Marine Career Series:
Marine-related Occupations

A primer for high school students
MARINE CAREER SERIES: MARINE-RELATED OCCUPATIONS
A PRIMER FOR HIGH SCHOOL STUDENTS

Original version
by
Prentice K. Stout
updated revision by
Rhode Island Sea Grant Information Office
University of Rhode Island
Narragansett, RI 02882-1197
This publication is sponsored by NOAA Office of Sea Grant, U. S. Department of Commerce, under Grant #NA89AA-D-SG-082. The views expressed herein are those of the author and do not necessarily reflect the views of NOAA or any of its sub-agencies. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notation that may appear hereon.

Single additional copies of this publication are available for reproduction cost from the Rhode Island Sea Grant Information Office, University of Rhode Island Bay Campus, Narragansett, RI 02882-1197.

Loan copies are available for 30 days from the National Sea Grant Depository, Pell Library, University of Rhode Island Bay Campus, Narragansett, RI 02882-1197

1st Printing 05/75
Revised 12/90

printed on recycled paper
# MARINE CAREER SERIES: MARINE-RELATED OCCUPATIONS
A PRIMER FOR HIGH SCHOOL STUDENTS

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>4</td>
</tr>
<tr>
<td>TECHNICAL CAREERS</td>
<td>5</td>
</tr>
<tr>
<td>PROFESSIONAL CAREERS</td>
<td>6</td>
</tr>
<tr>
<td>- Environmental Affairs</td>
<td>7</td>
</tr>
<tr>
<td>- Consultation and Education</td>
<td>7</td>
</tr>
<tr>
<td>- Engineering</td>
<td>8</td>
</tr>
<tr>
<td>- Business and Industry</td>
<td>9</td>
</tr>
<tr>
<td>- General</td>
<td>9</td>
</tr>
<tr>
<td>ACADEMIC AND SCIENTIFIC CAREERS</td>
<td>9</td>
</tr>
<tr>
<td>- Biological</td>
<td>9</td>
</tr>
<tr>
<td>- Chemical</td>
<td>10</td>
</tr>
<tr>
<td>- Geological</td>
<td>11</td>
</tr>
<tr>
<td>- Physical</td>
<td>11</td>
</tr>
<tr>
<td>- Environmental</td>
<td>12</td>
</tr>
<tr>
<td>- General</td>
<td>12</td>
</tr>
<tr>
<td>WHERE TO WRITE IN YOUR STATE</td>
<td>13</td>
</tr>
<tr>
<td>MARINE MARITIME ACADEMIES</td>
<td>14</td>
</tr>
<tr>
<td>FEDERAL SERVICE AND RELATED ORGANIZATIONS</td>
<td>15</td>
</tr>
<tr>
<td>RESOURCE INFORMATION</td>
<td>15</td>
</tr>
</tbody>
</table>
INTRODUCTION

The purpose of this booklet is to assist high school students in understanding the broad scope of job opportunities in marine-related occupations. College-oriented high school students should find it helpful in choosing classes that will prepare them for marine-related careers.

Some job opportunities do not require college degrees but might require specific training. Students should request information on this training from their guidance office or career resource center.

Vocational/technical programs are sometimes available at the high school level. Contact the Department of Education in your state for information.

Training for certain jobs may be obtained "on-the-job" without the need for post-secondary school studies. Opportunities for such training depend on job availability.

Comments and suggestions about this publication are welcome. Please write: Rhode Island Sea Grant Information Office, University of Rhode Island Bay Campus, Narragansett, RI 02882-1197.
TECHNICAL CAREERS

Technical personnel transform the ideas of scientists and professionals into goods and services. Technically and vocationally trained people are vitally needed. As more schools begin marine-related programs, their graduates will have a better chance of competing in the job market.

