

CAREERS IN ECOLOGY, EVOLUTION, and CONSERVATION BIOLOGY

There is no single, cut-and-dried career path in these fields as there is in, for example, some engineering fields. Given the rapidly changing nature of employment in conservation and environmental biology, together with the attitude of most field biologists towards bureaucracy and regulation, it's not likely that there will be such a cut-and-dried path to jobs, at least not in the near future. There are jobs out there, especially in applied areas, but there's no simple formula for finding and getting them. Here are some general suggestions for finding and getting such jobs.

- **The Natural Sciences Career Services** office provides some help with preparing resumes and cover letters, and doing an interview.

- **Choose your courses carefully**, to match your scientific interests and career goals. Use courses to help define your interests and career goals. See the section entitled 'Selecting courses.'

- **Accumulate skills** as well as knowledge. Many entry-level jobs require skills such as identifying plants or animals, using maps and GIS systems, writing, and producing graphics. Practical skills such as driving on unpaved roads, changing a tire, simple carpentry, first aid, and constructing fencing are also valued by employers.

- **Academic careers require advanced degrees.** See the section entitled 'Some thoughts on choosing a graduate school'.

Without an advanced degree, you may be able to **work as a research assistant**. Even if you only clean fish tanks, such a job is an excellent way to obtain experience that will prepare you for another job — and help persuade someone else to hire you.

- Many non-academic jobs for conservation biologists and other environmental biologists are with **environmental consulting firms**. Consulting firms usually earn money by being hired to help clients meet environmental regulations. Conservation biologists working for these firms may do a wide variety of tasks: surveying for an endangered bird species one week, preparing NEPA paperwork the next; preparing a slide presentation for a client the third. Some similar jobs are available with companies large enough to have their own 'in-house' staff to help them meet environmental regulations instead of contracting with consulting firms.

- **All sorts of government agencies employ biologists.** For example, you probably think of Texas Parks and Wildlife Department when you think of a state job, but conservation biologists and other environmental biologists are also employed by the state of Texas in the General Land Office (dredging, coastal land use), Railroad Commission (mine reclamation and revegetation), Texas Natural Resources Conservation Commission (air and water pollution), Department of Transportation (highway right-of-way vegetation), and the Department of Agriculture. At the federal level, you probably think of the National Park Service or the Fish and Wildlife Service, but biologists are also employed by the Department of Defense (to manage natural resources on

bases, for example), the Army Core of Engineers (to restore the Everglades, for example), the Department of Energy (energy-related environmental problems, especially at DOE sites like Hanford and Rocky Flats), and many others.

- **NGOs** (non-governmental organizations) rarely hire ‘on the open market’, because they usually have a pool of volunteers to hire from. If a job with an NGO like the Nature Conservancy or Greenpeace is your goal, start volunteering now.

- **Volunteering** is an excellent way to get the experience that will persuade a governmental agency or private company to hire you. In addition to the NGOs, many governmental agencies have positions for volunteers. For example, in Austin volunteers are needed by Wild Basin (public education, trail maintenance, etc.); by the Wildflower Center (tour guides, greenhouse and garden assistants, etc); by the Austin Parks and Recreation Department, especially the Nature Center (public education, care for animals, etc.) and the various City and County Preserves (trail maintenance, etc.;). Most government agencies can accept volunteers — ask the employee with whom you would like to work.

- **Consider your first jobs as an investment in your career.** If you want a career as an environmental consultant, for example, it’s better to work for minimum wage one summer planting grass to restore a marsh than to earn twice as much (in air-conditioning!) waiting tables or selling clothes. Jobs that give you experience, that teach you about the sorts of careers available in your field, and that help you identify your interests and career goals are well worth the short-term financial ‘loss’ of lower pay. Don’t disdain clerical jobs if they give you a chance to gain experience and information. Want to be an environmental lawyer? Try to get a job as a runner or file clerk in a law office. Considering an academic job? Do an independent research project with a professor, or work as a research technician, even if it’s only washing glassware. And so on.

- **Learn all you can about potential employers:** What do they do? Where is it done? What sorts of credentials, training, and skills do they need in their employees? what do their employees do? And, most important, what can you do that will help them get their job done? Never go into an interview ‘cold’. Finding out the answers to these questions before the interview is excellent preparation for the interview.

