I. A Brief Summary of Early Exploratory and Fishery-Independent Caribbean Surveys Conducted by NMFS Pascagoula

Walter Ingram, NMFS Pascagoula

II. **How is it funded, who administers it?** NMFS Pascagoula

III. **Why was the survey origially designed?** To explore possible fishery resources in the US Caribbean.

IV. **What are/were the intended outcomes/objectives?** See table below

V. **Describe the temporal and spatial coverage of the survey**

   a. **Show the geographic coverage of the survey:** See table and maps below
   b. **How often is the survey conducted?** Annually, but not necessarily during the same season each year.
   c. **Is it seasonal?** No

VI. **Describe the underlying experimental design:** See table below

VII. **Describe the methodology and gear:** See table below

VIII. **Describe the outputs of the survey:** Beginning in 1979 the data are digitally available. Most datasets contain catch and length data with gear type, location, and limited environmental/habitat information.

IX. **Self-Evaluation of pros and cons of Survey**

   a. **What suite of species does this survey target?** These surveys targeted multiple species. The reef associated surveys have collected red hind, while the deeper surveys collect members of the deep water snapper group.
   b. **What are the gear/method biases?** There are numerous gear and method biases, due to the fact that each survey has its own specific objectives (see table below).
   c. **What are the temporal/spatial limitations?** Due to the fact that each survey has its own specific objectives (see table below), there is no consistent temporal/spatial sampling over the time series. Also, in all surveys listed below the density of sampling effort is low compared to the area of the US Caribbean.
   d. **Is this survey expected to continue into the future?** No
   e. **It is relatively expensive/inexpensive, logistically difficult/easy?** It is expensive and logistically difficult to conduct NOAA "white boat" surveys.

X. **Self-Evaluation of utility of survey for generating information for stock assessment**

   a. **Spatial/Temporal coverage:** These data are of limited utility, due to the lack of consistent temporal/spatial sampling over the time series.
   b. **Data generated:** CPUE data are of very limited utility, and length data may be of some utility for certain species.

XI. **Provide any other information that may be relevant to this discussion:** N/A

XII. **Provide most relevant documentation:** All cruise reports are attached.

Table: Summary of Early Exploratory and Fishery-Independent Caribbean Surveys Conducted by NMFS Pascagoula.

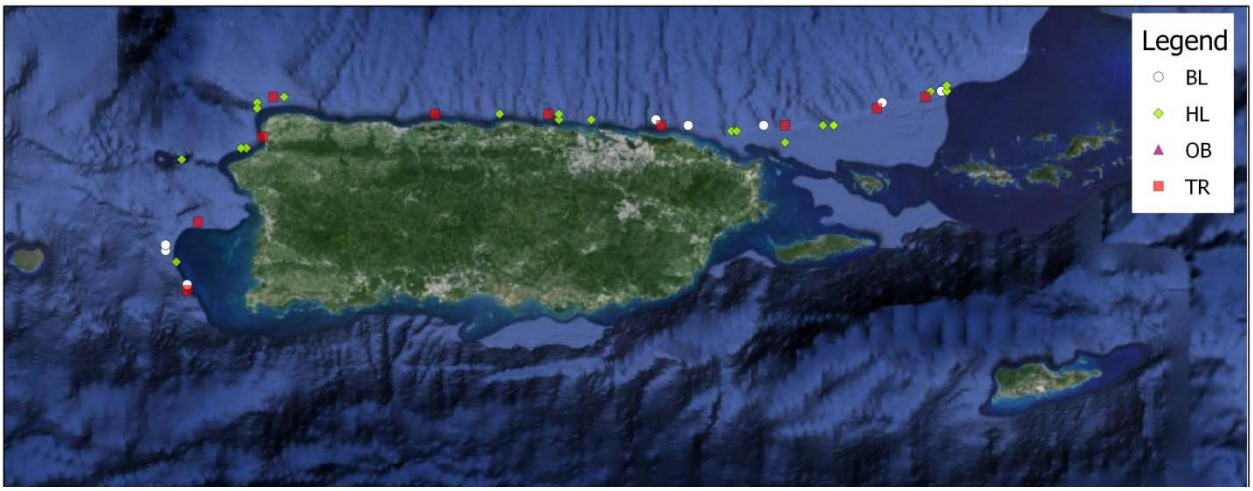
Vessel and Cruise Number	Year	Survey Name	Spatial Coverage	Administered By	Survey Objectives	Temporal Coverage	Depth Range	Number of Stations	Survey Design Methodology and Gear	Data Outputs	Pros and Cons	Utility for Stock Assessment
Oregon 62	1959	EXPLORATORY SHRIMP TRAWLING CRUISE	Puerto Rico and the Virgin Islands	USDOI, Fish and Wildlife Service, Bureau of Commercial Fisheries, Pascagoula, MS	1) To evaluate the shrimp trawling potential of the area around Puerto Rico and the Virgin Islands.	09/16/1959-10/17/1959	27-823 m	72	Depth recorder used to look for smooth bottom then trawl with shrimp net.	?	No formal survey design	?
Silver Bay 50	1963	EXPLORATORY FISHING TRIP AND FAUNAL SURVEY	From the East Coast of Florida to Mayaguez, Puerto Rico	USDOI, Fish and Wildlife Service, Bureau of Commercial Fisheries, Pascagoula, MS	1) To fill a serious gap in knowledge of the resources of the western Atlantic by performing a preliminary overall survey of the fauna of waters of the lower Bahamas and off the north coast of Hispaniola. 2) To conduct a brief re-survey of the scallop potential on the Florida east coast scallop bed.	09/25/1963-10/26/1963	27-2740 m	103	Dredges, trawls, longlines	?	No formal survey design	?
Oregon 107	1966	EXPLORATORY FISHING AND GEAR TESTING CRUISE	In the Lesser Antilles Between Puerto Rico and Trinidad	USDOI, Fish and Wildlife Service, Bureau of Commercial Fisheries, Pascagoula, MS	1) To initiate field studies on the application of fish pumps to harvest anchovies, herrings, and sardine-like fishes. 2) To determine seasonal distribution and relative abundance of swordfish and tuna. 3) To survey the fishery potential of Dominica, W. I., in cooperation with the Smithsonian Institution and the UN Special Fund Caribbean Fisheries Project. 4) To collect zoogeographic data for developing resource potential estimates.	02/15/1966-04/01/1966	N/A	84	Extensive observations were made on the attraction of small schooling fishes to night lights and their susceptibility to capture with an experimental 6" (1500 gpm) fish pump.	?	No formal survey design	?
Oregon II 90(78-05)	1978	EXPLORATORY SURVEY OF EXPLOITED AND LESS EXPLOITED COMMERCIAL FISHING AREAS	Puerto Rico to American Virgin Islands; off St. Kitts Island and off St. Lucia Island.	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To make a comparative survey of heavily exploited and less exploited commercial fishing areas using SCUBA divers and underwater television while using the OREGON II as the floating platform at the request of the Caribbean Fishery Management Council. 2) To perform television observations of the bottom and its related fauna where groupers congregate to spawn. 3) To assess the shelf area south of St. Thomas and St. John for conchs using the Remote Underwater Fishery Assessment System (RUFAS). 4) To locate a charted seamount with line fishing conducted. 5) To dredge and trawl for possible exploitable resources (coral, lobster, and shrimp) in water deeper than 40 fathoms.	07/21/1978-08/19/1978	13-731 m	250	SCUBA, underwater television, dredge, trawl, handlines	?	No formal survey design	?
Oregon II 97(79-04)	1979	EXPLORATORY SURVEY OF SHALLOW AND DEEP FISH REEF FISH HABITATS AND POPULATIONS	In the Western Gulf of Mexico and Off Puerto Rico and the Virgin Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To conduct a reef fish habitat survey in the western Gulf of Mexico. 2) To assist the Miami swordfish tournament as the communication center. 3) To perform a shallow and deepwater reef fish survey off Puerto Rico and the Virgin Islands.	06/13/1979-08/03/1979	77-549 m	52	Underwater television, bottom longline, traps, handlines	Standard data, lacking some env data	No formal survey design	Possibly length data

Oregon II 108	1980	EXPLORATORY CRUISE FOR SNAPPER-GROUPER STOCKS	In the Caribbean Sea Specifically, Puerto Rico, Culebra, and St. Thomas Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To evaluate availability and distribution of snapper/grouper resources in deep water (100-375 fms). 2) To determine if precious corals occur on offshore grounds off Culebra and St. Thomas Islands (50-175 fms). 3) To determine presence of deep-water shrimp north of Puerto Rico and St. Thomas. 4) To provide a one day demonstration cruise (07/18/1980) for dignitaries from the Caribbean area.	06/17/1980-07/24/1980	91-685 m	165	Bottom longlines, traps, handlines, and one surface longline	Standard data, lacking some env data	No formal survey design	Possibly length data
Oregon II 119	1981	EXPLORATORY SURVEY OF DEEP WATER SNAPPER-GROUPER STOCKS	Puerto Rico, Culebra, and St Thomas, U.S. Virgin Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To evaluate availability and distribution of snapper-grouper resources in deep water (100-240 fms) off Puerto Rico and the U.S. Virgin Islands. 2) To obtain biological data from snapper-grouper species caught. 3) To obtain bottom contour data to estimate area of habitat. 4) To obtain hydrographic data from all fishing stations.	07/13/1981-07/22/1981	91-464 m	15	Bottom longlines, traps, handlines	Standard data, lacking some env data	No formal survey design	Possibly length data
Oregon II 129	1982	SAMPLING CRUISE FOR DEEP WATER STOCKS OF SNAPPER AND GROUPER	Puerto Rico, Culebra and St. Thomas Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To sample snapper and grouper resources on deep water reefs (50-250 fms) with bottom and off-bottom longlines and traps. 2) To collect species, size and weight composition data as a function of gear, depth and habitat. 3) To collect biological data from selected snapper and grouper specimens including scales, otoliths, sex and maturation stage.	08/26/1982-09/30/1982	70-589 m		Bottom longline, off-bottom longline, fish traps, handlines, shrimp traps	Standard data, some env data	No formal survey design	Possibly length data
Oregon II 132	1983	PELAGIC FISHERY ASSESSMENT SURVEY	In the South and West Coasts of Puerto Rico and the U.S. Virgin Islalnds	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To determine the availability of oceanic fish species utilizing pelagic longline gear on the south and west coast of Puerto Rico and the U.S. Virgin Islands. 2) To deploy and test the effectiveness of aggregating structures for surveys of coastal and oceanic pelagic fish species on the south and west coasts of Puerto Rico and the U.S. Virgin Islands. 3) To collect biological samples for bio-profiles task personnel from pelagic fish species that are harvested (near the aggregating structures) by sport fishing vessels and/or commercial fishing vessels. 4) To collect ichthyoplankton and neuston samples at longline station sites. 5) To collect meteorological and physical data at each longline and fish attractant structure site. 6) To collect chlorophyll samples for the University of Puerto Rico. 7) To collect biological samples from tuna species to determine if histamine producing bacteria are present.	01/06/1983-02/11/1983	91-677 m	143	Pelagic longline, trolling around FADs, bongo, bottom longline, off-bottom longline, fish traps	Standard data, some env data	No formal survey design	Possibly length data

Delaware II 84-04	1984	SURVEY OF DEEP WATER SNAPPER-GROUPER STOCKS	Puerto Rico, Culebra and St. Thomas Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To sample snapper and grouper resources around Puerto Rico and the U.S., Virgin Islands with standardized traps, on-and-off-bottom longlines, and handlines within the 20-250 fm depth range, with empahasis from 100-250 fms. 2) To collect species, size, and weight composition data as a function of gear, depth, and habitat. 3) To collect biological data from selected snapper and grouper specmens including scales, otoliths, and gonads. 4) To collect temperature profile and acoustic bottom topographic data at selected stations. 5) To collect ichthyoplankton samples at selected stations in support of the Offshore Thermal Energy Research Project (OTEC). 6) To deploy FADS at stations selected by the Virgin Islands Department of Conservation and Cultural Affairs, Division of Fish and Wildlife. 7) To develop a temperature profile of the Grappler Seamount for the Center for Energy and Environmental Research (CEER).	04/10/1984-05/15/1984	37-457 m	182	Bottom longline, off-bottom longline, fish traps, MOCNESS	Standard data, some env data	No formal survey design	Possibly length data
Chapman 85-07(08)	1985	EXPLORATORY CRUISE TO ASSESS 13 DEEP WATER REEF FISH SITES AND TO PROVIDE PLATFORM SUPPORT FOR A COOPERATIVE SUBMERSIBLE STUDY	Puerto Rico, Culebra, St. Thomas, St. Johns and St. Croix Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To categorize deep-water benthic habitats around Puerto Rico and the U.S. Virgin Islands in terms of bottom type, topography and faunal components. 2) To map and survey dive areas using echo sounders to define potential dive sites. 3) To provide quantitative abundance indices of fishes and invertebrates within each habitat type based on catch rate. 4) To provide specimens caught in traps, trawls, and bottom longlines to University of Puerto Rico researchers. 5) To provide trap and longline catch per unit effort data for comparison with submersible population numbers from each habitat, and for comparison with historical catch effort data to evaluate population trends. 6) To locate Fish Attraction Devices (FAD's) deployed, in 1984 south of St. Johns and east of St. Croix to assess the condition of the structures and their potential for attracting fish.	09/22/1985-10/30/1985	46-720 m	171	Bottom longline, off-bottom longline, fish traps, shrimp trawl	Standard data, some env data	No formal survey design	Possibly length data, habitat data
Oregon II 168(87-06)	1987	EXPLORATORY SURVEY FOR SQUID	In the Caribbean in Selected Areas Around Puerto Rico and the U.S. Virgin Islands	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To survey selected sites for squid with a high opening fish trawl. 2) To collect specimens to verify species identifications based on video records from the 1985 Johnson Sea Link II submersible survey of Puerto Rico and the Virgin Islands. 3) To collect CPUE and size/sex data from all species caught using bottom longlines. 4) To collect algae samples from selected hard bottom sites using a small dredge.	07/28/1987-08/28/1987	37-1006 m	?	Forty foot shrimp trawl, high-opening fish trawl, dredge, bottom longline	?	No formal survey design	?
Delaware II 88-13	1988	SURVEY ICHTHYOPLANKTON AND YELLOWFIN TUNA STOCKS.	In the Coastal Waters of Puerto Rico, St. Thomas and St. Croix	USDOC, NOAA, NMFS, SEFSC, Pascagoula, MS	1) To collect ichthyoplankton samples with standard bongo, neuston and opening/closing bongo nets to assess recruitment patterns on reefs in the U.S. Virgin Islands and Puerto Rico. 2) To collect hydrographic data from the surface to 290 m using an STD, and collect surface chlorophylls at each sample site. 3) To assess yellowfin tuna populations in waters off St. Croix. 4) To record marine trash within the survey area.	11/15/1988-12/21/1988	0-290 m	107	Bongo, neuston, pelagic longline	Standard data, some env data	Systematic sampling grid near 100 ftm contour	?

Maps showing sampling distribution of traps, handlines, offbottom longline, and bottom longline effort from 1979-1985.

1979



1980

1981

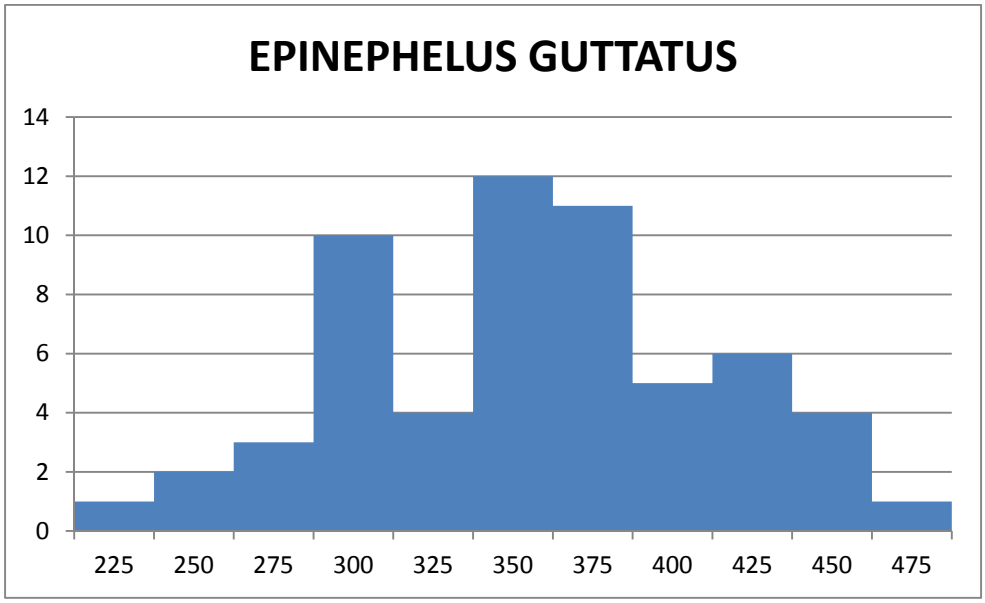
1982

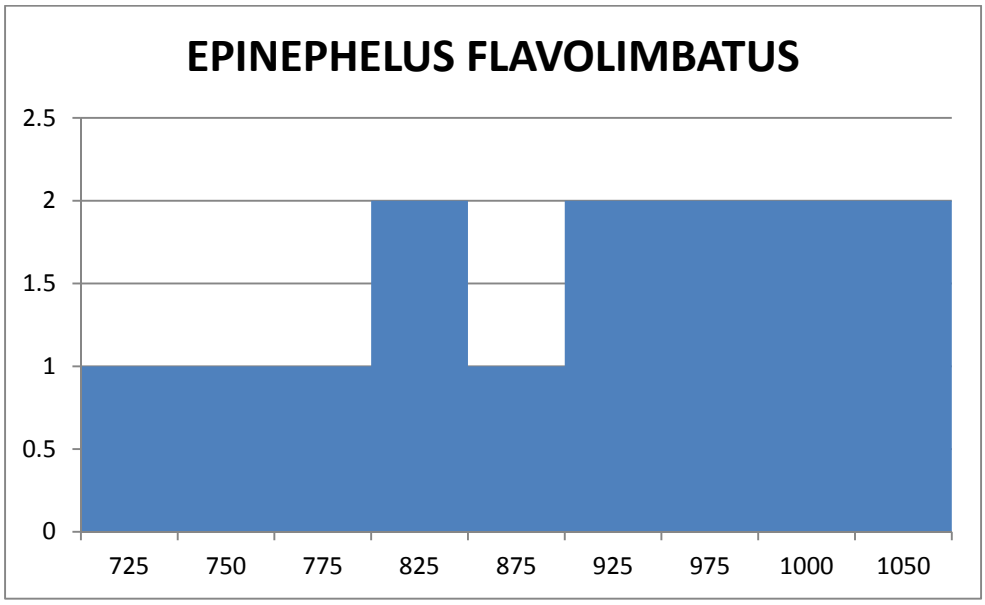
1983

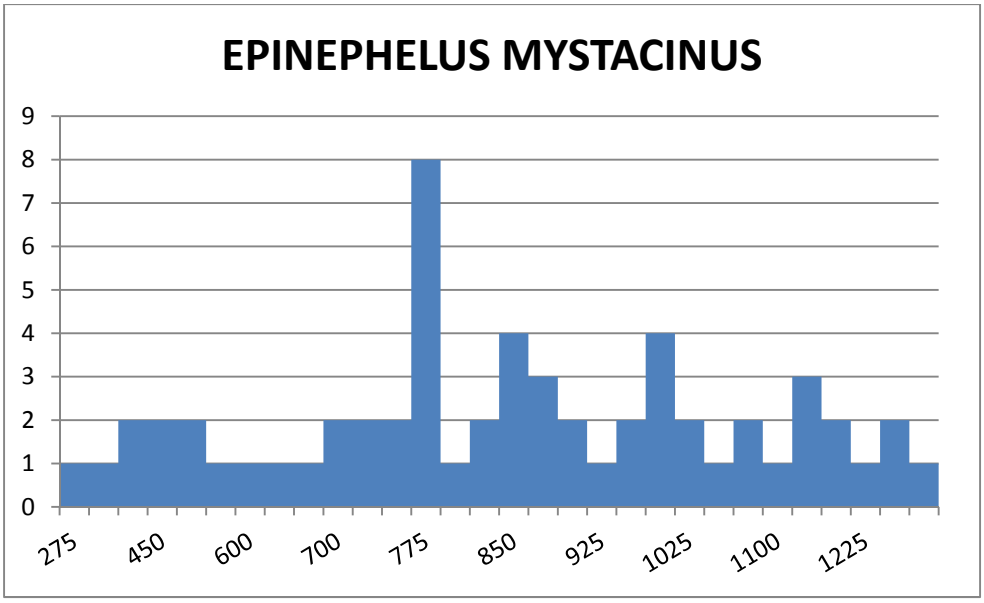
1984

1985

Graphs showing the length frequency distribution of selected organisms collected from 1979-1982 in Early Caribbean Surveys. Specimens from all gears are combined. For each graph the x-axis is length (either fork or total depending on the species) in mm and the y-axis is frequency in number.



