## Chapter 3

# Pursuing Graduate Studies in Fisheries

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The simple truth is that a graduate degree is now required for consideration for most entry-level fisheries positions. Whereas position descriptions for many fisheries jobs do not explicitly require graduate degrees, most of the applicants for such positions will have such degrees, typically rendering applicants without graduate degrees uncompetitive. Therefore, admission to graduate school is a crucial step in succeeding in this profession. However, the process of getting into graduate school at most colleges and universities is quite different from applying for admission to an undergraduate program; merely sending in your application materials will not suffice in most cases. Nor will simply meeting the minimum requirements. The opportunities are much more limited and the selection process is rigorous. Often, just a handful of positions are available annually, even in major fisheries programs. The competition can be fierce. You should therefore think of getting into graduate school as getting your first real job, and, as in getting a job, you should be ready to prepare, search, and compete for a graduate opening (Zale et al. 2000).

## Before You Apply

A number of questions require your careful consideration before you start the search and application processes. First, should you go to graduate school immediately after completing your undergraduate degree or should you work for a year or so first?

If you cannot define your career goals or reasons for going to graduate school, or your motivation is not strong, you should obtain work experience first (Orth and Adelman 1996); graduate school is a major commitment. An internship or technician position will hone your interests and enhance your qualifications. The only danger is that you may become less motivated to make the sacrifices required by graduate school after drawing a paycheck and enjoying the pace, schedule, and benefits of a real job. Some individuals never go back and therefore never achieve their full potential. Most, however, get frustrated by the limitations in advancement and responsibility incurred by the lack of an advanced degree and are thereby motivated to return to school. Commonly, they wish they had done so sooner.

Are you qualified for graduate school? Minimum requirements typically include an undergraduate degree in fisheries or a related discipline (e.g., biology, zoology, marine science, ecology, natural resources, wildlife, forestry) from a good college or university, a GPA above 2.8, and combined verbal and quantitative Graduate Record Examination (GRE) scores of about 1000. Of course, meeting these minima is insufficient if better applicants exist. Your chances are much better if your undergraduate GPA exceeds 3.5, your combined GRE score exceeds 1300, and you have work experience, great references, and have been an active member of a professional society, particularly the American Fisheries Society (AFS). Individuals with intermediate qualifications stand an intermediate chance of acceptance.

Should you apply only to schools that have named programs in fisheries and named degrees in fisheries? Limiting yourself to named fisheries programs will limit your opportunities greatly, as relatively few schools that offer graduate education in fisheries actually include the word "fisheries" in their program title. Many fisheries professionals did not receive their graduate education in named fisheries programs. Similarly, named fisheries degrees are relatively unimportant, though some state fisheries agencies rank job applicants with such degrees higher than those receiving other degrees (see Chapter 4).

Should you pursue a Master of Science (M.S.) or doctoral (Ph.D.) degree? The answer depends on your timeline, career goals, and abili-

ties. A M.S. degree typically takes about 2.5 years, whereas the duration of a Ph.D. program can be 3.5 to 5 years. A M.S. degree is the norm for freshwater fisheries management positions. In fact, a Ph.D. degree may be viewed as a liability for a management position because doctoral graduates are perceived to be more interested in research and academic positions than in staying in management. This perception is less widespread among marine agencies. University research and teaching faculty positions require Ph.D. degrees, but even if you plan on eventually getting a Ph.D., you may still want to get a M.S. degree first. Relatively few students have the experience and ability to excel at the Ph.D. level without first getting a M.S. degree, though a fair number of individuals erroneously think they can. A M.S. degree provides experience in conducting research that typically enhances the quality and efficiency of a subsequent Ph.D. research program. Students who take the direct Ph.D. route often take a year (or more) longer to complete their degrees than students who have already completed a M.S. degree because of their inexperience, and the quality of their research and research productivity often fall short as well. For these reasons, I myself do not consider individuals without M.S. degrees for Ph.D. positions in my program. Moreover, Ph.D. graduates who published their M.S. research are more competitive for postdoctoral and faculty positions because they typically have more publications than Ph.D.-only graduates. Individuals with both degrees also tend to have a broader technical and geographic knowledge of the profession, especially if they acquired the degrees at different schools and studied different topics for each degree. The only advantage of the direct-Ph.D. route is a shorter time to completion of one's education, and that advantage (perhaps only 1 or 2 years in reality) may not be as great as it may at first appear. Carefully weigh this advantage against the disadvantages when making your decision.