- **Most people are quite willing to talk about what they do,** what their company or agency does, and what its other employees do, especially if you ask politely, are considerate of their time, and have first done some investigation on your own. So ask them! You need not wait until they are hiring. You are asking for career guidance, not a specific job.

- The Undergraduate Library and PCL have collections of books about environmental careers. Some of them are on the regular shelves, some are in the library-use-only reference collection. Look under call numbers that begin with TD 170, HF 5382.75 U6, and GE 60

SOME THOUGHTS ON CHOOSING A GRADUATE SCHOOL

by Dr. N. Fowler

Before you can choose a grad school, you must clarify your career goals and your area of specialization.

- Your undergraduate classes will give you some ideas about your goals and interests.
- An independent research project is very useful in this context, especially if you are considering a research degree. Even if the project is not in the field that you decide to study in grad school, it will (a) give you a chance to find out what research is really like, (b) give you a chance to demonstrate to a graduate school that you can take on a project and see it through to completion, and (c) ensure that at least one faculty member knows you well enough to write a strong reference letter for your graduate school applications.
- Most of you have to have paid jobs; try to get jobs, both during college and between college and grad school, that give you a look at careers in which you may be interested. If you think you want to do water quality work, for example, better a poorly paid position washing glassware in a water quality testing lab (private or government agency) than a better paid position in a mall clothing store.
- Take every opportunity to talk to anyone with a job of a type in which you might be interested, or with a job working with people in an interesting area (your Aunt Susan, who is a secretary at a law firm that does some environmental law?). You don't have to be a job applicant to make an appointment to ask someone about their organization and their job; people may even be flattered to be asked for advice. Just be aware that they are probably very busy.
- Volunteering is an excellent way to get a look at some types of environmental jobs, and non-profit organizations always need volunteers. Volunteers can do everything from trail maintenance to political lobbying to research to teaching children to an occasional hour of office filing. Even if the task isn't what you want to spend your life doing, it will expose you to potential jobs and to people who can tell you about specific careers, and you may learn useful skills.
- If you are trying to narrow down specific academic interests, a good way is to read abstracts and titles of articles in the primary scientific journals in the field (*Ecology*, for example); read the article when you find one that is interesting. Read review articles, symposium volumes, even semi-popular material. Read, read, read.
- Take advantage of public lectures, on and off campus.
- Teach yourself as much as you can about plants, animals, geology, soils, Get yourself a set of field guides, get outdoors as much as you can, and use them.
- Don't pass up opportunities to learn other skills, in and out of classes. They may be the skills that get you your first, entry-level position. GIS, computer skills, Spanish, and plant identification are examples of such skills. Other skills that might help you get a job, and certainly can help you in a job, include such things as first-aid, fence-building, simple carpentry, basic vehicle maintenance (can you change a flat tire?), using a map to go cross-country without a trail, and what to take along for a hike with 8 kids.

There are two different types of graduate programs.

- (1) Professional training. Professional training is usually, though not always, obtained

through the acquisition of a professional (or 'terminal') master's degree program. These programs always include course work and may or may not include a research project. Such programs are most commonly offered by departments of forestry, fisheries, wildlife biology, environmental science, natural resource management, and so on. Essentially, law schools and schools of public administration like the LBJ school offer the same type of professional training, although the name of the degree differs. Such programs are designed to prepare students for specific kinds of jobs.

(2) Research/teaching. These programs are designed to prepare students to conduct independent scientific research and to teach college students and graduate students. However, some graduates of such programs take jobs with government agencies, private companies, or NGOs (non-governmental organizations). These programs include both course work and an independent research project. The usual degree is the Ph.D. It is usually not necessary to obtain an M.S. first. These programs are most commonly offered by departments of biology, ecology/evolution, zoology, or botany.

But note: You can't always tell what kind of degree a person is getting by the name of the department or even the degree they are earning.

Also note: Despite the above, there is a role for the research-oriented M.S. degree. It is especially useful for the student whose undergraduate training is deficient, or whose interests are not sufficiently well-defined to embark on a Ph.D.