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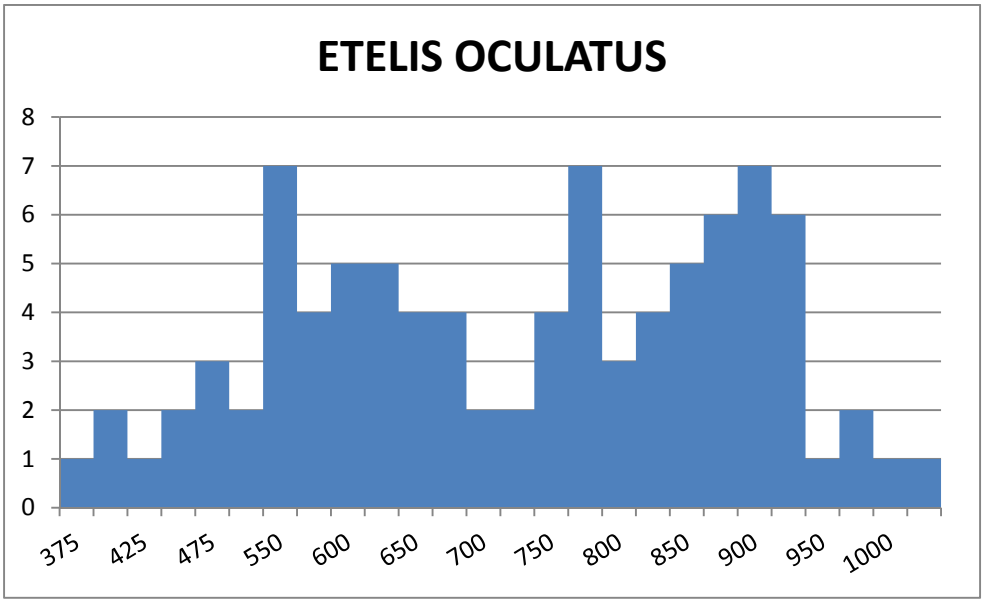
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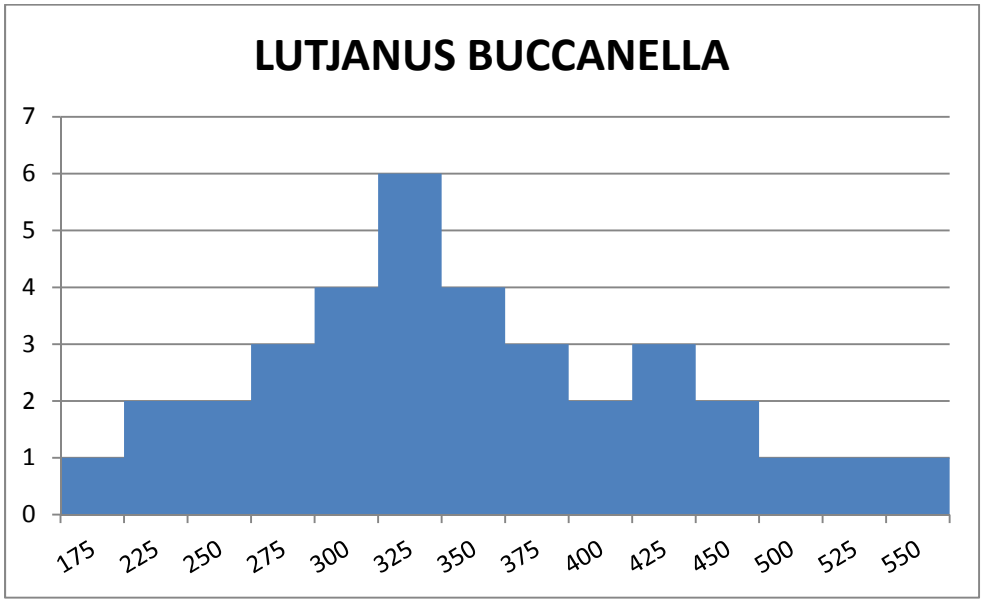
LUTJANUS BUCCANELLA
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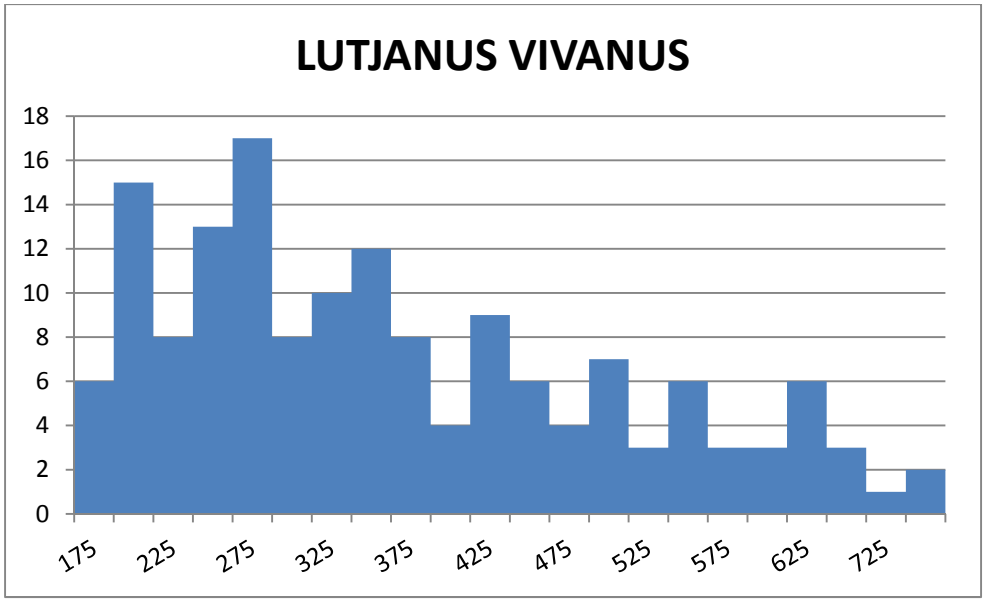
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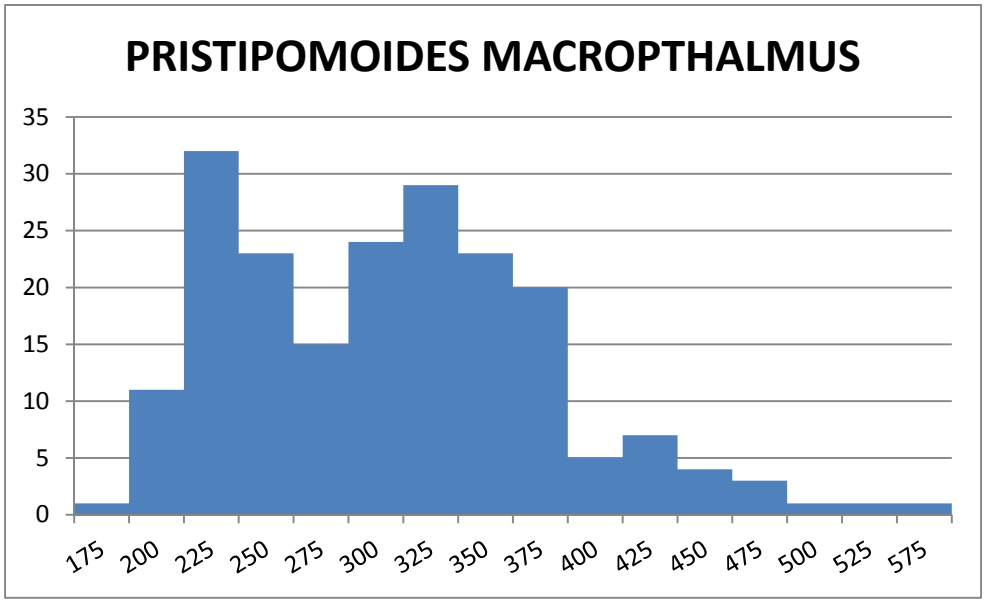
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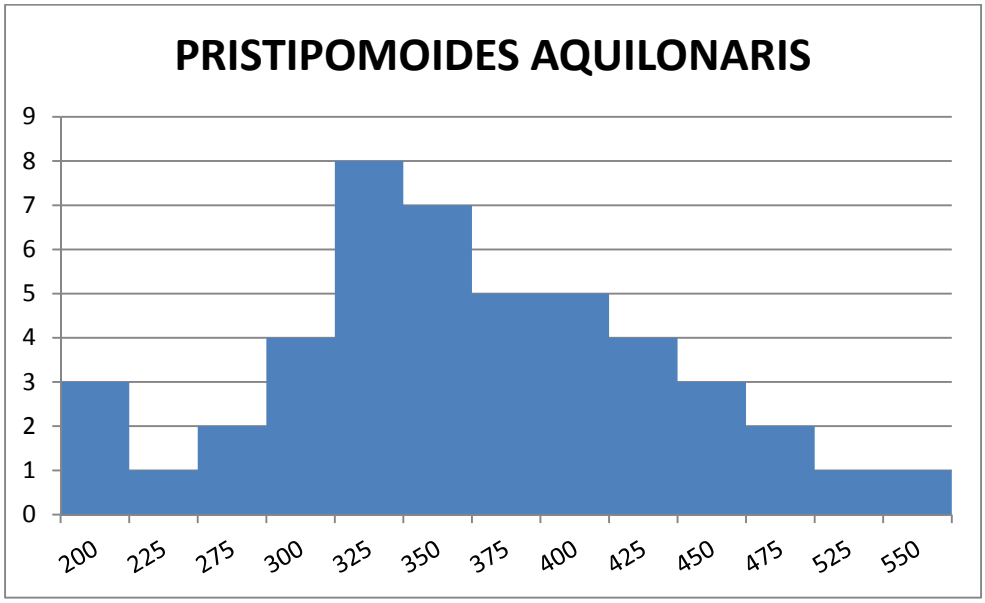
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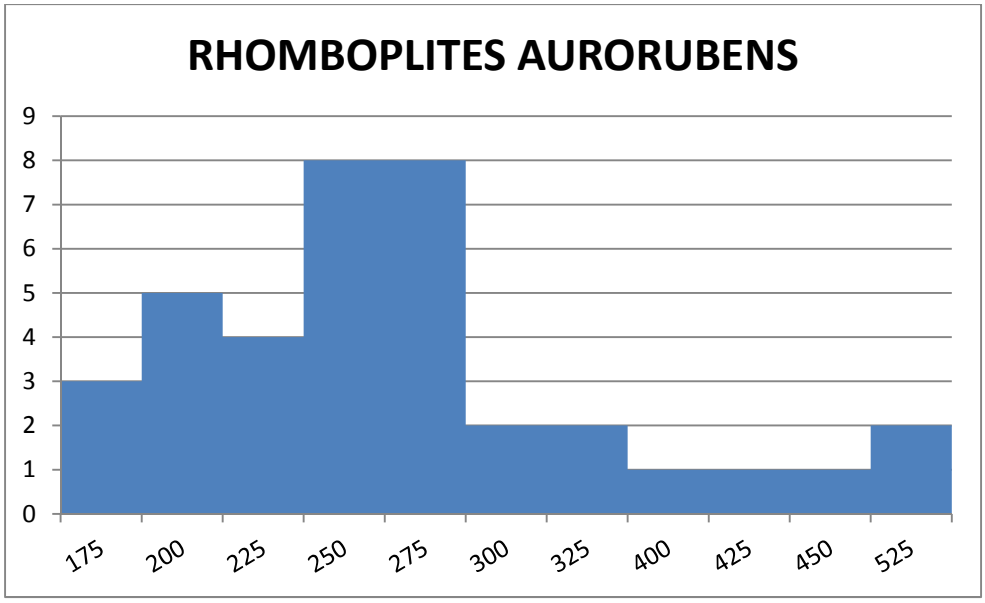
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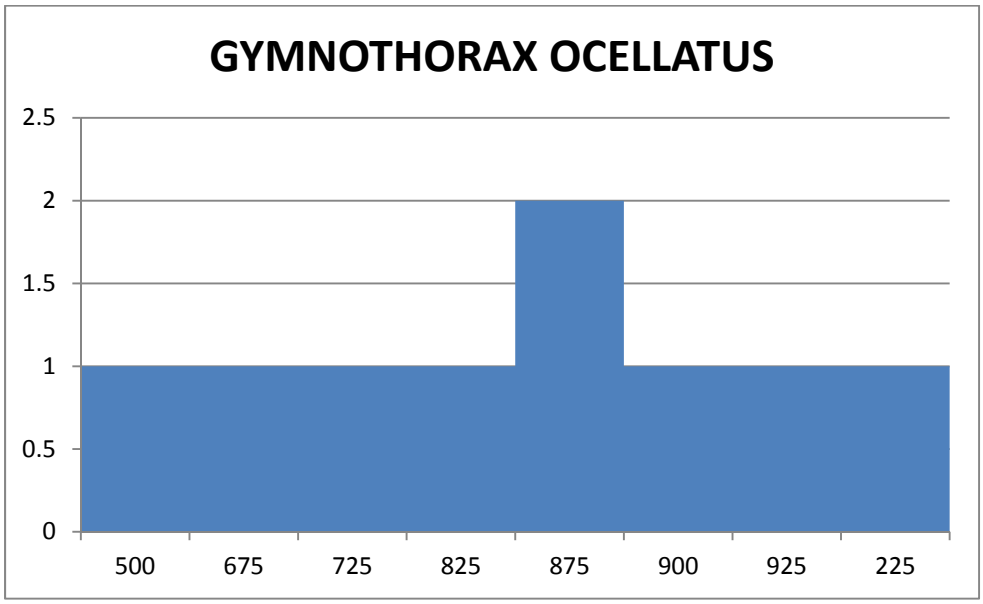
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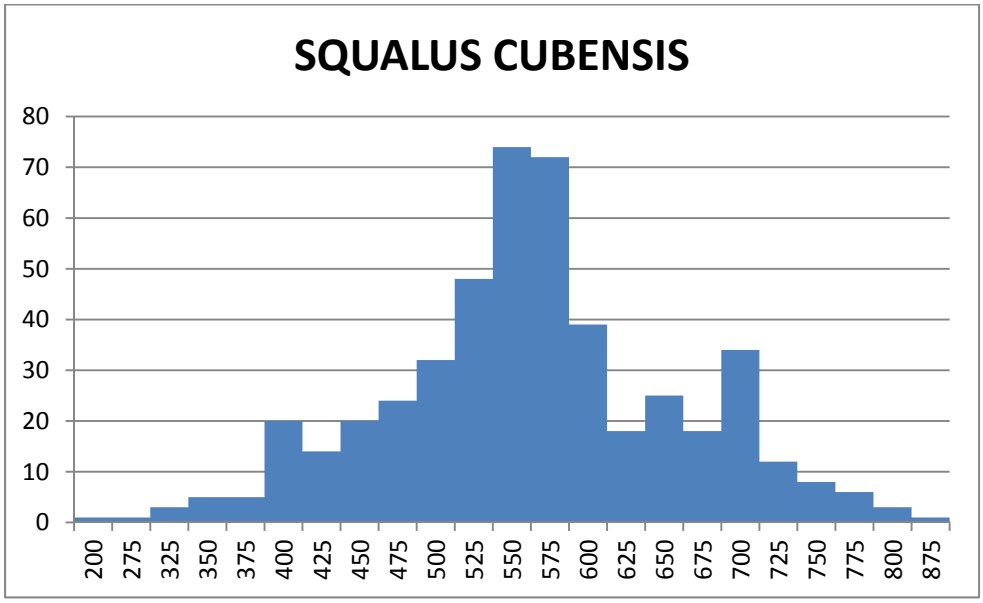
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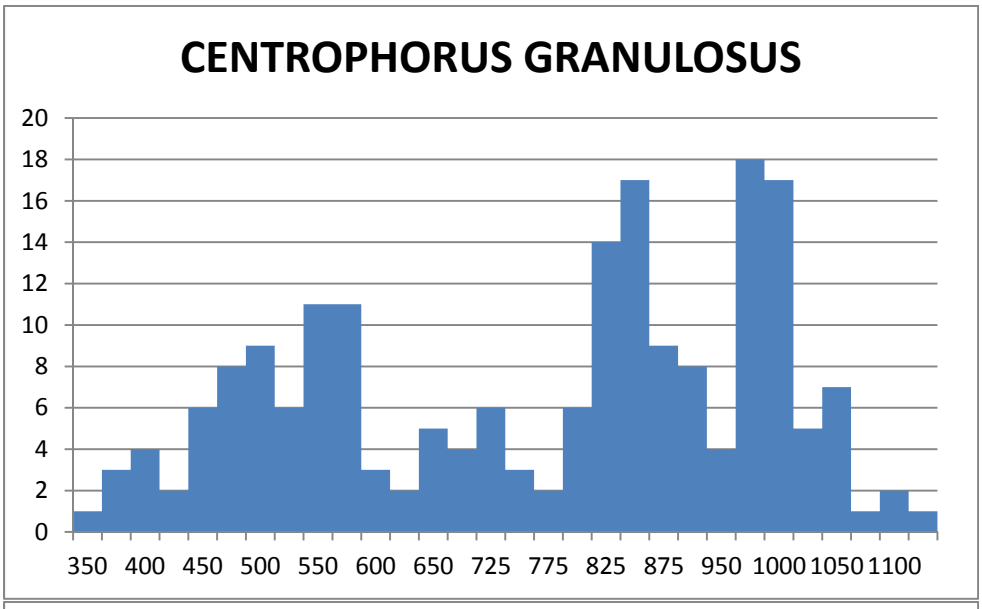
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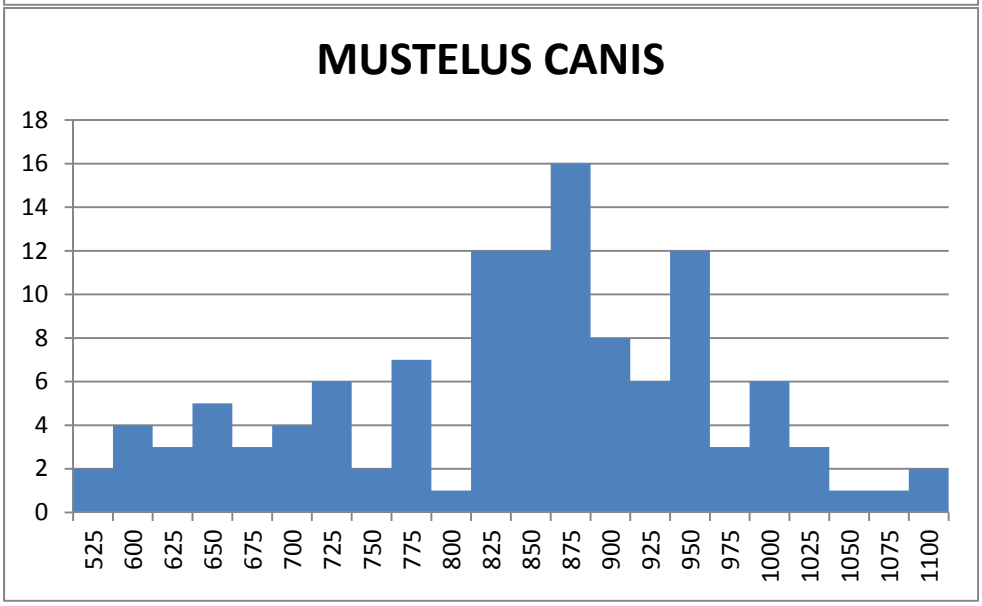
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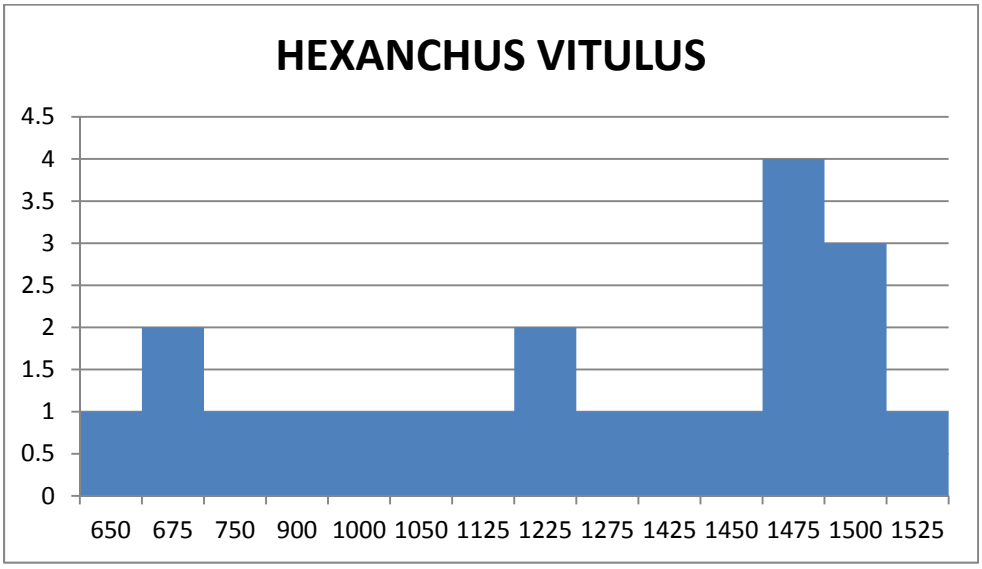
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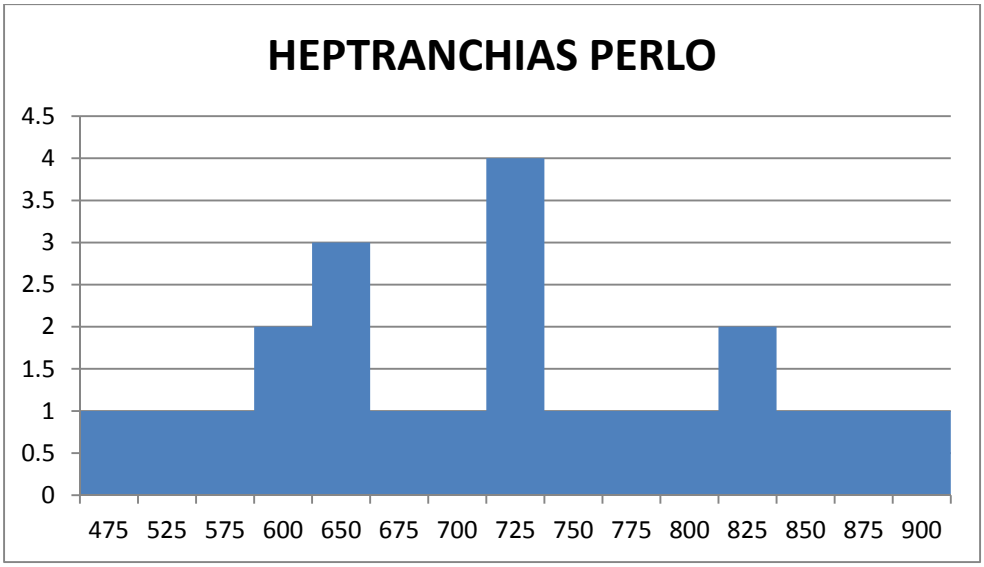
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U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries

October 19, 1959

FROM: Division of Industrial Research and Services
Branch of Exploratory Fishing and Gear Research

REPORT OF CRUISE NO. 62 - M/V OREGON

Extremely poor shrimp trawling conditions were found to exist in the Puerto Rico - Virgin Island area during Oregon Cruise No. 62. The thirty-one day cruise ended on October 17th, during which sixty-six exploratory drags were made in depths of 17 to 380 fathoms to evaluate the shrimp trawling potential of the area.

Approximately 2,000 miles of depth recorder transects were made over the 300 mile long area in attempt to locate clear bottom, with little success. On the shelf (inside of 50 fathoms), coral, rock, and sponge were encountered on every drag. The "slope" beyond 50 fathoms abruptly drops to 300-500 fathoms in most areas, with rock and coral as principle bottom constituents. Sixteen trawls were torn up during the survey and minor gear damage occurred on most of the remaining drags. Trawling stations were made in all locations that depth recorder tracings indicated a slight hope of getting the gear back.

Pink spotted shrimp were found in small numbers in 30 to 45 fathoms along the northern edge of the shelf. Drags of 5 to 10 minutes would produce up to two pounds of 26/30 and 41/45 count shrimp. Longer drags in this depth range resulted in gigantic sponge catches or tear-ups.

A very restricted smooth area in 150-300 fathoms off Aguadilla, Puerto Rico, was explored for royal red shrimp. Not a single specimen was caught, although the smaller deep-water shrimp, Penaeopsis megalops, (usually associated with royal red shrimp in the known areas) was present in small numbers. Elsewhere, deep water trawling produced only small number of another species of penaeid shrimp (Aristaeus).

Eight drags were made along the northern edge of Saba Bank in depths of 19 to 380 fathoms. The only shrimp caught were 5-count Scarlet shrimp in 360-380 fathoms at a rate of about 10 pounds per hour.

Small numbers of red snappers were caught in most successfully retrieved drags from inside of 50 fathoms. Other foodfish were absent in the catches. Depth recorder tracings indicated the presence of small school fish in several locations north of the Virgin Islands; hovering over bottom that was impossible to trawl with the gear on hand.

Numberous, large shcools of tuna were observed along the northeastern edge of the shelf. Several trolling captures yielded blackfin tuna ranging from 3 to 16 pounds. All of these fish had been

feeding on small Spanish sardines (Sardinella anchovia). In Mona Passage, scattered large tuna were observed on one occasion.

Scientific Personnel:

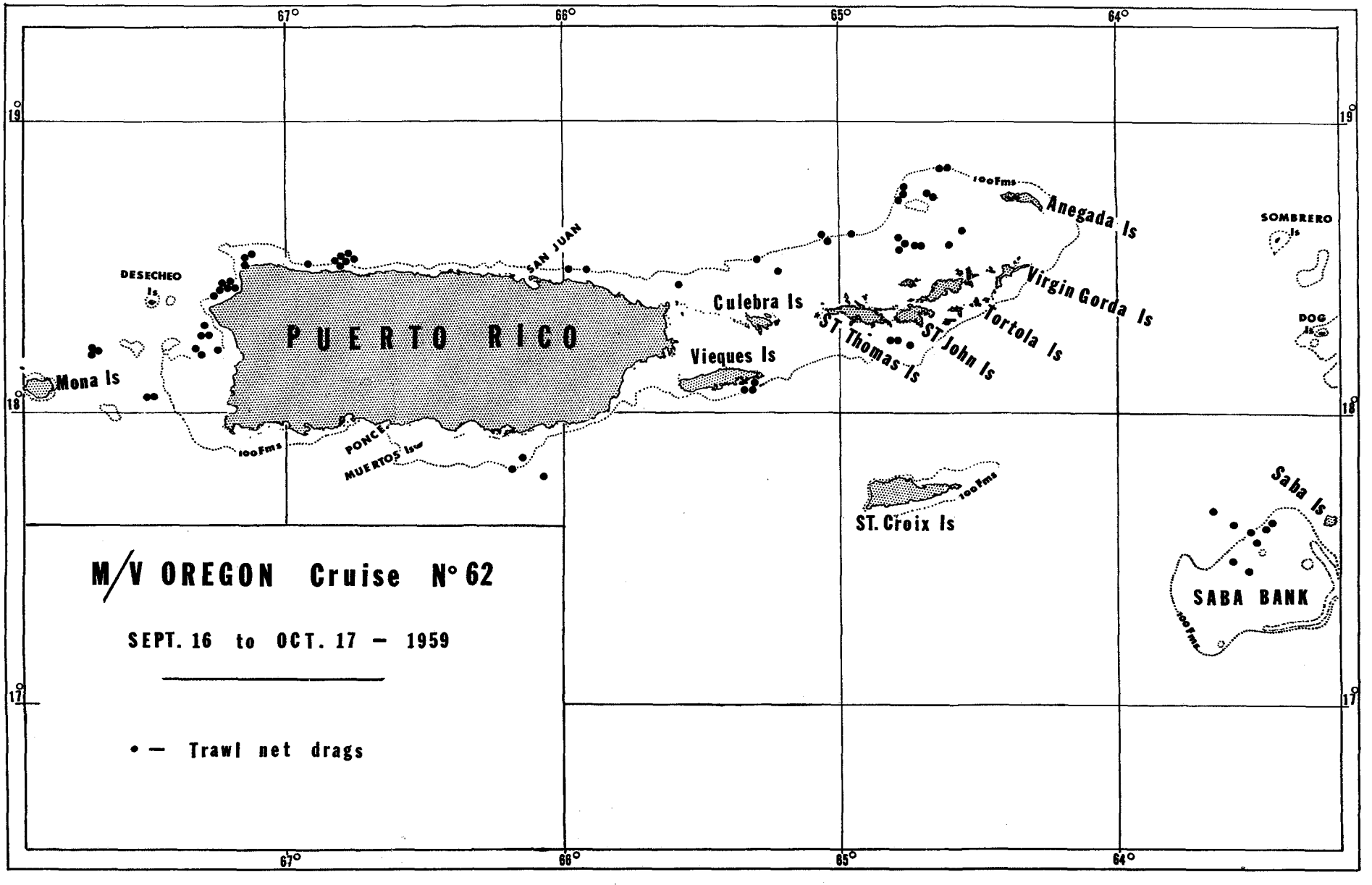
Harvey R. Bullis, Jr. - Field Party Chief (9/22 - 10/9)
Norman L. Pease - Fishery Methods and Equipment Specialist

Observers and Cooperators:

Seton Thompson, Regional Director, Region 2, Bureau of Commercial Fisheries (10/3 - 10/9)
Loren P. Woods, Curator of Fishes, Chicago Natural History Museum

Harvey R. Bullis, Jr.
Director, Gulf and South Atlantic Explorations and Gear Research

Oregon Stations 2602-2674


M/V OREGON Cruise N° 62
SEPT. 16 to OCT. 17 — 1959
• — Trawl net drags
PUERTO RICO
SAN JUAN
DESECHEO Is
Mona Is
PONCE
MUERTOS Isw
100 Fms
Culebra Is
Vieques Is
ST Thomas Is
ST John Is
Tortola Is
Virgin Gorda Is
Anegada Is
SOMBRERO Is
DOG Is
ST. Croix Is
Saba Is
SABA BANK
67°
66°
65°
64°
19°
18°
17°

U. S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Commercial Fisheries, Region II
Exploratory Fishing and Gear Research Base Headquarters
Pascagoula, Mississippi

R/V Silver Bay Cruise Report No. 50

November 5, 1963

The exploratory fishing vessel Silver Bay returned to Brunswick, Georgia, on October 26, completing a 32-day cruise from Florida's east coast to Mayaguez, Puerto Rico. Principal object of the cruise was to fill a serious gap in knowledge of the resources of the western Atlantic by performing a preliminary overall survey of the fauna of waters in the lower Bahamas and off the north coast of Hispaniola. A wide variety of gear was used in an attempt to gain as complete as possible a picture of the resource potential of the area surveyed and of the role of the area in affecting the distribution and occurrence or absence of resources in continuous areas--including the Puerto Rico-Lesser Antilles area and the Bahamas-Florida Straits area. Hurricane conditions, prevalent or threatening during much of the cruise, seriously interferred with attainment of the objectives.

Shrimp trawl drags were made over a total depth range of 25 to 800 fathoms off the north coasts of the Dominican Republic, and Puerto Rico in the Mona Passage. From 110 to 800 fathoms the bottom was generally soft mud that, combined with a moderate gradient, provided conditions suitable for trawling. Owing to weather conditions, only 14 drags could be made in this depth range--too few for proper evaluation. Among the possible commercial species taken in small amounts were royal-red shrimp (Hymenopenaeus robustus) and scarlet prawns (Plesiopenaeus edwardsianus). The former were taken in 2 drags in 350 and 400 fathoms; the latter were taken in all drags between 170 and 800 fathoms. Average size of the scarlet prawns increased with depth until those near 800 fathoms were 10 to 15 count heads-on. Also present in a few drags and in small numbers beyond 100 fathoms were Aristaeomorpha folicaea, which has been taken in relatively large numbers elsewhere in the western Atlantic, and an as-yet-unidentified penaeid resembling Penaeus schmitti, the South American shallow-water white shrimp.

Shallower depths were investigated with dredge and trawl, but were everywhere marked by very rugged bottom topography and heavy concentrations of coral, rock, and sponge, thereby indicating a general unsuitability for commercial fishing with conventional trawling gear. Commercial species of shrimps were present in small numbers in less than 1/3 of the drags made in 25 to 100 fathoms. No attempt was made to fish shallower waters belonging to the Dominican Republic as international waters useable by the U. S. industry were stressed in the survey. Fish catches throughout the depth range fished were light.

Two 60-hook tuna longline sets were made also off the north coast of the Dominican Republic along the 1,500-fathom isobath. The resulting total catch consisted of 4 whitetip sharks. Sampling of surface and subsurface resources was also conducted with midwater trawls, plankton and larval fish trawls, and suspended wire fish traps. Catches were preserved for scientific study. Trolling lines were set whenever the vessel was running between stations. Small numbers of dolphin, rainbow runners, and barracuda were caught. Despite careful bridge watch, no surface fish schools were seen during the cruise.

Throughout the area surveyed north of Hispaniola, bottom temperatures averaged lower at equal depths than those farther north in the Gulf Stream and Gulf of Mexico east in the Caribbean, and south off South America (temperature chart attached). The fauna was distributed bathymetrically at correspondingly deeper levels, thereby adding further evidence of the importance of temperature as a vital environmental factor in animal distribution.

At industry request, the first portion of the cruise was rescheduled to allow a brief re-survey of the scallop potential on the Florida east coast scallop bed. Thirty-two scallop stations were made between Bethel Shoals and Cape Canaveral in the 15 to 50 fathoms depth range. Catches of young scallops, 25 to 35 mm. in width, ranged from 0.1 to 4.0 bushels per 30-minute drag (average 0.6 bushel) at 20 (63 percent) of the stations. These scallops are indicative of the strong year class which should reach commercial size during the coming year. Catches of commercial-size scallops ranged from 0.2 to 2.5 bushels per 30 minute drag (average 1.1 bushels) at 10 (31 percent) of the stations. These scallops yielded approximately 85 meats per pound and the best catches were made in 27 fathoms off Cape Canaveral.

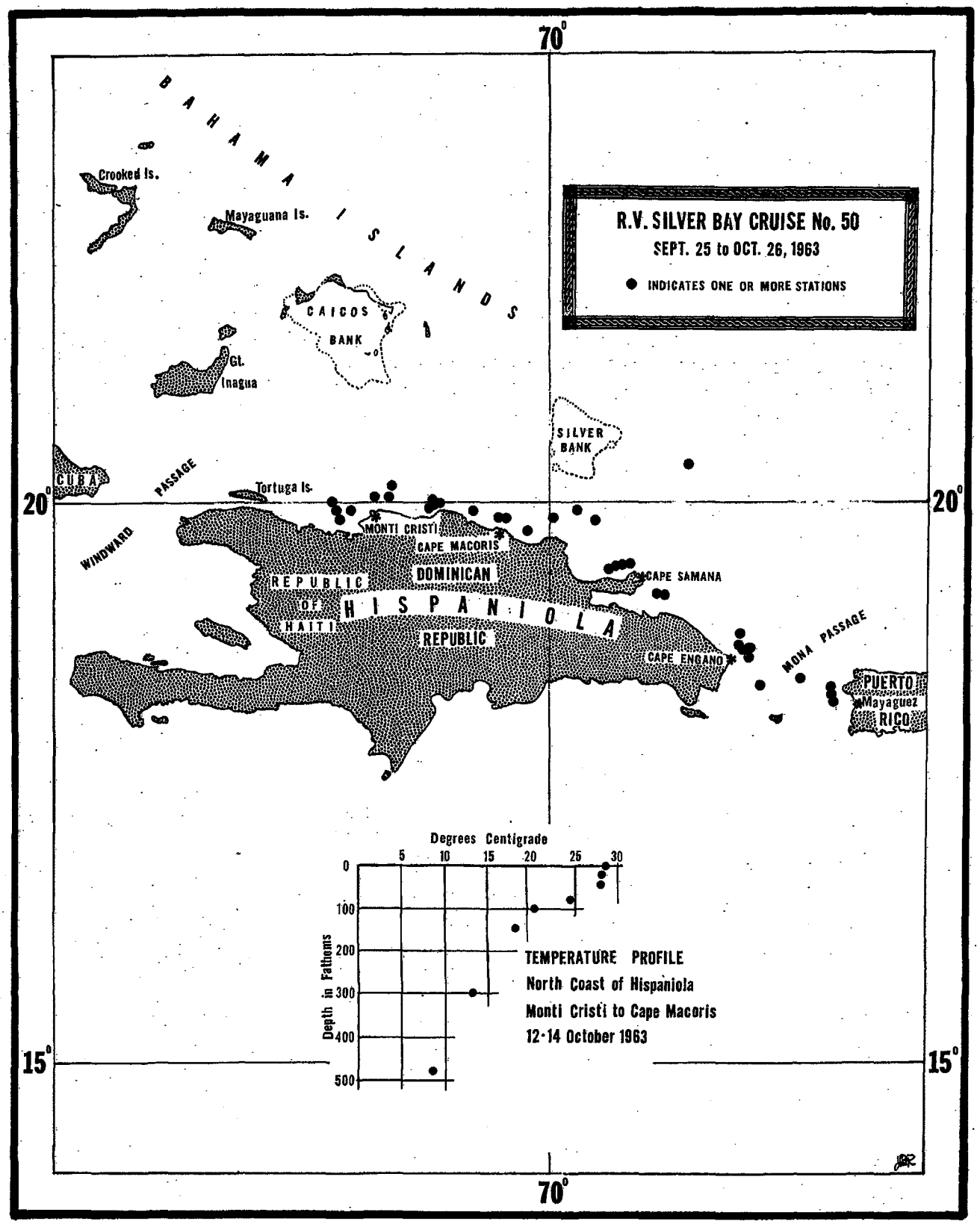
SCIENTIFIC PERSONNEL:

R. Cummins, Jr., Field Party Chief, 10/3-20/63
J. B. Rivers, Fishery Methods and Equipment Specialist, 9/25-10/20/63, Field Party Chief 9/25-10/2/63
P. J. Struhsaker, Fishery Biologist, 9/25-10/24/63
F. Nudi, Fishery Biologist, 9/25-10/24/63
F. Berry, Fishery Biologist, 9/25-10/20/63

Harvey R Bullis, Jr.

