Observer Coverage of the US Southeastern Atlantic Rock Shrimp Fishery, September 2001 through September 2006
Preliminary Report

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Introduction

In September 2001, NOAA Fisheries in cooperation with the commercial rock shrimp industry and the South Atlantic Fishery Management Council initiated observer coverage of the rock shrimp fishery operating in the US southeastern Atlantic (east coast). The primary objective of this research effort is to estimate catch rates during commercial shrimping operations for target and non-target species.

Seventeen rock shrimp trips were observed from September 2001 through September 2006. Thirteen trips occurred off the east coast, and four trips operated in the Gulf of Mexico and off the east coast. A total of 400 tows targeting rock shrimp were sampled during 208 sea days of observations, with 334 and 66 tows occurring off the east coast and Gulf of Mexico, respectively (Figure 1).

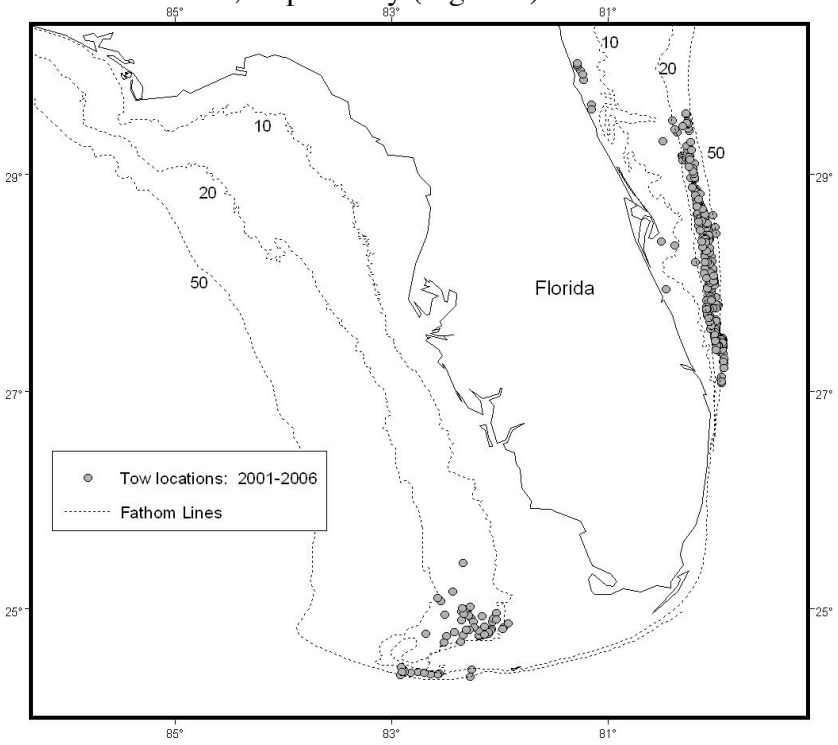

Figure 1. Distribution of sampling effort (tows) based on observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through September 2006.

Only east coast data are included in the preliminary summary presented below. Continued efforts are underway to obtain additional rock shrimp trawl observations off the east coast. Mandatory observer placement for the rock shrimp fishery is anticipated in July 2008.

Methods

NOAA Fisheries-approved observers were placed on cooperating shrimp vessels targeting rock shrimp. The intent was to sample east coast waters exclusively; however, once onboard, no attempt was made to direct fishing location or modify normal commercial operations. During two trips, the target species shifted from rock shrimp to penaeid shrimp; these additional 44 tows are not included in this assessment. Effort allocation was based on vessel availability and current commercial effort trends by area and season.

Vessel length, hull construction material, gross tonnage, engine horsepower and crew size information were obtained for each vessel. Gear characteristics related to bycatch reduction device (BRD), turtle excluder device (TED), net type and other associated gear were recorded at the start of each trip, or when changes were made. For each tow, bottom time, vessel speed and operational aspects relative to each net were documented.

