

CAREERS IN MARINE MAMMAL SCIENCE

Marine mammal science has become a rapidly developing, and highly topical discipline that strongly appeals to young people. Yet, many students do not clearly understand what this wide and varied field involves. This site addresses some of the questions commonly asked by people seeking a career in marine mammal science and provides suggestions on how to plan education and work experience. Given the location of SMRU the content of this site is tailored towards UK (and European) students and programmes.

You should also browse the very comprehensive career advice given by the Society for Marine Mammalogy (<http://www.marinemammalogy.org/strat.htm>) which emphasizes a North American perspective.

Other helpful (and entertaining) insights into career development in marine biology are provided by individual researchers and research groups, and you might want to sample some of the following links:

- ✓ Careers in the marine or aquatic sciences <http://hopkins.stanford.edu/careers.htm>
- ✓ Questions about a career in marine biology <http://129.49.19.42/marinebio/mycareer.html>
- ✓ How to become a marine biologist? <http://www.lovelab.id.ucsb.edu/biologist.html>

You should visit the following sites if your interests lie with marine mammal husbandry and training <http://www.imata.org/> or veterinary care <http://iaaam.org/>.

What is marine mammal science?

There are about 100 species of marine or aquatic mammals that depend on the ocean or fresh water for part or all of their life's needs. These species are divided into three main groups:

- a) the pinnipeds (i.e. seals, sea lions, fur seals, and walrus),
- b) the cetaceans (baleen and toothed whales), and
- c) carnivores (sea otters and polar bear).

Marine mammal scientists try to understand these animals' genetic, systematic and evolutionary relationships; population structure; community dynamics; anatomy and physiology; behaviour 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 usually varied and personally rewarding. However, competition for the limited number of available positions is strong.

One of the key things to remember is that 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 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.

Which subjects should be studied at school, which degree course should I choose?

The qualifications you will need vary greatly, as does the number and availability of higher education courses. Below are some more specific pointers depending on your age and the stage of your education:

Secondary school

Whatever branch of marine sciences you eventually end up in, you will need to have a good understanding of mathematics. At secondary school you should aim for a mix of sciences, arts and languages. If your school offers separate courses in physics, chemistry and biology then choose to do two or three of these rather than a combined sciences course. You must be able to communicate effectively. So apart from English, it is a good idea to achieve reasonable fluency in at least one other language. Taking part in sports, debating societies etc. all help develop your skills as a communicator and team worker.

If you are aged 13 to 17, you are probably thinking about GCSE options or A-level choices (Standard Grade or Higher Grade in Scotland). These decisions are important, but not irrevocable – as long as you choose a broad range of subjects, you will have plenty of career possibilities.

GCSE / Standard Grade

The essential subjects are the Sciences, Maths and English, and it is also recommended that you take at least one foreign language. All these subjects are now UK National Curriculum requirements. Note that some schools offer a choice of either the individual science subjects (Physics, Chemistry and Biology) or combined science, which counts as two subjects. If you have the choice, many people agree that it is best to study them as individual subjects. Whichever you choose, the important thing is to get the best possible result – “A” grades, if you can.

Post-16 qualifications

UK students are likely to sit AS levels, A levels, Highers, Advanced Highers, or International Baccalaureate. The following rather brief summary provides some information about subject choice. Students are urged to look carefully at the prospectuses of universities offering degree courses, for detailed and up-to-date information. Many university prospectuses use the UCAS points system to suggest entry requirements for a given course: typically 20+ points are asked for entry to quality courses. For information about the relative 'value' of the various qualifications according to UCAS points scores see <http://www.ucas.com/candq/tariff>.

"A-levels"

Most students aiming for university will need three A-levels or equivalent, and most students will begin their sixth form career taking 4 or 5 AS-levels. With a marine science career in mind, you should choose at least two science subjects, plus maths. In the final year at school you should aim to continue with sciences and maths, taking at least three of these through to A-level. There are several university courses that do not ask for a maths A-level, but most employers take the view that a sound basis in maths or statistics is essential once

you start working. If they cannot see evidence that you can cope with maths in the information on your application form, you may find it hard to get an interview. Remember that universities normally have “admissions tutors” for their courses who can give you detailed advice on A-level requirements for particular courses. Note that an A-level “A” grade is worth 10 UCAS points, “B” 8 points, “C” 6 points, “D” 4 points and “E” 2 points. It is important to check on suitable subject combinations before you make your final A-level decisions. In particular be aware that some universities will not accept “General Studies” as a valid A-level.

While you are still at school or sixth form college, you will find it helpful to get some work experience – a placement when you are 17 or 18 will be very different from the one you did before your GCSE and will give you a better insight into a scientific career. There is quite a lot of demand for placements at marine laboratories, so get your request in early and follow up with a phone call if you do not hear anything. Ideally use email – most school liaison officers are working scientists who only get a few hours a month to deal with enquiries, and it is easier to respond to a student using the “reply” key than it is to write a letter.

Higher Grades

Most of the general comments on A-levels apply, but the Scottish Higher Grades are not directly comparable to A-levels. Highers are a one-year course compared with two years for A-levels. A minimum of four Highers at B and C or above is regarded as equivalent to three A-levels, but students should aim to do five. If you are considering any branch of marine science, you should choose either three sciences with Maths and English, or two sciences with Maths, English and social science or foreign language. It is important to check university entrance requirements carefully remembering that they will differ between English and Scottish universities.

