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# UNITED STATES RESEARCH IN THE CONVENTION AREA DURING 1956

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## SUBAREA 5

### Haddock (Melanogrammus aeglefinus (L.))

Georges Bank Population in 1956. Landings of large haddock surpassed those of scrod for the first time since 1950. The 1954 year class entered the fishery two months later than usual. Scrod were thus available for a shorter period. This and the selectivity of the large mesh were chiefly instrumental in changing the scrod-haddock ratio.

Stock Definition. About 700 trawl caught haddock were tagged on Georges Bank with yellow Petersen disks on the left opercle. This tagging will supplement results obtained from earlier taggings of 1,870 haddock in the waters off Cape Cod.

Underwater Television. The behaviour and escapement of haddock, and other fish, were observed by means of a television camera rigged in the cod end of a standard otter trawl in experiments carried out from the research vessel Albatross III in November, 1956.

Effects of Mesh Regulation. A study of the effect of the large mesh on the yield of the 1952 year class is being made. Fish landed from this year class have averaged 15 percent heavier than in years prior to the use of large mesh. There has been no change in growth rate. The yield from the 1952 year class is estimated to be between 10 and 28 percent more than if small mesh had been used.

The sea sampling program is continuing. The data collected during the four years of this program, together with a new method being tested for obtaining haddock discard information, indicate it may be possible to discontinue this program in the near future.

Amendment to the Mesh Regulation. An amendment to Title 50, C.F.R., part 155, was proposed by the fishing industry. The amendment would allow mixed fishery trawlers to use small mesh gear in taking haddock provided the annual catch of haddock does not exceed ten percent of their total annual catch of trawl-caught fish. The amendment is regarded as an experiment to go into effect in 1957 for two years, with a review at the end of the first year.

Food Habits. During the past year studies continued on the feeding habits of haddock. Emphasis has been placed on the two main objectives of this work: detection of annual differences of the diet of haddock and completion of a survey of Georges Bank to determine benthonic and areal variations in food organisms.

The survey of the Georges Bank area covered sixty-eight stations spaced 15 miles apart. Bottom samples were obtained with the Petersen sampler, Van Veen grab, Digby scallop dredge, rocker-type and mud type quahog dredges.

Sampling by means of a sled-mounted ring net showed that many food organisms important to the diet of haddock are found in the water stratum that lies between one and four feet above the bottom.

Gross differences in the bottom fauna were found from one area to another. In general, the areas rich in food are the same areas where the commercial fishing fleets concentrate their efforts.

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Drift of Eggs and Larvae. Six cruises were completed during 1956 for the survey of eggs, larvae and pre-ring haddock. Data from the areas of Georges Bank, Browns Bank and the Gulf of Maine were analyzed.

The data indicate a poor haddock recruitment for the 1956 year class. Preliminary analysis of the limited numbers of pre-ring haddock collected in September make the drift of eggs and larvae appear probably the most important factor affecting year-class strength on Georges Bank.

## Redfish (Sebastes marinus (L.))

Redfish landings during the calendar year of 1956 were 152.6 million pounds (69,218 metric tons), a decrease of almost six million pounds from the 1955 total. The fishery in the Gulf of St.Lawrence declined considerably with a decreasing catch per day. The landings and catch per day from the Gulf of Maine and Grand Banks increased slightly while those from the Nova Scotian banks increased 30 percent from the 1955 value. In some regions along the Nova Scotian banks the catch per day was almost twice the value it had been in 1955.

The first step in studying the migrations of redfish was undertaken in the fall at Eastport, Maine. The tagging of 3,385 fish was accomplished by hook and line fishing, using shrimp or small herring as bait. The tagged fish ranged in length from 13 to 34 cm. with the mode at 20 cm. This is very close to the size composition of the fish found in the deep waters of the Gulf of Maine. During the subsequent fourteen weeks 185 were recovered at the tagging site, all in excellent condition. The average growth shown by the tagged fish during this period was about 2 mm.

The age and growth of redfish has been studied extensively in the Commission Subareas 3, 4 and 5. The Barents Sea growth rate appears to be typical of the growth of Sebastes on most of the eastern North Atlantic fishing grounds, and is much greater than that of the Gulf of Maine redfish. Preliminary results from the Grand Banks study show the growth to be considerably less than that for the Gulf of Maine.

At present, the racial studies suggest that all of the redfish of the Newfoundland to New England area are a similar stock. It is not yet clear how this group of Sebastes compares with the typical "marinus" and "mentella" forms of the Barents Sea region. Further study of the morphometric and meristic characteristics is being developed with the cooperation of Canadian biologists.

## Cod (Gadus callarias L.)

During the past year study of the cod in Subarea 5 progressed. Returns from the cod tagged off the New Jersey coast are approaching ten percent and indicate little or no mixing of these fish with the more northern stocks. The effective northeastern limit of these fish is enclosed within 42°N., 69°W. About one hundred cod were tagged from otter trawls on Georges Bank in December to further this phase of the investigation.

A study of monthly statistics kept since 1932 indicates a change in the distribution of cod on Georges Bank, both with regard to area and to depth. Indications are that this change may be associated with the warming trend in recent years.

Work is continuing on a bibliography of cod of the Northwest Atlantic. Approximately four hundred pertinent papers have been abstracted on punch cards.

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## Silver Hake (Merluccius bilinearis (Mitchell))

Analysis of the New England landings and catch per hour for the five year period from 1951 through 1955 revealed nearly a 50 percent decline in the catch per hour. Landings for the current year reflect a continuing decline in abundance.

