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U S DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
P O Drawer 1207
Pascagoula, Miss. 39568-1207

NOAA Ship *Oregon II* Cruise 290 (R2-10-01)
6/8-8/3/2010

INTRODUCTION

NOAA Ship *Oregon II* departed Pascagoula, Mississippi on June 24, 2010 for the 30th annual Summer Southeast Area Monitoring and Assessment Program (SEAMAP) Shrimp/Bottom fish Survey in the northern and western U.S. Gulf of Mexico. SEAMAP is a state-federal-university program for the collection, management and dissemination of fishery independent data.

The primary goal of the survey is to study the abundance and distribution of demersal organisms occurring in the northern Gulf of Mexico in 5 to 60 fm and to provide additional biological and catch rate information on demersal organisms occurring in the study area.

There were two amendments to survey dates. The first proposed amended dates were scheduled for Leg I: June 24th – June 29th and Leg II: July 1st – July 17th. The survey was extended to complete stations in the West Delta. The second amended dates of the survey were July 24th – August 3rd, 2010.

One hundred eighty-four hours were lost due to ship yard delays. Seventy-two hours were lost due to weather and mechanical issues aboard NOAA Ship *Oregon II*. There were two scheduled port calls to exchange scientific personnel (Galveston, Texas June 29th to July 2nd and Pascagoula, Mississippi July 17th to July 24th). The ship returned to Pascagoula, Mississippi on August 3rd, 2010.

Summary of Objectives:

1. Sample the northern Gulf of Mexico with Southeast Area Monitoring and Assessment Program (SEAMAP) standard sampling gear to determine the abundance and distribution of benthic fauna. Transmit information weekly, via email, for real time reports of catch rates of penaeid species.
2. Conduct 11 SEAMAP trawling stations in the seafood closure area off the Louisiana coast.
3. Collect size measurements to determine population size structures.
4. Conduct CTD cast to profile temperature, salinity, conductivity, transmissivity, dissolved oxygen concentrations and fluorometry.
5. Collect daily water samples and perform bench top dissolved oxygen tests using the Winkler Titration method on triplicate samples and handheld HACH DO meter. Transmitt data every 3 days to NOAA National Coastal Data Development Center at Stennis Space Center, Mississippi and other researchers to map the hypoxic zone.

6. Collect ichthyoplankton samples with bongo and neuston samplers to map the distribution of fish eggs and larvae.
7. Conduct 13 additional SEAMAP Plankton Stations with one additional bongo tow in the seafood closure area off of the Louisiana coast.
8. Collect additional ichthyoplankton samples with bongo and neuston samplers.
9. Perform additional trawling sampling in closed and surveillance Deepwater Horizon MC252 (DWH) closed fishing area.
10. Collect start and end dates/times, start and end latitude and longitude coordinates at visually encountered observation rafts of sargassum during survey observations.
11. Perform National Resource Damage Assessment (NRDA) Group bird observations from the bow of the *Oregon II*.
12. Collect batfish (*Ogcocephalus* sp.); Atlantic croaker (*Micropogonias undulatus*), grouper (*Epinephelus* sp. and *Mycteroperca* sp.); sharks, dogfish (*Mustelus* sp.), skates and rays (*Elasmobranchii*); red snapper (*Lutjanus campechanus*); vermillion snapper (*Rhomboptilus aurorubens*); spot (*Leiostomus xanthurus*) and tilefish (*Malacanthidae*) for age, growth, abundance and distributional studies.

MATERIALS AND METHODS

The sampling gear consisted of 40-ft shrimp nets with 8-ft by 40-in chain bracketed wooden doors. A standard free tickler chain cut 42 in shorter than the footrope was used to stimulate benthic organisms out of the substrate into the path of the oncoming net. Towing speed was targeted at 2.5 kt. Sample sites were downloaded from NOAA's Environmental Satellite, Data, and Information Service (NESDIS). Geographical strata consisted of Gulf coast shrimp zones 11-21 and bathymetric strata consisted of 5-60 fm. Once the data were downloaded, 325 sites were randomly selected. Towing durations were 30 min at a targeted speed of 2.5 kt with tow direction left to the discretion of the bridge watch.

The sampling design used in this survey was altered from that used in previous years by making 3 major changes. Day/night stratification and depth stratification were eliminated and tow duration was limited to 30 min. These changes resulted in an increased efficiency of the survey and an increase in the number of stations that could be occupied. Additional stations resulted in improvement in precision of catch per unit effort (CPUE) estimates for a number of species.

