

HISTORY OF THE DEPARTMENT OF FORESTRY AND ENVIRONMENTAL  
RESOURCES AT NORTH CAROLINA STATE UNIVERSITY, 1979-2008

VII. GRADUATE PROGRAM

The history of the graduate program in the Department since 1980 is one of continuous growth as opposed to the "ups and downs" of the undergraduate program. Although robust in 1980 the graduate program has grown in size and diversified in scope of offerings over the last 30 years. This growth was anticipated in the Department's 1980-81 Annual Report which stated, "In many ways, the growth and development of programs in Forestry at NC State will be in graduate programs and research. It will be very difficult to realize the potential in those areas that our faculty represents without some significant addition of new facilities." The new facilities did come and, as predicted, the graduate program flourished. These changes reflect the growth and diversification of the University's graduate and research programs over the same period.

When Bill Johnson died in 1979, Art Cooper was the Department's Graduate Administrator (a position required by the University of all departments with graduate programs). He kept this position until 1989 when he relinquished it to Lester Holley who served until 1999. Ben Bergmann served briefly from 1999-2000 with Steve McKeand then taking over and serving until 2003, followed by Bob Abt from 2003-2007 and Sarah Warren in 2007. The position is now titled Director of Graduate Programs with the day-to-day administrative details handled by a new Graduate Program Coordinator, Sarah Slover.

The number and kind of graduate degrees offered has also changed. In the early 1980s the Department offered a Master of Science and a Doctor of Philosophy, both in Forestry. Technically, the Masters degrees offered included both a Master of Science in Forestry and a Master of Forestry; however, the distinction between these degrees was often unclear, especially when individual programs of study were compared. In 1995 the Department sought to clarify the difference by offering a non-thesis Master of Forest Management degree, which was never implemented and has since been discontinued. At the same time Master of Natural Resources and Master of Science in Natural Resources degrees were approved and offered. Actually, the Department recognized the need for graduate study in natural resources in 1986 and several students did doctoral work in Natural Resources as early as the late 1980s with their work simply covered administratively under the rubric of the Doctoral degree in forestry. With the move of the wildlife undergraduate program into the Department the number of graduate degrees in that area increased. A doctoral degree in Fisheries and Wildlife, to be offered in multiple departments, including the De-

partment of Zoology and the College of Veterinary Medicine, was approved in January 2007<sup>1</sup>.

In contrast to the undergraduate program, enrollment in graduate study in the Department has shown a steady increase. From the 1960s to the mid-1970s enrollment ranged between 30-35, with the exception of 1969-71 when it was 64. From 1975 to the early 1980s it increased to the high 60s and to 83 by 1985. From that point enrollment, although fluctuating, continued a general rise, first topping 100 by reaching 101 in 1992. From that point to the present it has consistently exceeded 100, reaching all-time highs of 147 and 170 in 1996 and 1997. These all-time highs are in the years immediately following the Graduate School's establishment of a requirement that all graduate students be continuously enrolled, a requirement that continues in force today.

The growth in numbers of graduate students is reflected most in the Department's masters programs. Whereas in the early 1970s the number of masters and doctoral degrees awarded were roughly equal, by the mid- to late-80s twice as many masters degrees were granted, and by the early 2000s the number of masters relative to doctoral degrees had tripled<sup>2</sup>. Throughout the entire period from 1980 to present the number of Master of Science degrees awarded consistently exceeded by 2-6 times the number of Master of Forestry degrees granted. Offering of the Master of Natural Resources and Master of Science in Natural Resources degrees beginning in the mid-1990s accounted in large part for the increase in masters-level students between 1995 and 2005. Thirty students earned the MNR and 27 students the MSNR between 2000-2005.

Analysis of doctoral degrees granted reflects the evolution of the Department's research programs between 1980 and the present. The increase in enrollment in graduate study in the Department was accompanied by diversification of the subject matter offered for study. Until the mid-1980s over 80% of doctoral degrees were in the general areas of tree improvement and genetics (of conifers and hardwoods), forest management, soils, biometry, and economics with only an occasional dissertation in areas such as policy and physiology. This concentration of graduate study in mainstream forestry areas reflected both the expertise of the faculty at that time and the interests of students attracted into the program. During the 1980s the variety of

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<sup>1</sup> Although this is NCSU's first doctoral degree formally named "Fisheries and Wildlife", graduate students in these areas had been studying in the Department of Zoology and receiving degrees in Zoology for at least 50 years. In fact, instruction and degrees in Fisheries and Wildlife was one of the areas of biological science specifically reserved to NC State College when graduate programs were resumed there after university consolidation in the early 1930s.

