

# Observer Coverage of the US Southeastern Atlantic Rock Shrimp Fishery, September 2001 through December 2002 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 by area, season and depth.

Nine rock shrimp trips were observed from September 2001 through December 2002. Six trips occurred off the east coast, two trips operated in the Gulf of Mexico and off the east coast, and one trip targeted Gulf of Mexico waters exclusively. A total of 243 tows was sampled during 149 sea days of observations, with 177 and 66 tows occurring off the east coast and Gulf of Mexico, respectively (Figure 1).

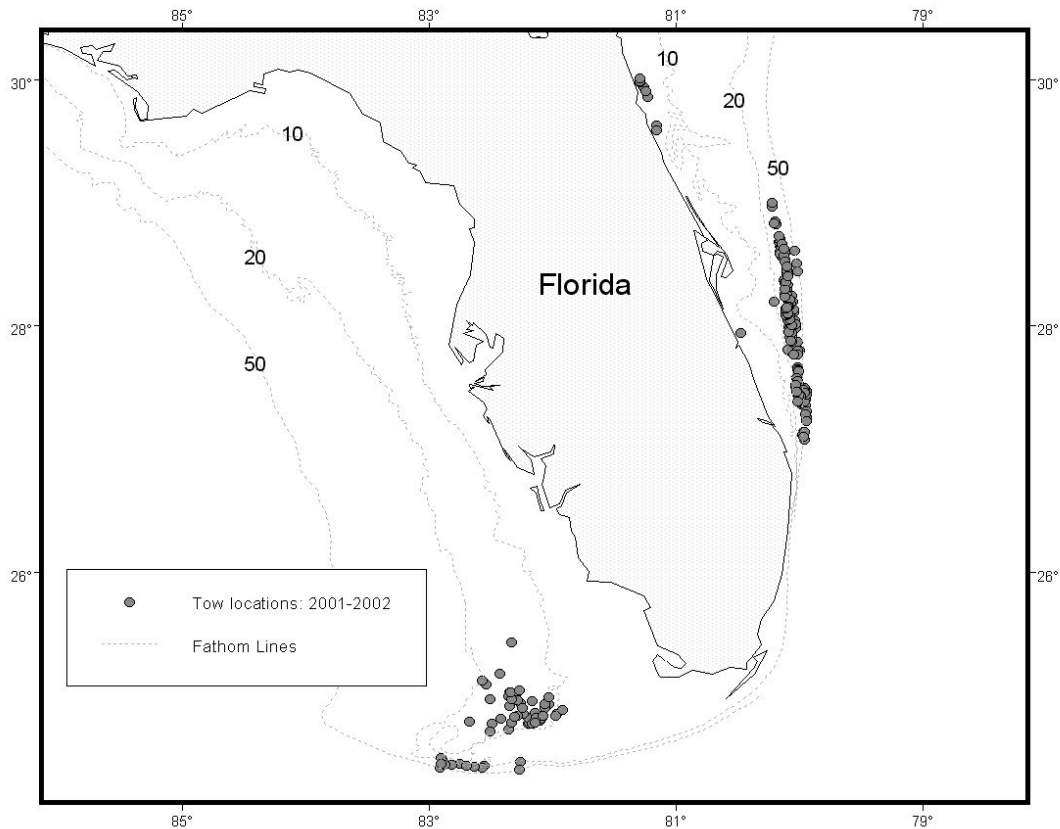


Figure 1. Distribution of sampling effort (tows) based on observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002.

Only east coast data are included in the preliminary summary presented below. One additional trip has been completed, but not included because data were not computerized at the time of this report. Continued efforts are underway to obtain additional rock shrimp trawl observations off the east coast.

## **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. 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. 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. For weight extrapolations 3 tows were removed, for number extrapolations 47 tows were set aside.

Two hundred thirty-three 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 for both years, and all areas, seasons, and depths. Catch estimates were also examined by year, season and depth. Seasonal categories are as follows: Winter – December, January, and February; Spring – March, April, and May; Summer – June, July and August; and Fall – September, October and November.

All data were entered into the southeast regional shrimp trawl bycatch data base developed in 1992 through 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 (i.e., individual identifiers removed) are available for use by all interested stakeholders.

## Results and Discussion

### Overview

Data from 177 tows were collected from eight trips off the east coast of Florida from September 2001 to December 2002. Approximately 75% of the tows (132) 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).

