

# European Master of Science in Marine Environment and Resources (RESEARCH) CAREERS IN MARINE ENVIRONMENT AND RESOURCES

## Introductory Guide \*



### A Joint MSc Programme (120 ECTS)

MER MSc is a Joint European MSc programme aimed to form multidisciplinary graduates of transverse research profile, by attracting highly qualified and motivated students from around the world into a fully integrated world class EU MSc programme.

The MER MSc programme gives students competences and skills to develop their marine career in the following fields:

- Integrated coastal zone management
- Protection of marine and estuarine environments
- Adaptation to global climate change
- Assessment of marine ecosystem health
- Conservation of biodiversity and natural heritage
- Management of fisheries and other marine resources

Both staff exchange and student mobility are promoted under a balanced ECTS scheme. Every student must spend at least 30 ECTS each in three different Partner Universities.

Successful students will achieve a Multiple MSc degree (120 ECTS) awarded by the three Partner Universities through which the studies have been undertaken.

**MER SECRETARIAT**  
R&D CENTRE FOR EXPERIMENTAL  
MARINE BIOLOGY AND BIOTECHNOLOGY  
(PLENTZIAKO ITSAS- ESTAZIOA; PIE-UPV/EHU)

UNIVERSIDAD DEL PAIS VASCO  
/EUSKAL HERRIKO UNIBERTSITATEA

AREATZA Z/G, E-48620 PLENTZIA-BIZKAIA  
BASQUE COUNTRY (SPAIN)

**\* only for guidance purposes, updated jobs' offers and career prospects are provided in announcements and through links in the MER consortium official webpage: [www.ehu.es/MER](http://www.ehu.es/MER)**

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# Introductory Readings

## Marine Careers

<http://www.marinecareers.net/>

Marinecareers.net introduces you to a wide range of marine career fields and to people working in those fields. In addition, it gives those men and women a chance to tell you what they like and dislike about their careers, what they see for the future in their fields, and much more. This site also provides you with some experts' views on what the future holds for marine science careers.

Students thinking about **careers in the marine sciences** often picture themselves working with whales. Within the marine science fields, however, only a few scientists specialize in that area. This web site introduces you to a wide range of marine career fields and to people working in those fields. In addition, it gives those men and women a chance to tell you what they like and dislike about their careers, what they see for the future in their fields, and much more. The people featured on *marinecareers.net* cover a wide range in many ways. Some work at colleges and universities. Others work for state and federal agencies, marine-related industries, research laboratories, independent organizations, or consulting firms. They come from all around the country and represent a variety of educational backgrounds. Some are in the early stages of their careers while others are well established in theirs. We asked each a set of questions designed to meet the information needs of students with an interest in marine careers. We present their answers here, allowing them to profile themselves. Some of the people profiled have allowed us to put an email link at the end of their profiles in case you have more questions. If you do contact them, please be patient as they are very busy people.

## Marine Biology

Scientists in this field study the **behavior** and **ecology** of plants and animals that live in the ocean and their roles in the marine food chain. They also study the effects of **pollution** on the marine environment.

The field of marine biology -- the study of marine organisms, their behaviors, and their interactions with the environment -- is considered one of the most all-encompassing fields of oceanography. To understand marine organisms and their behaviors completely, marine biologists must have a basic understanding of other aspects or "disciplines" of oceanography, such as chemical oceanography, physical oceanography, and geological oceanography. Therefore, **marine biologists and biological oceanographers** study these other fields throughout their careers, enabling them to take a "big picture" approach to doing research. Because there are so many topics one could study within the field of marine biology, many researchers select a particular interest and specialize in it. Specializations can be based on a particular species, organism, behavior, technique, or ecosystem. For example, marine biologists may choose to study a single species of clams, or all clams that are native to a climate or region.

One area of specialization, the emerging field of **marine biotechnology**, offers great opportunity for marine biologists. Marine biotechnology research presents a wide range of possibilities and applications. One focus area is the **biomedical field**, where scientists develop and test drugs, many of which come from marine organisms. An example of an application of biotechnology research can be seen in industry or defense, where researchers have developed non-toxic coatings that prevent the build-up of fouling organisms, such as barnacles and zebra mussels. Such coatings are useful for ships and intake pipes used in power plants.

**Molecular biology** is a related area of specialization in this field. Researchers apply molecular approaches and techniques to many environments, from coastal ponds to the deep sea, and many different organisms, from microscopic bacteria, plants, and animals to marine mammals. For example, molecular biology can be used to **identify the presence of a specific organism** in a water sample through the use of molecular probes. This is very useful when the organism in question is microscopic or similar to other organisms. The study of **disease** in organisms has also been aided by the use of molecular techniques. Researchers have developed antibodies that are specific to a particular virus, so that when the virus is present in the organism, detection and diagnosis is easier and faster. Likewise, new molecular techniques help scientists identify whether or not an animal has been exposed to **pollutants** and, in some cases, can determine the source of those pollutants. The field of molecular biology is growing and will continue to see significant advances.

### **Oceanography**

Geological oceanographers study the evolution of the ocean bottom and the nature of the minerals found there. Chemical oceanographers study the chemicals and chemical compounds in the oceans. Physical oceanographers study the ocean as mass in motion, from the gentle movements of ocean currents to the dramatic power of tidal waves. A narrative that attempts to cover three major disciplines of oceanography -- marine geology and geophysics, physical oceanography, and marine chemistry and geochemistry -- should be prefaced with the explanation that these **sub-fields of oceanography are related**. Oceanographers and others involved in these disciplines often work together to unravel the mysteries and unknowns of ocean science. In many government-sponsored research efforts, preference is given to projects that integrate the separate disciplines of oceanography and incorporate important principles from each to better understand a system, phenomenon, event, or process.

As a growing global population stresses the ability of our society to produce food, water, and shelter, we will continue to look to the oceans to help sustain our basic needs. Advances in technology, combined with demand, will improve our **ability to derive food, drinking water, energy sources, waste disposal, and transportation from the ocean**. It will be up to this and future generations to build upon our existing knowledge of the ocean and its potential to help meet the needs of the world and its inhabitants.

In reading about each of these sub-fields, keep in mind that some of the most important oceanographic discoveries have been made as a result of an **integrated, multidisciplinary approach**, often involving geologists, chemists, biologists, physical oceanographers, and engineers.

The 1977 discovery of active hydrothermal vent communities illustrates the benefits of this multidisciplinary approach. At these active hydrothermal vent sites, oceanographers observed thriving populations of hundreds of "new" species, including tube worms and giant clams. "Black smoker" chimneys also were observed, venting hot, metal-rich fluid that generates from within the Earth's crust and can reach temperatures as high as 350°C. Just outside these chimney-like structures, the water is much cooler -- about 2°C -- and has a higher pH. When these fluids meet, a reaction takes place and forms black "smoke." Although the vent sites are located at the bottom of the ocean floor where there is no light, life is plentiful. Scientists discovered that the chemistry of the water at these vent sites provides energy for bacteria to grow by chemosynthesis, in much the same way sunlight provides energy for plants to grow by photosynthesis.



### Ocean Engineering

This section covers the work of those who design and build the instruments, equipment, vehicles, and structures used in the marine environment. It also includes environmental engineers, who work to alleviate any harmful impacts we have on the marine and other environments. The field of ocean engineering provides an important **link** between the other oceanographic disciplines such as marine biology, chemical and physical oceanography, and marine geology and geophysics. Just as the interests of oceanographers have driven the demand for the design skills and technical expertise of ocean engineers, **the innovations in instrumentation and equipment** design made by ocean engineers have revolutionized the field of oceanography. This is especially true within the last three decades.

The invention of thousands of oceanographic instruments and devices has changed the way oceanographers study the oceans and coasts. Examples include: computer- and satellite-linked buoys and floats, sediment traps, ocean seismometers (instruments that measure seafloor movement in a manner similar to the way seismographs measure earthquake activity on land), underwater video equipment, acoustic measuring devices (instruments that make it possible to "sense" underwater objects and seafloor formations), and underwater vehicles, including submersibles and remotely operated vehicles (ROVs). Information that once took years to compile, and that frequently involved sampling in harsh weather conditions, can now be accomplished in minutes, often from remote locations, including ships and laboratories. The innovations of ocean engineers have enabled oceanographers to travel farther offshore and deeper into the sea, and to stay there for longer periods of time. Because of ocean engineers, major oceanographic discoveries -- including hydrothermal vents, ocean volcanoes, thousands of miles of underwater mountain chains, "new" species, and biological, chemical, geographical, and physical processes and phenomena -- have been made.

Ocean engineering is actually a combination of several types of engineering: a mix of mechanical, electrical, civil, acoustical, and chemical engineering techniques and skills, coupled with a basic understanding of how the oceans work. The importance of working in partnerships with oceanographers from other disciplines is critical, as the challenge of working in the ocean environment requires a range of backgrounds and skills.

### Related Fields

There are many jobs in the field of marine science that do not fit into the categories of marine biology, oceanography, or ocean engineering. Instead, these jobs may fit more than one category, or they may overlap other fields, such as **education, communication, economics, seagoing careers, or business** (an underwater filmmaker, a marine economist, an environmental educator, and a resource manager).

Many of these jobs are highly specialized and require very different educational backgrounds, experiences, and skills. Some of the jobs may be unique to the people who do them. In other words, they may have started their own business or created their position because they perceived a need for their expertise.

Some characteristics shared by people in virtually all marine-related careers include a love of the marine environment, a respect for the way the ocean works, and a sense of curiosity. Many people in the various fields of marine science describe a feeling of accomplishment or satisfaction about their work, knowing that being involved in their field has or will make a difference for present and future generations. Others like the sense of pioneering discovery, given the fact that much remains to be learned about the way the ocean works and the organisms that inhabit it.

There are **countless possibilities** for a marine-related career: marine educator, science writer, filmmaker, photographer, ecotourism guide, park ranger, beach superintendent, maritime or environmental lawyer, coastal or ocean policy experts, aquavet (veterinarians that specialize in marine or aquatic animals), economist, marine archaeologist, marine historian, fundraiser or spokesperson, aquaculturist, manager of an agency specializing in marine or freshwater issues, marina manager, ship's captain or mate, environmental planner, manager of a land conservation organization or land trust, botanist, computer specialist with a marine or environmental organization, ecologist, hatchery specialist, landscape or maritime architect, and so on.

While we certainly won't attempt to list all of the possibilities, it's probably safe to say that you can combine **your interest in the ocean** or freshwater with many other fields, hobbies, or specialties to design a potential career.



## Net Loss: Fish, Jobs & the Marine Environment

Worldwatch Paper 120, July 1994, Peter Weber, ISBN: 1-878071-21-1, 76 pages

With fisheries policy fiercely debated from the U.S. Congress to the United Nations, *"Net Loss: Fish, Jobs & the Marine Environment"* examines the ecological, social and economic crisis in world fisheries. Researcher Peter Weber describes a half-century of unsustainable fishing practices, reliance on exploitive technologies, and self-defeating government policies. "This is a global problem," Weber said, "that has already caused armed confrontations between fishing nations, gunfire between fishers, and hunger in the developing world. If current mismanagement continues, we can expect a future in which millions of fishers are out of work. A future in which major fish consumers -- especially in the developing world -- lose access to their main source of protein. A future in which traditional fishing cultures from Nova Scotia to Malaysia disappear."

After decades of rapid growth, the marine catch has stagnated or fallen in all but two of the world's fifteen major fisheries. Worldwide, the marine catch is down five percent since 1989. For the first time since World War II, the fish catch has failed to stay ahead of population increase. The current world crisis in marine fisheries is a clear-cut global example of the consequences of violating a principle of sustainability: if we harvest more than nature can replenish, the resource is diminished. It's the same with our bank accounts -- if we live on the capital, we soon run out of money. The account we are overdrawing is a big one. Marine fish and shellfish provide nearly 6% of the world's protein intake -- and 16% of the animal protein intake. For some 200 million people around the world, especially in coastal and island regions, fishing and fish-related industries are the primary means of support.

