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NOTE

# Compensatory Growth in the Bay Scallop, *Argopecten irradians* (L.)[1]

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## Abstract

The phenomenon of compensatory growth has been described as a negative correlation between growth increments in successive years and increasing size of individuals in a given year-class. Evidence is presented that bay scallops, *Argopecten irradians*, of the 1979 year-class, exhibited this growth phenomenon in the Poquonock River estuary, Groton, Connecticut.

## Introduction

The phenomenon of compensatory growth was described by Ricker (1958) as a negative correlation between gorwth increments in successive years and increasing size of fish in a given year-class. Simply stated, smaller fish grow faster to catch up with larger fish in a given year-class. Compensatory growth has been documented for both fish (Hile, 1941; Gerking, 1966; Ricker, 1969; and others) and molluscs (Chernin and Michelson, 1957; Eisenberg, 1966; Mooij-Vogelaar *et al.*, 1970; Peterson, 1978; Eldridge *et al.*, 1979; Eldridge and Eversole, 1982; and others). Time of spawning, variation in temperature during development, variable food availability and density-related growth inhibition have been cited as likely factors which set the stage for compensatory growth to occur (Sund, 1911, as cited in Ricker, 1969; Eldridge *et al.*, 1979; Eldridge and Eversole, 1982).

Stewart *et al.* (MS 1981) compared the growth of bay scallops in three eastern Connecticut estuaries. Generally, animals in their second growing season (i.e. those with a raised growth ring on their valves) exhibited slow pre-spawning growth, which increased sharply after spawning until late October and early November when growth essentially ceased. Although the scallop populations in the three estuaries exhibited the same general seasonal trend in growth, synoptic values of growth rate and total shell length differed significantly. The documentation of yearly growth in the bay scallop is sparse in the published literature. Marshall (1960) and Cooper and Marshall (1963) are the only other investigators who have studied growth in a natural population of bay scallops in eastern Connecticut. The purpose of this study was to determine if scallops, which grow less than their cohorts during the first growing season (no raised growth ring), compensated for their smaller size during the second season by growing at a faster rate.

## Materials and Methods

A representative sample of 200 scallops (1979 year-class) was collected by biologist-divers on 6 November 1980 at a station in the Poquonock River estuary, Groton, Connecticut (Fig. 1). The scallops occurred in shallow (1-2 m depth) water on a substrate of sand and silt in an eelgrass, *Zostera marina*, bed.

Total shell length of scallops (longest tangential axis from the middle valve hinge to the opposite shell margin) and length to the first growth ring (longest tangential axis from the middle valve hinge to the edge of the first ring) were measured to the nearest 0.1 mm. Growth in the second season was taken as the difference between the two measurements. The relationship between growth increments in the first and second seasons was determined by a functional (GM) regression (Ricker, 1973).

## Results and Discussion

Results of the functional regression (Fig. 2) show a negative correlation between increasing shell length at the end of the first growth season and growth during the second season. The equation that describes the line is

$$Y = 64.20 - 1.02X$$

According to the definition of Ricker (1958), bay scallops of the 1979 year-class exhibited compensatory growth.

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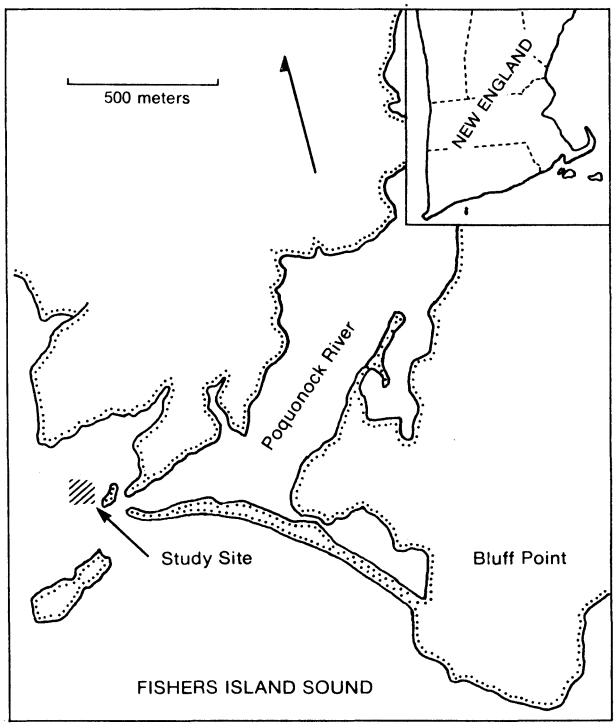


Fig. 1. The study site located in the Poquonock River estuary, Groton, Connecticut.

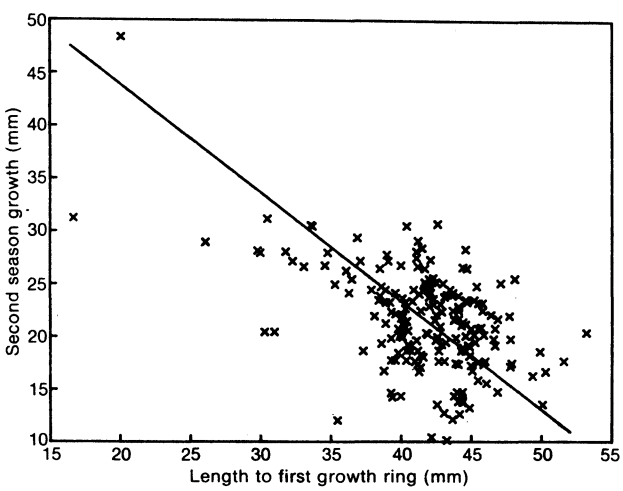


Fig. 2. Functional regression of second-season growth on length to first growth ring in bay scallops from the Poquonock River estuary.

Confirmation of this phenomenon in bay scallops has fishery enhancement and aquacultural production implications. Since scallops spawned late in the season (i.e., small-sized scallops) may still reach an "adequate" market (fishable) size in the following season, time of seed broadcast in enhancement efforts and time of placement in outgrowth cages in aquacultural enterprises may not be as "critical" a factor as is currently believed.

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