

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

OPERATING PROGRAM

| | |
|---|--|
| Field Station or Office of Origin <u>Woods Hole, Massachusetts</u> | Region or Area <u>Region 3, Gloucester, Massachusetts</u> |
| Subactivity (Symbol and Title) <u>1-31 Coastal and Offshore Research</u> | Program Title: <u>See Scallops</u> Program No. <u>431.83</u> |

| PROGRAM COMPONENTS OF COST | Previous Program | This Action | Current Program |
|--|------------------|-------------|-----------------|
| 10. Personal Services (Detail on reverse side) - - - - - | | 26,315 | 26,315 |
| 21. Travel and Transportation of Persons - - - - - | | 200 | 200 |
| 22. Transportation of Things - - - - - | | 5,200 | 5,200 |
| 23. Rent, Communications & Utility Services - - - - - | | | |
| 24. Printing and Reproduction - - - - - | | | |
| 25. Other Services - - - - - | | | |
| 26. Supplies and Materials - - - - - | | 1,600 | 1,600 |
| 31. Equipment - - - - - | | 1,200 | 1,200 |
| Other - - - - - | | | |
| Sub Total Program Direct Cost - - - - - | | 34,515 | 34,515 |
| Program Indirect Cost - <u>2/A</u> - - - - - | | 3,000 | 3,000 |
| TOTAL OPERATING PROGRAM | | 37,515 | 37,515 |

BREAKDOWN BY PROGRAM FEATURE

| NUMBER | PROJECT | Previous Program | This Action | Current Program |
|--------|--|------------------|-------------|-----------------|
| A | Biological and Ecological Studies | | 17,257.50 | 17,257.50 |
| B | Management | | 17,257.50 | 17,257.50 |
| | Sub Total Program Direct Cost - - - - - | | 34,515.00 | 34,515.00 |
| | Program Indirect Cost - <u>2/A</u> - - - - - | | 3,000.00 | 3,000.00 |
| | TOTAL OPERATING PROGRAM | | 37,515.00 | 37,515.00 |

ESTIMATE OF EXPENDITURES BY QUARTERS - F.Y. 19

| Object Class | First | Second | Third | Fourth |
|-------------------------|-------|--------|-------|--------|
| Personal Services | | | | |
| All Other Expenditures | | | | |
| Total Operating Program | | | | |

Prepared By: Name: Herbert W. Jordan Date: 7/19/63

Approved By: Name: Herbert W. Jordan Laboratory Director Date: 7/19/63

| <u>Personnel (name)</u> | <u>Grade</u> | <u>Cost</u> |
|--------------------------------|--------------|---------------|
| Poggy | GS 13 | 13,370 |
| Haynes | 9 | 7,600 |
| Jensen, H. | 8 | 6,444 |
| Total personal services | | 27,414 |

Equipment List

Experimental Scallop Dredge 1,000

| <u>Region #3</u> | | Briefing Statement (In thousands of dollars) | | <u>Coastal and Offshore Research</u> (Subactivity) | |
|------------------|-------------|---|------|---|------|
| | | Program without Increase | | | |
| No. | Title | 1965 | 1964 | 1963 | 1962 |
| | | \$ 84.0 | 84.0 | 82.0 | 80.0 |
| 431 | Sea Scallop | PP 4 | 4 | 4 | 4 |

Program:

Work plan: Sample the commercial catch and survey the beds with research vessel ALBATROSS IV.

Objective: Determine the effect of fishing on the stocks; make recommendations for management; study natural fluctuations in abundance and make predictions.

Accomplishments FY 1963: Analysis of port sampling is current. It has been determined that the age at which this shellfish is taken should be delayed one year.

Base of operations: Woods Hole, Massachusetts

REVIEW OF SEA SCALLOP PROGRAM

This program began in December 1954. At that time, there was very little in the literature on which to build. Hugh M. Smith (1891) had published a narrative account of the sea scallop fishery along the Maine Coast. Gilman A. Drew (1906a and 1906b) had sketched in some of its habits, morphology, and physiology. Lloyd M. Dickie (1951) gave an account of the fishery around Prince Edward Island and (Dickie, 1955) in the Bay of Fundy. J. A. Posgay (1953) had described spawning and growth in Cape Cod Bay.

There was almost nothing known about the Georges Bank stocks. William F. Royce had begun collecting landings statistics in 1943 at New Bedford, Mass., and these had been published by Premetz and Snow (1953). These historical data have since proved to be extremely useful in our understanding of this fishery.

In 1955 we began to collect length frequency samples at New Bedford in addition to the information on pounds landed, days fished, and area of capture. Although we had only a rough estimate of the growth rate, it was immediately obvious that the fishery was largely dependent on the newly recruited year class. A recording measuring board was devised (Posgay, 1958a) to speed the collection of length frequency data. Some attempts were made at direct measurement of abundance by underwater photography.