But there are positive notes. Weber describes steps that could allow marine fisheries to continue to meet food needs in developing countries for the next 20 to 30 years, as well as maintain cultural diversity and the stability of coastal communities that depend on fishing. **Central tenets are rehabilitation of depleted fisheries, environmental protection, and community-based management.** Yet despite success stories, the worldwide picture is bleak:

- Declining catches have already cost more than 100,000 jobs in the last few years among the world's 15 to 21 million fishers - a loss that could reach 9 out of 10 fishing jobs in the coming decades as countries struggle with the great gap between the capacity of the world's fleets and the limits of the oceans.
- The cost of fish in local marketplaces worldwide has risen dramatically. Low-income consumers are losing access to affordable fish as supplies tighten and affluent markets attract a larger and larger portion of the world fish supply. For example, in Kerala, India's number one fishing state, prices for shrimp jumped from \$50 a ton to \$1,300 a ton between 1961 and 1981 because of the rise of commercial fishing. As a result, per person consumption of shrimp and other fishing products fell from 19 kilograms per person to 9.
- Social unrest is increasing. Fishers are taking to the streets in Paris to protect their markets. Canada is intercepting foreign fishing boats outside Canada's waters. Honduran shrimp fishers are arming themselves against shrimp farmers in a battle over habitat.
- Depletion of fish stocks is now a fact. The once abundant North Atlantic cod may be commercially extinct. Canada has closed its cod fishery to allow the fish to repopulate - putting 30,000 people out of work. Western Atlantic bluefin tuna are down to only 10% of their former abundance. Now each bluefin commands \$270 per kilogram in Japan --



a bounty that only adds to the desire to hunt it down. Oysters in the Chesapeake Bay number 4% of former levels.

Weber identifies three major causes for the decline world fisheries:

- **Overfishing.** The most pervasive problem is that fishers catch more fish than nature can replenish. Too many fisheries are open to all comers, resulting in up to ten times the number of boats necessary to catch the available fish. "Serial overfishing" -- moving from one species to the next as each is depleted -- has become a worldwide problem.
- **Destructive fishing practices.** From shrimp fishers discarding red snapper to "biomass trawlers" scraping the seabed and disturbing entire ecosystems, industry practices range from inefficient to devastating.
- **Pollution and coastal development.** In the Baltic Sea, pollution is not only killing fish, but making it inedible. Destruction of coastal habitat in Indonesia has eliminated 60 to 80 percent of commercially desirable coastal species. In the Black Sea, an accidentally introduced jellyfish-like creature has disrupted the ecosystem and forced the closure of the Azov Sea fishery.

Reversing the decline in marine fishing, Weber shows, will require fundamental changes in an overcrowded industry. Finding the political will to change policies will be hard. Given the overcapacity of the world's fishing fleets, either industrial- style or community-based fishers will pay a heavy price. If countries continue to favor the world's 250,000 large-scale fishers, the 14-20 million small-scale fishers and their communities will be at risk.

But successful **fisheries management** is possible when national governments provide the legal framework, and fishing communities themselves retain day-to-day decision-making. Japan, for instance, has integrated traditional community-based management with modern fishery science and government regulation. Without combining national oversight with local control, marine fisheries will be depleted not only of fish, but of the social benefits they have long provided.





## Unpaid Work in Marine Science: A Snapshot of the Early-Career Job Market

[Osiecka et al. 2021 Frontiers in Marine Science 8; DOI:10.3389/fmars.2021.690163](#)

Unpaid positions in environmental sciences are common yet controversial. While they exclude already marginalised groups and are detrimental to the entire job market, many voices maintain that these positions are crucial, support science and conservation in economically disadvantaged areas, and allow early-career scientists their first step into the field. To better understand the real scale and nature of these positions, we reviewed relevant job offers within marine biology and conservation, advertised globally in English, from three random months in 2019–2020, both preceding and during the COVID-19 pandemic. Unpaid and pay-to-work positions were more common than paid jobs, and offered mostly in economically privileged areas, such as North America and Europe. Most of these postings required some or strong experience and education background. Most non-governmental and private organisations offering uncompensated work did not produce any peer-reviewed research output in the last 3 years. This review shows that a considerable proportion of unpaid work contributes to private businesses, and may often breach local labour laws.



## Other interesting readings and links about marine careers

(after <http://www.marinecareers.net>)

- [https://books.google.es/books/about/Aquarium\\_Careers.html?id=yqjdjgEACAAJ&redir\\_esc=y](https://books.google.es/books/about/Aquarium_Careers.html?id=yqjdjgEACAAJ&redir_esc=y)
- Career as a Naturalist. Birdwell, Leslie, 2000, 20 p. (Institute for Career Research CHICAGO), ISBN No. 1-58511-371-9.
- Career Ideas for Kids Who Like Science. Reeves, Diane Lindsey, 1998, 165 p. (Checkmark Books, NY), ISBN No. 0-8160-3680-2/0-8160-3686-1.
- Careers in Marine Science. [Available from the National Aquarium in Baltimore, Dept. of Education and Interpretation, Pier 3, 501 East Pratt St., Baltimore, MD 21202-3194.]
- Careers in Oceanography. American Geophysical Union, 1986, 28 p.
- Careers in Oceanography and Marine-Related Fields. The Oceanography Society, 1995, 28 p. [Single copies available from The Oceanography Society, 4052 Timber Ridge Drive, Virginia Beach, VA 23455; (804) 464-0131]
- Careers in the Environment. Mike Fasulo, Michael Fasulo, Paul Walker. McGraw-Hill Professional, 2007 - 343 páginas
- Education and Training Programs in Oceanography and Related Fields. Marine Technology Society, 1828 L St. NW, Suite 906, Washington, D.C., 20036; \$5; (202) 775-5966. <mailto:mtspubs@aol.com>
- Enhancing the Postdoctoral Experience for Scientists and Engineers: A Guide for Postdoctoral Scholars, Advisers, Institutions, Funding Organizations, and Disciplinary Societies. National Academy of Sciences, National Academy of Engineering, Institute of Medicine. 212 p: <http://books.nap.edu/catalog/9831.html>
- Environmental Jobs for Scientists and Engineers. Basta, Nicholas, 1992, 228 p. (John Wiley and Sons, Inc., NY), ISBN No. 0-471-54034-X/0-471-54033-1.
- Find Your Future: A Career Planning Guide in Science, Mathematics, and Engineering for Precollege Students with Disabilities and the Adults Who Work With Them. P. DuBois, R. Weisberger. [Available from the American Association for the Advancement of Science (AAAS), Chickona Royster, 1200 New York Avenue NW, Washington, DC 2005; (202) 326-6670.]
- Footsteps in the Ocean: Careers in Diving. Lang, Denise V., 1987, 143 p. (Loadestar Books, E.P. Dutton).
- Marine Careers: The Scientist. W.R. Hall and E.A. Chajes, 1993. Delaware Sea Grant Marine Advisory Service [Available from Delaware Sea Grant Marine Advisory Service, College of Marine Studies, University of Delaware, 700 Pilottown Rd., Lewes, DE 19958.
- MARINE BIODIVERSITY NETWORKING
- [https://www.youtube.com/watch?v=AFCQ4\\_liE64](https://www.youtube.com/watch?v=AFCQ4_liE64)
- <https://jobs.wm.edu/postings/search>
- Marine/Maritime Careers. Excerpted from Opportunities in Marine and Maritime Careers by W.R. Heitzmann. [Available by writing to Dr. Ray Heitzmann, Villanova University, Villanova, PA, 19085.]
- Marine Science Careers: A Sea Grant Guide to Ocean Opportunities. Adams, S., Crago, T.I., and DeRosa, S. 2000, 32 p. (University of New Hampshire Press). ISBN 0964952920.
- <https://seagrant.uaf.edu/bookstore/pubs/M-18.html>
- Ocean Opportunities. Burtis, William S., Marine Technology Society, 1991, \$3. Opportunities in Marine and Maritime Careers. Heitzmann, W.R., 1999, 142 p. (Rev Ed. Lincolnwood, IL: VGM Career Horizons), ISBN No. 0-8442-1833-2/0-8442-1838-3.

- Planning a Career in Fish and Wildlife Management. [Free from the NJ Dept. of Environmental Protection and Energy, Div. of Fish, Game & Wildlife, CN 400, Trenton, NJ 08625-0400; (609) 292-2965.]
- Put Your Science to Work: The Take-Charge Career Guide for Scientists. Fiske, P.S. 2000. 179 pp. ISBN 0-87590-295-2. American Geophysical Union: <http://www.amazon.com>
- Questions about Careers in Oceanography. Anderson, Aubrey L., 1993, 18 p. Available from Texas Sea Grant, 1716 Briarcrest, Suite 702, Bryan, TX 77802.
- Scientists & Engineers for the New Millennium: Renewing the Human Resource. Commission of Professionals in Science and Technology (<http://www.cpst.org>). Document is available for free as a PDF file: <http://www.cpst.org/S&E.PDF>
- Student Science Opportunities. Grand, Gail L., 1994, 292 p. (John Wiley and Sons, Inc., NY), ISBN No. 0-471-31088-3
- Vocational-Technical Marine Career Opportunities in Texas. Hollin, Dewayne, 1993, 24 p. Available from Texas Sea Grant, 1716 Briarcrest, Suite 702, Bryan, TX 77802.
- Zoological Park Careers. SeaWorld Education Department. 34 p. Contact 1-800-237-4268 or visit: <http://www.seaworld.org>

### 3) Additional readings

(after <http://www.marinecareers.net>)

- Campbell, Lee Anne. "Women in Science. . . Good Girls Don't?" *Nor'easter* 2(2): 26-31.
- Chase, Valerie. "I'll Do Anything to Work with Whales or Dolphins!" *Current* 11(1): 31-33.
- Chase, Valerie. "Getting Kids Wet." *Oceanus* 33(3): 20-26.
- Farrington, John W. "Marine Education." *Oceanus* 33(3): 5-11.
- Nowell, Arthur R.M. and Charles D. Hollister. "Undergraduate and Graduate Education in Oceanography." *Oceanus* 33(3): 31-38.
- Rosendahl, Bruce. "Becoming an Oceanographer." *Sea Frontiers* 36(May-June 1990): 3.
- Bridging the Gap: Minorities in Marine Science. VHS or CD-ROM, Copyright 2000. Southern Association of Marine Labs (SAML), the American Society for Limnology and Oceanography (ASLO), and the National Science Foundation (NSF). [Available from [gillganm@savstate.edu](mailto:gillganm@savstate.edu).]



## MER Fellowships and Careers - Websites

<http://fellowships.aaas.org/>

American Association for the Advancement of Science (AAAS) Fellowships for Scientists and Engineers

<https://jobs.fisheries.org/>

American Fisheries Society Student Opportunities and Internships:

<https://aslo.users.membersuite.com/community/career-center/browse-jobs/allJobs/allCities/allStates>

American Society of Limnology and Oceanography (ASLO) Aquatic Science Career Information:

<https://careernext.ceu.edu/>

The Environmental Careers Organization (ECO) helps students and graduates find paid internships in the U.S. and abroad. They also sponsor career fairs, conferences, and publications

<https://www.aza.org/jobs>

American Zoo and Aquarium Association (type "intern" into search box to see a listing of internships)

<https://www.epa.gov/careers/research-fellowships-and-scholarships#schol>

Environmental Protection Agency Graduate Fellowships

<https://orise.orau.gov/epa/current-research-opportunities.html>

<https://masweb.vims.edu/bridge/output.cfm?q=studentcenter>

Student Opportunities Listings from The Bridge

<https://vizi.vizirecruiter.com/National-Academy-of-Sciences-Engineering-Medicine-2962/index.html>

National Academies Careers and Fellowships Information

<http://www.training.nih.gov>

[https://www.training.nih.gov/career\\_services/graduate\\_students](https://www.training.nih.gov/career_services/graduate_students)

National Institutes of Health (NIH) Student Training Opportunities

[http://www.nmfs.noaa.gov/ole/about/hq\\_internship.html](http://www.nmfs.noaa.gov/ole/about/hq_internship.html)

National Oceanic and Atmospheric Administration (NOAA) Fisheries Office for Law Enforcement

[https://www.nps.gov/subjects/youthprograms/jobs-and-internships.htm#CP\\_JUMP\\_5459014](https://www.nps.gov/subjects/youthprograms/jobs-and-internships.htm#CP_JUMP_5459014)

National Park Service Career and Internship Information

<https://beta.nsf.gov/careers/job-types/students-and-recent-grads>

National Science Foundation's Student Opportunities Listings

<https://seagrant.noaa.gov/graduate-fellowships>

National Sea Grant College Program Fellowship Opportunities

<https://www.nwf.org/about-us/careers>

National Wildlife Federation Internship Opportunities

[http://www.serc.si.edu/pro\\_training/internships/internships.jsp](http://www.serc.si.edu/pro_training/internships/internships.jsp)

<http://www.intern.si.edu/>

<https://serc.si.edu/opportunities>

Smithsonian Environmental Research Center Internships & Smithsonian Institution Internships

<https://hopkinsmarinestation.stanford.edu/graduate-programgraduate-student-resources/job-postings>

Links to web pages that provide advice for those interested in a career in the marine or aquatic sciences and to web pages that have postings for jobs, post docs, traineeships, internships, etc. specific to the marine and aquatic sciences

[http://www.biologyjobs.com/search\\_result.cfm?requesttimeout=500](http://www.biologyjobs.com/search_result.cfm?requesttimeout=500)

Biology Jobs .com was created as a targeted resource for job seekers and employers in Life Science. Biology jobs are divided into categories in our database which include Agriculture, Anatomy / Physiology, Bioinformatics / Biotechnology, Botany, Cell Biology, Conservation, Ecology, Environmental Science Jobs, Genetics, Marine Science, Medicine, Natural Resources, Pharmacology, Postdoctoral ( postdoc ), Toxicology, Veterinary Medicine, and Zoology.