Boat Building and Repair

These personnel are involved in the construction and repair of sail and power boats for both commercial and recreational use:

- Electricians
- Mechanics (diesel and gas)
- Electronics Specialists (repair, sonar, radar)
- Painters
- Tool and Die Makers
- Marine Engineers
- Safety Inspectors
- Truckers
- Carpenters
- Fiberglass Technicians
- Sail and Rigging Specialists
- Welders
- Sheet Metal Workers
- Cost Accountants
- X-ray Technicians
- Guards

For more information, contact:

The American Ship Building Company
2502 Rocky Point Road
Tampa, FL 33607

Bath Iron Works Corporation
700 Washington Street
Bath, ME 04530

American Boat Builders & Repairers Assoc.
P.O., Box 1236
Stamford, CT 06904

Todd Shipyards Corporation
1102 S.W., Massachusetts
Seattle, WA 98134

Seatrain Lines, Inc.
270 Sylvan Avenue
Englewood Cliffs, NJ 07632

Newport News Shipbuilding Co.
4101 Washington Avenue
Newport News, VA 23607

Sales

Marine sales people work in the distribution and sale of products such as:

- Boats (power and sail)
- Electronics Equipment
- Fishing Equipment
- Seafood Products
- Marine Engines and Parts
- Boating Accessories
- Marine Insurance
- Real Estate

Marine Construction and Maintenance

Workers in the field of marine construction and maintenance are involved in a broad range of construction applications:
Mining and Petroleum
Piers, Breakwaters, Harbors and Channels
Power Plants and Energy Installations

Maritime Operations

These include a wide variety of personnel such as:

- Enlisted Military Personnel
- Port, Harbor, and Inland Operations Personnel
- Commercial Shipping Personnel

Commercial Fishing

Examples of dock and vessel personnel involved with the commercial fishing and shell-fishing industry are listed below:

Fishing Captains
Deckhands
Cooks
Net Makers

Engineers
Fish Handlers
Fish Processors
Net Designers

Marinas and Marina Personnel

These personnel, in addition to those in some of the categories above, are involved in the following aspects of marina management and operations:

Dock
Slip Maintenance
Rentals
Moorings

Boat Hauling
Storage
Fitting Out
Marina Store Sales

PROFESSIONAL CAREERS

There are perhaps 10 times as many opportunities in this category as in the scientific section.

Although categorizing these listings under the general heading "Professional" is difficult, certain generalizations can be made. Personnel within this category are highly trained individuals, usually possessing at least an undergraduate college degree. The job opportunities in this category are more widespread than in science. A broad range of high school studies and an interdisciplinary college program should be undertaken before specializing. Assistants to professionals require training in some specific aspect of technology, business, or science. It is strongly recommended that all students become proficient in reading and writing. The ability to express oneself is of vital importance.
Environmental Affairs

Environmental Health Services Sanitarians plan and conduct programs related to sanitation. They promote the maintenance of health standards and monitor the use of oceans for waste disposal. Sanitarians also enforce laws regarding handling, dispensing, and consumption of food from coastal waters.

Environmental Planners attempt to prevent and alleviate use of existing land, taking into consideration appearance as well as land use. They estimate the long-range needs of coastal areas for a wide variety of problems and services.

Environmental Regulation personnel inspect all phases of coastal zones, and through governmental agencies (e.g. EPA, state coastal zone boards, and enforcement agencies) set guidelines for the implementation of a broad range of regulations.

Consultation and Education

Coastal Resources personnel compile inventories of coastal resources upon which are based technical recommendations concerning coastal zone planning and management.

Coastal Zone Management personnel identify natural areas encompassed by the coastal zone and analyze the effects that changes in the zone will have on interdependent units in areas designated as natural ecosystems. They also develop management criteria for carrying out land and water use guidelines in these coastal areas.

Salt Marsh Management personnel develop systems for rating the quality of existing salt marshes to set preservation priorities, and work with local and state officials to determine the possibilities for creating management plans for marsh conservation.

Barrier Beach Management personnel identify areas to be regarded as barrier beaches, develop systems for their preservation, and determine policies for their use.

Education personnel prepare and disseminate a broad range of marine education materials useful to students, teachers, and the general public. They may also instruct in environmental and marine-related problems, and the role of citizens in solving these problems. Education personnel fulfill the essential needs to create environmental awareness and to provide the insight necessary for long-range decision making on matters of global conservation. They may teach any of the following audiences: elementary and secondary, college and university, vocational, technical, public awareness groups, and museums and aquaria.

Fisheries personnel are trained to work as field specialists in the operation of fishing vessels and gear. They consult with commercial fishermen on the application and introduction of new fishing techniques.

Seafood Processors transfer practical scientific and technological data and procedures to the marine food processing industry.

Recreational personnel provide information to coastal planners, boating businessmen, marine insurance specialists, environmentalists, and marine researchers regarding coastal planning for marine recreation uses such as swimming, boating, and sport fishing.

