

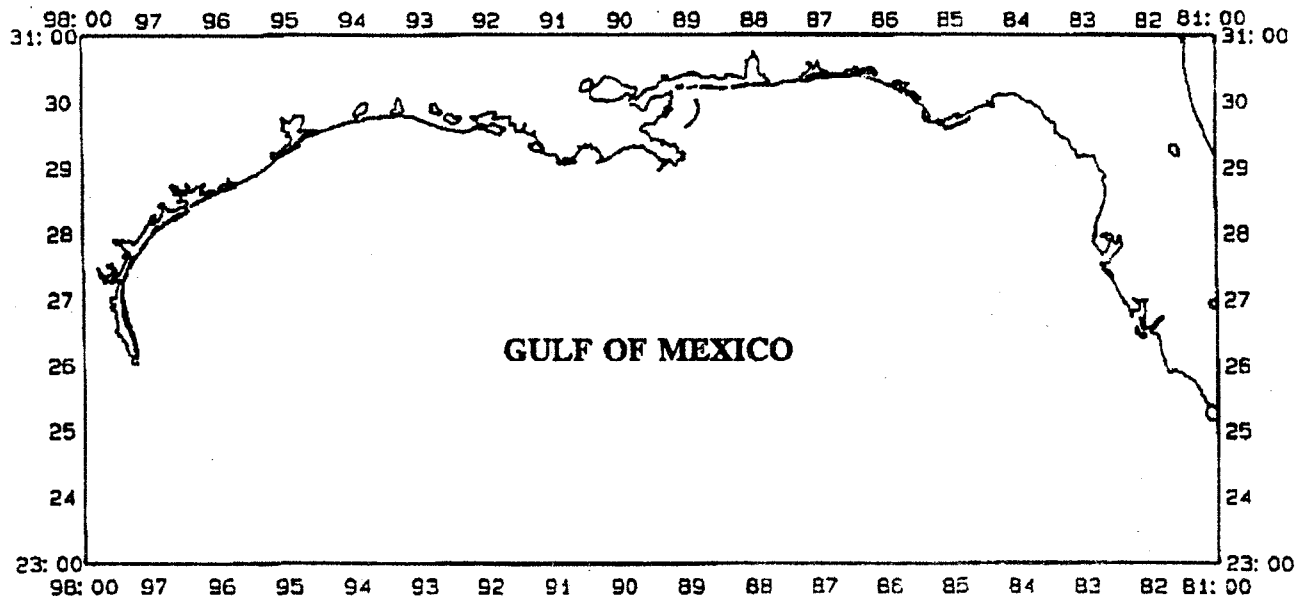
CRUISE RESULTS

Small Pelagics Survey

NOAA Ship *CHAPMAN* Cruise 92-04 (49)

07/08 - 08/19/92

09/23-30/92



U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Mississippi Laboratories
Pascagoula Facility
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Pascagoula, MS 39568-1207

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INTRODUCTION

The NOAA Ship CHAPMAN was scheduled to depart Pascagoula, Mississippi on July 8, 1992 to conduct an experiment to measure the acoustics backscattering cross-sections (σ_{bs}) of live individual species of small pelagics held in a cage, and to conduct a fisheries acoustic/trawl survey for small pelagics in the north central Gulf of Mexico. Personnel from the National Marine Fisheries Service, and one student cooperater participated. A total of 39 sea days were scheduled. A fourth Leg of 8 sea days was added due to lost work-days during the July-August period.

OBJECTIVES

1. Estimate the backscattering cross-section of small pelagic and other fish species held in a cage.
2. Estimate the abundance, distribution, and average target strength in situ of small pelagic species in the north-central Gulf of Mexico.
3. Collect length frequency data of small pelagic species captured in trawls.
4. Collect environmental data at all trawl locations.
5. Determine diel differences in relative abundance and vertical distribution of small pelagic species.
6. Collect small pelagic fish specimens.

METHODS

Gear - The fisheries acoustic system included a scientific echo sounder, two dual-beam transducers (38 kHz, 120 kHz), tow and deck cable, two chart recorders, two tape interfaces, two Digital Audio Tape decks and an Echo Signal Processor (ESP). A cage to hold a live fish under a transducer was borrowed from the Florida Department of Natural Resources, St. Petersburg, Florida. The cage frame was constructed of four stainless steel hoops, 2 meters in diameter. The hoops were joined together with

2-m sections of steel tube. The entire cage frame was 6 meters long when assembled. A cage, constructed of monofilament webbing, was attached between the last two hoops. A velcro strip was sewn into one side of the cage to allow for easy placement and retrieval of fish.

Gear employed to capture fish included a 90-ft bottom trawl, a 7-ft cast net and a lift net. The 90-ft trawl measured 90 feet on the headrope and 107 feet on the footrope. Its mesh size reduced from 8-inch stretch mesh in the wings and leading meshes of the trawl body, to 2-inch mesh just ahead of the 1.25-inch mesh codend. The codend contained a 7/8-inch mesh liner. A 1.25-in mesh fish funnel was attached at the start of the 2-inch webbing of the trawl body. The headrope was floated with twenty-four 10-inch CIES floats with 17 pounds of flotation each. The ground gear consisted of 9/16-inch cable with 3-inch rubber cookies suspended by 12-inch drop chains from the footrope. The lift net was constructed of 1.25 inch stretch mesh and measured 10 ft by 10 ft at its opening. The lift net was fished at night using an underwater lamp with rheostat to attract fish. The cast net was used at night to capture fish on the surface that were attracted by the ship's deck lights. Fish were kept alive in a live-tank (5 ft by 4 ft by 4 ft).