[http://www.oceancareers.com/2.0/available\\_careers.php](http://www.oceancareers.com/2.0/available_careers.php)

OceanCareers.com is a nationwide project supported by COSEE California (Centers for Ocean Sciences Education Excellence), part of a National Science Foundation (NSF) network created to foster scientists' involvement in ocean science education. One of ten COSEE Centers nationwide, COSEE California represents a powerful collaboration between the Marine Advanced Technology Education (MATE) Center at Monterey Peninsula College, the Lawrence Hall of Science at UC Berkeley, the Scripps Institution of Oceanography and the Birch Aquarium at Scripps, and California Sea Grant.

<http://ec.europa.eu/eures/home.jsp?lang=en>

The easy way to find information on jobs and learning opportunities throughout Europe.

Job vacancies in 31 European countries, CVs from interested candidates, what you need to know about living and working abroad and much more brought to you by the EURES network.

<http://ec.europa.eu/euraxess/index.cfm/jobs/index>

<http://ec.europa.eu/education/study-in-europe/>



# Guide of MER Careers

**SOURCE:** <http://www.oceancareers.com>

(Data derived from [U.S. Bureau of Labor Statistics](#) Occupational Employment Statistics released November of 2006-07)

OceanCareers.com  
c/o MATE Center  
Monterey Peninsula College  
980 Fremont Street  
Monterey, CA 93940

**DISCLAIMER:** THIS SECTION IS NOT AIMED AT PROVIDING UPDATED INFORMATION ABOUT JOB OPPORTUNITIES BUT AT PROVIDING INSPIRATIONAL GUIDELINES TO SUPPORT CURRENT JOB SEARCHERS (e.g. keywords, ideas, requisites, valuable merits, etc.)

## Environmental Consultants

### Description

Complete work on contracts for clients in areas such as environmental impact assessment, water pollution, air and land contamination, waste management, environmental policy, ecological/land management, noise and vibration measurement and environmental management.

### Other titles in this work field include:

- air analyst
- clinical researcher
- environmental analyst
- environmental consultant
- environmental health and safety specialist
- environmental health specialist
- environmental manager
- environmental protection specialist
- environmental safety specialist
- environmental scientist
- environmental specialist
- environmental systems coordinator
- environmentalist
- hazardous substances scientist
- health environmentalist

- pollution control chemist
- radiation safety specialist
- regulatory compliance specialist
- research environmental scientist
- water pollution specialist
- water quality analyst

### Tasks and Duties

- Collect and interpret data from a variety of sources, arrange and presenting in reports and policy recommendations.
- Communicate scientific and technical information through oral briefings, written documents, workshops, conferences, and public hearings.
- Conduct field surveys and monitor variable to establish baseline data or levels of pollution/contamination.
- Conduct audits to evaluate the environmental impact of particular activities.
- Conduct environmental impact assessments for a wide array of development projects.
- Review and implement environmental technical standards, guidelines, policies, and formal regulations that meet all appropriate requirements.
- Provide technical guidance, support, and

- oversight to environmental programs.
- Provide advice on proper standards and regulations or the development of policies, strategies, and codes of practice for environmental management.
- Determine data collection methods to be employed in research projects and surveys.

### Job Requirements

Examples of knowledge and skills required

- Computer Systems
- Chemistry
- Fluid Dynamics
- Geographic Information Systems
- Mathematics and Statistics
- Water Quality
- Teamwork/Interpersonal Relationships
- Physics
- Oceanography
- Meteorology

### Education

Education distribution: Percentage of environmental scientists and specialists, including health\* with...

- college degrees: **92.3%**
- some college: **4.4%**
- high school diploma or less: **3.3%\*\***



## Educational Programs Directly Related to Environmental Consultants

- **Coastal Engineering**, offered by Stevens Institute of Technology (Hoboken, NJ)
- **Engineering Sustainable Systems - Sustainable Water Resources**, offered by University of Michigan, School of Natural Resources and Environment (Ann Arbor, MI)
- **Engineering with a Specialization in Water Engineering**, offered by California State Polytechnic University, San Luis Obispo (San Luis Obispo, CA)
- **Environmental Engineering**, offered by North Carolina State University (Raleigh, NC)
- **Environmental Engineering**, offered by San Diego State University (San Diego, CA)
- **Environmental Engineering**, offered by Wilkes University (Wilkes-Barre, PA)
- **Environmental Engineering**, offered by University of Southern California (Los Angeles, CA)
- **Environmental Engineering**, offered by New Jersey Institute of Technology (Newark, NJ)
- **Environmental Engineering & Water Resources**, offered by Princeton University (Princeton, NJ)
- **Environmental Engineering-Environmental Processes concentration**, offered by Stevens Institute of Technology (Hoboken, NJ)
- **Environmental Engineering-Groundwater and Soil Pollution Control concentration**, offered by Stevens Institute of Technology (Hoboken, NJ)
- **Environmental Engineering-Inland and Coastal Environmental Hydrodynamics**

**concentration**, offered by Stevens Institute of Technology (Hoboken, NJ)

- **Environmental Resources Engineering**, offered by Humboldt State University (Arcata, CA)
- **Environmental Science and Engineering**, offered by The Center for Coastal Margin Observation & Prediction (Beaverton, OR)
- **Environmental Science and Engineering**, offered by The Center for Coastal Margin Observation & Prediction (Beaverton, OR)
- **Marine Environmental Technology**, offered by Florida Keys Community College (Key West, FL)
- **Maritime Systems-Environmental Engineering Track**, offered by Stevens Institute of Technology (Hoboken, NJ)

## Additional Educational Programs related to Environmental Consultants

- **Environmental Response (Technology)**

## Employment Trends

- Number of environmental scientists and specialists, including health employed in 2006: **65,000**
- Projected Number of environmental scientists and specialists, including health that will be employed in 2016: **80,405**
- The numbers of positions for environmental scientists and specialists, including health is expected to **increase by 23.7%** between 2006 and 2016.

## Environmental Enforcement Officers (or Environmental Compliance Inspectors)

### Description

Inspect and investigate sources of pollution to protect the public and environment and ensure conformance with Federal, State, and local regulations and ordinances.

### Other titles in this work field include:

- adjustment examiner
- agricultural chemicals inspector
- appraiser
- compliance analyst
- compliance manager
- compliance officer
- compliance specialist
- engineer, inspecting
- equal opportunity counselor
- equal opportunity specialist
- examiner
- field examiner
- field investigator
- hazardous waste management specialist
- health inspector
- inspector, air pollution
- inspector, boiler
- inspector, environmental compliance
- inspector, industrial waste
- inspector, quality assurance
- inspector, scales
- inspector, water pollution control
- inspector, weights and measures
- investigator, immigration
- medical investigator

- permit review assistant
- pesticide control inspector
- port patrol officer
- quality assurance representative
- registration specialist, agricultural chemicals
- regulatory compliance specialist
- reviewing officer, driver's license
- sanitation inspector
- warehouse examiner

### Tasks and Duties

- Analyze and implement state, federal or local requirements as necessary to maintain approved pretreatment, pollution prevention, and storm water runoff programs.
- Conduct research on hazardous waste management projects in order to determine the magnitude of problems, and treatment or disposal alternatives and costs.
- Determine the nature of code violations and actions to be taken, and issue written notices of violation; participate in enforcement hearings as necessary.
- Determine sampling locations and methods, and collect water or wastewater samples for analysis, preserving samples with appropriate containers and preservation methods.
- Determine which sites and violation reports to investigate, and coordinate compliance and enforcement activities with other government agencies.
- Examine permits, licenses, applications, and records to ensure compliance with licensing requirements.
- Inform individuals and groups of pollution control regulations and inspection findings, and explain how problems can be corrected.

- Inspect waste pretreatment, treatment, and disposal facilities and systems for conformance to federal, state, or local regulations.
- Interview individuals to determine the nature of suspected violations and to obtain evidence of violations.
- Investigate complaints and suspected violations regarding illegal dumping, pollution, pesticides, product quality, or labeling laws.
- Learn and observe proper safety precautions, rules, regulations, and practices so that unsafe conditions can be recognized and proper safety protocols implemented.
- Monitor follow-up actions in cases where violations were found, and review compliance monitoring reports.
- Observe and record field conditions, gathering, interpreting, and reporting data such as flow meter readings and chemical levels.
- Perform laboratory tests on samples collected, such as analyzing the content of contaminated wastewater.
- Prepare, organize, and maintain inspection records.
- Research and perform calculations related to landscape allowances, discharge volumes, production-based and alternative limits, and wastewater strength classifications, then make recommendations and complete documentation.
- Review and evaluate applications for registration of products containing dangerous materials, or for pollution control discharge permits.
- Verify that hazardous chemicals are handled, stored, and disposed of in

accordance with regulations.

- Evaluate label information for accuracy and conformance to regulatory requirements.
- Inform health professionals, property owners, and the public about harmful properties and related problems of water pollution and contaminated wastewater.
- Participate in the development of spill prevention programs and hazardous waste rules and regulations, and recommend corrective actions for hazardous waste problems.
- Prepare data to calculate sewer service charges and capacity fees.
- Prepare written, oral, tabular, and graphic reports summarizing requirements and regulations, including enforcement and chain of custody documentation.
- Research and keep informed of pertinent information and developments in areas such as EPA laws and regulations.
- Respond to questions and inquiries, such as those concerning service charges and capacity fees, or refer them to supervisors.

### Job Requirements

Examples of knowledge and skills required

- Chemistry
- Computer Systems
- Fluid Dynamics
- Geographic Information Systems
- Instrumentation
- Mathematics and Statistics
- Small Boat Operations
- Teamwork/Interpersonal Relationships
- Water Quality

## Education

Education distribution:

Percentage of compliance officers, except agriculture, construction, health and safety, and transportation\* with...

- college degrees: **58%**
- some college: **28%**
- high school diploma or less: **14%\*\***

## Educational Programs Directly Related to Environmental Enforcement Officers (or Environmental Compliance Inspectors)

- **Environmental Chemistry**, offered by Lake Superior State University (Sault Ste. Marie, MI)
- **Environmental Science Technology**, offered by Hillsborough Community College (Tampa, FL)
- **Environmental Technology**, offered by North Carolina State University (Raleigh, NC)
- **Habitat Assessment & Restoration Study**, offered by Peninsula College (Port Angeles, WA)
- **Marine Environmental Technology**, offered by Florida Keys Community College (Key West, FL)

## Employment Trends

- Number of compliance officers, except agriculture, construction, health and safety, and transportation employed in 2006: **237,000**
- Projected Number of compliance officers, except agriculture, construction, health and safety, and transportation that will be employed in 2016: **247,665**

- The numbers of positions for compliance officers, except agriculture, construction, health and safety, and transportation is expected to **increase by 4.5%** between 2006 and 2016.

