History of the Department of Forestry and Environmental Resources at North Carolina State University, 1979-2008

Forward by Arthur W. Cooper, Professor Emeritus, Department Head 1979-1994

My effort to write a history of the Department of Forestry and Environmental Resources at NC State University began in mid-2006 as a simple attempt to document “what happened” in the Department between 1979 and 2005. It intended to extend the history of the first 50 years of the Department, from the inception of the forestry program in 1929 to 1979, written by Ted Miller for the [then] School of Forest Resources 50th anniversary.

However, as I began the writing, I was quickly impressed with two things. First, that it would take much more than one year to complete the work. The length of time required to run down specific pieces of information and the generally fragmented, and often limited, sources of University information made the job much more time consuming than I originally envisioned it to be. In addition, difficulty in placing bounds on what should be included and the temptation to editorialize, interpret, and place into context events in the Department’s history, extended the writing another full year. Thus, the history is now for a 30-year period from 1979 to 2008.

Second, and perhaps more important, early in the writing I realized that the period about which I was writing was a period of dramatic change, not only in the Department but also in forestry as a profession and enterprise. In 1980 the Department was basically a classic forestry department with almost complete emphasis on forest management and its related fields. By 2008, a virtually complete turnover in faculty occurred, a different kind of forestry was being taught, new academic programs in natural resource management and environmental technology and management had begun, the graduate program had grown substantially, and the involvement of the faculty and exposure of students to the international dimensions of natural resource management had become pervasive throughout the Department. The nature and significance of these changes demanded that how and why they took place be documented.

This history consists of 5 parts:

• Narrative chapters describing various aspects of the Department’s activity and programs between 1979 & 2008;
• An annotated list of all faculty serving in the Department between 1979 and 2008;
• A list of honors won by the faculty between 1979 and 2008;
• A list of books written by faculty and published between 1979 and 2008;
• A bullet synopsis of the major events occurring in the Department between 1979 and 2008.

The SUBJECT MATTER CHAPTERS need little explanation. Each covers a major area of the Department’s activity. Various faculty members most closely involved with each area have reviewed virtually all of the writing and their comments have been incorporated. Chapter 10 covering those aspects of the Department’s research not related to the Research Cooperatives awaits small contributions from several faculty members before it is complete. Chapter 11 on Extension and Outreach is not yet done and will be added when it is finished. At some point a chapter 12 will be written summarizing the 30 years in the life of the Department, casting them into the context of events in the larger world, and predicting what, in my mind, they mean for the future.
The LIST OF FACULTY is a full list of all persons who served in tenure track and equivalent positions between 1979 and 2008. It does not include persons who were research assistants or research associates during their entire careers in the Department nor does it include SPA personnel. A person, however, is included if he/she began as a research assistant or associate or in a similar position and then moved into a tenure track slot. For persons who began as graduate students their initial date of appointment is chosen to be the date on which she/he converted from graduate student status to tenure track or to an appointment that led to a tenure track position. Living retired faculty members with emeritus status are shown as emeritus. For persons who have chosen early retirement their date of retirement is chosen to be the date on which their early retirement status ended and they became fully retired.

The LIST OF HONORS shows significant honors won by each faculty member during the period covered. The definition of “significant” is subjective. Clearly, a national honor (National Academy of Science, SAF award, etc.) is included as are State-wide honors. Campus honors are included when they are campus-wide and a major recognition of achievement by the University. Generally, editorships and associate editorships are not included. These honors illustrate the strength and reputation of our faculty and are an essential part of the Department’s history.

The LIST OF BOOKS is just that—a list of books written and published by our faculty, alone or with others, between 1979 and 2008. This list undoubtedly is missing entries as it includes only those I could run down myself. Additions will be appreciated.

The BULLET HISTORY is a summary, largely in single sentence form, of the major events in the Department’s history between 1979 and 2008. Although clearly abbreviated and without explanation, it is a short documentation of the Department’s history and, if for no other reason is useful for its brevity.

Most of the material, particularly that of a complex or controversial nature, has been read by at least one faculty member and his/her comments included. Nonetheless, a relatively small number of faculty members have been involved in such reviews. If, in your reading of this history, you find corrections that must be made or have additions that you think would enhance the story, please let me have them, either by email to my home email address (awcooper@earthlink.net) or as hardcopy in my box in the office. This first public copy of the text is labeled as Version 1.0 (given we are in the age of computers, what other identification would have been appropriate!) and dated 15 July 2008. As corrections and additions are accumulated, they will be added and the date and version updated.

Finally, I am responsible for all facts, conclusions, and opinions contained in these documents. As requested above, please provide me with any errors or omissions. After completing this work, I am impressed with the accomplishments, intellectual and otherwise, made by the Department in the last 30 years. The Department of Forestry and Environmental Resources at NC State University represents all that is good and important about higher education. In the face of a rapidly changing view of the role of forestry and foresters and given the need to adjust academic programs to meet societal needs, the Department has maintained an excellence and diligence that make me proud to say “I am a member of that Department.”

Many thanks for your help,

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

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In working on this history I have identified what are weaknesses in the College and Department’s record keeping relating to events that, collectively, compose their history. I will suggest some small steps that I think the College and Department can take that will serve to make its past more transparent to those who may be interested.

Finally, I am responsible for all facts, conclusions, and opinions contained in these documents. As requested above, please provide me with any errors or omissions. After completing this work, I am impressed with the accomplishments, intellectual and otherwise, made by the Department in the last 30 years. The Department of Forestry and Environmental Resources at NC State University represents all that is good and important about higher education. In the face of a rapidly changing view of the role of forestry and foresters and given the need to adjust academic programs to meet societal needs, the Department has maintained an excellence and diligence that make me proud to say “I am a member of that Department.”
HISTORY OF THE DEPARTMENT OF FORESTRY AND ENVIRONMENTAL RESOURCES AT NORTH CAROLINA STATE UNIVERSITY, 1979-2008

I. INTRODUCTION

This history of the Department of Forestry and Environmental Resources (henceforth “Department”) begins where Dr. William D. (Ted) Miller’s history from 1929 to 1979 leaves off. Although there is necessarily some overlap, the two histories deal with periods that are not only different in time but also vastly different in almost every influence, both internal and external, on the Department. The first 50 years of the Department’s growth reflect the rise of forestry in the South and the development of close working relationships between public and private forestry on the one hand and universities on the other. In the same way, the most recent 25 years show the effect of the dramatic changes that took place during that time in public attitudes toward forestry, in efforts to make forestry a more diversified profession, and in sweeping changes in the structure and operation of both public and private forestry in the South and nation.

The story must, unfortunately, begin on a sad note with the tragic death during Thanksgiving 1979 of the Department’s head, Dr. John W. “Bill” Johnson. His death occurred as the result of a heart attack suffered during a cross-country event in which he was running. Dean of the School of Forest Resources, the University home of the Department, Eric L. Ellwood immediately appointed Arthur W. Cooper, the Assistant Department Head, as Johnson’s successor. The suddenness of this event is underscored by the fact that students and faculty left for Thanksgiving vacation with Johnson as Department head and returned on the following Monday to find Johnson’s funeral over and Cooper as head. Johnson and Cooper had very different backgrounds. Johnson was a professional silviculturist who had worked as an industrial forester and had strong ties to many southern forest industries. Cooper, on the other hand, was a trained ecologist who had strong ties with North

1 In 1980, the Department was the Department of Forestry. It retained that name until 2004 when its name was changed to the Department of Forestry and Environmental Resources to reflect its rapidly-evolving broader mission. The term Department used in this history refers either to Forestry or Forestry and Environmental Resources depending on the time context of the discussion.
2 Dr. Miller’s history appears as a chapter entitled “Department of Forestry (1929-1979)” in “A History of the School of Forest Resources 1929-1979” published at the time of the School’s 50th anniversary in 1979.
3 The University “home” of the Department of Forestry has had 3 different names between 1980 and the present. In 1979-80 it was the School of Forest Resources. In 1987, as a result of a wholesale change of names throughout the University instituted by Chancellor Bruce Poulton, the name was changed to College of Forest Resources. During the 2002-2003 academic year the name was changed to College of Natural Resources to reflect the unit’s changing mission. Throughout this history the name used is that in effect when the matter under discussion occurred.
Carolina’s nascent environmental community, and had also served from mid-1971 to mid-1976 in a political job as Assistant Secretary of the North Carolina Department of Natural and Economic Resources. Whether these differences in background had any effect on the subsequent history of the Department is an open question. It can reasonably be argued, however, that external events such as the rise of public dissatisfaction with forestry and the dramatic restructuring of the southern forest industry were of such magnitude that they would have overridden any differences that might have existed in the backgrounds of the two men.

The history of the Department’s most recent 25 years begins with an established Department with many strengths, some unique. Its undergraduate program had, since its inception, turned out students with excellent training in field forestry including a summer of required field training at summer camp. The graduate program was firmly established and growing. One of the Department’s truly unique features in 1979, its Industry-University Research Cooperatives, with units in tree improvement, hardwood genetics and management, forest nutrition, and forest engineering, were without equal in any U.S. forestry school. A number of long-standing, best-known and best-loved faculty, including Ralph C. Bryant, John W. Duffield, Joseph O. Lammi, T. Ewald Maki, and Richard J. Preston (who had returned to teaching after stepping down as Dean) had recently retired. Finally, the Department had just undergone a period of explosive growth in undergraduate enrollment in the mid-1970s that reflected a rapidly rising national interest in natural resource management programs. This growth had been acknowledged by the University with added academic positions that, together with positions vacated by the recent retirements, were used to hire several faculty, including Art Cooper (who transferred from the Department of Botany following his return from State government), Douglas J. Frederick, James W. Gregory, Awatif E. Hassan, Bill Johnson, Jan G. Laarman, and Richard A. Lancia. The picture is, then, one of a Department with established strengths and traditions but with many new faces replacing old, familiar ones.

In some ways, the name of the Department and the larger unit within which it existed then and now is a microcosmic example of the changes that took place in forestry education during the last quarter of the 20th century. As Miller pointed out in his history of the first 50 years of the forestry program at NC State, the program began in 1929 as the Department of Forestry in the School of Agriculture. In 1931 the program became the Division of Forestry and remained so until 1950 when it became the School of Forestry. At that time the forestry and wood and paper products programs were, for the first time, separately identified with the forestry program becoming the Forest Management curriculum and later the Department of Forest Management. To reflect the growing range of interests in the School in 1968 it was renamed the School of Forest Resources with the forestry program renamed the Department of Forestry. This remained the name of the department until 2004 when, several years after the College changed its name to College of Natural Resources, the department acknowledged the
increasing breadth of its programs and faculty by renaming itself as the Department of Forestry and Environmental Resources. These names accurately reflect the events of the last 30 years that have seen forestry programs nationally become the homes for increasingly broad programs integrating forestry with other related natural resource disciplines.
II. FACULTY

Any history of an academic department must begin with its faculty and student body as these are, in the last analysis, the primary reason it exists. Because students come and go and faculty (for the most part) are longer tenured, we begin with the faculty.

The Forestry faculty at NC State has always been a multidisciplinary group. Ever since the faculty began its first period of growth in the late 1950s and 1960s it has had in addition to a core of professionally trained foresters a significant number of members who were not trained as foresters. Most of these had expertise in forest biology broadly defined and were united to the core of foresters by a common interest in trees as organisms and in forests as ecosystems. The eclectic nature of the forestry faculty has always been one of its great strengths, providing a multidisciplinary teaching and research base. As the Department continued to grow, it added both foresters and those whose work impinged on tree growth and forest management so that today fully one-third of the faculty have been trained in some other primary discipline and would be quite at home in another of NC State’s academic departments.

Perhaps the greatest change in the faculty over the last 30 years has been its increase in size. Whereas there were about 20 full-time, tenure track faculty in 1979, the number increased to over 40 during the 1980s. Continued growth and the addition of the Extension faculty to the Department in 1990 increased the number to over 50 by the mid-90s. It continues at approximately that level today. Only one of the 1979-80 faculty members held emeritus status (Bruce J. Zobel) but by 2005 there were 8 emeritus faculty. Only 2 of the 20 faculty in 1980 (Richard R. Braham, Douglas J. Frederick) remain as active faculty in 2008 and 9 who were active in 1979 (Arthur W. Cooper, Charles B. Davy, James D. Gregory, Awatif E. Hassan, D. Lester Holley, Robert C. Kellison, Richard A. Lancia, James R. McGraw, and Robert J. Weir) now hold emeritus status. Bruce Zobel remained an emeritus professor for the full 30 year period! Thus between 1979 and 2008 there was very nearly a complete turnover in tenure track faculty.

The Department faculty has undergone two concentrated periods of retirement and subsequent addition of new members. Between 1977 and 1979 the Department lost 6 of its oldest members: Ralph C. Bryant, 

1 A full list of all tenure track and equivalent faculty is shown in Appendix 1 together with brief information about their careers at NC State.
2 A faculty member’s full name is used the first time he/she is mentioned in the text. Thereafter, the name used for that person is the name by which he/she was most frequently known by peers and students.
John W. Duffield, Joseph O. Lammi, T. Ewald Maki, and Bruce J. Zobel to retirement and Bill Johnson to death. These men were, to a large extent, responsible for establishing NC State’s reputation as a national leader in forestry education and research. Thus, going into the decade of the 1980s the Department had only 7 professors as opposed to 10 associate professors and 7 assistant professors. By the late 1990s the department’s age structure shifted to 17 professors and 12 each of associate and assistant professors. Between 1995 and 2008 11 faculty members retired (H. Lee Allen, Art Cooper, E. Carlyle Franklin, Awatif Hassan, Lester Holley, Larry Jervis, Bob Kellison, Richard A. Lancia, Jim McGraw, Bob Weir (and Chuck Davey in 1992). Consequently, in 2008 the Department has nearly twice as many associate and assistant professors (32) as professors (17). It appears that another rash of retirements is not likely in the near future.