Marine Insurance personnel research and write insurance policies to cover both commercial and private fishing vessels, cargo transports, recreational boats, and marinas.
**Marine Lawyers** are responsible for implementation and interpretation of international marine law and the laws governing coastal zone management. An admiralty lawyer specializes in legal matters that relate to inland waters and the high seas.

**Naval Architects** work with the engineering staff on prototype design, development, and tooling. They design and test the structural integrity of manufactured parts. They work on marine engines, generators, steering controls, castings, pumps, hydraulic systems, plumbing, hardware, and extrusions.

### Engineering

Special engineering knowledge and skills are required because of the increasing sophistication of ocean research projects. Various combinations of electrical, mechanical, civil, chemical, and marine engineering expertise are required for oceanography research. Instrument design for the salty, corrosive ocean may employ acoustical, optical, computer, and signal processing techniques. Measurement programs span ocean time scales of years to milliseconds and ocean space scales of kilometers to millimeters. Electronic data handling and processing circuits using microprocessors and state-of-the-art devices are developed for these programs. Use of earth satellites has opened new possibilities for remote sensing and data transfer from unmanned instrumentation in the oceans. The pathways of sound transmission are both the subject of basic studies in oceanography and methods for collecting data on the ocean's properties (*The Research Fleet*, UNOLS, NSF Publication).

**Mechanical Engineers** study beach erosion, littoral drift, and the effects of tides, currents, and weather on the stability of coastal features. Such data are valuable in determining the placement of dikes, pilings, drill rigs, groins, and breakwaters. In addition, mechanical engineers study the physical forces that affect harbor, inlet, and waterway maintenance. Research on and development of materials to be used in salt water environments are also performed.

**Ocean Engineers** focus on projects that involve corrosion and corrosion control, underwater power systems, hydrodynamics of floating and submerged bodies, fluid dynamics, and basic ocean measurements.

**Environmental Engineers** specialize in applying engineering principles and practices to oceanic environmental problems with a view to improving and protecting conditions for living organisms. They seek to limit the degradation of natural resources, and to wisely manage the environment.

**Offshore Oil Supply Boat Crews and Oil Rig Personnel** are needed to operate various supply craft that will attend oil rigs. While the pay is high, the work requires skill and is physically demanding.

**Fisheries Engineers** operate and design a wide range of gear including pumps and engines, fishing tackle, and dock-side facilities.

**Electronics Engineers** design highly sensitive electronic instruments used in all phases of oceanographic research. The instruments include sonar and radar equipment, ship-to-shore communication equipment, and all types of biological, physical, and chemical monitoring equipment.
Business and Industry

Industrial Marine Economists study and analyze the economic factors involved in marine-related product distribution, and use of goods and services. Techniques of financing and marketing are examined, and improvements are suggested. Marine economists also outline the organizational structure of marine-related businesses, and study governmental regulations and requirements.

Market Research Analysts monitor and analyze the marine products market in an attempt to answer questions about consumers, dealers, and competitors. The products include seafood, boats and accessories, and fishing equipment. Market analysts are also concerned with research involving social and economic trends, as well as human motives and patterns of consumer buying.

Museum and Aquarium Administrators manage the business aspects of and oversee the construction of displays in museums and aquaria. They are also involved in setting guidelines and instituting any educational programs that occur at the aquarium.

Energy and Mineral Explorers are engineers, geologists, and technicians engaged in exploration for and research in natural gas, oil, and minerals located in offshore waters.

General

Underwater Technicians work as trained, qualified divers, capable of working with commercial diving apparatus, mixed gas supplies, underwater tools, and safety equipment. They work in oil fields, rigging pipelines, and wellheads. They test and operate underwater communication systems, photographic equipment, and underwater, closed-circuit television.

Technical Writers produce manuals and technical publications dealing with all aspects of marine work. They assist in the preparation and layout of publications used for recording research and technical work.

Statisticians collect, analyze, and interpret marine data. They summarize findings in tables, charts, and written reports for use by professionals in the marine industry.

ACADEMIC AND SCIENTIFIC CAREERS

Examples of the types of scientific jobs available are described in the categories below. At this level the job market is small, and applicants must have a bachelor’s or graduate-level degree, a broad interdisciplinary background in science and mathematics, and specialization in one major area of study.