<sup>2</sup> The data for graduation, for disciplinary area of graduate degrees, and for geographic origin of students come from study of Commencement Programs dating from 1970 to December 2006.

areas available for graduate study increased as the areas of expertise in the faculty broadened. Beginning in the late 1980s and continuing to the present the number of dissertations in other areas of forestry, or in areas related to forestry, increased. This increase was due more to the increase in total number of doctoral students than to any decline in interest in the core areas where the Department had always been strong. After 1990, significant numbers of doctoral dissertations reflect emerging areas of expertise in the faculty such as biotechnology, wetland science, remote sensing, and hydrology.

Thus, 25 years of growth and change in the graduate program have led to a population of 100-115 graduate students, roughly 60% of whom are masters students, about half working in forestry and half working in natural resources. The doctoral students, rather than working largely in traditional core forestry areas, are studying in a wide variety of fields that reflect, as might be expected, the wide range of expertise in the current faculty. Whereas in 1980 only the professional Masters, Master of Science, and PhD in Forestry were offered, in addition to these degrees the Department now offers the professional (non-thesis) Masters and Masters of Science degrees in Natural Resources and Fisheries and Wildlife as well as a PhD in Fisheries and Wildlife.

International students have always been an important part of the forestry student body. Prior to 1980 international students were a presence in a graduate study body that was largely dominated by domestic students. Each year one or two doctoral degrees were awarded to international students, with the majority of these in tree improvement or fields related to tree improvement. However, during the past 25 years international students have become a progressively more important part of the graduate student body and they are studying across the full gamut of departmental offerings. International students have always come from a wide array of countries, particularly those in Latin America, the East Indies, and since the mid-1980s, the Peoples Republic of China. The Department's first PRC student, Bailian Li, began study in fall 1983. He is specifically mentioned here because not only did he go on to obtain a degree in tree improvement but he eventually returned to a position in the Tree Improvement Cooperative and, ultimately, in 2007 was named the University's Associate Vice Chancellor for International Affairs. Quite a trip for the Kid from Kunming!

As at most institutions, administration of the details of a departmental graduate program at NC State are left largely to the departments. The Graduate School has campus authority for the approval of departmental graduate programs, although programs in new areas of study must be approved by the UNC system administration. It also establishes hour requirements for residency for degrees and has rules for the structure of graduate committees and course work requirements. Otherwise, departments are free to develop their own requirements relating to the details of administration of individual degree programs. As might be expected these Departmental requirements change and evolve over time as circumstances and the faculty change.

Because of the interdisciplinary nature of many forestry graduate degree programs the Department has never had strict requirements regarding course work in forestry (so long as they conformed to the guidelines of the Graduate School). Depending upon the background of a given student, it has not been uncommon for forestry graduate students, particularly doctoral candidates, to structure course work programs with few courses in forestry. Cooper recalls having lengthy, ultimately successful, discussions with the Graduate School regarding programs of study with limited numbers, or in a few cases, no courses in forestry. Breadth in structuring graduate programs in forestry so they fitted a given student's professional direction has always been an important feature of the Department's forestry graduate program. Even so, in 1993 the Department briefly considered whether it should institute a graduate core curriculum, but took no action. Now, with forestry graduate programs increasingly being pursued in the "interface" areas between forestry and other disciplines this latitude in structuring programs of study is essential in meeting students' needs.

The Masters degree programs in Natural Resources are structured quite differently. These degrees are jointly administered with several other departments (Soil Science; Parks, Tourism, and Recreation Management). Natural Resources Masters students must complete a core of course work and then complete courses within one of the seven areas of concentration within which degrees are offered in the Department and six hours within a second area of concentration. The Master of Science in Natural Resources requires a thesis but the Master of Natural Resources does not.

In the 1960s the Department adopted a form of doctoral preliminary exam different from the traditional written-oral subject-matter-based examinations. Several faculty, particularly Jack Duffield, came to believe that the traditional prelim exam, relying as it did on the ability to recall and repeat information obtained in prior classes, did not test the student's ability to draw together information from his/her areas of study and apply it to a problem in the field of forestry or science in general. Seizing on an idea for an argument-based prelim proposed in an article in Science, the faculty agreed to go to a written prelim based on issues, or "propositions" one of which was posed by each member of the student's committee. This form of written prelim was used for the succeeding 20 years without much modification and resulted in a number of well-written, well-reasoned propositions, some of which led to published papers.