The faculty has also changed dramatically in diversity of gender and of discipline. The Department has been relatively successful in increasing its number of women members. Whereas there was only one tenure track female member in 1979, there are now 12. It has had less success in recruiting minority members, never having had more than 1 African-American faculty member, Jerry L. Bettis from 1983-2000 and Stacy A. C. Nelson from 2002 to the present. Perhaps the biggest change in disciplinary mix involves a large increase in the number of members with interests in the social science dimensions of forestry. This reflects the Department’s conscious effort to move more strongly into areas such as policy, economics, international forestry, and resource management broadly defined where it had limited expertise prior to 1979. In addition, entire groups of faculty have developed in previously unrepresented areas, such as forest biotechnology, remote sensing and geobased information systems, information and systems science, resource policy, and international forestry. The move of the Fisheries and Wildlife Program in 2002 from the Department of Zoology also brought an expertise that previously had been shared with Zoology.

Significant additions to the faculty that brought new disciplinary breadth to the Department’s faculty include:

• Gary B. Blank (1979) to develop an across-the-curriculum writing program;
• E. Carlyle Franklin (1980) to head a research program specifically designed to speak to the needs of small forest land owners;
• Siamak Khorram (1980) in remote sensing and geobased information systems;
• Russell Lea (1980) in hardwood silviculture;
• Steven E. McKeand (1980) as a member of the Tree Improvement Cooperative faculty;
• H. Lee Allen (1981) as Director of the Forest Nutrition Cooperative;
• William S. Dvorak (1981) to direct the Central America and Mexico Coniferous Resources Cooperative (CAMCORE) a unique program with an initial mission to find and preserve threatened genotypes of Central American and Mexican pines;
• David A. Adams (1982) with expertise in environmental impact analysis and natural resource policy;
• J. Edward deSteiguer (1982) USDA Forest Service in economics and policy;
• Lawrence A. Morris (1982) in forest soils and nutrition;
• Henry V. Amerson (1983) in tissue culture and biotechnology;
• Gary Kronrad (1983) in small landowner forestry;
• L. John Frampton (1984) in tree improvement and in 1996 to Christmas tree research;
• Joseph P. Roise (1984) in systems analysis and management science;
• Anne M. Stomp (1986) and Ronald R. Sederoff (1987) to initiate what was to become the Department’s major new emphasis in biotechnology;
• Leslie Tolley-Henry (1987) in forest physiology;
• Edwin L. Jones (1988) in extension wildlife resources;
• Ross W. Whetten (1989) in forest biotechnology;
• Robert C. Abt (1991) in forest economics;
• Theodore H. Shear (1991) to develop a program in restoration ecology;
• Barry Goldfarb (1993) to initiate a new program in rooted cutting physiology and technology;
• Craig McKinley (1994) to manage an extension program and genetic improvement research in Christmas trees;
• Gary R. Hodge (1995) to the CAMCORE program;
• Bailian Li (1995) in the Tree Improvement Cooperative;
• George R. Hess (1996) with expertise in modeling and biometry;
• Robert E. Bardon (1996) in extension silviculture and forest management;
• Daniel J. Robison (1997) to direct the Hardwood Management Cooperative;
• Erin O. Sills (1997) to expand programs in economics and international forestry;
• Christopher E. Moorman (1999) in extension wildlife management;
• Susan E. Moore (2000), following several short term appointments of other persons, to manage the Forestry Educational Outreach Program (FEOP), the Department’s new extension education effort;
• Teresa H. Litzenberger (2001), Elizabeth G. Nichols (2002), and Linda R. Taylor (2005) to augment teaching and research in the Department’s newly-approved Environmental Technology Program;
• Toddi A. Steelman (2001) in forest policy and to expand Departmental research in the social dimensions of forestry;
• Bronson P. Bullock (2002) in biometrics and forest mensuration;
• Vincent L. Chaing (2002) in forest biotechnology;
• Stacy A. C. Nelson (2002) in remote sensing;
• Christopher S. DePerno (2004) extension wildlife management;
• John S. King (2005) in tree physiology;
• William E. Winner (2006) in nature-based tourism;
• April L. James (2007) in hydrology;
• Jose Stape (2008) to teach silviculture and direct the Forest Nutrition Cooperative;
• Melissa McHale (2009) to bring expertise in urban forestry

A final important change in the faculty occurred when Laurens G. (Larry) Jervis retired as College Forest Manager in 2001 and was replaced the next year by Joseph L. Cox.

Mentioning these individuals and their areas of expertise in no way diminishes the importance of the other individuals who have been added to the faculty in the last 25 years in research tenure track positions and as research associates. They continue to make major contributions to the Department’s long history of excellence in such core areas of forestry as silviculture and forest management, tree improvement, forest soils, mensuration, engineering, hydrology, and wildlife management as well as to the new, emerging areas developed in the Department during the last 30 years.

Although the integration of Forestry Extension and Fisheries and Wildlife faculties into the Department certainly contributed to the growth in size of the faculty, other factors have also been responsible. One of the most important of these has been the willingness of the College and Department administrations to utilize soft (non-appropriated) money from the industrial cooperatives and research grants to hire faculty members into tenure track positions. Most employees in the industrial cooperatives had, from the inception of these programs, been supported from industrial dues paid into the cooperatives. The individuals so hired were not given academic titles and were not subject to the protections of the University tenure code. Although there was no guarantee that these funds would continue to exist, the close working relationships that existed between the College and Department administrations and the industries generally assured that no changes would occur without substantial warning. Furthermore, decreases in hard (appropriated) State and Federal funds throughout the period made it clear that if the Department were to capitalize on opportunities to maintain its leadership in forestry teaching and research more extensive use had to be made of soft money.

During the early 1980s the Department began to apply “qualified” academic titles (e.g., “Research” Assistant Professor) to appointees hired with soft money. Although the use of such titles implied protection under the University tenure code, it was not clear that if the soft money funds disappeared, the employment commitment to the
individuals holding such appointments still existed. Although nei-
ther the College nor Department viewed these appointments as being
overly risky, the University seemed to. In fact, during a meeting
with the then Chancellor Bruce R. Poulton, in the mid-1980s, Poulton
pointedly brought to the Dean and Department Head’s attention the
fact that they had 5-6 equivalent faculty positions supported by soft
money for which they had no appropriated money backing and that, if
the soft money disappeared, the College could not count on support
from the University. Although the warning was, of course, duly
noted, the use of soft money appointments continued.

Over the subsequent years the use of soft money appointments has
become more “institutionalized” at the University level. Tenure po-
sitions qualified by the word “research” (or by other qualifiers) are
now in relatively common use and their limitations are clearly
spelled out in the University tenure regulations. In fact, nearly a
dozen current faculty members, including one full professor, now hold
such positions in the Department. In retrospect, this willingness of
the College and Department to “gamble” in the use of soft money posi-
tions was a major factor in the growth of the Department and in its
ability to develop programs that are now crucial to its position as a
leader in certain areas of forestry research. Without the judicious
use of soft money appointments, it is likely that the Industry-
University Cooperatives would not be as healthy as they now are and
programs in biotechnology and rooted cuttings might well never have
developed.

The Department has, on occasion, been criticized for having too
many graduates of NC State on its faculty. Whether this is a problem
is debatable. The facts are that of the 26 persons in all EPA (Ex-
empt from Personnel Act) categories in 1980 exactly half either had
gotten their highest degree from NC State or had transferred to the
Department from another NC State department. In the intervening
years 78 persons have been hired or promoted into all categories of
EPA positions; 20 (25%) of these had their highest degree from NC
State. Consequently, the Department now has 44 members in all EPA
categories and 16 of these (36%) have their highest degree from an NC
State department. Thus, the percentage of hires with NCSU degrees
has declined somewhat; furthermore, of the 22 hires in the last 10
years only 4 have NCSU degrees. This change reflects both a con-
scious attempt by the Department to broaden the educational back-
grounds of its members and the fact that most of the hires in the
last 10 years have been in areas where the Department has not tradi-
tionally been strong. Before closing the book on this debate, it is
important to note that a large number of the persons with NCSU de-
grees were hired to work in the research programs in which they had
obtained their degrees. On the one hand, this leads to an obvious
continuity in the work of the research program but on the other it
can lead to the intellectual inbreeding that can reduce a program’s
imagination and creativity. The Department has experienced both of
these outcomes in the last 30 years.
The Department has also made liberal use of joint, associate, and adjunct appointments. Joint appointments usually involve a sharing between two or more departments of a faculty member’s salary (and occasionally support funds) whereas associate appointments involve appointment in two or more departments with a salary commitment only from the “home” department. Adjunct appointments involve the granting of faculty status and rank, with no commitment of funds, to an individual who is not a member of the NC State faculty, but whose interests and expertise parallel or augment those of the faculty. Although joint, associate, and adjunct appointments were not always consistent with these definitions in the 1980s, their use is now clearly spelled out in University regulations.

It can be argued that much of the success of the Department from its earliest days lay in the numerous joint and associate appointments it has made. For at least the last 50 years, the Department has, at one time or another, had joint or associate appointees from the Departments of Botany, Entomology, Genetics, Plant Pathology, Soil Science, Statistics, Wood and Paper Science, and Zoology. The individuals involved added significantly to the depth and breadth of the Department’s programs, particularly in forest biology and they often taught courses that were critical parts of the undergraduate and graduate forestry programs. Often the willingness of sister departments in the university to grant joint or associate status attracted a faculty member to the Department or allowed development of close working relationships in areas of research. Perhaps the best example lies in the long-standing relationship between the Department, the Department of Genetics, and the Tree Improvement Program. Gene Namkoong, a U. S. Forest Service Pioneering Scientist located in the Department of Genetics contributed mightily to the intellectual development of many graduate students in tree improvement as well as making contributions of his own that established him as one of the world’s leading theoreticians in forest genetics. L. C. (Bud) Saylor began his career as a forest genetics graduate student in the Department of Genetics and early on moved to a distinguished career as Assistant and Associate Dean of the College. Another important example was the willingness of the Department of Electrical Engineering to accept Siamak Khorram as an associate faculty member. This associate appointment not only helped convince Khorram to come to NC State, but also led to his appointment as Director of the Computer Graphics Program in Electrical Engineering and, ultimately, to the program’s transfer to the Department of Forestry.

To say that the Department made liberal use of its ability to make adjunct appointments is putting it mildly. Adjunct appointments came from industry, the U. S. Forest Service, the U. S. Fish and Wildlife Service, the State Forest Service, consulting foresters, and other universities to name the most frequent sources. Although the motivation was usually to obtain additional technical expertise, appointments were occasionally made for political or other, often obscure, reasons. At any one point in time the Department usually had at least 40 adjunct appointees. Occasionally the list had to be
purged to eliminate persons whose expertise no longer related signif-
ically to the Department’s work, who may have left the region, or
who, in the most egregious cases, had died! Despite the fact that
the number of adjunct faculty in the Department occasionally grew
bloated and was not guided by any clearly-defined rules, the ability
to tap the expertise of such individuals by offering them a formal
affiliation with the faculty contributed enormously not only to the
Department’s programs but also to enhanced relationships with consti-
tuencies in the forestry sector generally. A full review of all ad-
junct appointments was carried out during 2006-07 and ground rules
were established for their appointment and re-appointment. As a con-
sequence the Department now (2008) has 41 adjunct appointments with
two more pending approval.

Over the past 25 years, the faculty of the Department have re-
duced many honors and recognitions. Although a full listing of
these is shown in Appendix 2, the more significant of these deserve
mention here.

There is no other Department of Forestry in the United States
with one, let alone two members of the National Academy of Science on
its faculty. Ellis B. Cowling had received this honor in 1973 and
Ron Sederoff was elected to membership in 1995. Likewise, there is
no other Forestry faculty in the country in which members have won
all three major awards of the Society of American Foresters within
the past 30 years. Bruce Zobel received the Sir William Schlich Med-
al in 1988 (Dean Richard J. Preston had won this award in 1972), Art
Cooper received the Gifford Pinchot Medal in 1999, and Chuck Davey
(1982), Bob Kellison (1997), and Ellis Cowling (2000) received the
Barrington Moore Award (Bruce Zobel had received it in 1968).

Ellis Cowling also won The University of North Carolina’s highest
honor, the O. Max Gardner award, for 1981. Bruce Zobel had also won
this award in 1972. Art Cooper (1998), Ellis Cowling (2001), Bruce
Zobel (2004), and H. Lee Allen (2007) received NC State’s Alexander
Quarles Holladay Medal.

Members of the faculty were presidents of several scientific so-
cieties. Chuck Davey served as President of the Soil Science Society
of America in 1976, the only forester up to that time to head that
society. Art Cooper was president of the Ecological Society of Amer-
Dick Lancia served as president of The Wildlife Society in 2005 and
Siamak Khorram was president of the World Space Center in 1981.

A number of faculty members were named Fellows of the Society of
American Foresters during the last 25 years, including: Ralph Bryant

Forestry faculty members have been active in campus governance in a variety of capacities. Since 1980 the following have served as members of the Faculty Senate: Tom Gemmer (1980-1982), Awatif Hassan (1984-1988), Dave Adams (1987-1989), Joe Roise (1988-1990), Bob Weir (1990-1994), Anne Stomp (1994-1996), Gary Blank (1996-1997, 2004-2006), and Gary Hodge (1999-2003). From 1996-97 Dick Lancia served as Interim Director of the Center for Teaching Excellence. Art Cooper served as Chair of the Council on Athletics and as University Faculty Athletics Representative from 1990-2001 as well as an Atlantic Coast Conference representative to the NCAA from 1995-2001; Bob Weir and Gary Hodge represented the Faculty Senate on the Council. Russ Lea, after 5 years as Associate Dean for Research in the College moved on to become Associate Vice Chancellor for Research in 1996 and ultimately, from 2001-2007, served as Vice President for Research and Sponsored Programs in the UNC General Administration. In 1997 Ed Jones moved into Extension administration as Associate State Leader for Natural Resources and Community Rural Development. Most recently, in 2006, Bailian Li was named Interim Vice Provost for International Affairs. This appointment became permanent in March 2007.

