

## STRATEGIES FOR PURSUING A CAREER IN MARINE MAMMAL SCIENCE

The field of marine mammal science has a growing appeal for young people. Yet many students do not clearly understand what the field involves. This brochure addresses questions commonly asked by people seeking a career in marine mammal science in the United States and provides suggestions on how to plan education and work experience.

### **What is marine mammal science?**

There are about 100 species of aquatic or marine mammals that depend on fresh water or the ocean for part or all of their life needs. These species include pinnipeds, which are seals, sea lions, fur seals, and walrus; cetaceans, which are baleen and toothed whales oceanic and river dolphins, and porpoises; sirenians, which are manatees and dugongs; and some carnivores, such as sea otters and polar bears. Many mammal scientists try to understand these animals' genetic, systematic, and evolutionary relationships; population structure; community dynamics; anatomy and physiology; behavior and sensory abilities parasites and diseases; geographic and microhabitat distributions; ecology; management; and conservation.

### **How difficult is it to pursue a career in marine mammal science?**

Working with marine mammals is appealing because of strong public interest in these animals and because the work is personally rewarding. However, competition for positions is keen.

There are no statistics available on employment of students trained as marine mammal scientists. However, in 1990 the National Science Board reported some general statistics for employment of scientists within the U.S.: 75 % of scientists with B.S. degrees were employed (43% of them held positions in science or engineering), 20% were in graduate school, and 5% were unemployed.

Marine mammal scientists are hired because of their skills as scientists, not because they like or want to work with marine mammals. A strong academic background in basic sciences, such as biology, chemistry, and physics, coupled with good training in mathematics and computers, is the best way to prepare for a career in marine mammal science. Persistence and diverse experiences make the most qualified individuals. Often developing a specialized scientific skill, such as acoustics analysis, biostatistics, genetic analysis, or biomolecular techniques, provides a competitive edge.

### **What are typical salaries in marine mammal careers?**

Marine mammal scientists enter this field for the satisfaction of the work, not for the money-making potential of the career. Salaries vary greatly among marine mammal scientists, with government and industry jobs having the highest pay. Salary levels will increase with years of experience and graduate degrees, but generally remain low considering the amount of experience and education needed. High competition in this field most likely will keep salaries at a modest level.

A recent (1990) survey of 1,234 mammalogists conducted by the American Society of Mammalogists indicated that 42.7% of the respondents earned >\$40,000/year. The salary range that included the most respondents (21.2%) was the \$30,000-\$40,000 range.

### **What types of jobs involve marine mammals?**

Most jobs with marine mammals are not as exciting or glamorous as popular television programs make them seem. Marine mammal studies often involve long, hard, soggy, sunburned days at sea, countless hours in a laboratory, extensive work on computers, hard labor such as hauling buckets of fish to feed animals, followed by hours of cleanup, writing numerous reports, and preparing tedious grant applications.

As in other fields of science, jobs dealing with marine mammals vary widely. Examples of marine mammal jobs include researcher, field biologist, fishery vessel observer, laboratory technician, animal trainer, animal care specialist, veterinarian, whalewatch guide, naturalist, educators at all levels, and government or private agency positions in legislative, management, conservation, and animal welfare issues. Many marine mammal scientists work with museum displays and collections as a curator, an artist or an illustrator, or a photographer or a filmmaker. Some people work with marine mammals as an avocation, which also can be rewarding.

Your answers to the following questions will help you determine your interests and decide which marine mammal scientists and facilities to contact for education, work experience, and job opportunities.

1) In what specific area of study are you interested, e.g. anatomy, physiology, evolutionary history, taxonomy, ecology, ethology, psychology, molecular biology, genetics, veterinary medicine, pathology, toxicology, biostatistics, management, conservation, museum curation, or education?

- 2) What species or group of marine mammals would you like to study?
- 3) Would you like a career that involves field or laboratory work?
- 4) Would you like a career that involves care of animals, teaching, research, or legislative/policy matters?
- 5) Would you like to work for government, industry, academia, oceanaria museums, or private organizations, or would you like to be self-employed?
- 6) In what part of the country would you like to work?

For example, the manatee is an endangered species in Florida. They have a high mortality rate because of accidental entrapment in flood control gates, collisions with speedboats, and loss of habitat. Local, state, and federal governments fund research on this species. Some local industries also are involved with management of manatees. Therefore, people wanting to study manatees most likely should look for education and work experience at universities and research facilities in Florida.