In 1955 a fishing ground on the northwest edge of Georges Bank was heavily exploited and contributed over one-fifth of the total landings of silver hake for New England. The southern New England stock has been increasingly exploited for industrial purposes. The bulk of these catches are one and two year old fish.

The aging of silver hake by determining the number of rings on otoliths appears to be the most satisfactory method. The otoliths are clear and the rings well defined in whole mounts, indicating seasonal growth. Current studies indicate that the first and second rings are apparently laid down during the first year and single rings in subsequent years.

Age-length composition by sex shows that females grow faster, are larger, and live longer than males.

Meristic counts and body proportions would seem to show two stocks of silver hake populations: one in southern New England waters and the other in the Gulf of Maine.

A three-week survey cruise was conducted with the Albatross III in New England waters in November. Age and growth as well as racial data collected on the cruise have shed considerable light on the life history and distribution of the silver hake in the New England waters.

## Flounder

The status of the flounder fishery remained stable during the past year. The decline of the yellowtail flounder (Limanda ferruginea (Storer)) was offset by the increased landings of blackback flounder (Pseudopleuronectes americanus (Walb.)) and more particularly the fluke (Paralichthys dentatus (L.)).

Progress has been made on the study of age determination and growth rates.

## Industrial Fishery

Abundance of industrial species principally red hake (Urophycis chuss (Walb.)), remained high and has contributed to a new peak in landings for this mixed fishery. There is no indication that an overfishing problem will be created by a proposed expansion in the processing industry.

Efforts are continuing to determine reliably the age composition of the red hake catch from monthly length frequency distributions.

A hydrographic survey of parts of the New England industrial fishing grounds is continuing. Regular sampling of industrial catches and life history information is being accumulated for the principal species in this fishery.

## Hydrography

Hydrographic research by the U.S.A. in the convention area was carried out by three agencies: U.S. Coast Guard, Fish and Wildlife Service and the Woods Hole Oceanographic Institution.

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A. The U.S. Coast Guard, as the agency operating the International Ice Patrol, examined the temperature and salinity distribution from the surface to about 1500 meters in network surveys off the eastern and southern slopes of the Grand Banks from Flemish Cap to the Tail of the Banks in April and again in May; in the northeastern slope from Flemish Cap to and including the Bonavista triangle in June. A post season cruise during July again occupied the Bonavista triangle and a section across the Labrador Sea from South Wolf Island, Labrador, to Cape Farewell, Greenland. The latter section[1] was occupied from surface to bottom. These data will be published in U.S. Coast Guard Bulletin No.42 which is expected to appear in print toward the end of 1957.

B. The Fish and Wildlife Service (NAFI) in connection with surveys of haddock eggs and larvae has collected temperature (bathythermograph) and surface salinity data in Subarea 5 during the period late February to late June. Over 4,500 drift bottles were strewn over the whole of the Gulf of Maine and Georges Bank area in the course of these five cruises. Four hundred returns have been received to date.

C. The Fish and Wildlife Service (Herring Investigations Laboratory) has undertaken a joint study with the Fisheries Research Board of Canada and in the course of that study, have taken bathythermograph observations throughout the whole of the Bay of Fundy and the Gulf of Maine during the latter parts of September, October and November. Nearly 4,000 drift bottles were set adrift during the period from which there have been 120 returns to date.

D. The Woods Hole Oceanographic Institution, under contract with the Fish and Wildlife Service, has tabulated historical temperature records, established oceanographic observation posts, examined all of the drift bottle returns from the Gulf of Maine area since 1930 and developed and employed a new telemetering device.

The daily records of surface water temperature at shore stations, lighthouses and lightships along the Atlantic Seaboard of the U.S. have been tabulated as monthly and annual means for the period of record. This comprises 29 locations in Area 5. (Bumpus, D.F., Surface water temperature along the Atlantic and Gulf Coasts of the United States, In prep.).

Twelve lightship stations from Maine to Florida were equipped at the end of 1955 as Oceanographic Observation Posts to collect surface temperature and salinity observations daily, bathythermograph drops daily and bottom water samples weekly. Including lightships, U.S. Coast and Geodetic Survey Tide Stations and cooperating observers, there are 15 locations in Subarea 5 from which daily surface water temperature readings are available for 1956.

Analysis of drift bottle experiments conducted in 1931, '32, '33, '34, '53, '55 and '56 (12,751 releases - 1,290 returns) has been completed. (Day, C.G., Drift bottle studies over the Gulf of Maine and Georges Bank. Woods Hole Oceanographic Institution, Ref.No.57-1. Unpublished MS.).

A new device, a transponding drift buoy has been developed. This instrument may be used to telemeter temperature or current data, or as a drifting radio beacon for the study of tidal or non-tidal currents. Experiments to study the non-tidal drift in the Bay of Fundy were conducted during the first two weeks of October, November and December. (Bumpus, D.F., J.Chase, C.G. Day, D.H.Frantz, Jr., D.D.Ketchum and R.G.Walden. A new technique for studying non-tidal drift with results of experiments off Gay Head, Massachusetts and in the Bay of Fundy. Woods Hole Oceanographic Institution. Ref. No.57-2. Unpublished MS.).

1) By courtesy of the U.S. Coast Guard the data from this section were circulated in graphic form within ICNAF on 15 Oct. 1956 (Serial No. 425). - The Secretariat.