How does graduate school differ from the undergraduate experience? Whereas coursework is the centerpiece of an undergraduate degree, the research process (including research issue identification, literature review, study design, proposal development, field work, experimentation, data analysis, writing, presenting, defending, and publishing) takes center stage in a graduate degree program (Rossman 1995; Fischer and King 1998). The purpose of graduate coursework is primarily to rectify deficiencies and gaps in one's undergraduate

program, especially in quantitative and statistical areas or to meet certification requirements, provide access to unique concepts and to faculty members that are otherwise unavailable, and also to take courses directly related to one's research topic. On the other hand, some marine graduate schools require students to take a prescribed and heavy set of courses during the first year of residency before the research component of the degree can be initiated.

Graduate school is a year-round endeavor. Summers and breaks are spent conducting research, and late nights are common. Field work is often conducted in geographic isolation (Gibbons 1998) far from friends and loved ones. Graduate students accept most or all of the responsibility for the success of their projects, especially at the Ph.D. level, and are expected to complete work as specified, meet deadlines, file reports, maintain equipment and vehicles, ensure safety and regulatory requirements are met, and supervise technicians. The expectations, responsibilities, and workload are much more demanding than at the undergraduate level; some students fail to meet the challenge and wash out.

## Finding a Graduate Student Position

Individuals with graduate degrees get jobs because they have accrued valuable skills, experience, and professional development while getting these degrees. Graduates who worked on actual fisheries management problems for their graduate research are therefore especially competitive for fisheries management jobs, because their experience prepares them explicitly for the work they will be expected to perform on the job. The same goes for other fisheries subdisciplines (e.g., fish health, human dimensions, population dynamics, ecology, aquaculture, statistics, physiology, toxicology, genetics, and early life history). Therefore, it is advantageous to find a graduate research project that addresses an issue in the subdiscipline that you expect to focus on in your career and that makes a significant contribution to that subdiscipline. If you have not yet decided on an area of specialization, look for a relevant, well-funded project at a quality school with a productive and respected advisor whose former students are successful. You

can decide on the specific direction of your career later as you gain familiarity with the profession.

Significant graduate research projects are rarely possible without appreciable resources such as vehicles, boats, equipment, laboratories, technicians, supplies, and agency support and cooperation. Faculty acquire funds to pay for such resources and the graduate students who perform the research by preparing and submitting grant proposals to funding agencies. When professors successfully secure grant money, they select the best students available to work with them on the research. Selected students are typically supported by research assistantships, which provide modest salaries for subsistence and tuition. Students and faculty find each other through one of three mechanisms.

The rarest approach involves the selection of graduate students from a pool of applicants who have applied to a program "blindly" (i.e., not to a specific professor or project). Few schools use this approach exclusively anymore, but many others still maintain applicant pools and occasionally select students from them, particularly when other approaches fail. Contact the programs you are interested in and determine if any use pools exclusively. If so, submit the required application materials before the specified deadlines and await a response. Some of the following advice may be useful in assembling a successful application. If a school does not use an applicant pool exclusively, the other techniques tend to be more effective, but applying to the pool likely would not hurt, except perhaps for the application fee.

Many preeminent faculty select graduate students from among those individuals who have previously contacted them about potential graduate opportunities. This technique is efficient and effective for highly qualified students (i.e., those with excellent grades and GRE scores, honors and awards, plenty of experience [especially undergraduate research, internships, work study, and summer technician positions, as well as experience in real jobs], and who have a track record of productive working relationships with supervisors, professors, and coworkers). When a professor receives grant funding, he or she may contact such prospective students to determine if they are still available and interested in the specific research. Clearly, this is a favorable