In 1956 and 1957 we improved our estimate of the growth rate using the Petersen method, started what became an extensive tagging program, began to estimate mortality rates, and made our first ventures into population dynamics calculations. The results of our investigations to date were reported orally to Panel 5, ICNAF, in June 1957. Papers were published on the vessels and gear used in the fishery (Posgay 1957a) and the range of the sea scallop (Posgay 1957b).

In 1958 Arthur Merrill succeeded in developing objective criteria for identifying annual rings on the shells of sea scallops from Georges Bank. His methods were validated (Merrill et al ms) by comparing his derived growth rates with those derived from the growth of tagged and recaptured animals. The manuscript describing these methods is currently under revision. A paper (Posgay, 1958b) was presented at the Annual Meeting of the International Commission for the Northwest Atlantic Fisheries giving a history of the fishery, a description of the gear, the results of our gear selection work, estimates of growth and mortality rates, and the results of inserting these rates in the Beverton and Holt population model. The basic conclusion of this paper

was that changes in the level of fishing pressure would not affect the yield of a year class much, but that postponing the age of first capture would increase the yield. A paper on underwater photography (Posgay 1958c) and another documenting the spawning time (Posgay and Norman, 1958) were published.

In 1959 Arthur Merrill discovered over 10,000 sea scallops less than 10 mm. in size among the fouling organisms on a navigation buoy. These sizes are rare in collections made on the bottom. This enabled him to work out the changes in shell morphology during the larval and postlarval stages (Merrill 1961) and demonstrated that the larvae were planktonic. Using the new shell reading technique, growth rates were calculated for all major fishing grounds. A study was begun of the scallop grounds in the vicinity of Hudson Canyon. A device to measure the distance traveled while dredging was developed. This makes our collections quantitative. Posgay (1959a) gave a paper on underwater photography at the International Oceanographic Congress. The report to ICNAF (Posgay, 1959b) summarized the previous year's research and concluded that all evidence pointed to increased yield if the age of first capture were postponed. The Commissioners proposed that sea scallops be brought under the terms of the Convention; this later was done.

In 1960, a survey was made to learn something of the distribution of sea scallops along the Middle Atlantic Coast (Merrill, 1960). An extremely abundance year class had been recruited to the Georges Bank fishery during 1959. In certain areas, where earlier year classes were scarce or absent it was possible to study the effect of the fishery on the stocks very closely. Research vessel from one such ground samples showed a total mortality rate of 85 percent during the first year after recruitment. About 8 percent of this was due to natural mortality, the rest to fishing. The report to ICNAF (Posgay, 1960) discussed this and concluded that the 9.3 million pounds supplied by this year class from the Southeast Part ground would have been 12.3 million if recruitment had been postponed one year, and 14.3 if postponed two years for the same amount of effort. The growth rate of this, the most densely aggregated year class that we had ever observed, was somewhat higher than the average we had previously calculated for the same area.

In 1961, Posgay (1961a) presented a paper at the ICNAF Tagging Symposium which analyzed the return of about 2,800 tagged shells out of some 13,000 released. They were used to calculate growth rates, validate the shell reading method of ageing, deduce the season of ring formation, and document the lack of movement. In 2-1/2 years at large, 80 percent of the recoveries

were reported within 2 miles of the place of release. The report to ICNAF (Posgay 1961b) discussed abundance, mortality rates, growth rates, and predicted yield. As before, it was concluded that rather large changes in fishing pressure would not affect yield very much and that postponement of age at first capture would increase yield. Posgay (1961c) sent a paper on the design of Albatross IV to FAO Research Vessel Forum.

Some tank experiments were conducted in 1962 to learn if our tags inhibited movement. The tagged animals moved about in the same manner as the untagged. We also learned that noise, pressure waves, in the water stimulated scallops to swim and that they are positively phototactic. An analysis of 18 years landings from Georges Bank showed that these relatively restricted areas supplied most of the catch. By restricting our sampling area, we are able to make more efficient use of ship time. Our abundance index showed a 30 percent decline from 1961. Comparing quantitative samples collected in 1962 with those collected in 1961 showed a total mortality rate (Z) of 9.75. All gear selection data collected by the United States and Canada was analyzed. It showed that simple increasing the size of ring used in the dredge would not result in a satisfactory savings gear. The report to ICNAF (Posgay 1962) predicted an 18 percent increase in the yield of a year class if age of first capture were postponed one year, and a 29 percent increase if it were postponed two years. A paper by Bourne (1962) reported on our inability to predict the precise quantitative effect of using larger rings in the dredges on the size composition of the catch.

In 1963, an analysis of all age composition samples gave a total mortality estimate of 0.73. The abundance index for Georges Bank was down 40 percent compared to 1962. All the growth rate samples, a total of 7,600 shells collected from 16 areas between 36 degrees and 51 degrees North Latitude, were placed on punched cards and run through an IBM 7090 computer. Posgay (MS 1963) started a paper on the growth rate of the sea scallop throughout its range. Manuscripts on the natural mortality rate (Merrill and Posgay, MS 1963) and variations in the length-weight ration (Haynes MS 1963) were submitted for publication.

CITATIONS

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