However, by the early 1980s deficiencies began to become clear in the proposition-based written prelim. With no limit placed on the length of time a student could devote to a given proposition, some students were taking months to complete one proposition. Furthermore, no real limits had ever been placed on where students could obtain information and many were getting it from other members of the faculty, in some cases even from committee members. These problems led the faculty to approve in 1982 a change in the proposition form of written

prelim. A student was given one proposition provided by each member of the doctoral committee and was allowed no more than two weeks from the time of receipt of the proposition to completion of the written response. Furthermore, information was to be sought only from the literature or peers and not from members of the faculty. In addition to these changes, students were given the option of substituting the more traditional form of written-oral subject matter test in lieu of writing propositions. These changes seemed to satisfy both faculty and graduate students and they have remained in force from the middle 1980s until the present. Today, however, the vast majority of students choose the subject matter written exam rather than the proposition-based exam. As has always been the case, students must complete the written prelim exam before the Graduate School will approve scheduling of the oral prelim exam.

By 1980 the Graduate School requirement for a reading knowledge of two foreign languages had been eliminated. Although some departments and programs still had a foreign language requirement, the Department had eliminated its requirement entirely for both the Masters and Doctors degrees. Depending on the nature of a student's research, a language might be required by the student's advisory committee.

A critical factor in the success of any graduate program is its ability to provide financial support for students in the form of teaching or research assistantships. In 1980, the Department had about 6 teaching assistantships and 2-3 Department-funded research assistantships, all supported from lapsed salary money, and other research assistantships supported by research programs, almost entirely through the Industrial Cooperatives. The value of a teaching assistantship was \$3600 and most research assistantships paid \$4000. By taking advantage of the "special talent" provisions of the State's residency requirements, students holding assistantships usually paid tuition at the in-state rate, an important consideration in determining the "value" of an assistantship.

As might be expected, the value of an assistantship and the ground rules regarding its administration have changed dramatically over the 27 years since 1980. One of the most important changes occurred in 1973 when the Legislature changed the ground rules regarding in-state tuition. Prior to 1973 a graduate student's tuition status was determined at enrollment and essentially could not be changed as long as the student remained enrolled. The 1973 action of the legislature provided that a graduate student was no longer precluded from gaining in-state tuition status while still a student. The law required that two determinations had to be made concerning resident status. First, had a student resided in North Carolina for at least 12 months and, second, during the 12-month period did the student's presence constitute legal residence. Administration of this two-test rule involved an elaborate scenario in which new out-of-state students could shift to the in-state tuition rate after residing in the State for one calendar year, by meeting certain "requirements" consistent with residence (such as getting a North Carolina driver's license and

registering an owned vehicle in North Carolina, establishing a North Carolina address, registering to vote, and filing a State income tax return), and indicating an intent to remain in North Carolina after completion of their degree. Needless to say, this process required both graduate student and the Department to engage in a process that in some cases resembled a charade. Through the ensuing years, this process has become institutionalized so that the guidelines for gaining in-state status, and thus the in-state tuition rate, are clearly stated on the Graduate School's web site and are carefully administered by a Residency Officer in the Graduate School.

As might be expected, this position with respect to out-of-state and, perhaps more importantly, to international graduate students created serious administrative problems throughout the University. It often made a financial offer for graduate study at NC State financially non-competitive with an offer from another graduate program and threatened to reduce both the number and quality of graduate students and even the viability of some research programs at NC State. Led by the Graduate Schools at the "flagship research universities" (NC State and UNC-CH) and by the UNC General Administration, the Legislature was eventually prevailed upon to provide an amount of money ear-marked for "tuition remission". Initially, the funds available to each department by the Graduate School were small and were applied only to first-year students with each such student then expected to take the steps necessary to become a resident of North Carolina and thus subject to the in-state tuition rate. The amount of tuition remission funds given a department by the Graduate School was influenced positively by the Department's record in converting out-of-state students to in-state students.

Nonetheless, individual research programs often had to provide tuition remission in order to make their offer for graduate study financially competitive. The impact of the out-of-state tuition situation was felt particularly by international students, virtually all of whom had no chance at all to become North Carolina residents. It frequently became necessary to commit tuition remission money to an international student for the full period of study, thus creating a strain on the amount of tuition remission money available for first-year US students. During the ensuing years, the amount of tuition remission money available to be apportioned by the Graduate School gradually increased and the Department ultimately was able to pay tuition remission to most first-year and international students. At present, essentially all tuition remission money is used for international students. Consequently, pressure is still exerted on research programs to obtain as part of a grant sufficient money to pay a student's tuition at whatever may be the applicable rate.

