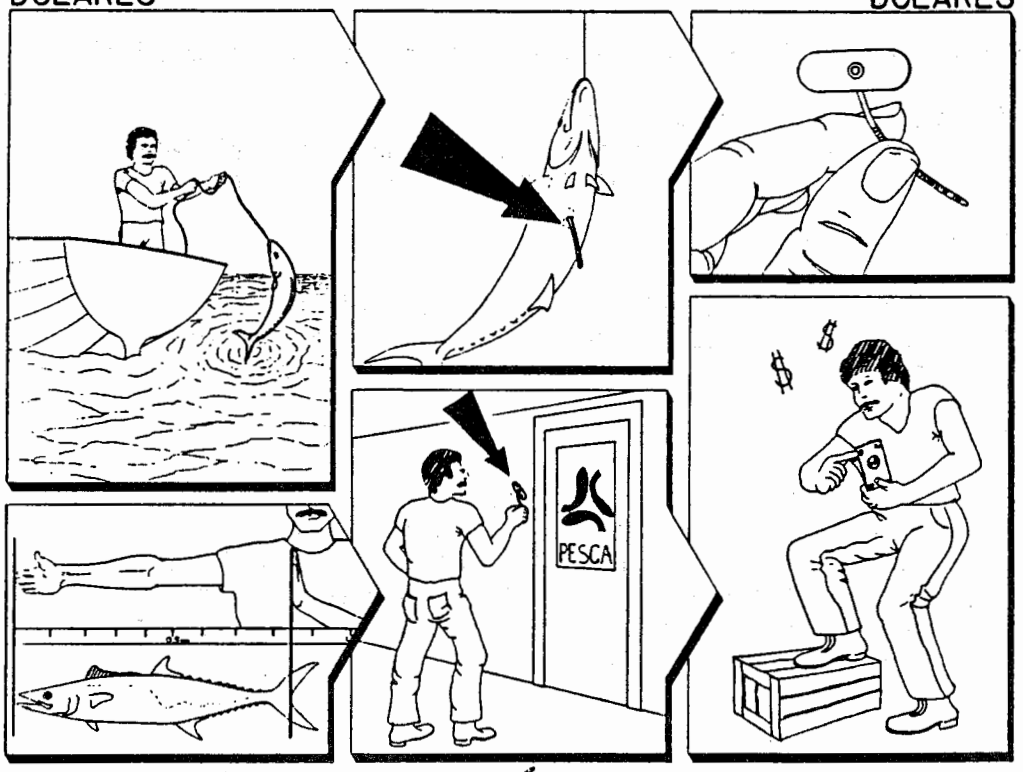
24928	06-May-88	VER	B.DEL RIO	30M	King	690	CS/VER	10-Jun-88	VER	A.LIZARDO	35	5
24929	06-May-88	VER	B.DEL RIO	30M	King	680	CS/VER	02-Jun-88	VER	ALVARDO	27	50
24933	06-May-88	VER	B.DEL RIO	30M	King	540	CS/VER	22-May-88	VER	B.DEL RIO	16	10
24934	06-May-88	VER	B.DEL RIO	30M	King	610	CS/VER	20-May-88	VER	B.DEL RIO	14	10
24952	05-May-88	VER	BARRANCAS	18M	King	715	RB/VER	17-May-88	VER	BARRANCA	12	0
24954	05-May-88	VER	BARRANCAS	18M	King	647	RB/VER	25-May-88	VER	COATZACOALCOS	20	85
24960	05-May-88	VER	BARRANCAS	18M	King	704	RB/VER	21-May-88	VER	ALVARADO	16	40
24967	05-May-88	VER	BARRANCAS	18M	King	613	RB/VER	12-May-88	VER	ALVARADO	7	40
24969	05-May-88	VER	BARRANCAS	18M	King	520	RB/VER	16-May-88	VER	ALVARADO	11	40
24982	06-May-88	VER	BARRANCAS	36M	King	543	AT/VER	17-May-88	VER	ALVARADO	11	40
24986	06-May-88	VER	BARRANCAS	36M	King	700	AT/VER	17-May-88	VER	ALVARADO	11	40
24996	12-May-88	VER	BARRANCAS	40M	King	680	RB/VER	17-May-88	VER	ALVARADO	5	40
25003	05-May-88	VER	B.DEL RIO	40M	King	650	BF/MML	21-May-88	VER	ALVARADO	16	40
25007	05-May-88	VER	B.DEL RIO	40M	King	620	BF/MML	17-May-88	VER	B.DEL RIO	12	10
25015	06-May-88	VER	BARRANCAS	36M	King	580	RL/YUC	04-Jun-88	VER	ALVARDO	29	40
25029	06-May-88	VER	BARRANCAS	36M	King	670	RL/YUC	07-Jun-88	VER	COATZACOALCOS	32	85
25033	06-May-88	VER	BARRANCAS	36M	King	750	RL/YUC	07-Jun-88	VER	ALVARDO	32	40
25034	06-May-88	VER	BARRANCAS	36M	King	880	RL/YUC	07-Jun-88	VER		32	
25038	06-May-88	VER	BARRANCAS	36M	King	630	RL/YUC	17-May-88	VER	ALVARADO	11	40
25040	07-May-88	VER	BARRANCAS	36M	King	560	RL/YUC	15-May-88	VER	ALVARADO	8	40
25041	08-May-88	VER	BARRANCAS	36M	King	590	RL/YUC	12-May-88	VER	ALVARADO	4	40
25044	11-May-88	VER	BARRANCAS	40M	King	700	RB/VER	17-May-88	VER	ALVARADO	6	40
25052	11-May-88	VER	BARRANCAS	40M	King	690	RB/VER	13-Jun-88	VER	A.LIZARDO	33	5
25111	10-May-88	VER	B.DEL RIO	40M	King	680	AT/VER	09-Jun-88	VER	ALVARDO	30	50
25121	16-May-88	VER	BARRANCAS	30M	King	630	RB/VER	03-Jun-88	VER	ALVARDO	18	40
25128	16-May-88	VER	BARRANCAS	30M	King	652	RB/VER	07-Jun-88	VER	ALVARDO	22	40
25129	16-May-88	VER	BARRANCAS	30M	King	513	RB/VER	11-Jun-88	VER	B.DEL RIO	26	10
25130	16-May-88	VER	BARRANCAS	30M	King	710	RB/VER	01-Jun-88	VER	ALVARDO	16	40
25199	17-May-88	VER	BARRANCAS	30M	King	610	RB/VER	07-Jun-88	VER	ALVARDO	21	40
25308	18-May-88	VER	BARRANCAS	40M	King	739	RB/VER	28-May-88	VER	ALVARDO	10	40
25312	18-May-88	VER	BARRANCAS	40M	King	585	RB/VER	28-May-88	VER	ALVARDO	10	40
25324	19-May-88	VER	BARRANCAS	30M	King	610	SS/MEX	28-May-88	VER	ALVARADO	9	40
25325	19-May-88	VER	BARRANCAS	30M	King	685	SS/MEX	30-May-88	VER	BARRANCAS	11	0
25328	19-May-88	VER	BARRANCAS	30M	King	570	SS/MEX	07-Jun-88	VER	ALVARDO	19	0

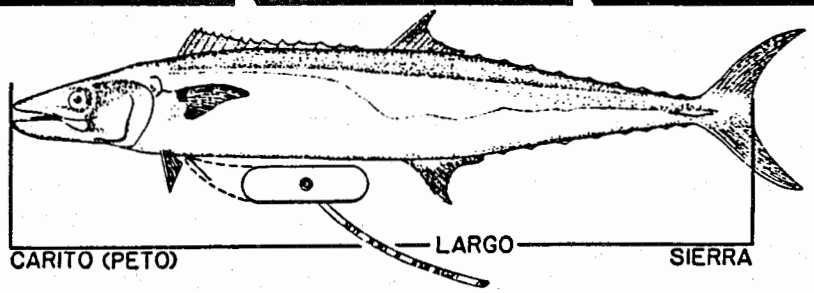
RECOMPENSA

$10 DOLARES

POR EL EQUIVALENTE EN MONEDA NACIONAL

$10 DOLARES





Caritos y Sierras están siendo marcados y puestos en libertad en todo el Golfo de México y a lo largo de la costa del sur del Atlántico para estudiar los hábitos migratorios y crecimiento. Este proyecto es un esfuerzo cooperativo entre el Gobierno Federal de los Estados Unidos y el Instituto Nacional de la Pesca. Si usted captura un pez con una placa, tenga la bondad de mandar la placa a la direccion anotada abajo. INCLUYA LUGAR, DIA DE CAPTURA, PROFUNDIDAD, PESO Y LARGO (VEA EL DIAGRAMA PARA MEDIR EL LARGO). INCLUYA TAMBIEN SU NOMBRE Y DIRECCION. Usted recibirá la recompensa en moneda nacional por el equivalente a $10.00 dolares, así como información a dónde y cuándo su pescado fue marcado. Muchas gracias por su valiosa ayuda.

National Marine Fisheries Service
3500 Delwood Beach Rd.
Panama City, Fl 32407-7499

Reward Poster, designed by MML, advertising a single $10.00 reward. The location of the local PESCA office or CRIP laboratory is printed opposite the NMFS address.

Quality Assurance Procedures Used in the
MARFIN King and Spanish Mackerel Tagging Program
Conducted by Mote Marine Laboratory in Mexico

1. Liaison with NMFS personnel on acceptable field techniques and data entry format.

2. Field Tagging Techniques -- Standardized Forms (in Spanish)

   A. Laboratory demonstration
   B. Field observation of tagging and equipment maintenance
   C. Tagging with experienced MML or PESCA observer present

   Tagging Equipment

   A. Cradles cleaned after each fish tagged
   B. Scalpels cleaned in alcohol after each fish tagged
   C. Soft fisherman's gloves used to handle fish

   Data Collection

   A. Standardized forms (in Spanish)
   B. Review of NMFS bioprofiles sampling manual
   C. Transfer of data from field sheets to bench sheets daily. Each field sheet assigned a number which identifies it permanently. All bench sheets correspond with coded variations.

3. Data Entry

   A. Verify all original field sheet entries with bench sheets (100%).
   B. All computer entry printouts are proofed with bench sheet entries (100%). Any discrepancies are referred back to original bench sheets.
   C. Bench sheets are totalled manually and checked against computer totals for each sample. Both species, each subarea and area.
   D. Two readers proof text and data appendices for accuracy and completeness.
   E. Senior Quality Assurance Officer reviews final draft version of each report submitted to NMFS.
   F. Liaison with appropriate NMFS personnel on format compatibility and data accuracy.

Estimating Recreational Angler Participation and Economic Impact In the Gulf of Mexico King Mackerel Fishery

J. Walter Milon
Associate Professor
Food and Resource Economics Department
University of Florida
Gainesville, FL 32611

ABSTRACT

Introduction:

The purpose of this project was to determine whether data from the Marine Recreational Fisheries Statistics Survey (MRFSS) conducted by NMFS could be used to estimate the travel cost demand models for recreationally caught king mackerel in the Gulf of Mexico and to evaluate the economic impact of possible alternative catch regulations such as changes in catch rates or bag limits. Travel cost demand models are a well-known technique used by many Federal agencies to estimate the economic value of recreation activities. This is the first study to examine the use of the MRFSS to estimate the economic value of recreational fishing in the Gulf of Mexico. The specific project objectives were:

* To develop travel cost demand models of recreational demand for king mackerel in the Gulf using data from the MRFSS;

* To use the demand models to estimate the net economic value for recreational king mackerel fishing in the Gulf;

* To use the demand models to estimate the change in net economic value due to possible regulations on king mackerel catch by recreational anglers;

* To compile available information on recreational angler expenditures in the Gulf and to estimate the gross economic value and economic impact of the recreational king mackerel fishery;

* To evaluate the existing MRFSS design and recommend modifications to improve the estimation of economic values for recreational fishing.

Summary of Results

Travel cost demand models were estimated using data from the 1981 and 1986 MRFSS. Two types of travel cost models were estimated: a) a pooled site model which reduces all fishing sites in the Gulf region

to a single average site, and b) a multinomial logit model which allows substitution across different sites in the region. Because the number of observations for anglers targeting king mackerel in 1981 and 1986 MRFSS was low, fishing sites were defined as large subareas within the region (Southwest Florida, Northwest Florida, Alabama/Mississippi, Louisiana, East Texas and West Texas).

Several statistical estimation issues were considered in the analysis. These included the proper specification of recreational catch rates, the selection of modes and sites by recreational anglers, the proper definition of travel costs for recreational fishing, and the effect of substitution to or from other species due to changes in king mackerel catch rates. These issues are considered in greater detail in the final report along with statistical results. Other issues relating to estimation of the king mackerel angler population and the extrapolation of economic value estimates to the angler population are also discussed in the report.

The results from the statistical analysis were used to estimate the economic value of possible recreational catch regulations for king mackerel in the Eastern Gulf of Mexico. To illustrate some of these results, the estimated net economic value of an increase in recreational catch in 1986 of 500,000 pounds ranged from $2.5 million to $25.5 million. The variation is due to differences in the demand models used to generate estimates and to different costs attributed to the travel time for a fishing trip. Similarly, the net economic loss due to a hypothetical one fish per angler bag limit in 1986 was estimated to vary between $2,255,366.00 and $4,176,455.00. The smaller range on the bag limit estimates is due to the fact that a one fish bag limit would have affected only a small number of recreational anglers in 1986.