position to be in, but success with this approach requires considerable preparation (see Chapter 1). Do well in school, get experience, and get along well with others. Start the search for a position early, about a year before you expect to enroll (Allen 1993). Study for the GREs and take them as soon as feasible, retaking them if your scores need improvement. Take the GRE biology subject exam; few schools require it anymore, but a high score is an impressive attribute. Go to professional meetings and talk to faculty members. Give people a chance to get to know about you, your plans, and your interests. Your advisor or supervisor will be glad to help with introductions. Do things that get you noticed such as actively participating in professional societies, serving on committees, volunteering for tough assignments, running for office, making presentations, applying for an AFS Skinner Memorial Travel Award, and publishing technical and popular articles. These are all indications that you are serious about this profession and have the energy and motivation to be productive. Finally, follow the directions below to make your prospective graduate advisor(s) aware of your interest in their program(s). When a position becomes available, faculty will already have a favorable impression of you and contact you.

Sometimes faculty do not already have someone in mind, or even if they do, are interested in seeing if better prospects might be available. To find out who is available, they send out "assistantship announcements" and hope that highly qualified potential students will see their announcement and apply for the vacancy. Copies of the announcements are circulated by email among professors, who forward the announcements to students that they know are looking for graduate opportunities. They may also post paper copies on a bulletin board or keep them in a special file. Ask your advisor where they are kept at your school. Paper copies are often also posted on temporary "jobs boards" at professional and scientific meetings. However, the most important and efficient medium available today for dissemination and retrieval of assistantship announcements is the internet, especially the AFS Job Center Online (see *Sources of Additional Information* at the end of the chapter). Almost all advertised fisheries assistantship vacancies are posted there. Responding to an assistantship announcement can be especially effective because the professor is actively searching to fill a vacancy and you can focus your application materi-

als on the specifics of the advertised position.

My focus here is on research assistantships because I believe that they offer the best opportunity for graduate education for the typical graduate student. Other common mechanisms are teaching assistantships (which require a student to teach to receive a stipend and therefore detract from time spent conducting research) and fellowships. Fellowships (e.g., National Science Foundation, Environmental Protection Agency STAR) are highly desirable because they involve no obligations other than research and a student's own teaching interests, better funding for publishing, equipment and stipends than assistantships, and freedom to explore one's interests that arise from an initial line of investigation. However, the competition for fellowships is fierce. Only Ph.D. and exceptional M.S. students receive them, and some applicants are unsuccessful in ever securing one. Other support is needed while waiting for a fellowship to be awarded. A research assistantship is therefore often a more dependable funding mechanism for the typical graduate student, because it already exists at the beginning of a student's graduate program, offers sufficient funding to complete the research and degree requirements, is available to exceptional and average students alike, and concerns a topic that both a funding agency and professor have decided is relevant.

## Evaluating a Potential Position

You should be selective when choosing a university, advisor, or project, but be selective for the right reasons (Grossman 1998; Box 3.1). Try to get on a pertinent project at a quality school with a productive and respected professor whose former students have the types of jobs you desire. Make sure that the project is fully funded, including an assistantship that you can subsist on. Do *not* be overly selective about where that school is and what species of fish the project involves—you should be willing to go anywhere and work on any relevant topic in your chosen subdiscipline. You will find that any locale is tolerable for a few years if you are addressing a challenging problem, working with good people, have the resources you need to do good research, and are doing the kind of work that will help your

**Box 3.1.** Questions, organized by themes, that can be asked of faculty and past and present graduate students to investigate prospective graduate programs and advisors. Answers to some of the questions may also be found through internet research.

**Questions for Faculty**

A. Advisor-Graduate Student Relationship

- How many students do you usually have?
- How often do you meet with your students?
- Do you have an open-door policy with your students, or do you meet with them by appointment?
- Do you meet with your students one-on-one, as a group, or both?
- Do you provide funding to cover all of the resources that your students need to conduct their research (e.g., vehicle, computer, equipment, technicians)?
- What laboratory and office space is available for your students?
- Is funding available to support a student throughout the duration of this study?
- How long will it take to complete this degree?
- Do your students present and publish their work? If so, where and how often? Do you pay travel and publication costs?
- Do you encourage students to attend scientific meetings if they are not presenting, and do you fund their travel when they do?
- What are the backgrounds of your current and past students?
- What proportions of your students are in M.S. and Ph.D. programs?
- What proportion of your students fails to complete their degrees?
- What are your former students doing now?
- What are your expectations for your students with regard to work hours, time off, professional activities, and other employment?