Based on data from 132 tows (584.6 hours of trawling), 22678.0 kilograms of total catch were recorded based on one net from each tow. Rock shrimp (*Sicyonia sp.*) comprised 2108.6 kilograms (heads-on) or 9.3% of the total weight. Catch-per-unit-effort (CPUE) for rock shrimp was 3.6 kilograms per hour (approximately 7.9 pounds per hour).

Rock shrimp percent composition extrapolated from 129 subsamples was 9.7%. Extrapolated CPUE for rock shrimp based on subsamples was 3.6 kilograms per hour.

A total of 233 unique species was collected. There were 37 species of crustacea, 166 fish, 29 invertebrates, and 1 of miscellaneous debris.

For the purpose of the graphs below, all percent values have been rounded to the nearest whole number. It is also 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 (129 tows) and number (85 tows). Thus comparison of weight and number estimates are not possible.

### Vessels, Gear and Tow Characteristics

Six vessels participated in the study. Overall vessel length ranged from 74 to 84 feet with 77.5 feet the average ( $\pm 3.8$  s.d.). All vessels were steel hull construction and had freezer storage capacity. Crew size ranged from 2 to 3 individuals.

Based on a per tow basis, average head rope length was 54.2 feet ( $\pm 3.0$  s.d.), and ranged from 45 to 61 feet. Four nets were pulled on each tow. All nets were equipped with TEDs (hard frame) and BRDs.

Tow depth averaged 33.2 fathoms ( $\pm 14.2$  s.d) and ranged from 8.3 to 73.2 fathoms. Tow time ranged from 1.2 to 7.0 hours, with average tow time being 4.4 hours ( $\pm 1.2$  s.d). The majority of tows occurred between dusk and dawn.

## Extrapolated Species Composition by Categories – Percent and CPUE

Based on weight extrapolations from species composition samples by category for both years, all areas, seasons, and depths (Figure 2), fish species dominated the catch at 54%, followed by non-shrimp crustaceans at 26%, rock shrimp at 10%, penaeid shrimp at 6%, other non-crustacean invertebrates at 3%, and debris at 2%. Catch-per-unit-effort (CPUE) in kilograms per hour by category was 19.9 for fish; 9.6 for crustaceans, 3.6 for rock shrimp, 2.3 for penaeid shrimp, 1.0 for invertebrates, and 0.7 for debris.

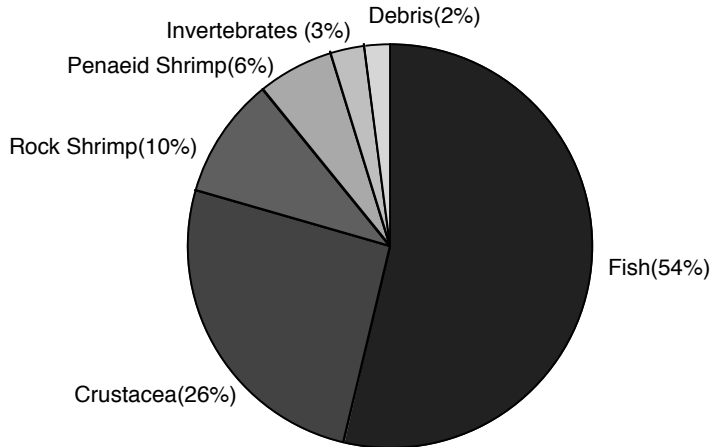


Figure 2. Percent species composition by weight and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002, n = 129 tows.

Extrapolated numbers from species composition samples by category for both years, and all areas, seasons, and depths are presented in Figure 3. Crustaceans were dominant by number at 46%, followed by fish at 32%, rock shrimp at 13%, penaeid shrimp at 4%, and invertebrates at 3%. As previously mentioned, tows where no counts were obtained (47) for a given species were set aside for the purpose of this analysis. Debris counts, where present, were entered as a default of one and accounted for less than 1% based on one unit of debris for each tow. CPUE estimates in numbers per hour for the category components were 1088 for crustaceans, 759 for fish, 316 for rock shrimp, 98 for penaeid shrimp, and 79 for invertebrates.