Choosing a program

- If you are planning to obtain professional training, find out what degrees people generally have in your chosen field.
- For professional training, but not for research training, it is a good idea to train in the part of the country in which you want to be employed. If you want to manage southern pine forests, get your degree from a south-eastern forestry school, not from the University of Washington.
- Jobs at primarily teaching institutions often go to people who are already located in the area. The more research-oriented the institution, the more likely they are to do a truly national or international search to fill positions. Tenure-track positions in science departments at major research universities are virtually never given to graduates of that institution. These positions are filled with an international search. Going to Major Research University X will just about guarantee that you won't be a professor there. (Spouses and future spouses of professors, take note.)
- The choice of a research program should be mostly the selection of a particular professor whom you want to have as your supervising professor. (Sometimes we say, 'the choice of a lab', which means the same thing.) You know what you are interested in, right? Identify the laboratories (professors) working in that specific area. Read their papers, then write to them describing your interests and background, perhaps outlining some possible research projects. Find out if they have room for you in their lab. Find out everything you can about them: Are there other graduate students in the lab to interact with, but not so many you will feel lost? Is the professor actively involved in presenting papers at national meetings and so on, but not so busy he or she is never in town? But most important, are they and their students (and postdocs) actively doing top-quality research now? Obviously, to choose a professor in this

way, you must have identified your scientific interests very precisely. For example, ‘plant ecology’ or ‘animal behavioral ecology’ aren’t specific enough; ‘the effects of herbivores on plant populations’ or ‘the role of kin selection in the evolution of mating behavior in fish’ are sufficiently specific.

While your supervising professor is the most important consideration in choosing a research program, you also want to be in a program that provides a good general training in ecology (or evolution, or whatever). You also want to have more than one professor providing advice and feedback.

- Can you get into the program to which you are applying? Be optimistic, but hedge your bets, too. No matter how good your record, they may not have room for you that year.

- Can they fund you? Often this takes the form of teaching assistantships. You are very unlikely to find someone to pay you, an untrained first-year student, to go live in the tropics and do your own research. Of course you have to have enough money coming in, from all sources, to eat and keep a roof over your head. But remember that this is an investment in your entire future career. The graduate school with the best TA salary now is not necessarily the one that has the lab that will give you the best chance at the best jobs later.

- Regardless of whether you are doing a research degree or professional training, it is a poor idea to do it in the same institution where you did your undergraduate work. You will get a much better training if you get the different perspective on the field provided by going to a different institution. For this reason, most professors refuse to admit an undergraduate from their institution to their labs.

Some more information about academic jobs.

- A post-doctoral position (a ‘postdoc’) is now virtually mandatory for tenure-track positions. It is 1-3 yrs of low-paid research-only employment. Sometimes it is necessary and/or desirable to do more than one postdoc. Count on going to a university for your post-doc different from the one where you did your Ph.D., and also different from the one where you will get a tenure-track position.

- With luck and a strong record, after a post-doc one gets a ‘tenure-track’ position as an assistant professor. Tenure is awarded to about half of assistant professors after a grueling 5-6 year period of proving themselves. Tenure-track and tenured positions require a mixture of teaching, research, administration of a lab, grant-writing, and student-related tasks like admissions and advising. Institutions vary widely in the ratio of teaching-related to research-related responsibilities. Regardless of the ratio, the stress may be high; positions in teaching colleges are by no means free of heavy work loads and demanding tasks. Like almost all professionals and managers in the US, professors take work home and work on weekends.

- There are also non-tenure-track academic teaching jobs, usually considered less desirable than assistant professorships. There are very few research-only academic jobs. Land-grant schools (i.e., ‘ag schools’ like Texas A&M and Texas Tech) have some positions that substitute Extension Service work for some or all of one’s teaching.

SOME THOUGHTS ON CAREERS IN CONSERVATION BIOLOGY

by T. Engels, Ph.D.

Dr. Engels has worked as an environmental biologist for a small private consulting firm, for a large strip-mining company, for the City of Austin, and most recently for a company that has a large contract with NASA. He received his Ph.D. from the Department of Zoology at UT, where he studied the effects of urban development on the endangered golden-cheeked warbler.

Types of jobs

There are four major types of employment for conservation biologists: in academia, in the public sector, as a private consultant, and in industry. Each of these have both positive and negative aspects. The one constant is that the nature of jobs is changing, and will continue to change, in all of them; the only constant in this field is continuous change.