A full recounting of the publication record of all faculty members here would be impossible. However, mention must be made of the many books and other volumes that faculty members have written or edited. These publications are included in Appendix 3.

No discussion of the Department’s faculty over the last 25 years would be truly complete without mention of the two women, Judy Rogers and Eileen Broderick, who served as Administrative Assistants to the Department Head during that time and who kept them and the Department running smoothly. Both women showed an uncommon devotion to the Department and an uncanny ability to deal with the administrative minutia now inflicted on a modern academic department. Despite the fact that she retired officially in the mid-1990s, Ms. Rogers continues to work part-time in the Department today. Without these two women the Department would never have functioned, let alone functioned as smoothly as it has.

3 Jack Duffield (1959), Dick Preston (1965), Waldy Maki (1969), and Bruce Zobel (1969) had been named in prior years. Eric L. Ellwood (1985) was also so honored.
III. ADMINISTRATION AND ORGANIZATION

Programs and Heads

In 1980 the Department of Forestry was relatively new, having been created in 1959 when the Forest Management Curriculum was designated as the Department of Forest Management. The Department was renamed the Department of Forestry in 1968 when the then School of Forestry was renamed the School (later College) of Forest Resources. Waldy Maki served as head of the Forest Management Curriculum and Department from 1951 to 1970. Chuck Davey headed the Department of Forestry from 1970-1978 with Bill Johnson serving from 1978 until his untimely death in late 1979.

The Department grew in disciplinary scope between 1980 and 2007. In 1980 its disciplinary makeup included each of what were, at that time, the major fields of forestry. The Forestry Extension Program was located in a separate department in 1980; in 1990 Forestry Extension was moved into the Department (with Wood Products Extension being moved to the Department of Wood and Paper Science). Finally, in 2003 the Fisheries and Wildlife Management Sciences Undergraduate curriculum was moved from the Department of Zoology to the Department, although the graduate program remains shared by the two departments.

The Department has had 3 heads since 1979-80: Art Cooper (1979-1994), Fred Cubbage (1994-2004), and Barry Goldfarb (2004 to the present). Cooper was appointed immediately after the death of Bill Johnson in late November 1979. No search was conducted as he had been a candidate when Johnson was appointed and served as Assistant Head under Johnson. Cooper was a member of NC State’s Department of Botany from 1958-1971, had served in an administrative position in North Carolina’s Department of Natural and Economic Resources from 1971-76, and had rejoined the NCSU faculty in forestry in 1976. Cubbage and Goldfarb were appointed after national searches. Prior to appointment, Cubbage had held a faculty position at the University of Georgia and most recently was a U. S. Forest Service scientist in the Research Triangle Lab and an adjunct faculty member. Goldfarb was a sitting faculty member, having come to the Department from Oregon State University in 1992 to run the newly-established rooted cutting program and to teach tree physiology. The three men had quite different backgrounds, Cooper being an ecologist, Cubbage a political scientist and economist, and Goldfarb a physiologist.

1 Technically there was a Department of Forestry from the inception of forestry at NC State in 1929 until 1931 when the Department was renamed the Division of Forestry.
Departmental Communication

As might be expected, each person brought his own style to the Department’s management. In a Department such as Forestry, with diverse interests, key faculty located in other Departments, and faculty often traveling, communication is an essential part of the Department Head’s duties. Cooper inherited and continued an institution designed to promote communication and conduct Departmental business, the Monday noon “nosebag” luncheon. As items of business mounted in number and complexity, these meetings often became, to put it mildly, painful for all parties. When one faculty member remarked to Cooper that the nosebag was “like listening to the Department Head read his mail out loud”—an accurate description—it was clear something different was needed. This served as the impetus to develop the Department’s first email system. Constructed of telephone wire strung along corridors and across office tile roofs, the system became fully “operational” in the fall of 1987. Primitive as it was, it linked the faculty’s computers together and provided a means for sharing of information. From this time on, regularly scheduled staff meetings were reduced in number so that by Cubbage’s and Goldfarb’s tenures no more than 4-6 regularly scheduled meetings were held each semester.

Administrative Structure

Between 1980 and 2005 the nature and duties of the Department Head’s position changed dramatically, with the greatest amount of this change taking place between 1980 and 1990. Prior to Cooper’s tenure, department heads in the (then) School of Forestry operated in a “top-down” environment with many important functions, particularly budgets and to some extent hiring, handled in the Dean’s office. This pattern was rooted in the early days of the School when disciplinary programs were small and their size and complexity did not warrant a significant administrative structure below the Dean’s office. However, by the early 1980’s the size of the various disciplinary programs had become large enough to make it essential that more responsibilities be delegated to Departments and their heads. In addition, throughout the decades of the 1980s and 1990s many major new administrative duties were passed down from the University to Colleges and departments further adding to the duties of the department heads.

The increase in responsibilities devolving on the Department Head had, by the late 1980s, reached the point where efficient management of the Department necessitated delegation of some administrative duties. Accordingly, in 1989 Cooper designated Lester Holley as Graduate Administrator and Jim Gregory as Coordinator of Undergraduate Programs. These two men joined Donald H. J. Steensen who handled job

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2 During the 1986-87 year each faculty member wishing one first had, on his or her desk, a personal computer, marking the Department’s entrance into the age of electronic communication.

3 The position of Graduate Administrator had been separate from that of Department Head prior to Cooper becoming Head. He carried the two titles and duties from 1980-1989.
placement, scholarships, and the directorship of the summer camp program as the Department’s administrative infrastructure. Steensen’s sudden death in 1989 necessitated assigning his duties to others, job placement to Larry Jervis, scholarships to Rich Braham, and the academic side of the summer camp program to Jim Gregory and on-site camp director to Jervis. With the transfer of Forestry Extension to the Department in July of 1990, Edwin L. Jones was named Department Extension Leader. These six positions, Graduate Administrator, Undergraduate Program Coordinator, Extension Leader, Placement Coordinator, Director of Scholarship Programs, and College Forest Manager and Summer Camp Director, constituted the Department’s administrative infrastructure from the mid-90s to the present. When Goldfarb was named Department Head, the position of Departmental Program Coordinator was created, and Lisa Schabenberger was hired to fill it. In addition to handling administrative minutiae for the Department Head, the Program Coordinator is proactive in identifying and managing activities that enhance or expand the Department’s programs, including enhanced communications, alumni relations and employee events. More recently, in 2006, Sarah Slover was hired in a new Graduate Program Coordinator position, providing enhanced services to the large number of graduate students in the Department and freeing the Director of Graduate Programs to concentrate more on policy matters. A similar approach for undergraduate programs was instituted in 2007, with Shannon Shinault becoming the first Undergraduate Program Coordinator, with responsibilities in recruiting and retention, outcomes assessment and placement (the faculty title of Undergraduate Program Coordinator previously used was changed to Director of Undergraduate Programs).

Budget management in the Department of Forestry was, and continues to be, somewhat decentralized. In the early 1980s responsibility for management of the Department’s allocation of State and Federal appropriated funds (“hard” money) was delegated to the departments. However bookkeeping responsibility remained in the Dean’s office until the early 1990s when it, too, was assigned to the College’s departments. Management of the research cooperative’s funds, however, remained largely in the cooperatives with each program providing its own bookkeeping. The increase in number and size of research grants earned by College faculty prompted Dean Ellwood to create in 1978 the position of Associate Dean for Research and Graduate Studies (later

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Research and Extension). Bookkeeping for grants and projects was assigned to persons reporting to the Associate Dean. Now bookkeeping for grants and contracts is done in the Department with oversight from the College research office.

Similarly, in the 1980s responsibility for record and data keeping for undergraduate students rested in the office of the Associate Dean for Academic Affairs. By the mid-nineties that responsibility had largely been decentralized to the College’s departments. Management of graduate student programs and graduate course offerings had always been the responsibility of the Graduate Administrator appointed in each department consistent with requirements of the Graduate School. Record keeping for the graduate program went with this assignment and remained there until 2006 when it was assigned as a major duty of the new Graduate Program Assistant.

University Reappointment, Tenure, and Promotion Procedures

During the late 1980s and continuing through the 1990s, the University undertook a proliferation of new reporting requirements and initiatives. These were driven by pressures from General Administration, the legislature, and the public for: (1) greater University-wide similarity in the promotion and tenure process, (2) closer oversight of faculty to ensure continued performance after tenure had been granted (“post-tenure review”), (3) an assessment of the extent to which departmental and university teaching programs were meeting their objectives (“outcomes assessment”), (4) demonstration of greater accountability in program management, and (5) better planning.

These pressures were not unique to North Carolina but were part of a national trend. New requirements to meet these objectives began during the later years of Cooper’s tenure, grew to full flower while Cubbage was head, and continue during Goldfarb’s administration.

The process of granting promotion and tenure to faculty became much more formalized in the last 25 years. When Cooper became Department Head decisions on promotion and tenure were made on the basis of rudimentary data gathered by the Department Head. These were reviewed by the Senior Faculty (then defined as the full professors only) and voted on, usually after one of the regularly-scheduled Monday noon staff meetings. Little or no information in support of a decision was sought from a candidate.

During the next 15 years requirements for documenting and granting promotion and tenure became much more systematic and complex. Each department was required to write a set of regulations describing, consistent with overall University rules, the data and process used in making its promotion and tenure decisions. These regulations were first written under Cooper in 1988, revised in 1991, and subsequently revised under both Cubbage and Goldfarb as University rules became progressively more detailed.

Most of the current process of reappointment, promotion, and tenure was developed under the direction of Provost Kermit Hall in 1996-1998, requiring complete and consistent dossiers, open communi-
cation among candidates and each set of departmental, college, and university review committees throughout the process, and the opportunity for responses by the candidates to their evaluations.

Among other things, the definition of those who could vote on a tenure and promotion decision (Voting Faculty) was changed so that only tenured professors voted on promotions to professor whereas both tenured professors and tenured associate professors voted on all other decisions regarding promotion and tenure. The promotion and tenure regulations for each department are now published on the University web site. The most recent version was approved in August 2005.

In addition, Cooper initiated a system of annual performance reviews, required for each faculty member (this also was formalized by the University in the 1990s). Initially, Cooper reviewed all faculty each year. By the end of his tenure, regulations were included in the 1988 and 1991 Departmental Promotion and Tenure Procedures to describe the frequency and content of reviews. Perhaps the most important role of these reviews was the opportunity for the Department Head and individual faculty members to review, and revise if appropriate, job assignments and to review progress toward tenure and promotion.

During Cubbage’s tenure the College of Forest Resources expanded these requirements to include the development of a “Creativity Agreement” and a Plan for Professional Development for each faculty member. This process was superseded in about 2002 by the University requirements for a Statement of Mutual Expectations that required each faculty member to develop such a statement that could be discussed and mutually agreed upon with the Department Head. This also prompted annual reviews between the Department Head and each faculty member; these have continued since.

Finally, a process for post-tenure review (designated Comprehensive Review of Tenured Faculty) was established by the University in 1998. The first requirements for such review were approved by the Department in July 1999. A Comprehensive Review Committee was established, consisting of 6 persons with defined terms of service on the committee. Professors were to be reviewed at least every 5 years and Associate Professors at least every 3 years. The materials to be submitted by persons being reviewed together with the processes of review and decision and the criteria to be met for each rank were described. This process, which still is in effect, also is affected by the 2002 Statement of Mutual Expectations process, which can inform the discussion about post-tenure review.

The department head was required to prepare and notify a list of persons for post-tenure review in a given year. This first set of requirements remain in force through the winter of 2007 but will be replaced, in response to new University requirements (now for Post Tenure Review) promulgated in January 2006, by a new, simplified set as soon as they are approved by the University. These processes allow
an assessment of a faculty member’s accomplishments and career development by his/her peers and assure that the department head and faculty member strive to come to an agreement on work assignments and expectations.

Planning

Prior to the early 1990s the University had essentially no organized long range planning process, with planning done through a series of poorly-coordinated efforts. Most planning centered around the “continuation/change/capital improvement” budgets which in turn were geared to the General Assembly’s budget process. A continuation budget was more or less taken as a given (albeit with occasional budget cuts coming as surprises) and program aspirations and growth were supposedly accomplished through new monies approved as part of the biennial change budget. New or improved physical facilities were included in the capital budget. Unfortunately, this process yielded little in the way of organized, tangible results. Competing proposals were prioritized on campus and at General Administration for the entire University system.

The probability of any specific proposal surviving this gamut of change budget review was low. New programs and resources were usually obtained more through action of supporters in the General Assembly than through organized approval as part of the University change budget. The Department of Forestry rarely benefited from any change budget proposal it put forward but occasionally did gain through initiatives at the College level (such as construction of Biltmore and Jordan Halls and creation of the Small Woodlot Research Program in 1979). As might be surmised, planning via the change budget was looked on by faculty as a largely futile exercise.

During the administration of Chancellor Poulton (1982-1989) an University-wide effort to coordinate long-range planning was begun. One of the first developments was a test program for outcomes assessment of undergraduate teaching programs. In 1990-91 the Department became one of 5 pilot departments on campus to develop and utilize tangible measures as a means of assessing outcomes. A draft plan was completed including evaluation of undergraduate students at the end of summer camp, the use of external reviewers in evaluation of senior projects in FOR 406, and exit interviews with graduating seniors.

These outcomes assessment processes were utilized each year during the early 1990s and produced results useful in the evaluation of the undergraduate teaching program and in curriculum revision. SAF accreditation reviews in 1989, 1994, and 2004 were also an important form of outcome assessment. None of these outcome assessment efforts dealt with the graduate program, research, or other Departmental activities. Outcomes assessment, now known by other names, is a required component of all departmental and college plans and programs.