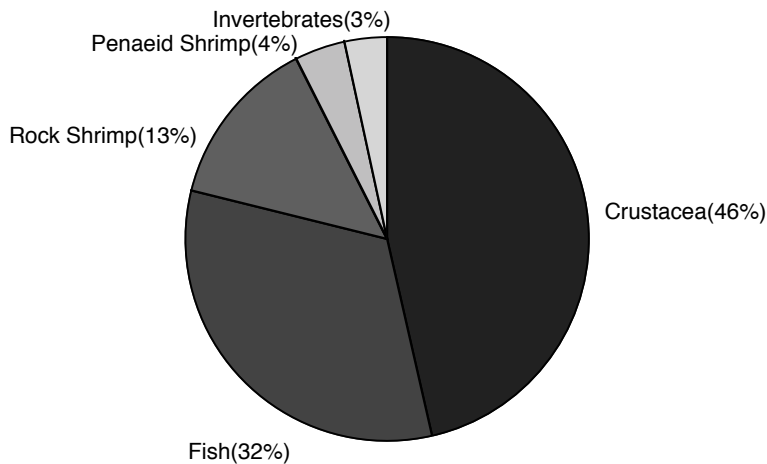


Figure 3. Percent species composition by number and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002, n = 85 tows.

## Extrapolated Species Composition by Species – Percent and CPUE

Weight extrapolations from the species composition samples for both years, all areas, seasons and depths (Figure 4) indicate that dusky flounder (*Syacium papillosum*) comprised 13% of the total catch, followed by both iridescent swimming crab (*Portunus gibbesii*) and rock shrimp at 10%, inshore lizardfish (*Synodus foetens*) at 9%, longspine swimming crab (*Portunus spinicarpus*) at 8%, spot (*Leiostomus xanthurus*) at 6%, blotched swimming crab (*Portunus spinimanus*) at 5%, brown shrimp (*Farfantepenaeus aztecus*) at 4%, and red goatfish (*Mullus auratus*) at 2%. All other species combined comprised 33% of the total weight.

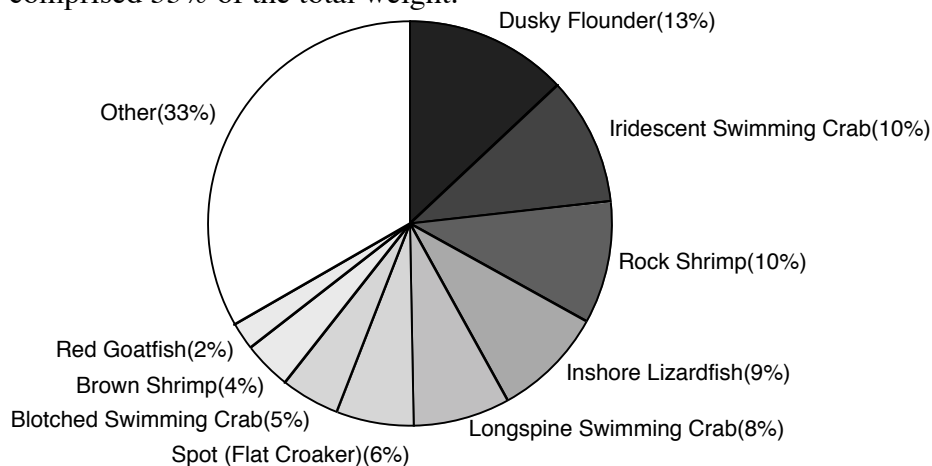


Figure 4. Percent species composition by weight from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002, n = 129 tows

CPUE at the species level for both years, and all 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 0.5 kg/hr. A total of 203 additional species occurred at a rate of less than 0.5 kg/hr.

Common Name	Genus Species (or Equivalent)	Kgs/Hr
Flounder, Dusky	<i>Syacium papillosum</i>	4.8
Crab, Iridescent Swimming	<i>Portunus gibbesii</i>	3.8
Shrimp, Rock	<i>Sicyonia sp.</i>	3.6
Lizardfish, Inshore	<i>Synodus foetens</i>	3.3
Crab, Longspine Swimming	<i>Portunus spinicarpus</i>	2.8
Spot (Flat Croaker)	<i>Leiostomus xanthurus</i>	2.3
Crab, Blotched Swimming	<i>Portunus spinimanus</i>	1.8
Shrimp, Brown	<i>Farfantepenaeus aztecus</i>	1.4
Goatfish, Red	<i>Mullus auratus</i>	0.9
Flounder (Family)	Bothidae	0.8
Seabass, Rock	<i>Centropristis philadelphica</i>	0.8
Searobin, Bluespotted	<i>Prionotus roseus</i>	0.8
Debris (rocks,logs,etc.)	Debris	0.7
Searobin, Horned	<i>Bellator militaris</i>	0.7
Croaker, Atlantic	<i>Micropogonias undulatus</i>	0.6
Flounder, Fringed	<i>Etiopus crossotus</i>	0.6
Squid and Octopus Class	Cephalopoda	0.6
Shrimp, Pink	<i>Farfantepenaeus duorarum</i>	0.5