### **Who employs marine mammal scientists?**

A variety of international, federal, state, and local government agencies employ marine mammal scientists for positions in research, education, management, and legal/policy development. U.S. federal agencies include National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Minerals Management Service, U.S. Fish & Wildlife Service, U.S. National Biological Survey, U.S. Navy, Office of Naval Research, Coast Guard, and Marine Mammal Commission. Other federal agencies that work on marine-related issues include National Park Service, Army Corps of Engineers, Environmental Protection Agency, National Science Foundation, National Aeronautics and Space Administration, Department of State, and Smithsonian Institution. Some coastal states, such as Alaska, California, and Florida, employ marine mammal scientists.

When oceanic operations, such as oil and gas exploration, production, and transportation, affect marine mammals, industry often hires marine mammal experts. Because commercial fishing operations can conflict with marine mammal conservation, some fishing organizations hire marine mammal scientists. Many environmental, advocacy, and animal welfare organizations hire marine mammal specialists. Oceanaria and zoos hire marine mammal specialists for veterinary care, husbandry, training, research, and education programs. Museums hire marine mammal specialists for educational programs, research, and curatorial positions.

### **What education is necessary to become a marine mammal scientist?**

#### High School Studies:

A broad education is essential for finding employment in marine mammal science. High school courses such as biology, chemistry, physics, mathematics, computer science, and language will provide a good educational base. Consult your guidance counselor for help in selecting coursework. Good grades are essential for admission to a university.

#### Undergraduate Studies:

Most entry-level marine mammal jobs require a B.S. degree, with a major in biology, chemistry, physics, geology, or psychology. A minor in any science, computer science, mathematics, statistics, or engineering also can be helpful. Good language and technical writing skills are essential. Many people are surprised by the amount of writing involved in marine mammal professions. Because marine mammals are found worldwide, foreign language training often is useful.

A student must first become a scientist before specializing in marine mammals. Generally, undergraduate students will concentrate on a basic science curriculum and rarely have an opportunity to take courses related to marine mammal science. Specialization in marine mammals generally comes later through practical work experience or while working toward an advanced degree. In other words, if your B.S. degree program does not include courses in marine sciences, do not become discouraged. Concentrate on finding practical experience and/or a masters degree with emphasis in marine mammal science. Maintaining a high grade point average as an undergraduate is very important if you intend to go to graduate school.

#### Graduate Studies:

The masters degree is usually the first opportunity college students have to specialize in marine mammal science. Care should be taken to select an advisor with experience in the subject and a reputable university with a diverse curriculum that will enable you to focus on marine mammal science.

Students who have dual majors or interdisciplinary training may have more employment opportunities. Because the field of marine mammal science is so diverse, students who train in specialized areas have practical tools that may help them gain employment. For example, a graduate degree in statistics may be very useful for entering the field of population assessment. A graduate degree in electrical engineering may be particularly useful for bioacoustics research. A graduate degree in environmental law may be important for developing a career in government policy-making or conservation.

### **What additional career opportunities will a graduate degree provide?**

With a B.S. degree, available marine mammal positions include animal care specialist, animal trainer, field technician, laboratory technician, consultant for industry, and entry-level government position. Generally, jobs at this level offer little opportunity for self-directed work.

The M.S. degree may facilitate individual work with marine mammals, e.g. designing research projects, developing management plans, supervising field or laboratory studies, or heading programs in education, husbandry, or training.

The acquisition of a Ph.D. or D.V.M. (or both) provides more career opportunities, including design and management of field and laboratory research programs, university faculty positions, coordination of government and industry programs, and management positions in oceanaria or museums.

Years of practical work experience sometimes can substitute for a graduate degree, but the time required to advance is typically longer.

### **How do I find a university program in marine mammal science?**

There are very few universities that offer a marine mammal science curriculum. To select an undergraduate university, visit campuses and talk with professors and students about your career interests. Most university libraries or counseling centers have university catalogs to help identify schools that meet your needs. In addition, there are several publications that list graduate programs by state and discipline, list marine mammal scientists by address, or summarize areas of research by marine mammal scientists (see list at the end of this brochure).

An interest in a certain marine mammal species may influence the geographic location of the graduate university you select. However, in most instances the best university is determined by selecting a graduate advisor specializing in your field of interest. Students should consider applying to several graduate schools. Application deadlines vary, but typically, applications should be submitted in January for admission into a graduate program the following fall. Many universities require graduate school applicants to take the Graduate Record Examination (GRE) and include the test scores with their applications.

### **How do I find an advisor for my graduate studies?**

Selecting an advisor for a graduate degree is a very important decision. He or she will become a mentor, a career-long colleague, and will help establish a network of scientific colleagues. An advisor obtains funds to support graduate student research and helps make contacts for future employment.