Biological

Biological Oceanographers (Aquatic Biologists) seek to understand the abundance of marine organisms, their distribution and life cycles, and the interactions of the populations with one another and with their environment. Much research in biological oceanography is directed toward the dynamics of food webs, from the rates of production
of organic matter, through cause and effect, to the ultimate fate of the organic material. All types of organisms, from bacteria and plankton to dolphins and whales are collected for laboratory studies or studied in their natural environment. Work in the deep sea on respiration, colonization, and other characteristics is conducted with submersibles or instruments sent to the seafloor (The Research Fleet, UNOLS, NSF publication).

**Fisheries Scientists** study biological, chemical, and physical factors that will, when coupled with fishing demands, affect the population dynamics of finfish and shellfish. They suggest legal actions necessary to conserve over-fished populations.

**Marine Bacteriologists** identify diseases of marine life and seek ways to control them. They develop ecologically sound methods of detecting and destroying harmful bacteria in the marine environment.

**Aquaculturists** research, design, and implement methods used in the commercial production of marine plants and animals.

**Biochemists** study the chemical composition of living organisms within the oceans. They identify and analyze the chemical processes related to biological functions.

**Physiologists** probe into the structure and function of plant and animal organs, tissues, and cells. They study the effects of the life processes of marine plants and animals on the marine environment.

**Fisheries Technicians** assist fisheries scientists. They should be familiar with population and environmental survey techniques, tagging procedures, collecting methods, organ and tissue removal, and stomach analysis for food and feeding habits. Fisheries technicians help design and construct fishing gear and fishways, and aid in fish tagging and hatchery production.

**Limnological Technicians** work on fresh water lakes. They take water samples, carry out field and laboratory analysis, measure physical parameters, and care for and maintain the sampling and measuring equipment used in hydrography. Limnological technicians perform routine lab tasks such as weighing and mixing solutions, and perform quantitative studies on water and the life forms in it.

**Chemical**

**Chemical Oceanographers** investigate the evolution of seawater and seafloor sediments to their present state and also the processes that contribute to their variability. They also seek to understand the extent to which the environment is changed naturally and by man. Some critical questions in chemical oceanography revolve around transformations in particles as they fall from the surface waters to the bottom of the water column. The origin and composition of the seafloor and its interaction with seawater is important to a general understanding of the oceanic system. Marine chemistry requires very careful sampling techniques. Often, very large volumes of water must be collected since certain measurements require as much as a thousand liters of water to be reduced to a very small quantity. The ship laboratory houses instrumentation which enables the chemist to monitor data and analyze samples while on board the ship (The Research Fleet, UNOLS, NSF publication).

**Chemical Technicians** assist chemical oceanographers in conducting analytical laboratory procedures such as measuring salinity and dissolved oxygen, analyzing and tabulating data, and assembly and use of scientific apparatus.
Geological

Marine Geologists and Geophysicists search for explanations for the formations of the earth as we know it today. Geophysical investigations extend from the earth's center outward to the limit of the solid earth, using sound waves and other remote sensing techniques. Geologists conduct research on the tectonic, volcanic, and sedimentation processes that determine the shape and structure of the seafloor. Considerable attention has been given recently to the boundaries of the earth's great crustal plates where heat is released from the planet's interior and volcanic events release material originating deep within the earth. Mineral deposits formed by these events and their contributions to the composition of seawater are of special interest to geologists and geochemists. Transport of material from surface and midwater depths to the seafloor is studied through analysis of sediment trap samples and use of particle counters and other devices. Resuspension and redistribution of sediments may be surveyed through placement of camera systems and current meters at or near the seafloor (The Research Fleet, UNOLS, NSF publication).

Geological Technicians aid geological oceanographers in analyses of compounds of the earth's crust, and in drawing maps and charts depicting locations and descriptions of geological formations.

Physical

Physical Oceanographers study the movement of ocean waters on small to global scales using a variety of instruments. Physical investigations include work on such persistent major currents as the Gulf Stream, on large eddies that resemble atmospheric weather systems, on wind-generated surface waves that spread from ocean to ocean, on internal waves that carry momentum and energy without disturbing the surface, and on small-scale motions that dissipate energy. These studies and those aimed at understanding the exchange of heat between the ocean and the atmosphere are critical to a better understanding of world climate and weather, to the nation's defense needs, and to our eventual utilization of the ocean's resources (The Research Fleet, UNOLS, NFS publication).

Marine Physicists observe and analyze various forms of energy, the structure of matter, and the relationship between matter and energy as they relate to processes occurring in the oceans.