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 December 2002, n = 129 tows.

### Estimated CPUE by Depth and Category

Figure 5 depicts CPUE in kilograms per hour by depth zone and category for both years, all areas and seasons. CPUE for fish was similar between the 0-25 (20.7 kgs/hr) and 26-50 (21.2 kgs/hr) fathom zones, with the 50+ fathom zone having the lowest fish CPUE (15.0 kgs/hr). Non-shrimp crustacean catch rates were highest in the 0-25 fathom zone (12.4 kgs/hr), followed by the 26-50 fathom zone (8.4 kgs/hr), and the 50+ fathom zone (8.2 kgs/hr). Rock shrimp catch rates were similar between the 26-50 and 50+ fathom zones, with CPUE for rock shrimp slightly higher in the 26-50 fathom zone (4.3 kgs/hr) than in the 50+ fathom zone (4.0 kgs/hr). CPUE for rock shrimp was lowest in the 0-25 fathom zone (2.1 kgs/hr). Penaeid shrimp catch rates were highest in the 26-50 fathom zone (2.8 kgs/hr), followed by the 50+ fathom zone (2.3 kgs/hr) and 0-25 fathom zone (1.4 kgs/hr). CPUE rates for other invertebrates and debris were less than 1.5 kgs/hr for all depth zones.

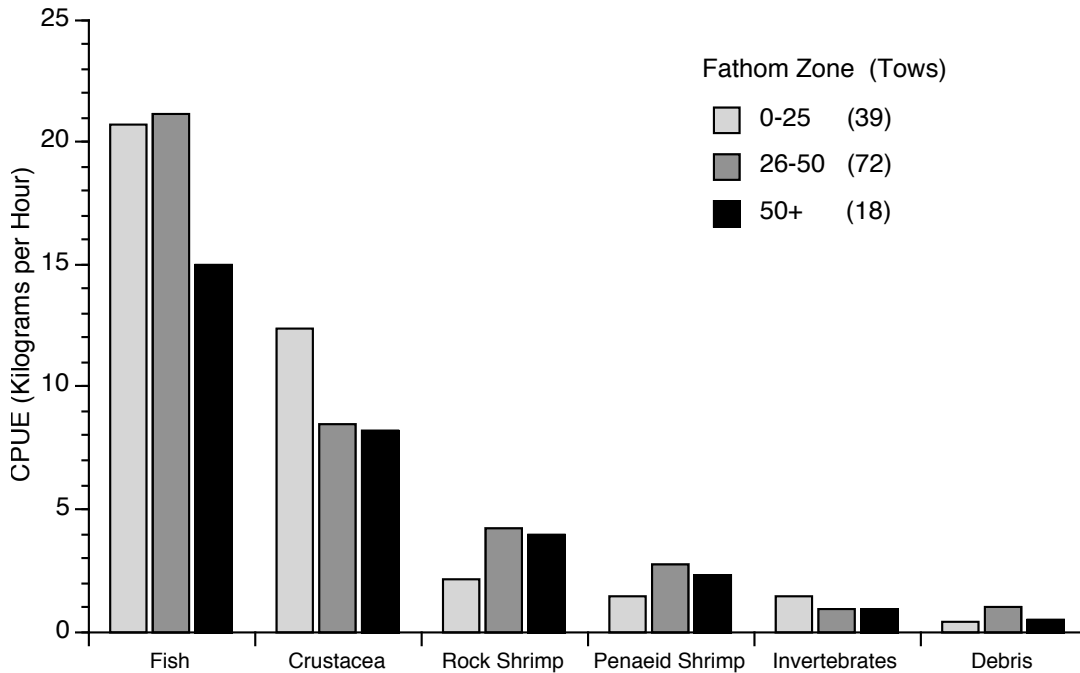


Figure 5. Catch-per-unit effort estimates in kilograms per hour by depth and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002, n = 129 tows.