Fishery-specific data were collected from one randomly selected net for each tow. Total catch and total rock shrimp weights were recorded (i.e., not extrapolated and based on one net per tow). A subsample (approximately 20% of the total catch weight) was processed for species composition. Modified characterization (species grouped) was conducted during three trips as part of BRD evaluation. Species weight and number were obtained from the subsample. A detailed description of the sampling procedures is contained in the NOAA Fisheries Characterization of the US Gulf of Mexico and Southeastern Atlantic Otter-trawl and Bottom Reef Fish Fisheries – Observer Training Manual as revised June 2001.

Species total weight and number were extrapolated from subsample weight to the total catch weight, and are also based on one net per tow. In the absence of a weight or number for a given species the entire tow was eliminated from the analysis.

Two hundred ninety-four unique species, family, taxa, etc. (now referred to as species) were recorded. Species were placed into the following categories: rock shrimp, penaeid shrimp, non-shrimp crustaceans, fish, other non-crustacean invertebrates, and debris (e.g., rocks, logs, trash).

Overall catch rates are presented collectively for all years, areas, seasons, and depths. Catch estimates were also examined by depth; a minimum of three vessels were required for stratification purposes.

All data were entered into the southeast regional shrimp trawl bycatch data base developed in 1992 though a southeast regional program conducted by NOAA Fisheries in cooperation with commercial fishing organizations and interests, state fishery management agencies and universities. This database is housed and managed at NOAA Fisheries Southeast Fisheries Science Center's Galveston Laboratory where final data sets are archived. Summarized data are available for use by all interested stakeholders.

Results and Discussion

Overview

Data from 334 tows targeting rock shrimp were collected from seventeen trips off the east coast of Florida from September 2001 to September 2006. Approximately 66% of the tows were successful relative to operational aspects (e.g., no torn webbing, hangs, clogging) and/or sampling requirements (e.g., no catch mixed together, rough weather). Only data where all nets fished successfully during a tow are included in this analysis. Based on data from 221 successful tows (838.3 hours of trawling), 38213.2 kilograms of total catch were recorded based on one net from each tow. Rock shrimp (*Sicyonia sp.)* comprised 6802.7 kilograms (heads-on) or 17.8% of the total weight. Rock shrimp percent composition when extrapolated from subsamples was 19.1%. For the purpose of the graphs below, all percent values have been rounded to the nearest whole number. A total of 294 unique species was collected: 49 species of crustacea, 192 fish, 51 invertebrates, and 2 of miscellaneous debris.

Vessels, Gear and Tow Characteristics

Eight vessels participated in the study. Overall vessel length ranged from 63 to 84 feet with 75.6 feet the average ($\pm$ 6.1 s.d.). Seven vessels were steel hull with one of fiberglass construction. Six vessels had freezer storage capacity. For the remaining two vessels, no data relative to cold storage were recorded.

Based on a per tow basis, average headrope length was 53.1 feet ($\pm$ 4.4 s.d.), and ranged from 40 to 61 feet. Four nets were pulled on each tow. All nets included in this assessment were equipped with TEDs (hard frame) and BRDs.

Tow depth averaged 30.1 fathoms ($\pm$ 11.2 s.d) and ranged from 8.3 to 73.2 fathoms. Tow time ranged from 0.9 to 7.0 hours, with average tow time being 3.8 hours ($\pm$ 1.2 s.d).

Extrapolated Species Composition by Categories – Percent and Catch-Per-Unit Effort

Based on weight extrapolations from species composition samples by category for all years, areas, seasons, and depths (Figure 2), fish species dominated the catch at 49%, followed by rock shrimp at 19%, nonshrimp crustaceans at 18%, noncrustacean invertebrates at 8%, penaeid shrimp at 4%, and debris at 2%. Catch-per-unit-effort (CPUE) in kilograms per hour by category was 22.5 for fish, 8.7 for rock shrimp, 8.2 for crustaceans, 3.8 for invertebrates 1.7 for penaeid shrimp, and 0.8 for debris.