Harvey R. Bullis, Jr.
Base Director, Gulf and
South Atlantic Exploration
and Gear Research Base

Silver Bay Stations Nos. 5096 - 5199


70°
R.V. SILVER BAY CRUISE No. 50
SEPT. 25 to OCT. 26, 1963
● INDICATES ONE OR MORE STATIONS
BAHAMA ISLANDS
Crooked Is.
Mayaguana Is.
CAICOS BANK
Gt. Inagua
SILVER BANK
CUBA
WINDWARD PASSAGE
Tortuga Is.
20°
MONTI CRISTI
CAPE MACORIS
DOMINICAN REPUBLIC
REPUBLIC OF HAITI
HISPANIOLA
CAPE SAMANA
CAPE ENGANO
MONA PASSAGE
PUERTO RICO
Mayaguez
15°
Degrees Centigrade
5 10 15 20 25 30
0 100 200 300 400 500
Depth in Fathoms
TEMPERATURE PROFILE
North Coast of Hispaniola
Monti Cristi to Cape Macoris
12-14 October 1963

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries - Region II
Exploratory Fishing and Gear Research Base Headquarters
Pascagoula, Mississippi

R/V Oregon Cruise Report No. 107

2/15 - 4/1/66

April 12, 1966

AREA: Lesser Antilles between Puerto Rico and Trinidad

OBJECTIVES: 1. Initiate field studies on the application of fish pumps to harvest anchovies, herrings, and sardine-like fishes.

2. Determine seasonal distribution and relative abundance of swordfish and tuna.

3. Survey the fishery potential of Dominica, W. I., in cooperation with the Smithsonian Institution and the UN Special Fund Caribbean Fisheries Project.

4. Collect zoogeographic data for developing resource potential estimates.

Extensive observations were made on the attraction of small schooling fishes to night lights and their susceptibility to capture with an experimental 6" (1500 g.p.m.) fish pump. A total of 17 nights was devoted to these studies at the locations shown on the cruise chart. Submerged 1000-watt lights were employed in combinations of from 1 to 4 units with precise intensity control. Species showing direct positive response to various light intensities included Anchoa lyolepis, Anchoviella eurystole, Jenkinsia sp., Membras sp., Harengula clupeola, H. humeralis, and Chirocentrodon bleekerianus, all of which appeared in dense concentrations at various times during the observations. Species showing indirect positive response (predator behavior on the above species ?) included Opisthonema oglinum, Decapterus punctatus, Trachurus sp., and several other carangids. All of these exhibited some degree of susceptibility to fish pump capture. In addition, incidental captures of larger fishes included miscellaneous flying fishes (avg. 1/4 lb. each) and large cutlassfish (2 to 3 lbs. each). Highest sustained catch rates were made at Grenada where in one hour 234 lbs. of anchovies and sardines were pumped. Samples of the most abundant species were sun-dried and sent to the Bureau's

Technological Laboratory for composition analysis. Results of the first series of analyses are as follows:

Species	Area	Protein %	Oil %	Water %	Ash %
Jenkinsia sp. (1")	British Virgin Islands	61.9	7.9	12.5	17.7
Jenkinsia sp. (3")	St. Lucia	34.1	7.8	15.7	42.4
Membras sp.	British Virgin Islands	68.1	9.5	13.6	8.8
Membras sp.	Dominica	66.6	4.8	15.7	12.9
Anchoa lyolepis	Anguilla Island	40.3	7.4	14.5	37.8
Harengula clupeola	Dominica	36.3	6.2	29.2	28.3

These will be reevaluated on the basis of frozen samples.

Longline sets of 500 to 600 hooks were relatively unproductive. A nighttime set off Antigua yielded a single 78-pound swordfish. A daylight set east of St. Lucia yielded 5 blackfin (Thunnus atlanticus). The combined billfish catch for all sets was one spearfish (Tetrapterus sp.) and one marlin (Makaira sp.). Additional species caught included 11 white-tip sharks (avg. 160 lbs.), barracuda (Sphyraena barracuda), snake mackerel (Gempylus sp.), and lancetfish (Alepisaurus sp.). Three sharks were tagged and released in cooperation with AIBS tagging studies and samples of flesh and liver were frozen from the remaining catch for analysis by Bureau technologists.

Deep set lines of 41 hooks each and equipped with magnesium anchor releases were fished in 200 fathoms off Dominica and in 400 fathoms off St. Lucia. The Dominica set surfaced on schedule with a catch of two small sharks. The St. Lucia set failed to surface.

The following species were captured while trolling between stations: 25 dolphin (Coryphaena hippurus and Coryphaena equisetis) avg. 12 lbs. each, 4 skipjack tuna (Katsuwonus pelamis) avg. 4 to 19 lbs., 3 little tuna (Euthynnus alletteratus), 4 blackfin tuna (Thunnus atlanticus) avg. 8 lbs. each, 1 wahoo (Acanthocybium solanderi) 37 lbs., 13 great barracuda (Sphyraena barracuda), 1 king mackerel (Scomberomorus cavalla) 23 lbs., 2 Spanish mackerel (Scomberomorus maculatus), and 1 cero (Scomberomorus regalis). Stomach contents and gonads of tuna and mackerel were preserved for the BCF Tropical Atlantic Biological Laboratory. Of unusual interest was a juvenile mola (Ranzania sp.) which was found in a dolphin's stomach.

Eight surface tuna schools were seen between Puerto Rico and Tobago and identified as blackfin and skipjack tuna. Attempts to sample these schools by trolling from both the skiff and the Oregon were unsuccessful.

Fourteen trawl and 28 dredge stations were made on limited grounds in the vicinity of Anguilla, Antigua, Dominica, St. Lucia, and Tobago. Catch rates of brown shrimp (Penaeus brasiliensis) in 30 to 40 fathoms off Tobago ranged from 5 to 16 lbs. (heads on) per hour with a 40-foot trawl. Shrimp counts varied from 11/15 to 26/30. Catches in this depth range were dominated by grunt (Haemulon melanurum) 4 per lb. Grunt and small vermilion snapper (Rhomboplites aurorubens) were filleted and frozen for taste tests by the Branch of Marketing Test Kitchen at Pascagoula. Deep-water shellfish of potential commercial value caught in 250 to 450 fathoms off Dominica included scarlet prawns (Plesiopenaeus edwardsianus) 17 lbs. per hour (heads on), striped shrimp (Plesionika longipes), Penaeopsis megalops - 12 lbs. per hour, and lobsterettes (Eunephrops bairdii and Nephropsis rosea). Dredging operations throughout the survey area were unproductive due to heavy aggregations of limestone rubble and rock.

Hand-line catches off Dominica, St. Lucia, Grenada, and Tobago were low and included 1 silk snapper (Lutjanus vivanus) 2 lbs., 4 croaker (Ophioscion sp.) 1/2 lb. each, 1 southern tilefish (Caulolatilus sp.) 2 lbs., 2 yellow-edge grouper (Epinephelus flavolimbatus) 10 lbs. each, 1 warsaw (Epinephelus nigritus) 12 lbs., and several wenchman (Pristipomoides sp.) 1 to 2 lbs. each.

Harvey R. Bullis, Jr.
Base Director

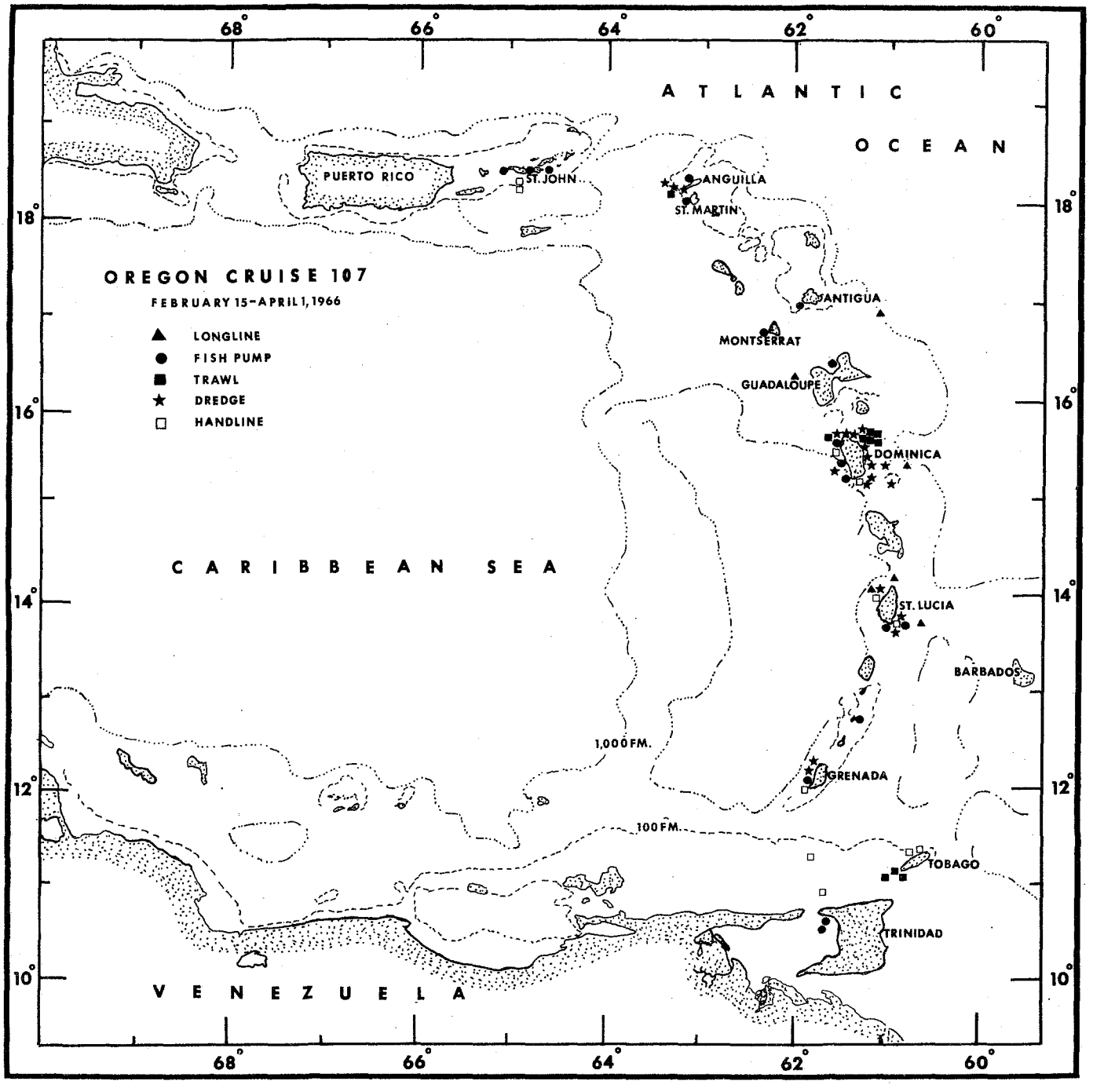
Scientific Personnel

Harvey R. Bullis, Jr. - Field Party Chief - 2/22 - 3/26/66
Robert Cummins, Jr. - Field Party Chief - 2/15 - 2/21/66 & 3/27 - 4/1/66
Charles M. Roithmayr - Fishery Biologist - 2/15 - 4/1/66
Sven J. Svensson - Fishery Methods & Equipment Specialist - 2/15 - 4/1/66

Cooperators and Observers

Alpheaus Osborne - St. Vincent - 2/22 - 3/19/66
Sydney Felix - Fisheries Officer - St. Lucia - 3/3 - 3/19/66
Edward Ponde - Montserrat - 3/3 - 3/25/66
L. M. Sorhaindo - Dominica - 3/3 - 3/21/66
Warren F. Rathjen - Chief, Exploratory Fishing, UNSFCFP - 3/3 - 3/11/66
Raymond B. Manning - USNM - 3/3 - 3/7/66
Honorable D. Otis Beasley (retired) - 2/22 - 3/1/66

Oregon Stations 5905 - 5989


OREGON CRUISE 107
FEBRUARY 15-APRIL 1, 1966
LONGLINE
FISH PUMP
TRAWL
DREDGE
HANDLINE
ATLANTIC OCEAN
CARIBBEAN SEA
VENEZUELA
PUERTO RICO
ST. JOHN
ANGUILLA
ST. MARTIN
ANTIGUA
MONTSERRAT
GUADALOUPE
DOMINICA
ST. LUCIA
BARBADOS
GRENADA
TOBAGO
TRINIDAD
1,000 FM.
100 FM.
68°
66°
64°
62°
60°
18°
16°
14°
12°
10°

CRUISE INSTRUCTIONS

Master
NOAA Ship OREGON II

Cruise Instructions: OT-78-05 (90) (cruise number)

1. Cruise Period 21 July 78 To 19 August 78

2. AREA OF OPERATION:

Caribbean Sea: Puerto Rico to American Virgin Islands; off St. Kitts Island and off St. Lucia Island.

3. ITINERARY:

Date	Depart/Arrive (Location)	Time
7/21	Dep. Miami	
7/25	Arr. Mayaguez, Puerto Rico	0800
7/26	Dep. Mayaguez	0800
8/1	Arr. St. Thomas, Virgin Islands	0800
8/3	Dep. St. Thomas	0800
8/4	Arr. St. Kitts	0800
8/4-8/5	Work off St. Kitts for two days with cooperator	
8/7	Dep. St. Kitts	0800
8/8	Arr. St. Lucia	1200
8/8-8/10	Work off St. Lucia for two days with cooperator	
8/11	Dep. St. Lucia	0800
8/16	Arr. Miami	
8/17	Dep. Miami	
8/19	Arr. Pascagoula	

4. OBJECTIVES:

1. To survey overexploited and unexploited reefs in Puerto Rico and the Virgin Islands, St. Kitts and St. Lucia using underwater television to determine the difference in species and biomass.

2. To make resource assessment stations by dredge or trawl in previously unexplored areas.

3. To assess deep water reef fauna with handlines.

5. OPERATIONAL PLANS:

1. Load supplies and equipment in Pascagoula and Miami.
2. Pick up cooperators in Mayaguez, conduct reef survey, and disembark cooperators at St. Thomas.
3. Proceed to St. Kitts, take aboard a cooperator and make a survey of the fauna, then disembark cooperator at St. Kitts.
4. Proceed to St. Lucia; take aboard a cooperator, complete a faunal survey, then disembark observer at St. Lucia.

6. EQUIPMENT & SUPPLIES FURNISHED BY:

Fisheries Center

Small boat and motor
Scuba diving equipment
Oversides television system
5 sets of trawls and doors
3 tumbler dredges
Handline fishing gear

Vessel

Winches and cable to operate fishing gear
Ladder to allow entry to small boat

7. DISPOSITION OF DATA:

The Chief Scientist is responsible for all data and specimens collected on this cruise. Data collected on this cruise will be available to other NOAA elements upon request through the Director Southeast Fisheries Center. If operations are conducted in Foreign waters, copies of all data, reports and publications will be forwarded to the host country as soon as they are available after completion of the cruise.

8. COMMUNICATIONS:

Daily communications with (org.) NMFS, Pascagoula, MS on 6515.4 MHZ will be at 0930 and 1430 hours Monday through Friday.

9. MEALS:

Meals for _____ scientists will be supplied 3 times a day.

10. CRUISE PARTICIPANTS: NOAA Only

Name	Title	Lab Represented	Alternate (Specify)
George Miller	Field Party Chief	NMFS, Miami	
Dave Sutherland	Fishery Biologist	NMFS, Miami	
Jane Corliss	Fishery Biologist	NMFS, Miami	
Robert Jenkins	FM & ES	NMFS, Miami	
Douglas Harper	Fishery Biologist	NMFS, Miami	
Gerald Webb	Biol. Technician	NMFS, Miami	
Harvey Bullis	Senior Scientist	NMFS, Miami	
Robert Cummins	Pascagoula Lab Dir.	NMFS, Pascagoula	
George Randall	FM & ES	NMFS, Pascagoula	
Joseph Tashiro	Fishery Biologist	NMFS, Miami	Alternate
Alex Dragovich	Fishery Biologist	NMFS, Miami	Alternate
Essie Coleman	Fishery Biologist	NMFS, Miami	Alternate

11. NON GOVERNMENT PARTICIPANTS:

Sponsored by: National Marine Fisheries Service

Name	Title	Organization	Nationality	Purpose	Dates On Board 7-20 To 8-21
Peter Mensah	Student Trainee,	School of Maritime Studies,	Ghanaian,	Trainee	
Patricia Nai	Student Trainee,	School of Maritime Studies,	Ghanaian,	Trainee	

12. GOVERNMENT NON NOAA PARTICIPANTS:

Sponsored by: _____

Name	Title	Organization	Nationality	Purpose	Dates On Board	To
Don Erdman	Asst.Dir.Mayaguez Lab	Puerto Rico Dept. of Agriculture	U.S.	Cooperator	7/25	8/1
Jack Dammann	Chief Scientist	Carib. Fishery Mgt. Council	U.S.	Cooperator	7/25	8/1
I.A. George	Fish Development Advisor	Ministry of Agr. Lands, Housing and Labor	British	Cooperator	8/4	8/5
Horace Walters	Fish Officer	Ministry of Agr. and Lands	British	Cooperator	8/8	8/10

Requested by:

_____ Cruise Leader

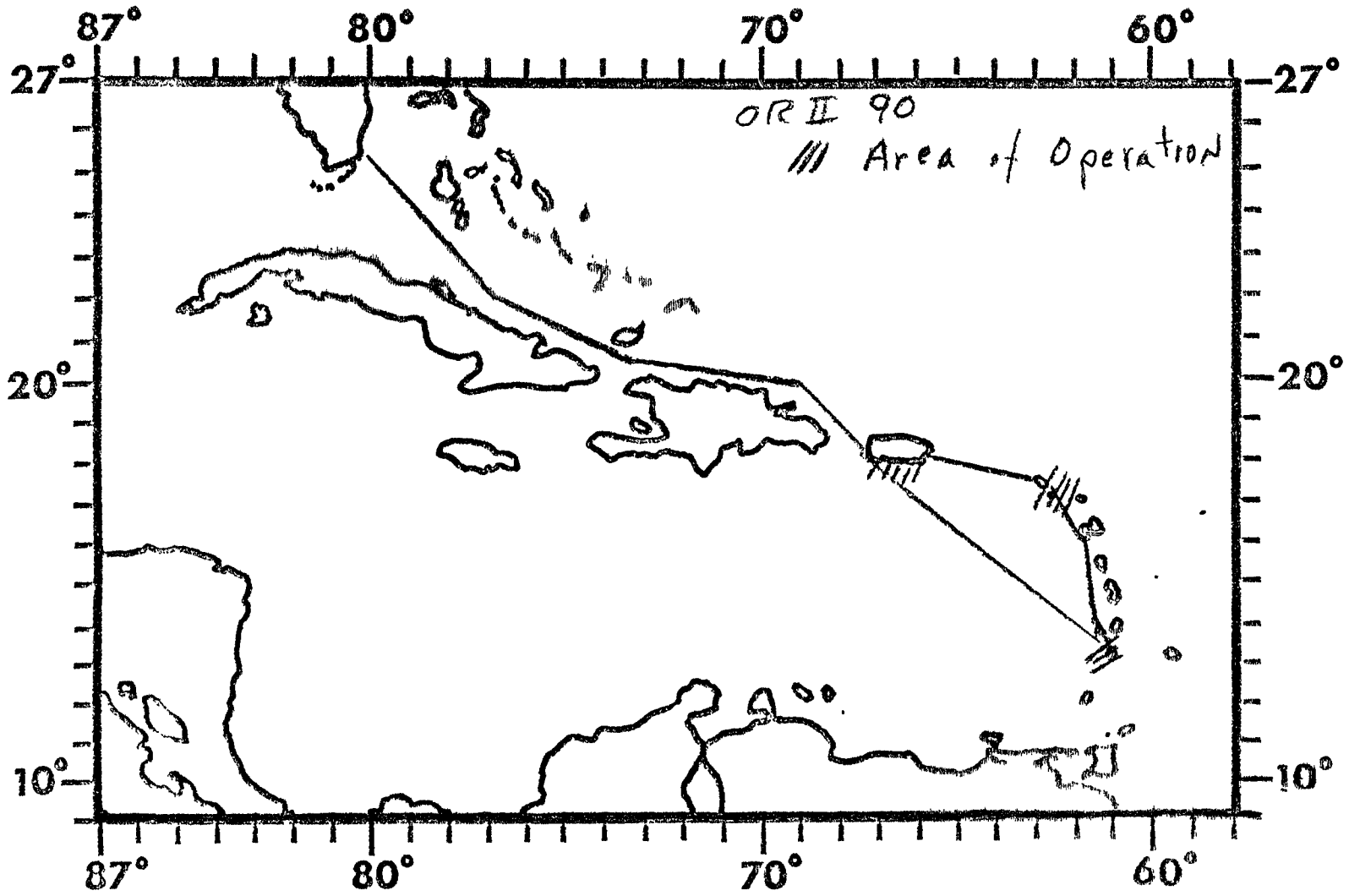
Approved By:

_____
Director AMC

Date _____

Richard F Berry
Acting Director SEFC

Date 4/5/78


87°
80°
70°
60°
27°
20°
10°
ORV 90
Area of Operation

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
P. O. Drawer 1207
Pascagoula, MS 39567

FRS OREGON II Cruise 79-04(97)
6/13 - 8/3/79

FRS OREGON II Cruise 97 was divided into three phases: 1) a reef fish habitat survey in the western Gulf of Mexico, 2) assist the Miami swordfish tournament as the communication center, and 3) a shallow and deepwater reef fish survey off Puerto Rico and the Virgin Islands. The FRS OREGON II departed Pascagoula June 13 and returned August 3 after completing all scheduled activities.

PHASE I - REEF FISH HABITAT SURVEY

Introduction

Phase I of OREGON II Cruise 97 concluded a survey of reef fish habitats in the western Gulf of Mexico between Galveston, TX and Brownsville, TX in 5 to 50 fathoms. Cruise objectives were to determine distribution and percentage of bottom types according to the following classifications: 1) rock, coral and sponge with relief exceeding one meter; 2) rock, coral and sponge with relief of less than one meter; 3) vegetative bottom - sea grass or algal flats; 4) sand or sand/shell; and 5) mud.

Data Collecting Procedures

Bottom type was determined by viewing closed-circuit underwater television (CCUTV) imagery at preselected stations. The CCUTV system was lowered to within a meter of the sea floor and visual impressions of the bottom recorded. Video recordings were taped at each station and annotated with audio recordings. Hydrographic data acquired at each station included surface temperature and salinity, water color, and secchi depth.

Results

The bottom slopes gently in the western Gulf of Mexico between Galveston, TX and Brownsville, TX in depths of 5 fms to 50 fms. None of the 270 stations occupied indicated relief exceeding one meter. The substrate consisted primarily of mud and sand interspersed with shell fragments at some stations. Visibility was poor; secchi readings ranged from 3 to 30 feet and averaged 10 feet. Heavy sediment loads were suspended from one to two meters above the bottom at the majority of stations within the 20 fms contour.

During the survey, the pan mechanism failed and one underwater bulb burned out. Data acquisition was not affected.

PHASE II - SWORDFISH TOURNAMENT

During the second phase, the FRS OREGON II served as a communications center for the Miami Swordfish Tournament. National Marine Fisheries Service personnel provided the tournament fleet with water temperature data and the occurrence of commercial ship traffic.

PHASE III - CARIBBEAN REEF FISH SURVEY

Introduction

This cruise was conducted in response to the Caribbean Fishery Management Council's request for information on deepwater snapper/grouper populations and bottom habitat. These snapper/grouper populations remain largely unexploited.

Survey objectives were to determine the species and size composition and catch per unit effort for reef fish in deep water using bottom longlines, electric reels, and wire fish traps. The survey also attempted to determine distribution and abundance of squid.

Survey Area, Methods and Gear

The survey area included the shelf and slope off the north coast of Puerto Rico, Culebra Island and St. Thomas, Virgin Islands, from 25 to 300 fathoms (Figure 1). The groundline of the bottom longline gear was approximately 1200 feet long with hooks placed every eight feet. Day and night sets were made at preselected sample sites. Each set consisted of about 150 circle hooks (No. 6) baited with fresh frozen squid and fished for two hours. During this interval, three electrically powered commercial fish reels were fished as the ship drifted. Reels were equipped with 1000 feet of cable, three No. 6 circle hooks baited with fresh frozen squid, and weights. Ten locally designed commercial wire fish traps were fished at three sites in 25 to 50 fms both day and night. Traps were baited with an assortment of squid, fish heads, and frames. Night lights were employed to attract squid and an automated commercial squid jigging machine used to catch squid.

Results

Bottom Longline Fishing

Fifty-two stations were completed along the north shelf edge in 50 to 300 fms (Figure 1). Bottom longlines were set on moderate to

steep slopes characterized by rocks, ledges, and coral (Figure 2). A total of 423 fish were caught weighing 3,423 lbs (Table 1).

Eight species of snapper contributed 19% of the total catch with 163 fish weighing 649 lbs. Principal species included silk snapper, 46 fish - 206 lbs; queen snapper, 17 fish - 162 lbs; and wenchman, 73 fish - 132 lbs. Other species included dog, mutton, blackfin and vermilion snappers. The best catch of snappers occurred during daylight in depths of 90-200 fms north NW of St. Thomas, Virgin Islands, at 18°35' N latitude, 65°07' S longitude (Figure 2). Nine queen snapper were caught weighing 76 lbs, with weights ranging from 3.0 to 14.5 lbs. Locations of snapper captures weighing 20 lbs or more per set are shown as triangles in Figure 1. The total weight of snapper caught in each set, location, and depth is listed in Table 2.

Seven species of groupers made up 41% of the total catch by weight with 82 fish weighing 1,404 lbs. Misty grouper was the major species caught with forty-two fish weighing 1,123 lbs. The average weight was 27 lbs. Other species included the yellowedge, 7 fish - 185 lbs; red hind, 24 fish - 31 lbs; yellowfin, 2 fish - 38 lbs; nassau, 1 fish - 16 lbs; red grouper, 1 fish - 10 lbs; and coney, 2 fish - 1.5 lbs. The best grouper catch occurred off Puerto Rico in 100 to 175 fms. Four misty grouper were caught weighing 137 lbs with weights ranging from 4.0 to 80.0 lbs. Locations of grouper captures weighing 40 lbs or more per set are shown as open circles in Figure 1. The total weight of grouper caught in each set, location, and depth is listed in Table 2.

Combined catch rates of snapper and grouper averaged 20.1 lbs per hour per 150 hooks or about 121 lbs per 24 hour sampling period. Bottom longline fishing continued for 17 days with an average of three sets per day. Fishing time per set was two hours bottom time. Sets were made both day and night with 27 night and 25 day sets.

Day/night catch rates were similar with an average of 40.9 lbs at night and 38.0 during daylight hours. A significant difference was noted between depths less than or greater than 100 fms with the shallower depths catching an average of 29.3 lbs and the deeper areas 44.9 lbs per set.

At least 14 other species including sharks, amberjack, barracuda, and eel contributed 40% of 1,370 lbs to the overall catch (Table 1). Dogfish and six-gill sharks caught were the major components, accounting for 91% of all species, other than snapper/grouper.

Of the 52 bottom longline sets, nine failed to catch snapper or grouper; twelve caught snapper only; nine caught grouper only; and twenty-two caught both snapper and grouper. Gear loss amounted to 625 hooks, four anchors, and eight tubs of mainline.

Results of bottom longline fishing demonstrate that the deepwater shelf/slope grounds off the north coast of Puerto Rico, Culebra Island, and St. Thomas, Virgin Islands, has a harvestable stock of snapper and grouper during summer months. Additional surveys should be conducted on the same grounds in fall, winter and spring to determine seasonal availability of fish. Special efforts should be made to develop a market for shark as their small size and lack of urea makes them suitable for human consumption.

It should be emphasized that bottom lines must be made of comparatively strong material to resist abrasion and cutting on the rock and coral bottom. Before setting, a "dry" run should be made over the bottom to determine slope gradient. Gear loss can be minimized by setting on moderate slopes and avoiding steep slopes.

Electric Snapper Reels

Three electrically-powered commercial snapper reels were fished at thirty-four stations in 17 to 200 fms during the time the bottom longlines and traps were fishing. Total fishing effort amounted to 102 man hours with 20 fish weighing 41 lbs caught at 10 stations. Species breakdown by weight and number of reel-caught fish are listed in Table 3.

The catch rate of snapper and grouper combined was 0.31 lbs per hour per reel. The failure to catch significant amounts of fish with the commercial reels was most likely due to strong currents and winds causing the ship to drift too fast with the result that the baited hooks failed to tend bottom. The use of a sea anchor may reduce the ship's drift and permit the hooks to tend bottom. Pick-up speed on the reels is very fast, and some fish were undoubtably lost when the hooks were set as the fish were being brought to the surface.

Wire Fish Traps

Ten wire fish traps were set both day and night in 27 to 49 fms at three locations north of Culebra Island east of Puerto Rico. Traps were deployed in the vicinity of bottom longline sets. The average fishing time for ten traps at each station was 8.8 hours, and the total trap effort at six stations amounted to 53 hours.

Ninety-one fish weighing 161 lbs were captured in the fish traps. Species breakdown by weight and number is listed in Table 4. Snapper accounted for 59 fish weighing 60 lbs; grouper, 13 fish weighing 92 lbs; and other species, 19 fish weighing 9 lbs. Snapper/grouper accounted for 94% of the total trapped species.

Snapper and grouper showed a preference for traps baited with squid. Traps baited with mullet, fish frames and amberjack failed to attract any snapper or grouper. Night trap catches were somewhat higher than the day catches at the same location, with overall catch rates of snapper and grouper 0.27 lbs per hour per trap.