The conclusions from this study are the MRFSS can be used to provide data for the economic valuation of recreationally caught king mackerel and other species. However, the existing survey has several deficiencies that make it unlikely that precise estimates can be generated from the data. In order to provde reliable economic information, greater consideration must be given to fishermen's site and species substitution alternatives, fishing activity at different times of the year, and the opportunity cost of time spent in fishing activities. Without this information it is unlikely that fishery managers will have accurate estimates of the economic effects of fishery regulations.

Supplemental Length and Sex Frequency Data and Catch Per Unit of Effort Information from the Commercial Fishery for Spanish Mackerel (Scomberomorus maculatus) off West Florida

Dr. Nelson M. Ehrhardt
Rosenstiel School of Marine and Atmospheric Science
University of Miami

ABSTRACT

Introduction

The goal of this project is to improve the data base used to assess Spanish mackerel stocks in the eastern Gulf of Mexico. Objectives are: 1) to design and implement a 3-year frame survey to collect supplementary size frequencies and catch per unit of effort in the commercial fishery off the west coast of Florida, and 2) to evaluate accuracy and precision of the information presently gathered by various other sources. This project is part of the National Marine Fisheries Service cooperative mackerel research efforts in the southeastern Atlantic.

Summary of Results

The project start date was October 1, 1987 and field work was implemented at the onset of the 1987-1988 fishing season in southern Florida (December 1987). Sampling effort was allocated according to an experimental sampling design which includes several strata and randomized elements. The experimental design was developed from results of a thorough analysis of historic spatial-temporal operational patterns observed in the Spanish mackerel fishery. For that purpose fishermen, fish house owners, and State and Federal fishery scientists and samplers were consulted. Sampling effort was proportionally allocated according to landings by months, regions, and fleets as: 1) Areas: Keys (70%), Central Florida (10%), and Northern Florida (20%). 2) Sub-Areas: Key West and Marathon; Cortez and Osprey; and Port St. Joe and Panama City. 3) Fleets: large and small run-around gillnetters (90%) and pompano gillnetters (10%). A 0.25 probability of encountering Spanish mackerel landed at any given area and day of the season was estimated from historic landings. As a result, 25% of the large vessels quota for 1987-88, or 350,000 lb, were expected to be randomly sampled. Samples consisted of all fish contained in two 200-lb bails randomly drawn from all bails landed by one sampled vessel, and all fish landed by sampled pompano gillnetters. All fish were measured to the nearest 0.5 cm, and a sub-sample consisting of the first 3 fish in a length class were separated for biological measurements (sex, weight, etc.). Total landings per sampled vessel, number of sets, and characteristics of the gear were also recorded.

During the period December 1987 - March 1988 a total of 3,720 Spanish mackerel were measured from samples randomly drawn from 360,275 lb of fish landed in west Florida, or 25.7% of the 1987-1988 commercial quota. The data collected have been submitted to the National Marine Fisheries Service to be included in the annual Spanish mackerel stock assessment analyses. Statistical evaluations concerning length frequency information collected by several institutions are presently underway.

King Mackerel Tagging off Texas

Hal R. Osburn
Texas Parks and Wildlife Department

ABSTRACT

This one year study was designed to improve our knowledge of king mackerel (Scomberomorus cavalla) stock identification and growth rates, thus allowing a more informed and equitable approach to the regulation of king mackerel in the southeastern United States. The objective was to expand the king mackerel mark-recapture (tagging) data base off Texas. As many king mackerel as possible were to be tagged by Texas Parks and Wildlife Department (TPWD) personnel during a prescribed amount of fishing effort and by at least ten selected sport-boat fishermen during any amount of volunteer fishing effort they would provide. Internal abdominal anchor tags provided by the National Marine Fisheries Service were used in the study.

Final results of this study are pending since the tagging period extends through September 30, 1988. However, as of September 15 over 200 king mackerel had been tagged and released; 69% by volunteer taggers and 31% by TPWD personnel. Nearly 70% of these fish were tagged off Port Aransas, 11% off Port Isabel, 10% off Galveston-Freeport, 6% off Sabine Pass and 4% off Port O'Connor. At least one tag (recovered off Freeport, Texas) has already been returned from this year's tagging effort. This is in addition to two tag recoveries (one near Vera Cruz, Mexico and the other from near Empire, Louisiana) from tagging efforts off Texas in 1986 and 1987.

The use of volunteer sport-boat fishermen proved to be an economical but unpredictable method of capturing and tagging king mackerel. As many as 21 fish in one day and a total of 76 fish to date were tagged by one volunteer. However, while some volunteers proved to be highly motivated and productive, others were not able to follow through on their original intentions. Some of the reasons reported for lack of participation by these volunteers were boat problems, conflicts with fishing tournaments and charter fishing needs and loss of interest.

COASTAL PELAGICS SESSION SUMMARY OF COMMENTS

o The small number of recaptured Spanish mackerel indicates that some troll caught fish do survive the capture and tagging procedure. But, this is not a good method for capturing Spanish mackerel for tag and release, because many of the fish are damaged.

o Stock assessments and management advice provided to the Fishery Management Councils by the NMFS Southeast Fisheries Center is dependent on the information provided by MARFIN studies.

o The new NMFS program to gather catch/effort information from charter boats will be more sensitive to the industry to promote a greater cooperative attitude, and thus, provide more reliable/useable data. The quality of data from this survey was previously interrupted because of PR problems that resulted from the implementation of a mandatory reporting system. Some cooperation problems may be related to fishermen's awareness that the more data they provide, the more they are regulated. However, fishermen become more cooperative when they realize that good data are a necessity for good workable management.

o The socioeconomic study to evaluate recreational angler participation in Gulf of Mexico king mackerel fishery may be biased because the chief source of data is tournament related. Tournament participants have higher incomes than the average angler and they may be more successful fishermen because they are more committed and more involved. However, researchers specifically target tournaments because of the ease of access to data, e. g., time, site and angler specific.

o Limited MARFIN resources prevent an in depth Gulf-wide survey of the full socioeconomic spectrum of king mackerel anglers. Nevertheless, values derived from this study of $30.00 to $40.00 per fish compare favorably with findings from another study ($15.00 per fish) of fishermen from a lower mean income level ($16K). Data collected by other states may be beneficial in adjusting values derived from this study. Also, the study may show that the fishing experience is valued higher than the fish landed, and thus, require different management strategies.

Continued Introduction of TEDs & Enhancement of Shrimp Trawl Selectivity in the Gulf Shrimp Fishery (NA86-WC-H-06131) (October 1, 1986 - September 30, 1987) (NA87-WC-H-06126) (October 1, 987 - September 30, 1989)

Thomas J. Murray
Gulf and South Atlantic Fisheries
Development Foundation, Inc.

ABSTRACT

This project began a cooperative effort among industry members, Sea Grant experts, and NMFS personnel to introduce and evaluate the use of various TEDs (Trawl Efficiency or Turtle Excluder Devices) in the Gulf shrimp fishery. The need for such a project came about as a result of population declines in sea turtles, several of which are protected by the Endangered Species Act. The incidental mortality of sea turtles in shrimp trawls is considered by some to be a significant factor in the decline of some species.

During the period from 1985-1987, efforts to encourage shrimpers to utilize TEDs on a voluntary basis were largely unsuccessful.

Much of the problem lay in the uncertainty surrounding TED legislation. At the time the project began (and, indeed, for the better part of its duration), it was unknown when (or even if) the regulations would be implemented, and which devices would ultimately be approved. As one contractor put it, "While we were required to transfer the technology, we had no real insight into what new technology would be approved or who would be required to use that technology." As illustration of the general state of development, part of this project included testing two new "soft TEDs," one of which may turn out to be the TED most widely used by shrimpers; yet when this project began, that device had not been exposed outside of South Carolina.

It soon became apparent that the initial objectives of the project -- "to expedite the introduction of the various Trawl Efficiency Devices (TEDs) throughout the Gulf shrimp fishery; to demonstrate efficiencies of various designs while educating harvesters as to the specialized gear's benefits, and to compile fishery dependent catch data as possible basis for biological assessment" -- were optimistic given the actual situation as it pertained throughout the Gulf during the project period.

Thus, a project that had begun as an effort to expedite the introduction of authorized devices and demonstrate their benefits, turned -- of necessity -- into an educational campaign wherein Sea Grant and NMFS personnel endeavored to convince shrimpers around the Gulf that TED regulations were indeed inevitable, that some kind of

TED would work in their trawls, and that they would be better off experimenting with the devices now rather than waiting until TED use was mandatory. On the advice of the Regional Director of NMFS, demonstrating efficiencies and compiling data took a "back seat" to simply getting the TEDs into the water, making the different devices visible and available to shrimpers, and familiarizing them with the legislation that mandated TEDs in the first place.

Conclusion:

The only conclusion that can be realistically drawn at this point is that work needs to be continued. The project was successful in that it exposed shrimpers to various TEDs, it increased shrimper awareness of TED regulations, and it encouraged shrimpers to experiment with the devices and work on adaptations that would make their efforts with the TEDs more productive. The project also assisted in the trials and ultimate certification of the first "soft" TED design.

But work has just begun and there is much that needs to be accomplished before shrimpers in the Gulf will accept the devices. Currently, regulations mandating the use of TEDs are being phased in, yet the industry is still woefully unprepared and ill-equipped for the advent of such a significant change. This project was originally funded from October, 1986 through September, 1987; however, final TED regulations did not appear until the end of June, 1987. Given this timetable and the often difficult conditions under which project personnel were working, there still exists a severe lack of expertise relative to the scale of educational efforts needed.

Research and development work needs to proceed hand-in-hand with implementation and demonstration. Work should continue on trawl design and excluder device improvements and modfications which would eliminate by-catch while minimizing shrimp loss. Support for transferring existing technology should continue and be expanded to facilitate TED introduction. Testing gear performance should continue to help improve understanding of the dynamics of shrimp trawling systems so that a better base of information for evaluating the effect of TEDs is available. Shrimpers themselves need to be more intimately involved in the development, modification, and testing phases. Now that fishermen realize that TED regulations are inevitable, they appear more willing to participate in trials and more interested in working on modifications that would solve their individual problems.

The attention developed over the past 8-12 months on the issue of incidental take of sea turtles by the shrimp industry and the regulations requiring mandatory use of Turtle Excluder Devices has stimulated interest by some innovators in the shrimp fishery to consider less burdensome adaptations to their trawls than those currently available.

This project will solicit members of the shrimp industry to

submit designs for trawl adaptations that would, in their opinion, eliminate the retention of non-target species. A review panel composed of industry, Sea Grant gear specialists, NMFS gear specialists and others as identified will evaluate the designs for determination of their success potential. The innovators whose designs are chosen will be provided funds for constructing their designs and conducting evaluation of these designs against standard trawls. Comparisons of shrimp retention will be conducted and adapted by the design. Upon completion of the testing, an evaluation of design effectiveness will be conducted and the information obtained transmitted to interested parties.

TED Technology Transfer and Certification

Charles A. Oravetz
National Marine Fisheries Service
Southeast Region
St. Petersburg, FL

ABSTRACT

Introduction

This is a one year project with objectives to:

1. Coordinate the use of TEDs by the Southeast U. S. Shrimp Fishery.

2. Coordinate the testing and certification of new TEDs.

3. Develop NMFS expertise on the use of all TEDs.

4. Develop and distribute information on certified TEDs.

This project supplements NMFS base funded efforts in TED technology transfer at the Southeast Regional Office and Pascagoula laboratory. It also supplements work by the states, Sea Grant and the Shrimp Industry through the Gulf and South Atlantic Fisheries Development Foundation (G&SAFDF MARFIN grant $535K for TED technology transfer).

Summary of Results

This award was made in late fiscal year 1987. A request was made to carry over funds and granted in January 1988. Of the $110K available under this award, $20K was used in the Southeast Regional Office to support TED technology transfer activities and $90K was transferred to the Pascagoula laboratory to support an additional TED gear specialist, develop NMFS gear expertise on non-NMFS TEDs and to evaluate TEDs for the exclusion of small turtles.

During the performance period Southeast Regional Office activities were:

- Modified the regulations to certify the Morrison and Parrish TEDs.

- Gave TED presentations to the Atlantic and Gulf States Marine Fisheries Commissions, Southeastern Fisheries Association and Key West shrimpers.

- Issued six press releases providing updates on the status of the

TED regulations.

- Issued 22 letters of authorization to test new TED designs.
- Cooperated with Texas Sea Grant to develop a fact sheet on the most frequently asked TED questions (copy attached).
- Briefed congressional staffers on the program to evaluate the effectiveness of the TED rules.

Activities at the Pascagoula laboratory included:

- The hiring of an additional TED gear specialist.
- Forty seven TED demonstrations/installations or workshops (list attached).
- Evaluation of TEDs on small turtle exclusion (results attached).