Trawl catch data were electronically recorded at-sea with the Fishery Scientific Computing System (FSCS), version 1.6, developed by NOAA's System Development Branch of the Office of Marine & Aviation Operations. For FSCS to be operational, the Scientific Computing System (SCS) version 4.2.3 was used to collect metadata, including position, depth, date, time and meteorological data. SCS was also used to collect metadata for ichthyoplankton stations and CTD stations. Catches were either processed in their entirety or subsampled, depending on the total catch weight. If catches exceeded 50 lb, then at least 10% was taken as a subsample. Catches (or subsamples) were sorted by species which were then enumerated and weighed. Additional data taken for specimens identified down to species level, included length measurements, sex, and gonad condition. Specimens that could not be identified to species level were frozen and brought back to the laboratory for identification.

Specimens were collected within closed areas of the DWH Oil Spill Closure area. SEAMAP Stations were randomly selected along with additional stations in the oil spill gridded area. Collected specimens were wrapped in foil, measured and weighed and frozen immediately for sensory and chemical analysis. Specimens were then transferred by chain of custody to the National Seafood Inspection Laboratory in Pascagoula.

Ichthyoplankton samples (conducted with bongo and neuston samplers) were collected at half-degree intervals of latitude and longitude within the defined survey area. Plankton sample sites were occasionally relocated to the nearest trawl sample site to optimize survey time. Bongo tows were made with 2 conical 61-cm nets with 0.335 mm mesh netting. General Oceanic flowmeters were suspended in each side of the frame to measure the amount of water filtered. Single oblique tows were made. Nets were towed at 1.5 to 2.0 kt to maintain a 45° wire angle of towing warp, and were fished to a maximum depth of 200 m or within 2 m of bottom in depths less than 200 m. Neuston sampling gear consisted of a 0.947 mm mesh net mounted on a 1 by 2 m frame. The net was towed for 10 min with the frame half submerged at the surface. Bongo and neuston samples were initially preserved in 10% buffered formalin and then transferred to 95% ethyl alcohol 36 h later.

An additional bongo tow was sampled at selected sites within the SEAMAP sampling area for NRDA analysis. The samples were initially preserved using a chilled 70% ethyl alcohol solution for the right bongo and a chilled 10% paraformalin solution for the left bongo. A 10 gm subsample was taken from the left bongo and frozen before preservation. The left bongo sample was transferred into methanol 6 h later. The right bongo was then transferred into chilled 70% ethyl alcohol 24 h later.

Sargassum rafts were visually observed during survey transits. The bridge collected start and end dates/times, start and end latitude and longitude coordinates. These data will be included as an addition to the ichthyoplankton database

Vertical profiles of temperature, conductivity, dissolved oxygen, percent light transmission and fluorometer values were recorded with a Seabird SBE 911. Forel-ule water color and percent cloud cover observations were also taken during daylight hours. Daily water samples (maximum depth) were taken at the first station after sunrise of each day to perform 3 replicate Winkler titrations to monitor the performance of the DO sensors on the environmental profiler. The values obtained from the Winkler titrations were recorded in the FSCS Access Database. An Orion LDOTM HQ10 portable dissolved oxygen meter was also used at these stations to compare DO readings. Additional water samples were collected for RNA analysis in conjunction with the DWH Oil Spill.

RESULTS AND DISCUSSIONS

One hundred and ninety-six stations were successfully sampled, 11 seafood sampling stations and 3 unsuccessful stations (Figure 1). For summary purposes, data were grouped into 2 geographic areas; West Delta (89°15'-94°00' W Long), and Texas (94°00'-98°00' W Long), and 6 depth intervals; 5-9, 10-19, 20-29, 30-39, 40-49, and 50-60 fm (Table 2). Table 1 lists the 5 most numerous species caught, plus pink and white shrimp and red snapper. The mean total catch rate for the survey was 146.8 kg/h, a 38% increase in relative abundance as compared to 2009 (106.3 kg/h) and a 47.8% increase relative to the 5 year mean for 2004-2009 (99.3 kg/h) (Table 2). Sciaenidae was the most abundant family caught with the Atlantic croaker making the greatest contribution (Table 2). Brown

shrimp, *Farfantepenaeus aztecus*, was the most abundant commercial shrimp species, followed by white shrimp, *Litopenaeus setiferus* and pink shrimp, *Farfantepenaeus duorarum*.