Squid

Night lights failed to attract large numbers of squid. A commercial squid jigging machine was turned on when small concentrations gathered under the lights, but no squid were caught. In some instances, it appeared that squid avoided the jigs. Few squid were caught with a dip net and identified as *Loligo peleai*.

Age and Growth Samples

Length and weight data, otoliths, scales and gonads were taken from snapper and grouper for age, growth and fecundity studies by NMFS Laboratory personnel, Beaufort, NC.

Seafood Technology Samples

Samples of snapper and grouper were collected at the request of the Director of the NMFS National Seafood Quality and Inspection Laboratory, Pascagoula, MS. The samples will be chemically analyzed to help in the positive identification of questionable species by USDC seafood inspectors.

CRUISE PARTICIPANTS

Phase I, 6/13-6/26/79

J. Benigno, Field Party Chief, NMFS, Pascagoula, MS
R. Brown, Co-op Student, NMFS, Pascagoula, MS
G. Reese, Fishery Biologist, NMFS, Pascagoula, MS
D. Sutherland, Fishery Biologist, NMFS, Miami, FL
R. Jenkins, FMES, NMFS, Miami, FL
L. Johnson, Statistician, NMFS, St. Petersburg, FL
S. Laws, Fishery Biologist, NMFS, Beaufort, NC
M. Look, Fishery Aide, NMFS, Beaufort, NC
S. Candileri, Student Trainee (Fishery Bio.), Troy State University

Phase III

7/2-8/3/79

C. Roithmayr, Field Party Chief, NMFS, Pascagoula, MS
George Randall, FMES, NMFS, Pascagoula, MS
Robert C. Gracy, Fishery Biologist, NMFS, Pascagoula, MS
Nathaniel Sanders, Jr., Fishery Biologist, NMFS, Pascagoula, MS
Richard Brown, Student Trainee, NMFS, Pascagoula, MS
Robert Jenkins, FMES, NMFS, Miami, FL
Stephen Candileri, Cooperator, Troy State University, Troy, AL

7/2-7/29/79

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Submitted By:

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Approved By:

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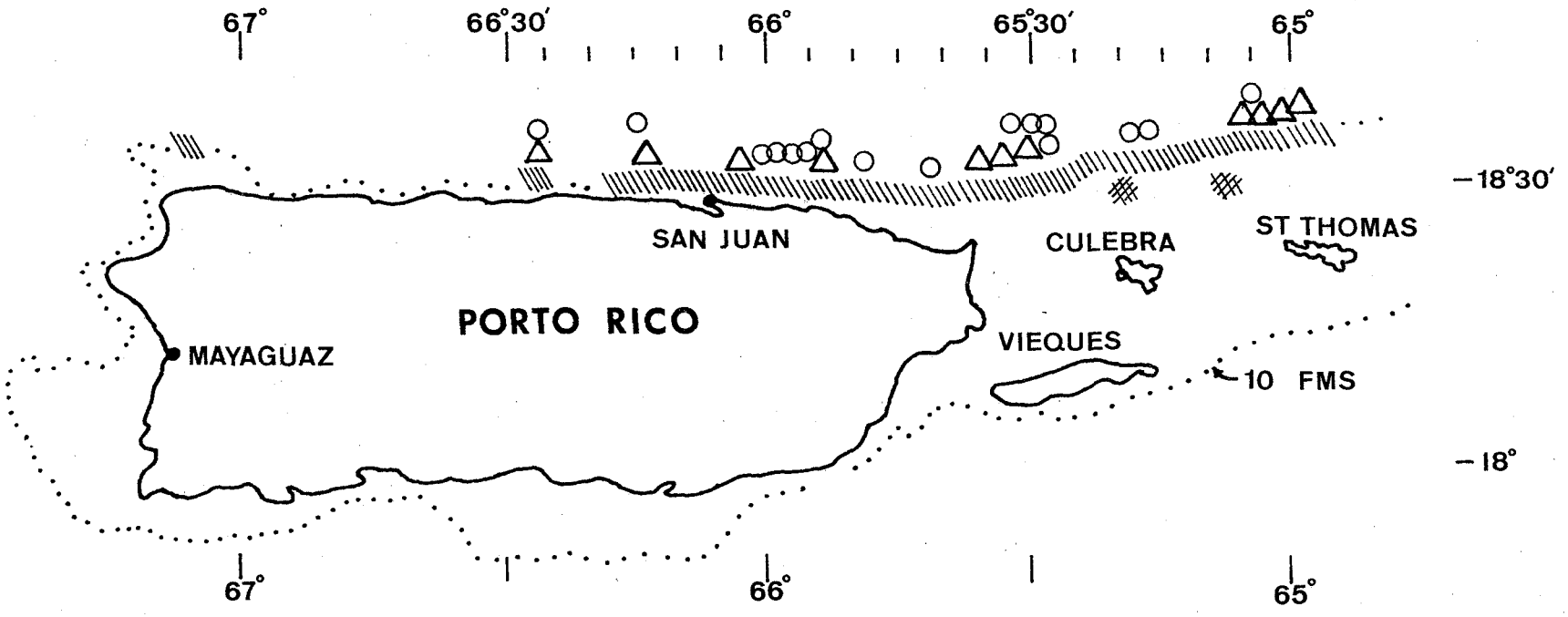
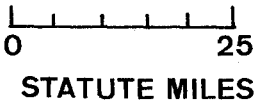


Figure 1. Survey coverage OREGON II Cruise 97 July 1979 Puerto Rico to St. Thomas. Oblique lines represent the grounds fished with bottom longline gear and electric fish reels. Cross hatch lines represent grounds where bottom longlines, electric fish reels and wire fish traps were fished. Triangles represent approximate locations where 20 pounds or more of snapper were caught per bottom longline set; open circles represent locations where 40 pounds or more of grouper were caught per longline set. Each set consisted of approximately 150 hooks, baited with squid, and fished for two hours.



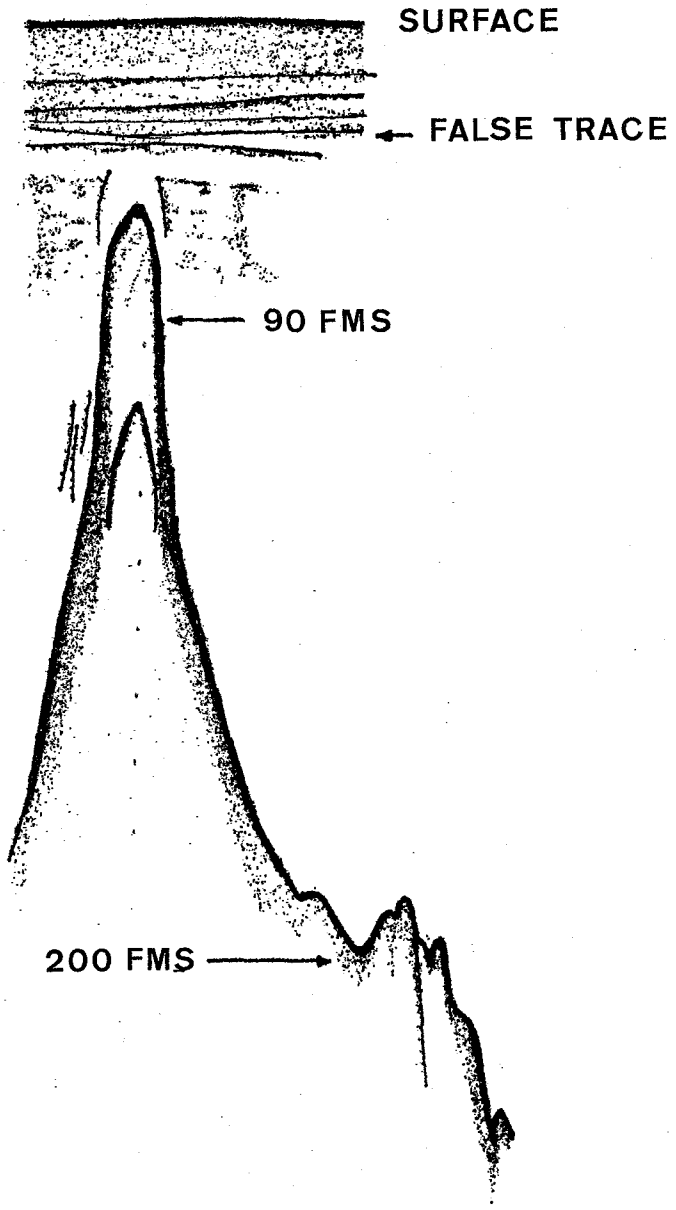


Figure 2. A bottom profile in 90 to 200 fms, NNW of St. Thomas, VI; 18°35' N latitude, 65°07' W longitude. Nine Queen snapper weighing 76 lbs and one Misty grouper weighing 35 lbs were caught during two hours of fishing with bottom lonelings at this site.

Table 1.--Fish species, number and weight captured with bottom longline gear, 50 to 300 fms north of Puerto Rico, Culebra Island and St. Thomas, VI

SCIENTIFIC NAME	COMMON NAME	NO.	LBS.
Family: Lutjanidae	Snappers		
Lutjanus vivanus	Silk snapper	46	206.0
Etelis oculatus	Queen snapper	17	162.0
Pristipomoides macropthalmus	Wenchman	73	132.1
Lutjanus analis	Mutton snapper	8	67.0
Lutjanus jocu	Dog snapper	4	48.0
Lutjanus buccanella	Blackfin snapper	12	30.5
Lutjanus synagris	Lane snapper	2	2.5
Rhomboplites aurorubens	Vermilion snapper	1	1.0
Total		163	649.1
Family: Serranidae	Groupers		
Epinephelus mystacinus	Misty grouper	42	1123.0
Epinephelus flavolimbatus	Yellowedge grouper	7	185.0
Mycteroperca venenosa	Yellowfin grouper	2	37.8
Epinephelus guttatus	Red hind	24	30.6
Epinephelus striatus	Nassau grouper	1	16.0
Epinephelus morio	Red grouper	1	10.0
Cephalopholis fulva	Coney	2	1.5
Total		82	1403.9
Other Species			
Mustelis canis	Smooth dogfish	67	453.0
Hexanchus griseus	Sixgill shark	17	415.0
Squalus spp. 1/	Dogfish shark	61	270.5
Centroscyllium fabricii	Black dogfish	13	106.0
Seriola dumerili	Greater amberjack	2	43.0
Carcharhinus falciformis	Silky chark	1	15.5
Sphyraena barracuda	Great barracuda	1	14.5
Ophichthus ocellatus	Pale spotted eel	4	12.5
Caranx lugubris	Black jack	1	11.0
Brotula barbata	Bearded brotula	2	8.3
Heptranchias perlo	Sevengill shark	2	8.0
Haemulon album	Margate	1	7.0
Gymnothorax moringa	Spotted moray	5	5.5
Holocentrus ascensionis	Squirrelfish	1	0.4
Total		178	1370.2
Grand Total		423	3423.2

1/ Largely Cuban dogfish, *Squalus cubensis*

Table 2.--Summary of snapper and grouper catch data caught with bottom long-line gear in 50 to 300 fms. north of Puerto Rico, Culebra Island and St. Thomas, V. I.

POSITION N. Lat.	POSITION W. Long.	SNAPPER WEIGHT Lbs.	GROUPER WEIGHT Lbs.	COMBINED WEIGHT Lbs.	PERIOD N/D*	DEPTH Fms.
18°35'	67°08'	12	--	12	N	158-160
18°31'	66°28'	20	58	78	D	140-200
18°31'	66°28'	12	32	44	D	250-300
18°28'	66°10'	2	--	2	N	130-175
18°28'	66°06'	--	--	--	N	55-90
18°30'	66°12'	--	--	--	N	50-150
18°31'	66°15'	40	85	125	D	200
18°29'	66°05'	24	--	24	D	50-100
18°29'	66°04'	2	--	2	N	175-260
18°30'	65°57'	2	55	57	N	170-220
18°30'	66°03'	--	--	--	D	220-265
18°29'	66°04'	--	15	15	D	148-250
18°28'	66°04'	--	--	--	D	50-100
18°29'	65°55'	2	83	85	N	154-205
18°29'	65°53'	15	--	15	N	50-100
18°31'	66°00'	18	64	82	D	168-215
18°30'	65°59'	15	66	81	D	150-190
18°29'	65°58'	3	--	3	D	78-95
18°29'	65°51'	21	--	21	N	50-150
18°30'	65°49'	--	137	137	N	100-175
18°30'	65°56'	11	45	56	D	175-270
18°29'	65°52'	--	22	22	D	176-250
18°28'	65°49	--	1	1	N	190-200
18°29'	65°41'	--	67	67	N	176-250
18°30'	65°37'	33	--	33	N	50-105
18°29'	65°49'	--	--	--	D	101-175
18°29'	65°46'	--	--	--	D	70-124
18°30'	65°32'	--	7	7	N	48-102
18°32'	65°32'	--	--	--	N	176-320
18°28'	65°45'	15	26	41	D	90-210
18°30'	65°30'	31	131	162	N	176-250

Table 2.--Continued

POSITION N. Lat.	POSITION W. Long.	SNAPPER WEIGHT Lbs.	GROUPER WEIGHT Lbs.	COMBINED WEIGHT Lbs.	PERIOD N/D*	DEPTH Fms.
18°29'	65°29'	8	36	44	N	45-76
18°27'	65°39'	5	1	6	D	50-100
18°29'	65°35'	17	--	17	D	50-208
18°30'	65°29'	8	45	53	N	101-175
18°32'	65°18'	4	115	119	N	110-215
18°29'	65°36'	6	--	6	D	82-140
18°32'	65°17'	--	65	65	N	50-150
18°32'	65°12'	10	16	26	N	40-140
18°29'	65°33'	45	70	115	D	150-220
18°29'	65°31'	--	24	24	D	50-145
18°35'	65°08'	17	15	32	N	100-165
18°35'	65°05'	27	13	40	N	42-186
18°30'	65°32'	--	3	3	D	85-175
18°29'	65°29'	4	46	50	D	110-195
18°34'	65°05'	23	19	42	N	100-220
18°35'	65°04'	--	--	--	N	170-280
18°37'	64°59'	47	--	47	D	107-166
18°37'	64°59'	--	--	--	D	102-170
18°35'	65°07'	76	35	111	D	90-200
18°35'	65°04'	41	--	41	N	50-100
18°36'	65°04'	10	30	40	N	110-176
TOTAL		626	1427	2053		

*N = Night

D = Day

Table 3.--Fish species, number and weight captured with electric commercial snapper reels, 17 - 200 fms

SCIENTIFIC NAME	COMMON NAME	NO.	LBS.
Family: Lutjanidae	Snappers		
Lutjanus vivanus	Silk snapper	11	15.2
Etelis oculatus	Queen snapper	1	5.5
Lutjanus buccanella	Blackfin snapper	1	3.5
Family: Serranidae	Groupers		
Epinephelus guttatus	Red hind	3	3.5
Epinephelus mystacinus	Misty grouper	1	2.5
Epinephelus morio	Red grouper	1	1.0
Other Families			
Remora remora	Remora	1	5.5
Mustelus canis	Smooth dogfish	1	4.0
Total		20	40.7

Table 4.--Fish species, number and weight captured with wire fish traps, 27-49 fms.

SCIENTIFIC NAME	COMMON NAME	NO.	LBS.
Family: Lutjanidae	Snapper		
Lutjanus buccanella	Blackfin snapper	17	25.8
Lutjanus analis	Mutton snapper	1	15.3
Rhomboplites aurorubens	Vermilion snapper	26	10.5
Lutjanus vivanus	Silk snapper	9	5.8
Lutjanus synagris	Lane snapper	6	2.3
Total		59	59.7
Family: Serranidae	Groupers		
Epinephelus striatus	Nassau grouper	4	45.0
Epinephelus morio	Red grouper	2	25.0
Mycteroperca venenosa	Yellowfin grouper	1	13.5
Epinephelus guttatus	Red hind	4	7.6
Cephalopholis fulva	Coney	2	1.0
Total		13	92.1
Other Families			
Haemulon aurolineatum	Tomtate	7	2.5
Gymnothorax moringa	Spotted moray	1	2.0
Lactophrys trigueter	Smooth trunkfish	3	1.8
Haemulon plumieri	White grunt	1	1.3
Holocentrus ascensionis	Squirrel fish	4	1.0
Holocentrus rufus	Longspine squirrelfish	2	0.3
Pseudupeneus maculatus	Spotted goatfish	1	0.3
Total		19	9.2
Grand Total		91	161.0

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
P. O. Drawer 1207
Pascagoula, MS 39567

FRS OREGON II Cruise 108

INTRODUCTION

The FRS OREGON II departed Pascagoula, MS June 17, 1980 to delineate snapper-grouper stocks in deeper offshore grounds off Puerto Rico, Culebra and St. Thomas Islands. Survey techniques included bottom longlines, West Indies arrowhead traps and hand reels fished from 100 to 375 fathoms. In addition, one surface longline set was completed and two large traps were fished in 238 fathoms for deep-water shrimp. A coral entanglement device was used to assess distribution of precious corals from 50 to 175 fathoms. One hundred and sixty-five stations were completed including 104 bottom longline sets, 12 fish trap, 23 handline, 1 surface longline set, 1 shrimp trap, and 24 coral entanglement stations. These stations netted 6,529 lbs of which 6,216 lbs came from bottom longlines. Represented in these catches were 32 families and 58 species of finfish.

OBJECTIVES

1. Evaluate availability and distribution of snapper/grouper resources in deep water (100-375 fathoms).

2. Determine if precious corals occur on offshore grounds off Culebra and St. Thomas Islands (50-175 fathoms).

3. Determine presence of deep-water shrimp north of Puerto Rico and St. Thomas.

GEAR

Bottom Longline

A standard bottom longline set consisted of about 160 hooks and 300 fathoms of groundline during the first 47 sets. These stations were made on the west and north coasts of Puerto Rico. Excessive gear loss forced a reduction to 200 fathoms of groundline and 100 hooks. Hook number per set varied due to vessel speed and handling problems during set out. Monafilament gangions were 2.5 feet in length with No. 7 or 9 circle tuna hooks and the groundline was 5/16" hardlay nylon trawl line. Bottom longline sets were soaked for 2 hours.

Surface Longline

Surface longlines used 100 fathoms of 5/16" hardlay nylon line with a hook gangion and float every 10 fathoms. Floats were connected to the mainline with 5 fathom drop lines which permitted the mainline to soak 5 fathoms below the surface. Gangions were made with 2 fathoms of 3/16" hardlay nylon connected to 1 fathom of 3/32" stainless steel leader with a 0/8 shark hook. Hooks were baited with squid and the set soaked from dusk to dawn.

ATC Keesler 1-0080

Handlines

Handlines used during the cruise were electric powered commercial snapper reels with 3/32 in stainless steel cable. Leaders were made from 200 lbs test monofilament with the three hooks 2 feet apart. Two or three pound weights were attached to the end of the leader, by a piece of cotton twine, to provide a means of breaking the leader free in the event the weights became snagged. Squid was used as bait.

Fish Traps

West Indies arrowhead traps were 6 ft by 4 ft by 18 in frames constructed of reinforcement rod and covered with 1-1/4" chicken wire. Traps were set on a single length of 1/2 in polyprolene line and were 30 ft apart. Trap sets were buoyed using a 1/2 in buoy line and float. Soak time was about 24 hrs.

Two large fish traps were used at one deep-water station (162 fathoms). These traps were constructed of heavy gauge pipe and were 8 ft by 6 ft by 2 ft with 2.5 inch stretch mesh webbing. Traps were set in the same manner as the West Indies arrowhead traps, but trap and buoy line were 1 in polyprolene. Soak time was 49 hrs.

Squid and fish parts were used for bait in both the West Indies and the large deep water traps. However, squid was the principal bait throughout the trapping efforts.

Shrimp Traps

Shrimp traps were large modified traps lined with burlap and used two 3" entrance funnels. Shrimp traps were buoyed in the same manner as the large fish traps and were allowed to soak 24 hrs. Equal portions of squid and fish were used as bait.

Coral Entanglement Gear

Coral entanglement gear consisted of a metal triangular frame 5 ft by 4 ft covered with 1 in stretch mesh webbing extending 10 ft behind the metal frame. The device was attached to the starboard trawl cable and allowed to drift on the bottom during bottom longline sets.

RESULTS

Bottom Longlines

Bottom longlines were fished along the west and north coast of Puerto Rico and the north coast of Culebra and St. Thomas Islands. Fishing depth varied between 100 and 175 fathoms (Fig 1). Bottom longline catches are listed in Tables 1 through 4. Commercially important species most commonly taken on the west coast of Puerto Rico included queen snapper (*Etelis oculatus*), wenchman snapper (*Pristipomoides macropthalmus*) and yelloweye snapper (*Lutjanus vivanus*). Grouper were caught less frequently on the west coast of Puerto Rico with the best catches occurring along the northwest coast in 160 to 190 fathoms. Yellowedge grouper (*Epinephelus flavolimbatus*) was the dominant grouper species taken in this section.

As fishing operations continued along the north coast of Puerto Rico, snapper catches decreased as grouper catches increased. Misty grouper (Epinephelus mystacinus) represented the grouper most frequently taken along the northern coast of Puerto Rico. Although fewer sets were made north of St. Thomas this area provided the highest catch rates of snapper and grouper and the lowest catch rates of sharks. In this area queen snapper and misty grouper were caught in canyons along the 100 fathom contour. They were the dominant snapper-grouper species caught and remain underutilized by area fishermen.

Wenchman snapper was the dominant finfish taken throughout the cruise.

Eleven species of shark were caught during the cruise. The Cuban dogfish (Squalus cubensis), smooth dogfish (Mustelus canis) and slope gulper (Centrophorus uyato) represented 90% by number and 84% by weight of the shark catch. Sharks were most abundant during night sets. Shipboard analysis of sharks stomachs indicate that garbage from ships traveling through the area represent a portion of their diet, as stomachs contained chicken, roast beef, cherries and beef tips.

A section of branching coral weighing approximately 2 lbs. was collected with the bottom longline gear near 18°36N-69°05W in 317 fathoms. This coral presently remains unidentified.

Surface Longline

No catch resulted from this set Future efforts with surface longlines should not be conducted with bottom longline fishing operations as these fishing techniques are not compatible, due to surface longline drift while tending bottom longline stations.

Handline

Twenty-three handline stations were completed between 25 and 104 fathoms and represented 14 hours of effort for 2 reels. Catches were low with jacks 35 lbs, grouper 7 lbs, snapper 2 lbs and other 0.2 lbs or 0.6 lbs per hour of commercially important species. Handline fishing becomes somewhat marginal in depths exceeding 100 fathoms because strong currents tend to lift the hooks off the bottom.

Fish Traps

Fish taken in West Indies arrowhead traps were generally small weighing 1 lb or less. Yelloweye snapper (Lutjanus vivanus) was the principal species caught in these traps. The smaller sized fish is indicative of the fishing depth as larger fish are generally taken in deeper water. Traps generally catch more reef fish species than do bottom longlines or handlines as the line fishing gear is more selective for larger fish.

Two shrimp traps were set off the northeast coast of Puerto Rico in 238 fathoms. The catch consisted of 14 isopods (Bathynomus sp.) weighing about 0.5 lbs and 9 shrimp (Nothostomus sp.) weighing about 0.5 lbs. The burlap liner tore loose elininating any further use of the traps for shrimp.

Coral Entanglement

Samples of crionoidea, hydroids, Serpulidae and gorgonians were collected. Also, black coral (Sticepathes sp.) was found east of San Juan, PR in 106 fathoms.

CRUISE PARTICIPANTS

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CARIBBEAN DIGNITARIES ABOARD FOR ONE DAY DEMONSTRATION CRUISE - July 18

Calvin Wheatley, Administrator Asst. to Gov., USVI
Donald Francois, Director, Division of Nat. Res. Mat., USVI
Omar Munoz-Roure, Exec. Dir., Caribbean Fisheries Management Council
Hector Vega Morera, Chairman, Caribbean Fisheries Management Council
Robert Creque, Per. Sec. Min. Nat. Res., British Virgin Islands
Noel Vanterpool, Dir. Dept. Agric. and Fish, British Virgin Islands
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Submitted by:

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Mike Russell, Field Party Chief

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Center Director

Table 1.--Catch distribution by area and depth for bottom longline; all sets 2 hours duration.

West Coast of Puerto Rico, 27 sets

Depth	Snapper No. Lbs.	Grouper No. Lbs.	Shark No. Lbs.	Other No. Lbs.	Number	Total Pounds	Hooks
100-149	31-120	3-8	17-75	8-47	59	250	760
150-199	66-209	6-168	79-261	5-14	156	652	1507
200-249	7-70		54-185		61	255	537
250-299			36-169	1-2	37	171	599
300-349			46-153		46	153	431
350-375							
Totals	104-399	9-176	232-843	14-63	359	1481	3834

North Coast of Puerto Rico and Culebra Island, 69 Sets

100-149	46-61	7-76	36-171	7-42	96	350	1223
150-199	75-126	7-164	136-617	13-38	231	945	1801
200-249	15-79	5-298	186-740	13-43	219	1160	1533
250-299	5-43	1-19	221-968	1-3	228	1033	2379
300-349	1-21		42-215	3-3	46	239	485
350-375			30-205	2-1	32	206	191
Total	142-330	20-557	651-2916	39-130	852	3933	7612

North Coast of St. Thomas, 8 Sets

100-149	43-146	2-40	3-40	3-42	51	268	399
150-199	22-53	7-253	13-86		42	392	194
200-249							
250-299	8-91		13-49		21	140	203
300-349				1-2	1	2	
350-375							
Totals	73-290	9-293	29-175	4-44	115	802	796

Table 2.--Predominant components of bottom longline catches.

Species	Depth	Total Number	Total Weight	% Number of Total Catch	% Weight of Total Catch	Day/Night Most Frequently Taken
Snapper						
Etelis oculatus	101-334	81	647	6	10	Day
Pristipomoides macrophthalmus	101-261	188	204	14	3	Day
Lutjanus vivanus	115-164	35	148	3	2	Day
Grouper						
Epinephelus mystacinus	134-261	24	728	2	12	Day
Epinephelus flavolimbatus	136-194	8	168	1	3	Day
Shark						
Squalus cubensis	118-363	488	1160	37	19	Night
Mustelus canis	115-271	122	615	9	10	Night
Centrophorous uyato	255-314	192	1431	14	23	Night

Table 3.--Number and weight of all species taken during bottom longlining.

Species	No. of Individuals	Pounds
Snapper		
Pristipomoides macropthalmus	188	204.0
Etelis oculatus	81	647.0
Lutjanus vivanus	35	148.0
Lutjanus jocu	1	7.0
Lutjanus apodus	1	3.0
Ocyurus chrysurus	2	3.0
Rhomboplites aurorubens	7	19.0
Grouper		
Epinephelus guttatus	1	0.5
Epinephelus mystacinus	24	728.0
Epinephelus niveatus	2	4.0
Epinephelus flavolimbatus	8	168.0
Epinephelus itajara	1	60.0
Cephalopholis fulva	1	0.5
Sharks		
Etmopterus sp.	4	1.0
Etmopterus hillianus	3	0.25
Scyliorhinidae	10	6.0
Scyliorhinus retifer	2	0.5
Centrophorous sp.	2	17.0
Centrophorous uyato	192	1431.0
Squalus cubensis	488	1160.0
Mustelus canis	122	615.0
Heptrachias perlo	22	64.0
Sphyrna lewini	1	73.0
Galeus melastomes	20	7.0
Hexanchus vitulus	19	373.0
Dalatias licha	4	68.0
Other		
Rajidae	1	25.0
Chimaera cubana	6	24.0
Caulolatilus intermedius	1	0.3

Table 3.--Continued

Species	No. of Individuals	Pounds
Haemulon plumieri	1	1.0
Haemulon album	1	5.0
Odontoscion dentex	2	0.8
Ruvettus pretiosus	1	2.0
Sphoeroides nephelus	1	1.0
Seriola fasciata	3	18.0
Seriola rivoliana	7	123.0
Seriola dumerili	3	61.0
Polymixia lowei	4	1.0
Synodus sp.	1	0.3
Saurida normani	1	0.75
Muraenidae	6	11.0
Gymnotherax	8	16.0
Gymnothorax funebris	1	2.0
Gymnothorax ocellatus	10	16.0
Ophichthus sp.	7	16.0
Ophichthus spinicauda	1	4.0
Myrophis sp.	1	0.1
Conger esulents	1	3.0
Conger triporiceps	1	7.0
Coral, sponge, bryozoa	16	70.0

Table 4.--Bottom longline sets catching 20 pounds or more of snapper or grouper.

Station	Day or Night Station	Pounds		Depth	Position	
31704	Day	S	40	150	18°02.5N	67°25.5W
31707	Night	S	70	154	18°03.8N	67°38.3W
31708	Day	S	52	154	18°04.3N	67°28.2W
31710	Day	S	20	113	18°06.6N	67°28.1W
31711	Day	S	70	154	18°07.2N	67°30.2W
31716	Day	S	82	138	18°11.3N	67°28.4W
31729	Day	G	117	194	18°25.5N	67°14.2W
31734	Day	G	33	166	18°24.9N	67°14.6W
31742	Day	G	26	156	18°34.9N	77°10.9W
31746	Day	S	31	265	18°32.5N	66°55.2W
31751	Day	G	120	242	18°31.3N	66°43.1W
31756	Night	G	53	224	18°31.9N	66°30.6W
31762	Night	G	20	136	18°31.2N	66°22.0W
31771	Day	S	21	334	18°32.1N	66°12.3W
31773	Day	G	75	246	18°30.0N	66°10.8W
31778	Day	S G	35 50	207	18°30.1N	66°06.8W
31781	Night	G	44	194	18°31.0N	66°00.2W
31814	Day	S	20	189	18°29.1N	65°33.2W
31816	Day	S	20	242	18°30.8N	65°39.6W
31834	Day	S G	43 68	181	18°31.5N	65°23.4W
31844	Day	S G	46 39	146	18°34.2N	65°08.2W
31846	Day	S	36	88	18°34.8N	65°06.4W
31853	Day	S G	51 253	159	18°35.0N	65°03.5W
31855	Day	S	91	262	18°36.1N	65°06.5M
31864	Day	S	59	95	18°34.8N	65°03.7W

Table 5.--Catch distribution from West Indies arrow head traps by depth and species.