MARINE ADVISORY
SEA GRANT COLLEGE PROGRAM — TEXAS A&M UNIVERSITY

Turtle Excluder Device Regulations in Texas:

Some commonly asked questions

In response to the many questions being asked concerning the impending turtle excluder device (TED) regulations, the following list of 20 commonly asked questions and answers has been compiled by your Texas Marine Advisory Service and the Texas A&M University Sea Grant College Program. The answers have been provided by the National Marine Fisheries Service (NMFS).

1. When do the TED regulations go into effect off Texas and to whom do they apply?

The regulations begin March 1, 1988, in Texas waters and are in effect each year March 1 through November 30. They apply to all shrimp trawlers.

In offshore waters (see back for definition of offshore and inshore), trawlers 25 feet long or longer must use TEDs. Trawlers less than 25 feet long, shrimping offshore, are not required to use TEDs if tow times are limited to 90 minutes. Inshore, all trawlers, regardless of size, must either limit their tows to 90 minutes duration or use TEDs. In 1988 the TED requirement is from shore out to the NMFS "15-mile boundary" (see back for clarification). Beginning March 1, 1989, the TED regulations will be in effect for all offshore waters.

There are some other exceptions and minor details about the regulations that are not covered in this answer. A one-page summary of the regulations is available from your county marine agent or NMFS. Remember that regulations are always subject to change. If you have any doubts about the regulations, contact your marine agent or NMFS.

2. What is a TED?

A TED is a Turtle Excluder Device. It fits into the back end of a shrimp trawl just before the cod end. Its purpose is to release sea turtles and other large objects from the trawl while allowing the smaller shrimp to pass through openings in the TED into the cod end of the trawl.

3. What are certified TEDs?

Certified TEDs are those types described by federal regulations issued June 29 and October 5, 1987. Currently, five types of TEDs are certified. These include the National Marine Fisheries Service (NMFS) TED, Cameron TED, Matagorda TED, Georgia TED and Morrison TED. The first four are "hard TEDs" made out of steel, fiberglass, etc. The Morrison soft TED is made of poly webbing. In the near future, a sixth type of TED should be certified. Known as the Parrish TED, it is a soft TED similar to the Morrison TED.

4. Can I build my own TED?

Yes. There is no requirement to obtain a TED from any special source. As long as a TED meets the minimum dimensions of one of the five types of TEDs specified in the regulations it can be obtained from any source or you can build it yourself. A list of TED manufacturers and diagrams with specifications of TEDs are available from your marine agent or from NMFS.

5. Can a TED be modified?

Yes, within certain limits. As long as it doesn't hinder turtle release, any modification that is not specifically prohibited by the regulations can be made. An example would be installing a webbing funnel of the proper size ahead of the TED. The NMFS believes webbing funnels in some cases may help reduce shrimp loss.

6. Can a cannonball shooter be used for a TED?

Yes, provided it meets the minimum specifications in the regulations.

7. Are TEDs required for each net on my boat?

No. TEDs are required only in the trawls with which you are fishing, and only when you are in TED-required areas.

8. Who will enforce the use of TEDs in Texas?

Enforcement will be carried out by NMFS enforcement agents, the U.S. Coast Guard, U.S. Customs Officials and the U.S. Fish and Wildlife Service.

9. When will enforcement begin?

On March 1, 1988.

10. How will the regulations be enforced?

Mostly by at-sea boardings at least during 1988 because of the 15 nautical mile limit.

11. How much shrimp loss or bycatch reduction can I expect if I use TEDs?

Shrimp catch and bycatch reduction with TEDs is variable. It depends on which type TED you use, whether it is installed properly, bottom type and what kind of fisherman you are. Some fishermen report no shrimp losses with TEDs while others claim they have some losses. TEDs are like any other new piece of fishing gear, e.g. four rigs. It may take a little time for individual fishermen to learn how to use them.

TED TYPES	ESCAPE?		
HARD TEDS	YES	NO	%
Saunder's	10	10	50
NMFS's	19	1	95
Georgia (Top)	18	2	90
all 2 Funnels (Bottom)	13	7	65
SOFT TEDS			
Parrish	11	9	55
Morrison	20	0	100

(Chi-square = 25.8, $P < 0.001$)

POST-TEST IMPROVEMENT RESULTS

TED TYPES	ESCAPE? YES	NO	%
Georgia (Bottom w/o funnel)	4	1	80
Morrison (Weighted Flap)	10	0	100
Saunder's (Door Redesigned)	5	0	100

Date	Name/Location	Type of Assistance
10/11/87-10/16/87	Melbourne, Cape Canaveral, FL	TED tests
10/26-10/30/87	Corpus Christi, TX	Construct & Modify TED's
11/01-11/07/87	Savannah, GA	Demonstrate TED's to Mexican authorities
12/01-12/04/87	Lake Charles, LA	TED trials (inshore waters)
12/08-12/11/87	Corpus Christi, TX	TED trials (inshore waters)
1/5/88	Joel Noel, Biloxi, MS	Const. & Inst. of TED's
1/5/88	Terry Van Patten, Pascagoula, MS	Const. & Inst. of TED's
1/5/88	Fisher's Cape Canaveral, FL	Telephone discussion const. & inst. of Ted's
1/10/88	Auld's Shrimp Dock, Bayou la Batre, AL	Const. & Inst. of TED's
1/11/88	Otto Peterson, Gautier, MS	Const. & Inst. of TED's
1/12/88	Telephone call Don Sweat Key West, FL	How to properly rig TED's
1/14/88	Auld's Shrimp Dock, Bayou la Batre, AL	Installation of funnels
1/21/88	Gary Nickelson Bayou la Batre, AL	Inst. of grids & funnels
1/22/88	Gary Nickelson's Boat	Installed 2 GA TED's with funnels

1/22/88	Sprinkles Net Shop, Bayou la Batre, AL	Inst. of TED's (with Rick Wallace)
1/22/88	Billy Barnes Net Shop Bayou la Batre, AL	Inst. of grids & funnels (with Rick Wallace)
1/26/88	Don Sweat called	Discussion of problems with TED's
1/28/88	John Ray Nelson Bon Secour, AL	Const. of TED's (with Rick Wallace)
1/29/88	Deep Sea Marine, Bayou la Batre, AL	Const. & Inst. of TED's
2/1/88	Marine Products, Inc.	Const. of TED's
2/5/88	Tele. conv. Hudson Products, Bayou la Batre, AL	Dis. of fiberglass TED's
2/8/88	Marine Products, Inc. Brandon, FL	Const. of TED's
2/8/88	Gulfport, MS (Sea Grant)	TED Workshop Gulfport
2/9/88	Biloxi, MS (Sea Grant)	TED Workshop Biloxi
2/10/88	Pascagoula, MS (Sea Grant)	TED Workshop Pascagoula
2/11/88	Bon Secour, AL (Sea Grant)	TED Workshop Bon Secour, AL
2/12/88	Telephone conv. Sprinkle Net Shop	Const. of TED's
2/13/88	Barnes Net Shop Bayou la Batre, AL	Const. (Funnel Inst. in GA TED's)

2/13/88	Tide Marine, Bayou la Batre, AL	Const. (Funnel Inst. in GA TED's)
2/22-24/88	Key West, FL	Assistance to shrimpers
2/25/88	Stormy Spellmeyer, Grand Bay, AL	Const. of TED's & Funnels
2/25/88	Tele. Joe Potter, Bon Secour, AL	Discussion - Inst. of grids & funnels
2/26/88	Benton net Shop Bon Secour, AL	Const. of TED's
3/1-2/88	Key West, FL Workshop	Southeastern Fisheries
3/3/88	Morgan's Net Shop,	Grid angle & funnel
3/3/88	King's Shrimp Net Shop,	Grid angle & funnel
3/3/88	Local shrimpers, Key West, FL	Discussion on rigging
3/4/88	Ralph Andrews Net Shop, Ft. Myers, FL	Inst. of grids & TED funnels
3/7/88	Stormy Spellmeyer Grand Bay, AL	Inst. of grids & funnels
3/16/88	Benton Net Shop, Bon Secour, AL (George Mateo)	Called to check the const. of TED's & funnels
3/16/88	Nelson Net Shop Bon Secour, AL	Called to check the const. of TED's & funnels

3/88	Individual fishermen (5) 3-Pasc. 2-Biloxi	Construct & install TED's
2/10-12-88	Billy Zirlott, Bayou la Batre, AL, Bayou Trawl Boards	Installed TED's
2/18-19/88	Billy Howard Bayou la Batre, AL Bayou Trawl Boards	Installed TED's
2/25-26/88	Angelo Petramdis, TROPICAL TRADER, Panacea, FL	Installed TED's
2/11/88	Sea Grant Workshop Bayou la Batre, AL	Technical information
2/2/88	Otto Peterson, Gautier, MS	Technical information
2/3/88	Billy Burbank, Burbank Trawls	Technical information
4/4-4/5/88	Jacksonville, FL	TED Workshop
5/12-13/88	Lockport, LA	Test TED's
5/27-6/4/88	Brunswick, GA	TED trials
6/26-7/3/88	Houston, Corpus Christ, TX	Test TED's

SHRIMP (Part 1) SESSION SUMMARY OF COMMENTS

Turtle Excluder Devices (TEDs)

o The NMFS responsibility with regard to TEDs was to develop a device that excludes sea turtles. Sea Grant and the fishing industry have agreed to collect data concerning shrimp loss.

o The South Carolina Experience: South Carolina intended to develop turtle regulations that coincided with federal regulations. When the federal regulations were put on hold, the state decided to withdraw theirs too. Conservation pressure, however, was able to reverse this decision, and the state regulations were kept in place. The Morrison TEDs that were used by most shrimpers did not perform well (lost shrimp) due to algae fouling. The shrimp industry brought suit against the state claiming a high shrimp loss. The result of this suit was an injunction against the state enjoining the enforcement of the state TED regulations. The state Supreme Court reversed this injunction and TEDs were back in. Then the industry sued again, claiming that the state had exceeded its legal authority. The same lower court judge issued another injunction against TED enforcement. This decision also was reversed by the state Supreme Court. By this time the shrimp season was almost over and the state elected not to enforce the last few days of the season. This whole situation was clouded by a very poor brown shrimp season. The shrimpers blamed the Morrison TED, but the highest catches early in the season were during TED usage.

o The finfish by-catch with the NMFS TED has been about 30% of a

standard trawl, i. e., a 70% reduction. Other TEDs exclude somewhat less.

o Since regulations are not now in place, the MARFIN funds designated for technology transfer are essentially in "escrow" and will be used when the regulations go back in place. The Sea Grant and industry organization for technology transfer is still intact, ready to continue work.

Louisiana Cooperative Shrimp Mark/Recapture Project

Philip Bowman, Brandt Savoie and Robert Ancelet
Louisiana Department of Wildlife and Fisheries

ABSTRACT

The Louisiana coast is divided into three shrimp management zones with Zone 1 including all state waters east of the Mississippi River. This area contributes significantly to the state's shrimp harvest producing an average of 16.8% of Louisiana's brown shrimp harvest, and is extremely important to the Gulf overall brown shrimp catch. This area is also important from a recreational shrimping perspective since it contains two large estuarine lakes, Lake Pontchartrain and Lake Borgne, which are adjacent to New Orleans, the largest metropolitan area in Louisiana and has a significant portion of the state's recreational shrimping effort.

Mark/recapture experiments on brown shrimp to date have been mostly centered west of the Mississippi River and recent information from Zone 1 is sparse. Information from the Department of Wildlife and Fisheries Shrimp Monitoring Program has indicated shrimp growth rates and migration patterns differ from those west of the Mississippi River. In order to collect additional information on brown shrimp east of the Mississippi River, the Louisiana/Mississippi Cooperative Shrimp Mark/Recapture Project was prepared. Objectives of this project were to collect additional information on the growth and migrations of brown shrimp.

During May and June, 1987 16,000 brown shrimp were tagged and released in two general areas in Louisiana east of the Mississippi River. There were 8,000 releases in the Lake Borgne system (4,000 in May and 4,000 in June) and 8,000 were released in the Bay Gardene area on the periphery of Breton Sound (4,000 in May and 4,000 in June). Techniques used in this study were similar to those used by the National Marine Fisheries Service and Louisiana Department of Wildlife and Fisheries shrimp mark/recapture experiments in Louisiana during the late 1970's and 1980.

During this experiment no reward was offered for returned shrimp; however, news of the experiment was published by the Department and carried on numerous metropolitan New Orleans radio and television stations and numerous news articles appeared in New Orleans newspapers.

In the Lake Borgne area 248 returns were reported for a return rate of 3.1%. An eastward drift was observed in 74% of the returns; however, 14 miles was the maximum distance traveled with some returns remaining out for 61 days. An average increase in size of 0.77 millimeters per day was observed.

A total of 175 shrimp were recovered from the Bay Gardene area for a return rate of 2.2%. A substantial movement southeastward toward Breton Sound was observed with returns from as far as 55 miles and maximum times out of 45 days being reported. An increase in average size of 0.67 millimeters per day was observed.

