U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center

3209 Frederic Street
Pascagoula, MS 39567

Cruise Report

Date Submitted: 12/04/2019

Platform: NOAA Ship OREGON II

Cruise Number: R2 19-02 (332)

Project Title: SEAMAP Summer Groundfish

Cruise Dates: 06/06/2019 - 07/19/2019

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Date: _____

INTRODUCTION

NOAA Ship *Oregon II* departed Pascagoula, MS on June 6, 2019 for the 43rd Summer Shrimp/Bottom Fish Survey, 39 of which have been conducted under the auspices of the Southeast Area Monitoring and Assessment Program (SEAMAP). SEAMAP is a state-federal-university program for the collection, management and dissemination of fishery independent data.

The primary objectives of this survey are to monitor the relative abundance, spatial distribution, and size composition of penaeid shrimp stocks and other demersal organisms across the northern Gulf of Mexico (GOM) in water depths from 5 to 60 fm.

NOAA Ship *Oregon II* was scheduled for 38 days at sea, which was divided into three legs: Leg 1) June 6-June 20; Leg 2) June 22 – July 3; and Leg 3) July 8-19. The first leg departed June 6th and steamed SW towards Brownsville, TX as scheduled. Sampling began on June 9th. Leg II of the survey was delayed in Galveston, TX for four days due to radar maintenance. The ship departed Galveston, TX on June 26th to begin Leg II. Leg III of the survey was delayed one day and departed on July 9th due to weather. The ship returned to Pascagoula, MS on July 19th. There were two scheduled port calls to exchange scientific personnel (Galveston, TX June 20 and Pascagoula, MS July 3). There was a total of 5 days lost throughout the survey.

Summary of Objectives:

1. Sample the northern GOM with SEAMAP standard trawl sampling gear to determine the abundance and distribution of demersal and benthic fauna.
2. Collect size measurements to determine population size structure of demersal and benthic fauna.
3. Determine size distribution of penaeid shrimp and provide real-time shrimp reports to Gulf States Marine Fisheries Commission (GSMFC).
4. Record profiles through the water column of temperature, salinity, fluorescence, dissolved oxygen and turbidity using a Conductivity/Temperature/Depth (CTD) unit at all stations. Collect max depth water samples daily using Niskin bottles and measuring the dissolved oxygen (DO) levels using Winkler titrations. Transmit the processed CTD profiles to a previously setup file transfer protocol (FTP) site as often as time permits to NOAA National Center for Environmental Information (NCEI) at Stennis Space Center, MS and other researchers to map the hypoxic zone.
5. Conduct a pilot study to determine the feasibility of using a Manta Water Quality Sonde attached to the trawl to collect fine-scale dissolved oxygen measurements along the trawl path.
6. Conduct video bottom habitat characterization with cameras and attached lighting system to the CTD.
7. Monitor trawl performance using the NOTUS Trawl Monitoring System and trawl cameras.
8. Collect select specimens for genetic, age, growth, abundance and/or distributional studies.

MATERIALS AND METHODS

The sampling gear consisted of a 12-m (40 ft) shrimp net with 2-m by 1-m chain bracketed wooden doors towed with 54-m bridles and a single warp. A standard free tickler chain cut 106 cm shorter than the footrope was used to stimulate organisms out of the substrate and into the path of the oncoming net. Sample sites (206) were randomly selected between 5 and 60 fm within Gulf Coast shrimp statistical reporting zones 5-21. Bathymetric data were obtained from NOAA's Environmental Satellite, Data, and Information Service (NESDIS) website. Sampling sites were proportionally allocated according to surface area of statistical zones and two depth allocation units, 5-20 and 21-60 fm. Tow durations were 30 min at a targeted speed of 2.5 kt with tow direction left to the discretion of the bridge watch. The NOTUS Trawlmaster Gear System was used at multiple stations. NOTUS assessed in real-time the accuracy of the trawl's deployment, as it is

being towed, and during its retrieval. With sensors attached to the doors and footrope, the system calculated how far the doors were spread and monitored the trawl's position in reference to the sea floor using an inclinometer. The sensors and hydrophone communicated to a command center that collects and displays all of the appropriate data. Along with determining the functionality of the trawl, a MANTA Water Quality Sonde was attached to the trawl to determine the feasibility of collecting fine scale dissolved oxygen measurements throughout an entire tow. In addition to these other gear, GoPro cameras were also attached to the head rope at selected trawls. The GoPros were only used during daylight hours to assess functionality of each trawl. At the completion of each trawl, the GoPro was removed and downloaded. It was then re-attached for the next trawl.

