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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
Pascagoula Facility
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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
William Tobias, Government of the Virgin Islands 5/4-5/6/84
Donald Hoss, NMFS, Beaufort, NC 5/6-5/10/84
Shailor Cummings, Miami, FL, Alantic Oceanographic and Meteorological Laboratory (AOML) 5/3-5/10/84
Jorge Capella, University of Pureto Rico, Mayaquez 5/6-5/8/84
David Peters, NMFS, Beaufort, NC 5/6-5/10/84
Ed Mayers, NOS, Washington, DC 5/6-5/10/84
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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.

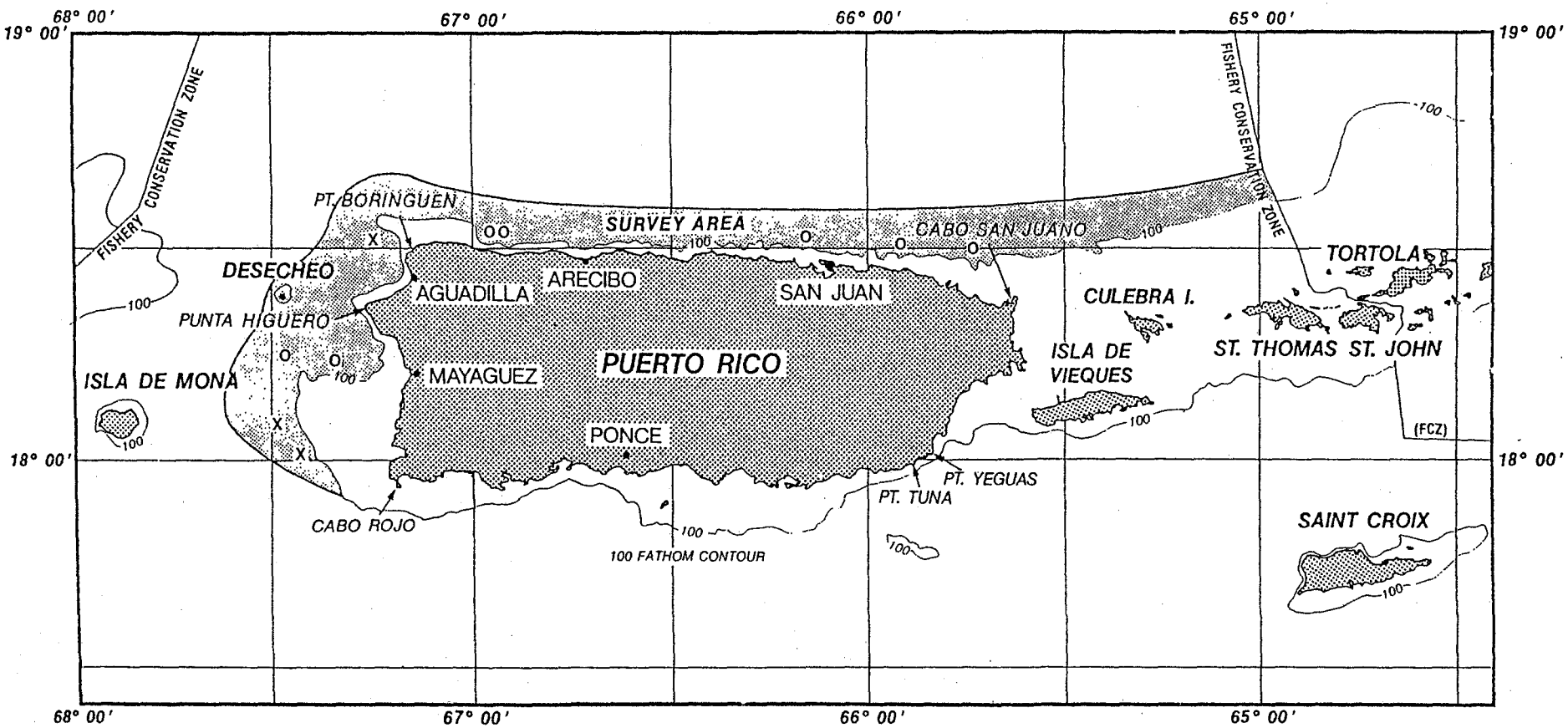

Figure 1. Survey area for DELAWARE II Cruise 84-04 is represented by the stippled area. Bottom longline sets catching more than 20 lbs are represented by an X for snapper and an O for grouper