In the 1990s the University initiated a program of long-range academic planning under Provost Kermit Hall, which sought to bring
some order to the planning process, at both the University and College levels. Much before that, Cooperative Extension initiated their own strategic planning, with long and detailed efforts that continue periodically.

Two types of plans are now prepared: compact plans and strategic plans. Compact plans are developed on the unit (department and college) level. They are the mechanism by which each College reviews its external and internal context, states its goals, proposes action items (i.e., programs and educational or research goals), states the resources necessary to implement those action items (i.e., budgets, faculty lines, capital improvements), and proposes measures by which progress can be assessed (i.e., enrollment, program growth, credit hours taught, research achievements, etc.). They are iterative in the sense that they involve several cycles of review and discussion within the planning unit. Compact plans now cover 3-year intervals, with updates. Plans developed through this process are subject to the same constraint that governs all planning done in a unit–college–university system, i.e., not all items proposed in unit plans are accepted or received with the same priority at the College level. The same constraint operates, of course, at the College–University level of planning.

Strategic plans, on the other hand, are executed at the university level and cover longer planning horizons. The university initiated various strategic plans from about 1995 to 1997, but these appeared to be more vehicles for scoping and discussion of issues and priorities than operational plans. No specific new College or Departmental resources or faculty lines stemmed directly from these efforts. Strategic plans state the University’s mission, define its special niche, and express its vision for the future with broad goals consistent with institutional mission designed to achieve that vision.

Faculty Additions

In addition to these strategic and compact planning efforts, major personnel changes in terms of faculty and programs occurred throughout the period, sometimes not so informed by strategic planning as by discussions among departmental faculty and the Head. The Department maintained a very strong and viable complement of faculty throughout the 1980s to the present, with virtually all but a few retiring or departing faculty positions being replaced, although not always in kind.

Of the approximately 50 or more faculty in the Department at any given time, Cooper and Cubbage hired all but a few during their tenures, and Goldfarb has added several as well. These faculty included economics, silviculture, biometrics, geographic information systems, genetics, biotechnology, extension, international forestry, resource policy, ecology, environmental technology, and other disciplines. The Department also has had a plethora of “soft-money” faculty lines, with up to 17 professors appointed on external funds during
the 1990s. The faculty is very diverse for a forestry faculty, growing to more than ten women, one African-American, and immigrants from many different countries at various times. This diverse and renewed faculty provides great breadth, depth, and vigor to the programs in the department.

Departmental Compact Planning

Review of the Department and College planning documents developed under this process reveals much of the thinking that guided growth and change since the mid-1990s. The Department’s first strategic plan was prepared in 1995-96 through the work of six large committees with all faculty assigned to at least one of these. The plan called attention to the changing forestry environment, the concurrent increase in demand for programs with broader environmental objectives, and the large budget cuts the Department had suffered. Goals included an increase in undergraduate and graduate credit hour production, slight increases in enrollment in undergraduate and graduate programs, maintenance of leadership in its areas of excellence, enhancement of the outreach program, and increased international research and teaching programs, including a Masters’ International Program in conjunction with the Peace Corps. Most of these goals were included in the College’s 1998 Strategic Plan, together with specific budget initiatives in genomic science, an environmental technology program, and distance learning.5

The first cycle of University Compact Planning in 1998-99 identified a number of College initiatives in which the Department was deeply involved. These included emphasis on increasing diversity of gender and race (always problems in the natural resources) and greater student exposure to other cultures. This effort directly supported efforts then underway in the Department to develop formal study abroad programs. Other initiatives called for development of a strategic forest industry initiative, an Albemarle Sound Research Center, an undergraduate degree program in environmental technology, a major role for the Department in the campus-wide genomic science initiative, and institutionalization of the Southern Center for Sustainable Forests (an entity established in 1997 in response to a recommendation in Governor James B. Hunt’s Task Force on Sustainable Forestry).

Planning for the environmental technology undergraduate program, already underway when the plan was written and with courses taught during 2001-2002, ultimately led to hiring of necessary faculty and to the curriculum being offered for the first time in the fall of 2003. Movement of the Forest Biotechnology Program to the Centennial Campus, included in the Compact Plan, took place. That program continues today to be one of the premier research centers in the coun-

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5 This narrative on planning does not try to include all initiatives identified at the Departmental or College level. Rather, it includes those that seem to have had the most impact on the Department, in other words, those proposals that seem to have led to something tangible.
try, with a faculty of considerable breadth and stature. The plan emphasized the critical importance of the space contained in the final wing of Jordan Hall. It also contained a recommendation that the name of the College be changed to “College of Natural Resources”, a change that took place in 2000.

The 2002 Departmental Compact Plan, the background work for which was done by a committee of the Departmental leadership, summarized progress toward meeting goals in the 1999-2000 Plan and proposed very general priorities unified by the common theme “Sustainable Development of Forest and Natural Resources”. These included the management of green infrastructure in a developing world and sustainable forests to meet world fiber needs. More tangible were initiatives in natural resource distance learning and outreach, focused recruiting and marketing of Departmental programs, and revision of the forest management curriculum. Several of these proposals appear in the College Compact Plan for 2003-2006.

New Department programs and initiatives were an integral part of the 2004-07 College Compact Plan. Buried in the initiative for a Green Infrastructure for Sustainable Communities was a proposal to rename the Department as the Department of Forestry and Environmental Resources. This change took place effective January 1, 2005. The initiative also proposed hiring new faculty in urban forestry, ecological restoration, and conservation biology. As of the winter of 2007 the Department was actively seeking the urban forestry addition, although the emphasis has shifted somewhat to urban ecology. Forest biotechnology was again prominently featured in an initiative on Forest Materials and Biotechnology, in collaboration with the Department of Wood and Paper Science. The move to the Centennial Campus in 2000 and the hiring of Vincent Chiang in 2002 further established this program’s stature. An initiative in International Programming in Natural Resources focused attention on the strong existing international programs of the Department. Interestingly, this Compact Plan stressed the importance of the Hofmann Forest to achievement of the College’s initiatives and acknowledges the important role that Department faculty played in revising the Forest’s management plan.

The 2006-07 update to the College Compact Plan cites renaming of the Department to Forestry and Environmental Resources, transfer of the Environmental Science minor program from CHASS to CNR, advertising of the urban forestry position and development of an urban forestry undergraduate forestry option, hiring of a part-time international program coordinator together with study tours to Namibia, Costa Rica, and China as major accomplishments based on proposals in the 2004-07 Compact Plan.

Although it is easy to get lost in the welter of plans generated over the past 8-10 years, an overview of them shows that the Department has achieved substantial growth and has moved in important new directions. Although the most recent plans in places seem to substitute acronyms and buzz words for substance it is clear that they have
served as useful vehicles for changing directions and new initia-
tives.

The Forestry Foundation

Looking backward from 2008, it is clear that the ability of the Department and College to undertake many of the new programs and initiatives they have in the last 10-12 years, plus their ability to enrich programs already offered, is due in large part to the increa-
singly important role of the Forestry Foundation. In order to under-
stand how the Foundation has assumed this importance, it is necessary to understand the history of the relationship between the College, the Department, and the Foundation.

The Forestry Foundation is as old as the forestry program at NC State, having been founded on April 15, 1929, by 4 persons (all of whom were NC State trustees at the time) to assist in preserving a tract of pine near Raleigh that could be used for demonstration and research. Later the scope of the Foundation was increased to cover most of the lands acquired for the Department of Forestry and Col-
lege. In this role, it supported the Director of the [then] Division of Forestry, Julius Hofmann, in acquiring the Hill Forest and, most significantly in the mid-1930s, nearly 80,000 acres of wetland in Jones and Onslow Counties, later named the Hofmann Forest. For the next 60 years the Foundation’s role was primarily to oversee, through a resident manager, the management of the Hofmann Forest and to as-
sist in obtaining funds to pay off the debt incurred when the land was bought. For many years this role involved oversight of the man-
age of the Hofmann Forest by Halifax Paper Company (later and, in succession, Albemarle Paper Company, Hoerner-Waldorf Corporation, and Champion International) which in 1945 had signed a 99 year contract to manage the Forest. The contract provided for some money to be paid to the Foundation and for the Foundation to harvest timber from a small portion of the Forest on its own. Funds derived from manage-
ment of the Hofmann Forest of necessity were devoted to paying off the debt on the property and only small amounts of money were made available by the Foundation for use by the College. In 1977 the Hof-
mann Forest was transferred to the NC State University Endowment, with the Foundation retaining management responsibility, inclusive of expenditures and receipts, with the College being the beneficiary. However, the amount of funds accruing to the College was never great. In fact, as recently as the mid-1980s, the amount made available to the College was scarcely $15,000 with no more than 2/3 of that ever going to the Department in any one year.

All of the forestry operations changed dramatically, however, when in the fall of 1986 Champion International announced its inten-
tion to walk away from its lease on the Forest. This meant that re-
sponsibility for management of the Forest reverted to the Forestry Foundation, the Foundation’s Forest Manager G. Edward (Eddie) Jack-
son, and his small staff. This unforeseen turn of events caused con-
siderable consternation in the College administration and the Founda-
tion. Given the immensity of the land area involved, and the limited
staff available, it was entirely unclear how a responsible job of managing 80,000 acres of wetland forest would be carried out.

These events, in the long run, proved to be the catalyst for forging a stronger working relationship between the College, Department, and Foundation. Early on, a collective decision was made that the Foundation itself would manage the Hofmann with significant input from Department faculty members, primarily Bob Kellison, Lee Allen, and Carlyle Franklin with Glenn Catts playing the major role in inventory and planning. Harold (Butch) Blanchard, a 1964 graduate of the Department, and his consulting firm were hired by the Foundation to succeed Eddie Jackson as Forest Manager, and to manage the Forest with input on planning and management practices from the Department. This arrangement was not without its problems, as Blanchard and some faculty members did not always see eye-to-eye on management practices. However, everyone involved realized that what they were managing would, in short order, become a “living endowment” for the College and looked past their differences to develop and execute a management program that would produce significant revenues for the College on a sustained basis. At the same time, the membership of the Foundation changed so that, by the early to mid-1990s, there had been a virtually complete changeover in its directors. The new directors of the Foundation saw their duties as transcending just management of the Hofmann Forest with support of the College and its programs as their primary mission. The Foundation also expanded its role to include fund raising to support College programs.

These changes have had a dramatic and positive effect on the College and all of its departments. The most recent budget approved by the Forestry Foundation contained over $300,000 for scholarships, operations, and research with funds provided to all departments in the College. In 2007-2008 funds derived from the Hofmann Forest allocated to the Department by the College supported 22 undergraduate scholarships and 11 graduate fellowships, provided salaries to support administrative assistance in several places in the Department, as well as operational support. In every sense of the word, the Forestry Foundation has played a major role in expanding College programs, supporting students in the College, and providing discretionary funds to be used to enhance operations. The Department has shared in these allocations of resources. Undoubtedly this close working relationship will continue under the NC State Natural Resources Foundation, Inc.

Clearly the Hofmann Forest has become the “living endowment” that everyone envisioned when Champion walked away from its contract. However, in the same way that endowments in the bank can suffer from the vagaries of the financial world, forests suffer from the whims of markets, weather, storms, and fire. It is fair to say that during each dry spring and fall and during the annual fall hurricane season, all administrators in the College and its departments say a silent prayer that the timber on the Hofmann Forest will be spared for yet another year.
IV. PHYSICAL FACILITIES

Raleigh campus facilities

In 1980 the Department was housed in Biltmore Hall, together with the rest of the School of Forestry (except Wood and Paper Science) having moved from Kilgore Hall in 1970. Biltmore Hall was planned in the early 1960s. Its construction was delayed a number of years as it was originally part of an higher education bond package that was defeated in 1963. Thus a building that was conceived in the early 1960s was finally occupied by programs that had experienced almost 10 years of growth beyond what was envisioned during planning. A major problem was the necessity to accommodate the Recreation Resources program that had been transferred to the School of Forestry in 1967 in a move that was not at all anticipated in planning for Biltmore. Between 1970 and 1980 the Department had grown substantially, adding several new faculty positions and two new research programs, the Forest Nutrition and Forest Engineering Cooperatives.

Thus, in 1980 the Department was occupying extremely crowded quarters. One symbol of the crowded conditions was that there was only one teaching laboratory for the entire undergraduate teaching program! It was used by dendrology and other forestry courses (silvics, management, aerial photography) either shared laboratories with other departments or went without. In some cases (silvics) no attempt was made to include a lab and in others (management) teaching was essentially all done in the field. It is doubtful that any other major US forestry program was carried on in more limited facilities than those at NC State. In fairness, the School administration was painfully aware of this situation and regularly included requests for new space in its biennial change budget. These requests never reached an high enough priority at the University or General Administration level to have any hope of being realized.

Obviously, this critical space dilemma was one of the first priorities facing Cooper when he became Department Head. Being unable to obtain or create more space, he sought to subdivide and make priority assignments of what space the Department did have as he made major reallocations of space during 1980-81. Several criteria were used in reassigning space one of which, how much time a faculty member actually spent in Raleigh, derived from the fact that the faculty members involved in the research cooperatives spent a good deal of their working time away from Biltmore Hall. The result of this subdividing and reassigning was that several very important programs (the Hardwood and Nutrition Cooperatives) were crammed into rooms that had been divided into cubicles smaller than prison cells and without windows. In response to one faculty member’s impassioned complaint about feeling imprisoned, Cooper offered to buy him a window, nail it on his wall, and
provide four changeable seasonal scenes. A flippant solution to an obviously serious problem!