Catch data were electronically recorded at-sea with the Fishery Scientific Computing System (FSCS), version 1.6, developed by NOAA's Systems Development Branch of the Office of Marine & Aviation Operations. The FSCS was used in conjunction with the Southeast Advanced Logger (SEAL version 4.0.1) which recorded position, depth, date, time, and meteorological data. Catches were either processed in their entirety or subsampled, depending on the total catch weight. If catches exceeded 22.7 kg (50 lb), then at least 10% was taken as a subsample. Catches (or subsamples) were sorted to the lowest taxonomic level possible then enumerated and weighed. Taxa that were not identified to species level were returned to the laboratory for additional taxonomic resolution. Weights were collected using Marel motion compensating M1100 scales. Large capacity scales (30 kg max, 10 gm resolution) were used to obtain total catch weights and small capacity scales (6 kg max, 1 gm resolution) for individual species weights. Scales were calibrated before every station. Lengths were recorded using Limnoterra Limited electronic measuring boards. There was a protocol change adopted for sampling the three commercial shrimp species at the spring 2019 SEAMAP Meeting. Based on analyses and discussions with stock assessment scientists, a maximum of 50 individuals of the three commercial shrimp species per station were selected for size measurement, weight, and sex. A maximum of 20 individuals per species of snapper, grouper, triggerfish, and lionfish per station were selected for individual size measurements, weight, and sex. For all other species, a maximum of 20 individuals were selected per station for size measurements and every fifth individual collected weight and sex in that series of 20. Real-time shrimp data were transmitted weekly to the GSMFC to consolidate data from all SEAMAP partners in order to monitor the abundance, distribution and size structure of commercial brown, white, and pink shrimp.

Vertical profiles of temperature, conductivity, DO, percent light transmission and fluorometer values were recorded with a Seabird SBE 911. Water color and percent cloud cover observations were also taken during daylight hours. Bottom water samples were taken at the first station after sunrise in order to perform three replicate bench-top Winkler titrations to calibrate DO sensors mounted on the environmental profiler. The values obtained from the Winkler titrations were manually recorded in the Microsoft Access database. Second CTD casts were conducted when catches indicated tows most likely transited hypoxic boundaries (little to no catch is expected where DO concentration falls below 2.0 mg/L). CTD profiles were transmitted to a FTP website hosted by the NCEI.

As part of a pilot study to characterize bottom habitat, GoPro cameras and a LED light system were attached to the rosette of the CTD profiler to illuminate bottom substrate at every station. When the CTD cast was complete, the camera was removed and downloaded to be reviewed later.

Due to the high occurrence of live bottom (sponges and corals) in the East Delta, mitigation measures were used prior to and during the survey to avoid these areas.

Prior to leaving the dock:
All previously known untrawlable areas including non-flat hard bottom areas, hydrophones, seagrass, reef sites, previous hang locations, wrecks, artificial reefs, Marine Protected Areas, and anything else deemed as untrawlable areas were taken out of the sampling universe. All stations selected for this survey fell in areas believed to be trawlable.

At Sea:
An Edgetech 4125 dual frequency side scan sonar, an EK-80 bottom depth sounder, and a Real Time SCS program were all used to help identify and avoid any habitat or obstructions along the sea floor. Every station in depths less than 50 m was surveyed at least once at a target speed of 5.0–6.0 kt. Watch Leaders (WL) and/or the Field Party Chief (FPC) used all methods in combination with one another to designate whether a station was trawlable. If a transect was deemed untrawlable, more transects would be run until either a trawlable transect was found or an hour of attempting to find one had passed. If no transects were deemed trawlable after one hour, the station was dropped. When a transect was deemed trawlable, a CTD and a trawl were completed.

Any movement of a station had to maintain the targeted starting depth of the original station and shrimp statistical zone before being moved.

RESULTS AND DISCUSSION

Two hundred and six stations were planned for NOAA Ship *Oregon II* to complete. One hundred seventy-eight stations were completed successfully, 15 were given an operational code for gear problems (e.g. torn net, broken tickler chain, etc.), and 28 were dropped by the WL using the coral/sponge mitigation measures at sea (Figure 1).

The total catch weight was 7740.2 kg. There were approximately 38,144 measurements; 14,581 individual weights, and 8,744 sex determinations recorded from 467 species.

For summary purposes, NOAA Ship *Oregon II* operated in three geographic areas; East Delta (81˚00'-89˚15' W Long), West Delta (89˚15'-94˚00' W Long) and Texas (94˚00'-98˚00' W Long). The West Delta and Texas regions were grouped together for this data summary due to similar species composition.