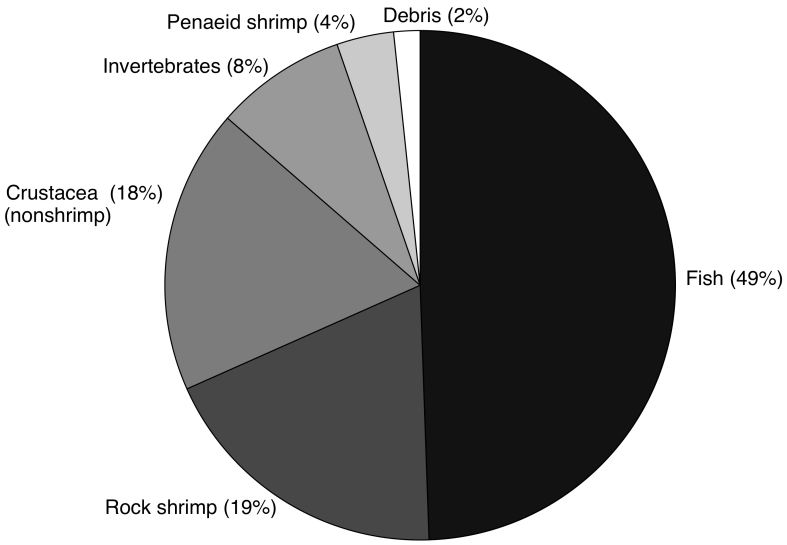

Figure 2. Percent species composition by weight and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through September 2006, n = 221 tows.

Extrapolated numbers from species composition samples by category for all years, areas, seasons, and depths are presented in Figure 3. Crustaceans were dominant by number at 36%, followed by fish at 30%, rock shrimp at 28%, invertebrates at 4%, and penaeid shrimp at 3%. Tows where no counts were obtained (89) for a given species were set aside for the purpose of this analysis. Debris counts where entered as a default of one and accounted for less than 1% based on one unit of debris for each tow where present. CPUE estimates in numbers per hour for the category components were 825 for crustaceans, 679 for fish, 642 for rock shrimp, 86 for invertebrates, and 67 for penaeid shrimp.

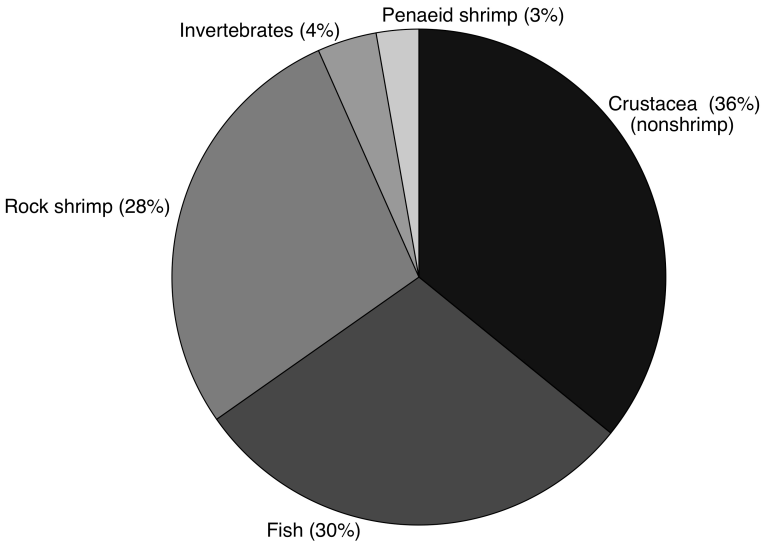

Figure 3. Percent species composition by number and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through September 2006, n = 132 tows.

It is important to note that the order of the categories presented in Figures 2 and 3 are different. Sample size used for extrapolation purposes is different between weight (221 tows) and number (132 tows). Thus comparison of weight and number estimates are not possible. The remaining sections of this report contain extrapolated estimates by weight only.

Extrapolated Species Composition by Species – Percent and CPUE

Weight extrapolations from the species characterization samples for all years, areas, seasons and depths (Figure 4) indicate that rock shrimp genus comprised 16% of the total catch, followed by dusky flounder (*Syacium papillosum*) at 13%, inshore lizardfish (*Synodus foetens*) at 11%, iridescent swimming crab (*Portunus gibbesii*) at 7%, longspine swimming crab (*Portunus spinicarpus*) at 6%, spot (*Leiostomus xanthurus*) at 5%, blotched swimming crab (*Portunus spinimanus*) and brown shrimp (*Farfantepenaeus aztecus*) each at 3%, and horned searobin (*Bellator militaris)* and brown rock shrimp (*Sicyonia brevirostris*) each at 2%. All other species combined comprised 32% of the total weight.