Depth	Hrs. Soaked	*Lutjanus vivanus*	*Lutjanus buccanella*	*Rhomboplites aurorubens*	*Mycteroperca tigris*	*Epinephelus guttatus*	*Epinephelus morio*	*Holocetrus ascersionis*	*Holocentrus rufus*	*Haemulon striatum*	*Balistes capriscus*	*Canthidermis sufflamen*	*Chaetodon capistratus*	*Chaetodon sedentarius*	*Gymnothorax moringa*	*Panulirus argus*
		# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.	# Lbs.
35-39	65	28-9	6-7		2-2	2-4		4-1		2-.3			2-.15			2-2
40-44	76	33-25	4-4	5-2			2-23	10-3								
45-49	24	3-1									3-2			1-.03		
50-54																
55-59	52	30-21	7-7			5-9		5-1	4-2			1-5			1-5	
60-64																
65-69	21	20-22	36-30													

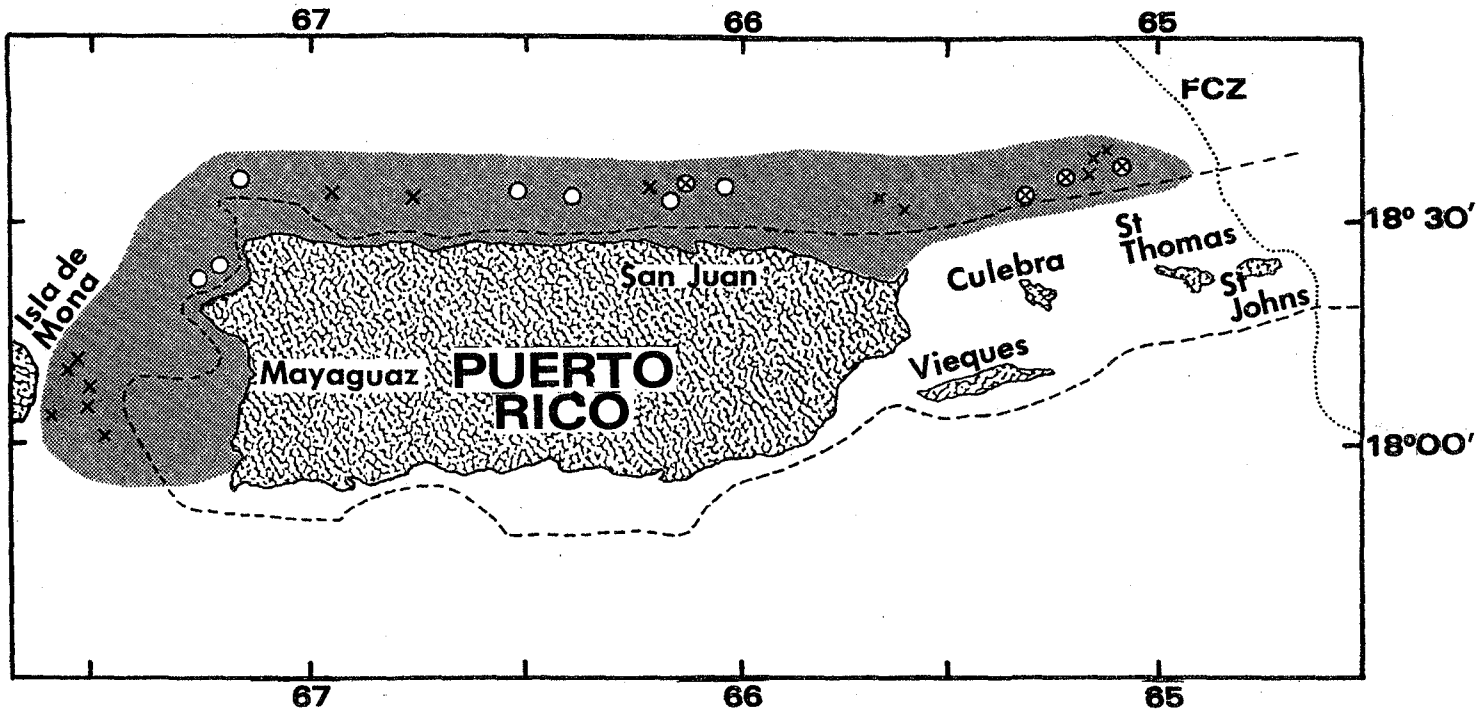

Figure 1.--Survey area for OREGON II Cruise 108 is represented by the shaded portion with dashed line representing the 100 fathom contour. Bottom longline sets catching more than 20 lbs are represented by an X for snapper and an O for grouper. Those areas in which more than 20 pounds of snapper and grouper were caught are represented by a ⊗.

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
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Pascagoula, MS 39567

FRS OREGON II Cruise 119

INTRODUCTION

The FRS OREGON II departed Pascagoula, Miss. July 13, 1981 to sample deep water stocks of snapper-grouper off Puerto Rico, Culebra and St. Thomas Islands. Fishing gear included bottom longlines, fished between 140 and 254 fathoms, and West Indies arrowhead traps and hand reels fished between 50 and 100 fathoms. Fifteen stations were completed including 13 bottom longline sets, 1 fish trap, and 1 handline station. Total combined catch from these stations was 389 lbs of which 366 lbs came from bottom longlines. Represented in these catches were 10 families and 20 species of finfish. The cruise terminated at 0200 hours July 22, 1981 when the fishing line was caught in the ship's wheel and the seals around the FRS OREGON II's shaft began leaking oil. This damage required that the vessel be dry-docked in Puerto Rico for repairs. Cruise participants were returned to Pascagoula, Miss.

OBJECTIVES

1) Evaluate availability and distribution of snapper-grouper resources in deep water (100-240 fathoms) off Puerto Rico and the U. S. Virgin Islands.

2) Obtain biological data from snapper-grouper species caught.

3) Obtain bottom contour data to estimate area of habitat.

4) Obtain hydrographic data from all fishing stations.

GEAR

Bottom Longline

A standard bottom longline set consisted of 100 hooks and 200 fathoms of ground line. Hook number per set varied due to vessel operation and handling problems during set out. Monofilament gangions were 2.5 feet in length with No. 7 circle tuna hooks and the ground line was 5/16 in hardlay nylon. Bottom longline sets soaked 2 hours and squid was used for bait.

Handlines

Electric powered commercial handline snapper reels with 3/32 in stainless steel cable were used. Terminal gear consisted of 200 pound test monofilament leader with the three hooks placed 2 feet apart. Two or three pound weights were attached to the end of the leader by a piece of cotton twine to provide a means of breaking the leaders free in the event the weights became snagged. Mackerel was used as bait.

Fish Traps

West Indies arrowhead traps measuring 6 ft by 4 ft by 18 in were constructed of reinforcement rod and covered with 1-1/4 in chicken wire. Traps were set on a length of 1/2 in polypropylene line and were placed 30 ft apart. They were buoyed using 1/2 in buoy line and a float. Total trap soak time was about 63 hours. Squid and fish parts were used for bait.

RESULTS

Bottom longlines were fished along the west coast of Puerto Rico, including one set along the north coast. Fishing depth varied between 140 and 254 fathoms (Table 1). Bottom longline catches are listed in Tables 1-3. Commercially important species taken on the west coast of Puerto Rico included queen snapper (*Etelis oculatus*), wenchman snapper (*Pristipomoides macrophthalamus*), misty grouper (*Epinephelus mystacinus*), and yellowedge grouper (*Epinephelus flavolimbatus*). Snapper were taken more frequently than grouper, with snapper occurring between 148-254 fathoms and grouper between 145-250 fathoms (Table 2). Fewer species of snapper were caught this year along the west coast of Puerto Rico than during previous cruises.

Fish Traps

One fish trap station was completed in 36 fathoms of water west of Mayaguez, Puerto Rico. Fish taken in West Indies arrowhead traps weighed 1 lb or less. Squirrel fish (*Holocentrus rufus*) was the dominant trap caught species.

Handlining

One handline station of 9 hours duration was completed in 10 fathoms west of Mayaguez, Puerto Rico. No fish were caught. Cut mackerel was used as bait.

Hydrographic Data

XBT's were shot at 13 stations to provide temperature profiles.

CRUISE PARTICIPANTS

Mike Russell, Field Party Chief, Pascagoula, MS, 7/13-28/81
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Ben Jimenez, Center Staff, Miami, FL, 7/19-22/81

Submitted by:

for Mike Russell, Field Party Chief

Approved by:

Andrew J. Kemmerer, Director
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for Richard J. Berry
William W. Fox, Jr.
Center Director

Table 1.--Catch distribution by depth for 12 bottom longline sets off the west coast of Puerto Rico.

Depth	Snapper		Grouper		Shark		Other		Total		
	No.	Lbs.	No.	Lbs.	No.	Lbs.	No.	Lbs.	Number	Pounds	Hooks
100-149	3	5			16	31			19	36	289
150-199	4	16	3	136	14	95	2	4	23	251	700
200-254	19	51			19	28	1	1	39	80	296
Total	26	72	3	136	49	154	3	5	81	367	1285

Table 2.--Predominant components of bottom longline catches.

	Depth Range (Fms)	Total		Percent of Total Catch	
		Number	Weight	Number	Weight
Snapper					
Etelis oculatus	148-254	13	53	16	14
Pristipomoides macrophthalamus	158-254	11	16	14	4
Totals				30	18
Grouper					
Epinephelus mystacinus	190-250	1	72	1	20
Epinephelus flavolimbatus	145-164	2	64	2	17
Totals				3	37
Sharks					
Squalus cubensis	140-254	34	55	42	15
Mustelus canis	140-254	13	55	16	15
Hexanchus vitulus	145-164	1	32	1	9
Carcharhinus springeri	145-164	1	12	1	3
Totals				60	42

Table 3.--Number and weight in pounds of all species taken during bottom longline and trap sets.

Species	Bottom Longline		Traps	
	Number Individuals	Weight Pounds	Number Individuals	Weight Pounds
Snapper				
Pristipomoides macrophthalamus	11	16		
Etelis oculatus	13	53		
Lutjanus buccanella	1	1	2	2
Apsilus dentatus	1	2		
Grouper				
Cephalopholis fulva			6	2
Epinephelus mystacinus	1	72		
Epinephelus flavolimbatus	2	64		
Epinephelus guttatus			8	6
Sharks				
Squalus cubensis	34	55		
Carcharhinus springeri	1	12		
Mustelus canis	13	55		
Hexanchus vitulus	1	32		
Others				
Pontinus longispinis	1	1		
Gymnothorax funebris	1	1		
Gymnothorax ocellatus	1	3		
Holocanthus tricolor			4	1
Chaetodon capistratus			3	.3
Gymnothorax moringa			1	4
Holocentrus rufus			13	5
Carpilius corallinus			1	2

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
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Pascagoula, MS 39567-0112

FRS OREGON II Cruise 129
8/26 - 9/30/82

INTRODUCTION

The FRS OREGON II departed Pascagoula, MS on August 26, 1982 to sample deep water stocks of snapper-grouper off Puerto Rico, Culebra and St. Thomas Islands (Fig. 1). Fishing gear included bottom and offbottom longlines fished between 38 and 322 fathoms; fish traps (sablefish and Florida) and handlines fished between 38 and 86 fathoms; and shrimp traps fished in 283 and 301 fathoms. Two hundred and forty-four stations were completed, including 222 bottom and offbottom longline sets, 16 fish traps, 2 shrimp traps and 4 handline stations. Total combined catch from all stations was 6,386 lbs. of which 3,396 lbs. came from bottom longlines, 2776 lbs. from offbottom longlines, 156 lbs. from fish traps, 52 lbs. from shrimp traps and 6 lbs. from handlines. Represented in these catches were 39 species of finfish from 19 families and 11 species of invertebrates from 4 families.

OBJECTIVES

1. Sample snapper and grouper resources on deep water reefs (50-250 fathoms) with bottom and offbottom longlines and traps.

2. Collect species, size and weight composition data as a function of gear, depth and habitat.

3. Collect biological data from selected snapper and grouper specimens including scales, otoliths, sex and maturation stage.

GEAR

Bottom longline: A standard bottom longline set consisted of 50 hooks and 100 fathoms of ground line. Hook number per set varied due to vessel operation and handling problems during set out. Monofilament gangions were 2.5 feet in length with No. 7 circle tuna hooks and the ground line was 3/8" braided nylon. Bottom longline sets soaked 2 hours and squid was used for bait.

Offbottom longline: Offbottom longlines consisted of 100 fathoms of floating polypropylene mainline and 20 evenly spaced 10 ft PVC pipes weighted at the bottom with a 4" float at the top. Each pipe was 10 feet long with 6 evenly spaced hooks on 8-inch monofilament gangions. The pipes were designed to set vertically in the water with one end on the bottom and the other attached to the floating mainline. Squid was used for bait on all hooks and soak time for all sets was 2 hours. Number 7 circle tuna hooks were used exclusively.

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Bottom longlines and offbottom longlines were hooked together and set as a unit. During Cruise 129 the gear was hauled with a hydraulic pot hauler.

Fish traps: Each of the 16 fish trap sets consisted of three sablefish and three Florida fish traps. Sablefish traps were spaced approximately 35 feet apart and bouyed at one end of the set. Three Florida fish traps were attached at the end of the sablefish traps, 30 feet apart. Sablefish traps were 3x3x6 feet with a single funnel, while Florida fish traps were 2x2x4 feet with a single funnel.

Shrimp traps: Eight shrimp traps were set along the mainline with each trap 30 feet apart. Jacks (Carangidae) and squid were used for bait. Shrimp traps measured 4 X 3 X 1 feet and were oval in shape. They were constructed of plastic and had ½ inch mesh liners.

Handlines: Handlines used during the cruise were electric powered commercial snapper reels with 3/32 inch stainless steel cable. Leaders were made from 200 lb. test monofilament with the three hooks 2 feet apart. Twenty pound weights were attached to the leader by a piece of cotton twine, to provide a means of breaking the leader free if the weights snagged. Squid was used as bait.

ENVIRONMENTAL DATA COLLECTION

Expendable bathythermographs were shot at 215 stations to provide temperature profiles of deep water fishing stations. Complete coverage of all 244 stations was not possible due to malfunction of 12 XBT probes, addition of 13 stations south of St. Thomas and Isla de Vieques, which were not anticipated, and sampling of 4 very shallow handline stations where temperature profile from hydrocasts had shown no change from surface to bottom. Hydrocasts were completed at 135 stations providing water samples for laboratory determination of salinities. Adverse weather conditions prevented taking hydrocasts at 5 stations while 4 stations were in very shallow water (less than 5 fathoms). Surface salinity and temperature were taken at all stations. Other environmental observations were taken as part of routine station observations, including air temperature, barometric pressure, sea color, sea conditions, and wind speed and direction. All environmental data have been put into the SEFC computer system.

RESULTS

Bottom longlines: Bottom longlines were fished along the west and north coast of Puerto Rico and the north coast of both Culebra and St. Thomas Island. An additional two days of fishing was completed south of St. Thomas and Isle de Vieques. Fishing depth varied between 38 and 322 fathoms (Fig. 1). Bottom longline catches are listed in Tables 1, 2 and 3. Dominant snapper species taken on bottom longlines during the cruise were, by weight, queen snapper (*Etelis oculatus*), wenchman snapper (*Pristipomoides macropthalmus*) and silk snapper (*Lutjanus vivanus*).

Dominant groupers were misty grouper (Epinephelus mystacinus), yellowedge grouper (Epinephelus flavolimbatus) and snowy grouper (Epinephelus niveatus). The dominant species of shark caught were the slope shark (Centrophorous granulosus), cuban dogfish (Squalus cubensis), and smooth dogfish (Mustelus canis). Five other species of shark were also caught. All species were taken between 98 and 278 fathoms (Table 2).

Catches along the west coast of Puerto Rico were poor for all species, however, frequency of sharks was highest in this area. As fishing operations continued eastward along the north coast of Puerto Rico, catches of shark per set dropped slightly accompanied by an increase in the catch of snapper and grouper. This trend continued as fishing operations moved north of St. Thomas where snapper was the dominant species taken. Grouper catches also showed a slight increase in number and weight per set north of St. Thomas. Most notable along the northern slope of Puerto Rico and the Virgin Islands was the marked decrease in sharks taken as fishing operations moved easterly.

Catch composition seen south of St. Thomas remained about the same as seen on the north coast with snapper the most frequently taken species followed by shark and grouper. Grouper catches were slightly lower than seen on the north coast of St. Thomas (Table 3). the north coast of St. Thomas (Table 3).

Offbottom longline: Offbottom longlines were fished in conjunction with bottom longlines and reflected a similar catch composition as seen on the bottom longlines. By weight, wenchman snapper (Pristipomoides macropthalmus) was the dominant snapper caught on offbottom longlines, with queen snapper (Etelis oculatus) second, and silk snapper (Lutjanus vivanus) third.

Species composition of grouper, by weight, remained the same as seen on bottom longlines with misty grouper (Epinephelus mystacinus) first, yellowedge grouper (Epinephelus flavolimbatus) second, and snowy grouper (Epinephelus niveatus) third. Offbottom longlines produced 11 species of sharks with the dominant species, by weight, being the slope shark (Centrophorus granulosus), the cuban dogfish (Squalus cubensis) and the smooth dogfish (Mustelus canis) respectively. These species were taken between 98 and 322 fathoms (Tables 4 and 5).

Catch trends for offbottom longlines were similar to bottom longlines with the lowest per set catches of snapper and grouper occuring along the west coast of Puerto Rico; but sharks were again more prevalent in this area. The occurrence of sharks decreased and snapper captures increased along the north coast of Puerto Rico and Culebra Island with the occurrence of grouper remaining about the same. Frequency of snapper and grouper per set then increased north of St. Thomas as the occurrence of sharks decreased. South of St. Thomas grouper were not taken on offbottom longlines, however, the frequency of snapper captures remained the same as for the north coast.

Overall, the catch of snapper and grouper was lower on offbottom longlines but sharks were caught more frequently. Catches of 20 pounds, or more

of snapper or grouper on longlining gear are listed in Table 6.

Frequent gear tangles occurred with the offbottom longline and are probably the result of improper gear handling techniques during set out and retrieval. Some of these problems would be resolved with a smaller vessel.

Fish traps: Sixteen fish trap stations between 55 and 86 fathoms were completed, representing 189 hours of soak time. Sablefish traps produced 48 finfish weighing 49 lbs. while Florida fish traps produced 71 finfish weighing 107 lbs. The principal finfish was silk snapper (*Lutjanus vivanus*), (Table 7).

Shrimp traps: Two shrimp trap stations were made in 283 and 301 fathoms, with soak times of 26 and 18 hours, respectively. Catches included 40 *Bathynomus giganteus* weighing 34 lbs., 8 nephropsis weighing 6.2 lbs. and 170 *Hetrocarpus* weighing 12 lbs. The south slope may have some limited commercial potential for trapping blind lobsters.

Handlines: Four handline stations were completed between 21 and 40 fathoms representing 7 hours of effort for 3 reels. Catches were low with a 4 lb. red hind (*Epinephelus guttatus*) and a 2 lb. coney (*Epinephelus fulvus*) caught. Handline fishing aboard the OREGON II is marginal due to the vessels rapid drift rate and its inability to maintain position.

Cruise Participants

Mike Russell, Field Party Chief, Pascagoula, MS 8/26-9/30/82
Larry Braswell, Coop Student, Pascagoula, MS 8/26-9/30/82
Fred Diaz, NOAA Officer, Pascagoula, MS 8/26-9/30/82
Malcolm Meaburn, Chemist, Charleston, SC 9/1-9/24/82
Guy Davenport, Biologist, Miami, FL 9/1-9/24/82
Essie Coleman, Biologist, Miami, FL 9/1-9/24/82
Diane Mason, Biologist, Beaufort, NC 9/1-9/24/82
Steve Candileri, Biologist, FL. Dept. Nat. Res., Tampa, FL 8/26-9/30/82
Frida Schnitzler, Biologist, LaFayette, LA 8/26-9/30/82
Joy Gilder, Student, Florence, AL 8/26-9/30/82
Lewis Mendoze, Caribbean Council, P.R. 9/1-9/30/82
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David Olson, Caribbean Council, VI 9/22-9/24/82

Submitted by:

Mike Russell
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Approved by:

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William W. Fox, Jr.
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Table 1. Number and Weight of All Species Taken With Bottom and Offbottom Longlines.

Species	Bottom L.L.		Off Bottom L.L.	
	No.	Wt.	No.	Wt.
Snapper				
Etelis oculatus	17	187	8	82
Lutjanus buccanella	4	9	2	5
Lutjanus vivanus	9	30	13	27
Pristipomoides aquilonaris	23	26	19	20
Pristipomoides macropthalmus	69	146	53	108
Rhomboplites aurorubens	6	5	4	4
Grouper				
Epinephelus flavolimbatus	3	86	4	86
Epinephelus guttatus	1	2	1	1
Epinephelus mystacinus	13	336	7	159
Epinephelus niveatus	2	70	2	42
Sharks				
Carcharhinidae	2	58	1	19
Centrophorous granulosus	111	1181	139	1333
Dalatias licha			1	21
Etmopterus hillianus			4	4
Galeus arae			1	1
Heptranchias perlo	2	5	8	30
Hexanchus vitulus	13	327	10	132
Mustelus canis	49	263	54	241
Scyliorhinus retifer	1	1		
Scyliorhinus torrei			1	1
Scymnodon sp.	2	11	1	6
Squalus cubensis	162	457	190	445

Table 1.--continued

Species	Bottom L.L.		Offbottom L.L.	
	No.	Wt.	No.	Wt.
Other				
Caranx lugubris			1	7
Chimera cubana			1	6
Gymnothorax funebris	1	1		
Gymnothorax moringa	11	33	5	26
Hildebrandi fluva	1		1	1
Hildebrandi gracilior			3	12
Ophichthus sp.	9	39	1	2
Polymixia lowei			2	1
Pomadasysi crocro			1	1
*Ruvettus pretiosus**			1	-
Seriola dumerili	3	90		
Seriola rivoliana	2	24		
Odontoscion dentex	1	1		

* Shark Damage

Table 2.--Dominant Components of Bottom Longline Catches

Species	Depth	Total Number	Total Weight	% Number of Total Catch	% Weight of Total Catch	Day/Night Most Frequently Taken
Snapper						
Etelis oculatus	103-242	17	187	3	6	D
Pristipomoides macropthalmus	114-241	69	146	13	4	D
Lutjanus vivanus	98-161	9	30	2	1	D
Grouper						
Epinephelus mystacinus	125-210	13	336	3	10	N
Epinephelus flavolimbatus	180-161	3	86	1	3	N
Epinephelus niveatus	198-236	2	70	.4	2	D
Sharks						
Centrophorus granulosus	184-274	111	1181	21	35	N
Squalus cubensis	114-278	162	457	31	13	N
Mustelus canis	114-251	49	263	9	8	N

Table 3.--Catch distribution by area and depth for bottom longlines.

Depth In Fm	Snapper No.	Snapper Lbs.	Grouper No.	Grouper Lbs	Shark No.	Shark Lbs.	Other No.	Other Lbs.	Total Number	Total Pounds	Total Hooks
West Coast of Puerto Rico, 20 Sets											
50-99											50
100-149	4	2			2	3	4	6	10	11	234
150-199	8	18	1	12	83	701	2	6	94	737	499
200-249			1	33	9	111	4	13	14	157	146
250-299											50
Total	12	20	2	45	94	815	10	25	118	905	979
North Coast of Puerto Rico and Culebra Island, 71 Sets											
50-99	2	2							2	2	50
100-149	8	19	3	62	37	361	2	3	50	445	549
150-199	53	206	7	187	84	512	13	115	157	1,020	1,681
200-249	11	62	2	75	86	435	3	11	102	583	1,000
250-299					5	7			5	7	245
Total	74	289	12	324	212	1,315	18	129	316	2,057	3,525
North Coast of St. Thomas, 9 Sets											
0-49							1	35	1	35	50
100-149	10	22	1	2	1	17			12	41	100
150-199	9	20	2	48	6	17			17	85	200
200-249											
250-299					10	60			10	60	100
Total	19	42	3	50	17	94	1	35	40	221	450
South Coast of St. Thomas, and Isla de Viequez, 11 Sets											
50-99											
100-149	4	11							4	11	150
150-199	14	32	1	31	7	21	1	1	23	85	200
200-249	5	9	1	44	13	64			19	117	200
250-299											
Total	23	52	2	75	20	85	1	1	46	213	550

Table 4.--Dominant Components of Offbottom Longline Catches

Species	Depth	Total Number	Total Weight	% Number of Total Catch	% Weight of Total Catch	Day/Night Most Frequently Taken
Snapper						
Pristipomoides macropthalmus	140-238	53	108	10	4	D
Etelis oculatus	140-225	8	82	2	3	D
Lutjanus vivanus	98-161	13	27	3	1	D
Grouper						
Epinephelus mystacinus	148-176	7	159	2	6	D
Epinephelus flavolimbatus	114-161	4	86	1	3	N
Epinephelus niveatus	198-236	2	42	---	1	D
Sharks						
Centrophorus granulosus	198-322	139	1,333	28	47	N
Squalus cubensis	114-278	190	445	37	16	N
Mustelus canis	100-251	54	241	10	9	N

Table 5.--Catch distribution by area and depth for offbottom longline.

Depth In Fm	Snapper No.	Snapper Lbs.	Grouper No.	Grouper Lbs.	Shark No.	Shark Lbs.	Other No.	Other Lbs.	Total Number	Total Pounds	Total Hooks
West Coast of Puerto Rico, 20 Sets											
50-99					1	19			1	19	119
100-149	3	10	1	31	15	69	1	1	20	111	588
150-199	2	5	1	16	92	892	3	2	98	915	1,308
200-249					13	99			13	99	240
250-299					4	19			4	19	102
Total	5	15	2	47	125	1,098	4	3	136	1,163	2,357
North Coast of Puerto Rico and Culebra Island, 71 Sets											
50-99	2	2							2	2	114
100-149	4	3	2	32	43	136	2	22	51	193	1,560
150-199	30	83	7	192	86	248	4	13	127	536	3,936
200-249	18	63			90	439			108	502	2,400
250-299	1	3			16	71			17	74	360
300-350					3	32			3	32	120
Total	55	154	9	224	238	926	6	35	308	1,339	8,490
North Coast of St. Thomas, 9 Sets											
1-49	2	5	1	1					3	6	120
100-149	14	24			4	21	1	1	19	46	240
150-199	4	7	2	16	6	57	1	7	13	87	474
200-249											
250-299					7	46			7	46	240
Total	20	36	3	17	17	124	2	8	42	185	1,074
South of St. Thomas and Isla de Viequez, 11 Sets											
50-99											
100-149	8	15			1	10			1	10	360
150-199	11	26			23	61	1	1	24	62	474
200-249					6	14	1	3	7	17	474
250-299											
Total	19	41			30	85	2	4	32	89	1,308

Table 6.--Bottom and Offbottom Longline Sets Catching 20 Pounds, or more, of Snapper or Grouper. Bottom Longline, LL; Offbottom, OB.

Station No.	Day/ Night	#/Pounds	Gear	Depth	Position	
37125	D	1/33G	LL	208	18°16'	67°15'
37133	N	1/31G	OB	145	18°28'	67°11'
37176	D	1/26G	OB	198	18°31'	66°31'
37177	D	2/23S	LL	198	18°31'	66°31'
37189	D	2/54G	LL	180	18°31'	66°22'
37197	D	1/58G	LL	236	18°32'	66°21'
37207	N	2/39S	LL	173	18°31'	66°22'
	N	1/14G				
37215	N	2/83G	LL	180	18°31'	66°08'
37223	D	3/22S	LL	187	18°30'	66°04'
37233	D	5/20S	LL	161	18°29'	65°49'
37246	N	1/32G	LL	158	18°29'	65°44'
37249	N	2/61G	LL	140	18°29'	65°52'
37250	N	1/35G	OB	151	18°29'	65°50'
37254	N	5/24S	OB	150	18°29'	65°40'
37256	D	5/29S	OB	225	18°30'	65°40'
37258	D	1/65G	OB	162	18°29'	65°37'
37268	N	1/46G	OB	160	18°32'	65°24'
37279	N	3/9 S	LL	202	18°32'	65°18'
		1/17G				
37309	N	1/40G	LL	184	18°37'	64°58'
37320	D	1/31G	LL	171	18°11'	65°05'
37333	N	1/44G	LL	210	18°06'	65°18'

Table 7.-- Catch Distribution from Fish Traps by Depth and Species.