## Extrapolated Species Composition by Year and Season

Species composition by year, season, weight and category are presented in Figure 6. Fish species comprised more than 50% of the total catch in both years and all seasons. Typically, non-shrimp crustaceans ranked second by weight except in fall 2001, when rock shrimp comprised 22% of the total catch. Penaeid shrimp percent composition ranged from 3% to 7% among the seasons. Invertebrates comprised a relatively smaller component of total catch and ranged from 4% to <1%. Similarly, debris contributed a small percentage relative to total weight ranging from 3% to less than 1%.

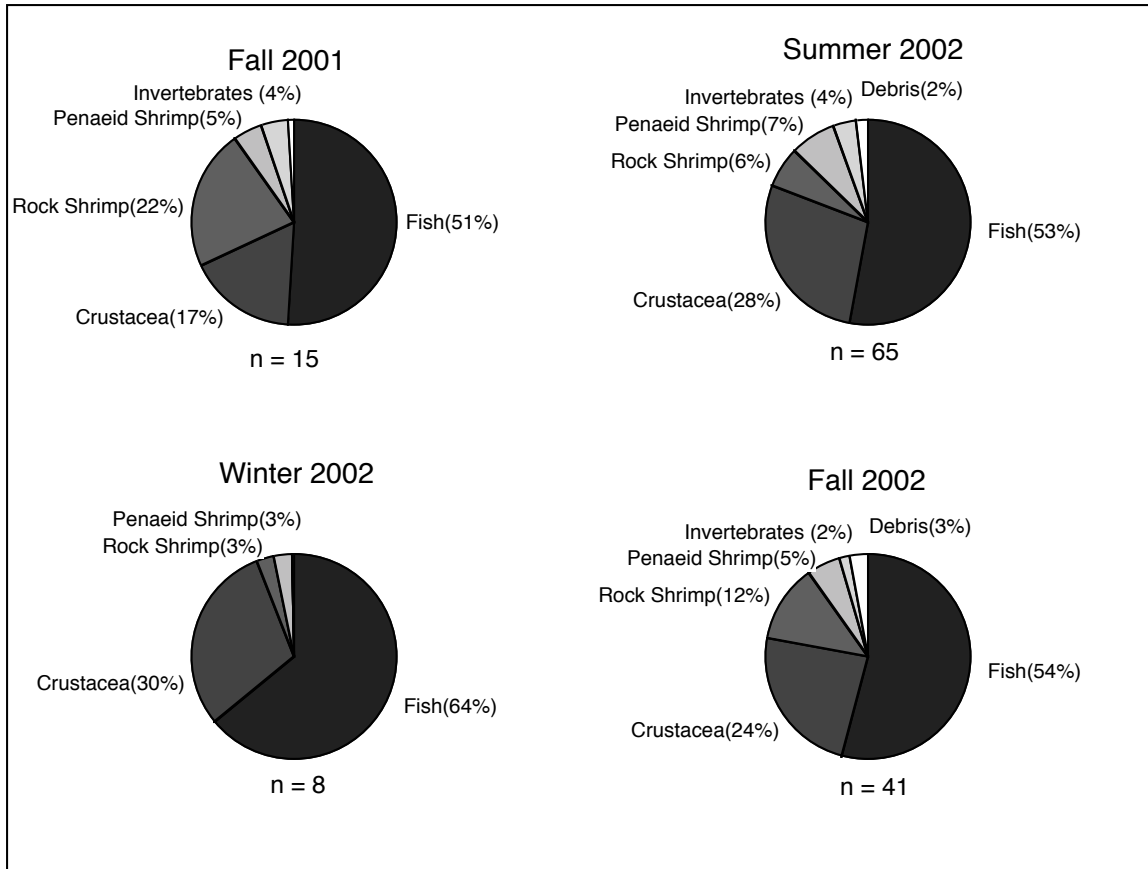


Figure 6. Percent species composition by year, season, weight, and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002.