An Economic Assessment of the Louisiana Inshore Shrimp Fishery

Walter R. Keithly, Jr.
Coastal Fisheries Institute
Center for Wetland Resources
Louisiana State University

ABSTRACT

Introduction

The Louisiana inshore shrimp fishery has expanded in terms of both manpower and capital in recent years in conjunction with the decline in the state's coastal oil-and-gas related activities. This expansion has heightened the need for current economic and socioeconomic information which can be used in the management of Louisiana's most valuable commercial fishery. The project goal of this two year MARFIN project, therefore, is to provide an economic and socioeconomic evaluation of the Louisiana inshore shrimp fishery via (1) determining the level and related changes in the level of dependence on the inshore shrimp resource by full and part-time commercial fishermen, and (2) changes that have occurred in relation to fewer job opportunities in coastal oil-and-gas resulted sector, and (3) determining which factors of production affect individual boat catch of shrimp.

Summary of Work

Tapes containing information on Louisiana's commercial shrimp license sales have been collected and sorted for the purpose of constructing a time-series data set. Because of a difference in the 1987 Louisiana shrimp license requirements, the latest year of data will provide little information for use in this study.

Questionnaires have been developed and administered to more than 500 commercial shrimp fishermen throughout Louisiana. These primary data have been automated and are currently being analyzed. Some preliminary results from this survey will provide the basis for discussion at the MARFIN meeting.

Shrimp Fisheries Management to Increase Economic Returns

Wade Griffin

ABSTRACT

This is the second year of a three year project to update the generalized bioeconomic fisheries simulation model (GBFSM), develop a related mathematical programming model (MPM) for shrimp policy analysis, assimilate the data for both models, and conduct various policy analysis. This work is to be done in cooperation with shrimp management agencies, particularly the Texas Parks and Wildlife Department. GBFSM will be used to determine the impact over time of a policy, such as the Texas closure, by allowing effort (vessels) to enter and leave the fishery as economic conditions dictate.

MPM is a static partial equilibrium model which uses the surplus maximization principle. It is a nonlinear optimization model with linear constraints. In brief terms, it simulates production and consumption of different shrimp categories within each period in a year in such a way that the demand and supply will be in equilibrium. This is accomplished by maximizing the sum of producers' and consumers' surpluses under a set of constraints characterizing production, resource availability and material balances. This procedure yields simultaneous equilibria in all markets where markets are of different shrimp size categories.

Data are being assimilated so that both models will simulate the Texas shrimp fishery. Since many biological characteristics of shrimp are unknown, GBFSM is used to derive their values. The information derived from GBFSM (about biological characteristics of shrimp) is used by MPM which is in turn used to analyze policy issues related to optimum management of the Texas shrimp fishery.

Wade Griffin spent most of the summer in Austin, Texas at the Texas Parks and Wildlife Department putting GBFSM on their mainframe computer. At their request, the model was changed so that it depicted eight rather than four depth zones. As a result of this change, all catch-effort data were reconstructed and the model retuned. The model is now set up for two areas (See Figure 1), eight depth zones (nursery, Bay and 6 offshore depths at 5 fathom increments), two species (Brown and White), six size classes of shrimp and four vessel classes. Figure 2 through 5 show the derived biological coefficients (recruitment, movement, natural mortality, and fishing mortality, respectively) in the current GBFSM version where no movement of shrimp can occur between areas. The current version of GBFSM does an excellent job of predicting landings across depth and across month (See Figures 6 through 9) but is less accurate in predicting the landings by size of shrimp (See Figure 10 and 11). Prediction by size

class is expected to improve when movement is allowed between areas.

Once the model is completely tuned based on depth, then both GBFSM and MPM will be restructured in terms of depth and distance since regulations are based on these factors. Economic data will then be assimilated for both models and policy analysis begun. Texas Parks and Wildlife personnel will then be trained to use both models.

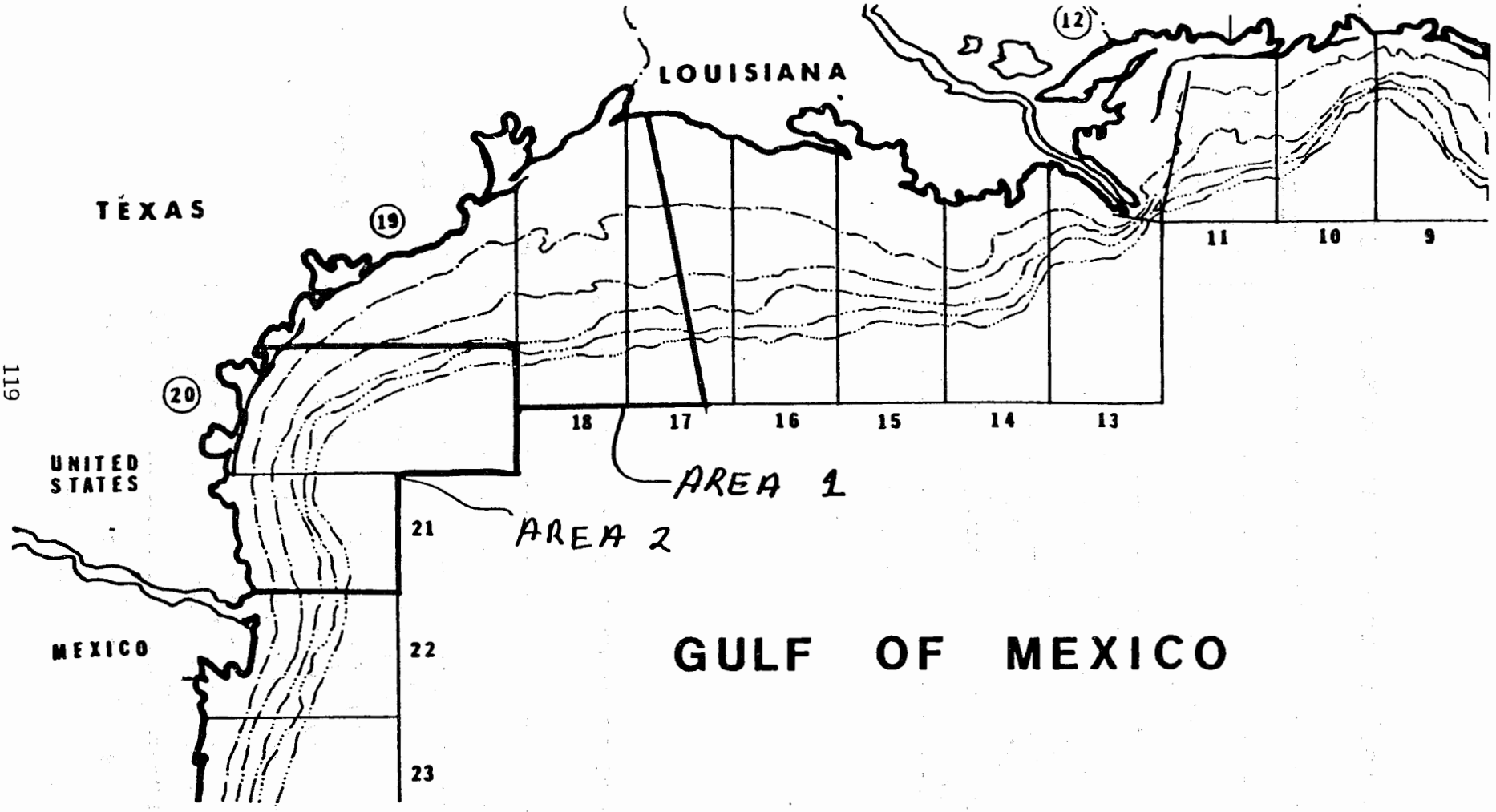

LOUISIANA
TEXAS
UNITED STATES
MEXICO
GULF OF MEXICO
AREA 1
AREA 2
9
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Figure 1.

Brown shrimp recruitment rate, area 1&2

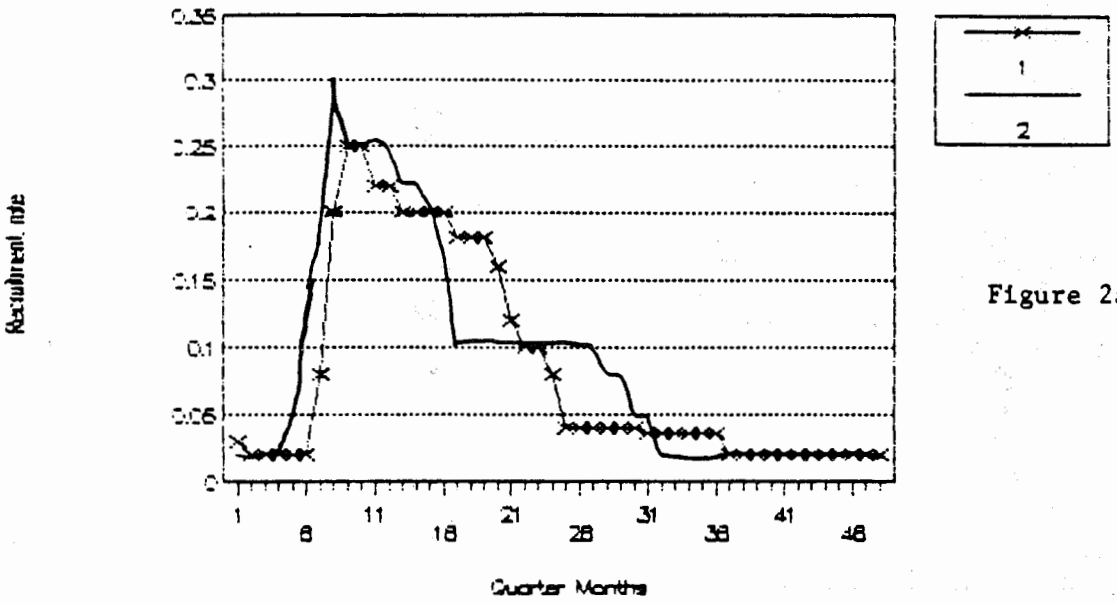

Figure 2a.

White shrimp recruitment rate, area 1&2

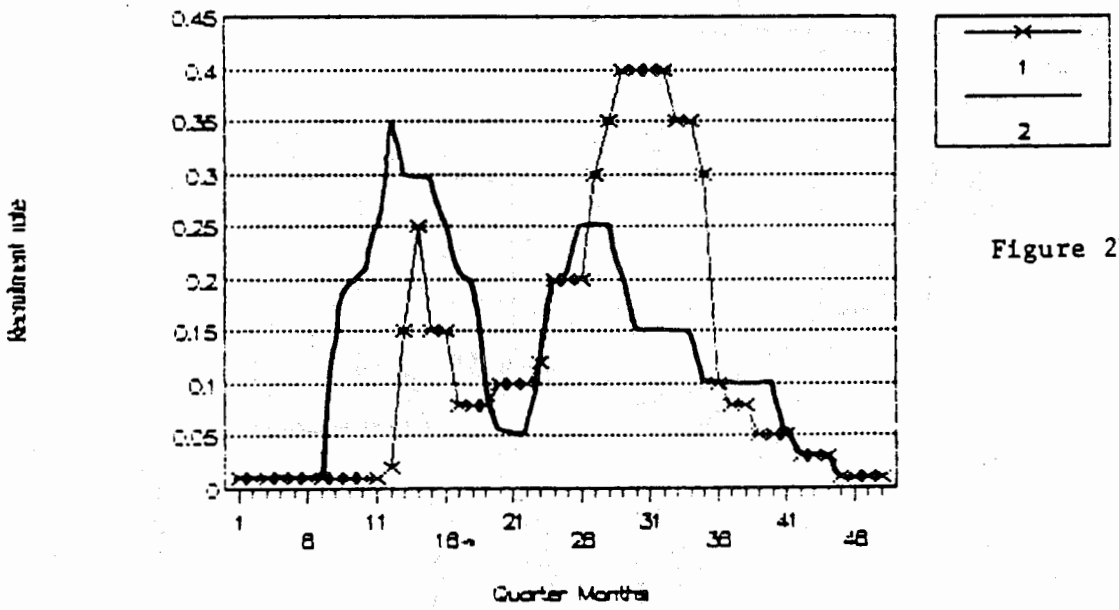

Figure 2b.

Brown shrimp movement rate, area 1&2

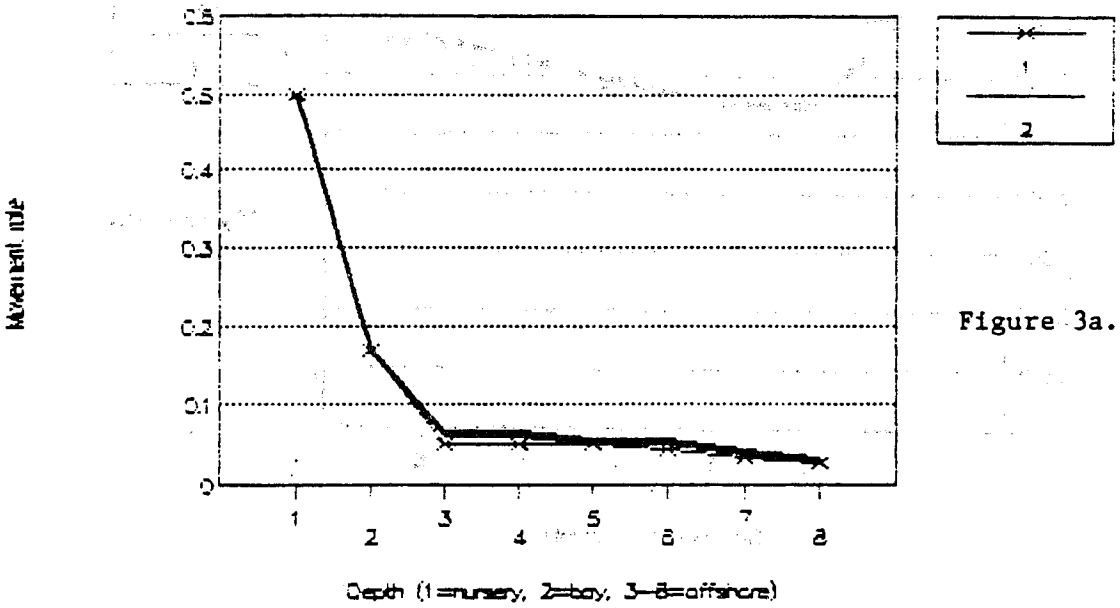

Figure 3a.