Fifty-two bongo and 37 neuston stations were accomplished (Fig. 2). Neuston and right side bongo samples were returned to Pascagoula for subsequent shipment to the Polish Sorting Center for sorting and identification according to standard SEAMAP protocol. Left bongo samples were sent to the SEAMAP Plankton Archiving Center at the Gulf Coast Research Laboratory (GCRL) in Ocean Springs, Mississippi.

Two hundred and eight CTD casts, 87 cloud cover, and 90 water color measurements were collected (Table 3). There were 25 Winkler Titrations conducted (Table 3). There were no secci disc measurements taken on this survey.

Fish and invertebrate samples were frozen and returned to staff members at GCRL, skate samples were collected for Dr. James Sulikowski (University of New England), batfish species were collected for Bronson Nagareda, croaker were collected for Brittany Palm and red snapper samples were shipped to the Texas A&M University, Corpus Christi.

ACKNOWLEDGMENTS

On behalf of Mississippi Laboratory and the scientific party I would like to thank the Commanding Officer and crew of NOAA Ship *Oregon II* for a job well done during the survey.

Leg III (July 24 – August 1, 2010)

Name	Title	Sex	Organization	Citizenship
Andre DeRosa	Field Party Chief	M	NMFS, Miss.	USA
Brittany Palm	Watch Chief	F	IAP, Miss.	USA
Alonzo N. Hamilton, Jr.	Watch Chief	M	NMFS, Miss.	USA
Michael Hendon	Res. Fish. Bio.	F	NMFS, Miss.	USA
Darin French	Res. Fish. Bio.	M	IAP, Miss.	USA
Allison Orton	Coop. Stud.	F	IAP, Miss.	USA
Holland McCandless	Volunteer	F	Cooperator	USA
David Berquist	Volunteer	M	Cooperator	USA
Sandra Daigle	Volunteer	F	Cooperator	USA
Stephen Powell	Res. Chem.	F	NRDA	USA
Ute Hop	Res. Observ.	F	NRDA	USA

CRUISE PARTICIPANTS

Leg I (June 24 – June 29, 2010)

<u>Name</u>	<u>Title</u>	<u>Sex</u>	<u>Organization</u>	<u>Citizenship</u>
Andre Debose	Field Party Chief	F	NMFS, Miss.	USA
Alonzo N. Hamilton, Jr.	Watch Chief	M	NMFS, Miss.	USA
Carrie Horton	Fish. Bio.	F	IAP, Miss.	USA
Brittany Palm	Fish. Bio.	F	IAP, Miss.	USA
Devin Flawd	Intern	M	IAP, Miss.	USA
Misty Cartrett	Volunteer	F	Cooperator	USA
Brody Benoist	Volunteer	M	Cooperator	USA
Alex Fogg	Volunteer	M	Cooperator	USA
Holland McCandless	Volunteer	F	Cooperator	USA
Michelle Shoemake	TAS	F	TAS Program	USA

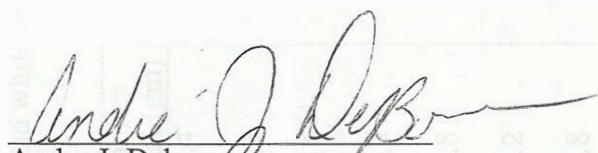
Leg II (July 1 – July 17, 2010)

<u>Name</u>	<u>Title</u>	<u>Sex</u>	<u>Organization</u>	<u>Citizenship</u>
Andre Debose	Field Party Chief	F	NMFS, Miss.	USA
Alonzo Hamilton	Watch Chief	M	NMFS, Miss.	USA
Brittany Palm	Watch Chief	F	IAP, Miss.	USA
Michael Hendon	Res. Fish. Bio.	M	NMFS, Miss.	USA
Sean Lucey	Res. Fish. Bio.	M	NMFS, MA	USA
Geoff Shook	Res. Fish. Bio.	M	NMFS, MA	USA
Holland McCandless	Volunteer	F	Cooperator	USA
David Benoist	Volunteer	M	Cooperator	USA
Bruce Taterka	TAS	M	TAS Program	USA
Kimberley Lewis	TAS	F	TAS Program	USA
Abigail Williams	Volunteer	F	Gustavus College	USA

Leg III (July 24 – August 3, 2010)