The three most abundant species that accounted for at least 1% of the total catch in number and weight from the West Delta included the Atlantic croaker, *Micropogonias undulatus* (n=119,584), the Paper scallop, *Euvola martensis* (n=13,514), and brown shrimp, *Farfantepenaeus aztecus* (n=22,707). These three species represent 56.2% of the 243,138 total specimens caught in that region (Table 1).

In the East Delta, the three most abundant species that accounted for at least 1% of the total catch in number and weight included the Atlantic croaker (n=6,773), Atlantic spot, *Leiostomus xanthurus* (n=3,133) and Gulf squid, *Doryteuthis spp.* (n=2,205). These three species comprised 49.3% of the 28,606 total specimens caught in that region (Table 2).

Hypoxic conditions were defined as areas with less than 2.0 mg/L of oxygen. Each CTD cast was uploaded and sent to NCEI for distribution among interested organizations. The final map of hypoxic conditions shows the occurrence of various levels of DO throughout the survey area (Figure 2).

The Manta Water Quality Sonde was deployed on 13 trawls; however, we had some technical issues and only recorded reliable dissolved oxygen data for two trawls. The NOTUS Trawlmaster Gear System was deployed on 77 trawls, however, there was a malfunction with the hydrophone, which could not be resolved without sending it back to the manufacturer for service. In addition, a trawl camera was placed on 15 trawls, primarily in the eastern GOM where the water quality was favorable. Finally, the CTD camera system was used at all of the 210 stations where a trawl was conducted to characterize the bottom habitat type. Due to the low visibility in the western GOM, only 53 stations had water quality clear enough to characterize the bottom.

Fish and invertebrate samples were frozen and returned to staff members at NOAA Fisheries Pascagoula, MS and Panama City, FL; University of Southern Mississippi-GCRL, Texas A&M University, Tulane University, and Florida Fish and Wildlife Conservation Commission.

QUALITY CONTROL

As part of a study to determine 100% accuracy of our identifications, five specimens of each species from both day and night watches were identified, saved and frozen. Specimens were a representation from each newly encountered species within each Shrimp Stat Zone. These samples were brought back to NOAA Fisheries in Pascagoula, MS to verify for accuracy.

ACKNOWLEDGMENTS

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

CRUISE PARTICIPANTS

Leg I: June 6 – June 20, 2019

Name	**Title**	**Organization**
Chrissy Stepongzi	Field Party Chief	Riverside Technology, Inc.
Alonzo Hamilton	Watch Leader	NMFS
Andre DeBose	Watch Leader	NMFS
Mark Grace	Watch Stander	NMFS
Kevin Rademacher	Watch Stander	NMFS
Adam Kemberling	Watch Stander	Riverside Technology, Inc.
Warren Brown	FMES	NMFS
Christian Jones	Watch Stander	NMFS
Caitlin Zimmer	Watch Stander	Tulane University

Leg II: June 26 – July 3, 2019

Name	**Title**	**Organization**
Taniya Wallace	Field Party Chief	Riverside Technology, Inc.
Chrissy Stepongzi	Watch Leader	Riverside Technology, Inc.
Kristin Hannan	Watch Leader	Riverside Technology, Inc.
Andy Millett	Watch Stander	Riverside Technology, Inc.
John Moser	Watch Stander	NMFS
Mike Cyrana	Watch Stander	Tulane University
Joseph Salisbury	Watch Stander	Riverside Technology, Inc
Caroline Pollard	Watch Stander	Tulane University?
Amy Brower	Watch Stander	University of West Florida?

Leg III: July 9 – July 19, 2019

Name	**Title**	**Organization**
Andre DeBose	Field Party Chief	NMFS
Adam Pollack	Watch Leader	Riverside Technology, Inc.
Kenny Wilkinson	Equipment	NMFS, Stennis Space Center
Brandi Noble	Watch Leader	NMFS
Nick Hopkins	Watch Stander	NMFS
Nicolette Beeken	Watch Stander	Volunteer
Ryan Jones	Watch Stander	Florida Wildlife and Fisheries
Emily McMullen	Watch Stander	Volunteer
Hayden Roberts	Watch Stander	Teacher at Sea Program

Table 1: The most abundant species caught at 138 stations in the West Delta, which accounted for 1% of the total catch in number and weight on NOAA Ship *Oregon II* R2-19-01 (332).