B. The Graduate Program

- How many fisheries faculty are in the program?
- Do the students and faculty actively publish in peer-reviewed journals? (Are they respected, high quality ones?)
- Do the faculty maintain memberships in professional societies? If so, which ones?

- How many students are in the graduate program as a whole?
- How many students are studying topics in fisheries?
- What proportions of the students are in M.S. and Ph.D. programs?
- What courses do you encourage or require your students to take?
- What courses do you teach, and how often do you teach them?
- Does the program offer sufficient courses to fulfill AFS professional certification requirements?
- What is the program's record with regard to placing graduates in fisheries jobs?
- Is tuition payment included in students' financial support?
- Are students provided with health insurance or other benefits?

C. The School

- What other graduate programs or facilities are available at the school that might be useful to students in fisheries?

**Questions for Graduate Students**

A. Advisor-Graduate Student Relationship

- Are faculty able to spend enough time with their students?
- To what degree do faculty treat students as colleagues?
- What is the reputation of my potential advisor within the program?
- Is my potential advisor actively involved in his or her students' research?
- Is my potential advisor a micro-manager, or more laissez-faire?

B. The Graduate Program

- Are courses in the catalog taught regularly?
- Are the faculty committed to effective teaching, and do they keep their courses up-to-date?
- Which courses would you recommend?
- Do the faculty actively publish work outside of that done by their students? (Does your potential advisor do so?)
- Do the students routinely attend scientific meetings to present their research?

**Box 3.1.** Continued

- Do students actively participate in any professional societies? If so, which ones?
- Do the students have a professional or student organization of their own? If so, how active is it?
- Do students usually finish their degrees in a timely manner?
- Is the laboratory and office space available to students adequate?
- What are the demographic characteristics of the students in the program? (Will you fit in?)
- What do students like about the program?
- What do students complain about?

C. The School

- What other graduate programs or facilities at the institution do you find useful?
- How easy is it to find affordable housing in the area?
- Are student stipends adequate to cover living expenses?

career in the long run. Willingness to go anywhere is indicative of maturity and shows your dedication to the profession. Wanting to stay close to home or in a restricted area suggests narrow-mindedness or insecurity; successful graduate students tend to be open-minded and confident. Being flexible in where you live will be a necessity until you start accumulating experience and can start looking for better positions in better places. Exposure to new ecosystems, colleagues, cultures, and issues will expand your understanding and experience. Staying in the same region or worse yet, getting another degree at the same school, will retard your professional growth.

If your interest in a school does have something to do with its location, it may be best not to let that be known. It can be taken to indicate that your interests may not be in research, academics, and dedication to the profession, but rather in fly-fishing, skiing, line-dancing, or whatever else that locale is known for. To be competitive upon graduation, you will not have much time for recreation anyway. Graduate school is a full-time commitment. You may well be better off going to school in an insipid setting where you can get an excellent education with few distractions to divert you. If recreation is your primary focus, graduate school may not be for you. Faculty are also leery of

applicants that select a school for personal reasons, such as proximity to one's significant other. Professors prefer students whose sole reason for applying to a program is the educational opportunity it provides; such students tend to be the most dedicated, successful, and productive.

On the other hand, some faculty specifically seek students with regional ties or species-specific affinities, because they believe that such attachments will inspire and focus them. They believe that their passion for a species or topic will enhance the quality of their research and the effort they put into it. These faculty have seen students take an assistantship simply because that was all that was available, but then fail because they were not interested in the topic. Those same students excelled when given a project they had a predilection to. You should discern which type of student you are and find a compatible advisor.

## Contacting the Faculty Member

After deciding upon a faculty member with whom you would like to work, or finding an outstanding assistantship vacancy that is compatible with your interests and experience, the next step is to contact your prospective advisor and inform him or her of your availability and suitability for the project or program. It is critical that you make a memorable and favorable first impression (Reese 1999). Therefore, I strongly recommend against initially contacting the professor by telephone. Instead, make your initial contact by email or postal mail, emphasizing your qualifications. The professor can then look at your materials at a time of his or her choosing and can evaluate your suitability for a position. Your packet should include a concise, organized, and detailed letter expressing your interests, career goals, and why you are perfectly suited to the program or advertised assistantship (see Chapter 2 for advice on writing cover letters). Accentuate the ways in which your skills, expertise, and experience match those needed for the research. Give the professor an idea of how motivated and dependable you are by emphasizing your ability to meet or surpass performance expectations in a previous or current assignment that was completed on time and within the limits of the available resources.

