Session Three.
The Coursework of Conservation: Are University Curricula on Target

The Changing Face of University Wildlife Programs

John E. McDonald, Jr.
U.S. Fish and Wildlife Service
Hadley, Massachusetts

Jonathan A. Jenks
South Dakota State University
Brookings, South Dakota

David W. Willis
South Dakota State University
Brookings, South Dakota

The question of whether or not college and university wildlife programs of study are meeting the current and future needs of employers, typically state and federal agencies but increasingly the private sector as well, has been a recurrent topic of discussion within our profession. In just the past two decades, a series of papers has been published on the topic including the Fall 1989 issue of *The Wildlife Society Bulletin*, a special session at the 2000 North American Wildlife and Natural Resources Conference and another special section in the Fall 2000 issue of *The Wildlife Society Bulletin*, as well as individual papers and presentations in the intervening years (and, of course, prior to 1989). This 2009 session builds on the work of an *ad hoc* committee established by The Wildlife Society (TWS) to assess where curricula stand with regard to meeting the needs of students, their future employers and the profession. Given the diversity of schools offering wildlife-related courses and the ongoing changes affecting our profession, we believe it is appropriate to reexamine this issue periodically.

As Wallace and Baydack (2009) indicated, more than 400 colleges and universities in the United States currently offer wildlife-related courses. Many offer some form of natural resource major or concentration, scores offer a wildlife or wildlife and fisheries major or concentration, and 110 have student chapters of TWS, indicating some level of faculty and institutional support for wildlife education and interest on the part of students. Although hundreds of schools may offer a course containing some wildlife-related content, many of those are relative newcomers to the field, and students graduating from those schools would not be considered "wildlife biologists" by most definitions. In addition, graduates of some schools that do offer a degree in "wildlife" (variously defined) do not meet the minimum standards for certification by TWS or the federal government criteria for employment in the Wildlife Biologist series. Certainly, in many of the latter schools, careful planning around the minimum curriculum will result in a student meeting the credit hour requirements for TWS certification and/or government employment. However, students need the guidance of a counselor or faculty member to ensure that they understand essential class requirements if those professional opportunities are important to them. Often, they must be willing to spend more time and money to achieve those objectives.

A common lament in those earlier perspectives, and in many informal hallway discussions, was that incoming students had increasingly less exposure to the outdoors and consumptive activities (i.e., hunting, fishing, trapping) than previous generations of students, as Miller et al. (2009) noted. In each case, this likely was true, and it continues to be as students entering wildlife programs reflect the changing demographics in our society. Kelker (1944) described a course in "winter woodcraft" taught in 1942 at Utah State University, based on "a distinct need to train many wildlife students and others how to live outdoors…," so this is not a completely new fear. However, the internal pressures at colleges and universities to reduce the credits required for graduation and, thus, costs to customers (students), large class sizes, and a decreasing tolerance for any kind of risk in society in general all contribute to there being fewer formal opportunities to obtain field experience during classes, as opposed to simply hearing how things are done (Hafner 2007). Thus, at a time when more students than ever before likely would benefit from hands-on opportunities during their formal education, there are fewer of those experiences to be had.

Objectives and Methods

Our charge for this paper and as part of the TWS committee was to look at the changing face of university wildlife programs. This assignment could have taken several directions: to look at the composition of students in programs over time, the faculty in programs and their specialties and degrees of self-identification as wildlife biologists, the content of the programs, or various combinations of these factors. Other subcommittees focused on the needs of employers, the value of TWS certification, the factors driving observed changes, and the appropriate blend between theory and practice .We chose to focus on an examination of how some of the long-standing wildlife programs at universities in the United States have evolved over time. We conducted a nonrandom survey of 30 colleges and universities that house U.S. Geological Survey Cooperative Fisheries and Wildlife Research Units (Coop Units), as these are primarily land grant schools that we expected would have reasonably long histories of offering wildlife-related courses, if not degrees. To minimize intrusion, we first examined the program websites to see if information on the history of the program was presented; four schools had sufficient information on their websites that we did not follow up with direct contacts. For schools without sufficient historical information on their websites, we made direct contact with known colleagues to solicit information on the history of their programs. We asked for information on first faculty hires dedicated to wildlife, in which school, department or college the "wildlife" program was housed over time, when the first courses were offered, trends in student numbers through time, and program name changes. We were able to gather useful information for 24 schools using both methods, but not all of the information discussed above was provided by each school. Some of the information, particularly on student numbers and numbers by gender, was only readily available for the past 10 to 20 years, so our discussions on some topics will be limited.