Depth	Hrs Soaked	*Lutjanus buccanella*	*Lutjanus vivanus*	*Rhomboplites aurorubens*	*Holocentrus rufus*	*Odontoscion dentex*	*Epinephelus striatus*	*Mycteroperca venenosa*	*Mustelus canis*	*Stenorynchus sp*
		No./Lbs.	No./Lbs.	No./Lbs.	No./Lbs.	No./Lbs.	No./Lbs.	No./Lbs.	No./Lbs.	No./Lbs.
55-60	107	8/12	25/23	2/2			1/24	1/30		
61-65	21	1/1	6/5	4/3	3/2					
66-70										
71-75	13	2/7	15/19	38/17					1/6	1/1
76-80										
81-85	20		5/3			2/1				1/1
86-90	28		3/1							

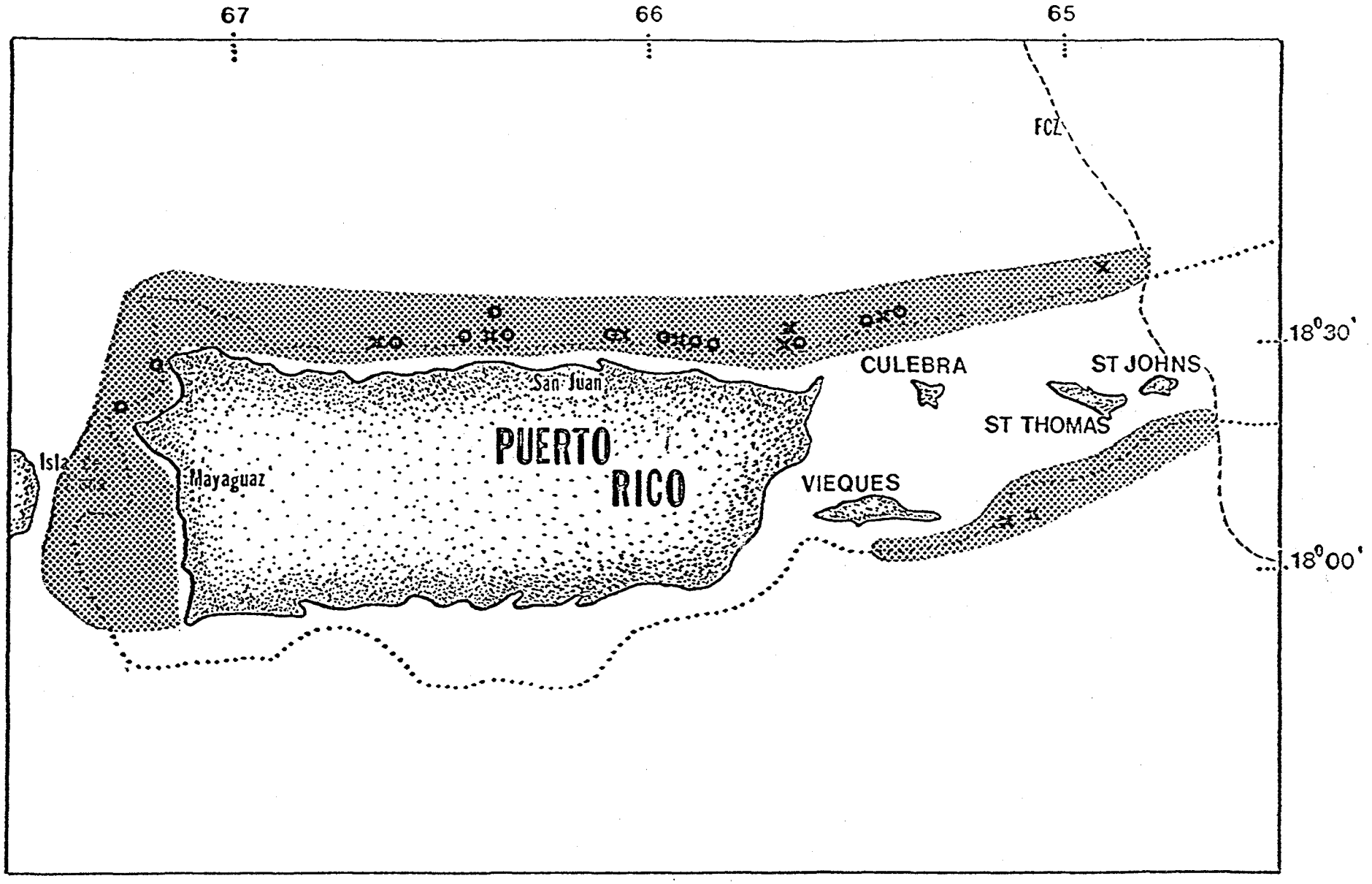

Figure 1. Survey area for OREGON II Cruise 129 is represented by the stippled area with the dotted line representing the 100 fathom contour. Bottom longline sets catching more than 20 lbs. are represented by an x for snapper and an o for grouper.

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FRS OREGON II CRUISE 132
1/6/83 - 2/11/83

INTRODUCTION

In cooperation with the Caribbean Fishery Management Council, a pelagic fishery assessment survey was conducted from the FRS/OREGON II on the south and west coasts of Puerto Rico and the U.S. Virgin Islands (Figure 1). Target coastal and oceanic fish species were identified by the management council prior to the cruise as possible marine resources to increase fishery landings in their area.

The vessel departed Pascagoula on January 6 with port calls at Key West, Florida on January 8, Mayaquez, Puerto Rico on January 12, 16, 19, Ponce, Puerto Rico on January 24, Charlotte Amalie, St. Thomas on January 25, Frederiksted, St. Croix on February 2 and San Juan, Puerto Rico on February 4. The port call in Key West, Florida, was to embark cruise personnel and load six fish attractant devices, manufactured by McIntosh Marine, Inc. The devices had been purchased by the Virgin Island Government and were delivered to St. Thomas and St. Croix. At Mayaquez, the port call was made to embark cruise participants from Puerto Rico and review the cruise plan with local and U.S. Virgin Island representatives. Other port calls at Mayaquez were for the purposes of embarking interested fishermen, representatives from fishery organizations, and the press to demonstrate longlining operations and fish attractant devices. An unscheduled port call had to be made at Mayaquez to deliver a fishing vessel which had been encountered offshore without power. The port call at Ponce was to pick up longline gear which had been lost and later found by two Puerto Rican fishermen, and port entry at San Juan provided the opportunity to deliver chlorophyll samples to University of Puerto Rico scientists.

OBJECTIVES

1) Determine the availability of oceanic fish species utilizing pelagic longline gear on the south and west coast of Puerto Rico and the U.S. Virgin Islands.

2) Deploy and test the effectiveness of aggregating structures for surveys of coastal and oceanic pelagic fish species on the south and west coasts of Puerto Rico and the U.S. Virgin Islands.

3) Collect biological samples for bio-profiles task personnel from pelagic fish species that are harvested (near the aggregating

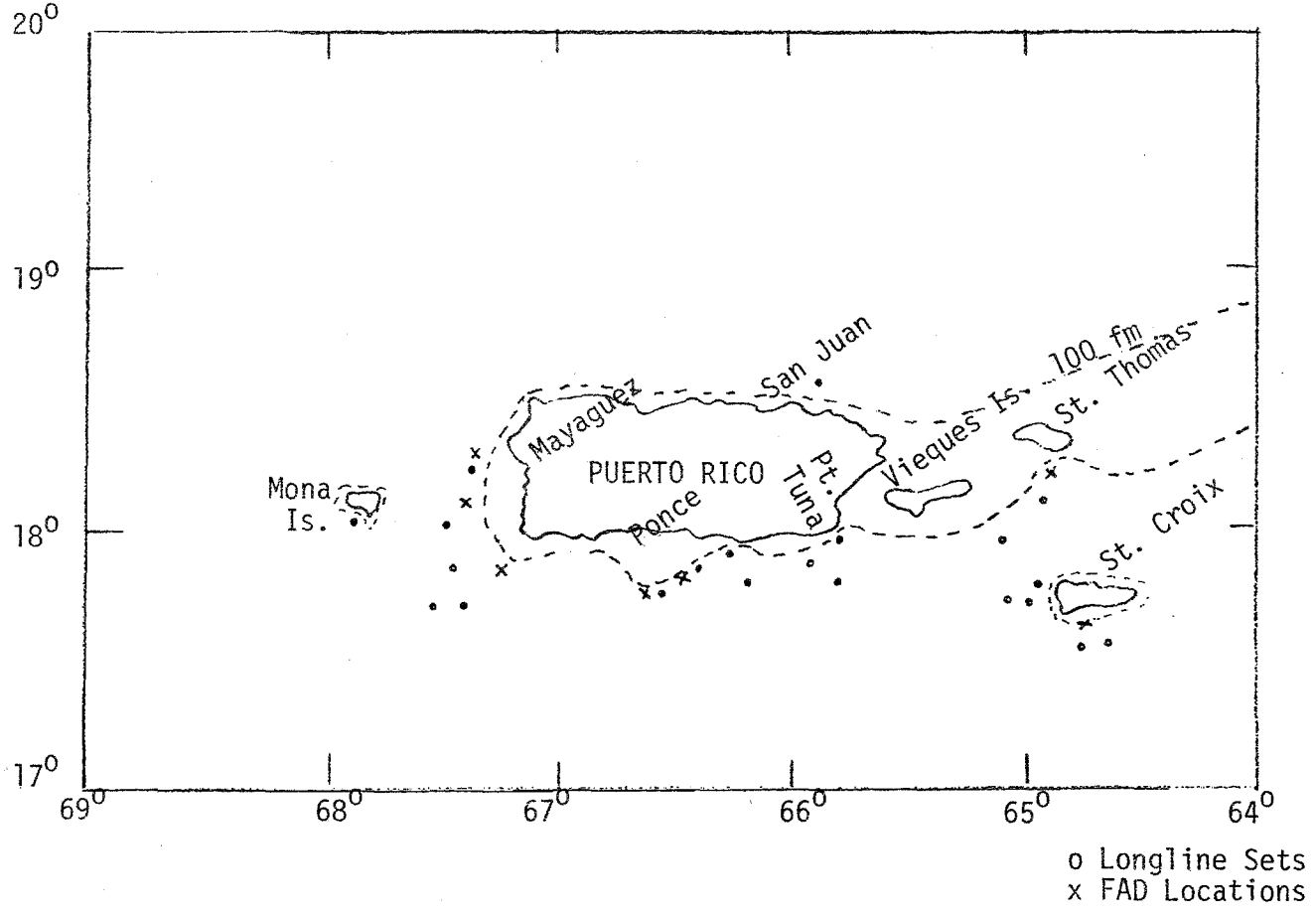

Figure 1. Cruise survey area, OREGON II Cruise 132.

structures) by sport fishing vessels and/or commercial fishing vessels.

4) Collect ichthyoplankton and neuston samples at longline station sites.

5) Collect Meteorological and physical data at each longline and fish attractant structure site.

6) Collect chlorophyll samples for the University of Puerto Rico.

7) Collect biological samples from tuna species to determine if histamine producing bacteria are present.

During the cruise planning, harvesting strategies and techniques were established to determine the availability of pelagic fish stocks in the cruise area. Pelagic longlining and fish attractant devices (FAD's) were considered as appropriate techniques for harvesting local fish species once deployed at locations where some measure of fishing success was available. A review of historical catch records, previous fishery surveys, seasonal weather conditions and interviews with local fishermen provided a general information base for directing the survey.

Survey activities included pelagic longline sets, fish attractant device deployments, bongo and neuston net tows, environmental data collections, and collecting chlorophyll samples.

On two different occasions vessels were encountered in distress. The first vessel was encountered near Great Inagna Island; the second was located off southwest Puerto Rico. Both vessels were towed to the nearest ports.

DESCRIPTION OF FISHING GEAR AND TACTICS

A pelagic longline was utilized to assess available oceanic fish species offshore (beyond the 100 fathom depth contour) and the stationery fish attractant devices (Figure 2) were deployed inshore (100 fathom depth contour) to determine their effectiveness for attracting coastal fish species.

Pelagic longline gear and fish attractant devices were fabricated by laboratory personnel before departing Pascagoula. The longline gear (Figure 3) consisted of 1200 fathoms of mainline, which when set out, provided over one mile of fish sampling coverage. Along the mainline, 120 hooks were spaced 60 feet apart. Gangion lengths were a standard 20 feet.

The longline configuration was designed to sample four different depths (50, 80, 120 and 150 feet) at each fishing site. Thirty gangions with hooks were attached (AK-SNAPS) to the mainline at each depth interval. Sections of line, without gangions, reflecting the depth interval were incorporated into the mainline to ensure reaching the proper fishing

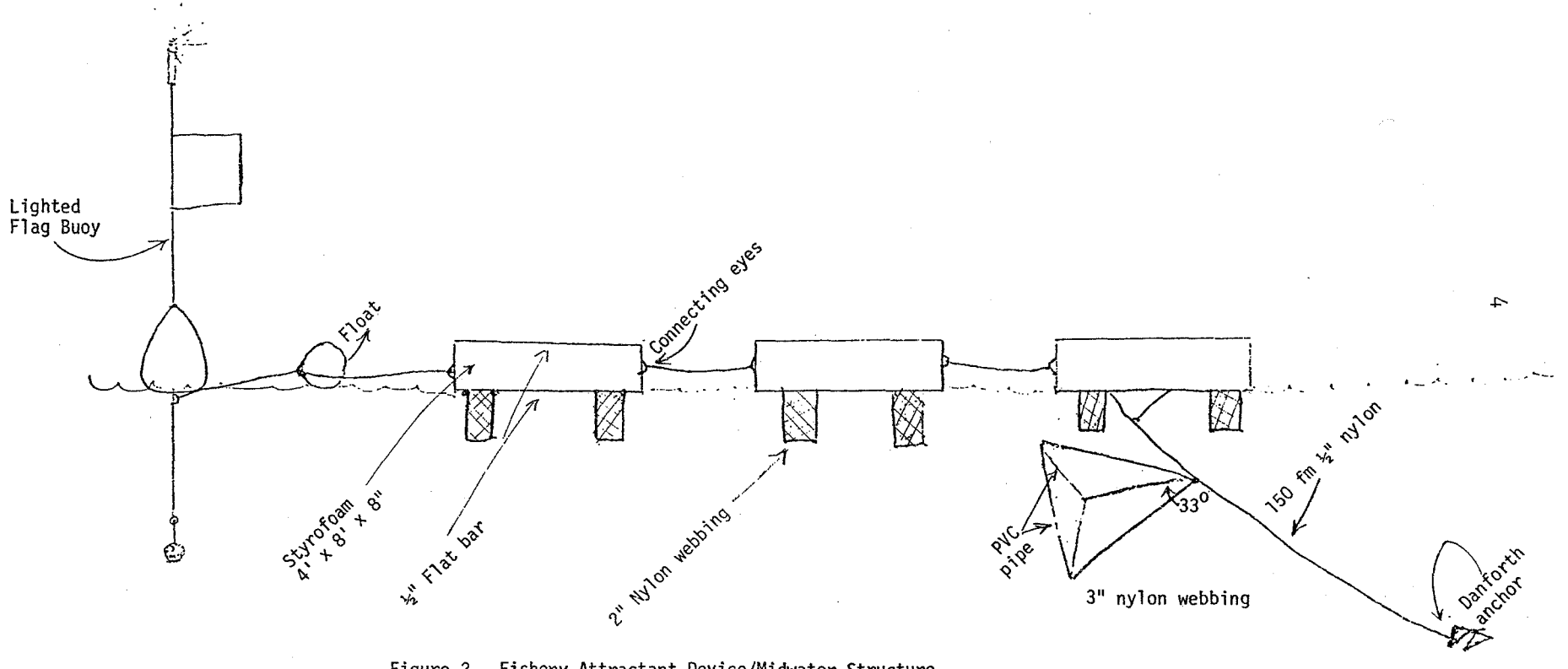

Figure 2. Fishery Attractant Device/Midwater Structure

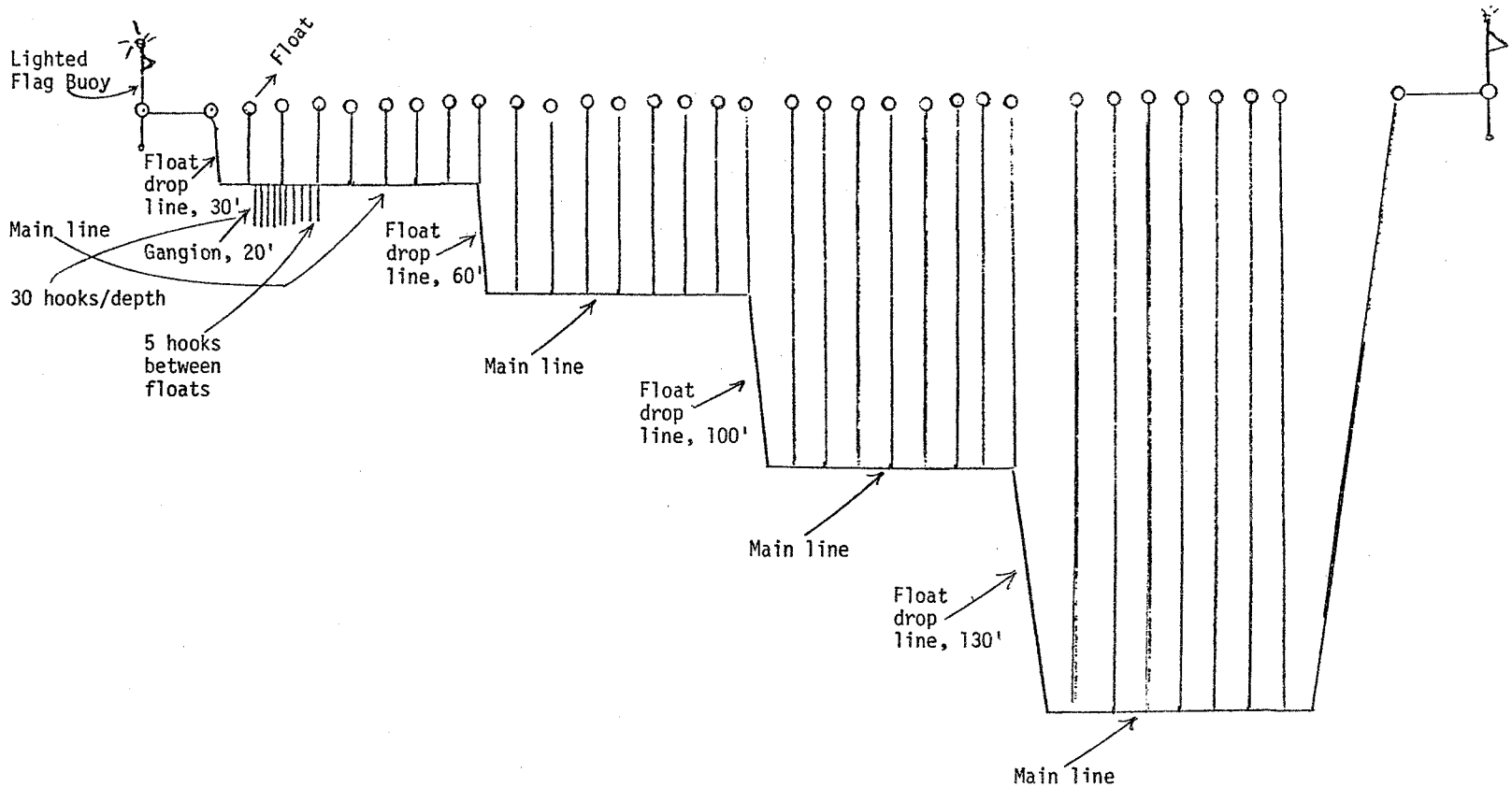

Figure 3. Diagram of pelagic longline, 1,200 fathoms of main line, 120 hooks.

depth. Two types of hooks (3½-0 shark and 8-0 Japanese tuna) were used alternately at all longline sites, except for the first and second sets, at which shark hooks were used exclusively.

Longline bait consisted of squid and northern mackerel. Tuna hooks were baited with squid while only mackerel was used on the shark hooks.

A majority of the longline sets were made during the evening hours, however, daytime sets were conducted for comparative purposes. Expendable bathythermograph probes were used to document water temperatures and for detection of significant temperature changes (thermocline) within the water column. Historical fishing reports indicated pelagic fish stocks tend to occupy depths just below the thermocline.

Tubs of longline gear (30 hooks per tub) were deployed from the stern of the OREGON II. The gear was retrieved by a power block located on the ship's bow. The longline remained overboard 10 to 12 hours and was retrieved either at daylight or sunset.

While retrieving the longline, catch data were recorded and documented on a standard longline station form according to depth of capture and type of bait. Also, each hook was observed for bait returned or lost. If a shark was captured, it was brought aboard for identification and biological sampling or tagged and released. Tag data were provided to the NMFS Narragansett Laboratory for shark distribution and migration studies. All pertinent data were recorded on the general laboratory station sheet and inlude not only the longline information, but such data parameters as date, time, location (latitude and longitude), fishing gear description, water temperatures, weather conditions, etc.

Fish attractant devices were deployed from the FRS/OREGON II at preselected sites in coastal areas of Puerto Rico and the U.S. Virgin Islands. FAD locations were identified in cooperation with Caribbean Fishery Management Council members, Sea Grant representatives, state agency members, and sport and commercial fishermen. Although FAD's were deployed and retrieved from the OREGON II, sampling of the devices was conducted by local vessels accompanied frequently by a NMFS representative who coordinated sampling from local ports.

Each of the fish attractant devices (Figure 2) was constructed from three sheets of styrofoam (4 ft. x 8 ft. x 8 in.) connected together and framed with one inch by 1/8 inch flat bar for additional strength, durability, connecting eyes, and buoy and anchor attachments. These devices were essentially of the fixed surface/floating type; however, two of the FAD's were modified to include a mid water structure suspended from the anchor line to approximately 40 fathoms below the surface. The midwater structure was made of one inch PVC pipe into a tripod shape (33° leg angles) and covered with three-inch nylon webbing (See Figure 2).

Sampling of the FAD's by small vessels occured on a daily basis by trolling artificial baits or dead natural baits. The only artificial bait used was feather dusters while natural baits included ballyhoo,

small cero mackerel and small lady fish.

A control area, at least 800 yards from the FAD site, was established to evaluate the effectiveness of each structure. Trolling time and catches were recorded in both control and FAD areas.

Bongo nets (0.505 and 0.333 mm) were towed at each longline fishing station, sampling the water column from the surface down to 200 meters. The sample from each net was identified and preserved for the Miami Laboratory. Surface neuston net (1 x 2 m frame, 0.947 mm) tows were also made in conjunction with longline stations for the Miami Laboratory.

Chlorophyll samples were collected during daylight hours while steaming between fishing areas. Measured volumes of water were pumped through filters which were frozen for later analysis. These samples will be used as ground truth evidence for comparison with satellite coastal zone scanner imagery.

Standard environmental data were recorded at all survey stations. Those data included temperatures (air, surface water, midwater at 650 feet), wind speed and direction, sea conditions, water color, barometric pressure, and current flow speed, and direction.

DISCUSSION AND RESULTS

No previous pelagic longline survey or FAD deployments had been made by NMFS on the Puerto Rican and U.S. Virgin Island Coasts. This survey was perhaps more of an exploratory fishing effort in which probable catch expectations, for the most part, were unknown. Fortunately, no formal cruise track design was demanded, providing the needed flexability required in surveying areas where minimal experience existed.

Twenty-one longline sets were made in the survey area (Figure 1). Catch results are shown in Table 1. Of significance was the capture of four swordfish (*Xiphias gladius*); one individual was taken southwest of Mona Island, another, west of St. Croix, and two offshore of Point Tuna, Puerto Rico. Large sharks (up to 11 feet in length) were taken during most longline sets. They caused considerable fouling, requiring two to three hours just to overhaul the entangled longline. On two occasions, the mainline was severed, thus requiring retrieval from the terminal longline buoy.

Tuna species are considered excellent candidates for capture by pelagic longline fishing gear, however, only one tuna was caught during the entire survey period. This was a yellowfin tuna (*Thunnus albacares*), weighing 80 pounds, and captured on the west coast of St. Croix. Biological samples were taken from three areas of the yellowfin for histamine analysis. Those samples included intestinal tract, gill surface, and skin surface. Samples were subjected to culture media for possible growth of histamine producing bacteria. Preliminary observations at sea indicated negative production. The samples were eventually refrigerated and transported to the University of Wisconsin Research Institute for further analysis. Other than sharks and the yellowfin tuna, the only fish species caught were one oilfish (*Ruvettus pretiosus*) and two Barracuda

Table 1.--Pelagic Longline Catch Summary.

OREGON II Station No.	Date	Position Lat. N.	Position Long. W.	Time Set	Bottom Depth (Fathoms)	Hook Depth (Ft)	Bait	Hook Type	Number Caught - Species/Weight in Pounds - Comments
38403	1/13/83	18° 02'	67° 31'	1900	520	80	mackerel	3½-0 shark	1-mako shark/800
						80	mackerel	3½-0 shark	1-tiger shark/400
38411	1/14/83	17° 58'	67° 58'	1600	700	150	mackerel	3½-0 shark	1-tiger shark/300
						150	mackerel	3½-0 shark	1-swordfish/118
38426	1/15/83	17° 56'	67° 27'	1600	727	50	mackerel	3½-0 shark	1-tiger shark/300
						120	mackerel	3½-0 shark	1-sand shark/150
						150	mackerel	3½-0 shark	1-white tip shark/78
38443	1/17/83	17° 48'	67° 32'	0800	1200				- no catch -
38445	1/17/83	17° 48'	67° 21'	1900	1500	80	squid	8-0 tuna	1-oilfish/1
						370	mackerel	3½-0 shark	1-mako shark/85
38463	1/18/83	18° 14'	67° 21'	1900	382				- lost gear -
38471	1/20/83	17° 47'	66° 30'	2000	520	50	mackerel	3½-0 shark	1-reef shark/150
						80	squid	8-0 tuna	1-barracuda/18
38481	1/21/83	17° 43'	66° 22'	2000	750				- no catch -
38482	1/22/83	17° 48'	66° 18'	0900	540				- no catch -
38484	1/22/83	17° 44'	66° 11'	2000	500	80	squid	8-0 tuna	1-barracuda/19
						80	mackerel	3½-0 shark	1-silky shark/188
38504	1/26/83	17° 36'	64° 38'	1700	675	150	mackerel	3½-0 shark	1-mako shark/250
38506	1/27/83	17° 38'	64° 48'	0900	400				- no catch -
38507	1/27/83	17° 42'	64° 56'	1800	490	120	mackerel	3½-0 shark	1-swordfish/72
						150	mackerel	3½-0 shark	1-tiger shark/200
38509	1/28/83	17° 43'	64° 57'	0900	330	370	squid	8-0 tuna	1-yellowfin tuna/80
38511	1/28/83	18° 05'	64° 59'	2000	1200				- no catch -
38519	1/29/83	17° 56'	65° 51'	1700	1000	120	mackerel	3½-0 shark	1-swordfish/210
						120	mackerel	3½-0 shark	1-tiger shark/350
38521	1/30/83	17° 48'	65° 49'	0900	180				- no catch -
38523	1/30/83	18° 02'	65° 11'	2300	1350				- no catch -
38525	1/31/83	17° 58'	65° 49'	1700	900	80	mackerel	3½-0 shark	1-swordfish/45
						80	mackerel	3½-0 shark	1-tiger shark/350
38534	2/1/83	17° 45'	65° 54'	1700	380	80	mackerel	3½-0 shark	1-reef shark/120
38543	2/3/83	18° 34'	65° 50'	1800	480	150	mackerel	3½-0 shark	2-tiger sharks/600
						150	mackerel	3½-0 shark	1-mako shark/125

(Sphyraena barracuda). At seven of the longline sites, there were no fish caught (See Table 1) and very few of the returned hooks were without bait. Four of these sets were made during the daytime.

An entire longline set was lost on January 19. The gear had been set-out the evening before and as usual, the OREGON II drifted with it all night as bridge personnel recorded drift speed and direction. At 0600 hours on January 19, the OREGON II departed the longline site, leaving the gear adrift, to embark representatives of the fishing industry, fishery organizations and the local press at Mayaquez, Puerto Rico. As scheduled, a demonstration of the pelagic longline operations was to occur with this group aboard, west of Mayaquez. The OREGON II arrived Mayaquez at 0800 hours and departed at 0900 hours with the representatives aboard. Upon returning to the longline gear site at 1115 hours, no gear was found. Immediately the OREGON II initiated a search pattern of the area, anticipating the drift direction which had been recorded early that morning, but without success. A request to the Coast Guard for assistance in locating the longline with helicopters was provided. However, their search from the air did not locate the longline. The longline was given up as lost and the OREGON II returned to Mayaguez to disembark the visiting group.

Another longline, composed of only 60 hooks was fabricated on the following day while steaming to the next set location. Four longline sets were made with the modified gear (60 hooks) on January 20, 21 and 22. A radio message received from an NMFS representative on January 22 revealed that the longline gear lost on January 19 had been found by two Puerto Rican fishermen. The message also revealed the gear would be delivered to Ponce, Puerto Rico on January 24. At that time, the longline gear was received and the remaining sets were conducted with normal gear configurations.

Scheduled longline sets off the southwest coast of Vieques Island were cancelled. Ongoing United States Navy operations in that area pre-empted any other at sea activities; however, alternate sites east of Vieques Island were selected and longline sets were made.

Abrupt changes in water temperature profiles (thermocline) were not detected from expendable bathythermograph casts at longline station areas. Temperatures varied from 79° F, at the surface to 70° F, at 650 feet below the surface. This gradual temperature change (approximately 1.3^{o} F/100 feet) suggested a remarkable mixing of oceanic waters within that depth range. On four occasions, where recorded temperatures dropped two or three degrees fahrenheit, at the 350 foot depth, float drop lines were prepared and attached to the main line for fishing effort (60 hooks) at 370 feet. The effort produced only one mako shark and one yellowfin tuna. Most likely, the yellowfin tuna was caught near the surface while retrieving the longline since a school of these fish were observed feeding on the surface nearby.