Planning for a new building began in earnest during the early 1980s. In an attempt to make the proposal more attractive the new facility was designed around a “Natural Resources Research Center” concept involving Forestry, the Department of Marine, Earth, and Atmospheric Sciences, and the Water Resources Research Institute. Members of the School of Design faculty assisted in this planning effort, the result of which was a building in which most of the core natural resource programs at NC State were to work synergistically on the State’s natural resource management issues. The concept even included a position as coordinator of the Natural Resources Research Center whose duties were to facilitate the coordinated teaching and research of the occupants of the building. Although the building never achieved a very high place in University priorities it nevertheless was attractive to external constituencies. Through their support, and particularly that of the then Lieutenant Governor Bob Jordan, the building was eventually approved by the General Assembly and construction began in 1987 on a site immediately east of Biltmore Hall.

The decision to locate the new building adjacent to Biltmore Hall was not as easily made as one might suppose. At the time the new building was approved, the University was beginning construction on the Centennial Campus located south of the main campus on part of what had been Dorothea Dix Hospital property. Chancellor Poulton had put a great deal of pressure on the College of Textiles to locate its new facilities, which would house all of the Textile academic and research programs in toto, on the Centennial Campus rather than remodeling Nelson Hall where there was clearly no space for additional growth. For a variety of reasons, not the least of which was the fact that such a move would mean that the Textiles undergraduate program would become the first such program to locate away from the core of the main campus, Textiles resisted moving. Eventually, they did agree to move and it is now clear that this move was a very positive one for the Textiles program.

Similar pressure was brought on Dean Elwood to move the new Natural Resources Building to Centennial Campus. Ellwood and his Associate Deans and Department Heads to a person felt that this would be a major mistake as it would leave the College with its programs split between two separate physical locations. Eventually, this argument won the day and the new building was built next to Biltmore Hall. Although Dean Ellwood and his administrative associates believed that this location was the best decision for the College at that time, there was a general feeling, however, that viewed in the long perspective as to where the major growth of the University would be directed in the future, our successors years hence might view the decision to locate on the main campus as short-sighted in the extreme.

None of the planning for the new building provided any immediate relief for programs and faculty shoe-horned into Biltmore Hall. For-
tunately, other alternatives proved available. In 1982 Bill Dvorak and his CAMCORE program were moved to Grinnells Lab across Dan Allen Drive on Faucette Drive to the west of Biltmore. CAMCORE remained there for 25 years. The analytical laboratory that served the Forest Nutrition and Hardwood Cooperatives was moved in early 1983 to a new trailer complex across the Beltline where a number of agriculture research facilities were located. Throughout the 1980s the Loblolly Pine Tissue Culture Program, supported by industry funds through the Southern Forest Research Center (a School of Forest Resources entity manned largely by Department of Forestry faculty) operated out of a lab facility in the basement of Gardner Hall in Department of Botany space until it was terminated in the early 1990s. The Atmospheric Research Program, developed and funded largely through grants to Ellis Cowling from various sources and by the US Forest Service, was started and has spent its entire life in a trailer complex off Varsity Drive south of the McKimmon Center. Finally, the Forest Equipment Research Cooperative directed by Awatif Hassan throughout its existence occupied a small amount of space in Hodge Wood Products Lab. This arrangement was never at all satisfactory to Hassan or the occupants of Hodge Lab and was a continued source of low-level irritation to the Departments of Forestry and Wood and Paper Science until the Equipment Cooperative was dissolved. The Fisheries and Wildlife Program, jointly shared by Forestry and Zoology (until fall 2003 when it was transferred to Forestry) moved to a remodeled private dwelling, the Turner House, on the corner of Brooks Avenue and Hillsborough Streets in 1990 where it remains located today.

The new building was finally occupied in the spring of 1989. As no funds were available for moving or for new furniture, the actual moving of furniture and personal possessions was largely done by the students of the College Forest work crew. In a dedication ceremony in the fall of 1989 the new building was named Jordan Hall for the Jordan family. Jordan Hall offered the Department some relief from its space problems. The lion’s share of space in the two towers went to Marine, Earth, and Atmospheric Sciences with Forestry assigned the 3rd floor of one tower, several rooms on the third floor of the other tower, the fifth floor of one tower, and a part of the sixth floor. Only one program then located in a separate facility, the lab of the Forest Nutrition and Hardwood Programs, was relocated to the third floor of Jordan. The fifth floor space was assigned to the Computer Graphics Program of Forestry and Dr. Hugh Devine’s geo-based mapping program. The sixth floor space was ultimately assigned to the new Biotechnology Program headed by Ron Sederoff. Thus, although a number of faculty were moved into more satisfactory office space, only one outlying program was brought together with the bulk of the Department’s other programs. The others remained in their separate facilities throughout.

1 The Jordan family had a long connection with the College. Bob Jordan, who was so instrumental in obtaining funds for the building, his brother Jack and sister Genie all graduated from the College and all had made major contributions of time and wealth to NC State and the College.
the entire 15 years between the opening of Jordan Hall and its third tower.

Although the Forest Biotechnology Program was moved into space in Jordan Hall it was generally agreed that its rapid growth in faculty and graduate students and the increased sophistication of its lab facilities would quickly demand some other solution. Ultimately, this was achieved when the Program moved in 2000 into much larger facilities on the Centennial Campus. The space relinquished on the sixth floor of Jordan was taken over by the College of Agriculture and Life Sciences for use by an interdisciplinary instruction program in biotechnology.

The original plans for what was to become Jordan Hall called for three six floor towers at a total cost of upwards of $18 million. When Lt. Gov. Bob Jordan privately informed the College administration that it would be virtually impossible to obtain more than $11 million for the building, plans were scaled back to two towers. This decision meant that several programs and anticipated growth in the Department scheduled for inclusion in the new building could not be accommodated. Nonetheless, plans for the third tower remained alive, if dormant. Passage of the massive higher education bond issue in 2000 revived the 55,000 square foot project and in November 2005 construction was begun on the third tower. Occupancy took place during the late spring of 2007.

The Department occupies all of the second and third floors and half of the fourth and fifth floors. Two Environmental Technology labs are on the second floor and one ET research lab is on the third floor. Each floor contains 8-9 faculty offices and 1-2 bull pens for graduate students. Environmental technology occupies the second floor offices, CAMCORE and the Christmas tree breeding program the third floor offices, Forestry Extension the fourth floor offices, and other forestry faculty moved from Biltmore are on the fifth floor. Thus, all of the Department’s programs except for Tree Improvement and Rooted Cuttings have moved out of Biltmore Hall and are together in Jordan. The Fisheries and Wildlife and Biotechnology Programs, however, will remain where they are outside the Biltmore-Jordan complex with little hope that they will be united with the remainder of the Department any time in the foreseeable future.

In 1979-80 the Department had little in the way of dedicated laboratory space, either for teaching or research. Most research involved field studies and required little in the way of indoor lab space. Some exceptions to this were Tom Perry’s physiology lab on the second floor of Biltmore, another shared lab on the second floor of Biltmore used for soils analysis and dendrology teaching, and forest engineering work space in Hodges Lab.

Over the 30 years since 1979-80 there has been a dramatic change in this situation. New programs that demand dedicated lab space have
been established and requisite lab space and facilities developed. These include:

-- a soil and tissue analysis lab used primarily by the Forest Nutrition Cooperative, first fully developed in trailer facilities in Method and now located in the core of the western third floor of Jordan;

-- a rooted cutting facility with laboratory space on the first floor of Biltmore and additional greenhouse space;

-- the Forest Biotechnology Program, initially using the space in Biltmore made available when Tom Perry retired (now used by Anne Stomp in her bioremediation research), then moved to the fifth floor of Jordan, and finally to an entire floor of a research building on the Centennial Campus;

-- an earth observation center located in the core of the fifth floor of the west wing of Jordan. When Siamak Khorram arrived to handle remote sensing teaching and research, the Department had no facilities other than aerial photo equipment used in a shared lab on the third floor of Biltmore. Because of his joint appointment in Electrical Engineering, Khorram was appointed director of the Computer Graphics program shortly after his arrival in 1980. With this program’s facilities as a base, Khorram and his associates (primarily Hugh Devine in Recreation Resources and Heather Cheshire, one of his graduate students) built up what is now the Center for Earth Observation. The Center has a large teaching laboratory and research facilities including a specialized UNIX workstation, several powerful NT workstations, a softcopy photogrammetry work station, and other associated equipment.

-- in the new wing of Jordan Hall, fully equipped laboratories for teaching and research in Environmental Technology, plus lab space for CAMCORE and the Christmas tree program.

No discussion of physical facilities would be complete without mention of development of the Department’s computer capability. In 1979-80 personal computers were essentially unknown. The Department and College were relying on computing facilities provided at the University level that depended for input on cards processed on a punch machine. The first item resembling a computer was a dedicated word processor purchased by the Tree Improvement Program only after intense discussion with Dean Ellwood and Cooper as to the wisdom of the purchase. By the early 1980s the personal computer had become a reality, albeit an antiquated reality by later standards. Several faculty members obtained personal computers for their research and it became evident that this capability should be provided for students as well. The first such College-wide facility was a lab equipped with 20 or so Apple personal computers and a few IBM PC “clones” located in a second-floor room (2006) of Biltmore. It was loving known as the “Apple orchard.” It also housed the servers for the primitive beginnings of a College-wide computer network. Because the cost of such equipment vastly exceeded the meager equipment budget of any of the College’s departments, this lab served as a College-wide facility. With-

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2 Thanks to Gary Blank for providing some details on this facility.
in just a year or so Gary Blank had received a grant for word processing software to serve as an aid in improving the quality of student writing and Hugh Devine was using primitive graphics software to teach students to develop basic maps. Several years of forestry senior management plans were developed in this facility.

However, this first computer room was small, crowded, and due to the heat generated by the computers and bodies in the room, uncomfortable hot most of the time. Consequently, the College computer lab was shifted to a larger room (3032) on the third floor of Biltmore where it has remained ever since. Throughout the 1980s the College continually upgraded this computer lab and provided technical assistance to students and faculty, both in the lab and in faculty offices. As mentioned earlier, in 1987 the Department tied its computers together in a network by providing telephone wire connections running from individual offices to servers in the computer lab and began using Department-wide email, albeit in a severely limited form.

As a generalization, NC State University was slow and perhaps naive in its judgments as to how fast students and faculty alike would begin using computers in their everyday teaching and research work. Beginning in the early 1990s, the University began a crash program of updating computing capability throughout the entire campus. The College and Department shared in this program and within a short time full blown campus-wide computing capability, including email and administrative services was available. Since then campus, College, and Departmental computing capability has continued to grow and by 2008 had become state-of-the-art and an indispensable part of the administrative, teaching, research, and outreach functions of the College and University. The College computing lab on the third floor of Biltmore has regularly undergone equipment upgrades and is now an integral part of instruction in the Department. In addition, the College employs a PhD level information technology specialist, a hardware specialist, and several associates who provide professional-level guidance in all areas of information technology.

**Summer Camp facilities**

A discussion of the Department’s physical facilities would be incomplete must consider the Hill Forest facilities that are so essential to the summer camp program. The Hill Forest Camp facilities were initially constructed by Civilian Conservation Corps workers in the mid-1930s using materials harvested on the forest. Ever since, construction of additional Hill Camp facilities has never involved State funds and has always been either with moneys derived from operation of the Piedmont (Hill, Schenck, Hope Valley, Goodwin) forests or from a fund held by the North Carolina Rural Rehabilitation Corporation that was composed of moneys derived from the forced sale of a part of the Hope Valley Forest to the Corps of Engineers for construction of the B. Everett Jordan Reservoir. Use of these funds had to be approved by the Corporation and initially had been used for land acquisition. Later an agreement was reached that they could also be used for facility construction and improvements on the School Forests. Use of the
proceeds from timber sales on the Piedmont forests was greatly hampered because they had to be budgeted and spent on a fiscal year basis with limited carry-over authority to the next fiscal year. Thus, a building project had to be carefully manipulated so that planning took place in one fiscal year with construction and payment for work begun and completed in the next fiscal year.\(^3\)

In 1980 an expansion of the camp, necessitated by growth in student numbers, advent of women into the program, and addition of the Wildlife summer camp in the 1970s, had just been completed using both School Forest receipts and Rural Rehabilitation funds. It involved construction of 5 new cabins, a new bath house facility, a classroom building, a tool shed, and a caretaker’s cottage at the entrance to camp. However, the original buildings of the camp (the lodge, faculty cabin, Thacker House, dining hall, and garage/work facilities) remained much as they had been since World War II.

Although the new classroom opened in 1979 was vastly superior in construction to its predecessors, it proved to be uninhabitable after mid-day. Addition of insulation and a large exhaust fan provided only marginal relief. Learning and teaching in that building were not easy experiences what with the steady beat of the exhaust fan and heat oppressive enough to put teacher and student alike asleep. In the spring of 1991 the classroom building was air conditioned, not only to make instruction more comfortable, but also because it was necessary to protect the computers that came into widespread use at summer camp in the late 1980s.

Another essential project was remodeling of the kitchen and dining hall located in an old World War II barracks building which was badly in need of an overhaul. In the spring of 1982 the dining hall was improved and a new ice machine added. Plans for a new kitchen were approved and new equipment purchased in 1982-83; the kitchen itself was finished in 1983-84 in time for use during the 1984 summer camp program.

The septic tank and waste disposal facilities, though not as exciting as buildings, were obviously essential to the smooth operation of summer camp. For years the camp got along with a system that needed constant upkeep and repair. Visitors to the camp looking for Larry Jervis often found him down with some students digging out the septic lines to remove beer cans or other debris that some disenchantment students had thoughtfully stuffed down the commodes!

The potable water supply was an equally serious problem. Since the beginning of summer camp in the 1930s water was taken from a driven pipe in a spring on the slope above camp. This source proved adequate and passed all health testing for years. Although the system

\(^3\) See the Section on College Forests for a further elaboration of this problem.
never ran completely dry, there were times during particularly dry summers when water was scarce.