<u>Name</u>	<u>Title</u>	<u>Sex</u>	<u>Organization</u>	<u>Citizenship</u>
Andre Debose	Field Party Chief	M	NMFS, Miss	USA
Brittany Palm	Watch Chief	F	IAP, Miss.	USA
Alonzo N. Hamilton, Jr.	Watch Chief	M	NMFS, Miss.	USA
Michael Hendon	Res. Fish. Bio.	F	NMFS, Miss.	USA
Devin Flawd	Res. Fish. Bio.	M	IAP, Miss.	USA
Allison Odom	Coop. Stud.	F	IAP, Miss	USA
Holland McCandless	Volunteer	F	Cooperator	USA
David Benoist	Volunteer	M	Cooperator	USA
Sandra Coghlan	Volunteer	F	Cooperator	USA
Stephani Powell	Bird Obser.	F	NRDA	USA
Lisa Hug	Bird Obser.	F	NRDA	USA

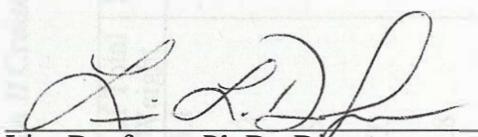
Submitted By:



Andre J. DeBose
Field Party Chief

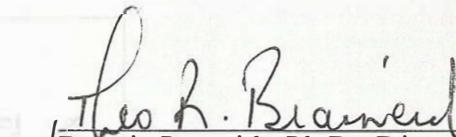
Date 12-8-2010

Approved By:



Lisa Desfosse, Ph.D., Director
Mississippi Laboratory

Date 12/15/10



✓ Bonnie Ponwith, Ph.D., Director
Southeast Fisheries Science Center

Date 12/17/10

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Table 1. Five most numerous organisms caught during NOAA Ship *Oregon II* Cruise 290 (R2-10-01), plus pink and white shrimp, and red snapper (n = 178).

	Name	Percent of Total Number Caught	Percent of Total Catch Weight	Percent Frequency Of Capture	Weight Per Individual (gm)
1	Atlantic croaker (<i>Micropogonias undulatus</i>)	42.5	46.1	66.3	28.4
2	Brown shrimp (<i>Farfantepenaeus aztecus</i>)	9.3	5.2	93.3	14.5
3	Gulf butterfish (<i>Peprilus burti</i>)	5.6	6.9	82.0	32.6
4	Lesser blue crab (<i>Callinectes similis</i>)	4.6	2.0	74.7	11.3
5	Rough scad (<i>Trachurus lathami</i>)	4.2	2.8	44.4	17.8
6	Longspine porgy (<i>Stenotomus caprinus</i>)	3.7	4.2	69.1	30.2
7	White shrimp (<i>Litopenaeus setiferus</i>)	0.7	1.1	36.5	45.8
8	Pink shrimp (<i>Farfantepenaeus duorarum</i>)	0.2	0.2	26.4	22.5
9	Red snapper (<i>Lutjanus campechanus</i>)	0.1	0.8	47.8	189.9

Table 2. Mean catch rates (kg/hr) of Atlantic croaker, brown shrimp, Gulf butterfish, lesser blue crab, rough scad, longspine porgy, white and pink shrimp, red snapper, crustacea, finfish and total live catch for NOAA Ship *Oregon II* Cruise 290 (R2-10-01) by area, depth, and diel strata.

Atlantic croaker

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	89.4	26	122.4	18	157.4	10	26.3	4	10.7	1	29.5	38	125.4	33	80.5	71	104.5
Texas	11	108.5	40	81.3	23	7.6	20	0.2	8	0.1	5	0.1	59	28.9	48	60.8	107	43.2
Areas Combined	23	98.5	66	97.4	41	73.4	30	8.9	12	3.6	6	5.0	97	66.7	81	68.8	178	67.7

Brown shrimp

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	0.9	26	3.5	18	13.0	10	11.1	4	4.9	1	3.5	38	9.6	33	3.1	71	6.6
Texas	11	2.6	40	6.9	23	14.9	20	9.7	8	4.1	5	1.1	59	8.9	48	7.3	107	8.2
Areas Combined	23	1.7	66	5.5	41	14.1	30	10.2	12	4.4	6	1.5	97	9.2	81	5.6	178	7.6