Describe your involvement, progress, productivity, and enthusiasm for the work. Remember, the faculty member wants to know if the two of you are going to work productively together with a minimum of problems and inconveniences.

Research potential advisors before writing to them (Reese 1999). Look them up on the internet, read their recent publications, call their former students, and ask your advisor about them. If applicable, investigate the research topic described in the announcement. Incorporate this knowledge into your cover letter and subsequent conversations. Show that you have done your homework. Make certain that the letter is organized, grammatically correct, and devoid of typographic errors or misspellings. A poorly written letter is indicative of poor communications skills and inattention to detail—it will get you deleted from consideration immediately.

In addition to the letter, include a complete curriculum vitae (CV; see Chapter 2). Include sections on your education, professional and volunteer experience, internships, professional society affiliations and service, short courses, skills, certifications, honors and awards, publications, and presentations. Also append photocopies of your GRE scores and university transcripts (which should include a final or current grade point average; if not, calculate and provide it), plus the names, titles, and contact information for three professional references who can describe your academic and professional abilities as well as your character (professors in particular, but also supervisors or colleagues, and not clergy, politicians, or friends). At this stage, you do not yet need written letters of recommendation. Delay asking for these until submission of the formal application, at which time you will know exactly what they need to address; some schools ask specific questions or use a form. You do not want to hassle your references for multiple versions. Enclose an example of your technical writing (e.g., senior or M.S. thesis, term paper, or reprint) in your packet to illuminate your communications skills. Advisors spend countless hours teaching graduate students how to write; showing that you can already write well will significantly enhance your prospects. Also include any other items requested in the assistantship announcement. Email, overnight, or priority mail this pre-application packet to the faculty member.

## Telephoning the Faculty Member

If you have the necessary qualifications and have presented them favorably, the faculty member will soon be calling you. If not, give him or her at least a week or two to read your material before making follow-up contact. When you do call, first try to set up an appointment for a subsequent call; the professor may be busy at the moment you call and may prefer to talk to you later. Better yet, schedule the call by email. Call promptly at the appointed time, not early and most certainly not late. Address the professor as "Dr." until told otherwise. Start the conversation by reiterating your background, skills, expertise, and experience, and how these match those needed to do the research. Do not presume that the professor has studied your pre-application in great detail and knows who you are. Answer any questions forthrightly and honestly. Organize your thoughts and speak clearly. Think of this conversation as a phone interview (see Chapters 4 and 5).

Do not start by asking the professor to describe the project (if responding to an assistantship announcement). It might seem like a convenient way to start the conversation, but professors dislike having to describe a project for the umpteenth time. If you have prepared appropriately, you should already have a good idea of what the study involves. Remember, *you* are applying for the assistantship and the professor will have numerous candidates to choose from. If you come across as uninformed, you will not be viewed as favorably as an applicant who already has a grasp of the project and recognizes the relevance of the research. However, you should have some *specific* questions about the study (and university) ready in case the professor asks if you have any (Box 3.1). Make sure that they are insightful to show that you have done your homework, not just things you should have already looked up on the internet.

If this initial conversation goes well, enlist your references, particularly your advisor, to contact the professor and speak on your behalf, especially if they already have a pre-existing relationship. Faculty are much more comfortable accepting a student who has been endorsed by someone they know and trust than accepting a student who looks great on paper, but about whom they do not have a personal

guarantee. Exploit this by using your advisor's connections. If you have any other direct connections, such as a coworker, supervisor, or fellow student who knows the professor, be sure to use these as well. Personal connections can be crucial for getting into graduate school.