## Environmental Monitoring Technician

### Description

Performs laboratory and field tests to monitor the environment and investigate sources of pollution, including those that affect human and animal health or damage habitat. Under direction of an environmental scientist or specialist, may collect samples of gases, soil, water, and other materials for testing and take corrective actions as assigned.

### Other titles in this work field include:

- decontamination technician
- emergency response technician
- emergency spill response technician
- environmental compliance technician
- environmental safety specialist
- environmental technician
- hazardous material technician
- hazardous waste technician
- infectious waste technician
- mobile lab technician
- pollution control technician
- remediation technician
- technician, pollution control

## Tasks and Duties

- Record test data and prepare reports, summaries, and charts that interpret test results.
- Collect samples of gases, soils, water, industrial wastewater, and asbestos products to conduct tests on pollutant levels and identify sources of pollution.
- Respond to and investigate hazardous conditions or spills, or outbreaks of disease or food poisoning, collecting samples for analysis.
- Provide information and technical and program assistance to government representatives, employers and the general public on the issues of public health, environmental protection or workplace safety.
- Calibrate microscopes and test instruments.
- Make recommendations to control or eliminate unsafe conditions at workplaces or public facilities.
- Prepare samples or photomicrographs for testing and analysis.
- Calculate amount of pollutant in samples or compute air pollution or gas flow in industrial processes, using chemical and mathematical formulas.
- Initiate procedures to close down or fine establishments violating environmental and/or health regulations.
- Determine amounts and kinds of chemicals to use in destroying harmful organisms and removing impurities from purification systems.
- Discuss test results and analyses with customers.
- Maintain files such as hazardous waste databases, chemical usage data, personnel exposure information and diagrams showing equipment locations.



- Perform statistical analysis of environmental data.
- Set up equipment or stations to monitor and collect pollutants from sites, such as smoke stacks, manufacturing plants, or mechanical equipment.
- Distribute permits, closure plans and cleanup plans.
- Weigh, analyze, and measure collected sample particles, such as lead, coal dust, or rock, to determine concentration of pollutants.
- Examine and analyze material for presence and concentration of contaminants such as asbestos, using variety of microscopes.
- Develop testing procedures, and direct activities of workers in laboratory.
- Develop and implement programs for monitoring of environmental pollution and radiation.

### Job Requirements

Examples of knowledge and skills required

- Chemistry
- Computer Systems
- Data Processing
- Geographic Information Systems
- Instrumentation
- Marine Biology
- Mathematics and Statistics
- Physics
- Small Boat Operations
- Water Quality

### Education

Education distribution:  
Percentage of environmental science and protection technicians, including health\* with...

- college degrees: **46%**
- some college: **35%**
- high school diploma or less: **19%\*\***

### Educational Programs Directly Related to Environmental Monitoring Technician

- **Environmental Chemistry**, offered by Lake Superior State University (Sault Ste. Marie, MI)
- **Environmental Science & Technology**, offered by Southern Maine Community College (South Portland, ME)
- **Environmental Science Technology**, offered by Hillsborough Community College (Tampa, FL)
- **Environmental Studies**, offered by Hampshire College (Amherst, MA)
- **Environmental Technology**, offered by North Carolina State University (Raleigh, NC)
- **Habitat Assessment & Restoration Study**, offered by Peninsula College (Port Angeles, WA)
- **Industrial Technology Certificate: Oil Response Emphasis**, offered by Prince William Sound Community College (Valdez, AK)
- **Industrial Technology: Oil Spill Response**, offered by Prince William Sound Community College (Valdez, AK)
- **Marine Environmental Technology**, offered by Florida Keys Community College (Key West, FL)
- **Oil Spill Response**, offered by Prince William Sound Community College (Valdez, AK)

### Employment Trends

- Number of environmental science and protection technicians, including health employed in 2006: **36,000**
- Projected Number of environmental science and protection

technicians, including health that will be employed in 2016: **43,560**

- The numbers of positions for environmental science and protection technicians, including health is expected to **increase by 21%** between 2006 and 2016.

## Fish and Game Wardens

### Description

Patrol assigned area to prevent fish and game law violations. Investigate reports of damage to crops or property by wildlife. Compile biological data.

### Other titles in this work field include:

- fishing game warden
- game and fish protector
- game protector
- guard range
- mammal control agent
- park guard
- park warden
- state game protector
- warden
- wildlife control agent
- wildlife officer
- wildlife protector
- woods warden

### Tasks and Duties

- Collect and report information on populations and conditions of fish and wildlife in their habitats, availability of game food and cover, and suspected pollution.
- Design and implement control measures to prevent or counteract damage caused by wildlife or people.

- Investigate crop, property, or habitat damage or destruction, or instances of water pollution, in order to determine causes and to advise property owners of preventive measures.
- Investigate hunting accidents and reports of fish and game law violations, and issue warnings or citations and file reports as necessary.
- Issue licenses, permits, and other documentation.
- Patrol assigned areas by car, boat, airplane, horse, or on foot, to enforce game, fish, or boating laws and to manage wildlife programs, lakes, or land.
- Protect and preserve native wildlife, plants, and ecosystems.
- Provide advice and information to park and reserve visitors.
- Seize equipment used in fish and game law violations, and arrange for disposition of fish or game illegally taken or possessed.
- Serve warrants, make arrests, and compile and present evidence for court actions.
- Document and detail the extent of crop, property, or habitat damage, and make financial loss estimates and compensation recommendations.
- Inspect commercial operations relating to fish and wildlife, recreation, and protected areas.
- Participate in search-and-rescue operations and in firefighting efforts.
- Perform facilities maintenance work such as constructing or repairing structures, and controlling weeds and pests.
- Promote and provide hunter and trapper safety training.
- Provide assistance to other local law enforcement agencies as required.
- Recommend revisions or changes in hunting and trapping regulations or seasons and in animal management programs so that wildlife balances and habitats can be maintained.
- Supervise the activities of seasonal workers.
- Survey areas and compile figures of bag counts of hunters in order to determine the effectiveness of control measures.
- Address schools, civic groups, sporting clubs, and the media to disseminate information concerning wildlife conservation and regulations.
- Collect royalties assessed on fish, wildlife and timber resources.

## Job Requirements

Examples of knowledge and skills required

- Small Boat Operations
- Safety and Seamanship
- Marine Biology
- Navigation
- Teamwork/Interpersonal Relationships
- Instrumentation

## Education

Education distribution:  
Percentage of fish and game wardens\* with...

- college degrees: **42%**
- some college: **26%**
- high school diploma or less: **32%\*\***

## Educational Programs Directly Related to Fish and Game Wardens

- **Advanced Diploma in Integrated Coastal and Ocean Management**, offered by The Marine Institute of Memorial University of Newfoundland (St. John's, Newfoundland and Labrador, CN)
- **Agricultural, Food and Resource Economics Major with focus in Environmental And Resource Economics Concentration**, offered by Mississippi State University (Mississippi State, MS)
- **Aquatic Resource Management**, offered by Auburn University at Montgomery (Montgomery, AL)
- **Aquatic Sciences: Research and Management**, offered by University of Michigan (Ann Arbor, MI)
- **Biology:emphasis in Fisheries and Wildlife Mangement**, offered by University of Arkansas at Little Rock (Little Rock, AR)
- **Center for Microbial Oceanography: Research and Education**, offered by University of Hawaii at Manoa (Honolulu, HI)
- **Coastal Resources Management**, offered by East Carolina University (Greenville, NC)
- **Earth Systems Science and Policy: Marine & Coastal Ecology Concentration**, offered by California State University Monterey Bay (Seaside, CA)
- **Environmental and Natural Resource Economics**, offered by University of Rhode Island (Kingston, RI)

- **Environmental Economics and Policy (EEP)**, offered by Duke University Nicholas School of the Environment and Earth Sciences (Durham, NC)
- **Global Studies and Maritime Affairs**, offered by California Maritime Academy (Vallejo, CA)
- **Marine Affairs**, offered by University of Rhode Island (Kingston, RI)
- **Marine Management**, offered by Dalhousie University (HALIFAX, NOVA SCOTIA, CANADA, CN)
- **Marine Policy**, offered by University of Maine (Orono, ME)
- **Marine Policy and Marine Science**, offered by University of Maine (Orono, ME)
- **Marine Resource Management**, offered by Oregon State University - College of Oceanic and Atmospheric Science (Corvallis, OR)
- **Marine Resources Management**, offered by Texas A&M University at Galveston (Galveston, TX)
- **Marine Sciences and Technology: focus in Living Marine Resources Science and Management**, offered by University of Massachusetts (Lowell, MA)
- **Natural Resources Management**, offered by Grays Harbor College (Aberdeen, WA)
- **Ocean and Coastal Resources**, offered by Texas A&M University at Galveston (Galveston, TX)
- **School of Marine Sciences: focus in Living Marine Resources Science and Management**, offered by University of Massachusetts (Lowell, MA)

## Additional Educational Programs related to Fish and Game Wardens

- Environmental Monitoring Response
- Marine Policy
- Wetland Science
- Wildlife and Fisheries Science

## Employment Trends

- Number of fish and game wardens employed in 2006: **8,000**
- Projected Number of fish and game wardens that will be employed in 2016: **8,568**
- The numbers of positions for fish and game wardens is expected to **increase by 7.1%** between 2006 and 2016.

## Fish Hatchery Managers

### Description

Direct and coordinate, through subordinate supervisory personnel, activities of workers engaged in fish hatchery production for corporations, cooperatives, or other owners.

### Tasks and Duties

- Determines, administers, and executes policies relating to administration, standards of hatchery operations, and facility maintenance.
- Oversees trapping and spawning of fish, egg incubation, and fry rearing, applying knowledge of management and fish culturing techniques.
- Oversees movement of mature fish to lakes, ponds,

streams or commercial tanks.

- Collects information regarding techniques for collecting, fertilizing, incubating spawn, and treatment of spawn and fry.
- Accounts for and dispenses funds.
- Prepares reports required by state and federal laws.
- Prepares budget reports.
- Confers with biologists and other fishery personnel to obtain data concerning fish habits, food, and environmental requirements.
- Approves employment and discharge of employees, signs payrolls, and performs personnel duties.

## Job Requirements

Examples of knowledge and skills required

- Small Boat Operations
- Marine Biology
- Safety and Seamanship
- Teamwork/Interpersonal Relationships
- Mathematics and Statistics
- Water Quality
- Fluid Dynamics
- Data Processing

## Education

Education distribution: Percentage of farm, ranch, and other agricultural managers\* with...

- college degrees: **26%**
- some college: **29%**
- high school diploma or less: **45%\*\***

## Educational Programs Directly Related to Fish Hatchery Managers

- **Aquaculture**, offered by Hillsborough Community College (Tampa, FL)



- **Aquaculture**, offered by University of Maine (Orono, ME)
- **Aquaculture**, offered by Peninsula College (Port Angeles, WA)
- **Aquaculture and Aquatic Sciences- concentration in Aquatic Science**, offered by State University of New York-Morrisville (Morrisville, NY)
- **Aquaculture and Aquatic Sciences- concentration in Aquaculture Technology**, offered by State University of New York-Morrisville (Morrisville, NY)
- **Aquaculture and Fisheries Technology**, offered by University of Rhode Island (Kingston, RI)
- **Aquaculture Restoration Ecology Program**, offered by University of Maryland System, Horn Point Environmental Laboratory (Cambridge, MD)
- **Aquaculture Technology**, offered by Cumberland County College (Vineland, NJ)
- **Aquarium and Aquaculture Science**, offered by Saddleback Community College (Mission Viejo, CA)
- **Aquarium and Aquaculture Science**, offered by Saddleback Community College (Mission Viejo, CA)
- **Aquarium and Aquaculture Science Certificate**, offered by Saddleback Community College (Mission Viejo, CA)
- **Environmental Technology**, offered by Bristol Community College (Fall River, MA)
- **Fish Management & Aquaculture**, offered by Hocking College (Nelsonville, OH)
- **Fisheries and Aquaculture**, offered by Grays Harbor College (Alberdeen, WA)
- **Fisheries, with focus in marine fisheries and aquaculture**, offered by University of Alaska, Fairbanks (Fairbanks, AK)

- **Masters in Marine Aquaculture**, offered by Escuela Superior Politecnica del Litoral (Guayaquil, Ecuador, )
- **Seafood Science and Nutrition**, offered by University of Alaska, Fairbanks (Fairbanks, AK)
- **Wildlife and Fisheries with Aquaculture Science Option**, offered by Mississippi State University (Mississippi State, MS)

### Additional Educational Programs related to Fish Hatchery Managers

- Environmental Monitoring Technology
- Estuary Science / Technology (Science)
- Estuary Science / Technology (Technology)
- Marine Biology
- Marine Biotechnology
- Marine Microbiology
- Wildlife and Fisheries Science

### Employment Trends

- Number of farm, ranch, and other agricultural managers employed in 2006: **258,000**
- Projected Number of farm, ranch, and other agricultural managers that will be employed in 2016: **258,000**
- The numbers of positions for farm, ranch, and other agricultural managers is expected to **increase by 0%** between 2006 and 2016.

