

INTRODUCTION

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This report is the fifth in an evolving annual series intended to provide fishermen and resource managers with a convenient synopsis of the marine environment.³ The objective of the reports in this series is to describe in a timely manner the gross features of the marine environmental fluctuations in areas of interest to American fishermen, fishery biologists, and managers.

The fact that variations in the environment affect the distribution, abundance, and availability of fish has been recognized and studied for at least eighty years by the Council for the Exploration of the Sea and successor organizations. Such studies are a continuing effort of the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program of the National Marine Fisheries Service (NMFS). MARMAP is a major source of biological and other scientific infor-

mation needed for management of the nation's fishery resources under P.L. 94-265, the Fishery Conservation and Management Act (FCMA) of 1976.

Duties and activities of MARMAP include the collection and analysis of the biological, chemical, and physical oceanographic data needed to provide basic information on the abundance, location, and condition of the commercial and recreational fishery stocks within the U.S. fishery conservation zone.

A major emphasis of MARMAP in recent years has been to develop mathematical models of marine populations, leading to improved methods for predicting fishery yields. Knowledge of environmental factors, particularly during critical phases of the development of a year class, and of the effects of variations of these factors, has proved to be of great importance in

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³Previous volumes in this series are:

Goulet, J. R., Jr. (compiler). 1976. The environment of the United States living marine resources - 1974. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., MARMAP Contrib. 104, 375 p.

Goulet, J. R., Jr., and E. D. Haynes (editors). 1978. Ocean variability: Effects on marine fishery resources - 1975. U.S. Dep. Commer., NOAA Tech. Rep. NMFS Circ. 416, 350 p.

Goulet, J. R., Jr., and E. D. Haynes (editors). 1979. Ocean variability in the U.S. fishery conservation zone, 1976. U.S. Dep. Commer., NOAA Tech. Rep. NMFS Circ. 427, 362 p.

Pedrick, R. A., M. C. Ingham, D. R. McLain, J. Namias, and others. 1979. Marine environmental conditions off the coasts of the United States, January 1977-March 1978. Mar. Fish. Rev. 41(5-6): 20-69.

All are available on request from NOAA, NMFS, F/SR2, 3300 Whitehaven Street, N.W., Washington, DC 20235.

these models.

Historically, each species has been managed as if it existed alone in a stable or "average" environment. Modern computers have made it possible to express interrelationships among species mathematically and thus to develop "ecosystem" models. The various effects of the environment and its variations in time and space on the different species of the ecosystem can also be included in the model. The changing of controllable factors, such as harvest rates and total annual catches, can be tested before the fishing season by "running" the model on the computer under various assumptions to determine which fishing strategies appear to be most productive and least damaging to the stocks.

Scientists within NMFS have considerable expertise in fisheries analysis and population dynamics. The Atlantic and Pacific Environmental Groups within NMFS were created under the MARMAP program to apply environmental data to the solution of fisheries problems. Notable progress has been made in many cases, with considerable success in several instances, by using the modeling approach and including environmental parameters. Annual environmental reports are issued by the Environmental Groups in cooperation with the Fishery Research Centers and others.

This volume presents an overview of the climatological variations of the year 1978 and first quarter of 1979, and mentions possible environmental effects on species of interest to commercial fisheries. It reflects the availability of recent oceanographic information as well as the authors' judgement regarding those parameters which affect marine populations.

Information on fluctuations of ocean circulation would be particularly desirable in these reports, but routine measurements of ocean currents are sparse and not directly intercompar-

able. It is necessary to use indirect measures of ocean circulation such as calculations of Ekman transport and upwelling indices, and measurements of sea level and sea-surface temperatures (SST) to infer circulation changes. Also, it is desirable to look first at the atmospheric large-scale driving forces of the ocean as an aid in understanding the smaller-scale regional oceanographic and biological effects. Therefore the report first presents descriptions of the large scale fluctuations in atmospheric circulation, surface (Ekman) transport, upwelling, sea level, and SST to define the major changes in oceanic conditions during the period and relative to prior years. Discussions of regional fluctuations of SST, salinity, river discharge, and biological factors are then presented for areas along the Pacific coast of North America from the eastern Bering Sea to the eastern tropical Pacific and along the Atlantic Coast from the Gulf of Maine to the Gulf of Mexico.

The data presented in this report are primarily physical, since such data are available more widely and more rapidly than biological observations. It is hoped that these descriptions will be of use to biologists in identifying unusual observations of marine organisms and relating them to environmental events. The authors encourage readers to note and report unusual biological occurrences. Such reports are published in periodicals such as the University of Rhode Island's quarterly newsletter, Coastal Oceanography and Climatology News, which includes unusual observations from both the Pacific and Atlantic coasts. A form for reporting unusual biological observations in Alaska has been developed by Dr. R. R. Straty of the NMFS laboratory at Auke Bay, AK 99821, and Alaskan readers are encouraged to submit reports to him. Many other sources of data on oceanographic fluctuations are available. Fishing Information is published monthly by the Southwest Fisheries Center, NMFS, La Jolla, CA 92038. It contains maps

of monthly mean surface pressure, winds, and SST, and a vertical section of subsurface temperature in the Pacific. The gulfstream, published monthly by the Oceanographic Services Branch, National Weather Service, Silver Spring, MD 20910, focuses on Gulf Stream eddy activity and SST's and their anomalies off the U.S. east coast. The Monthly Weather Review and Weatherwise are published under the sponsorship of the American Meteorological Society, Boston, MA 02108, and provide monthly descriptions of weather conditions. National Fisherman, Camden, ME 04843, is a monthly newspaper with many articles of interest to the ocean-

ographic community as well as to the commercial fisherman, including effects of weather. The reader is referred to these sources for additional details on environmental fluctuations and for timely updates of changing conditions.

In view of the availability of information from the other established sources listed above, this series will be discontinued with this volume. The Atlantic and Pacific Environmental Groups will continue to issue their annual reports and will respond directly to specific requests from NMFS users for oceanographic data and other information.