By 1987 teaching assistantship stipends had increased to \$8000 and research assistantships to \$9000. For the 2007-2008 academic year the standard stipend is \$13,000 for masters and \$15,000 for PhD students. Depending upon proposed field of study and background, assistantships may be as much as \$24,000. In addition, some students (par-

ticularly those in Fisheries and Wildlife Science) must serve as TAs in General Biology.

In 1980 the Department had salary support for about 6 teaching assistants each semester. These funds were gathered together from unfilled faculty positions. The majority of Teaching Assistants served in the Dendrology course and, where possible, TAs were assigned to other undergraduate courses with laboratories. Beginning in the mid-1980s all doctoral students were required to teach at least one semester as part of the requirements for their degree from the Department or take a course in college teaching offered by the College of Education and Psychology. Many students did both. In 1989 when CEP ceased to offer the course a 6-week seminar in college teaching, taught by Lester Holley, was used as a substitute. The requirement for teaching experience has persisted through to the present and Masters students may elect to serve as TAs. The Director of Graduate Programs administers the TA program and TAs receive \$2000 per course taught. For the 2006-2007 year, there were 49 TA positions.

In the middle 1990s the University began to place more emphasis on insuring that Teaching Assistants were reasonably qualified for the work they were undertaking. The Graduate School now attempts to insure quality among TAs by requiring that every graduate student attend an orientation program it offers. In addition, graduate students serving as TAs are encouraged to utilize University programs at the Faculty Center for Teaching and Learning that are specifically designed for graduate students. For those planning to teach, there is a fellowship program, Preparing for the Professoriate. Several departmental graduate students, including Ellen Donohue, Frank Koch, Kevin Potter, Anthony Snider, and Rebecca Vidra have received this award. Teaching Assistants in the Department have always been evaluated using the same instrument that is used to evaluate the faculty. Evaluations are returned to TAs to assist them in their professional development. Each year the Graduate School makes an Outstanding Teaching Assistant Award. Forestry graduate student Stephanie Jeffries received this award in 2001.

Since the late 1980s the Department has been donated, or has instituted with its own resources, a number of graduate fellowships. As of now these are: the Namkoong Family Fellowship donated by Gene Namkoong and his wife, Carol, in 1989, the Gunnar and Lillian Nicholson Graduate Fellowship (1991), the Bruce and Barbara Zobel Graduate Fellowship donated by Bruce and Barbara in 1992, the Forestry Foundation Graduate Fellowship (1995), the James L. Goodwin Graduate Fellowship (1997), Charles B. Davey, and Arthur W. Cooper Graduate Fellowships, and Forestry Faculty Fellowship for Excellence in Graduate Education Graduate Fellowships (supported by contributions from the Departmental faculty themselves) all initiated in 2002. These Fellowships provide cash awards over and above the value of a graduate assistantship. Increase in support from the Hofmann Forest has allowed the Department to create Hofmann Forest Graduate Scholarships. These scholarships have a service requirement and thus do not fall in the same category

as the named Fellowships. The Hofmann Scholarships provide a stipend, tuition, health insurance and some professional development funds to qualified PhD students. In 2007-2008, 11 students received Hofmann Scholarships.

An important change made in the Department's administration of its graduate program began in 2006 when a requirement that each student's graduate committee must meet at least once a year with a report of the results of the meeting filed with the Graduate Program Director. This is an important step designed to keep graduate students moving ahead toward their program objectives and to detect problems in individual student's programs. The Graduate School is considering making such reports a requirement but has not done so yet.

Since 1979 the Department's graduate course offerings have been almost completely restructured. The only specific course to survive intact from before 1980 is Forest Genetics, and its content and current instructor both differ. Through the early 1980s the Department's graduate course offerings consisted of single courses that were graduate level treatments of the major fields of forestry (management, silviculture, tree improvement, economics, policy) each developed by the faculty member with expertise in that area. This paucity of graduate courses in forestry reflected one of the Department's core beliefs about its graduate program—that it drew strength from the latitude students had to draw extensively from the offerings of other departments, particularly the biological sciences, soil science, and statistics. However, as the graduate program grew in the early 1980s, students began to express a desire for more opportunities to take courses in forestry. In addition, the program began to attract increasing numbers of students who did not have a traditional undergraduate forestry background and who, therefore, needed forestry courses as part of their graduate programs. The limit that the Graduate School placed on the number of upper level undergraduate courses that could be counted toward a graduate degree meant that many of these "new-to-forestry" students had to take courses for which they could not receive graduate credit as part of their program of study.