The urgency of repairing these basic utilities led to a decision in 1994 to seek permission to use one-half of the remaining $450,000 Rural Rehabilitation land acquisition fund toward camp renovations. These proposed renovations included upgrading the wastewater treatment system, replacing the men’s toilet building, construction of additional student and faculty housing, and expanding the dining hall. All work was to be completed by the 1996 camp season. This proved to be an optimistic plan!

In 1996-97 a new toilet and shower building was completed and a new well drilled. Planning for the waste disposal system ran into continued snags with contractors and County and State permitting authorities. Ultimately approval to construct the new waste disposal system was obtained and it was completed in March 1999. These three projects used $274,000 of the available money and improvements to housing and the dining hall were deferred.

The Thacker House, located on the far side of the lake and used for years as faculty housing, was razed in 2002-2003 and new faculty housing was erected in time for the 2004 camp session. This new facility allows for several faculty members to reside at summer camp at the same time and is winterized for year-round use.

Plans for new dining hall are moving ahead and construction is contingent at this time on selling the Hope Valley Forest.
V. UNDERGRADUATE CURRICULUM

When reviewing the history of the Department’s undergraduate curricula and program one wonders if “there is nothing new in the world” and that “history does indeed repeat itself” for these statements seem true about the Forestry curriculum at NC State. Although there is a certain circularity in the curriculum changes between 1979 and 2008, the overall trend has been toward leaner, more focused programs with fewer opportunities for free study (electives) and greater incorporation of new technology and changing social values. There also is no doubt that the undergraduate program in its entirety has improved in many ways and that it is richer in opportunities, by any measure, in 2008 than it was in 1979.

Majors

In 1979-80 the Department had two undergraduate majors, Forestry and Conservation. The Forestry curriculum had, of course, existed literally since the beginning of the School in 1929, whereas the Conservation curriculum, which was jointly administered with the School of Agriculture and Life Sciences, was created in the late 1960s to serve students whose interests lay more in the area of natural resources and the environment. By the 1980s enrollment in the Conservation curriculum had declined and it was perceived by faculty and students alike as a weak program with insufficient depth in any area of study. After a number of years of committee study and intra-College discussion, the Conservation curriculum was replaced in the mid-1990s by a Natural Resources curriculum, jointly administered by the Colleges of Forest Resources and Agriculture and Life Sciences, and the Department of Marine, Earth, and Atmospheric Sciences. The Natural Resources major administered by Forestry had two concentrations: Ecosystem Assessment and Policy and Administration.

Between the mid-1990s and 2008 the Department added three additional curricula, Environmental Science: Watershed Hydrology, Environmental Technology, and by transfer from the Department of Zoology, the Fisheries and Wildlife Science Program. Whereas the Natural Resources concentrations, Hydrology, and the forestry-related parts of the Fisheries and Wildlife Program were taught by existing members of the Department of Forestry, the Environmental Technology Program was an entirely new venture requiring the addition of several faculty with the expertise required to teach the specialty courses, particularly the laboratories, required in the new program.

Enrollment

The story of enrollment in the Department of Forestry’s undergraduate programs between 1979-80 and today very clearly parallels the
changes in public attitudes toward forestry and natural resources during the same period, reflecting the decline in respect for the forestry profession and rise in interest in "environmental" education. In 1979-80 undergraduate enrollment in all Departmental programs was 281, having declined sharply from a peak of 464 in 1975-76, with about 90% of the students in Forestry and the remainder in Conservation. That decline in enrollment continued uninterrupted, reaching a low between 160-170 by the late 1980s. At the same time the percentage of students majoring in Conservation rose to roughly 25% in the early 1990s and then to 40% when the Natural Resources curriculum became available in 1993. The number of Forestry majors rose slightly to between 150-180 during the 1990s and then declined markedly to 83 by fall 2007. While this decline in Forestry enrollees was occurring, enrollment in Natural Resources also declined slightly from about 100 in the early 1990s to 34 in fall 2007. Enrollment in the Environmental Science: Watershed Hydrology option also declined from over 20 to 6 over the same period. However, enrollment in the new Environmental Technology curriculum (88 students in fall 2007) together with the more than 100 Fisheries and Wildlife Sciences students now included in the Department’s student head count, produced an increase in total undergraduate enrollment to slightly over 345 by fall 2007.

Although total undergraduate enrollment in the Department remains above 300 with two programs growing in size, the enrollment situation in the Forestry program has to be a major concern to the Department and should be a major concern to the forestry community in North Carolina. The number of young people studying forestry at NC State has declined from over 400 in the mid-1970s to under 100 in the mid-2000s. Thus, although the Department’s total number of enrolled students is relatively robust, forestry in the classical sense is no longer the discipline that drives what the Department teaches. The Department’s recent change in name from Forestry to Forestry and Environmental Resources clearly updates its name to describe its current undergraduate student population and what it sees as its future educational clientele. As opportunities arise in the future to replace faculty who leave or retire, it may become difficult to justify maintaining a full range of expertise in forestry disciplines when making new hires. Then again, the Department’s graduate student and research programs may rescue its undergraduate teaching program as they have in the past.

It is worth noting that this situation is not unique to NC State; enrollment in forestry is declining in virtually all US and Canadian forestry schools. This enrollment decline is clearly associated with declining job opportunities in both public and private forestry. Although persons will still be hired to manage the nation’s forest lands, it appears that the training required of these hires will be different from that offered in “traditional” forestry programs. The Department has been wise to broaden its educational programs and thus position itself to continue as a prime source of forest land managers although the educational background of those land managers will be much different than in the past.
Recruiting

As a result of declining enrollment in the early 1980s, and in an effort to attract more minority students to the Department, a program of student recruiting was begun. This program started in the fall of 1983 when Jerry L. Bettis, the Department’s first black faculty member, was hired to develop and carry out a student recruiting program. Half of Bettis’ salary was paid by Weyerhaeuser Company for several years after his move to the Department. Furthermore, the unwritten expectation was that Bettis would complete a Master’s and perhaps Doctor’s degrees and assume a larger role in the academic life of the Department. Bettis’ recruiting efforts over the remainder of the 1980s met with middling success at best. Although student enrollment did begin to increase, the number of black students attracted to the program remained small and hardly representative of the effort Bettis put into his work. In the fall of 1990 responsibility for all College recruiting programs moved to the office of the Associate Dean for Academic Affairs. A full-time employee was hired and College and Department recruiting efforts were coordinated there until the summer of 2007 when Shannon Shinault was hired to manage recruiting efforts as well as to deal with retention, outcomes assessment, and placement.

As a part of efforts to increase enrollment of black undergraduates in 1985-86 the Department began discussions about broadening the base of schools from which students transferred to NC State. In a direct effort to increase minority enrollment, a transfer program with North Carolina A. & T. State University was discussed. These discussions initially concentrated on a traditional transfer program with students obtaining their general course background at A. & T. and then moving to the Department to complete their forestry study. Their degree would be awarded by NC State. This concept never was acceptable to A. & T. because it would result in a net loss of graduates for them. After extended discussion the proposal was altered to a 3 + 2 program, with the student completing 3 years at A. & T. and 2 at NC State with Bachelor’s degrees awarded from both institutions. An agreement on such a program was signed during the 1989-90 school year and the U. S. Forest Service assigned an employee, Dr. Lincoln Moore, to the A. & T. campus to teach the necessary introductory courses. Although the necessary courses were actually taught at A. & T., no student ever transferred to NC State to complete the program.

In 1988-89 Jim Gregory and Gary Blank traveled to the Haskell Indian School in Kansas in an effort to develop a transfer program for Native American students. In addition, visits were made to Cherokee, NC, and to the Intertribal Council Timber Management meeting. Nothing came of any of these overtures.

The availability of scholarship money is obviously an important element of a successful student recruiting program. In 1980-81 the Department’s undergraduate scholarship budget was $6,750 provided by 5
endowed accounts. These funds, which came largely from timber harvests on the Goodwin Forest, supported 8 students; the largest award was $1,000. As monies from various sources, including scholarship endowment gifts and funds derived from management not only of the Goodwin Forest but also the Hofmann and Bull Neck Swamp Forests, increased the number and diversity of scholarships the Department could offer increased dramatically. In 2007-2008 the undergraduate scholarship budget was $261,500. Roughly one-third of these funds come from endowed accounts and the remainder from management of the various forests. The funds support 68 undergraduates. Although the largest award is $11,800, most are about $4,500. It is impressive to note the number and variety of scholarships and recipients recognized during the academic awards banquet now hosted by the Forestry Foundation each spring. In this regard, the Department has come a long, long way since 1980.¹

The Curricula

Forestry

The Forestry curriculum underwent almost continuous revision between 1980 and the present. Analysis of these revisions reveals the faculty’s efforts to provide an education that reflected the evolving needs of forestry professionals, that incorporated emerging technological changes in the field, and that met changing University requirements.

The curriculum in effect in 1979 had not been significantly revised in a number of years. It underwent a thorough revision in 1980-81 as a result of studies conducted during the University’s required 10-year review of curricula. Changes made represented adjustments due to retirement of several key faculty and to the influx of new faculty, both occurring in the late 1970s. The changes responded to the views of faculty and employers that graduates at that time were weak in communication skills, needed computer and remote sensing skills, took junior-senior courses that needed more emphasis on silviculture (particularly of hardwoods) and did not have sufficient quantitative skills. The course of study approved beginning in the fall of 1981 called for completion of 141 semester hours with 9 of these in a required summer camp program of 9 weeks. Features of the curriculum were:

- two semesters of freshman English taken consecutively with a grade of C or better
- mathematics through calculus
- 25 hours in the basic physical, biological, and soil sciences

¹ Information on the undergraduate scholarship program was provided by Richard Braham who has been a member of the Scholarship Committee from its inception in 1980. He has chaired the committee ever since Don Steensen’s death in 1989.
• 60 hours of forestry courses including a junior-senior sequence of silvics, silviculture, land management, and planning
• 15 hours of forestry concentration electives in one of 14 identified areas of forestry
• 21 hours of humanities/social science and free electives
• summer camp with 2-hour courses in silviculture, forest biology, and forest protection and a 3-hour course in mapping and mensuration

This 1981 curriculum serves as a base-line against which to measure both subsequent changes in the forestry program and efforts to include new technological advances in land management while at the same time meeting more restrictive University requirements.

One of the most important systemic changes in the curriculum was a writing-across-the-curriculum requirement. Recognition of the fact that forestry students (in reality all NCSU students at that time) lacked skill in written communication led the Department to hire Gary B. Blank, a Department of English lecturer, quarter-time in 1979. In 1981 Blank was appointed as a Lecturer in the Department of Forestry with half of support coming from the College of Engineering for work in its Writing Assistance Program. This arrangement lasted until 1988. Blank's responsibilities were to provide individualized assistance to forestry students with writing problems and to assist the faculty to develop a writing-across-the-curriculum requirement. As a result of Blank's efforts, and with the cooperation of the faculty, writing requirements in many courses were strengthened. Strong writing requirements remain a cornerstone of the Forestry curriculum even today.

The intensive curriculum review that resulted in the 1981 curriculum also led to a number of other changes, at least three of which are reflected in 2006. The first of these was the extension of the University C-wall rule so that it applied to eight required courses in the Forestry curriculum and to the required course in statistics. In addition, a grade point average of 2.0 or better was required for entry into summer camp. These changes, which the University allowed departments to make applicable to their curricula, were a result of what both the faculty and employers of graduates generally believed was an insufficient University requirement for graduation then in force. From 1974 to 1982 there was no University grade point average required for graduation. By 1980-81 this permissive rule had been altered to allow departments to count only 12 hours of D toward graduation. Departments were also permitted to designate courses in which a D grade could not count toward graduation. Nonetheless, a number of employers of forestry graduates still were pointedly enquiring as to what assurance they had that a student graduating under these University requirements was a competently-trained forester. The faculty sought to provide this assurance by requiring that a grade of C or better be earned in 8 "core" forestry courses (those at the junior-senior level).
and one statistics course. That requirement remained in force until the curriculum revision of 1997 when it was replaced by a Major Grade Point Average of 2.0 or better in all major courses.

The need to maintain more systematic and continuing oversight of the Department’s undergraduate academic programs became apparent during the work leading to the 1981 revision of the Forestry curriculum. Consequently, a Departmental Courses and Curriculum Committee was established and charged with maintaining the required oversight. Tom Gemmer chaired this committee until his death in 1983. Others who have chaired it are Jim Gregory 1989-1994, Dick Lancia 1994-1997, Awa-tif Hassan 1997-2003, Joe Roise, 2003-2007, and Gary Blank 2007 to present. In addition, an Advising and Scholarship Committee was also established and chaired by Don Steenssen until his death in 1989; Richard R. Braham has chaired it since 1989. It was charged with administering the Department’s undergraduate advising program and awarding the scholarships that the Department was able to offer. Both of these committees became Departmental standing committees and exist today. As the number of scholarships the Department could offer increased dramatically, and as an oversight role for the College advising program was developed by the Associate Dean for Academic Affairs, the purview of the Advising and Scholarship Committee was reduced to oversight of the scholarship program only.

One thing that became clear as a result of the work leading to the 1981 curriculum was the central role that computer technology would play in education of foresters in the future. Because this fact also became evident to the other departments in the School and because the costs involved would far outstrip any funds available to a single Department, the School established its first computer laboratory in the fall of 1982. This lab, now located in 3006 Biltmore, was then affectionately referred to as “The Apple Orchard” because it consisted of 25 Apple II computers. This lab has grown over the years until it is now well-stocked with state-of-the-art computers with the appropriate software required for instruction in the College’s course offerings.

The process involved in the 1980-81 curriculum review showed the importance of, and need for, a continuing process of course and curriculum evaluation. Accordingly, the new Courses and Curriculum Committee developed a process for evaluating courses beyond that required by the University at the end of each semester. It involved mid-semester student evaluations and a peer review process. This system was effective for several years but gradually went out of use as other evaluative activities were developed.