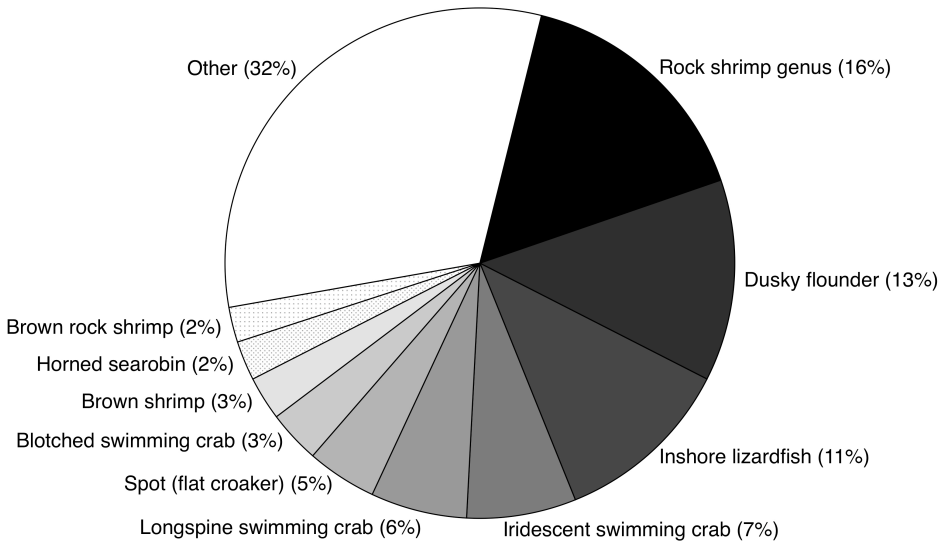

Figure 4. Percent species composition by weight from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through September 2006, n = 183 tows

CPUE at the species level for all years, areas, seasons and depths is presented in Table 1. CPUE estimates in kilograms per hour are given for species that occurred at a rate greater than or equal to 0.7 kg/hr. CPUE for 278 species was less than 0.7 kg/hr.

Table 1. Catch-per-unit effort estimates in kilograms per hour by species from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through September 2006, n = 183 tows.

Common Name	**Genus Species (or Equivalent)**	**Kgs/Hr**
Rock Shrimp Genus	*Sicyonia sp*	6.2
Dusky Flounder	*Syacium papillosum*	5.1
Inshore Lizardfish	*Synodus foetens*	4.5
Irridescent Swimming Crab	*Portunus gibbesii*	2.7
Longspine Swimming Crab	*Portunus spinicarpus*	2.4
Spot (Flat Croaker)	*Leiostomus xanthurus*	1.8
Blotched Swimming Crab	*Portunus spinimanus*	1.3
Brown Shrimp	*Farfantepenaeus aztecus*	1.0
Horned Searobin	*Bellator militaris*	1.0
Brown Rock Shrimp	*Sicyonia brevirostris*	0.9
Rock Seabass	*Centropristis philadelphica*	0.7
Squid and Octopus Class	Cephalopoda	0.7
Debris (rocks,logs,etc.)	Debris	0.7
Bluespotted Searobin	*Prionotus roseus*	0.7
Red Goatfish	*Mullus auratus*	0.7
Lefteye Flounder Family	Bothidae	0.7

Estimated CPUE – by Depth

Figure 5 depicts CPUE in kilograms per hour by depth zone and category for all years, areas and seasons. CPUE for fish was highest in the 0-25 fathom zone (25.5 kgs/hr), followed by the 26-45 fathom zone (22.2 kgs/hr), and the 45+ fathom zone (16.8 kgs/hr). Non-shrimp crustacean CPUE was similar among the fathom zones. Catch rates were highest in the 0-25 fathom zone (8.9 kgs/hr), followed by the 45+ fathom zone (8.3 kgs/hr), and the 26-45 fathom zone (7.7 kgs/hr). Rock shrimp catch rates were highest in 26-45 fathom zone (10.6 kgs/hr), followed by the 0-25 fathom zone (7.0 kgs/hr), and the 45+ fathom zones zone (5.1 kgs/hr). Invertebrate CPUE was highest in the 26-45 fathom zone (7.7 kgs/hr). Lower catch rates were observed in the 26-50 fathom zone (2.3 kgs/hr) and the 45+ fathom zone (0.8 kgs/hr). CPUE rates for penaeid shrimp and debris were less than 2.5 kgs/hr for all depth zones.