## Estimated CPUE by Year and Season

Figure 7 depicts CPUE estimates in kilograms per hour by year and season. Catch rates of fish were highest as compared to the other species categories for both years and in all seasons. The highest estimated catch rate of fish was observed in winter 2002 (27.1 kgs/hr) followed by fall 2001 (22.5 kgs/hr), fall 2002 (19.8 kgs/hr) and summer 2002 (19.0 kgs/hr). CPUE of non-shrimp crustaceans was highest in winter 2002 (12.6 kgs/hr), followed by summer 2002 (10.2 kgs/hr), fall 2002 (8.7 kgs/hr) and fall 2001 (7.7 kgs/hr). Rock shrimp catch rates were highest in fall (9.9 kgs/hr) and (4.5 kgs/hr) in 2001 and 2002, respectively. Lower catch rates occurred in summer 2002 (2.3 kgs/hr), and winter 2002 (1.2 kgs/hr). Penaeid shrimp CPUE was highest in summer 2002 (2.7 kgs/hr) followed by fall 2001 (2.0 kgs/hr), fall 2002 (1.9 kgs/hr) and winter 2002 (1.2 kgs/hr). Other invertebrates and debris catch rates were less than 2.0 kilograms per hour for all seasons.

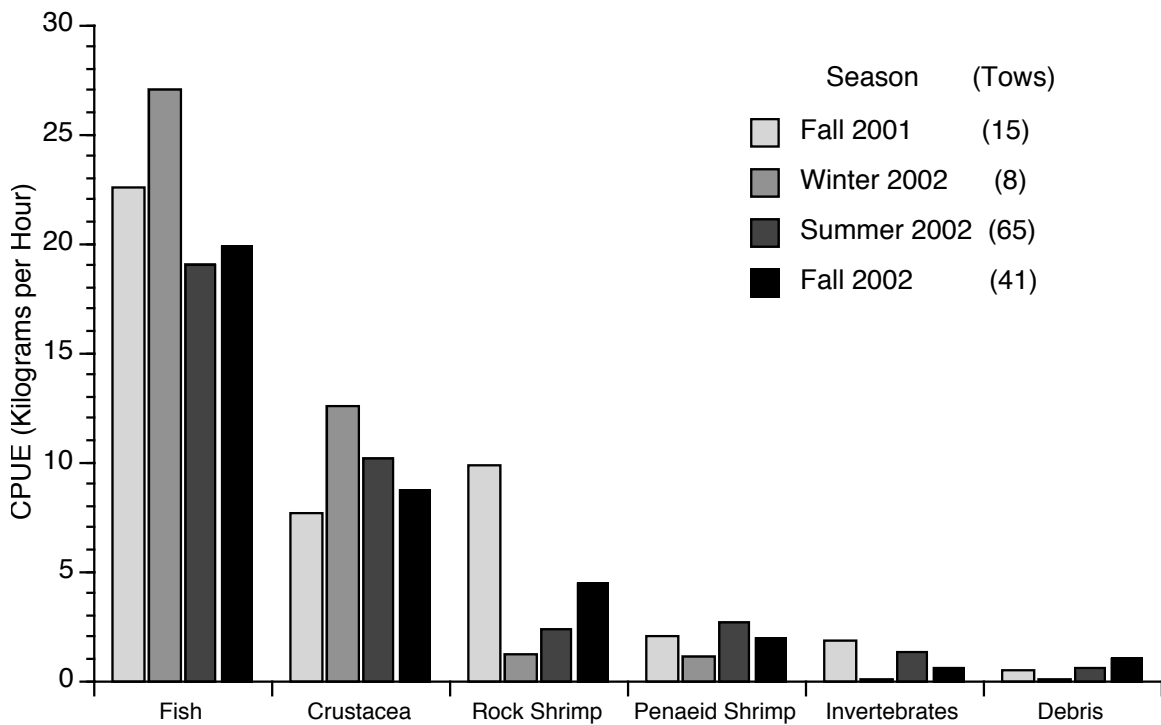


Figure 7. CPUE in kilograms per hour by year, season, weight, and category from observer coverage of the US southeastern Atlantic rock shrimp fishery from September 2001 through December 2002.

## Sea Turtles

Four loggerhead sea turtles were captured in rock shrimp trawls during the study period. Three sea turtles were taken in try nets, and one in a TED-equipped net. All were released alive and conscious. One additional unidentified sea turtle was reported by the crew as captured in a try net, with an unknown release status.

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, or by email: [elizabeth.scott-denton@noaa.gov](mailto:elizabeth.scott-denton@noaa.gov)