Material submitted to the University with the 1981 curriculum included a statement of the objectives of the curriculum, one of which dealt with ethics. The importance of this objective was driven home by a court case in which one of our graduates had become involved. Thomas O. Perry, who had taught the young man involved, was called as a character witness. After his testimony, the judge pointedly asked
Perry if we "taught our students anything about ethics" while they were with us. This episode, coupled with another similar case involving one of our graduates, jolted the faculty into a greater concern with ethics and professionalism, which was reflected by dealing with these subjects at numerous places throughout the undergraduate program and particularly in summer camp.

Several problems emerged early on in implementation of the new curriculum. Integration of transfer students into the forestry program had always been difficult, particularly in a way that would not obligate them to take 5 years to finish. The new curriculum did nothing to ease this difficulty. The transition most transfers had to make directly from their sophomore year at their first institution into summer camp at NC State had proven particularly difficult. In an effort to deal with this problem, a short-lived, ill-fated experiment with an intensive one-week course teaching dendrology and elementary mensuration was offered after the end of the regular semester and before summer camp. The experiment did not work. To deal with the wide variation in mathematics skills of entering freshmen, 3 "tracks" were developed based on math ability as predicted by math admissions scores. The dendrology course was eliminated.

The occasion of a 10-year Society of American Foresters Accreditation review in 1984 led to an intensive review of the 1981 curriculum by faculty, alumni, and persons who hired our students. The conclusions reached were that the curriculum was basically sound and that a broad science/forestry background was better than specializations that necessarily would be limited in scope. As a result of weaknesses identified by the Department’s preparation for the Accreditation review, the following significant changes were made:

- The introductory course (FOR 110) was strengthened and its forestry content broadened.
- A policy course (FOR 472) was added as a requirement.
- Changes were made to meet the new University Humanities/Social Sciences requirements.
- The concentration requirements were eliminated.

Steps were taken to broaden the base of undergraduate advisers by using a larger number of faculty as advisers. A number of research faculty readily agreed to handle a limited load of undergraduates, thus enriching the available pool of advisers. The review also revealed that a course in wood procurement should be available. This problem was met by offering a "mini" course in procurement during spring break in 1986; this later evolved into a regular course.

During the fall semester 1984 freshman orientation was shifted from June to August before the beginning of classes. Cooper felt that the June orientation occurred at a time when students were barely removed from high school and not yet ready to think about college. As he put it, "their bodies might have been at State for orientation, but
their minds were at the beach.” He felt that an orientation in the days immediately before classes would allow the Department to orient “both their minds and bodies” to the academic experience on which they were about to embark. The orientation began with a picnic for new students and their families at the Schenck Forest and continued with one day at the Hill Forest and another on campus. Although the program accomplished the objectives that Cooper set out for it, the logistics were difficult (one year a bus broke down stranding a number of students, not a good first impression!) and the program was never especially popular with the faculty. It was eventually abandoned with incoming freshmen participating in the early summer orientation with all other new students. However, the picnic in late August for incoming students and their families remains a Department tradition.

In order to fine-tune the curricular changes that had just been made, the faculty fully reviewed the program during the 1985-86 academic year. As a result:

- Two new curricula, Forest Management and Forest Science were developed.
- A new course in management science (FOR 434) was developed to be taught both for Forestry and Wood Science majors by Joseph P. Roise.
- The Physics requirement was strengthened from one 5-hour course to a full year sequence in Physics.
- General Ecology was added as a requirement.

Required hours remained at 141. This new program was submitted to the University and approved in spring 1987.

Curriculum changes over the next few years were limited. Discussions continued concerning more effective sequencing of the junior-senior courses, and summer camp hours were increased from 9 to 10, the Science Concentration was dropped in 1992 due to low enrollment, and the curriculum was renamed Bachelor of Forest Management. Perhaps the most important development was that of a new College-wide computer course, CFR 134, to be taken in the first semester of the freshman year. In the Forestry program this course was integrated with the first course in forestry (FOR 110), with the requirement that all writing assignments must be done with a word processor. These changes were incorporated into a curriculum revision approved in 1989, again with 141 total hours. At the same time these changes were being developed, there was discussion concerning a possible Forest Engineering Concentration to be added to the Management and Science Concentrations. Although these discussions continued off and on for several years, nothing ever came of them.

The Department also participated in an experiment proposed by the English Department that its students enter directly into the second freshman English course (ENG 112) with the intensive writing experience in FOR 110 taking the place of the first freshman composition
course. Although Forestry students did seem to do better in ENG 112 this experiment was abandoned after several years. The increases in emphasis on quantitative methods and computer skills in the several junior-senior courses created problems for instructors and students for several years; the problems eventually decreased as the more intensive quantitative requirements of the first two years began to have a positive effect in the junior-senior courses. One of the most important curricular changes took place in the early 1990s when several new instructors were integrated into the junior-senior courses on a rotating basis. This had the effect of diversifying the faculty to whom upper level Forestry students were exposed, thus meeting a criticism that had been raised for several years that juniors and seniors were effectively taught by a small number of faculty.

During the early 1990s considerable public debate arose when it became known that the majority of students in the UNC system were taking about 5 or more years to graduate. A number of factors were suggested as being the causes of this phenomenon, among them being the fact that many curricula required more, and sometimes many more, than the traditional 120 hours for graduation. With its 141 hours for graduation, the Forestry curriculum was particularly susceptible to this criticism. During the 1992-93 academic year the UNC Board of Governors instituted a requirement that any curriculum with hours-to-graduation greater than 128 must be submitted to the UNC Board of Governors for approval, and any curriculum exceeding 135 hours must be advertised as a 5-year program. Although it could be legitimately argued that the Forestry curriculum was really four academic years requiring 131 hours with 10 of its hours in a required summer program, it became clear early on that University authorities were unlikely to accept this argument and that, even if they did, the process for reviewing a curriculum in excess of 128 hours would be lengthy at best. It was generally accepted that advertisement as a 5-year curriculum would negatively impact enrollment and therefore was not an option. Thus, the Forestry faculty was faced with the task of cutting at least 13 hours out of a curriculum that it already perceived as having little room for major change. To further complicate the matter, after many years of discussion, the University approved its first substantive change in general education requirements in 1992.

Fortunately, the necessity to integrate these significant new requirements in the Forestry program coincided with the work necessary for the curriculum’s 10-year SAF accreditation review scheduled for 1994. The faculty also had available the results of two full years of implementation of its outcomes assessment program. Extensive discussions led to a consensus for change in a number of areas:

- Increased emphasis on ecosystem processes and non-timber values
- Increased mensuration field practice and reinforcement of mensuration skills in upper level classes
- Instruction in forestry operations
- Additional emphasis on wood products
• Updating forestry core courses to stay abreast of changes in the profession
• More attention to ethics and leadership skills

The major changes in the curriculum were:

• Reduction of required hours from 141 to 126 including summer camp by dropping all advised and free electives with a consequent loss of virtually all flexibility in the program
• Incorporation of the University General Education requirements
• Addition of a course in Wildlife Management
• Dropping of several non-forestry courses and re-sequencing a number of forestry courses to accomplish a better integration of the courses in the junior and senior years
• A major revision of FOR 434 (Management Science) into a course with focus on forest operations and analytical decision-making tools

This curriculum became effective in the summer and fall of 1994 and was the academic basis for reaccreditation of the forestry program by SAF. In its response to the accreditation visit the SAF review team identified a lack of public speaking requirements in the 1994 curriculum. Under new Department Head Fred Cubbage this deficiency was addressed in a memo to SAF about treatment of oral communications in the forestry program and the program was subsequently fully accredited.

The faculty was never happy with the 1994 curriculum’s severe limitations on flexibility. Consequently, faculty analysis of each element was begun shortly after its approval and a revised Forest Management program requiring 128 hours and allowing 9 hours of advised and technical electives was approved in 1996-97. The ten hours of new requirements were realized by:

• Increasing the total required hours from 126 to 128
• A reduction by the Department of Mathematics in credit hours for a required calculus course from 4 to 3
• Elimination of a second course in Physics (this change had been debated for the last several revisions and had always been rejected by the faculty as weakening too much the physical science requirements of the curriculum. The need for elective hours had finally trumped the perceived importance of physics!)
• Ecology was used to meet the University requirement for a Science/Technology/Society elective

This curriculum became effective in June of 1997 and was the basis on which the Forestry program’s SAF accreditation was extended in 1999.

As a part of its ongoing process of curriculum review in August 2002 the Department again convened a meeting of faculty, alumni, and
employers. This review differed from previous curriculum reviews in that it was conducted by a facilitator and a series of specific recommendations based on results of the discussions emerged. These were:

- More flexibility in course selection should be provided
- The program should be broadened in scope
- More emphasis should be placed on personal skills development, especially in communications, critical thinking, and leadership

To meet the recommendations for greater flexibility and breadth in course selection the curriculum was revised to include 6 concentration areas: Business, Biology, International Forestry, Management, and Related Areas (the latter designed to allow students to branch out into other disciplines related to forestry) in the original revision and Urban Forestry was added in 2006. Writing and speaking communication skills were taught, as they had been for the last 25 years, both on an across-the-curriculum basis and in a special 1-hour sophomore-level course. This curriculum, approved in 2003, was the basis of the 2005 SAF accreditation of the Department’s forestry academic program.

Examination of the specific changes made to create the 2003 curriculum and comparison with previous curricula reveals some major changes in philosophy and requirements. These changes, it appears, were necessitated in order to accommodate general University curriculum requirements and to incorporate the faculty’s view that the education of forestry professionals demanded a broader and different set of knowledge and skills than in the past. The most important changes in course requirements were:

- Reduction in the breadth of science requirements by replacing General Biology with Plant Life, by requiring either a second course in Chemistry or a course in Physics rather than both, and by replacing General Ecology with a new course in Forest Ecology
- No course in computer use was required as it had become apparent that virtually all students brought the requisite skills with them from high school. Application of computer technology to forestry was taught on an across-the-curriculum basis

A number of important changes were made in Forestry course requirements, including:

- A course in forest insects or forest pathology, not both
- A new mensuration sequence, running from the sophomore year through summer camp and the junior year (FOR 172, 273, 374), was created
- A new sequence of four one-hour professional development courses (FOR 150, 250, 350, 450) was created to cover criti-
• Critical thinking, communications, professional ethics, and leadership
• A return to a minimum grade requirement (C-) in all core forestry courses for graduation.

Comparison of the Forestry curriculum of 1980 with that of 2005 reveals both significant consistencies and major changes in the philosophy underlying the program. Throughout the 25-year period a set of forestry courses, from an introduction through dendrology, several configurations of mensuration courses, silvics, silviculture, economics, management, and planning remained the core of the curriculum. Courses in remote sensing and policy added in 1981 remained as requirements throughout the period. There has also been a consistent belief in the importance of writing and speaking skills as illustrated by the continuing writing-across-the-curriculum commitment embodied in all curricula and the special communication course in the newest program. Likewise, there has always been a commitment to advanced mathematical skills as embodied by a requirement for courses in calculus and statistics. The need for computer skills was first recognized in the 1981 curriculum and a course, as well as integration of computer technology into most forestry courses, were the vehicles to achieve this objective. When it became clear in the early 2000s that a basic course in computer use was not needed, computing skills across-the-curriculum were retained as an educational objective.

Despite these consistencies there have been some major changes that have significantly altered the curriculum. The most important of these has been the reduction in total hours from 141 to 128 essentially mandated by the UNC system’s decision limiting 4-year curricula to no more than 128 hours. As a consequence of this requirement, the total number of basic science hours has been reduced from 25 in 1981 to 16 in 2005. In addition, the number of hours of humanities and social science electives has been reduced from 21 to 12, with no purely free electives as there were in 1981. This seems ironic in that the new General Education requirements of the University that went into effect at the same time as the 128 hour limit were designed to provide greater breadth to what was perceived as the unreasonably narrow requirements of specialized curricula such as forestry.

The faculty’s view of the need for, and nature of, concentration areas changed several times over the period from 1980 to 2005. The curriculum in force in 1981 had 14 concentrations which were eliminated in the 1984 revision. Shortly thereafter, two concentrations, Management and Science, were created with Science soon being eliminated due to a lack of student interest. The 2003 curriculum returned to the multiple concentration philosophy, establishing 5 concentrations. However, it appears that the concentrations of 2003 are different from those of 1981 in that they are designed not so much to promote depth in an area of forestry as to allow the student to branch out and explore forestry’s interfaces with emerging areas that will influence the profession in the coming years.
Conservation, later Natural Resources

The Conservation curriculum, a joint venture of the Schools of Forestry and Agriculture and Life Sciences, was approved in the late 1960s in response to the need for an academic program meeting the needs of students with interests in the "environment" as opposed to forestry. It underwent no major changes from the time it was created until it was replaced by Natural Resources in the 1991-92 academic year. As pointed out earlier, enrollment in Conservation ballooned in the mid-1970s but declined dramatically thereafter.

The professed strength of the Conservation curriculum, its breadth, was also its greatest weakness. The program had the same broad base in basic science as the forestry program and required basic courses in resource management areas including forestry, geology, soils, marine science, recreation, economics, watershed management and either wildlife or fisheries. However, no second level courses in these areas were required, so to build the requisite depth in knowledge appropriate to a trained resource manager the student had to use electives. Some students did so, but many did not. Furthermore, there were no integrative courses that tied together the intricacies of management of one resource with management of others. There was one concentration area, Natural Resource Management and Administration, in the Forestry Conservation curriculum and 4 others, Environmental Technology, Communications, Environmental Education, and Soil Conservation, in the Agriculture and Life Sciences Conservation curriculum.