Geographers study special characteristics of the earth's terrain, sediments, vegetation, and climate in relation to the oceans. They analyze maps, aerial photographs, and observational data collected in the field.

Meteorologists study atmospheric conditions and related data to obtain information for short-term and long-term weather forecasting. They conduct research on long-range forecasting, radio wave propagation, and severe weather phenomena such as typhoons and hurricanes.

Hydrographic Survey Technicians assume responsibility for operating standard surveying instruments, including bottom grabs, sextants, measuring instruments, depth recorders, wire drags, and navigational equipment. They read charts and assist with data acquisition, processing, and analysis, as well as the interpretation of the original data. Work ranges from surveying and engineering in tidal and coastal areas to geomagnetic and hydrospace seismological observations.
Marine Engineering Technicians aid in the research and development necessary to coastal and amphibious engineering. The work deals with hydro-mechanics, waterfront structures, and amphibious equipment. They assist various hydraulic, structural, and general research engineers to set up and conduct experiments. They also aid in theoretical investigations, including data reductions, machine computations, and marine engine operations.

Environmental

Marine Ecologists study the mutual relationships among organisms and their environment. They examine effects of environmental influences such as rainfall, temperature, season and state of the tide on the organisms.

Water Pollution Technicians work with scientists to determine the extent of pollution in bays, estuaries, and the oceans; they are involved in research concerning control and abatement of industrial and other pollutants. These technicians participate in surveying questionable areas, as well as in the design of sampling systems. They assist life scientists in conducting ecological studies in waters suspected or known to be polluted.

General

Systems Analysts and Computer Programmers analyze scientific processes and problems associated with the collection, organization, and reporting of data, and convert the data to a form suitable for automatic data processing equipment.

Applied Statisticians survey, collect, organize, interpret, summarize, and analyze numerical data related to sampling. Through the use of statistical tools, they interpret the data gathered in marine-related studies.

Oceanography Technicians assist oceanographers in a variety of chemical and physical tests and analyses, such as tide and current studies, water analysis for dissolved gases and minerals, and wave studies. They maintain order in the laboratory both ashore and afloat, keep inventory on laboratory stock, calibrate and operate measuring and surveying instruments used in data acquisition, keep records, plot graphs and profiles, and reduce processed oceanography data to a standard format.

Deck Support Technicians assist the deck support party aboard an oceanography vessel. They should have a familiarity with a broad range of physical, chemical, meteorological, biological, and geological oceanographic sampling and measuring instruments. These technicians are required to rig these instruments and sampling devices for deployment, to operate all types of oceanographic winches and booms during actual operations, and to stow and repair many of these tools when they are not being used. They crate and label all equipment and samples for shipment to shore installations.

Applied Research Technicians design equipment using basic marine science concepts.

Oceanographic Instrumentation Technicians determine instrument accuracy, modify equipment, and design new auxiliary apparatus.
WHERE TO WRITE IN YOUR STATE

Alabama
See Mississippi

Alaska
Alaska Sea Grant College Program
University of Alaska
138 Irving II, UAF
Fairbanks, AK 99775-5040

California
Calif. Sea Grant College Program
University of California, A-032
La Jolla, CA 92093

Southern California
Sea Grant College Program
University of Southern California
University Park
Los Angeles, CA 90089-1231

Connecticut
Conn. Sea Grant College Program
Univ. of Connecticut
Marine Sciences Institute,
Avery Point
Groton, CT 06340

Delaware
Delaware
Sea Grant College Program
263 E. Main Street
Newark, DE 19716

Florida
Florida Sea Grant College Program
University of Florida
G002 McCarty Hall
Gainesville, FL 32611

Georgia
Georgia Sea Grant College Program
University of Georgia
Ecology Building
Athens, GA 30602

Hawaii
Hawaii Sea Grant College Program
University of Hawaii
1000 Pope Road - Room 200
Honolulu, HI 96822

Illinois/Indiana
Ill./Ind. Sea Grant College Program
University of Illinois
1206 S. 4th Street, UIUC
Champaign, IL 61820

Louisiana
Louisiana Sea Grant College Program
Louisiana State University
202 Wetland Resources Building
Baton Rouge, LA 70803-7507

Maine/New Hampshire
UM/UNH
Sea Grant College Program
University of Maine
30 Coburn Hall
Orono, ME 04469-0114

Maryland
Maryland Sea Grant College Program
University of Maryland
College Park, MD 20742