## Hydrologists

### Description

Research the distribution, circulation, and physical properties of underground and surface waters; study the form and intensity of precipitation, its rate of infiltration into the soil, movement through the earth, and its return to the ocean and atmosphere.

### Other titles in this work field include:

- environmental consultant
- geophysical laboratory chief
- geophysicist
- hydrogeologist
- seismologist
- volcanologist

### Tasks and Duties

- Apply research findings to help minimize the environmental impacts of pollution, water-borne diseases, erosion, and sedimentation.
- Compile and evaluate hydrologic information in order to prepare navigational charts and maps, and to predict atmospheric conditions.
- Conduct research and communicate information to promote the conservation and preservation of water resources.
- Conduct short-term and long-term climate assessments, and study storm occurrences.
- Design and conduct scientific hydrogeological investigations to ensure that accurate and appropriate information is available for use in water resource management decisions.
- Evaluate research data in terms of its impact on

issues such as soil and water conservation, flood control planning, and water supply forecasting.

- Investigate properties, origins, and activities of glaciers, ice, snow, and permafrost.
- Measure and graph phenomena such as lake levels, stream flows, and changes in water volumes.
- Study and analyze the physical aspects of the Earth in terms of the hydrological components, including atmosphere, hydrosphere, and interior structure.
- Study and document quantities, distribution, disposition, and development of underground and surface waters.
- Study public water supply issues, including flood and drought risks, water quality, wastewater, and impacts on wetland habitats.
- Answer questions and provide technical assistance and information to contractors and/or the public regarding issues such as well drilling, code requirements, hydrology, and geology.
- Collect and analyze water samples as part of field investigations and/or to validate data from automatic monitors.
- Coordinate and supervise the work of professional and technical staff, including research assistants, technologists, and technicians.
- Design civil works associated with hydrographic activities, and supervise their construction, installation, and maintenance.
- Develop or modify methods of conducting hydrologic studies.
- Draft final reports describing research results, including illustrations,

appendices, maps, and other attachments.

- Evaluate data and provide recommendations regarding the feasibility of municipal projects such as hydroelectric power plants, irrigation systems, flood warning systems and waste treatment facilities.
- Install, maintain, and calibrate instruments such as those that monitor water levels, rainfall, and sediments.
- Investigate complaints or conflicts related to the alteration of public waters, gathering information, recommending alternatives, informing participants of progress, and preparing draft orders.
- Prepare hydrogeologic evaluations of known or suspected hazardous waste sites and land treatment and feedlot facilities.
- Administer programs designed to ensure the proper sealing of abandoned wells.
- Monitor the work of well contractors, exploratory borers, and engineers, in order to enforce rules regarding their activities.
- Review applications for site plans and permits, and recommend approval, denial, modification, or further investigative action.

## Job Requirements

Examples of knowledge and skills required

- Geographic Information Systems
- Technical Writing
- Oceanography
- Chemistry
- Physics
- Marine Biology
- Surveying
- Water Quality
- Fluid Dynamics
- Data Processing

## Education

Education distribution:  
Percentage of hydrologists\* with...

- college degrees: **93%**
- some college: **7%**
- high school diploma or less: **0%\*\***

## Educational Programs Directly Related to Hydrologists

- **Earth Science with Ocean Mapping Option**, offered by University of New Hampshire (Durham, NH)
- **Hydrographic Science**, offered by University of Southern Mississippi (Stennis Space Center, MS)
- **Marine Science and Technology**, offered by Monterey Peninsula College (Monterey, CA)
- **Marine Science and Technology**, offered by Monterey Peninsula College (Monterey, CA)
- **Ocean Engineering with an Ocean Mapping Option**, offered by University of New Hampshire (Durham, NH)
- **Ocean Engineering with an Ocean Mapping Option**, offered by University of New Hampshire (Durham, NH)
- **Ocean engineering with specialization in Ocean instrumentation and seafloor mapping**, offered by University of Rhode Island (Naragasset, RI)
- **Ocean engineering with specialization in Ocean instrumentation and seafloor mapping**, offered by University of Rhode Island (Naragasset, RI)

## Additional Educational Programs related to Hydrologists

- Geographic Information Systems (Technology)
- Geographic Information Systems (Science)
- Navigation and Charting Technology (Transportation)
- Navigation and Charting Technology (Technology)

## Employment Trends

- Number of hydrologists employed in 2006: **8,000**
- Projected Number of hydrologists that will be employed in 2016: **9,680**
- The numbers of positions for hydrologists is expected to **increase by 21.0%** between 2006 and 2016.

## Marine Biologists

### Description

Study the origins, behavior, diseases, genetics, and life processes of animals and wildlife of the marine environment. May specialize in wildlife research and management, including the collection and analysis of biological data to determine the environmental effects of present and potential use of land and water areas.

### Other titles in this work field include:

- animal behaviorist
- animal biologist
- aquatic biologist
- conservation resources management biologist
- ecologist
- entomologist

- environmental consultant
- environmental specialist
- field naturalist
- fish and wildlife biologist
- fish conservationist
- fish culturist
- fish technologist
- fisheries biologist
- fisheries management biologist
- fishery biologist
- genetic scientist
- herpetologist
- ichthyologist
- limnologist
- mammalogist
- marine biologist
- marine scientist
- migratory game bird biologist
- naturalist
- nematologist
- ornithologist
- protozoologist
- wildlife biologist
- wildlife conservationist
- wildlife manager
- wildlife technician
- zoologist

### Tasks and Duties

- Study animals in their natural habitats, assessing effects of environment and industry on animals, interpreting findings and recommending alternative operating conditions for industry.
- Inventory or estimate plant and wildlife populations.
- Analyze characteristics of animals to identify and classify them.
- Make recommendations on management systems and planning for wildlife populations and habitat, consulting with stakeholders and the public at large to explore options.
- Disseminate information by writing reports and scientific papers or

journal articles, and by making presentations and giving talks for schools, clubs, interest groups and park interpretive programs.

- Study characteristics of animals such as origin, interrelationships, classification, life histories and diseases, development, genetics, and distribution.
- Perform administrative duties such as fundraising, public relations, budgeting, and supervision of zoo or aquarium staff.
- Organize and conduct experimental studies with live animals in controlled or natural surroundings.
- Oversee the care and distribution of zoo/aquarium animals, working with curators and zoo/aquarium directors to determine the best way to contain animals, maintain their habitats and manage facilities.
- Coordinate preventive programs to control the outbreak of diseases.
- Prepare collections of preserved specimens or microscopic slides for species identification and study of development or disease.
- Raise specimens for study and observation or for use in experiments.
- Collect and dissect animal specimens and examine specimens under microscope.

### Job Requirements

Examples of knowledge and skills required

- Marine Biology
- Teamwork/Interpersonal Relationships
- Computer Systems
- Physics
- Mathematics and Statistics
- Oceanography
- Technical Writing

- Submersibles
- Physics

## Education

Education distribution:

Percentage of zoologists and wildlife biologists\* with...

- college degrees: **95%**
- some college: **5%**
- high school diploma or less: **0%\*\***

## Educational Programs Directly Related to Marine Biologists

- **Biological Sciences: Marine Biology emphasis**, offered by University of California, Davis (Davis, CA)
- **Marine Biology**, offered by Florida Institute of Technology (Melbourne, FL)
- **Applied Marine Biology & Oceanography**, offered by Southern Maine Community College (South Portland, ME)
- **Aquaculture Restoration Ecology Program**, offered by University of Maryland System, Horn Point Environmental Laboratory (Cambridge, MD)
- **Aquatic Biology**, offered by Southwest Texas State University (San Marcos, TX)
- **Aquatic Biology**, offered by Southwest Texas State University (San Marcos, TX)
- **Aquatics Biology**, offered by Southwest Texas State University (San Marcos, TX)
- **Biological Oceanography**, offered by Texas A&M University (College Station, TX)
- **Biological Oceanography**, offered by Moss Landing Marine Laboratories (Moss Landing, CA)
- **Biological Science, Marine Biology Track**, offered by Florida State University (Tallahassee, FL)
- **Biological Sciences with concentration in Marine Biology and Fisheries**, offered by California Polytechnic State University, San Luis Obispo (San Luis Obispo, CA)
- **Biology - Marine & Freshwater Option**, offered by University of New Hampshire (Durham, NH)
- **Biology and Marine Sciences**, offered by University of Alabama (Tuscaloosa, AL)
- **Biology with a Concentration in Marine and Environmental Biology**, offered by Monmouth College (West Long Branch, NJ)
- **Biology with a Marine Biology emphasis**, offered by Bloomsburg University of Pennsylvania (Bloomsburg, PA)
- **Biology with a specialization in marine biology**, offered by Escuela Superior Politécnica del Litoral (Guayaquil, Ecuador, )
- **Biology with Aquatic Biology focus**, offered by University of Wisconsin-Superior (Superior, WI)
- **Biology with concentration in marine and freshwater biology**, offered by Hofstra University (Hempstead, NY)
- **Biology with Concentration in Marine Biology**, offered by California State University Stanislaus (Turlock, CA)
- **Biology with concentration in Marine Biology**, offered by University of South Florida (St. Petersburg, FL)
- **Biology with concentration in Marine Biology**, offered by Kingsborough Community College of the City - University of New York (Brooklyn, NY)
- **Biology with Concentration in Marine Biology**, offered by California State University - San Jose (San Jose, CA)
- **Biology with courses in marine biology**, offered by Saint Peters College (Jersey City, NJ)
- **Biology with Focus in Aquatic and Marine Science**, offered by Bowling Green State University (Bowling Green, OH)
- **Biology with focus in Marine Biology**, offered by Ithaca College (Ithaca, NY)
- **Biology with focus in Marine Biology**, offered by Humboldt State University (Arcata, CA)
- **Biology with focus in Marine Biology**, offered by University of South Alabama (Mobile, AL)
- **Biology with focus on Marine Biology**, offered by Florida Atlantic University (Davie, FL)
- **Biology with Marine Biology option**, offered by California State University - Northridge (Northridge, CA)
- **Biology with Marine Biology Option**, offered by Lock Haven University of Pennsylvania (Lock Haven, PA)
- **Biology with Marine Science emphasis**, offered by Orange Coast College (Costa Mesa, CA)
- **Biology with specialization in Marine Biology**, offered by California State University - Fullerton (Fullerton, CA)
- **Biology with specialization in Marine Biology**, offered by Florida Atlantic University (Davie, FL)
- **Biology with specialization in Marine Biology**, offered by California State University - Fullerton (Fullerton, CA)
- **Biology with Specialization in Marine Science**, offered by Boston University Marine Program (Woods Hole, MA)
- **Biology, with focus in ecology of aquatic organisms**, offered by University of Alabama at Birmingham (Birmingham, AL)
- **Biology- concentration in Marine Biology**, offered by San Francisco State University (San Francisco, CA)
- **Biology- Marine Biology option**, offered by Oregon State University (Corvallis, OR)
- **Biology- Marine Emphasis**, offered by Western Washington University (Bellingham, WA)
- **Biology- with focus in ecology of aquatic ecosystems**, offered by University of Alabama at Birmingham (Birmingham, AL)
- **Biology-Marine Biology option**, offered by Tuskegee University (Tuskegee, AL)
- **Biology: Aquatic Biology concentration**, offered by University of California, Santa Barbara (Santa Barbara, CA)
- **Biology: Concentration in Marine Biology**, offered by San Francisco State University (San Francisco, CA)
- **Biology: focus in Ecology of Aquatic Ecosystems**, offered by University of Alabama at Birmingham (Birmingham, AL)
- **Biology: focus in Ecology of Aquatic Organisms**, offered by University of Alabama at Birmingham (Birmingham, AL)
- **Biology: Marine Biology Concentration**, offered by Northeastern University (Boston, MA)
- **Biology: Marine Biology concentration**, offered by Salem State College (Salem, MA)
- **Biology: Marine Biology Concentration**, offered by San