Fish attracting devices were deployed at seven locations along the south coasts of Puerto Rico and the U.S. Virgin Islands (See Figure 1). The devices were anchored along the 100 fathom contour in areas readily accessible to small fishing boats from local ports. Catch and effort

data associated with sampling these structures are shown in Table 2. The second and third FAD's were lost within 42 hours after deployments. Since these FAD's were to be utilized at other locations, a change in the configuration was necessary in order to meet the remaining scheduled deployments. This configuration consisted of only two sections of styrofoam with no midwater device suspended from the anchor line.

A tremendous amount of interest was generated throughout Puerto Rico and the U.S. Virgin Islands regarding the FAD deployments. Cooperating fishermen and local organizations provided their vessels and time to conduct test trolling with artificial and dead natural baits at FAD locations. Trolling effort (Table 3) was sporatic at most locations with most effort conducted at the FAD site west of Mayaquez, Puerto Rico. All trolling was conducted during the daylight hours.

Ichthyoplankton samples and neuston net samples were collected at 24 locations in the survey area. All samples were preserved and provided to the Miami Laboratory for sorting and identification.

A total of 93 chlorophyll samples were delivered to University of Puerto Rico scientists on February 5th, at San Juan. These samples were collected as time permitted while steaming between longline and FAD deployment locations.

Table 2.--Fish Attractant Device Catch Summary

OREGON II Station No.	Position Lat. N.	Position Long. W.	Dates Deployed	Catch Fad	Catch Control	Hours fished Fad	Hours fished Control	Summary/Remarks
38400	18° 14'	67° 24'	1/14 - 18/83	5	33	21½	26½	Four species of fish (2 cero mackerel 28 dolphin, 7 barracuda, 1 wahoo) 16 missed strikes. FAD in water 150 hrs off sponge bank-Mayaquez, P.R.
38401	18° 06'	67° 26'	1/14/83	0	1	0	1½	FAD lost less than 26 hrs after deployment on 1/13/83 off P.R.
38402	17° 52'	67° 07'	1/14/83	0	2	4½	4½	One wahoo, 1 barracuda. FAD lost less than 42 hrs after deployment on 1/13/83. 16 bottomfish (grouper & snapper) caught fishing on bottom within FAD area off La Parquera.
38470	17° 51'	66° 30'	1/22 - 23/83	7	3	12½	11½	Eight barracuda, 2 dolphin Two missed strikes FAD in water 97 hrs off Ponce, P.R.
38480	17° 50'	66° 25'	1/22/83	1	0	2	2	One strike in control FAD in water 75 hrs off Ponce, P.R. One barracuda
38491	18° 12'	64° 56'	1/27 - 31/83	3	4	16	15½	Four barracuda, 2 king mackerel, 1 blackfin tuna, 3 missed strikes FAD in water 194 hrs off St. Thomas.
38502	17° 38'	64° 50'	1/27 - 29/83	0	18	7	15	Yellowfin tuna and flying fish concentrated within 500 yds of FAD. 3 king mackerel, 11 barracuda, 3 dolphin, 1 wahoo, 6 missed strikes. FAD in water 142 hrs off St. Croix, U.S.V.I.
TOTAL			1/14 - 31/83	16	61	63½	76½	Two cero mackerel, 33 dolphin, 31 barracuda, 3 wahoo, 5 king mackerel, 1 blackfin tuna, 27 missed strikes. All FAD's in water approx. 740 hrs.

Table 3. Fishing effort around seven FAD locations on the Puerto Rican and U.S. Virgin Island coasts.

OREGON II FAD Stat. No.	No. Boat Trips	No. Fish Caught	Total Hours Fished	Hours FAD Deployed	Percent Hours Fished
38400	9	38	48	150	32.0
38401	1	1	1½	26	6.0
38402	1	2	9	42	22.0
38470	5	10	24	97	24.7
38480	2	1	4	75	5.3
38491	5	7	31½	194	16.2
38502	7	18	22	142	15.5
Total 7	30	77	141	726	19.4

Cruise Personnel

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Wendy Taylor, Fishery Methods & Equip. Sp., Pascagoula, MS 1/6-2/11/83
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Harold Brusher, Fishery Biologist, Panama City, FL 1/6-2/11/83
Robert Jenkins, Fishery Methods & Equip. Sp. Miami, FL 1/8-2/11/83
Tom Kisting, Computer Specialist, Miami FL 1/8-2/11/83
Dennis Lee, Fishery Biologist, Miami, FL 1/8-26/83
Luis Mendoza, Captain: R/V Crawford, Mayaquez, P.R. 1/12-23/83
Ivan Colon, Student: Univ. of P.R. San Juan, P.R. 1/12-25/83
Jim Dalmedia, Commercial Fisherman, St. Johns, V.I. 1/26-28/83
Richard Wood, Fishery Biologist, St. Johns, V.I. 1/26-28/83
Mary Lou Pressick, Fishery Biologist, Puerto Real, P.R. 1/25-2/2/83
Omar Munoz, Caribbean Fishery Management Council, San Juan, P.R. 1/19/83
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Oliver Serramo, CEER, Mayaquez, P.R. 1/19/83
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Tomas Muniz, Owner, TV/7, San Juan, P.R. 1/19/83
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NOAA Ship DELAWARE II Cruise 84-04
4/10-5/15/84

INTRODUCTION

The NOAA Ship DELAWARE II departed Pascagoula, MS on April 10, 1984 to sample deep water stocks of snapper-grouper off Puerto Rico,Culebra and St. Thomas Islands (Figure 1). Fishing gear included bottom and offbottom longlines fished between 46 and 366 fathoms (fm); fish traps (Florida) fished at 89 fm; and handlines fished between 65 and 70 fm. The cruise terminated on May 15 in Miami, Fla.

Port calls included Key West on April 12 to deliver trawling gear and pick up one cruise participant and multiple opening/closing nets and environmental sensing system (MOCNESS) sampling gear. Additional cruise participants boarded in Mayaguez April 16 and 17. Several cruise participants were exchanged in San Juan, PR, April 24 and 25 as scheduled. The longline portion of the cruise was completed May 3 when the arrived in Charlotte Amalie, St. Thomas.

Fisheries personnel from the Government of the Virgin Islands boarded the vessel in Charlotte Amalie May 4 to deploy fish aggregation devices (FADS). This leg of the cruise terminated May 6 in Frederikstad St. Croix

Cruise participants from Beaufort, N.C. and the University of Puerto Rico at Mayaguez boarded the vessel May 6 to determine the temperature pro file of the Grappler Seamount southeast of Puerto Rico, and to collect ichthyoplankton samples using MOCNESS.

OBJECTIVES

1) Sample snapper and grouper resources around Puerto Rico and the U.S. Virgin Islands with standardized traps, on-and-off bottom longlines, and handlines within the 20-250 fm depth range, with emphasis from 100-250 fms.

2) Collect species, size, and weight composition data as a function of gear, depth, and habitat.

3) Collect biological data from selected snapper and grouper specimens, including scales, otoliths, and gonads

4) Collect temperature profile and acoustic bottom topographic data at selected stations.

5) Collect ichthyoplankton samples at selected stations in support of the Offshore Thermal Energy Research Project (OTEC).

6) Deploy FADS at stations selected by the Virgin Islands Department of Conservation and Cultural Affairs, Division of Fish and Wildlife.

7) Develop a temperature profile of the Grappler Seamount for the Center for Energy and Environmental Research (CEER).

GEAR

Bottom Longline: A standard bottom longline set consisted of 50 hooks and 100 fm of ground line. Monofilament gangions were 2.5 ft in length with No. 7 circle tuna hooks attached to 3/8" braided nylon ground line with AK snaps. Bottom longline sets soaked 2 hr and squid was used for bait.

Offbottom Longlines: Offbottom longlines consisted of 100 fm of floating polypropylene mainline and 20 evenly spaced 8 ft PVC poles. They were weighted at the bottom and had a 4 in float at the top in order to maintain them in an upright position. Each pole had 5 evenly spaced No. 7 circle tuna hooks on 8-in monofilament gangions. Squid was used for bait and sets soaked for 2 hours.

Fish Traps: Each of the 10 fish-trap sets consisted of 3 Florida traps. The 3 Florida fish traps were attached 30 feet apart and were buoyed at one end with a single buoy. The traps were 2 X 2 X 4 ft with a single funnel. Squid was used as bait.

ENVIRONMENTAL DATA COLLECTION

Expendable bathythermographs (XBT) were shot at 180 stations to provide temperature profiles of deep water fishing stations. Other environmental data taken as part of routine station observations included: air temperature, barometric pressure, sea color, sea condition, and wind speed and direction. All environmental data have been placed into the Pascagoula computer data file.

RESULTS

One hundred and eighty-two stations were completed, including 180 combined bottom and offbottom longline, 1 fish trap, and 1 handline stations. Total combined catch from all longline stations was 3,902 lbs of which 1,946 lbs came from bottom longlines, and 1,956 lbs from offbottom longlines. No catches were made with traps or handlines. Represented in these catches were 41 species of finfish from 23 families.

Bottom Longlines: Bottom longlines were fished along the west and north coasts of Puerto Rico and the north coast of both Culebra and St. Thomas Islands between 46 and 366 fm. Bottom longline catch composition is shown in Tables 1, 2, and 3. Dominant snapper species, by weight, taken on bottom longlines were queen snapper (Etelis oculatus), wenchman snapper (Pristipomoides macrophthalmus) and silk snapper (Lutjanus vivanus). The only grouper species taken was misty (Epinephelus mystacinus). Smooth dogfish (Mustelus canis), slimy dog shark (Centrophorus granulosus), and Cuban dogfish (Squalus cubensis) were the dominant sharks caught. Eight other species were also caught (Table 2).

Catches along the west coast of Puerto Rico for snapper were fair, while catches of sharks were high. As fishing continued eastward along the north coast of Puerto Rico, catches of snapper and sharks increased. North of St. Thomas, catches of snapper were poor, and grouper were not taken during this portion of the cruise. Sharks were the dominant portion of the catch in the three areas surveyed (Table 3).

Offbottom Longline: Offbottom longlines were fished in conjunction with bottom longlines on the west and north coast of Puerto Rico, and north of Culebra and St. Thomas Islands between 46 and 366 fm. Catch composition was similar between offbottom and bottom longlines (Table 1). By weight, wenchman snapper (Pristipomoides macrophthalmus) was the dominant snapper caught on offbottom longlines, with queen snapper (Etelis oculatus) second, and silk snapper (Lutjanus vivanus) third. Three species of grouper were caught on offbottom longlines. They were, by weight, misty (Epinephelus mystacinus), yellowedge (Epinephelus flavolimbatus), and snowy (Epinephelus niveatus) (Tables 1, 4 and 5). Offbottom longlines produced 10 species of shark with the Cuban dogfish (Squalus cubensis) the dominant species by weight. The smooth dogfish (Mustelus canis) and the slime dog shark (Centrophorus granulosus) were, by weight, the next dominant species, respectively. Shark species were taken between 110-264 fms (Table 5).

Bottom longlines produced higher catch rates in pounds per hook than offbottom longlines. Pounds of snapper caught per set were only slighty higher on the west coast of Puerto Rico than on the north coast. Catches of grouper were poor. Grouper were not taken on either gear type north of St. Thomas and the number of snappers taken per set was low. A considerable increase in sharks per set was seen in the area north of St. Thomas.

The number of catches having 20 or more pounds of snapper or grouper (Table 6) was less than half that seen on similar cruises in June 1980 and June 1983, in the same area.

Fish Traps: Five fish traps were set in 89 fm west of Mayaguez, Puerto Rico. Attempts to recover the traps after 3 days soak failed due to a parted mainline. All traps were lost.

Fish Aggregating Devices (FADS): Two FADS were deployed. One was south of St. John in 133 fm of water at 18°10.7' N. Lat. 64°46.0' W. Long. The other was deployed north of St. Croix at 17°50.2' N. Lat. and 64°26.0'

W. Long. in 155 fm of water. Plans to set two additional FADS were cancelled because the buoys did not deploy as intended.

Grappler Seamount Profiles: Thirty six XBT shots were completed on the Grappler Seamount, located southeast of Puerto Rico, in a grid array providing a temperature profile of the surrounding water mass. These data completed a data set being compiled by CEER.

MOCNESS Samples: Twelve ichthyoplankton tows, using the MOCNESS, were completed within 4 locations from southeast of Puerto Rico to northeast of St. Croix. This quantitative information will help determine the potential numbers of fish that will be subjected to the environmental impact of an offshore thermal energy plant.

Cruise Participants

Mike Russell, Field Party Chief, Pascagoula, MS 4/10-5/15/84
Karen Lecke, Biological Technician, Pascagoula, MS 4/10-5/3/84
Daniel Foster, Coop Student, Pascagoula, MS 4/10-5/3/84
John Gill, Biological Technician, Beaufort, NC 4/10-5/6/84
Carol Roden, Cooperator, Florence, AL 4/10-5/15/84
David Costa, Cooperator, Galveston, TX 4/10-5/15/84
Marta Beatriz Riesco, Caribbean Fishery Management Council, Puerto Rico 4/16-4/24/84
Luis H. Mendoza, University of Puerto Rico, Mayaquez 4/17-4/24/84
Jose Cardoza, University of Puerto Rico, Mayaquez 4/17-4/24/84
William P. MacLean, College of the Virgin Islands 4/25-5/3/84
Clifford Crook, College of the Virgin Islands 4/25-5/3/84
Rudnell O'Neill, College of the Virgin Islands 4/25-5/3/84
Ileana E. Clavijo, Government of the Virgin Islands 5/4-5/6/84
Vernon Richards, Government of the Virgin Islands 5/4-5/6/84
Joe LaPlace, Government of the Virgin Islands 5/4-5/6/84
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Donald Hoss, NMFS, Beaufort, NC 5/6-5/10/84
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Bud Cross, NMFS, Beaufort, NC 5/6-5/10/84

Submitted by:

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Mike Russell
Field Party Chief

Approved by:

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Richard Berry
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Table 1. Number and weight of all species taken with bottom and offbottom longlines.

Species	Bottom Longlines No.	Bottom Longlines Wt.	Offbottom Longlines No.	Offbottom Longlines Wt.
Snapper				
Apsilus dentatus	0	0	1	3
Etelis oculatus	14	120	15	61
Lutjanus vivanus	4	28	5	20
Pristipomoides aquilonaris	10	11	2	2
Pristipomoides macrophthalmus	26	41	25	64
Rhomboplites aurorubens	1	1	4	5
Grouper				
Epinephelus flavolimbatus	0	0	4	92
Epinephelus mystacinus	5	149	7	79
Epinephelus niveatus	0	0	1	24
Sharks				
Carcharhinus plumbeus	2	28	3	19
Centrophorus granulosus	40	393	49	335
Dalatias licha	2	43	0	0
Deania profundorum	1	4	3	16
Etmopterus hillianus	1	1	2	2
Etmopterus pusillus	0	0	3	1
Heptranchias perlo	2	4	0	0
Hexanchus griseus	0	0	1	55
Hexanchus vitulus	5	87	7	121
Mustelus canis	73	418	59	362
Scyliorhinus retifer	3	3	8	7
Squalus cubensis	171	389	226	616
Sphyrna zygaena	1	22	0	0

Table 1 (Cont'd)

Species	Bottom Longlines No.	Bottom Longlines Wt.	Offbottom Longlines No.	Offbottom Longlines Wt.
Other				
Bythitidae	1	1	1	2
Chimera cubana	1	2	1	3
Conger esculentus	1	17		
Cynoponticus savanna	0	0	1	1
Dasyatis guttata	1	21	0	0
Gymnothorax funebris	4	7	4	6
Gymnothorax moringa	3	8	5	13
Gymnothorax nigromarginatus	4	12	4	13
Gymnothorax sp.	2	2	2	4
Ophichthus sp	28	104	0	0
Odontoscion dentex	3	3	1	1
Polymixia lowei	0	0	2	2
Rhinoptera bonasus	1	6	0	0
Saurida sp.	2	1	1	2
Seriola dumerili	2	19	3	23
Sphoerodes pachygaster	0	0	1	2
Trachichthydae	1	1	0	0

Table 2. Dominant components of bottom longlines catches by weight.

Species	Depth most frequently taken in Fathoms	Total Number	Total Weight	% number of total Catch	% Weight of total Catch	Day/night most frequently Taken
Snapper						
Etelis oculatus	100-199	14	120	3.4	6.2	Day
Pristipomoides macrophthalmus	150-199	26	41	6.3	2.1	Night
Lutjanus vivanus	100-149	4	28	1.0	1.4	Day
Grouper						
Epinephelus mystacinus	150-199	5	149	1.2	7.7	Night
Sharks						
Mustelus canis	100-200	73	418	17.6	21.5	Night
Centrophorus granulosus	150-249	40	393	10.0	20.2	Night
Squalus cubensis	150-249	171	389	41.3	20.0	Night

Table 3. Catch distribution by area and depth for bottom longlines.

Depth in Fm	Snapper No.	Snapper Lbs.	Grouper No.	Grouper Lbs.	Shark No.	Shark Lbs.	Other No.	Other Lbs.	Total Number	Total Pounds	Total Hooks	Total Pounds per 100 Hooks
West coast of Puerto Rico, 38 sets												
50-99	0	0	0	0	0	0	1	11	1	11	50	22.0
100-149	12	44	0	0	36	192	6	25	54	261	795	32.8
150-199	4	22	2	23	41	280	4	25	51	350	497	70.4
200-249	5	15	0	0	54	204	3	9	62	228	349	65.3
366	0	0	0	0	0	0	0	0	0	0	50	0.0
Total	21	81	2	23	131	676	14	70	168	850	1741	48.8
North coast of Puerto Rico and Culebra Island, 47 sets												
100-149	5	28	1	9	27	102	3	25	36	164	397	41.3
150-199	14	69	1	84	71	287	32	94	118	534	548	97.4
200-249	8	14	1	33	38	194	3	8	50	249	398	62.6
250-299	0	0	0	0	6	12	2	7	8	19	100	19.0
300-350	0	0	0	0	1	17	0	0	1	17	49	34.7
Total	27	111	3	126	143	612	40	134	213	983	1492	65.9
North coast of St. Thomas, 5 sets												
0-49	0	0	0	0	0	0	0	0	0	0	50	0.0
150-199	6	6	0	0	0	0	0	0	6	6	50	12.0
200-249	1	3	0	0	9	20	0	0	9	23	50	46.0
250-299	0	0	0	0	18	84	0	0	18	84	100	84.0
Total	7	9	0	0	27	104	0	0	33	113	250	45.2

Table 4. Dominant components of offbottom longline catches by weight.

Species	Depth Fathoms	Total Number	Total Weight	% Number of total Catch	% Weight of total Catch	Day/night most frequently Taken
Snapper						
Pristipomoides macropthalmus	150-199	25	64	5.5%	3.3%	Night
Etelis oculatus	100-199	15	61	3.3%	3.1%	Day
Lutjanus vivanus	100-149	5	20	1.1%	1.0%	Day
Grouper						
Epinephelus mystacinus	150-199	7	79	1.5%	4.0%	Night
Epinephelus flavolimbatus	100-199	4	92	.9%	4.7%	Night
Epinephelusniveatus	194	1	24	.2%	1.2%	Night
Sharks						
Squalus cubensis	150-249	226	616	50%	31.5%	Night
Mustelus canis	100-200	59	362	13%	18.5%	Night
Centrophorus granulosus	150-249	49	335	11%	17.1%	Night

Table 5. Catch distribution by area and depth of offbottom longlines.

Depth in Fm	Snapper No.	Snapper Lbs.	Grouper No.	Grouper Lbs.	Sharks No.	Sharks Lbs.	Other No.	Other Lbs.	Total Number	Total Pounds	Hooks	Pounds per 100 Hooks
West coast of Puerto Rico, 38 sets												
50-99	0	0	0	0	0	0	0	0	0	0	100	0.0
100-149	6	10	5	79	34	186	6	12	51	287	1800	15.9
150-199	10	19	0	0	72	291	4	11	86	321	1200	26.8
200-249	8	29	0	0	70	380	4	11	82	420	700	60.0
366	0	0	0	0	0	0	0	0	0	0	100	0.0
Total	24	58	5	79	176	857	14	34	219	1028	3900	26.4
North coast of Puerto Rico and Culebra Island, 47 sets												
100-149	4	13	0	0	17	92	6	27	27	132	800	16.5
150-199	14	54	7	116	80	263	4	8	105	441	1095	40.3
200-249	3	17	0	0	44	204	2	3	49	224	800	28.0
250-299	0	0	0	0	10	35	0	0	10	35	200	17.5
300-350	0	0	0	0	0	0	0	0	0	0	100	0.0
Total	21	84	7	116	151	594	12	38	191	832	2995	27.8
North coast of St. Thomas, 5 sets												
0-49	2	7	0	0	0	0	0	0	2	7	100	7.0
100-149	0	0	0	0	0	0	0	0	0	0	0	0.0
100-199	5	6	0	0	0	0	0	0	5	6	100	6.0
200-249	0	0	0	0	9	16	0	0	9	16	95	16.8
250-299	0	0	0	0	25	67	0	0	25	67	200	33.5
Total	7	13	0	0	34	83	0	0	41	96	495	19.4

Table 6. Bottom and offbottom longline sets catching 20 pounds, or more, of snapper(s) or grouper (G). Bottom longline, BL; offbottom, OB.

Station No.	Day/night	#/Pounds	Gear	Depth Fathoms	Position	
8	Day	8/29 S	OB	210	17°54.24' N.	67°21.48' W.
13	Day	2/21 S	BL	130	18°04.80' N.	67°27.25' W.
18	Night	1/24 G	OB	194	18°15.40' N.	67°29.18' W.
44	Night	1/26 G	OB	148	18°13.18' N.	67°15.18' W.
83	Day	2/38 S	BL	185	18°32.15' N.	67°11.60' W.
102	Night	1/34 G	OB	191	18°31.00' N.	66°42.50' W.
103	Night	1/84 G	BL	191	18°31.00' N.	66°42.50' W.
122	Day	1/27 G	OB	170	18°31.18' N.	66°15.27' W.
141	Night	1/33 G	BL	200	18°29.38' N.	65°53.32' W.
144	Night	1/23 G	OB	178	18°29.50' N.	65°44.88' W.

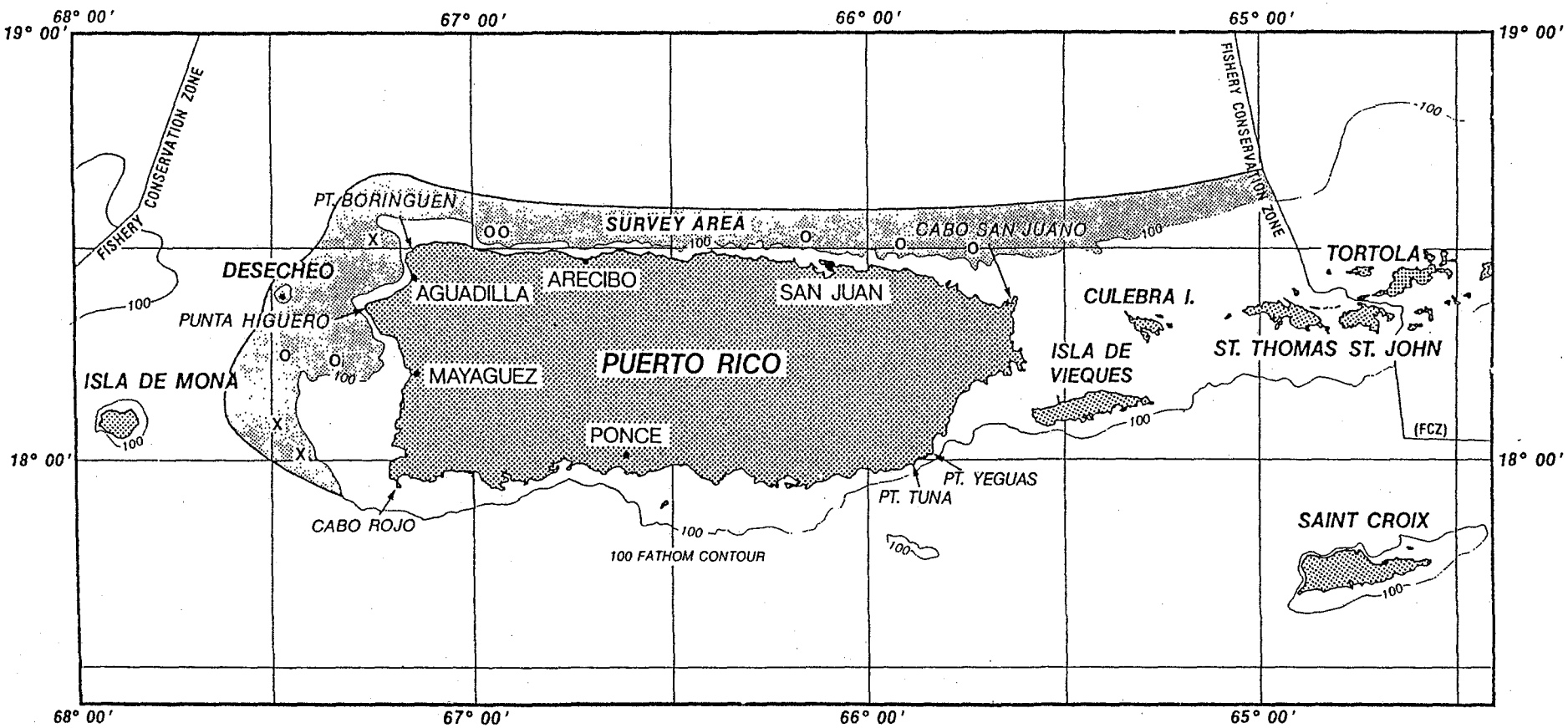

Figure 1. Survey area for DELAWARE II Cruise 84-04 is represented by the stippled area. Bottom longline sets catching more than 20 lbs are represented by an X for snapper and an O for grouper

U. S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
Pascagoula Facility
P O Drawer 1207
Pascagoula, MS 39568-1207

NOAA Ship CHAPMAN Cruise 85-07 (8)
9/22-10/30/85

INTRODUCTION

The NOAA Ship CHAPMAN departed Pascagoula, MS on September 22, 1985 to assess 13 deep water reeffish sites off Puerto Rico, Culebra, St. Thomas, St. Johns and St. Croix Islands (Figure 1); and to provide fishing and platform support for a cooperative submersible study. The submersible study was part of a joint research project between the National Marine Fisheries Service, Southeast Fisheries Center, Mississippi Laboratories, the University of Puerto Rico, Sea Grant Program, Mayaguez, Puerto Rico, the Department of Conservation and Cultural Affairs of the U.S. Virgin Islands, CODREMAR of the Commonwealth of Puerto Rico, and the Caribbean Fisheries Management Council. Harbor Branch Foundations' R/V SEWARD JOHNSON and the Research Submersible JOHNSON SEA-LINK were used for the visual survey of selected study sites. Habitat, faunal components, and species reaction to passive fishing gear were evaluated.

Fishing gear included bottom and offbottom longlines, Florida fish traps, University of Puerto Rico (UPR) fish and shrimp traps, and a 42-ft shrimp trawl.

The cruise terminated October 30 in Pascagoula, MS. Port calls included: Mayaguez, PR September 29 to pick up one cruise participant and additional fishing gear; Guanica, PR on the evenings of October 4, 5, 6 during adverse weather; Charlotte Amalie, St. Thomas, Virgin Islands October 14 and 15; and Mayaguez, PR October 22 to drop off one cruise participant and to unload and transfer equipment and specimens.

OBJECTIVES

1) Categorize deep-water benthic habitats around Puerto Rico and the U. S. Virgin Islands in terms of bottom type, topography and faunal components.

2) Map and survey dive areas using echo sounders to define

potential dive sites.

3) Provide quantitative abundance indices of fishes and invertebrates within each habitat type based on catch rate.

4) Provide specimens caught in traps, trawls, and bottom longlines to UPR researchers.

5) Provide trap and longline catch per unit effort data for comparison with submersible population numbers from each habitat, and for comparison with historical catch effort data to evaluate population trends.

6) Locate Fish Attraction Devices (FAD's) deployed, in 1984 south of St. Johns and east of St. Croix to assess the condition of the structures and their potential for attracting fish.

GEAR

Bottom Longline: A standard bottom longline set consisted of 50 hooks and 100 fm of ground line constructed of twisted Iceline. Monofilament gangions were 2.5-ft in length with No. 7 circle tuna hooks attached to 3/8-in ground line with AK snaps. Bottom longline sets soaked 2 hr and squid were used as bait.

Offbottom Longlines: Offbottom longlines consisted of 100 fm of floating polypropylene mainline and 20 evenly spaced 8-ft PVC Kali poles. Poles were weighted at the bottom and had 4-in plastic floats at the tops to maintain them in an upright position. Each pole had 5 evenly spaced No. 7 circle tuna hooks on 8-in monofilament gangions. Squid were used as bait and sets soaked for 2 hr. Bottom and offbottom longlines were joined together for 200 fm sets for comparative purposes. They are shown in this report as separate sets.

Florida Fish Traps: Three Florida fish traps were attached 50-ft apart along a bottom line and were buoyed at one end with a single buoy. The traps were 2 X 2 X 4-ft with a single funnel. Squid were used as bait.

UPR Fish and Shrimp Traps: Three fish and two shrimp traps were attached to the Florida fish trap sets via an additional 100 fm of groundline. In sites deeper then 300 fm, UPR fish and shrimp traps were set without Florida fish traps. Shrimp traps were 1.5 X 1.5 X 4-ft with a 2-in funnel at each end. A covering of burlap was placed over most of each trap. UPR fish traps were of 3 sizes: large,

1.5 X 5 X 6-ft; medium, 10-in X 3 X 4-ft; and small, 10-in diameter minnow traps. All traps were double funneled. Squid, fish, and shark were used as bait.