White shrimp movement rate, area 1&2

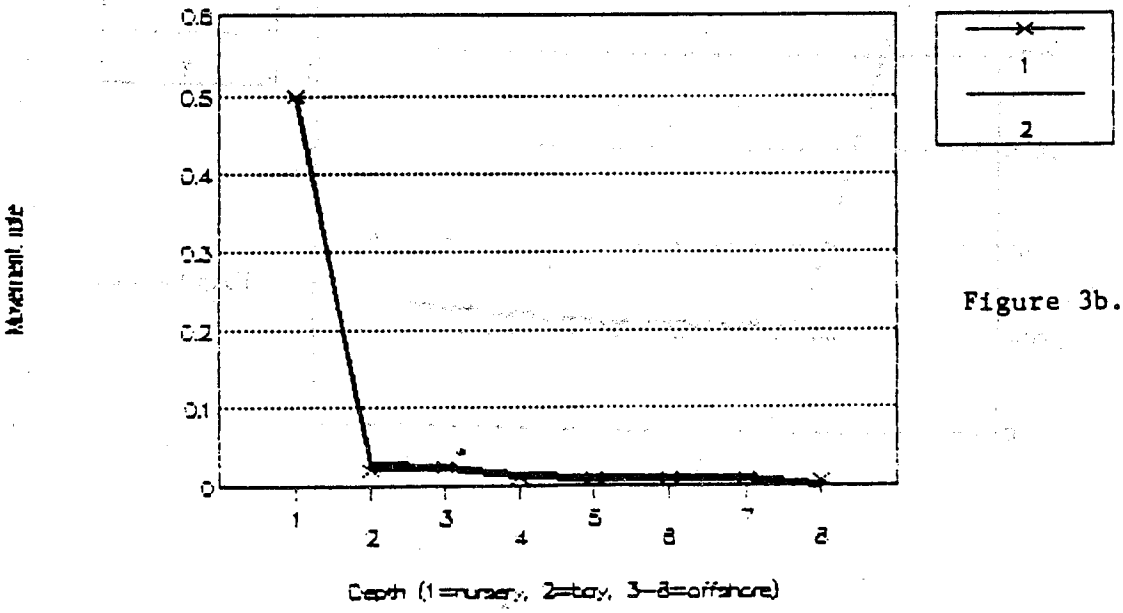

Figure 3b.

Brown shrimp nat. mortality, area 1&2

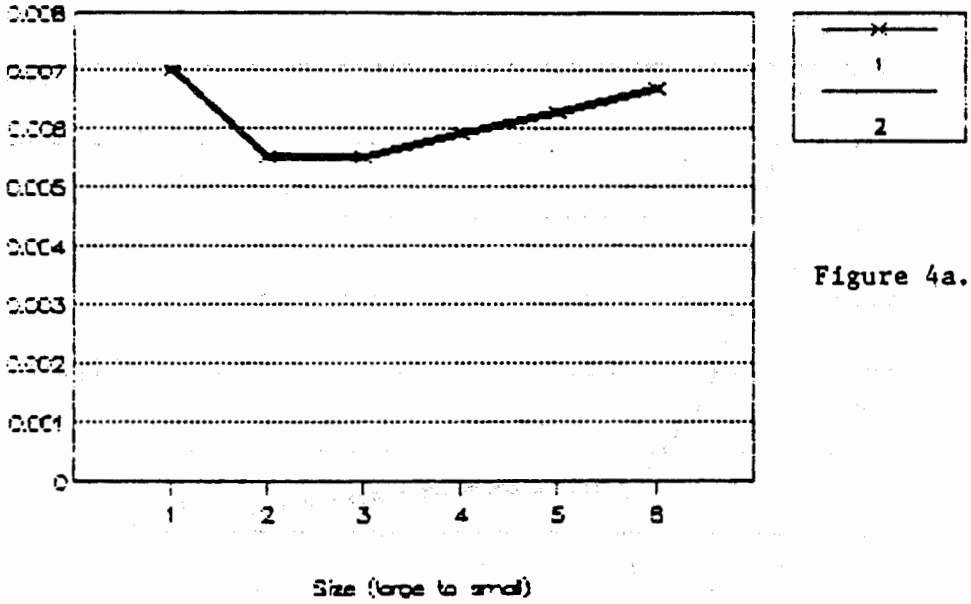

Figure 4a.

White shrimp nat. mortality, area 1&2

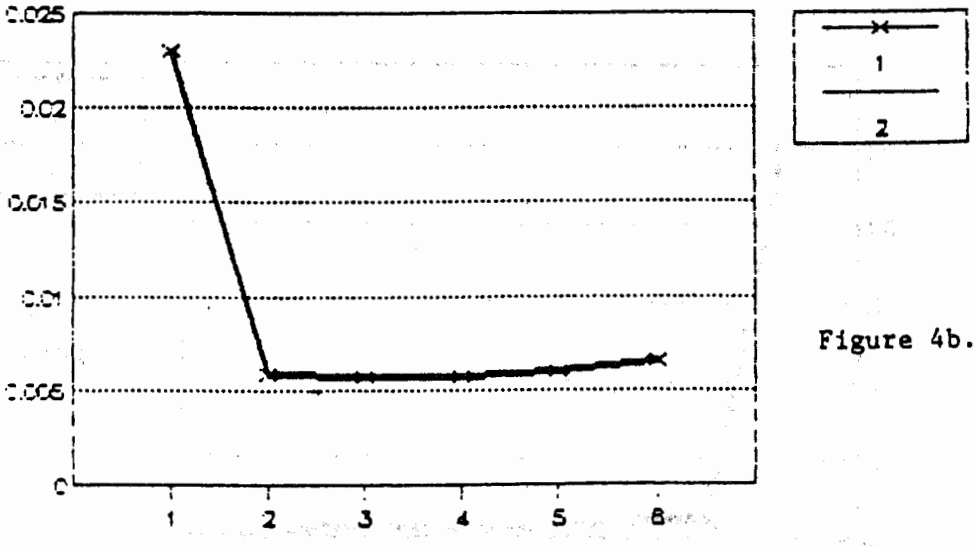

Figure 4b.

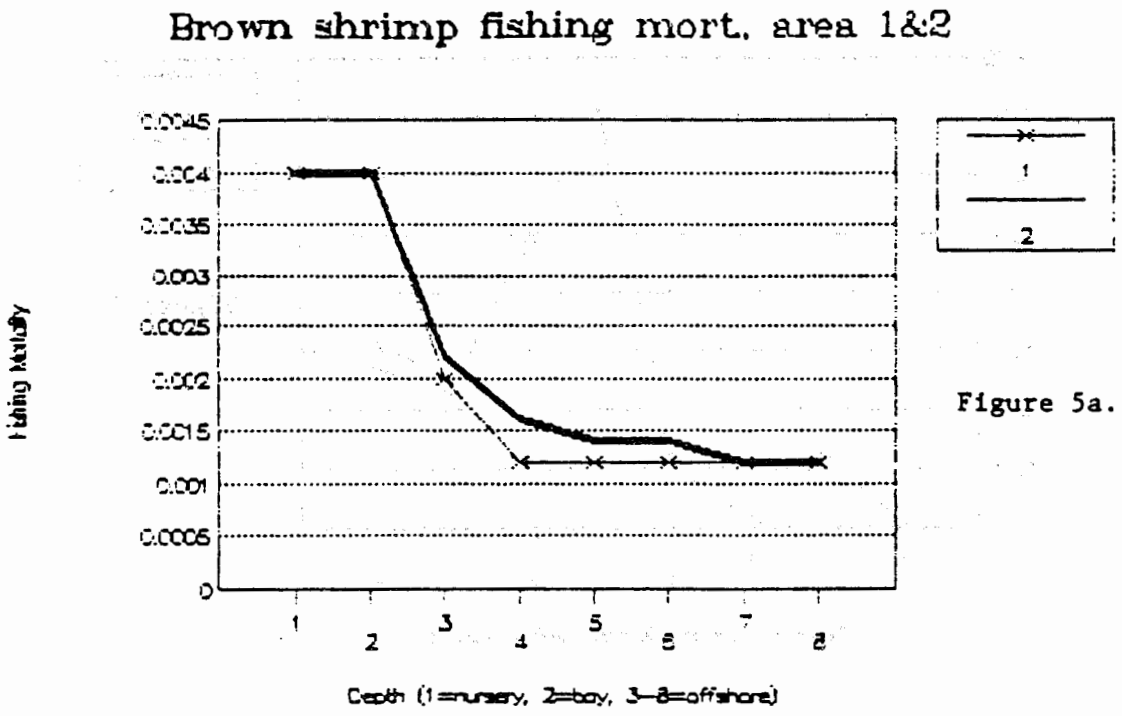

Figure 5a.

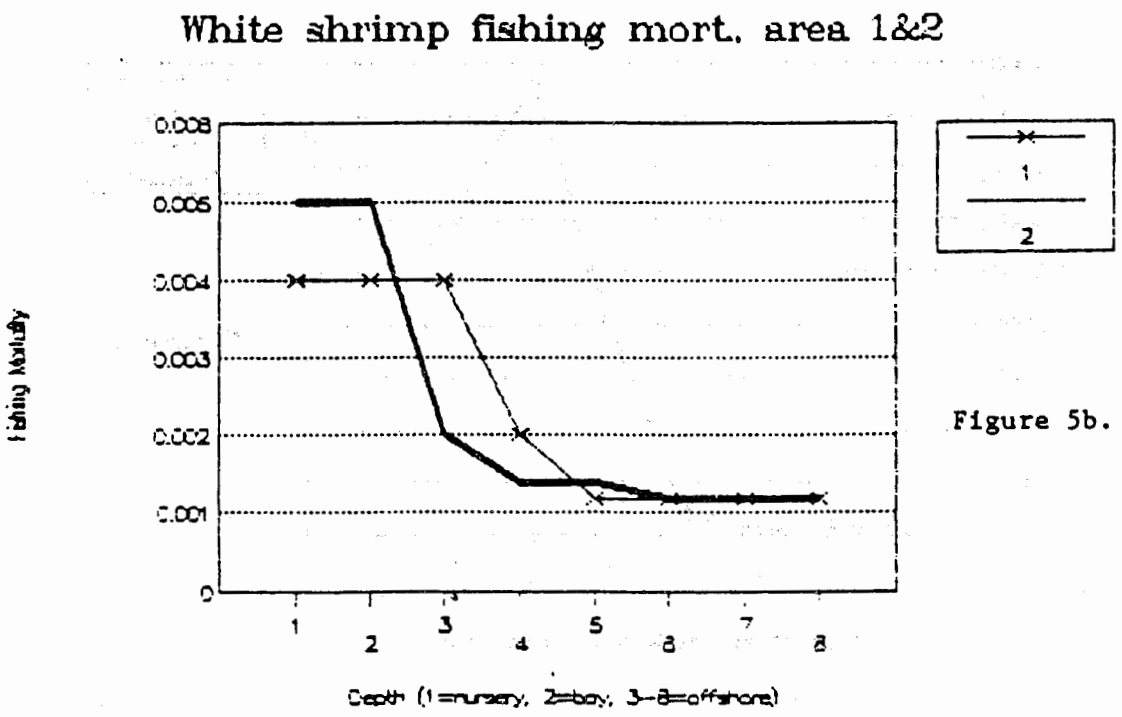

Figure 5b.

Brown shrimp, area 1, 1963–75 average

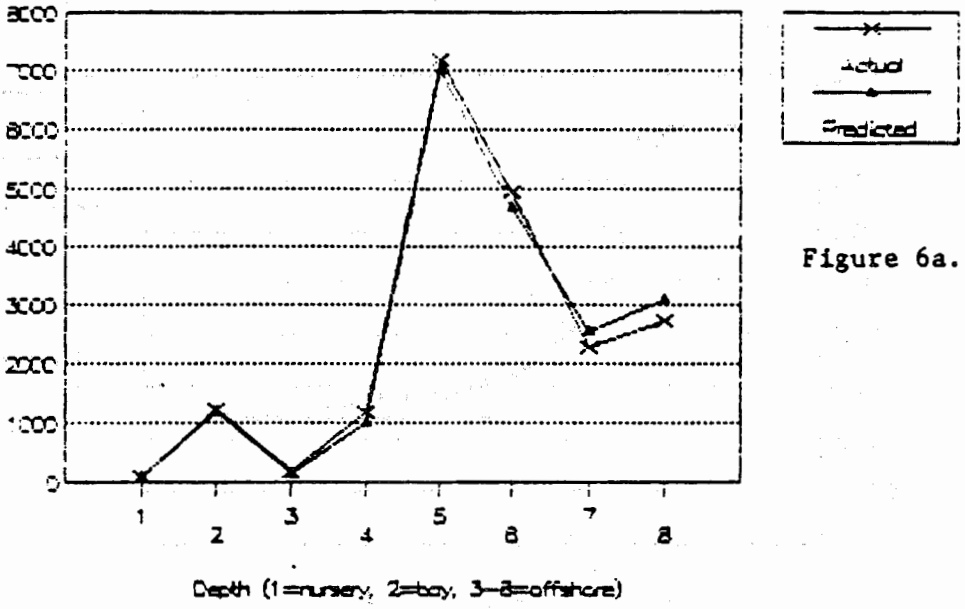

Figure 6a.