- Diego State University (San Diego, CA)
- **Biology: Marine Biology concentration**, offered by Old Dominion University (Norfolk, VA)
  - **Biology: Specialization in Marine Biology**, offered by Stanford University (Stanford, CA)
  - **Conservation Biology with a Fisheries and Aquatic Biology Track**, offered by University of Minnesota (St. Paul, MN)
  - **Ecology, Evolution, and Marine Biology**, offered by University of California, Santa Barbara (Santa Barbara, CA)
  - **Ecology, Evolution, and Marine Biology**, offered by University of California, Santa Barbara (Santa Barbara, CA)
  - **Fisheries & Wildlife Science, Marine Science Example**, offered by Oregon State University (Corvallis, OR)
  - **Fisheries and Aquaculture**, offered by Auburn University (Auburn, AL)
  - **Marine and Environmental Biology and Policy**, offered by Monmouth College (West Long Branch, NJ)
  - **Marine and Estuarine Science Program**, offered by Western Washington University (Bellingham, WA)
  - **Marine and Freshwater Biology**, offered by University of Texas, Austin (Port Aransas, TX)
  - **Marine and Freshwater Biology**, offered by University of Texas, Austin (Port Aransas, TX)
  - **Marine Biology**, offered by Dalhousie University (HALIFAX, NOVA SCOTIA, (CANADA ), )
  - **Marine Biology**, offered by Stanford University (Stanford, CA)
  - **Marine Biology**, offered by University of Washington (Seattle, WA)
  - **Marine Biology**, offered by Scripps Institution of Oceanography (La Jolla, CA)
  - **Marine Biology**, offered by Hawaii Pacific University (Kane'ohe, HI)
  - **Marine Biology**, offered by University of California, Los Angeles (Los Angeles, CA)
  - **Marine Biology**, offered by Northeastern University (Nahant, MA)
  - **Marine Biology**, offered by State University of New York at Maritime College (Bronx, )
  - **Marine Biology**, offered by University of South Florida (St. Petersburg, FL)
  - **Marine Biology**, offered by Stanford University (Stanford, CA)
  - **Marine Biology**, offered by University of South Florida (St. Petersburg, FL)
  - **Marine Biology**, offered by Auburn University (Auburn, AL)
  - **Marine Biology**, offered by University of Oregon (Eugene, OR)
  - **Marine Biology**, offered by University of Oregon (Eugene, OR)
  - **Marine Biology**, offered by Wittenberg University (Springfield, OH)
  - **Marine Biology**, offered by University of Alaska, Fairbanks (Fairbanks, AK)
  - **Marine Biology**, offered by Florida State University (Tallahassee, FL)
  - **Marine Biology**, offered by Florida Institute of Technology (Melbourne, FL)
  - **Marine Biology**, offered by Florida Institute of Technology (Melbourne, FL)
  - **Marine Biology**, offered by University of North Carolina at Wilmington (Wilmington, NC)
  - **Marine Biology**, offered by University of North Carolina at Wilmington (Wilmington, NC)
  - **Marine Biology**, offered by University of North Alabama (Florence, AL)
  - **Marine Biology**, offered by University of New Hampshire (Durham, NH)
  - **Marine Biology**, offered by University of Rhode Island (Kingston, RI)
  - **Marine Biology**, offered by University of Oregon (Eugene, OR)
  - **Marine Biology**, offered by Grays Harbor College (Alberdeen, WA)
  - **Marine Biology**, offered by Barry University (Miami Shores, FL)
  - **Marine Biology**, offered by Palm Beach Atlantic College (West Palm Beach, FL)
  - **Marine Biology**, offered by Occidental College (Los Angeles, CA)
  - **Marine Biology**, offered by Occidental College (Los Angeles, CA)
  - **Marine Biology**, offered by Nova Southeastern University (City of Dania Beach, FL)
  - **Marine Biology**, offered by Nova Southeastern University (City of Dania Beach, FL)
  - **Marine Biology**, offered by University of Hawaii at Manoa (Honolulu, HI)
  - **Marine Biology**, offered by Nova Southeastern University (City of Dania Beach, FL)
  - **Marine Biology**, offered by Northwest Missouri State University (Kirksville, MO)
  - **Marine Biology**, offered by Millersville University of Pennsylvania (Millersville, PA)
  - **Marine Biology**, offered by California State University - Long Beach (Long Beach, CA)
  - **Marine Biology**, offered by San Francisco State University (San Francisco, CA)
  - **Marine Biology**, offered by University of Alaska, Southeast (Juneau, AK)
  - **Marine Biology**, offered by Texas A&M University at Galveston (Galveston, TX)
  - **Marine Biology**, offered by Maine Maritime Academy (Castine, ME)
  - **Marine Biology**, offered by University of Alaska, Fairbanks (Fairbanks, AK)
  - **Marine Biology**, offered by Roger Williams University (Bristol, RI)
  - **Marine Biology**, offered by University of Connecticut (Groton, CT)
  - **Marine Biology**, offered by University of West Alabama (Livingston, AL)
  - **Marine Biology**, offered by Wittenberg University (Springfield, OH)
  - **Marine Biology**, offered by University of Maine (Orono, ME)
  - **Marine Biology**, offered by University of Maine (Orono, ME)
  - **Marine Biology**, offered by Fairleigh Dickinson University (Teaneck, NJ)
  - **Marine Biology**, offered by College of Charleston (Charleston, SC)
  - **Marine Biology**, offered by Union University (Jackson, TN)

- **Marine Biology**, offered by Troy University (Troy, AL)
- **Marine Biology**, offered by College of Charleston (Charleston, SC)
- **Marine Biology**, offered by University of California, Santa Cruz (Santa Cruz, CA)
- **Marine Biology and Fisheries**, offered by University of Miami (Miami, FL)
- **Marine Biology and Fisheries**, offered by University of Miami (Miami, FL)
- **Marine Biology and Fisheries**, offered by University of Miami (Miami, )
- **Marine Biology Program**, offered by Boston University (Boston, MA)
- **Marine Biology Summer Program**, offered by Princeton University (Princeton, NJ)
- **Marine Biology-Biochemistry**, offered by University of Delaware (Lewes, DE)
- **Marine Biology/ Biomedical Sciences**, offered by Texas A&M University at Galveston (Galveston, TX)
- **Marine Biology/Oceanography**, offered by Dalhousie University (HALIFAX, NOVA SCOTIA, (CANADA ), )
- **Marine Program**, offered by Boston University (Boston, MA)
- **Marine Science with emphasis in Marine Biology and Biological Oceanography**, offered by University of South Carolina (Columbia, SC)
- **Marine Science with specialization in Marine Biology**, offered by University of South Carolina (Columbia, SC)
- **Marine Science- Marine Biology Concentration**, offered by University of Maine (Orono, ME)
- **Marine Science-Biology**, offered by University of Tampa (Tampa, FL)
- **Marine Sciences with focus in Biology**, offered by University of Miami (Miami, FL)
- **Marine Vertebrate Biology**, offered by Stony Brook University (Stony Brook, NY)
- **Oceanography: specialization in Marine Biology**, offered by

University of Hawaii at Manoa (Honolulu, HI)

- **Oregon Institute of Marine Biology**, offered by University of Oregon (Eugene, OR)
- **Science, Track B**, offered by Community College of Rhode Island (Warwick, RI)
- **Scripps Institution of Oceanography**, offered by University of California, San Diego (La Jolla, CA)
- **Wildlife and Fisheries Science**, offered by Mississippi State University (Mississippi State, MS)

## Additional Educational Programs related to Marine Biologists

- **Marine Botany**
- **Marine Chemistry**
- **Marine Ecology**
- **Ocean Observing Technology (Science)**

## Employment Trends

- Number of zoologists and wildlife biologists employed in 2006: **20,000**
- Projected Number of zoologists and wildlife biologists that will be employed in 2016: **22,000**
- The numbers of positions for zoologists and wildlife biologists is expected to **increase by 10%** between 2006 and 2016.

## Marine Geologists

### Description

Study composition, structure, and history of the earth's crust specializing in ocean areas; examine rocks, minerals, and fossil remains to identify and determine the sequence of processes affecting the development of the earth; apply knowledge of chemistry, physics, biology, and

mathematics to explain these phenomena and to help locate mineral and petroleum deposits and underground water resources; prepare geologic reports and maps; and interpret research data to recommend further action for study.

### Other titles in this work field include:

- aquatic chemist
- biological oceanographer
- chemical oceanographer
- marine geophysicist
- ocean scientist
- oceanographer
- physical oceanographer

### Tasks and Duties

- Analyze and interpret geological, geochemical, and geophysical information from sources such as survey data, well logs, boreholes, and aerial photos.
- Plan and conduct geological, geochemical, and geophysical field studies and surveys; sample collection; and drilling and testing programs used to collect data for research and/or application.
- Investigate the composition, structure, and history of the Earth's crust through the collection, examination, measurement, and classification of soils, minerals, rocks, and fossil remains.
- Prepare geological maps, cross-sectional diagrams, charts, and reports concerning mineral extraction, land use, and resource management, using results of field work and laboratory research.
- Locate and estimate probable natural gas, oil, and mineral ore deposits and underground water resources, using aerial photographs, charts, and

- research and survey results.
- Identify risks for natural disasters such as earthquakes, and volcanic eruptions, and provide advice on ways in which potential damage can be mitigated.
- Conduct geological and geophysical studies to provide information for use in regional development, site selection, and the development of public works projects.
- Inspect construction projects in order to analyze engineering problems, applying geological knowledge and using test equipment and drilling machinery.
- Communicate geological findings by writing research papers, participating in conferences, and/or teaching geological science at universities.
- Measure characteristics of the Earth, such as gravity and magnetic fields, using equipment such as seismographs, gravimeters, torsion balances, and magnetometers.
- Test industrial diamonds and abrasives, soil, or rocks in order to determine their geological characteristics, using optical, x-ray, heat, acid, and precision instruments.
- Develop applied software for the analysis and interpretation of geological data.

## Job Requirements

Examples of knowledge and skills required

- Geographic Information Systems
- Chemistry
- Computer Systems
- Fluid Dynamics

- Mathematics and Statistics
- Oceanography
- Physics
- Submersibles

## Education

Education distribution:  
Percentage of geoscientists, except hydrologists and geographers\* with...