Gulf butterfish

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	4.0	26	19.5	18	18.0	10	8.9	4	1.2	1	0.0	38	15.8	33	11.3	71	13.7
Texas	11	5.1	40	6.5	23	7.0	20	12.5	8	1.4	5	20.2	59	6.2	48	9.9	107	7.8
Areas Combined	23	4.5	66	11.6	41	11.8	30	11.3	12	1.3	6	16.8	97	10.0	81	10.4	178	10.2

Lesser blue crab

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	0.1	26	0.7	18	1.7	10	0.3	4	0.0	1	0.0	38	1.1	33	0.4	71	0.7
Texas	11	0.7	40	7.1	23	6.1	20	1.8	8	0.0	5	0.0	59	3.7	48	5.1	107	4.4
Areas Combined	23	0.4	66	4.6	41	4.1	30	1.3	12	0.0	6	0.0	97	2.7	81	3.2	178	2.9

Table 2. continued.

Rough scad

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	0.0	26	0.3	18	6.4	10	2.9	4	9.1	1	0.5	38	2.6	33	2.8	71	2.7
Texas	11	0.0	40	3.6	23	5.6	20	12.6	8	0.7	5	2.9	59	6.6	48	3.3	107	5.1
Areas Combined	23	0.0	66	2.3	41	6.0	30	9.4	12	3.5	6	2.5	97	5.0	81	3.1	178	4.1

Longspine porgy

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	0.0	26	1.3	18	16.7	10	16.1	4	11.3	1	21.3	38	7.9	33	7.9	71	7.9
Texas	11	0.2	40	1.8	23	8.2	20	12.4	8	2.0	5	2.9	59	3.7	48	6.7	107	5.1
Areas Combined	23	0.1	66	1.6	41	11.9	30	13.7	12	5.1	6	6.0	97	5.3	81	7.2	178	6.2

White shrimp

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	1.9	26	1.8	18	0.0	10	0.0	4	0.0	1	0.0	38	0.8	33	1.1	71	1.0
Texas	11	5.0	40	4.4	23	0.0	20	0.0	8	0.0	5	0.0	59	1.5	48	2.9	107	2.2
Areas Combined	23	3.4	66	3.3	41	0.0	30	0.0	12	0.0	6	0.0	97	1.2	81	2.2	178	1.7

Pink shrimp

Area	Depth												Diurnal Period				Total	
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	0.0	26	0.4	18	0.0	10	0.0	4	0.0	1	0.0	38	0.1	33	0.3	71	0.2
Texas	11	0.2	40	0.6	23	0.2	20	0.1	8	0.0	5	0.0	59	0.4	48	0.2	107	0.3
Areas Combined	23	0.1	66	0.5	41	0.1	30	0.1	12	0.0	6	0.0	97	0.3	81	0.2	178	0.3

Table 2. continued
Red snapper

Area	Depth										Diurnal Period				Total			
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	0.0	26	0.3	18	2.3	10	0.4	4	0.0	1	11.3	38	0.4	33	1.5	71	0.9
Texas	11	0.2	40	0.6	23	1.1	20	1.6	8	7.1	5	1.5	59	1.8	48	0.9	107	1.4
Areas Combined	23	0.1	66	0.5	41	1.6	30	1.2	12	4.7	6	3.1	97	1.2	81	1.1	178	1.2

Crustacea

Area	Depth										Diurnal Period				Total			
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	6.5	26	9.6	18	18.8	10	17.2	4	8.6	1	5.4	38	16.8	33	7.3	71	12.4
Texas	11	10.7	40	22.6	23	28.6	20	15.3	8	8.1	5	4.1	59	19.0	48	19.8	107	19.4
Areas Combined	23	8.5	66	17.5	41	24.3	30	15.9	12	8.3	6	4.3	97	18.2	81	14.7	178	16.6

Finfish

Area	Depth										Diurnal Period				Total			
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	140.8	26	191.0	18	241.2	10	86.9	4	66.1	1	115.4	38	196.4	33	145.0	71	172.5
Texas	11	160.8	40	133.7	23	59.6	20	59.4	8	45.3	5	49.9	59	80.2	48	115.7	107	96.1
Areas Combined	23	150.3	66	156.3	41	139.3	30	68.6	12	52.2	6	60.8	97	125.7	81	127.6	178	126.6

Total catch

Area	Depth										Diurnal Period				Total			
	5 - 9		10 - 19		20 - 29		30 - 39		40 - 49		50 - 60		Day		Night			
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
East Delta																		
West Delta	12	147.5	26	201.26	18	263.1	10	110.2	4	79.9	1	123.4	38	215.0	33	154.9	71	187.1
Texas	11	174.1	40	160.0	23	92.6	20	81.6	8	57.6	5	60.5	59	103.7	48	140.0	107	120.0
Areas Combined	23	160.2	66	176.2	41	167.5	30	91.2	12	65.0	6	71.0	97	147.3	81	146.1	178	146.8

Table 3. Summary of environmental samples and data collected during NOAA Ship *Oregon II* Cruise 290 (R2-10-01).