Brown shrimp, area 2, 1963–75 average

Figure 6b.

White shrimp, area 1, 1963–75 average

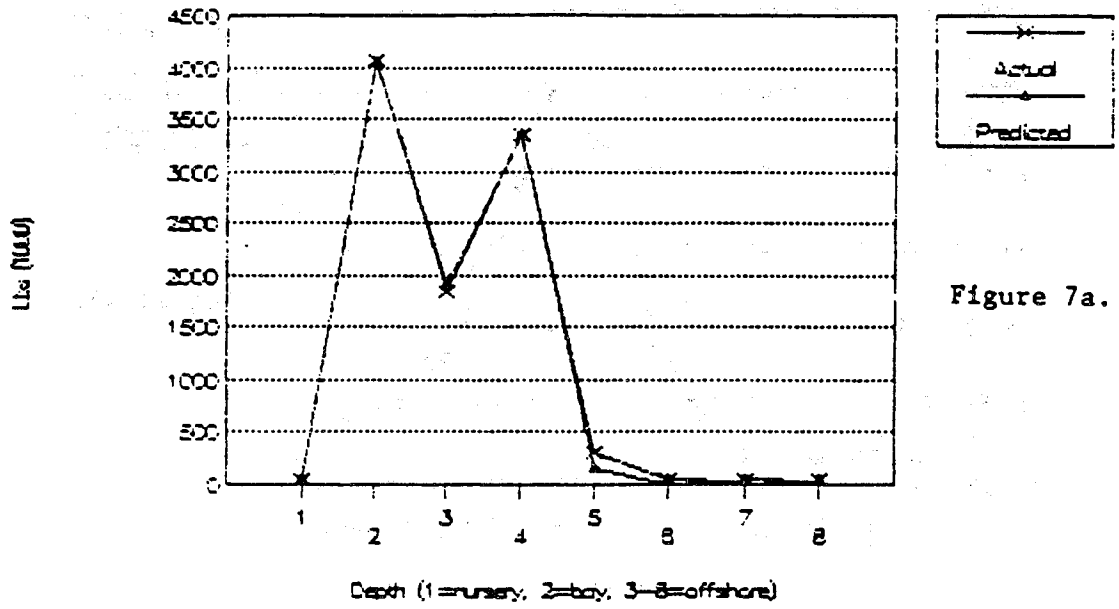

Figure 7a.

White shrimp, area 2, 1963–75 average

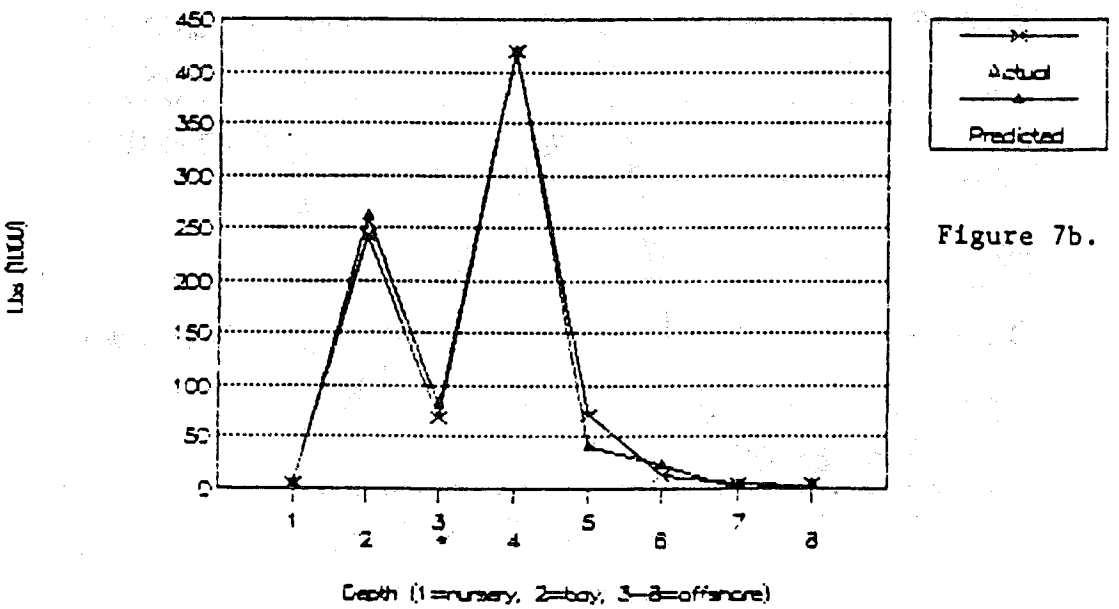

Figure 7b.

Brown shrimp, area 1, 1963–75 average

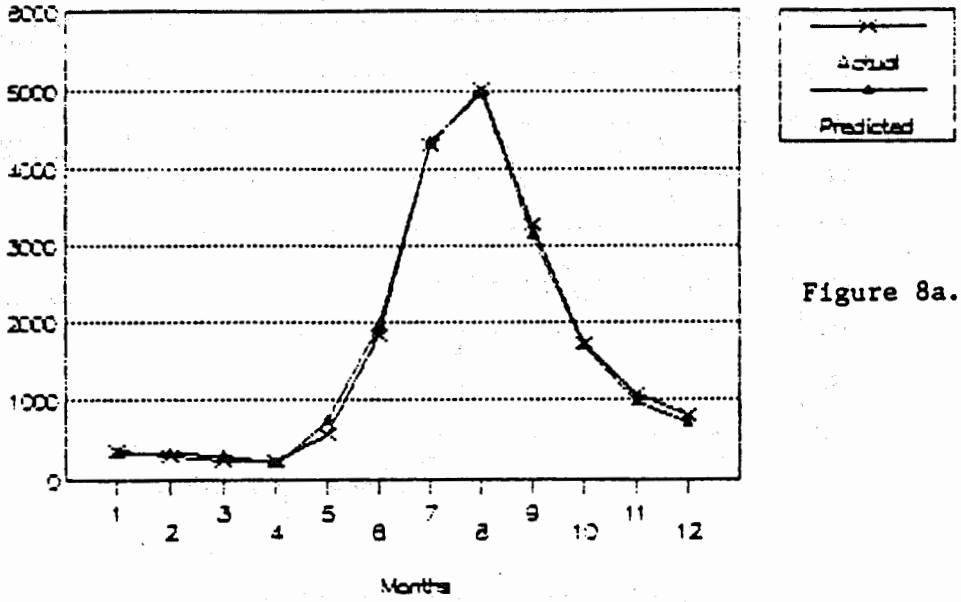

Figure 8a.

Brown shrimp, area 2, 1963–75 average

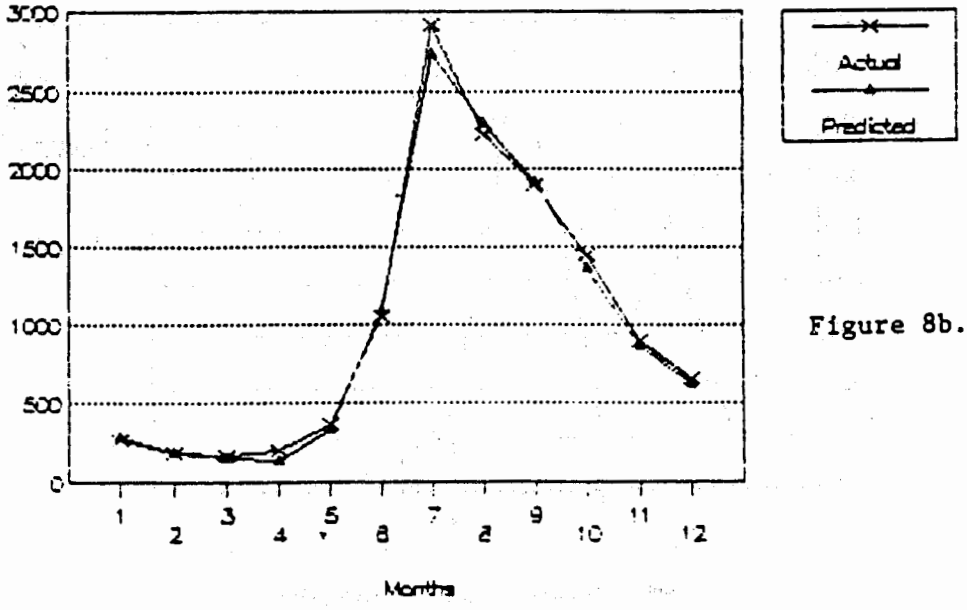

Figure 8b.

White shrimp, area 1, 1963–75 average

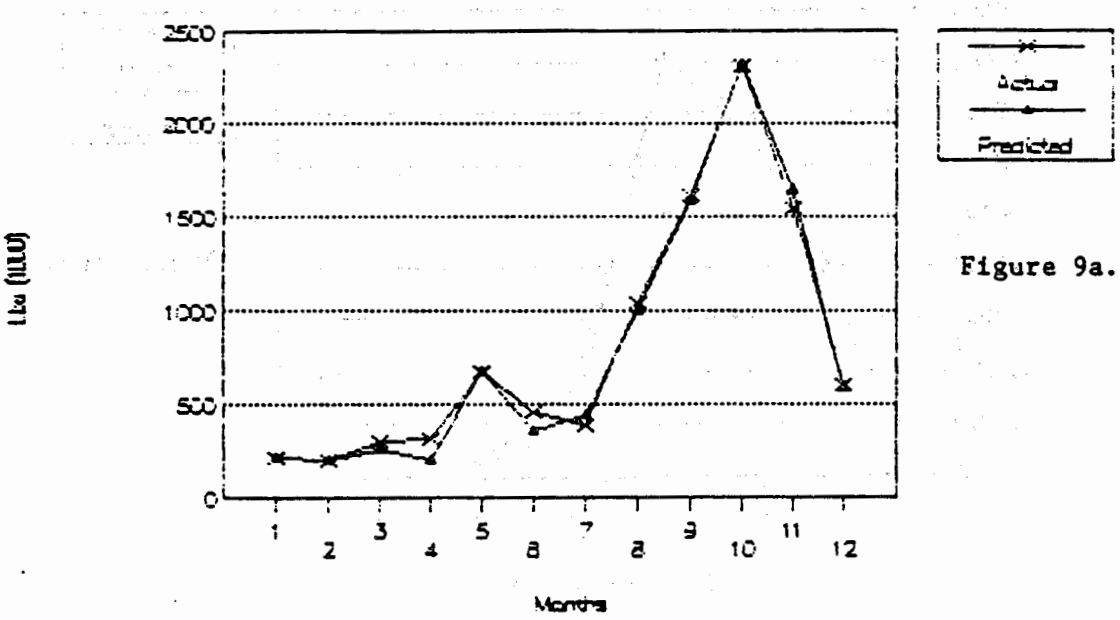

Figure 9a.

White shrimp, area 2, 1963–75 average

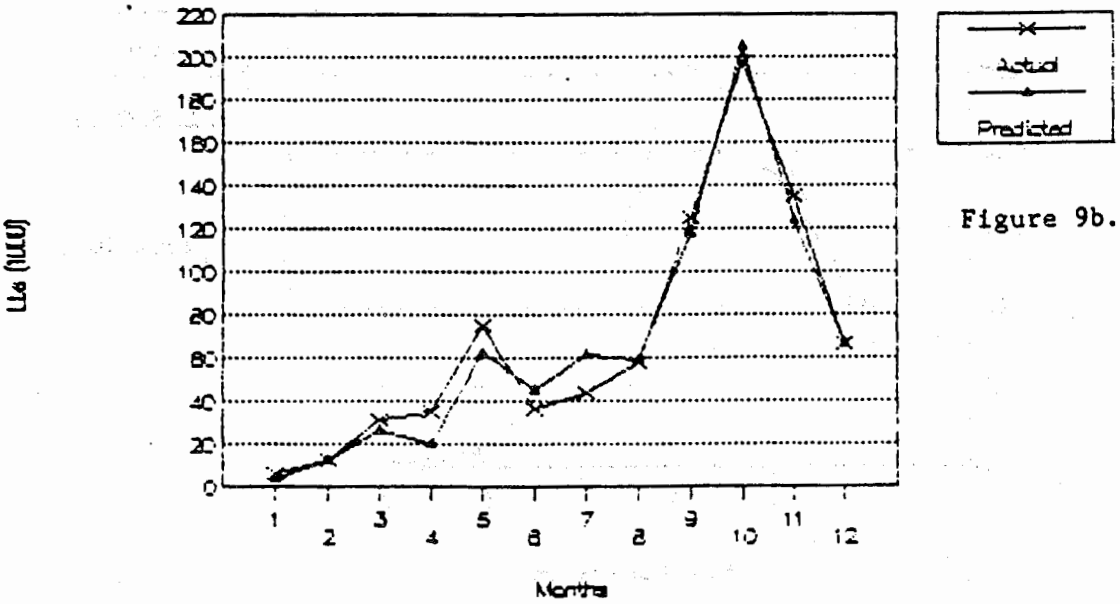

Figure 9b.