- college degrees: **93%**
- some college: **7%**
- high school diploma or less: **0%\*\***

## Educational Programs Directly Related to Marine Geologists

- Coastal and Marine Geoscience**, offered by University of Delaware (Lewes, DE)
- Coastal Geology Minor**, offered by Coastal Carolina University (Conway, SC)
- Earth Science-Environmental Geology concentration**, offered by Tennessee Technological University (Cookeville, TN)
- Geological Oceanography**, offered by Dalhousie University (HALIFAX, NOVA SCOTIA, CANADA, )
- Geological Oceanography**, offered by Dalhousie University (HALIFAX, NOVA SCOTIA, CANADA, )
- Geological Oceanography**, offered by Old Dominion University (Norfolk, VA)
- Geological Sciences**, offered by Brown University (Providence, RI)
- Geological Sciences**, offered by Brown University (Providence, RI)
- Geological Sciences--Earth Systems Emphasis**, offered by University of California, Santa Barbara (Santa Barbara, CA)
- Geological Sciences: Marine Geology emphasis**, offered by San Diego State University (San Diego, CA)
- Geology with an Oceanography emphasis**, offered by University of California, Davis (Davis, CA)
- Geosciences**, offered by Pennsylvania State, University Park Campus (University Park, PA)
- Marine and Environmental Geology**, offered by University of Hawaii at Manoa (Honolulu, HI)
- Marine and Environmental Geology**, offered by University of Hawaii at Manoa (Honolulu, HI)
- Marine Chemistry & Geochemistry**, offered by Scripps Institution of Oceanography (La Jolla, CA)
- Marine Geology**, offered by University of South Florida (St. Petersburg, FL)
- Marine Geology**, offered by University of South Florida (St. Petersburg, FL)
- Marine Geology & Geophysics**, offered by Oregon State University (Corvallis, OR)
- Marine Geology & Geophysics**, offered by Oregon State University (Corvallis, OR)
- Marine Geology and Geophysics**, offered by University of Miami (Miami, )
- Marine Geology and Geophysics**, offered by Woods Hole Oceanographic Institution (Woods Hole, MA)
- Marine Geology and Geophysics**, offered by University of Washington (Seattle, WA)
- Marine Geology and Geophysics**, offered by University of Miami (Miami, )
- Marine Geology and Geophysics**, offered by University of Washington (Seattle, WA)
- Marine Geology and Geophysics**, offered by Massachusetts Institute of

Technology (Cambridge, MA)

- **Marine Geology and Geophysics**, offered by University of Washington (Seattle, WA)
- **Marine Science with focus in Geology**, offered by University of Miami (Miami, FL)
- **Marine Science with specialization in Marine Geology**, offered by University of South Carolina (Columbia, SC)
- **Marine Science- Marine Geology focus**, offered by University of North Carolina at Wilmington (Wilmington, NC)
- **Marine Science- Physical Marine Sciences Concentration**, offered by University of Maine (Orono, ME)
- **Ocean engineering with specialization in Marine geomechanics**, offered by University of Rhode Island (Naragassett, RI)
- **Ocean engineering with specialization in Marine geomechanics**, offered by University of Rhode Island (Naragassett, RI)
- **School of Marine Sciences: focus in Marine Biogeochemistry and Environmental Change**, offered by University of Massachusetts (Lowell, MA)
- **School of Marine Sciences: focus in Marine Biogeochemistry and Environmental Change**, offered by University of Massachusetts (Lowell, MA)

### Additional Educational Programs related to Marine Geologists

- Chemical Oceanography
- General Earth Science
- General Oceanography
- Marine Resource Management

### Employment Trends

- Number of geoscientists, except hydrologists and geographers employed in 2006: **31,000**
- Projected Number of geoscientists, except hydrologists and geographers that will be employed in 2016: **37,510**
- The numbers of positions for geoscientists, except hydrologists and geographers is expected to **increase by 21%** between 2006 and 2016.

## Marine Resource Managers

### Description

Manages marine resources using sound management and governance practices to effectively represent marine and coastal issues for stakeholders.

### Other titles in this work field include:

- coastal resource manager
- environmental manager
- environmental resource manager
- environmental resource planner
- environmentalist
- marine policy advisor
- marine policy specialist
- marine program coordinator

### Tasks and Duties

- Confer with scientists, engineers, regulators, and others, to plan and review projects, and to provide technical assistance.
- Invoke governance tools such as zoning, permits, mapping and impact

assessments to manage resources.

- Advise stakeholders on applicable laws and regulations.
- Develop outreach and education programs to raise public awareness of resource status.
- Organize resource monitoring efforts. Collect pertinent environmental data from multiple sources of information to assess overall status of resources.
- Collect and analyze available scientific, economic and social data to develop policy recommendations.
- Submit proposals for funding of initiatives such as monitoring, education and outreach programs.
- Determine scientific and technical goals within broad outlines provided by top management and make detailed plans to accomplish these goals.
- Plan and direct research, development, and production activities.
- Develop client relationships and communicate with clients to explain proposals, present research findings, establish specifications or discuss project status.

### Job Requirements

Examples of knowledge and skills required

- Chemistry
- Marine Biology
- Navigation
- Small Boat Operations
- Teamwork/Interpersonal Relationships
- Water Quality
- Geographic Information Systems
- Oceanography
- Mathematics and Statistics



## Education

Education distribution:  
Percentage of natural sciences managers\* with...

- college degrees: **87.0%**
- some college: **4.2%**
- high school diploma or less: **8.8%\*\***

## Educational Programs Directly Related to Marine Resource Managers

- **Advanced Diploma in Integrated Coastal and Ocean Management**, offered by The Marine Institute of Memorial University of Newfoundland (St. John's, Newfoundland and Labrador, CN)
- **Agricultural Engineering Technology & Business: Natural Resources & Environmental Management**, offered by Mississippi State University (Mississippi State, MS)
- **Agricultural, Food and Resource Economics Major with focus in Environmental And Resource Economics Concentration**, offered by Mississippi State University (Mississippi State, MS)
- **Aquaculture Restoration Ecology Program**, offered by University of Maryland System, Horn Point Environmental Laboratory (Cambridge, MD)
- **Aquatic Resource Management**, offered by Auburn University at Montgomery (Montgomery, AL)
- **Aquatic Sciences: Research and Management**, offered by University of Michigan (Ann Arbor, MI)
- **Biology:emphasis in Fisheries and Wildlife Mangement**, offered by University of Arkansas at Little Rock (Little Rock, AR)
- **Center for Microbial Oceanography: Research and Education**, offered by University of Hawaii at Manoa (Honolulu, HI)
- **Coastal & Marine Sciences**, offered by Smith College (Northampton, MA)
- **Coastal and Marine Geoscience**, offered by University of Delaware (Lewes, DE)
- **Coastal Ecology**, offered by Louisiana State University (Baton Rouge, LA)
- **Coastal Ecology**, offered by Louisiana State University (Baton Rouge, LA)
- **Coastal Engineering**, offered by Stevens Institute of Technology (Hoboken, NJ)
- **Coastal Environmental Management (CEM)**, offered by Duke University Nicholas School of the Environment and Earth Sciences (Durham, NC)
- **Coastal Fisheries**, offered by Louisiana State University (Baton Rouge, LA)
- **Coastal Fisheries**, offered by Louisiana State University (Baton Rouge, LA)
- **Coastal Marine and Wetland Studies**, offered by Coastal Carolina University (Conway, SC)
- **Coastal Resources Management**, offered by East Carolina University (Greenville, NC)
- **Coastal Studies**, offered by University of Connecticut (Storrs, CT)
- **Coastal Studies**, offered by Louisiana State University (Baton Rouge, LA)
- **Coastal Studies**, offered by Louisiana State University (Baton Rouge, LA)
- **Coastal Studies Program**, offered by Bowdoin College (Brunswick, ME)
- **Coastal Zone Management**, offered by Nova Southeastern University (City of Dania Beach, FL)
- **Coastal Zone Management**, offered by Florida Institute of Technology (Melbourne, FL)
- **Coastal Zone Management**, offered by Florida Institute of Technology (Melbourne, FL)
- **Earth Systems Science and Policy: Marine & Coastal Ecology Concentration**, offered by California State University Monterey Bay (Seaside, CA)
- **Environmental and Natural Resource Economics**, offered by University of Rhode Island (Kingston, RI)
- **Environmental Economics and Policy (EEP)**, offered by Duke University Nicholas School of the Environment and Earth Sciences (Durham, NC)
- **Environmental Management**, offered by Lake Superior State University (Sault Ste. Marie, MI)
- **Environmental Resource Management**, offered by Florida Institute of Technology (Melbourne, FL)
- **Fisheries & Water Resources with concentration in Watershed Management**, offered by University of Wisconsin - Stevens Point (Stevens Point, WI)
- **Global Studies and Maritime Affairs**, offered by California Maritime Academy (Vallejo, CA)
- **M.S. in Coastal and Watershed Science and Policy**, offered by California State University Monterey Bay (Seaside, CA)
- **Marine Affairs**, offered by University of Rhode Island (Kingston, RI)
- **Marine Management**, offered by Dalhousie University (HALIFAX, NOVA SCOTIA, CANADA, CN)
- **Marine Policy**, offered by University of Maine (Orono, ME)
- **Marine Policy and Marine Science**, offered by University of Maine (Orono, ME)
- **Marine Resource Management**, offered by Oregon State University - College of Oceanic and Atmospheric Science (Corvallis, OR)
- **Marine Resources Management**, offered by Texas A&M University at Galveston (Galveston, TX)
- **Marine Science and Conservation**, offered by Duke University Nicholas School Marine Laboratory (Beaufort,, NC)
- **Marine Science with emphasis in coastal resource management & marine affairs**, offered by University of South Carolina (Columbia, SC)
- **Marine Sciences and Technology: concentration in Integrated Coastal Management**, offered by University of Massachusetts (Lowell, MA)
- **Marine Sciences and Technology: focus in Living Marine Resources Science and Management**, offered by University of Massachusetts (Lowell, MA)

- **Natural Resources Management**, offered by Grays Harbor College (Aberdeen, WA)
- **Natural Resources Technology**, offered by Grays Harbor College (Aberdeen, WA)
- **Ocean and Coastal Resources**, offered by Texas A&M University at Galveston (Galveston, TX)
- **Oceanography and Coastal Sciences**, offered by Louisiana State University (Baton Rouge, LA)
- **School of Marine Sciences: concentration in Integrated Coastal Management**, offered by University of Massachusetts (Lowell, MA)
- **School of Marine Sciences: focus in Coastal Systems Science**, offered by University of Massachusetts (Lowell, MA)
- **School of Marine Sciences: focus in Coastal Systems Science**, offered by University of Massachusetts (Lowell, MA)
- **School of Marine Sciences: focus in Living Marine Resources Science and Management**, offered by University of Massachusetts (Lowell, MA)
- **Error! Hyperlink reference not valid.**, offered by aaa Test Case (, )
- **Water Resource Management**, offered by University of Wisconsin-Superior (Superior, WI)
- **Water Resources**, offered by University of Georgia (Athens, GA)
- **Wetland Science and Management**, offered by Louisiana State University (Baton Rouge, LA)
- **Wetlands and Coastal Resources**, offered by College of William and Mary (Gloucester, VA)
- **Wetlands and Coastal Resources**, offered by College of William & Mary (Williamsburg, VA)

## Additional Educational Programs related to Marine Resource Managers

- Marine-related Law

## Employment Trends

- Number of natural sciences managers employed in 2006: **45,000**
- Projected Number of natural sciences managers that will be employed in 2016: **50,085**
- The numbers of positions for natural sciences managers is expected to **increase by 11.3%** between 2006 and 2016.

## Marine Technicians

### Description

Individuals who apply basic seamanship, science, computer, and engineering skills to the marine environment – including the open ocean, coastal regions, estuaries, rivers, swamps, and lakes. They may work aboard ships or other vessels, directly underwater (e.g., diving, in submarines), remotely underwater (e.g., ROVs), in a marine laboratory or onshore support facility, or in any number of other marine and coastal settings.

### Other titles in this work field include:

- assistant, laboratory
- assistant, research
- gamma facilities operator
- gamma ray operator
- hydrographer
- laboratory worker
- laser technician
- map plotter

- meteorological aide
- observer
- oceanographer, assistant
- physical science aide
- pilot, submersible
- radiosonde operator
- scientific aide
- scientific helper
- sonoscope operator
- technician, data reduction
- technician, hot cell
- technician, laboratory
- technician, laser
- technician, meteorological
- technician, science
- tester
- vector control assistant
- water tester
- weather observer

## Tasks and Duties

- Operate communications equipment such as radio and satellite receivers.
- Complete post cruise analysis and write required reports.
- Operate small boats.
- Store and properly handle hazardous materials required of vessel mission.
- Coordinate pre/post cruise logistics such as equipment install and removal.
- Inventory equipment and order replacement supplies of sampling and other items required for vessel mission.
- Participate in or direct deck operations such as sampling (launching and retrieving equipment).
- Maintain and manage computers and computer networks.
- Collect data while underway. Collect and monitor data from various geophysical, meteorological, biological, and geochemical systems.

- Utilize equipment and advanced instruments to collect data.

## Job Requirements

Examples of knowledge and skills required

- Chemistry
- Small Boat Operations
- Safety and Seamanship
- Physics
- Computer Systems
- Oceanography
- Meteorology
- Marine Biology
- Geographic Information Systems
- Mathematics and Statistics

## Education

Education distribution:  
Percentage of marine technicians (who work aboard research vessels)\* with...