Observation	Number
Shrimp trawl	196*
Bongo	52
Neuston	37
CTD	208
Water color	90
Cloud cover	87
Winkler Titrations	25

* Includes 178 standard survey stations, 11 seafood safety sampling stations, 4 stations pursuing live juvenile red snapper, and 3 unsuccessful stations during which nets were torn on bottom obstructions.

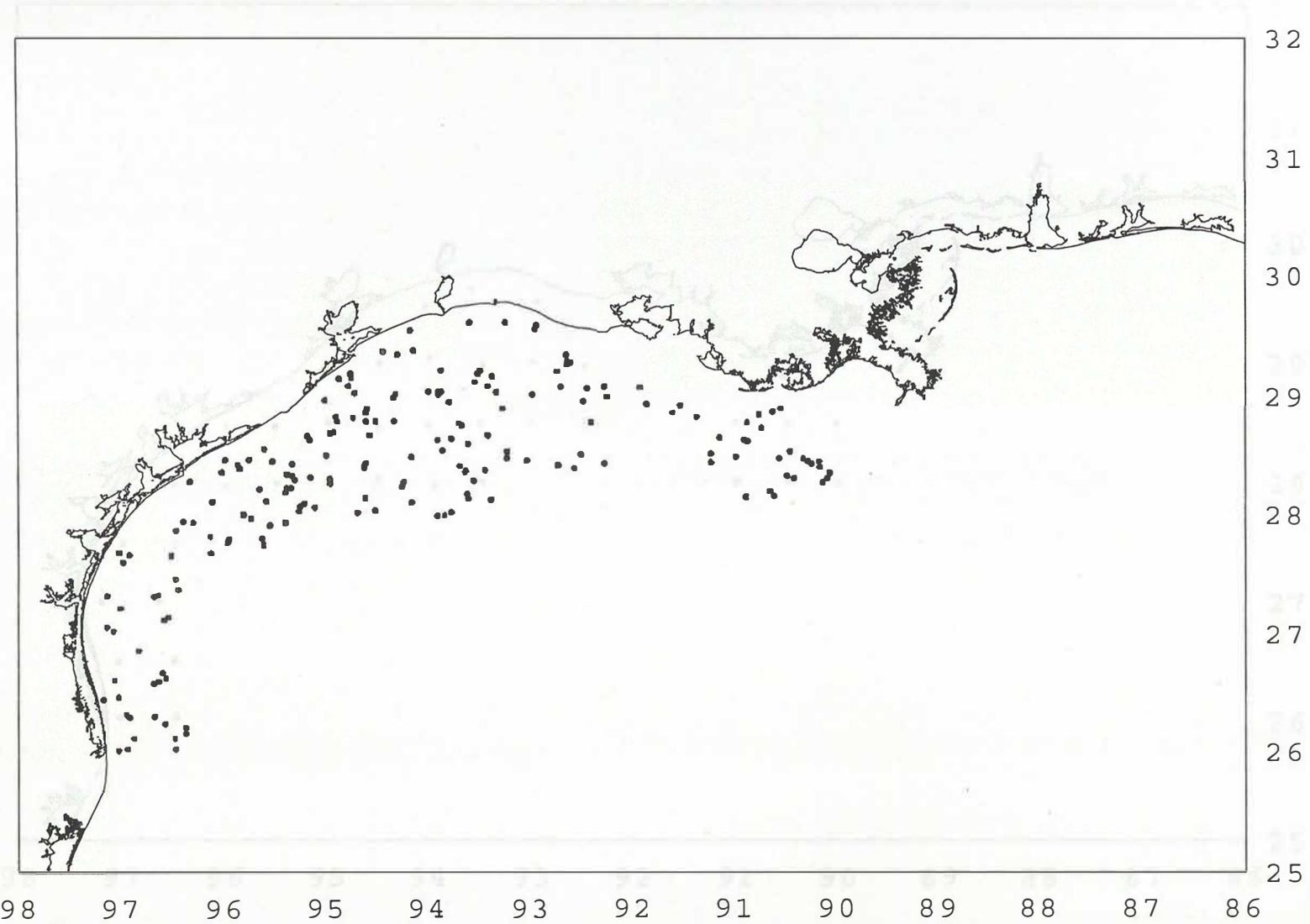


Figure 2. Hydrobathyte sampling stations completed during NOAA Ship *Oregon II* Cruise 290 (R2-10-01).