Lone Wildlifers in the Beginning

Cornell University was selected by the American Game Association to begin a program of "professional training in game farming and management" in 1917 (Ogelsby and Brumsted, Cornell Department of Natural Resources website http://www.dnr.cornell.edu/mission/history/ accessed February 23, 2009). This program was directed by the ornithologist Arthur A. Allen, alone, for 30 years. The other early wildlife programs, those with identifiable roots in the 1930s, tended to follow one of two models. The first was along the Cornell line, in which a single faculty member was hired to teach courses in "game management" in a forestry or agriculture school or department, often remaining the sole wildlife faculty for several years or even decades (e.g., University of Massachusetts, University of Wisconsin, North Carolina State University). This single faculty member would teach a variety of management-oriented undergraduate or graduate courses, without much specialization. The second model involved the establishment of a Coop Unit in a forestry or biology department, which resulted in wildlife management beginning as a graduate program, and often staying that way for decades (e.g., Pennsylvania State University, Virginia Tech). There were some exceptions, such as the University of Wisconsin, for which regular faculty members (in this case, Aldo Leopold) were hired in the 1930s long before a Coop Unit was established but wildlife degrees were only at the graduate level until 1967.

Early undergraduate courses often were designed to fill a need in the context of agricultural or forestry programs. Thus, courses were along the lines of "Grazing and Wildlife" (University of Florida in the School of Forestry), "Vermin Control" (North Carolina State University Wildlife and Fisheries Program), and various takes on "Game Management" or "Wildlife Management," using Leopold's 1933 *Game Management* as the key (or sole) text. Others were offered through Biology or Zoology programs (e.g., University of Missouri), where courses in wildlife conservation were developed alongside those of mammalogy, ornithology and entomology (e.g., University of Minnesota). Students with one of these other majors often were able to have a concentration in game or wildlife. For example, the first course in "Conservation of Natural Resources" was taught in 1938 at South Dakota State College (now South Dakota State University) and "Conservation and Management of Wildlife" first appeared in the college catalog as a branch of study in 1939. However, the program was housed in the Entomology-Zoology Department, and the Department of Wildlife Management was not formed until 1963.

Several wildlife programs were created during the 1950s through the early 1970s, either as concentrations in a Forestry Department (University of Vermont), Animal and Range Sciences (New Mexico State University) or as part of a larger interdisciplinary program (University of Washington, University of Arizona). These programs displayed similar patterns of development as those that were established earlier, growing slowly from a single faculty member to greater numbers as enrollments increased and the wildlife program became more independent.

Student Demographics and Numbers

Few of the historical documents obtained contained information on the gender of students in the early years of wildlife programs, but most of the anecdotal evidence confirmed that students were nearly all males, although some women were noted in programs as early as the 1930s. In at least one school (the University of Massachusetts), women were not permitted to enroll in the wildlife major until the late 1950s, although they could take introductory classes (J.S. Larson, University of Massachusetts, personal communication: 2008). Because most wildlife programs were relatively new during the 1930s, and often limited to graduate study, numbers of students were low at most schools, with just a handful of degrees awarded each year. During the second World War, some schools awarded no wildlife-specific degrees as enrollments declined. As expected, most schools reported increases in student numbers in the immediate postwar years, as veterans took advantage of GI Bill benefits. This student population continued to be almost exclusively male.

Regional trends in natural resource program enrollment have been consistent, with peaks in all regions and majors in the mid-1990s, followed by a decrease to a lower level and then a leveling off, with wildlife enrollments perhaps increasing slightly in recent years not far below their peak (Sharik 2008). In the wildlife programs for which we had information, we did not detect a convergence of trends or cycles of enrollment through time, particularly for the period 1980 to present. Some programs followed the regional pattern described above, e.g., the University of Massachusetts had about 270 undergraduates in 1995 and about 75 undergraduates in 2005. Other schools reported peak student enrollments during the 1980s or 1990s but are near historically low numbers at present, e.g., the University of Arizona had 162 undergraduates in 1981 and 79 in 2006, and the University of Wisconsin-Madison had 208 undergraduates in 1995 and 104 in 2007. However, other programs are at or near their historic enrollment peaks, e.g., South Dakota State University had 89 undergraduate students in 1982 and 263 in 2008, or experienced peak enrollments in the mid-1970s after the first Earth Day (Oregon State University) and have maintained lower but relatively consistent student numbers since that time. Thus, regardless of the consistent regional trends in natural resource enrollments, wildlife programs specifically have not seen their enrollments move in unison.