- college degrees: **46%**
- some college: **35%**
- high school diploma or less: **19%\*\***

## Educational Programs Directly Related to Marine Technicians

- **Applied Science & Technology**, offered by University of California, Berkeley (Berkeley, )
- **Applied Science & Technology**, offered by University of California, Berkeley (Berkeley, )
- **Bachelor of Technology (Ocean Instrumentation)**, offered by Memorial University of Newfoundland (St. John's, Newfoundland, CN)
- **Bombardier Recreational Products (BRP)**, offered by

Alexandria Technical College (Alexandria, MN)

- **Diploma of Technology-Primary Technology Year**, offered by Memorial University of Newfoundland (St. Johns Canada, )
- **EETC (Equipment & Engine Training Council)**, offered by Alexandria Technical College (Alexandria, MN)
- **Marine and Small Engine Mechanics: AAS/Diploma**, offered by Alexandria Technical College (Alexandria, MN)
- **Marine Engineering Technology**, offered by Seattle Central Community College (Seattle, WA)
- **Marine Engineering Technology**, offered by Memorial University of Newfoundland (St. Johns Canada, )
- **Marine Repair Technician**, offered by Wisconsin Indianhead Technical College (Ashland, WI)
- **Marine Science and Technology**, offered by Monterey Peninsula College (Monterey, CA)
- **Marine Science Technician**, offered by Saddleback Community College (Mission Viejo, CA)
- **Marine Science Technology**, offered by College of the Redwoods, Mendocino Campus (Fort Bragg, )
- **Marine Science Technology**, offered by College of the Redwoods (Fort Bragg, CA)
- **Marine Technology**, offered by Bristol Community College (Fall River, MA)
- **Marine Technology**, offered by New England Institute of Technology (Warwick, RI)
- **Marine Technology**, offered by Cape Fear Community College (Wilmington, NC)

- **Marine Technology (Commercial Diving)**, offered by National Polytechnic College of Science (Wilmington, CA)
- **Maritime Operations and Technology Program**, offered by U.S. Merchant Marine Academy (Kings Point, NY)
- **Maritime Power Plant Facilities Operator**, offered by Great Lakes Maritime Academy/Northwestern Michigan College (Traverse City, MI)
- **Mercury**, offered by Alexandria Technical College (Alexandria, MN)
- **Stihl**, offered by Alexandria Technical College (Alexandria, MN)
- **Technology**, offered by Memorial University of Newfoundland (St. Johns Canada, )
- **Error! Hyperlink reference not valid.**, offered by aaa Test Case (, )
- **Vessel Operations**, offered by Clatsop Community College: Marine and Environmental Research and Training Station (MERTS) (Astoria, OR)

## Additional Educational Programs related to Marine Technicians

- Computer Information and Technology
- Electronics Technology
- Environmental Monitoring Response
- Environmental Monitoring Technology
- Geographic Information Systems (Technology)
- Seamanship
- Submersible Technology (Technology)

# Guide of Potential Available Jobs in MER

## Aquatic Toxicologist

Lab work performing water and sediment toxicity and bioaccumulation tests, and some field work collecting water and sediment samples and performing biological assessments. We provide all necessary training; however, the successful applicant will be knowledgeable regarding the basic principles and techniques used in aquatic toxicology research and testing, basic statistical analyses, basic water quality characteristics and analytical methods. In addition, the successful applicant will be able to work independently and within a team environment, to establish and maintain effective working relationships with others, and to communicate effectively verbally and in writing.

## Analytical and environmental chemist

**Responsibilities:** perform experiments in collaboration with others that are unique or that must be repeatedly validated; develop new experimental methods; method development, validation and analysis utilizing GC, write methods, reports, and publications as requested by senior management; write professional reports suitable for journal publication and make professional presentations; perform analyses, instrument calibrations and calculations following established procedures; carry out experiments based on plan devised by senior personnel or management; contribute those experiments by suggesting improvements or modifications; perform data documentation in notebook and computer files.

### Requirements:

- Candidate MUST have previous sediment and tissue experience with fish and or shellfish

- Strong Industry experience round in analytical chemistry and environmental chemistry
- Knowledge of the literature and suggest methodology
- Working knowledge of basic statistics and physical and inorganic chemistry

## Marine Pollution Advisor

Technical Adviser for Combating oil and chemical spills in the marine environment. Candidates should possess a degree in a scientific, engineering or related discipline. Relevant practical experience of pollution control, and / or the effects of pollution on marine resources are desirable. The successful candidate must be willing to travel extensively, often at short notice, and be able to work under pressure. Good written and oral presentation skills, strong interpersonal skills and computer literacy are all vital.

## Environmental Scientist

**Responsibilities:** Mussel Watch Program data collected from laboratory analysis of chemical and microbial contamination, and histopathology for the identification and counting of disease, tumors, parasites, and gonadal index. It is the intent of NOAA and EPA partners to expand the analysis to include effects-based monitoring, specifically cellular, subcellular and molecular level techniques that should provide linkage between cause (chemical contamination) and effects (histopathology).

### Qualifications:

- Ph.D. in Environmental Toxicology, Analytical Chemistry, Molecular Biology, Biochemistry or a related field, ...
- Experience involving the development and application of environmental monitoring initiatives, as well as development and implementation of a

comprehensive quality management program for all data collection and analysis activities.

- Understanding of state-of-the-science techniques for field collection and laboratory analysis of environmental samples using analytical chemistry and molecular biology.
- Knowledge of statistical analysis for environmental data is important.

### Duties and Responsibilities:

- Mussel Watch Program data analysis, quality control, quality assurance, and scientific writing, at a minimum, the individual will:
- Review and write quality management plans for future data collection activities
- Perform quality assurance of current data and the data collection system (sample design, chain of custody, etc.)
- Review and analyze data, and write technical manuscripts.
- Support the development of grant applications for further funding of mussel watch as requested.

## Aquatic Ecotoxicologist

**Job's Role:** research on the effects of pharmaceuticals on aquatic organisms, especially fish; identification and measurement of physiological and molecular endpoints in fish that are relevant to their therapeutic effects in humans. **Requirements:** post-doctoral researcher with prior experience of both aquatic ecotoxicology (including the associated laboratory biochemistry) and analytical chemistry.

## Littoral-Zone Oceanographer.

**Job Role:** Oceanography, Marine Biology, Atmospheric Physics, Earth & Environment. As a Littoral-Zone Oceanographer, you will contribute to the selection, implementation and validation of coupled wave,



current and morphology models. The successful candidate will play a major role in field programs designed to improve understanding of littoral-zone dynamics and test model performance. Further, the research is also expected to be highly relevant to coastal management, particularly in the context of climate change. For management, the major issues are beach stability and coastal inundation, at timescales from individual storms up to decadal and centennial evolution.

#### Responsibilities:

- the delivery of a short-term littoral-zone prediction system to the Royal Australian Navy to facilitate nearshore operations;
- the development of littoral-zone modeling capability suitable for coastal management applications under present and future climate scenarios;
- a contribution to the implementation and/or development of shoreline evolution models for climate timescales (10-100 years);
- a contribution to the development of data-assimilation approaches to improve littoral-zone modeling;
- the expansion of field capability in littoral-zone oceanography.

#### Requirements:

- experience relevant to littoral-zone oceanography,
- familiarity and experience with littoral-zone modeling techniques and packages, and perspective on their relative strengths and weaknesses;
- experience in inshore field work, including relevant instrumentation;
- experience with littoral-zone data and data-analysis techniques;
- an ability to meet project milestones;
- excellent interpersonal skills, including an ability to communicate successfully with a variety of audiences, and work effectively in a cross-disciplinary research team.

#### Fisheries Director

The Fisheries Director operates within the Standards & Licensing Team and will lead a team

responsible for the MSC's own quality control of fishery assessments to ensure rigor and credibility.

The successful candidate will have extensive experience in a fishery science, fisheries management and marine

#### Research Molecular Geneticist

Conservation Biology: marine and anadromous organisms. Research activities include: assessing genetic and phenotypic variation to support conservation and recovery of listed species; analyzing composition of mixed fishery stocks (Genetic Stock Identification, or GSI); estimating reproductive success in wild or naturally spawning populations; characterizing components of adaptive evolution; determining the evolutionary consequences of inbreeding within and interbreeding among distinct populations; exploring how life histories respond to selection such as size-selective exploitation; and evaluating consequences of hatchery domestication and climate change. Diverse marine organisms such as salmon and steelhead, killer whales, Pacific herring, hake, rockfish, eulachon, tunicates, abalone, corals and sponges. Primary activities involve population genetics, genomics, and quantitative genetics, as well as on providing genetic analysis of forensic evidence in support Law Enforcement activities.

#### GC/MS/MS Chemist with Fish Tissue experience

##### Responsibilities:

- Perform experiments in collaboration with others that are unique or that must be repeatedly validated
- Develop new experimental methods
- Method development, validation and analysis utilizing GC,
- Write methods, reports, and publications as requested by senior management
- Must be able to write professional reports suitable for journal publication and

make professional presentations.

- Perform analyses, instrument calibrations and calculations following established procedures.
- Carry out experiments based on plan devised by senior personnel or management. Contribute those experiments by suggesting improvements or modifications.
- Perform data documentation in notebook and computer files

#### Requirements:

- BSc or MSc degree in Chemistry
- Candidate must have previous sediment and tissue experience with fish and or shellfish
- Strong Industry experience round in analytical chemistry and environmental chemistry
- Advanced degree a plus but experience and proven publication record is more important
- 2 - 5 years industrial experience in chemistry related field
- Knowledge of the literature and suggest methodology
- Working knowledge of basic statistics and physical and inorganic chemistry

#### Climate Scientist

Support an interdisciplinary team working to develop and update EPA policy and guidance documents, support tool development, coordinate external review of work products, and research, compile, and manage data on climate change, water resource management, and water utility activities related to adaptation and mitigation in the water sector.

#### Essential Job Functions

- Analyze and interpret trends and patterns using available precedents and guidelines to provide company or clients with an accurate picture of relevant environmental /climate concerns and issues.
- Interface with environmental scientists, economists, and other technical personnel to ensure that departmental activities are according to client specifications and guidelines.

- Develop and execute testing procedures, strategies, and relevant tools for analysis and interpretation of environmental /climate data and adaptation / mitigation strategies.
- Translate climate science and water resource management practices into the appropriate context for use in infrastructure investment planning and long-term decision making.
- Convey technical information regarding climate change and subsequent potential impacts on water resources to both water utility professionals and non-technical audiences.
- Experience working with federal environmental and safety rules and regulations and other related issues and topics.
- Ability to obtain a Top Secret clearance required.

#### Marine Pollution Advisor

An international, non-profit organisation involved in all aspects of combating oil and chemical spills in the marine environment is seeking a new Technical Adviser to join team. Our clients work is varied and challenging. It involves giving advice world-wide on the most effective methods for responding to oil and chemical spills from ships, minimising their impact on economic resources and the environment, and the provision of compensation.

#### Requirements:

- a degree in a scientific, engineering or related discipline. Relevant practical experience of pollution control, and / or the effects of pollution on marine resources are desirable. The successful candidate must be willing to travel extensively, often at short notice, and be able to work under pressure. Good written and oral presentation

skills, strong interpersonal skills and computer literacy are all vital. Fluency in a language, in addition to English, would be a considerable advantage. Candidates will ideally be fluent in either Mandarin or Spanish.

(April 2011)\*

**\*DISCLAIMER:**  
THIS SECTION IS NOT AIMED  
AT PROVIDING UPDATED  
INFORMATION ABOUT JOB  
OPPORTUNITIES BUT AT  
PROVIDING INSPIRATIONAL  
GUIDELINES TO SUPPORT  
CURRENT JOB SEARCHERS  
(e.g. keywords, ideas,  
requisites, valuable merits,  
etc.)



**MER SECRETARIAT**

R&D CENTRE FOR EXPERIMENTAL  
MARINE BIOLOGY AND BIOTECHNOLOGY  
(PLENTZIAKO ITSAS- ESTAZIOA; PIE-UPV/EHU)

UNIVERSIDAD DEL PAIS VASCO  
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BASQUE COUNTRY (SPAIN)

**www.merconsortium.eu**

More updated information can be obtained from  
the following web sites

<http://www.soton.ac.uk>

<http://www.ehu.es>

<http://www.u-bordeaux.fr>

<http://www.uliege.be>

<https://international.uac.pt/>