Jobs in academia. These jobs usually require that you have a Ph.D. A few community colleges will hire people with only an M.S. degree. Most universities and many colleges will require postdoctoral research experience as well (a 'postdoc') for all permanent appointments. Community colleges and some smaller colleges will not require a postdoc; these instead look for people with prior college teaching experience, generally acquired as a temporary lecturer.

In most academic jobs, people are evaluated by the quality and quantity of scientific articles they publish, and therefore by their research. This generally requires obtaining grants to support the research, as well as actually conducting the research and writing it up.

- Pro's:
- freedom to choose research questions (within funding constraints)
 - a stimulating intellectual environment
 - a relatively unstructured day-to-day schedule
- Con's:
- a relatively unstructured day-to-day schedule
 - dependence on grants, which are getting harder to obtain
 - the pressures of "publish-or-perish"
 - the long time lag between beginning a project and getting rewarded for it
 - dealing with reviewers' often harsh criticisms

Regulatory jobs in the public sector. Most public sector jobs have as their goal making sure that environmental laws and regulations are followed. These jobs may also involve developing regulations.

- Pro's:
- working on behalf of the public to protect the environment
 - work hours often more regular than in other jobs
 - less likely to be expected to work more than 40 hrs per week
 - pay structure predictable and well-defined
- Con's:
- jobs can become repetitive, doing the same thing every day
 - little chance to get credit (or blame) for individual work, because letters and reports go out signed by 'the agency'

- specialization can become extreme
- pay structure usually doesn't reflect individual achievements well

Other public sector jobs (i.e, managers of public land) exist but are not discussed here, being outside my personal experience.

Environmental consultants help people understand what they are doing to the environment, and environmental laws and regulations. Employment ranges from very large firms to firms that have only 2 or 3 employees; one can also be self-employed. Environmental consultants are hired by clients, such as landowners and small companies. The amount and type of work available is 'regulation-driven'.

Pro's: • a wide variety of tasks, with no two days the same
• pay scales are unstructured and vary widely; earnings often directly related to the amount of money recently earned from contracts with clients
• the opportunity to develop new contracts (identifying clients and persuading them to hire you or your company)
• the opportunity to learn about new fields, often far from one's original training

Con's: • pay scales unstructured; earnings often unpredictable
• hours irregular and unpredictable; may be away from home for 2 weeks on short notice; work is likely to be slack in the winter and crazy in the spring
• the responsibility for developing new contracts
• you are usually unable to make the 'final' decision; that is left to the client. It can be frustrating to have no control over the final decision-making process.

Jobs in industry. Larger companies will hire environmental biologists to help the company comply with environmental laws and regulations. Their tasks are similar to those of environmental consultants.

Pro's: • fast-paced, never dull
• clear accountability; individual achievements are identified
• rapid rewards (and penalties)

Con's: • fast-paced, stressful
• expectation of working long hours whenever the current crisis requires it

Jobs with non-governmental organizations (NGO's). A few environmental biologists have jobs with non-profit environmental organizations like the Sierra Club and Save our Springs.

Pro's: • the satisfaction of working for a cause you believe in, and of working directly on environmental problems

• may have considerable opportunities for individual initiatives

Con's: • low pay
• frustration with the political process, limited success, and political compromises

• very low job security, due to uncertainty of funding

- fund-raising (unless you enjoy this aspect of the job)

Preparing for your career

One good way to start today to prepare for a career in conservation biology is to volunteer, even just 1 day per month, for an NGO or perhaps a public agency. You will start to find out what you like to do, and start making connections with people who will eventually be sources of employment.

It's easier to decide what you like to do when you're not in school. After you get your B.S., invest a few years in jobs that will help you decide what you want to do. Your first job is not a life-long commitment!

Two skills that you can get from your courses are particularly important: statistics and writing.

- Learn how to write clearly and concisely; it is critical in all jobs.
- The most valuable single course that I took at UT was statistics. All job routes use it. It will make you a valuable employee. Statistics will teach you how to design and how to evaluate studies.

I also took a full set of biology courses, which have of course been very useful. If I had it to do over again, I would take a course in soils and one in geology. Both subjects are useful in dealing with ground water quality, a big part of environmental consulting.