BIOLOGY AND ECOLOGY OF THE ROCK CRAB, CANCER IRRORATUS SAY, 1817, IN SOUTHERN NEW ENGLAND WATERS (DECAPODA, BRACHYURA)

BY

PAUL N. REILLY and SAUL B. SAILA
Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island 02881, U.S.A. 1)

INTRODUCTION

The rock crab, Cancer irroratus, is abundant in southern New England waters. It is a major food item for many species of commercial and industrial fish and is potentially important as a commercial food source. At present, rock crabs are a component of the industrial “trash” fishery. In local markets at Galilee, Rhode Island, Cancer borealis Stimpson is sold under the name “rock crab”. Landings of C. irroratus in the United States have averaged about two million pounds per year, primarily from pot fisheries in Maine and Massachusetts (Krouse, 1972; Massachusetts Landings, 1974). The Canadian maritime provinces support a fishery ranging from 100,000 to 600,000 pounds per year (Stasko, unpublished). This project was undertaken to investigate age, growth, mortality, fecundity and sexual maturity of rock crabs.

Within the last four years, numerous papers have been written concerning the biology and ecology of rock crabs. Shotton (unpublished), Shotton & Van Engel (1971) and Terretta (unpublished) studied the adult rock crab population in Chesapeake Bay and coastal Virginia. Winget et al. (1974) sampled adults from November to April in Delaware Bay. Krouse (1972) utilized lobster traps to capture male and female rock crabs in Maine waters. Scaratt & Lowe (1972) collected crabs with commercial lobster gear in Northumberland Strait, New Brunswick, and, with SCUBA, provided the only available information concerning size frequency distributions of juveniles. Jones (unpublished) sampled adult rock crabs with an otter trawl in Narragansett Bay for one year. This study describes several aspects of the southern New England crab population with emphasis placed on juveniles.

METHODS

In cooperation with the industrial fishing fleet at Galilee, Rhode Island, the adult rock crab population was sampled on 50 occasions from March 1974 to May 1975, from Block Island Sound east to Nantucket Shoals (fig. 1). Crabs were caught in otter trawls with a 76 mm stretched mesh in the forward section and a 51 mm stretched mesh in the cod end. All crabs were measured to the nearest

1) Present address of senior author: Department of Fish and Game, 411 Burgess Drive, Menlo Park, California 94025, U.S.A.
millimeter, sexed, and the condition of the shell (hard, soft or paper shell) and presence of eggs on females were noted.

SCUBA diving and two species of predatory demersal fish were used to sample juvenile rock crabs. Live crabs were collected by hand during 38 dives in Pt. Judith Salt Pond (fig. 2) from June 1974 to May 1975. The search area had a sandy-silty bottom covered with blue mussels, *Mytilus edulis* L., and was approximately 5 m deep at mean low water. In August and September, and again in April and May, thorough, digging searches, in part using a one meter-square iron grid, were conducted to estimate population density and biomass, and to compare size frequency distributions nine months apart. All crabs were measured to the nearest 0.1 mm, and the condition of the shell was noted. Crabs were retained in holding tanks with running sea water to observe molting. These laboratory molts are to be distinguished from field molts, in which a recently molted crab was found alongside its cast exoskeleton.

The little skate, *Raja erinacea* Mitchill, and the Atlantic cod, *Gadus callarias* L., were chosen as biological samplers for this study, based on previous reports (Field, 1907; Bigelow & Schroeder, 1953; Richards et al., 1963) and preliminary observations of the frequency of occurrence of crabs in the stomachs. Skates occur during the entire year in southern New England coastal waters, while cod are found from November to April. All crabs were measured to the nearest 1.0 mm, and sexed when possible. When the carapace of a rock crab was broken, either the propodus of the larger claw or the four distal segments of the longest (first) leg were measured to the nearest 0.5 mm. This was then converted to the standard carapace width based on calculated regressions for carapace width-claw length and carapace width-leg length.

Large concentrations of cast rock crab exoskeletons were found on several occasions in and along Pt. Judith Pond and along Narragansett Bay. The size distributions aided in the determination of periods of molting.

Egg counts were made for female rock crabs with carapace widths from 21 to 82 mm. Eggs were scraped from the abdomen and dried in an oven. The abdominal

![Fig. 1. Location of industrial trawl rock crab samples, Block Island Sound to Nantucket Shoals, March, 1974 to May, with 20 fathom line. Open circles represent a male/female ratio less than 1.0. Shaded circles represent a male/female ratio greater than 1.0.](image-url)