First, identify marine mammal scientists who are doing current research in your area of interest, their university affiliation, whether they have funds to support graduate students, and if they are accepting new students. Keep in mind that many government and industry scientists also have adjunct appointments at universities and can serve as Go-advisors.

There are two ways to find potential advisors:

- 1) Find the names of authors in current scientific journals, such as *Marine Mammal Science*, *Aquatic Mammals*, *Journal of Mammalogy*, *Canadian Journal of Zoology*, *Journal of Zoology*, *Behavioral Ecology* and *Sociobiology*, or *Fisheries Bulletin*, or in recently published books on marine mammals. Scientists who publish are most likely to fund graduate student projects.

- 2) Attend specialized scientific conferences on marine mammals hosted by professional societies such as The Society for Marine Mammalogy, International Marine Animal Trainers' Association, European Association for Aquatic Mammals, European Cetacean Society, American Cetacean Society, or International Association for Aquatic Animal Medicine. Dates and locations of these meetings are published in the newsletter or journal of the respective societies. At these meetings, make a personal contact with a potential advisor and express your interest in doing graduate work with him or her. Follow up any good lead by telephone, letter, or visit.

Because there is competition for advisors in the field of marine mammal science, an advisor will select students from a pool of applicants. Students should realize that, unlike the case in undergraduate study, graduate school faculty do NOT have to advise students just because they are enrolled at their university. Students sometimes enroll at a university because of a well-known professor and assume they will have the opportunity to work under him or her. BEFORE entering a graduate program, contact the professor and establish his or her willingness to serve as your advisor. Discuss the possibilities of financial support and decide on a potential research project. At many universities, the advisor needs to notify the graduate school to approve your application. Many prospective graduate students with good grades and experience are rejected because they do not have an advisor working from inside the university to facilitate their acceptance.

Many graduate schools will not accept students without financial support. Graduate assistantship funds for marine mammal studies are rare, and most graduate programs have a limited number of teaching assistantships. Students should be prepared to support themselves or find research funds on their own.

### **How do I convince an advisor to accept me as a graduate student?**

- 1) Talk to former graduate students about a particular scientist as an advisor and ask how to promote yourself.
- 2) Send the advisor a letter and your resume inquiring about the possibility of working with him or her. Be specific about your research interests and career goals. Follow up with a telephone call or visit.
- 3) Initiate a personal contact with a potential advisor. Faculty members rarely request visits by potential students because such encouragement might be misconstrued as an agreement to serve as the student's advisor. As mentioned earlier, one good opportunity to meet a potential advisor is at a scientific conference. Another strategy is to contact a potential advisor, noting that you just "happen to be in the area" and would like to meet. It is very useful to be informed about the advisors background and point out ways that your interests interface.
- 4) Gain practical work experience, which is an increasingly important factor in admission to a graduate program. Develop a well-rounded set of experiences, including work in the marine environment.
- 5) Publish in a scientific journal; even co-authoring a paper can impress a potential advisor.

### **How do I gain practical work experience with marine mammals?**

As a high school or undergraduate student, practical experience can be gained by volunteering at federal, state, or local organizations that work with marine mammals. For example, volunteer as a laboratory assistant for a research project with marine mammals or volunteer for the marine mammal stranding network in the United States. Also, oceanaria, zoos, and museums often have large volunteer or docent programs. This volunteer experience provides practical skills, an employer reference, a network of contacts in the field of marine mammal science, and most importantly helps you team whether you really like this type of work. Because they already have observed a volunteers work habits and commitment, organizations often hire from their pool of volunteers. Many oceanaria, zoos, museums, and government agencies have internships that provide practical experience (see list at the end of this brochure).

Many careers in marine mammal science require experience in the marine environment. SCUBA certification, boat-handling experience, or sea time may be helpful in securing employment in the field of marine mammal science.

### **How do I become a marine mammal trainer?**

Most marine mammal trainers start by volunteering at an oceanarium or zoo. Often people work in other departments, such as operations, maintenance, or education, before transferring to a job in animal training. For the best advice about a career in marine mammal training, contact the International Marine Animal Trainers' Association.

### **How do I become a marine mammal veterinarian?**

To become a marine mammal veterinarian, follow the basic curriculum and schooling of other veterinarians, but try to gain practical experience with marine mammals by volunteering at an oceanarium or zoo. A few veterinary schools are developing specialized course work in the area of exotic animal medicine, including marine mammals. For more information, contact the American Veterinary Medical Association and the International Association for Aquatic Animal Medicine.