After Highers, Advanced Highers can then be taken. Each Advanced Higher is equivalent to one A-level. (There is some suggestion that, because of the amount of independent study that is expected at Advanced Higher, point scores based on Advanced Higher grades may be perceived by some universities as slightly more valuable than those based on A-level grades.)

Foundation Year

Some universities allow candidates who do not have A-levels to undertake a year’s foundation studies before starting their degree course.

University degrees

The majority of marine mammal scientists have a first degree in a science subject such as biology, chemistry, physics, geology or mathematics followed by a Master’s degree and/or Doctorate in their specialised area.

The most important feature that a marine science employer will be looking for is evidence of a high quality education in a relevant science subject, coupled with the possession of a suite of important skills. The ability to communicate clearly both written and orally, computer literacy, ability to work in a team, ability to work safely in a laboratory or conduct field work, and flexibility are all desirable skills.

Finance

You will soon find that tuition fees, accommodation charges, books and living expenses can add up to a large sum of money. Unless parents, guardians or sponsors are able to help, you might find yourself owing a large sum of money by the time you finish your degree. So you need to select your course with care and be realistic about your chances of finding employment afterwards in your chosen field.

In general, there are not many organisations able to sponsor your undergraduate studies. Find out if there are any bursaries or scholarships available from your intended university, or even from organisations in your hometown – you may be surprised how many charitable or civic-minded societies are interested in assisting local young people to go to university.

Undergraduate Education

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, knowledge of a foreign language can be very helpful.

A student must first become a scientist before specializing in marine mammals. Generally, undergraduate students will concentrate on a basic science curriculum and do not always have an opportunity to take courses related to marine mammal science. Some universities offer modules in marine mammal biology as part of their Bachelor degree programmes. Although such modules are a bonus and provide early insights into the diverse field of marine mammal science, they should not be a prime feature influencing your choice of university. Excellence in teaching and overall degree programme content (e.g. including good quantitative training) should be considered more important. Specialization in marine mammals generally comes later through practical work experience or while working towards an advanced degree (e.g. master's degree with emphasis in marine mammal science).

Undergraduates should focus on maintaining a high grade point average to gain admission to graduate school. Throughout your education keep abreast of developments in computing, and be aware of the public debate about science in general. Joining learned societies will expand your horizons and bring you into contact with working scientists and guest lecturers, giving you a much better chance of knowing where to find work later on. You should gain experience by assisting in research activities outside your studies. Some weeks as intern, volunteer or assistant at a research lab will give you valuable insights into what you might be doing when you graduate. Such experience will also look good on your CV.

Postgraduate Education

Many advertised posts now ask for qualifications beyond the basic science degree. Sometimes this is to keep applications to a reasonable level, and if you have gained sound practical experience, it might still be worth applying. However, many employers are looking for skilled and specialised people with a postgraduate degree. A doctorate usually is required if you wish to pursue your own line of research and a position in academia.

There are two typical postgraduate qualifications: the Master's degree and the Doctorate (PhD). Although in many cases you may be able to proceed towards a PhD straight after a Bachelors, it is becoming more common to complete a Master's degree before entering a Doctorate programme.

Master's degrees can be called Master of Science (MSc) or Master of Research (MRes). In the UK both are one year taught programmes requiring intensive study and the submission of a dissertation. The MRes is often viewed as the preparatory (first) year of a PhD aiming to provide students with the skills required for pursuing an active research career. Both, MRes and MSc, are internationally recognized Master's degrees. One of the few (if not the only) dedicated Master's degree in marine mammal science is currently being offered by the University of St Andrews (<http://bio.st-andrews.ac.uk/mms>) with many of the marine mammal scientists at SMRU involved in teaching and supervising students.

A Doctorate (PhD) is a research degree where over a period of three to four years, you undertake in-depth research about a particular topic under the guidance of a supervisor. You are required to submit a written thesis and defend it in an oral exam (called a Viva) before the coveted total of "Dr" can be awarded. The thesis has to be a piece of original work describing the research undertaken and its implications for present knowledge.

Postgraduate study is an investment in your intellectual development and career potential. When considering further study you should thoroughly investigate the many ways in which you can finance your studies as the level of support can vary dramatically from subject to subject and indeed, year to year.

Grants for postgraduate study are awarded on a competitive basis. In general, the principal awarding bodies provide funds for one to three years of study. Competitively advertised places in PhD programmes often carry with them funded studentships. So although you will not be on a comfortable salary, you can at least afford to live while you undertake further study. Some people opt to do part-time PhDs after they get a job, but this often takes seven years or more and many candidates find it hard to spare the required amount of time.

Details of postgraduate courses and research opportunities are available directly from universities. Adverts for postgraduate studentships can often be seen in magazines such as "New Scientist" and "Nature" as well as the education sections of national newspapers. There are also many online resources, so it is worthwhile spending some time searching the web. Sometimes postgraduate positions are advertised on subject-specific mailing lists – such as the MARMAM discussion group (<http://whitelab.biology.dal.ca/marmam.htm>) or the ECS mailing list (<http://web.inter.nl.net/users/J.W.Broekema/ecs/>).

Last but not least, by the time you consider entrance to a postgraduate programme you should have started building a network of contacts in the scientific community. Ask your tutors, advisors or lecturers from undergraduate studies for suggestions for postgraduate positions or contacts to other research groups. Also keep in mind that you will need at least two referees to provide you with strong letters of recommendation for admittance to competitive postgraduate programmes. Reference letters and personal recommendations often make the difference when selecting between candidates with good grades. So make sure that you have built good contacts and distinguished yourself from the crowd. Your referee should know you well enough to provide a truthful, and hopefully glowing recommendation.