Figure 1. Shrimp trawl stations accomplished during NOAA Ship *Oregon II* Cruise 290 (R2-10-01).

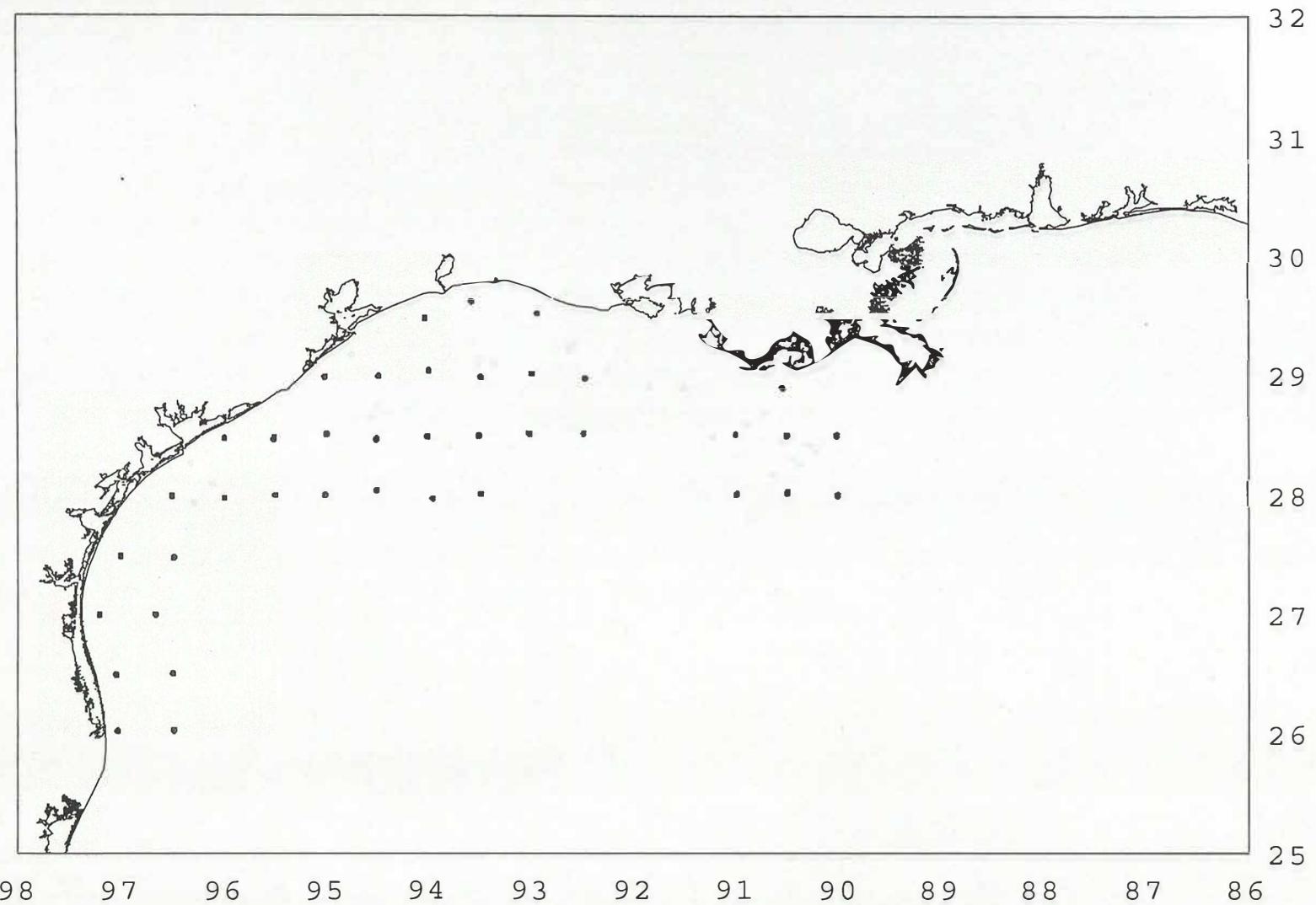


Figure 2. Ichthyoplankton sampling stations completed during NOAA Ship *Oregon II* Cruise 290 (R2-10-01).