The consistent theme we did notice (and expected), whether actual numbers were provided or simply through the direct experience of our contact person, was a tremendous change in the ratio of men to women in wildlife programs over the past several decades. Several schools reported women outnumbering men in the undergraduate or graduate programs as early as the 1980s (e.g., University of Wisconsin, University of Massachusetts); that trend has continued at those schools with annual variability around 1 to 1. However, there are some apparent regional differences, with some schools, particularly in the Midwest, reporting women at 35 percent or less of the undergraduate enrollment since the late 1980s.

As part of the TWS ad hoc committee, Edge and Petersen (unpublished data) explored the drivers of change in university fish and wildlife programs and focused in part on the characteristics of students entering these programs. They reported on the body of literature on this cohort of students and described several characteristics that affect the types of instruction to which the students respond most readily, make them less adapted to fieldwork and result in less-direct personal experience in the outdoors. Although these students are more technologically savvy and open to various ways of thinking and problem solving, the overall impression of the current cohort that enrolls in wildlife programs with less inherent outdoor knowledge than previous generations appears to be confirmed (McDonald and Woytek 2005, Willis and Jenks 2009).

Trends in Faculty and Program Identity

The numbers of faculty members in wildlife programs increased through time and across all the programs for which we had information. As noted above, many of these long-standing programs were comprised of a single faculty member for a long period of time, and this person taught a wide variety of classes without much regard to specialty. Thus, in many cases, increases in faculty from one to two and from two to three were spaced over a number of years, and recent increases have happened at shorter intervals. Most programs reported that they were currently at or near peak faculty numbers, regardless of trends in student enrollment. Several programs reported 10 or more wildlife faculty (e.g., University of Wisconsin, Oregon State University). Along with the overall increases in faculty were increases in the number of women faculty members, although, in almost every case, women comprised less than 50 percent of the wildlife program faculty. The increased faculty also has permitted greater specialization. The historic information we received from most schools discussed the additions of mammal specialists, extension specialists and habitat specialists, which allowed for manageable divisions of the class load. The recent histories included much broader additions among the

faculty, with quantitative biologists, landscape ecologists, geneticists and human dimensions specialists added in the larger programs, along with a concomitantly broader array of courses (e.g., Conservation Ecology).

This broadening of faculty interests and specialties also has coincided with a change in how most programs, whether housed in their own department or as concentrations within other larger departments or schools, self-identify. Thus, most programs have undergone a series of name changes that sought to portray how the programs viewed their content and missions. Changes have moved uniformly away from such names as Game Management or Wildlife Management to those such as Wildlife Conservation, Wildlife Ecology and Natural Resources Conservation, confirming Scalet's (2007) observations on the subject. To be sure, some schools have had such broad names for decades, but even within those historically broader schools, the name of the wildlife concentration or degree has changed along the same continuum from an explicit management orientation to a less descriptive conservation title.

Because the types of program histories we received varied tremendously from year-by-year accounts of events between the 1930s and the present to much shorter timelines of events or trends in enrollments, we can only provide what might be considered an annotated outline of how wildlife programs have evolved. We recognize the bias associated with only surveying schools with Coop Units (and that wildlife programs at some schools predated the Coop Units by decades) but believe that was a reasonable filter to use to focus on programs with the longest histories. In addition, we either were unable to contact each school with a Coop Unit or did not receive a reply from each school contacted. As informal and lacking in rigor as our methods were, we believe we have compiled the type of supporting information that Scalet (2007) envisioned would confirm his personal observations on the shifts that have occurred in university wildlife programs.

Where Do We Stand?

Our primary objective was simply to describe the paths that some of the wildlife programs followed to reach their current structure and to describe broad trends in student and faculty numbers. However, we thought it necessary to touch on a number of subjects that others in this special session will explore in greater detail and offer more perspective. A number of schools discussed the blend of experiential learning or "camp-type" courses compared to standard lecture-laboratory classes and noted that they either required or offered these as electives, although we also know that other schools have curtailed or limited the number of camp-type courses they offer. During a symposium at the 2005 TWS conference on the value of experiential learning in natural resources education, presenters discussed the range of different programs available to students, from summer-long courses based on campus to short, one- or two-week field trips. These classes provided students an opportunity to put into practice many of the skills they learned during the lecture and laboratory sections of campus-based courses. Invariably, the presenters mentioned that surveys of alumni revealed the field courses to be among the courses that students valued most highly and in which they thought they learned most.