Brown shrimp, area 1, 1963–75 average

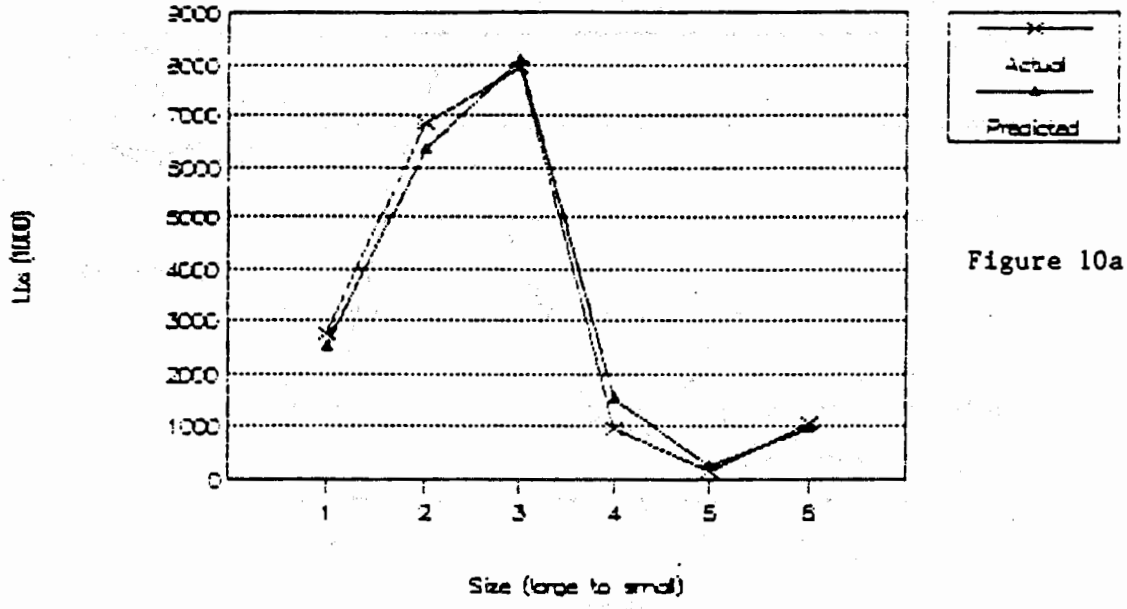

Figure 10a.

Brown shrimp, area 2, 1963–75 average

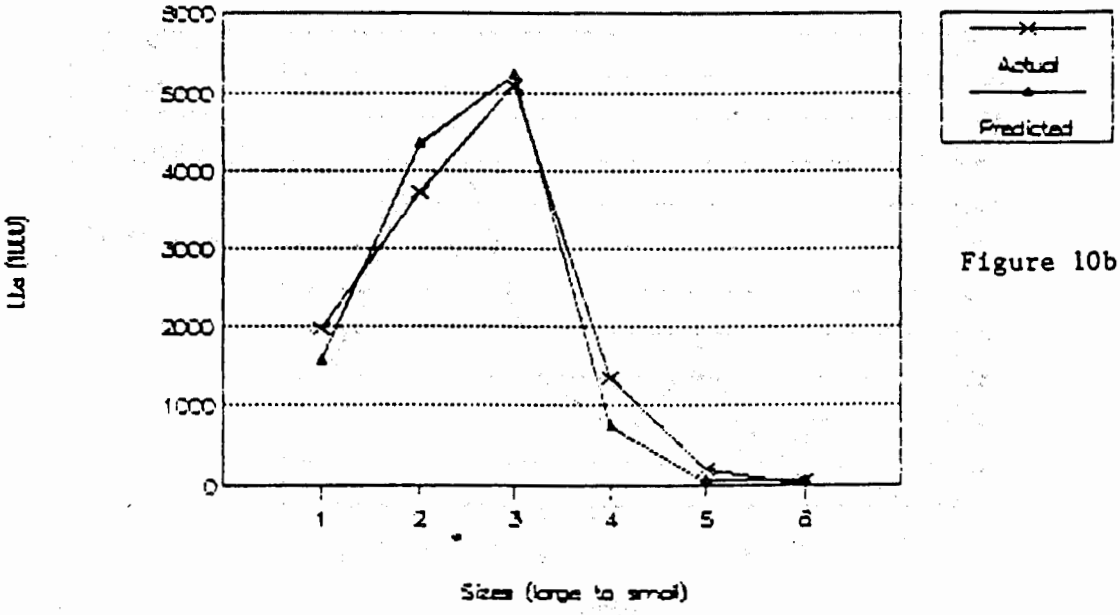

Figure 10b.

White shrimp, area 1, 1963–75 average

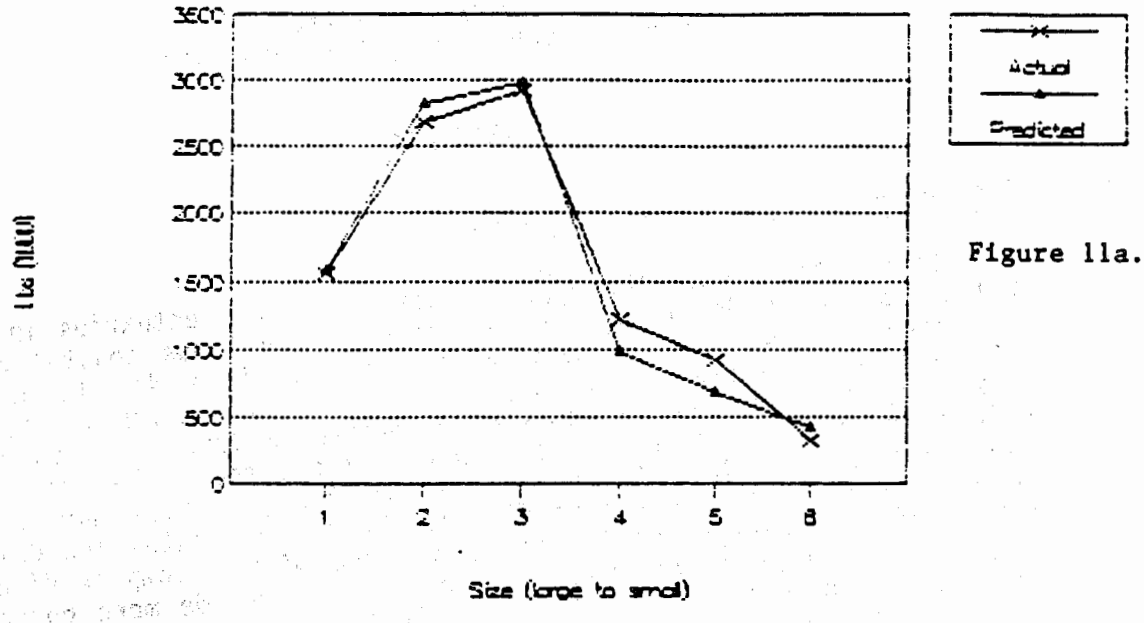

Figure 11a.

White shrimp, area 2, 1963–75 average

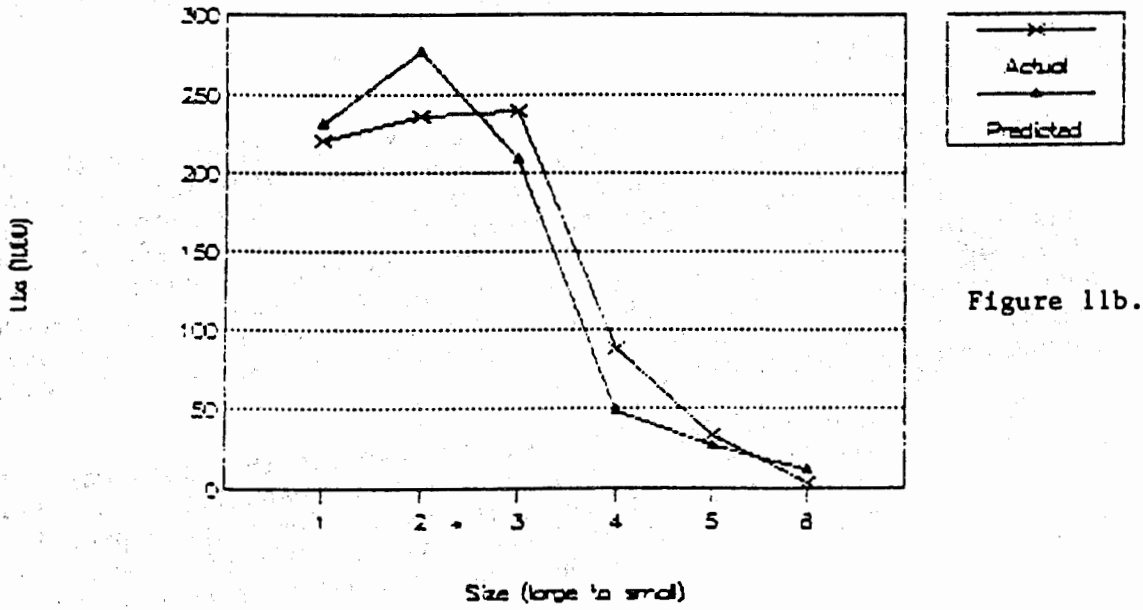

Figure 11b.

Socio-Economic Study of the Inshore Shrimp Fisheries in Galveston Bay, Texas and Calcasieu Lake, Louisiana

Dr. Edward F. Klima
Galveston Laboratory/NOAA-NMFS-SEFC

ABSTRACT

Introduction:

Shrimp fishing in the bays, sounds, lakes and estuaries in Texas and Louisiana is important to the economies in these coastal areas. In recent years, reduced employment opportunities in the coastal communities has increased the importance of inshore shrimping both as a primary and supplemental source of family income. This increased effort in the inshore areas has been reducing the number of shrimp available to migrate offshore and become the potential harvest and revenue of the offshore shrimp fleets. Thus, the States and Gulf of Mexico Fishery Management Council was faced with a complex dilemma. Should the inshore fisherman be restricted to provide more potential revenue for the offshore fleets or should the inshore fishery continue to support an already depressed economy? Unfortunately, few socio-economic data exist with regards to the growing inshore commercial fishery. Without such data, the management decisions made by the Council are likely to be arbitrary and could result in negative impacts on some segments of the local economies.

The goal or objective of this one year project was to collect specific economic and social data about the inshore shrimp fisheries of the Gulf of Mexico. This information will be used to assess and compare the distribution of benefits to the Gulf shrimp fisheries caused by current and proposed regulations.

Summary of Results

Galveston Bay, Texas and Calcasieu Lake, Louisiana were the two sites chosen for the study of the inshore shrimp fisheries. Although these areas are in close proximity to each other, they represent very different natural and human environments and thus, reflect some measure of the considerable socio-economic diversity that characterizes the U.S. Gulf of Mexico coastal communities. Random dock side interviews at each site were conducted with shrimp boat captains. A total of 159 social questionnaires and 526 economic data sheets were completed during the study.

Data obtained from the social survey revealed that much more of the shrimp harvested from Galveston Bay was channelled into the surrounding community than from Calcasieu Lake. Demographic profiles of the interviewed population indicated that in Calcasieu Lake, the number of participants in the fishery has gradually increased within

the last 10 years, in response to declining economic conditions, while growth in the Galveston Bay fishery has occurred only with the last 5 years and can largely be attributed to the influx of Asian immigrants into the area. More of the Galveston Bay inshore fisherman reported impacts from the offshore Texas Closure than did shrimpers from the fishery in Calcasieu Lake.

Data from the economic survey revealed many interesting facts. Only the commercial fishery from Galveston Bay will be discussed here, but information about the bait fishery in Galveston Bay and the trawl and butterfly fisheries in Calcasieu was also obtained during the study.

Although landings per trip were lower on the average during the fall season than the spring season, ex-vessel revenues per trip were approximately the same or greater because larger shrimp were caught during the fall. In the spring, average revenues per trip were $97.00 compared to an average of $150.00 in the fall. Operating costs per trip for fuel, ice, food and lost gear or vessel repair ranged from $5.00 to $513.00. Fuel accounted for 74%, ice for 8% and food for 18% of the normal operating expenses (i.e., excluding repair costs). Net revenues for all trips ranged from $-263.00 to $1,907.00, with an average of $64.00.

SHRIMP (Part 2) SESSION SUMMARY OF COMMENTS

o The butterfly shrimp net is a wing net made of webbing on a rectangular frame that can be lowered into the water. These nets are generally used at night on outgoing tides.

o The amount of unreported shrimp landings in Louisiana could be over 30 million pounds per year.

o The McCardle model used by Wade Griffin maximizes producer and consumer surplus.