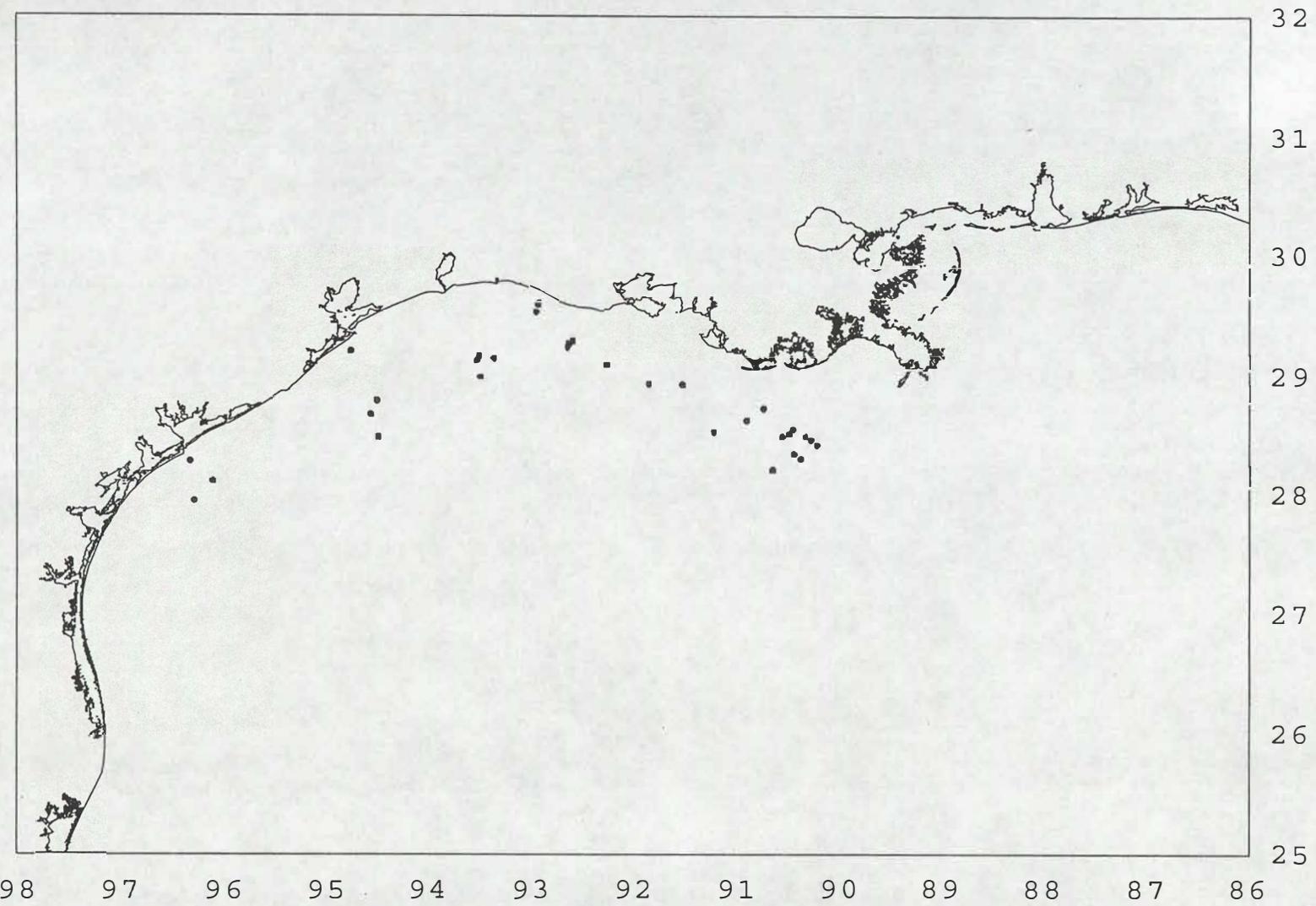


Figure 3. Locations where hypoxic conditions (bottom dissolved oxygen measurement ≤ 2.0 milligrams per liter) were encountered during NOAA Ship *Oregon II* Cruise 290 (R2-10-01).