ZONE	TAXON	Frequency	Percent Number Caught (%)	Percent Weight Caught (%)	Percent Occurrence (%)
WEST	*Micropogonias undulatus*	69	41.3	40.6	53.9
WEST	*Leiostomus xanthurus*	32	2.8	5.8	25.0
WEST	*Peprilus burti*	81	2.4	4.7	63.3
WEST	*Euvola martensis*	63	7.1	4.2	49.2
WEST	*Farfantepenaeus aztecus*	108	7.9	4.2	84.4
WEST	*Stenotomus caprinus*	88	2.1	3.4	68.8
WEST	*Cynoscion nothus*	33	2.1	2.5	25.8
WEST	*Trichiurus lepturus*	82	1.2	2.2	64.1
WEST	*Cynoscion arenarius*	50	1.2	1.5	39.1
WEST	*Callinectes similis*	60	2.6	1.2	46.9
WEST	*Doryteuthis spp.*	84	1.8	1.1	65.6

Table 2: The most abundant species caught at 40 stations in the East Delta, which accounted for 1% of the total catch in number and weight on NOAA Ship *Oregon II* R2-19-02 (332).

ZONE	TAXON	Frequency	Percent Number Caught (%)	Percent Weight Caught (%)	Percent Occurrence (%)
EAST	*Micropogonias undulatus*	11	27.6	17.4	27.5
EAST	*Leiostomus xanthurus*	9	12.8	13.2	22.5
EAST	*Lagodon rhomboides*	17	6.7	5.4	42.5
EAST	*Syacium papillosum*	21	4.4	3.6	52.5
EAST	*Synodus foetens*	27	1.0	2.4	67.5
EAST	*Eucinostomus argenteus/gula*	8	3.8	1.9	20.0
EAST	*Doryteuthis spp.*	26	8.9	1.7	65.0
EAST	*Stenotomus caprinus*	6	2.4	1.6	15.0
EAST	*Chloroscombrus chrysurus*	4	1.3	1.0	10.0

Figure 1: Trawl stations assigned to NOAA Ship *Oregon II* R2-19-02 (332).

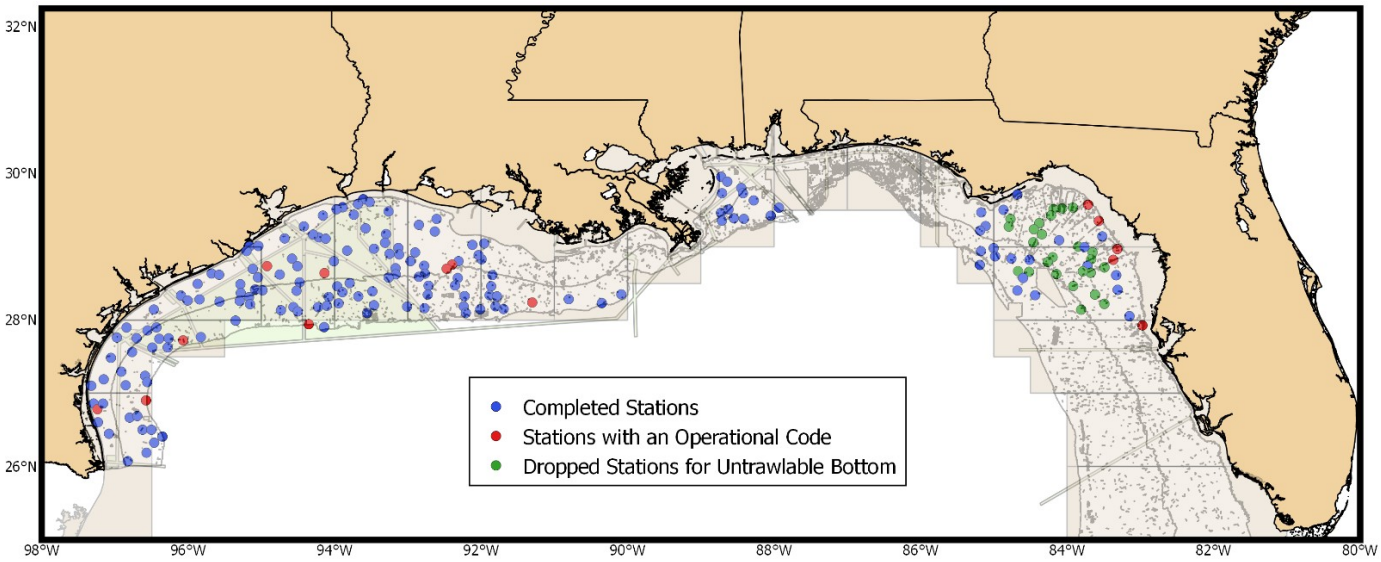

Figure 2. Dissolved oxygen levels as recorded during cruise R2-19-02 (332). (https://www.ncddc.noaa.gov/hypoxia/products/)