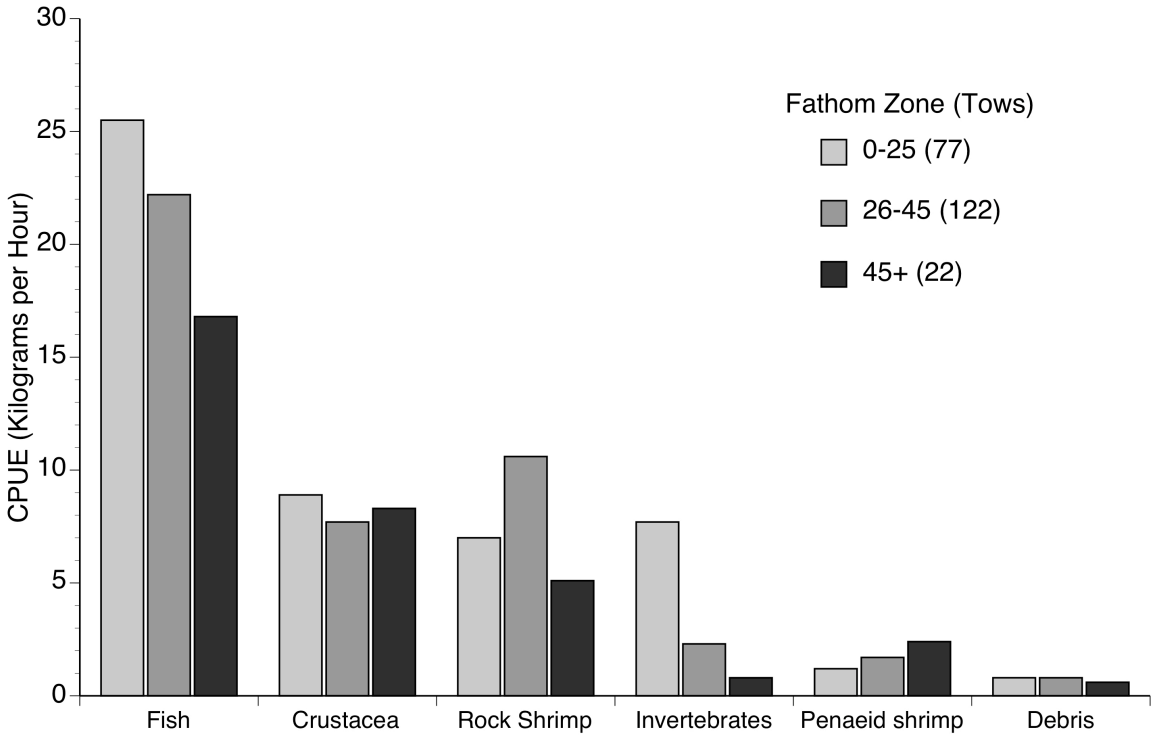

Figure 5. Catch-per-unit effort estimates in kilograms per hour by depth and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through September 2006, n = 221 tows.

Sea Turtles

Eleven sea turtles (six loggerhead, two Kemp's Ridley, three unidentified) were captured in rock shrimp trawls during the study period. Eight sea turtles were taken in try nets, and three slid out of TED-equipped nets. Nine were released alive and conscious, with two released in an unknown condition.

We sincerely acknowledge and thank the commercial rock shrimp fishery members for their participation in this research effort, and look forward to their continued involvement. For further information regarding this report, please contact Elizabeth Scott-Denton, NOAA Fisheries, 4700 Avenue U, Galveston, Texas 77551, (409) 766-3571, elizabeth.scott-denton@noaa.gov.