Massachusetts
MIT Sea Grant College Program
Mass. Institute of Technology
Building E38, Room 320
77 Massachusetts Avenue
Cambridge, MA 02139

WHOI Sea Grant College Program
WHOI
Bell House
Woods Hole, MA 02543

Michigan
Mich. Sea Grant College Program
University of Michigan
4111 I.S.T. Building
2200 Bonisteel Boulevard
Ann Arbor, MI 48109

Minnesota
Minn. Sea Grant College Program
University of Minnesota
Extension Office
208 Washburn Hall
Duluth, MN 55108
### MARINE MARITIME ACADEMIES

<table>
<thead>
<tr>
<th>State</th>
<th>Address Details</th>
</tr>
</thead>
</table>
| Mississippi | Mississippi-Alabama Sea Grant Consortium  
P.O. Box 7000  
Ocean Springs, MS 39564-7000 |
| New Hampshire/Maine | UNH/UM Sea Grant College Program  
University of New Hampshire  
Kingman Farm  
Durham, NH 03824 |
| New Jersey | Sea Grant Program  
N.J. Marine Science Consortium  
Sea Grant Program  
Building 22  
Ft. Hancock, NJ 00732 |
| Puerto Rico | Puerto Rico Sea Grant College Program  
University of Puerto Rico  
P.O. Box 5000  
Mayaguez, PR 00709-5000 |
| Rhode Island | Rhode Island Sea Grant College Program  
University of Rhode Island Bay Campus  
Marine Resources Building  
Narragansett, RI 02882-1197 |
| South Carolina | South Carolina Sea Grant Consortium  
287 Meeting Street  
Charleston, SC 29401 |
| Texas | Texas A & M Sea Grant College Program  
Texas A & M University at Galveston  
P.O. Box 1675  
Galveston, TX 77553-1675 |
| Virginia | Virg. Grad. Marine Science Consortium  
Sea Grant Program  
University of Virginia  
170 Rugby Road  
Charlottesville, VA 22903 |
| Washington | Wash. Sea Grant College Program  
3716 Brooklyn Avenue, N.E.  
Seattle, WA 98105 |
| Wisconsin | Wisconsin Sea Grant Institute  
1800 University Avenue  
Madison, WI 53705 |

**Director of Admissions**  
California Maritime Academy  
Vallejo, CA 94591  

**Admissions Office**  
Great Lakes Maritime Academy  
Northwestern Michigan College  
1701 East Front Street  
Traverse City, MI 49684  

**Director of Admissions**  
Maine Maritime Academy  
Castine, ME 04421  

**Academic Dean**  
Massachusetts Maritime Academy  
Buzzards Bay, MA 02532  

**Admissions Office**  
Texas Maritime Academy  
Texas A & M University  
P.O. Box 1675  
Galveston, TX 77551  

**Director of Admissions**  
U.S. Merchant Marine Academy  
Kings Point, NY 11024
FEDERAL SERVICES AND RELATED ORGANIZATIONS

U.S. Coast Guard personnel are responsible for the protection of the nation's coastline. They regulate foreign and domestic fishing within U.S. coastal waters, recreational boating, and navigational jurisdiction.

U.S. Navy personnel perform a broad range of duties that involve the defense of the United States. Extensive research and development in ocean-related disciplines are carried out.

U.S. Army Corps of Engineers personnel are responsible for construction and maintenance of dams, navigational waterways, rivers, harbors, and shoreline structures.

Merchant Marines have responsibility for the operation of ocean-going vessels carrying domestic and foreign commerce. They are responsible for maintaining order and safety of the crew, passengers, cargo, and vessel. A merchant marine functions as agent for the ship's owner by conferring with customs officials, and with the various mates on board ship.

National Oceanic and Atmospheric Administration (NOAA) personnel are responsible for a wide range of duties that include weather services, satellite systems, marine fisheries, charting and navigation, coastal zone management, environmental research, data gathering, and university applied research programs.

RESOURCE INFORMATION


Environmental Studies Department. Environmental Opportunities. P.O. Box 670, Walpole, NH 03447. Environmental Studies Department, Antioch/New England Graduate School, Keene, NH 03431


Keiffer, E. 1983. Programs in Fisheries at the University of Rhode Island. P-962. Rhode Island Sea Grant, University of Rhode Island Bay Campus, Narragansett, RI 02882-1197. 14 pp.