A 120 kHz transducer was bolted at the top of the cage. A 38 kHz transducer was suspended under the 120 kHz transducer using stainless steel clips, and was swapped in and out when frequency was changed. The top of the cage was 3.5 - 3.6 meters from the face of transducer and was 1.8 meters deep. A single fish was placed in the cage at a time. The echo sounder transmitter source level was set a 0 dB with a ping rate of 3.33 pings/second and a pulse width of 0.3 ms. Receiver gains were either set at either -6 dB or 0 dB for both frequencies.

RESULTS

Cruise 92-04 was designed to obtain backscattering cross-section data at 120 kHz and 38 kHz frequencies on species of small pelagics in the Gulf of Mexico, and to determine the summer distribution and abundance of small pelagics and scattering layers. The estimates of acoustic backscattering cross-section from live fish held in a cage are needed since very few in situ backscattering cross-section estimates have been made on fish near the sea bottom during previous surveys (CHAPMAN Cruises 90-02, 90-08).

The acoustic system was calibrated before and after the cruise in a large tank of freshwater located at Stennis Space Center. Three different 120 kHz transducers were employed during the cruise. During Leg 1, a borrowed 120 dual-beam transducer was used (SIN 102-89-027). The 120 kHz transducer (SIN 33-120-718-004)frequency failed during CHAPMAN cruise 92-03, and was sent to BioSonics for repair. A second 120 kHz transducer was procured (SIN 33-120-718-026). During Legs 2 and 3, two 120 dual-beam transducers were used (SIN 33-120-718-004 and SIN 33-120-718-026). CHAPMAN cruise 92-04 was originally scheduled for

39 sea-days comprised of three 13-day Legs. Installation of a new sewage treatment system prior to the cruise departure date forced the cruise to be rescheduled for 37 sea-days with Legs of 10, 13 and 14 days. Problems with the new sewage treatment plant, the ship's air conditioner and with the fishery acoustic system, however, resulted in a reduction of sea-days to 22, with only 16.5 actual working-days. A fourth 8-day Leg was added in September to supplement TS cage experiment data.

All objectives for the Small Pelagics cruise were not met due to the mechanical failure of the NOAA Ship CHAPMAN (17 working-days lost) and the failure of the fishery acoustic system (4.5 working-days lost). Some acoustic backscattering data were collected, however, no survey was conducted due to the lost work days at sea. One working-day was lost due to severe weather during Leg 4.

Fish were captured from three areas in the Gulf: 1) south of Gulf Shores Alabama in a depth of 22 to 38 fathoms, just off of Panama City, Florida in depths of 7 to 12 fathoms, and along the eastern edge of Desoto Canyon in depths of 35 to 50 fathoms. The cage was set up in Pensacola Bay, Florida, St. Andrews Bay, Florida or at sea south of Gulf Shores, Alabama. The 90-ft trawl was used 32 times, the cast net twice and the lift net once. A single midwater tow was made with the 90-ft trawl. A CTD was deployed at 31 stations. Samples for surface chlorophyll were taken at 8 stations, and surface, midwater, and bottom DO measurements were made at 11 stations.

TS was measured on 17 different species (Table 1). The average duration in the cage to obtain 100 accepted single echos was 1 hour. No data were obtained on round herring and Atlantic thread herring. Round herring were captured, but did not survive.

Table 1. Number of fish measured during the target strength cage experiment.

NUMBER OF FISH MEASURED		
SPECIES	120 kHz	38 kHz
Butterfish	7	7
Rough scad	0	6
Round scad	18	19
Bigeye scad	7	6
Chub mackerel	12	6
Spanish sardine	10	10
Scaled sardine	0	7
Blue runner	8	7
Longspine porgy	6	4
Croaker	0	2
Spot	3	3
Pinfish	5	6
Atlantic bumper	2	3
Vermilion snapper	1	0
Spotfin butterflyfish	1	0
Red snapper	1	0
Bullet tuna	0	1

CRUISE PARTICIPANTS (NOAA only):

Leg 1: (7/16/92 - 7/18/92); 3 sea-days.

Chris Gledhill	Field Party Chief	NMFS, Pascagoula, MS
Mark Grace	Fishery Biologist	NMFS, Pascagoula, MS
Ken Wilkinson	Elec. Tech.	NMFS, Stennis SC, MS

Leg 2: (7/25/92 - 8/01/92); 8 sea-days.

Chris Gledhill	Field Party Chief	NMFS, Pascagoula, MS
Cliff Harper	Elec. Tech.	NMFS, Stennis SC, MS

Leg 3: (8/06/92 - 8/19/92); 11 sea-days.

Chris Gledhill	Field Party Chief	NMFS, Pascagoula, MS
Gladys Reese	Fishery Biologist	NMFS, Pascagoula, MS
Perry Thompson	Fishery Biologist	NMFS, Pascagoula, MS
Cliff Harper	Elec. Tech.	NMFS, Stennis SC, MS

Leg 4: (9/23/92 - 9/30/92); 3 sea-days.

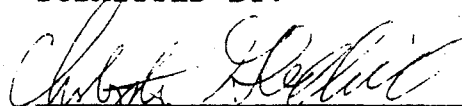
Chris Gledhill	Field Party Chief	NMFS, Pascagoula, MS
Jim Harris	Biological Tech.	NMFS, Pascagoula, MS
Ken Wilkinson	Elec. Tech.	NMFS, Stennis SC, MS

CRUISE PARTICIPANTS (Foreign):


Leg 2: (7/25/92 - 8/01/92); 8 sea-days.

Oriville Phillips	Student (British)	U. Virgin Islands, St. Thomas, USVI
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SUBMITTED BY:



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Field Party Chief



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Mississippi Laboratories

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Brad Brown
Director SEFC

DATE: 7 26 92