Beginning in 1980, review of the Department's graduate courses became a continuing process. In 1982 revisions in FOR 571 (Advanced Forest Mensuration), 572 (Conservation Policy Issues), and 614 (Advanced Topics in Forest Land Management) were proposed and courses in Tree Improvement Techniques, Environmental Impact Assessment, and Advanced Wildlife Habitat Management were developed. In addition, a seminar in forestry research to be required of all entering graduate students was instituted. A dramatic increase in interest in tropical forestry led to an experimental colloquium in 1986 and 1987. This course evolved into a formal course in Tropical Forestry taught by Jan Laarman and Bruce Zobel with students from Duke attending along with those from NC State. In 1991 courses in Conservation and Sustained Development (taught jointly with the NC State Department of Soil Science and Duke University) and Advanced Dendrology were offered as

well as a full revision of the graduate course in Biometrics. A course in Agroforestry was jointly offered by Forestry and Soil Science.

An important innovation, the "mini course" was begun in the late 1980s. These were 6-week, 1-credit hour courses in specific areas of forestry offered to allow students with weak backgrounds in certain areas to become familiar with them. One of the first of these offered was a course in Procurement Forestry that actually was intended more to plug a weakness in the undergraduate curriculum than to strengthen the graduate program. Other mini courses, in areas such as measurements, silviculture, policy, and dendrology, quickly developed and at the present time as many as half a dozen of these exist, with the specific courses offered each year determined by demand and faculty availability.

After extensive review, in the summer of 1999 the Department submitted about 30 course revisions to the Graduate School for approval. As of fall 2007 the Department offers nearly three dozen graduate level subject matter courses in forestry plus seminars, special topics, and research offerings. In addition, the Department teaches at least four graduate courses in natural resources, together with seminars, special topics, and research courses, and cross-lists several of its forestry graduate courses with natural resources. In short, the wealth of graduate courses that exists now represents a dramatic increase from the limited offerings that existed in 1980.

Extra-curricular opportunities have always existed for graduate students in the Department. In 1980 the Forest Resources Association of Graduate Students, affectionately known as FRAGS, was the focal point for contact between the graduate student body and the School administration. FRAGS consisted of representatives from all three departments in the School. It met regularly each semester, often with the Associate Dean, and considered matters relating the academic environment and welfare of the graduate student body. FRAGS gradually became less and less active and it was finally replaced in the mid-1990s by the Natural Resources Graduate Student (NRGS) organization. This organization plays much the same role as FRAGS but has become a more active organization. For example, it is responsible for organizing the spring College Distinguished Lecture which is held in conjunction with the meeting of the Forestry Foundation at which both undergraduate and graduate student honors awards are made.

Perhaps the most active graduate student organization in the Department is the NC State Chapter of the International Society of Tropical Foresters. This organization meets regularly throughout the academic year, frequently at faculty or student homes, to hear talks about tropical forestry issues and to share good fellowship and good spirits as graduate students are wont to do. The existence of this organization is testimony to the important role that research in the tropics plays in NC State's present research and teaching programs.

In the early to mid-1980s the graduate students organized a spring camping trip in which the Department Head, Art Cooper and other faculty if they desired were invited to participate. Using School busses or vans, between 20 and 30 graduate students, together with some family members and faculty, traveled to various locations, including Mt. Rogers in Virginia, Mt. Mitchell, and Joyce Kilmer Forest. These three-day trips were organized around "family groups" (determined in advance by students themselves according to their individual desires) that did their own cooking and housekeeping. The highlight of the trip was a "dessert contest" on Saturday evening with judging falling to Cooper who, of course, got to eat some of each dessert. The entries ranged from truly exotic (Cherries jubilee and a deep-dish apple pie baked in coals) to mundane (a bag of Oreo cookies). Many international students participated in these trips, so many, in fact, that one year each was coerced to sing his or her country's national anthem. Perhaps 8-10 were sung. This trip offered opportunities for many students to see parts of North Carolina they might otherwise not have seen and to extend their learning in an unstructured environment. Like the undergraduate trips to Washington, this event also fell by the wayside.

Given what appears to be an unclear future for the study of forestry at the undergraduate level, it seems evident that the Department's graduate program will continue to grow and prosper. It seems likely that there will eventually be a doctoral degree in Natural Resources to be added to the newly approved degree in Fisheries and Wildlife Science. If, and when, it is approved, it will be interesting to see how the numbers of students working in forestry as opposed to those in fisheries and wildlife and natural resources shake out. If the past is truly prologue, the latter two fields will soon out-enroll forestry.