## Visiting Your Prospective Advisor

Schedule a visit if it seems that the professor is interested in you and you are still interested in the position (Fischer and King 1998). A professor is much more likely to extend an offer to someone that they have met and who appears to be someone that they can get along with and work productively with, than a prospect that they know only through correspondence. A visit is also an opportunity for you to assess the school, its resources, the project, and the faculty member (Allen 1993). Be sure to talk to the professor's current students (Box 3.1); they can offer the best insight into what your life will be like if you go to graduate school there. Of course, you have to make a good impression during your visit. That is, you need to come across as mature, intelligent, knowledgeable, dedicated, productive, and easy to work with. See the interviewing tips described in Chapters 4 and 5; most of them apply to this situation as well. Dress nicely and pay attention to personal hygiene.

## The Decision

If you are qualified and have done well in your interactions with your prospective advisor, you have a good chance of getting an offer. If you do, give it careful consideration, weigh your options, and make a decision within a few days. Call the faculty member and let him or her know what you have decided. If you decide to pass, let the faculty member know promptly, so that he or she can offer the assistantship to someone else. Be courteous and considerate because the fisheries profession is small and you likely will deal with this individual again in the future. If you decide to accept, submit the official application (if you have not already been required to do so), schedule a starting date, make plans to relocate, and get ready to begin one of the most exciting, challenging, and satisfying periods of your life.

## Dealing with Deficiencies

All of the above is based on the assumption that you have been a stellar undergraduate student and therefore have excellent grades and GRE scores, as well as loads of experience, professional service, honors, awards, and outstanding references. But, what if you do not? For example, perhaps you partied a bit too much as a freshman, flunked a few courses, and your GPA was never able to fully recover. Or, maybe you are simply not good at standardized tests and your GREs reflect that. Having a deficiency in one category is not usually a deal-breaker if your other categories compensate for it. For example, a low GPA, especially one that shows consistent improvement after a poor freshman year, can be offset by high GREs (and vice-versa). Experience, good references, honors, awards, publications, presentations, and professional activities are all important factors, and depending on the project and perspective of the advisor, may help bail you out. Therefore, be sure to highlight your strengths.

Having several deficiencies will not necessarily exclude you from getting into grad school either. It will, however, likely limit you to less desirable opportunities such as those at less prestigious schools, teaching assistantships, or research assistantships that entail work unrelated to your research topic. These can be golden opportunities for you to show your true potential and still make fisheries your career despite past mistakes and deficiencies. If you excel, you might have your assistantship converted to a project-related research assistantship in your second year. Moreover, teaching experience and familiarity with another research topic will pay off in the long run.

Another option is to be admitted as a nondegree graduate student unsupported by an assistantship and enroll in several graduate courses. This can be costly compared to getting an assistantship, but you can thereby get to know the faculty, participate in professional activities, volunteer on other students' projects, ace the courses, and impress the heck out of everybody such that when the next assistantship becomes available faculty will select you despite your deficiencies. A variant of this strategy is to work as a technician for an agency and impress your supervisors to such an extent that they fund a graduate research project

tailored to your experience and knowledge. The agency benefits by having a known individual conduct the research and by subsequently gaining a more educated and promotable employee. This strategy is something of a long shot, but occurs more frequently than you might expect. The bottom line is that deficiencies are surmountable if you are dedicated, hard-working, and willing to make sacrifices. A career in fisheries is well worth it.

## Sources of Additional Information

Most announcements for graduate student positions are posted to the AFS Job Center Online (under *Student Opportunities* at http://www.fisheries.org/html/jobs.shtml) or the Job Board hosted by the Department of Wildlife and Fisheries Sciences at Texas A&M University (under *Graduate Assistantships* at http://www.wfsc.tamu.edu/jobboard). You can also broaden your search by asking your advisor or colleagues to watch for announcements and forward them to you, or by signing up for email listserves that routinely receive announcements. Some useful listserves include ECOLOG (https://listserv.umd.edu/archives/ecolog-l.html; sponsored by the Ecological Society of America) and those listed on the AFS Computer User Section web site (http://www.fisheries.org/cus/cuslistsnew.htm; especially AFS-L). The Education Section of AFS maintains a web site focused on the educational requirements of fisheries professionals (http://www.fisheries.org/education/programs.htm). This web site lists colleges and universities that have graduate programs in fisheries and related fields and is useful for researching potential schools.

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