Trawls: Forty two-ft four seam semi-balloon shrimp trawls were used with 8-ft by 40-in wooden chain doors and a 180-ft bridle.

ENVIRONMENTAL DATA COLLECTION

Expendable bathythermographs (XBT) were shot at each sampling site to provide temperature profiles. Other environmental data taken included air temperature, barometric pressure, sea color, sea condition, and wind speed and direction. All environmental data have been placed into the permanent Pascagoula environmental data file.

RESULTS

Inclement weather and lost time required several modifications to the original cruise schedule. Station 11 (Figure 1) was dropped and the standard sample of four bottom and offbottom longlines and four trap sets were reduced at stations 3 and 13. Despite adverse weather conditions, 171 stations were completed, including 49 bottom and 48 offbottom longline, 45 Florida fish trap, 13 UPR shrimp trap, 13 UPR fish trap, and three shrimp trawl stations. Total combined catch from all stations was 1,144 lb of which 465 lb came from bottom and 278 lb from offbottom longlines, 208 lb from Florida fish traps, 121 lb from UPR fish traps, 23 lb from UPR shrimp traps, and 49 lb from three shrimp trawl stations.

Bottom and Offbottom Longlines: Longlines were fished along the north, south, and west coasts of Puerto Rico; north of St. Thomas; south of St. Johns; and east of St. Croix between 27 and 384 fm. Catch by longline gear is shown on Table 1. Dominant snapper species, by weight, were queen snapper (*Etelis oculatus*) and by number wenchman snapper (*Pristipomoides macrophthalmus*) (Table 1). By weight, yellowedge (*Epinephelus flavolimbatus*) and misty grouper *mystacinus*) were dominant on bottom and off- bottom gear respectively, with the rock hind (*E. adscensionis*) caught most frequently. Smooth dogfish (*Mustelus canis*) and Cuban dogfish (*Squalus cubensis*) were the most frequently caught sharks. Catches throughout the cruise of all species were generally poor. Red and rock hind (*Epinephelus guttatus*) and (*E. adscensionis*) were taken most frequently at Escollo Grappler, east of St. Croix and northwest of Puerto Rico. Snapper catches were highest south of St. John, east of St.

Croix and north of St. Thomas Islands. Catch composition of snapper and grouper was similar between bottom and offbottom longlines. Shark and other species caught were dissimilar with fewer species caught on offbottom longlines. Distribution of effort by gear and depth is shown on Table 2.

Florida Fish Traps: Forty-five trap sets, catching primarily snapper, were made in 25 to 242 fm (Table 2). The silk snapper was dominant by weight, and the vermilion snapper (*Rhomboplites aurorubens*) by number (Table 3). Traps were soaked for 12 hr, with the exception of two trap sets which soaked 24 hr. The extended soak period did not appreciably improve catch rates.

University of Puerto Rico Fish Traps: Thirteen UPR fish trap sets were made between 125 and 394 fm (Table 3). One large misty grouper, weighing 40 lb, was taken in 242 fm northeast of the entrance to San Juan harbor. The dominate species caught in these traps was the giant isopod *Bathynomus giganteus* (Table 4).

University of Puerto Rico Shrimp Traps: Thirteen UPR shrimp trap stations were completed between 113 and 394 fm (Table 2). The dominate species, by number, were *Heterocarpus ensifer* and *Heterocarpus laevis* (Table 5). Fewer *Bathynomus* and fish species were taken in these traps than in the UPR fish traps (Tables 4 & 5).

Shrimp Trawl: Three trawl stations were completed between 273 and 307 fm south of Guanica, PR. One trawl tore after hitting a bottom obstruction and only portions of the body and bag were recovered. Trawl caught specimens are listed on Table 6. Several trawl caught species were used to verify video records and identification of fishes and invertebrates observed from the submersible.

Fish Attraction Devices (FADs):

Bottom echo tracings and the sonar search failed to locate either FAD site.

Cruise Participants

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Richard J. Berry
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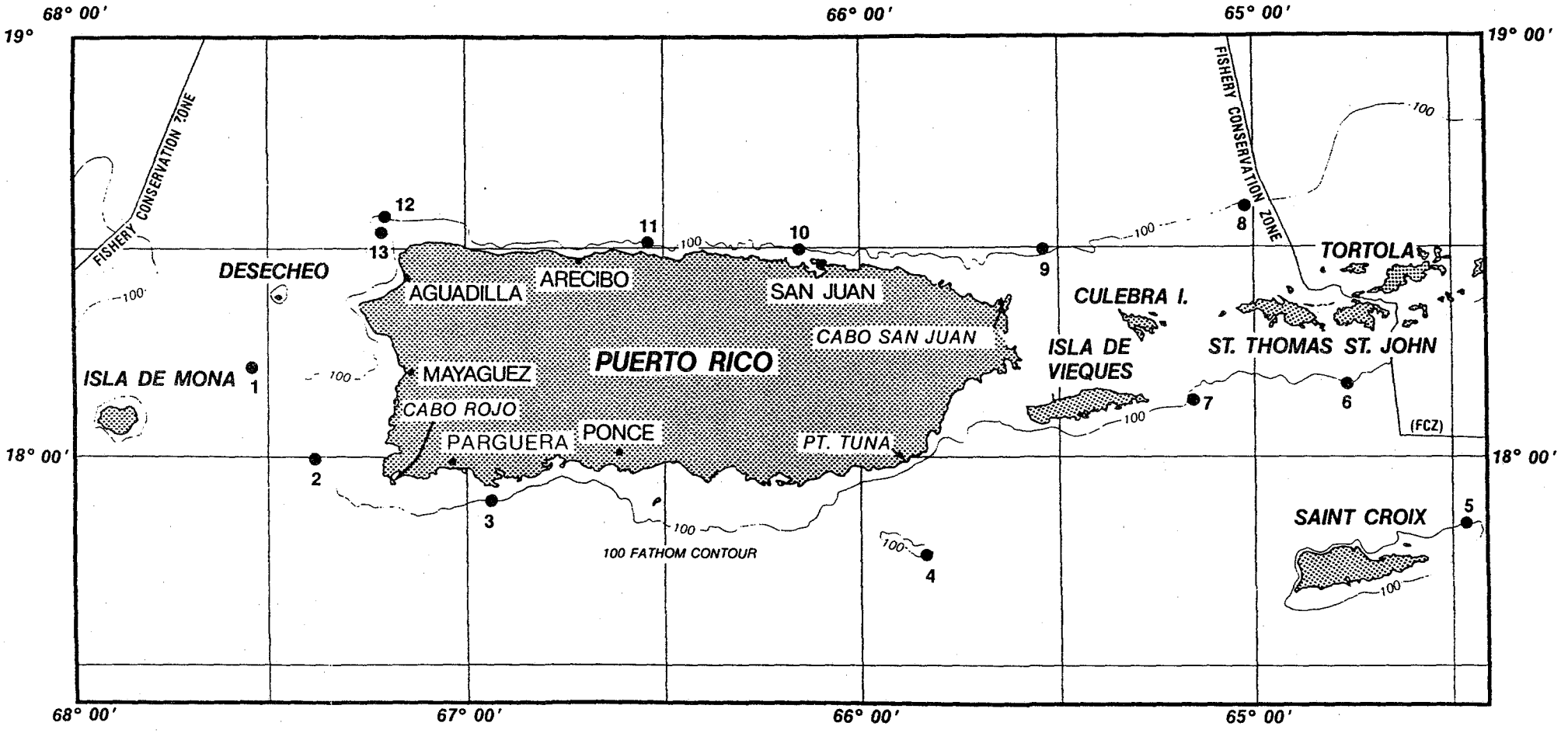
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MAYAGUEZ
CABO ROJO
PARGUERA
PONCE
PT. TUNA
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Table 1. Number and weight (lb) of all specimen taken with bottom and offbottom longlines.

Species	Bottom Longline No.	Bottom Longline Wt.	Offbottom Longline No.	Offbottom Longline Wt.
Snapper				
Apsilus dentatus	7	33	3	12
Etelis oculatus	8	53	9	51
Lutjanus buccanella	2	9	1	17
Lutjanus vivanus	4	12	-	-
Pristipomoides macrophthalmus	13	26	13	22
Rhomboplites aurorubens	1	1	-	-
Grouper				
Epinephelus sp.	-	-	1	11
Epinephelus adscensionis	6	10	9	9
Epinephelus flavolimbatus	1	23	-	-
Epinephelus fulvus	-	-	2	3
Epinephelus guttatus	4	11	2	5
Epinephelus mystacinus	1	20	1	17
Sharks				
Carcharhinus plumbeus	-	-	1	13
Centrophorus granulosus	3	28	5	43
Heptranchias perlo	1	2	-	-
Hexanchus griseus	1	7	-	-
Hexanchus vitulus	1	25	-	-
Mustelus canis	12	80	3	12
Squalus asper	1	19	-	-
Squalus cubensis	20	79	10	37

Table 1. (Cont'd)

Species	Bottom Longline No.	Bottom Longline Wt.	Offbottom Longline No.	Offbottom Longline Wt.
Other				
Canthidermis sp.	2	7	-	-
Caranx lugubris	-	-	1	7
Caulolatilus cyanops	1	1	-	-
Crinoidea	3	1	-	-
Gymnothorax conspersus	1	4	1	2
Gymnothorax moringa	1	1	-	-
Gymnothorax ocellatus	1	1	-	-
Gymnothorax sp.	1	2	1	2
Madreporaria	4	4	-	-
Malacanthus plumieri	-	1	-	2
Ophichthus sp.	2	4	-	-
Ophiuroidea	3	1	1	5
Polychaeta	1	1	-	-
Seriola dumerili	-	-	1	8

Table 2. Distribution of effort, by set and depth increments for bottom longlines, offbottom longlines, Florida fishtraps and Puerto Rico fish traps.

Fathoms	Bottom Longlines	Offbottom Longlines	Florida Fish Traps	Puerto Rico Fish Traps
21-30	1	1	1	0
31-50	4	4	6	0
51-60	2	2	1	0
61-70	2	2	3	0
71-80	1	1	0	0
81-90	0	0	0	0
91-100	3	3	1	0
111-130	7	7	7	1
131-150	3	3	2	0
151-170	6	6	7	0
171-190	7	7	5	0
191-210	1	1	1	0
211-230	7	8	8	4
231-250	4	2	3	4
251-270	0	0	0	0
271-290	0	0	0	0
291-310	0	0	0	0
311-330	0	0	0	1
331-350	0	0	0	1
351-370	0	0	0	0
371-390	1	1	0	1
391-410	0	0	0	1

Table 3. Number and weight (lb) of all specimens taken with Florida fish traps.

Species	No.	Wt.
Snapper		
Lutjanus buccanella	3	4.0
Lutjanus vivanus	45	90.0
Pristipomoides aquilonaris	1	1.0
Pristipomoides macrophthalmus	24	40.0
Rhomboplites aurorubens	55	37.0
Grouper		
Epinephelus adscensionis	3	5.0
Serranidae	1	1.0
Sharks		
Squalus cubensis	3	2.0
Other		
Antigonia capros	1	0.1
Balistes vetula	1	2.0
Cidaris sp.	1	0.3
Conger triporiceps	2	5.0
Crinoidea	4	0.2
Decodon puellaris	2	1.0
Echinodermata	7	11.0
Echinoidae	1	0.1
gorgonian	1	0.2
Holocentrus ascensionis	6	4.0
Holocentrus rufus	1	1.0
Mithrax sp.	2	1.0
Ophiuroidea	3	0.3
Paguridae	4	0.2
Plectrypops sp.	1	1.0
Stenocionops sp.	1	0.1
Stenorynchus sp.	1	0.1

Table 4. Number and weight (lb) of all specimens taken with University of Puerto Rico fish traps.

Species	No.	Wt.
Snapper		
Pristipomoides macrophthalmus	3	5
Grouper		
Epinephelus mystacinus	1	40
Shark		
Centrophorus granulosus	1	7
Scyliorhinus sp.	1	2
Squalus cubensis	3	4
Other		
amphipod	1	0.1
Aristaeomorpha foliacea	9	0.5
Bathynomus giganteus	108	55.0
Carangidae	1	0.1
Gymnothorax sp.	2	5.0
Heterocarpus ensifer	41	1.5
Heterocarpus laevis	6	0.4
Myxinidae	1	0.3
Plesionika sp.	7	0.2
Plesiopenaeus edwardsianus	6	0.2

Table 5. Number and weight (lb) of all specimens taken with University of Puerto Rico shrimp traps.

Species	No.	Wt.
Bathynomus giganteus	14	5.2
Crinoidea	2	0.1
Dardanus	3	0.1
echinoderm	1	0.1
Eunephrops sp.	2	0.1
Gymnothorax conspersus	3	8.0
Gymnothorax sp.	1	2.0
Heterocarpus ensifer	97	1.3
Heterocarpus laevis	31	0.2
Myxinidae	10	5.0
Ophiuroidea	1	0.1
Paguridae	4	0.3
Parapandalus sp.	3	0.2
Penaeidae	1	0.1
Porcellana sp.	1	0.1
Sipunculida	1	0.1

Table 6. Number and weight (lb) of all specimens taken during trawling.

Species	No.	Wt.
Fish		
Bathyclupea sp.	3	.1
Bathypterois sp.	1	.2
Chaunax pictus	7	6.9
Chimaeridae	1	1.0
Cyttopsis roseus	1	.3
Gonostomatidae	1	.1
Halosauridae	2	.3
Hollardia sp.	2	.3
Lophiodes sp.	2	3.1
Macrouridae	1	.1
Merlucciidae	1	.1
Muraenesocidae	1	.2
Myctophidae	5	.1
Neoscopelidae	8	1.0
Ogcocephalidae	5	.1
Ophidiidae	11	.9
Poecilopsetta sp.	3	.2
Polymixia nobilis	9	3.2
Scyliorhinus	3	.9
Steindachneria	2	1.4
Trachichthyidae	3	.1
Crustacea		
Anomura	5	.1
Aristaeomorpha foliacea	33	.1
Bathynomus giganteus	1	.3
Calappa sp.	2	.1
Eugonatonotus crassus	1	.1
Galatheidae	80	.9
Glyphocrangonidae	27	.4
Heterocarpus ensifer	38	.8
Heterocarpus laevis	1	.1
Majidae	1	.1
Oplophorus sp.	6	.1
Oplophorus gracilirostris	7	.2
Paguridae	16	.4
Penaeus sp.	103	4.7
Plesionika longipes	30	.7
Squilla	2	.1

Table 6. (Cont'd)

Species	No.	Wt.
Other		
Actiniaria	2	.1
Amphineura	23	.1
Asteroidea	20	.4
Brachyura	1	.1
Cidaridea	5	.6
Echinoderma	17	.3
Gastropoda	27	3.2
Holothuroidea	11	5.5
Mellita sp.	6	3.0
Mollusca	12	.4
Ophiuroidea	267	1.3
Scaphopoda	5	.1
Sipunculida	2	.1
Xenophora	35	4.0
Zoantharia	1	.1

U. S. Department of Commerce
National Oceanic and Atmospheric Administration
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NOAA Ship OREGON II Cruise 87-06 (168)
7/28-8/28/87

INTRODUCTION

The NOAA Ship OREGON II departed Pascagoula, MS on July 28, 1987 to conduct a squid survey and collect specimens in selected areas around Puerto Rico and the U. S. Virgin Islands. This cruise was conducted in response to the Caribbean council's request for assessment of unutilized squid resources and verification of species identifications made during the 1985 Johnson Sea Link II submersible survey.

Port calls were made in Mayaguez, PR August 3 - 4; St. Thomas, VI August 12 - 14; and San Juan, PR August 17 - 18. The vessel returned to Pascagoula August 27. During the August 17 San Juan port call, Mr. Justo A. Mendez, Secretary to the Department of Natural Resources, and Mr. Iven Sanchez, Executive Director of CODREMAR, toured the vessel. Discussions with Mr. Mendez and Mr. Sanchez included the cruise mission and probable objectives of further cruises to the Caribbean area. In addition, Mr. Mendez discussed his intent to make Puerto Rico the hub for fisheries development and management techniques in the Caribbean.

OBJECTIVES

1) Survey selected sites for squid with a high opening fish trawl.
2) Collect specimens to verify species identifications based on video records from the 1985 Johnson Sea Link II submersible survey of Puerto Rico and the Virgin Islands.
3) Collect CPUE and size/sex data from all species caught using bottom longlines.
4) Collect algae samples from selected hard bottom sites using a small dredge.

METHODOLOGY

Stations for specimen collections were selected based on data collected during the 1985 submersible survey. Forty foot shrimp trawls were towed both day and night between 173 and 550 fathoms (fm). Tow duration was 45 minutes. Stations for the squid survey were selected based on bottom type. High opening fish trawls were towed for one hour duration during daylight (7 a.m. to 7 p.m.) with towing depths between 175 and 520 fm. Dredge site selections were based on bottom type and optimum depths for algae growth. Dredging depths ranged between 20 and 55 fm, with tow duration between 5 and 10 minutes. Bottom longline stations were selected based on areas where previous catches of Queen snapper (*Etelis oculatus*) had occurred. Sets were made

during both day and night hours at most sites in 80 to 350 fm. Soak time was two hours and squid was used for bait.

Gear used during the survey included trawls, dredges and bottom longlines. Trawls included 40-ft. two seam semi-balloon shrimp trawls and 65 and 80 ft. high opening fish trawls. Door sizes varied from 8'x40" wooden chain doors (shrimp trawls) to 9'x40" wooden chain doors and 3 meter steel "v" doors (fish trawls). Dredges were either 2'x10" or 3'x10" and were constructed of a welded steel frame with a nylon web bag covered with polypropelene chafing gear. Weak links were placed on one side of the bridle allowing the dredge to break loose under heavy pressure, thereby preventing excessive damage. Bottom longlines consisted of 200 fm of 5/16" twisted iceline as the mainline and 100 gangions 27" long constructed from 100 pound test monofilament and No. 7 circle tuna hooks.

A 200 meters hydrocast was made at all stations which were more than 5 miles apart. Expendable bathythermal probes (XBT's) were dropped at all stations where hydrocasts were made. Hydrographic data collected included temperature, salinity and dissolved oxygen.

RESULTS

Trawl and bottom longline catch rates were low throughout the entire survey area. Dredge collections were, however, very successful, with many forms of algae collected. A total of 141 finfish and invertebrate species were caught in the 40' shrimp trawl, 195 in the combined data from the 65' and 80' fish trawls, and 19 on bottom longlines. Finfish caught in trawls were generally small deepwater species of no commercial importance. A compilation of all species caught is available through the NMFS, Mississippi Laboratories, Pascagoula Laboratory (Gary M. Russell, Chief Scientist). The great depths hampered setting trawls, which resulted in 19 water hauls and 9 sets in which the trawls became twisted. In addition, 22 trawls were destroyed by rough and rocky bottom, which prevented adequate sampling of these areas. Future efforts to sample this area will require different gear, possibly beam trawls, dredges or towed underwater camera systems.

Shrimp Trawls

Thirty-nine shrimp trawl stations were completed, of which 11 had no catch. In the remaining tows, catch rates were very low, ranging from 1 to 47 pounds per tow with a total catch of only 124 pounds. By weight fin fish represented 52%, sponge and sea urchins 29%, crustaceans 13% and other species 5% of the catch. One misty grouper (*Epinephelus mystacinus*) was collected. No other commercially important species of snapper, grunts, or porgy were caught in shrimp trawls during the cruise.

Fish Trawls

Thirty fish trawl stations were occupied, of which 8 had no catch. Catch rates were again very low ranging from 1 to 187 pounds per tow with a total catch of only 706 pound. By weight, sponge and urchin made up 67%; finfish, 23%; crustaceans, 3%; and others, 6% of the catch. One Queen snapper was collected, but no other commercially important species were taken in fish

trawls. Squid were collected at several stations but catch rates were generally low, ranging from .1 to 4 pounds. A total of only 8.3 pounds of squid were caught during the cruise.

Bottom Longlines

Fifteen bottom longline sets were made with catches ranging from 2 to 140 pounds. A total catch of 507 pounds was taken during the cruise. Queen snapper represented 9%; Wenchmen snapper (*Pristipomoides macrophthalmus*), 2%; and sharks, 82% by weight of bottom longline catches. Catch rates of snapper and grouper in the survey areas were lower than expected.

Dredges

Twenty five dredge hauls resulted in the collection of many species of algae. However, identifications of these collections will require months of laboratory work at the University of Puerto Rico, Mayaguez, Puerto Rico. Those data will be available through the NMFS, Pascagoula Laboratory when the identifications are completed.

CRUISE PARTICIPANTS

Mike Russell, Field Party Chief, Pascagoula, MS	7/28-8/27/87
Karen Lecke, Fisheries Biologist, Pascagoula, MS	7/28-8/27/87
Jim Benton, Fisheries Biologist, Pascagoula, MS	7/28/8/27/87
Bennie Rohr, Fisheries Biologist, Pascagoula, MS	7/28-8/27/87
Sara Templeton, Cooperator, Auburn, AL	7/28-8/27/87
Sharon Riemer, Cooperator, Auburn, AL	7/28-8/27/87
Tomio Iwamoto, Fisheries Biologist, California Academy of Science, San Francisco, CA	7/28-8/22/87
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Lena Sang, Fisheries Biologist, U of PR, Mayaguez, PR	8/14-8/22/87
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Jay Rooker, Fisheries Biologist, U of PR, Mayaguez, PR	8/18-8/22/87
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U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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DELAWARE II Cruise 88-13
11/15-12/21/88

INTRODUCTION

The DELAWARE II departed Woods Hole, Mass. on November 15, 1988 for Mayaguez, Puerto Rico to conduct a cooperative cruise with the Caribbean Fishery Management Council, CODREMAR, University of Puerto Rico-Mayaguez, Government of the Virgin Islands, and NMFS. The first leg, November 24 to December 6, was an ichthyoplankton survey of the south coast of Puerto Rico, St. Thomas and St. Croix (Figure 1). An unscheduled port call was made in St. Thomas (Nov. 30-Dec. 2) for emergency medical treatment to the vessel Captain and to obtain his replacement. The vessel again returned to St. Thomas (Dec 6-9) for a scheduled port call to exchange members of the scientific party for the second leg. The vessel also stopped briefly in St. Croix to board two additional scientists. The second leg (Dec. 9-12) surveyed yellowfin tuna stocks near St. Croix using pelagic longlines.

OBJECTIVES

1) Collect ichthyoplankton samples with standard bongo, neuston and opening/closing bongo nets to assess recruitment patterns on reefs in the US Virgin Islands and Puerto Rico.

2) Collect hydrographic data from the surface to 290 m using an STD, and collect surface chlorophylls at each sample site.

3) Assess yellowfin tuna populations in waters off St. Croix.

4) Record marine trash within the survey area.

MATERIALS AND METHODS

The ichthyoplankton survey began at the south end of Mona Passage and proceeded eastward along a preselected cruise track of offshore and inshore stations. Offshore stations were 12 miles apart with inshore stations usually

not more than 3 miles apart; these stations were intended to bracket the 100 fathom curve i.e, two sample sites on the shelf and two off the shelf. Inshore one additional station was permitted when space allowed. Sampling effort was concentrated in three general areas: 1) south end of Mona Passage to Point Verraco, 2) south of St. Croix and 3) the south end of Virgin Passage (Figure 1).

Offshore STD casts were made to 290 meters, but, in depths less than 200 meters they were made to within 5 meters of the bottom. After completion of the STD cast, a single oblique bongo tow was made using 61 cm bongos and .333 mm mesh nets. Simultaneously, a 1 x 2 meter neuston with a .947 mm net was towed on the surface for 10 minutes. Bongo and neuston samples were initially preserved in 10% formalin for 48 hours then changed to 95% ethanol. Surface chlorophyll samples were collected at all but one station and frozen for processing at the Pascagoula Laboratory. XBT's were dropped at selected sites to verify STD recordings.

Three 24 hour stations were occupied to assess changes in species complexity and density. Site one was south of Point Tuna, Puerto Rico and site two was north of Christiansted, St. Croix. At these stations an opening and closing bongo was towed every 4 hours for five minutes at 100, 60, 30, and 10 meter depths. During the 100 meter bongo tow a 10 minute neuston tow was made. All samples, from 24 hour stations, were preserved in 95% ethanol. The alcohol was changed after 48 hours.

The pelagic longline consisted of 9 miles of braided 3/8" nylon mainline. Hooks, on 40 foot gangions, were placed 200 feet apart. Drops were attached to bullet floats every third hook. Drops were initially 100 feet long but were increased to 160 feet. A high flyer (tall buoy) was attached along the mainline ever three miles. Herring and squid were used for bait.

Sets were made in the evening and required about one and a half hours to complete. Haulback began at 7:00am local time and required six to seven and a half hours to complete.

RESULTS

A total of 104 ichthyoplankton stations were occupied with the following samples obtained: bongo tows (86), neuston tows (104), opening and closing tows (68), STD casts (103), XBT casts (14), and chlorophyll samples (103).

Three pelagic longline sets were completed with the following fish caught: swordfish - Xiphias gladius (4), white marlin - Tetrapturus albidus (1), dolphin - Coryphaena hippurus (8), oil fish - Ruvettus pretiosus (2), blue shark - Prionace glauca (1), and unidentified ray - Dasyatidae (2).

Swordfish caught during longlining averaged 65 pounds total weight and the white marlin weighed about 90 pounds.

Three trash watches were set, however, little trash was observed.

DISPOSITION OF SAMPLES

Left bongo samples were sent to the NMFS Miami Laboratory, and the right bongo, opening and closing bongo, and neuston samples to NMFS Beaufort, NC, Laboratory for sorting select species and storage. Chlorophyll samples were sent to NMFS Pascagoula, Miss., for processing.

CRUISE PARTICIPANTS

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Paul Yoshioka, Biologist, University of Puerto Rico, 11/23-12/7/88
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Gary Owns, Biologist, Cooperator, 11/23-12/7/88
Miguel Figuerolo, Biologist, CODREMAR, 11/23-12/7/88
Bob McAuliffe, Fisherman, St. Croix, 12/9-12/88
Nick Zinkowski, Fisherman, Culebra, 12/9-12/88
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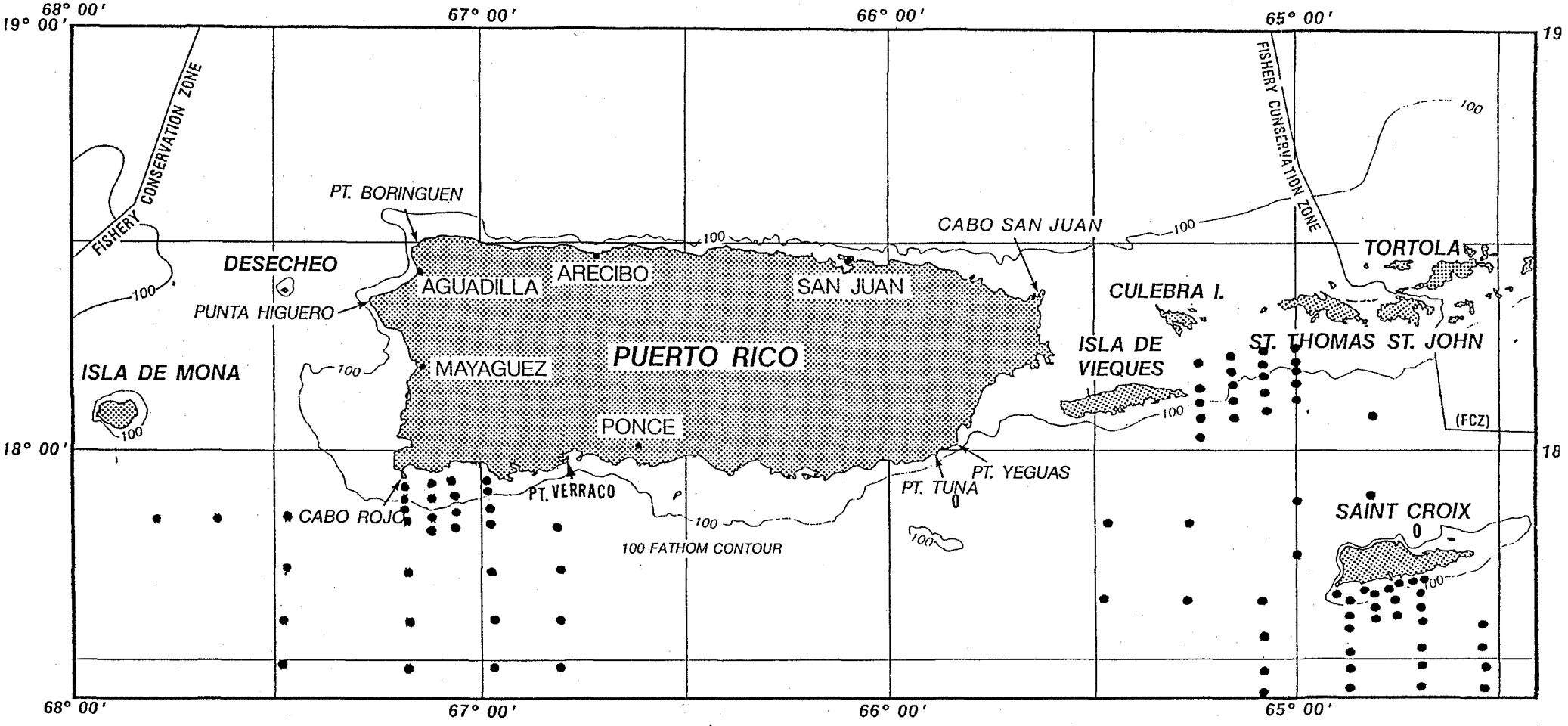

Figure 1. Standard ichthyoplankton stations are indicated by a "•" and 24 hour stations a "0."