A Video Training Program for Fishing Tournament Directors and Managers to Facilitate Safety, Resource Awareness, and Success in Fishing Tournaments

Marion L. Clarke

ABSTRACT

Objective:

To produce a series of video training tapes that will provide educational opportunities for tournament organizers, promoters, and sponsors which will stimulate conservation, management and wise use of Gulf fishery resources by marine recreational fishermen.

Summary of Work:

The presentations of fishing tournament experts were taped during the 1986 Fishing Tournament Directors Conference. This video was made in broadcast quality 3/4 inch format for future use. This project has synthesized, compiled, and edited this video into a format usable in the Fishing Tournament training video tapes. This video is supplemented by taping sessions at fishing tournaments to provide footage to demonstrate the points being made by the speakers.

After organizing available resources, the first step was to select a qualified studio to handle the production of the training tapes. Bids and statements of qualification were solicited. Four bids were received and evaluated. Broadcast Quality of Miami was identified as most qualified and selected to expedite the project.

The 3/4 inch video from the conference was copied to half inch VHS format and digitized. The tapes were reviewed by project participants (Chuck Helmly, Marion Clarke, Don Pybas, and Broadcast Quality staff) and comments and suggestions were combined to establish the major emphasis of each training tape. The five video training tapes are: 1. So You Want to Hold a Fishing Tournament: What Do You Need to Know? (30 minutes); 2. Securing Sponsors and Promoting a Fishing Tournament (12-15 minutes); 3. Insurance, Safety, Liability, and Credibility in Conducting A Fishing Tournament (12-15 minutes); 4. Judging the Catch! (12-15 minutes); and 5. Alternative Formats for Fishing Tournaments (12-15 minutes).

An outline of the tournament conference tapes and the projected content of the training tapes was constructed from the concepts of the resources available. A series of meetings (3) have been held between the studio staff and the project advisory group. These meetings provided for an opportunity to review current work and project next steps needed to fill voids in available resources. This group and the

project monitor, Ron Schmied, NMFS, were very helpful in guiding the development and implementation of the project.

Fishing tournaments were contacted to collect any existing video of tournaments that they were willing to share with the project. Several good sources were identified and the video obtained. The video was converted to VHS for convenience of review for project participants.

On location video taping at the South Florida Fishing Classic (June 24 & 25, 1988) was completed. Additional fishing tournaments will be taped during the Fall of 1988 to obtain video needed to complete the training tapes. Fishing tournaments targeted for future video shooting will not enable the project to be completed on the scheduled completion date of November 1, 1988. A no cost eight month extension for completion of the project has been requested and tentatively approved by NMFS. The selection of a contractor delayed the actual start of the project and the scheduling of tournaments video work complicated the completion of the project in the original time frame of the grant. The training videos will be available for distribution by June 1, 1989.

An Analysis of Potential Regulatory Changes on the Economic Structure of the Eastern Gulf of Mexico Finfish Industry Centered in Florida

Robert L. Degner and Charles M. Adams
University of Florida

ABSTRACT

Introduction:

The basic objective is to determine the market structure and current economic status of the Florida commercial mullet fishery and explore the economic interrelationships with other estuarine species in the production and marketing systems so that potential regulatory changes can be evaluated.

The two-year project is nearing completion and is scheduled to terminate September 30, 1988. The work is being conducted solely by researchers at the University of Florida.

Summary of Results:

Long-term and seasonal production and marketing trends for the major estuarine species--i.e., mullet, red drum and seatrout--have been analyzed using secondary data. Detailed seasonal landings patterns and degree of joint production of these species have been derived from 24 months of Trip Ticket data obtained from the Florida Department of Natural Resources (DNR) for all major mullet-producing counties of the state. A survey of 67 Florida fishhouses and 57 secondary seafood handlers has provided estimates of quantities of various mullet product forms produced, descriptions of their respective marketing channels, and the degree of horizontal and vertical integration. Industry perceptions regarding current and proposed Florida fishery regulations have also been addressed. Entry/exit analyses of primary handlers and processors of mullet indicate that the industry is relatively stable and that few barriers to entry exist on an industry-wide basis. Recently obtained Trip Ticket data for 1987 will provide a measure of industry concentration and estimates of fishermen's gross income profiles generated by mullet, red drum and seatrout. These Trip Ticket data will also be used to analyze the first-round economic impacts resulting from alternative management scenarios on fishermen and fishhouses.

Educational Tools for Marine Recreational Fishermen to Promote Wise Use and Conservation of Gulf Fishery Resources

Edward E. Burgess
National Marine Fisheries Service

ABSTRACT

Introduction:

The objectives of this project are:

1. Inform anglers of federal saltwater sport fishing regulations and to encourage angler support for and compliance with federal fishery conservation efforts.

2. Educate saltwater anglers on proper catch and release techniques.

Summary of Results:

A brochure describing federal saltwater sport fishing regulations and contact points for obtaining state regulatory information has been prepared.

The filming of a high quality 28-minute video on proper catch and release techniques has been completed. Filming focused on capturing a significant number of representative fish species and then releasing them carefully using a variety of techniques. In the process, the correct method for holding and handling the different catches were shown.

Those efforts were supplemented with footage on various types of habitat including mangroves, flats, bulkheading, docks, and bridge wingwalls. Various types of boats were targeted and clips of wildlife captured the camera's attention whenever possible.

The following fish species were filmed:

Amberjack	Sailfish	Barracuda
King Mackerel	Seatrout	Little Tunny
Mutton Snapper	Redfish	Ocean Tally
Ladyfish	Catfish	Shark
Jack Crevalle	Dolphin	Blue Runner

There are tagging sequences on sailfish and redfish.

Once the final script is approved the film will be edited and the video completed. At that time a brochure depicting catch and release techniques will be printed and distributed.

Steps to Evaluate the Management Efficacy of Marine Recreational Fishing Statistics

Edward E. Burgess
National Marine Fisheries Service

ABSTRACT

Introduction:

This project provides enhancement to the National Marine Recreational Fishing Statistics Survey (MRFSS) to make it more responsive to the needs of fishery managers. In this regard, recreational fishery statistics are used in management for three diverse tasks. It is extremely important to make the distinction between these tasks because each requires different emphasis and different levels of precision in order to be achieved. The tasks are:

1. Evaluation of the status of individual stocks and determination of allowable biological catches which may be removed annually.

2. Monitoring of the level of catch such that within-season adjustments to regulations can be made (e.g., quota monitoring).

3. Accumulation of user-statistics and the characteristics of the users to guide allocation decisions.

The enhancement to the recreational fishing survey to meet the needs of the management tasks involve increasing the sampling rate and decreasing the sampling period and processing time.

Summary of Results:

The MRFSS is conducted under contract and those contracts have been modified using MARFIN funds to increase the sampling rate. In addition, sampling periods and data processing has been modified to allow for monthly estimates instead of bi-monthly estimates. The actual enhanced data collection under this project began July 1, 1988 and although July data have been edited and summarized, it is too early to measure all the benefits from this project.

Electronic Data Collection and Entry For Field Sampling of Fisheries

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ABSTRACT

Objective

To demonstrate through use in an established survey the increased efficiency, accuracy, and cost effectiveness of field sampling with modern electronic devices that weigh and measure fish, record the data electronically, and transfer it directly to computers.

Timetable

Equipment acquisition and deployment - 1 year.

Demonstration - Continuing at no further cost.

Approach

Off the shelf, inexpensive devices for electronically measuring (by Limnoterra Ltd. and others) and weighing (by Mettler and others) fish are available. These devices directly enter data on micro chips. In return the data can be transmitted via tape or disc directly to a computer for summary and analysis.

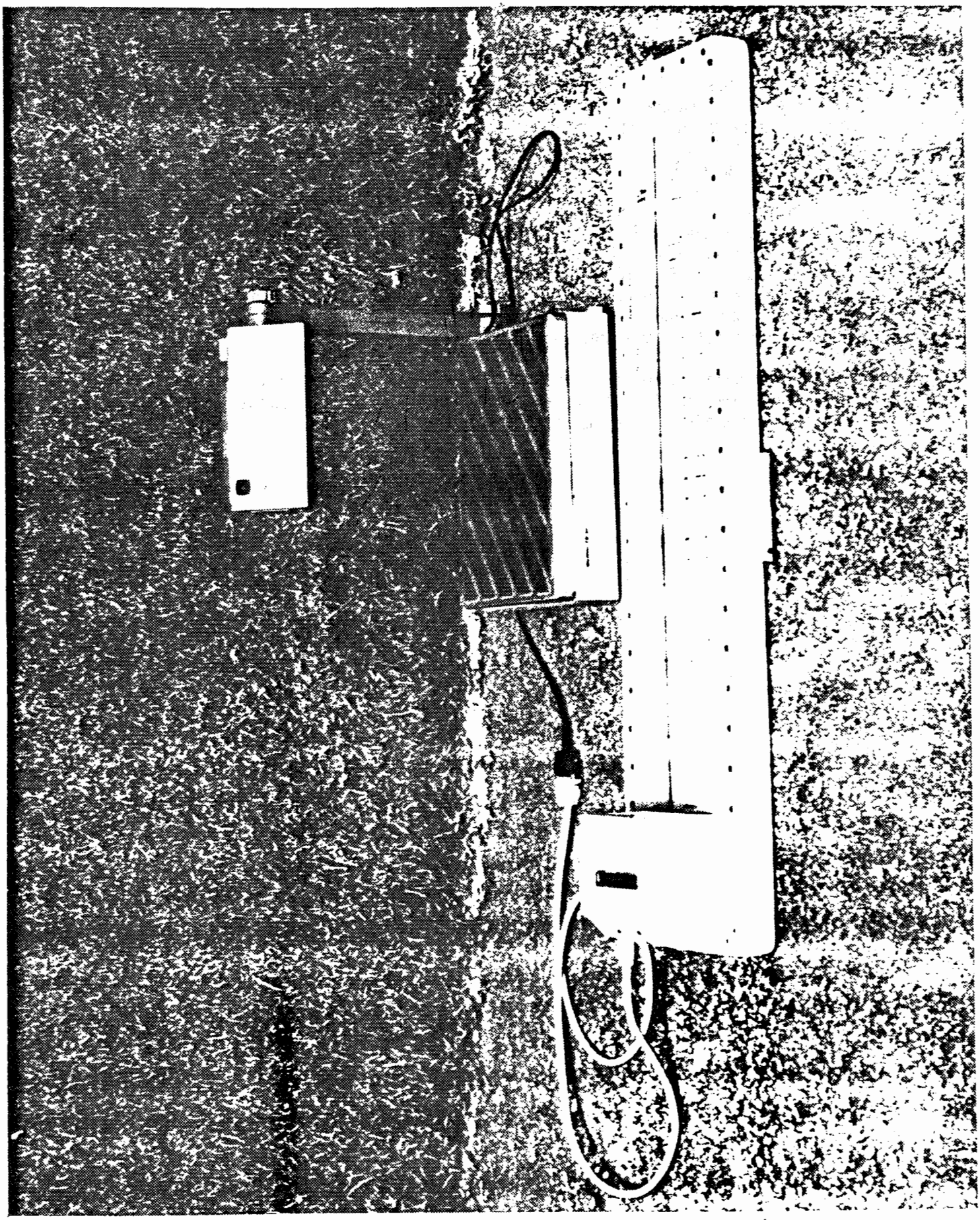
We have equipped field personnel of the Gulf of Mexico Headboat Survey with electronic equipment to demonstrate both the effectiveness of the gear and the ease of transition from the manual mode to a totally electronic system. The Gulf of Mexico headboat survey provides an ideal proving ground for the system because it offers virtually every problem that fishery surveys encounter; e. g., wide geographic spread, diverse species composition, rigorous work settings (at dockside and occasionally at sea), large volume of data, need for rapid data reporting, many field technicians, need for much transportation of equipment, etc. Successful implementation in the headboat survey provides an excellent example of the system's effectiveness.

Field collection of fisheries data in the southeast is primitive compared to the technology available. The current system, of paper, pencil, mail, data entry contract, etc., is expensive, slow, and error fraught. We cannot afford to continue the old practices in major surveys when modern rugged equipment which works is available at

modest prices. This equipment eliminates the need for most data editing, data entry clerks, negotiation of data entry contracts, most error corrections and numerous other expensive activities that are totally peripheral to the main circuit of data collection-data summary-data analysis.

Samplers of headboat catches located at St. Petersburg, Pensacola, Empire, Port Fourchon, Galveston, Port Aransas and Port Isabel were equipped with Mettler TE30/J balances by November 1987 and Limnoterra Ltd. FMB IV measuring boards by August 1988. The balances are extremely rugged and require only minor precautions to prevent heat and water damage. The boards have functioned well but require some protection from direct midday sun.

Size data on over 20,000 fish per year are now transmitted from Gulf samplers to the Beaufort Laboratory on mini-cassette tapes and entered directly into computer storage.



GENERAL SESSION SUMMARY OF COMMENTS

Electronic Data Collection

o The cost of scale, board, and box with micro-cassette is about $6,000.00.

Finfish Industry

o The numer of mullet firms is fairly stable, but there is a trend to smaller sized firms.