Some of this sentiment likely stems from the sheer enjoyment of doing the physical things these students went to college to learn how to do. Yet, Bennitt (1946), Peek (1989) and White (2001) all cautioned against the temptation to view a wildlife program as merely the opportunity to acquire a specific set of field skills. These authors noted that a sound, general education and the development of critical thinking skills are of more long-term value to the graduate of a wildlife program and their future employers than merely having learned the mechanics of a trade. In a TWS committee report on the proper training for wildlife work, Leopold (1939) noted, "The student who likes the woods but dislikes to study should be skeptical of his fitness" as a wildlife professional.

The use of summer camps and courses to provide technical skills holds appeal, but some programs avoid the use of such requirements because they limit the potential for students to obtain summer jobs or internships with agencies and universities. Taking a course that provides one-time experience in biotelemetry likely is not as valuable as working for the entire summer as a technician on a telemetry study. For example, at South Dakota State University, most undergraduate students obtain work experience from May to August, and many vary their experiences across the three or more summer seasons occurring during the undergraduate degree program.

Bennitt (1946), in assessing the student's responsibilities in a university education, noted that "The serious student expects to acquire a good deal of knowledge, even technical knowledge, apart from his courses." But Edge and Petersen (unpublished data), in the TWS *ad hoc* committee report, commented that a characteristic of the current "millennial" generation of students is to study less and lack self-direction in learning. So, it may be that we are finally at a "this time is different" point, at which incoming students are, on average, so lacking in basic natural history skills and field savvy that university programs, working with employers, need to provide formal training in matters that both Leopold (1939) and Willis and Jenks (2009) noted previous generations of students were simply expected to have as part of their basic makeup. Yet, as Hafner (2007) and Miller et al. (2009) noted, university programs not only are not geared to do what

might be considered remedial natural history and techniques instruction, but they are being moved by many forces farther away from that goal, if it is a goal at all.

The New Face

Our nonrandom survey of wildlife programs provided a sense of the general evolution of this field of study from strongly utilitarian and management-oriented, often as a concentration in a forestry or agriculture program in which one or two men taught other men, to today's interdisciplinary, ecology-oriented programs in which women often outnumber men among the students and are taught by a larger and more diverse faculty, though still dominated by men. Other factors that separate today's programs from those of the past are the existence and growth of distance education and increasing numbers of nontraditional (i.e., older) students. Although the postwar era (i.e., World War II) saw large numbers of what would be termed nontraditional students, many of them shared the common experience of the military and almost all were men. We expect that neither of those conditions dominates the field today, although there has been an increase in students with a military background as a result of conflicts in the Middle East. Distance education was something not often reported on in the responses to our queries, but that we know exists. For example, a Master's of Science degree in Wildlife Science is offered through distance education by Texas A&M University (http://distance.tamu.edu/futureaggies/distance-degrees/master-of-wildlife-science.html) while Oregon State University now offers online coursework and degrees in fisheries management (http://ecampus.oregonstate.edu/online-degrees/graduate/fisheries-management/). Such programs certainly will influence the workload distribution for faculty members, especially given the interest in distance education displayed by some upper-tier university administrators and the increased workload typically associated with online courses.

Given the regularity with which the subject of how best to educate wildlife biology students is visited, we do not pretend to offer the last word. We do believe that our profession may have finally moved into the long-anticipated and perhaps dreaded era in which incoming students must be assumed to have little experience with the physical tools of fieldwork, poor understanding of wildlife/habitat relationships and scant exposure to consumptive or nonconsumptive uses of wildlife (or their habitats). The shared perception among faculty is that many of the Millenials entering wildlife programs have acquired more pseudo-experience of nature via television programs and other media than direct experience via muddy boots and chore-calloused hands. Thus, university programs will need to work closely with the potential employers of their graduates to design curricula and extracurricular activities to fill these knowledge gaps and still provide an education worthy of a four-year (or more) university degree. Such activities will require some adjustment on the part of specialist faculty and university administrators to develop more management-oriented courses for both game and nongame organisms and to include more life history information in existing courses. Academic advisors also will need to stress to those students who intend to have a career in wildlife biology and management the importance of acquiring knowledge and skills outside of the classroom to complement and better contextualize their class-based education.

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