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## **Marine Research**

Robert L. Dow

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## MARINE RESEARCH

by  
Robert L. Dow

### Inshore Hydrography:

That the Maine coast is an ideal place for studies of the dynamics of biology and geology is apparent from a consideration of the range of tide from eight to twenty-five feet, of mean annual seawater temperature from 43°F. to 52°F., of sediments from clay to bedrock, and of fauna from arctic to sub-tropical.

Geological and hydrographical changes are dramatically accelerated and varied in this environment. The beginnings and the initial processes of what ultimately may require millions of years for completion can be observed, studied and measured. A few of the many possibilities for such research and study are suggested by the enclosed reprint.

Oceanographic research has been generally limited to offshore studies or relatively remote areas. The complexities of inshore hydrography have been recognized for years but little research has been done except in a few selected areas. A study of the Maine coast would be a completely new field in terms of the necessity for development of improved equipment, methods and techniques. Present methods are generally inadequate for proper delineation of physical hydrography.

### Glaciation and Submergence:

Closely related to the marine environment is the fact that roughly the lower third of Maine was intruded by post-glacial seas some twelve thousand years ago. This extensive area containing marine fossilization to at least three hundred feet above present sea level offers unprecedented opportunity for marine biologists, ecologists, oceanographers, paleontologists, geologists and other scientists to study the effects of glaciation and of submergence.

No other region of the United States has undergone the documented changes in the elevation relationship between land and sea which has occurred in Maine during the most recent glacial and post-glacial period.

At least one site of pre-Wisconsin debris has been identified in Maine. It has an age in excess of 38,000 years. In view of the extensive, relatively unexplored area available, it is likely that other study areas will eventually be found.

### Post Glacial and Contemporary Ecology:

Comparative studies of post-glacial and contemporary ecology will have practical value in understanding the problems of marine fisheries.

Post Glacial and Contemporary Ecology Cont'd:

1. Poor growth in shellfish which may be caused by one or more of the following: water temperature, over-crowding, low salinity, inadequate oxygen, insufficient or poor quality food, and physical pollution has been observed in both living as well as fossil soft-shell clams. This similarity in growth characteristics indicates the changes in the past 12,000 years have not been sufficiently critical to have measurable effect upon the species.

2. Estimated changes in temperature between 12,000 years ago and the present, based on oxygen isotope measurements and index fossils of bottom core samples, are approximately the same as inshore seawater temperature changes of the fourteen-year period, 1939 to 1953. The concept of fluctuation in seawater temperature having a direct influence on the relative abundance of selected marine species is supported by changes and similarities in species distribution between post-glacial and present times.

3. Short-term temperature changes such as those between 1939 and 1953 are likely to have more drastic effects on marine resources and the composition of those resources than long-term temperature changes such as those that have occurred in the past 12,000 years.

4. Post-glacial fossils indicate the adaptability and temperature-change tolerance of most marine species.

5. Estimated temperature changes of the past 12,000 years have been less drastic than sea level changes. The effect of changes in sea level appears to have had more influence on the survival and relative abundance of certain species than have changes in temperature.

6. Information on post-glacial conditions, as interpreted from fossil assemblages, provides support in developing both long-term and short-term forecasts of relative abundance of commercialized species.

7. The evidence supplied by studies of fossil and living animals indicates that species abundance may be influenced by minor temperature fluctuations but species survival apparently is not.

It is, therefore, suggested that a marine research institute be established in western coastal Maine. With this geographical location it would be available at no great distance to all colleges and universities of New England. Likewise, it would be roughly midway between Canadian marine research centers at Befford, Halifax and St. Andrews and those of northeastern United States at Woods Hole, Bingham and Lamont. With its location it could offer more in the way of scientific challenge than any other site.