Although the Agriculture and Life Sciences experience with its Conservation program was generally good, Forestry's was not. After its period of heavy enrollment in the 1970s, enrollment declined and a progressively greater number of weak students enrolled in the program. In addition, the faculty viewed the curriculum as fundamentally flawed because of its lack of depth in any area of resource management. As a result there was little enthusiasm for the program in the Department.

However, by the late 1980s it became obvious to the Department that a Forestry curriculum alone would not satisfy the needs of students expressing interest in natural resource management and that at least one viable alternative was needed. Consequently, in 1987-88 work was begun on revising the Conservation curriculum and converting it into a Natural Resources curriculum. Whereas this effort was viewed as absolutely essential to the Department's future, the College of Agriculture and Life Sciences was initially cool to the proposed change, largely because it viewed the Conservation curriculum it administered as meeting the needs of its student clientele. Because of this very different view of a shared curriculum it took until 1991-92 for a new Natural Resources curriculum to be approved by the University. The major changes made were elimination of unused concentration areas and a strengthening of the course structure of the program. The strong breadth in basic and natural resource science was maintained but to this was added a series of new Natural Resource courses, all to
be taught by Forestry faculty, designed to tie together resource management courses and to present concepts that were common to all areas of natural resources planning and management. Two concentration areas were proposed in Forestry, Ecosystem Assessment and Policy and Administration. Although the curriculum had not yet been approved, it was agreed that a section entitled Natural Resources listing all related courses would appear when the University catalog next appeared in 1992.

Because basic agreement had been reached on the structure of a Natural Resources curriculum, and because the Department of Forestry needed the up-to-date program to attract badly-needed new student enrollment, the Department advertised the opportunity to study natural resources that the new curriculum offered by enrolling students into Conservation with the understanding they would be transferred to Natural Resources once that curriculum was approved. This resulted in a rapid increase in enrollment in Conservation in 1990 and 1991 and an enrollment of 115 when the Natural Resources curriculum became effective in the Fall of 1992. The curriculum has maintained a healthy enrollment ever since.

Limited changes in course content and total hours were made in Forestry’s Natural Resources curriculum effective in the summer of 1994. Further, more substantive course changes were made effective in the summer of 2003. In addition, two more important changes were made. One involved structuring the technical electives into two categories, Biological Sciences and Management Sciences. Students in the Ecosystem Assessment curriculum were required to take 18 hours of Biological and 6 hours of Management courses with majors in the Policy and Administration program required to take 18 hours of Management and 6 hours of Biology courses. The other important change involved addition of a summer practicum requirement between the junior and senior years. Students prepared for this with a one-hour course in the fall of the junior year and reported on their experiences in a one-hour course in the fall of the senior year. These changes remain in effect today. Enrollment currently is about 50 students (~15% of departmental undergraduate enrollment).

Environmental Sciences, Watershed Hydrology

During the 1990s the Colleges of Agriculture and Life Sciences, Physical and Mathematical Sciences, and Natural Resources cooperatively developed a number of Environmental Sciences curricula. Forestry participated in this program through development of a special degree program in watershed hydrology (Environmental Sciences, Watershed Hydrology). Jim Gregory was the driving force behind development of this program, and he served as advisor for students in the program since it became effective in January 1995 until his retirement.

As might be expected the curriculum, although strong in all the basic sciences, places emphasis on the physical sciences, particularly those with direct relevance to water management. In addition it requires students to take courses in Civil and Biological and Agricultu-
tural Engineering and the courses that are common to all the Environmental Sciences programs. The curriculum underwent a minor revision that was approved in August of 2003. Enrollment during the first 7 years of the program averaged nearly 20 students; now, however, it is below 10.

Environmental Technology

The Department’s newest curriculum, Environmental Technology, became effective in August, 2003. Planning for this program goes back a number of years into the late 1990’s during the closing years of Larry Tombaugh’s tenure as Dean. Tombaugh sensed that the College needed a new academic program to fill a void in an important area of resource management at NC State and to compete with environmental programs developing on other campuses in the State. The program he envisioned was one that combined an understanding of environmental processes and systems with monitoring and assessment of those systems and that focused on hands-on experience in analysis of ecosystems and their condition. The curriculum would fit in the void between the purely engineering approach to environmental management and the other resource-based curricula offered at the University. Ted Shear was asked to lead planning for this program. Shear undertook this responsibility with an enthusiasm that belied the fact that the better part of his salary at that time he himself earned through research grants in environmental restoration.

After several years of effort a curriculum was developed and approved that mixed basic biological and physical science courses and university general education requirements with a four-year sequence of 13 new courses (plus one cross-listing with MEAS) in Environmental Technology. These courses include instruction in field and laboratory monitoring of the properties of water, air, soils, plants, and ecosystems, spatial information technology, assessment of and response to hazardous materials, laboratory safety, environmental regulation and assessment, forensics, and preparation for professional certification. The program also requires a summer practicum between the junior and senior years. Although Shear continues as a faculty advisor for this curriculum, 3 new faculty were required to teach the new ET course sequence. During its early years the program undoubtedly was hampered by a lack of adequate lab facilities. This problem has been remedied by the addition to Jordan Hall occupied in the summer of 2007. Despite the fact that the curriculum was not approved until 2003, 7 graduates completed the program in that same year and there were 15 graduates in 2005-2006. Total enrollment exceeded 60 in the fall of 2006. Given the importance of environmental monitoring, assessment, and the need to determine the state of natural and man-made systems at a point in time and on a continuing basis, the outlook for the Environmental Technology program and its graduates is robust.
The Fisheries and Wildlife Program originated in the Department of Zoology prior to World War II. In its early days the program was headed by Ross Stephens and later Frederick S. Barkalow. Both of these men were influential in establishment in 1947 of the North Carolina Wildlife Resources Commission as an independent State agency. The program flourished in Zoology, especially during Barkalow’s tenure as head, regularly had a strong enrollment, and graduated large numbers of students many of whom went on to successful and influential careers in the fisheries or wildlife professions.

In the mid-1970s a legislative appropriation of funds to NCSU, in addition to providing support for the Department of Zoology, earmarked funds for an additional position in wildlife management in the School of Forestry. Dick Lancia was hired into this position in 1978. With Lancia teaching the newly-established and essential fisheries and wildlife summer camp, the program became a joint offering of the Departments of Zoology and Forestry. This dual role was further emphasized when Jay D. Hair was hired in 1977, using funds from both departments, to coordinate the program. Hair left in 1981 to a distinguished career with the National Wildlife Federation and an unfortunate early death in 2002. Following Hair’s departure, several individuals (Gary San Julian, Bill Lewis, Phil Doerr) led the program on an interim basis until 1986 when Rich Noble was hired as coordinator. Noble strengthened the dual leadership role and, with the help of Dean Elwood, moved the headquarters of fisheries and wildlife to Turner House on the corner of Brooks Avenue and Hillsborough Street. Dr. Noble retired in 2001, and Pete Bromley assumed the role of coordinator until his retirement in 2003. Bromley’s retirement, coupled with a change in programmatic emphasis in Zoology, prompted transfer of the administrative responsibility for the fisheries and wildlife undergraduates to the Department in the Fall of 2003. The faculty for the program remains partly in Zoology and partly in Forestry and Environmental Resources. Dick Lancia served as Program Coordinator until his retirement in 2008 when Chris Moorman took over the position. In 2006 Lancia became Director of Graduate Programs for fisheries and wildlife, and a PhD in Fisheries and Wildlife was approved in January 2007.

It would not be appropriate to trace the entire history of the Fisheries and Wildlife undergraduate curriculum here. For the more than half-century prior to its shift into the Department, the College of Agriculture and Life Sciences managed the program. As it is now constituted, the Fisheries and Wildlife Science major has two curricula, one in Fisheries and one in Wildlife. Both are built around a core of specialty courses, require at least one course in the basic sciences and math through calculus, and demand competence in communication and computer skills. The Fisheries and Wildlife curricula provide more opportunity for elective courses than does the Forestry curriculum, albeit a number of the electives are constrained. Both Fore-
stry and Fisheries and Wildlife require a summer educational experience taught at the College’s Hill Demonstration Forest.

Forestry and Wildlife Summer Camp and Summer Practicums

Almost from the first days of the forestry curriculum there has been a strong emphasis on practical, hands-on experience as a part of the education offered in the Department. The requirement for this experience is reflected in the summer programs required in the Forestry, Fisheries and Wildlife, Natural Resources, and Environmental Technology curricula. The concept of a summer learning experience emphasizing learning in the environment the student is being educated to manage and the practical application of concepts learned in the classroom is so deeply rooted in the Department’s educational philosophy that it is difficult to imagine a curriculum without it being approved by the Department.

The summer forestry program has been taught at the Hill Demonstration Forest north of Durham since 1936. Rustic, but more than adequate living and teaching facilities built with materials and/or funds derived from the lands of the Forest itself allow an excellent on-site instructional program. Instruction in forestry has continued uninterrupted since 1936, and since 1979 a summer program in fisheries and wildlife management has been offered. The Forestry summer camp was a 9-week (9 credit hour) program in 1980 but increased to 10 weeks (10 credit hours) in the mid-1980s and remains at that level today. The Fisheries and Wildlife summer program has always been a 6-week (6 credit hour) program. Don Steensen served as Director of the forestry Summer Camp program from 1972 until his death during the camp season in 1989. From then until the present Summer Camp has had dual management. The College Forest manager (Jervis until 2001 and then Cox) is responsible for physical facilities, logistics, and on-site administration. The Director of Undergraduate Programs in the Department is responsible for academic aspects of the program. Dick Lancia was Fisheries and Wildlife Camp Director from its inception in 1979 until 2004, and for a brief period after Jervis’ retirement directed both the Wildlife and Forestry programs. Chris DiPerno has directed the Fisheries and Wildlife summer program since 2005.

Summer, or in some cases spring, field courses were, at one time, features of almost every US forestry curriculum. For various reasons too complicated to explain here, such programs have largely disappeared and the summer program at NC State is today virtually unique\(^2\). For that matter few, if any, wildlife curricula incorporate summer programs. As indicated, the Department has persisted in offering summer programs in both disciplines. Undoubtedly, one of the major reasons these programs remain feasible is the excellent teaching and living environment offered at the Hill Forest. Another important reason is that employers have long regarded the fact that NCSU students “know

\(^2\) Purdue has a 5-week summer camp program.
field forestry (or wildlife)” as an important plus in their hiring decisions.

The titles of the forestry courses offered at summer camp have remained little changed since 1980. There has always been a course in silviculture (prior to the mid-1980s this was the only formal course in this important subject) and another in mapping and mensuration. The content of mapping and mensuration, however, is much different now with up-to-date geospatial and remote sensing techniques replacing plain table map, compass, and aerial photographs. What was forest biology in 1980 is now forest communities, then as now a course in the composition and dynamics of the major forest ecosystems of North Carolina with trips taken both to the Coastal Plain and Mountains. In 1980 two hours were devoted to forest protection, a course including fire protection, entomology, and pathology. Today, entomology and pathology are no longer taught at summer camp. Instead, there is a 1-hour course in fire management and a unique, 1-hour course in forest wildlife where the students in the forestry and fisheries and wildlife programs study together. In the 1990s evening programs were begun that dealt with various issues related to the student’s professional development such as ethics, race and gender issues, international forestry, and the role of politics in natural resource management.

It would not be an exaggeration to say that the summer camp program is as rigorous and exhausting today as it was in 1979. The program is offered from mid-May to mid-July during some of the hottest days of a North Carolina summer. Days begin early and end late, with numerous assignments requiring effort far beyond attendance during class periods. The food has always been plain, plentiful, nourishing, and a source of frequent vexation to the students. A brief story, however, shows that the food has been good. Dean Ellwood for years tried to entice then Chancellor John T. Caldwell to visit the forest when classes were in session. When Caldwell finally consented to visit it so happened that the cook had turned out a lunch with, among other things, fried chicken and homemade biscuits. The rumor is that every spring thereafter Caldwell would call Ellwood and ask when they could visit “his summer camp.” The only condition Caldwell put on the visit was a promise from Ellwood that fried chicken and biscuits would be served!

The physically- and intellectually-taxing conditions of the camp—there was, and is, no air conditioning in the student cabins—often led students to feel as if they hated the whole camp experience. However, the faculty has always observed that classes were “made” at summer camp and the bonding that occurred there was an essential part of the forestry curriculum. Indeed, the dissatisfaction with summer camp seems to decay logarithmically once it was over and at graduation most seniors looked back on it as an almost idyllic experience. Well, perhaps not idyllic but certainly as one of the most important of their many educational experiences at NC State. A reading of the section in the Pinetum dealing with summer camp will confirm this generalization.
The Fisheries and Wildlife summer program has always been 6 weeks in length, running from mid-May until late June. In its early days all course work was rolled into one course involving extensive field work dealing with species identification, habitat associations, and management practices. Trips were taken both to the North Carolina mountains and the eastern shore of Virginia. Today, the same subjects are covered but they are included in three separate courses, one 4-hour course in wildlife management and two 1-hour courses, one in fisheries management and one in management practices in the North Carolina mountains.

A practicum was made a requirement in the Environmental Technology Program in 2005. This course is offered not only in the first session of summer school but also in the fall and spring semesters. It emphasizes professional practice as an environmental technologist, covering such subjects as resume writing, interviewing skills, and search techniques and resources.

General Education Courses

Historically, the Department offered courses that were designed to teach students in its own curricula. Of course occasional students from other programs would take forestry courses but no serious effort was made to offer courses that would provide education in forestry for students from other programs. One exception was the course in Conservation of Natural Resources, begun by Keith Argow in the late 1960s, which led to creation of the Conservation curriculum. Another was FOR 252 which was also begun in the 1960s in order to offer a single course in forest management to students in the two-year Agricultural Institute program (organized in 1959) in the College of Agriculture and Life Sciences. Although the Ag Institute dropped FOR 252 as a required course in the early 1980s, the Department continued to offer it as a course in basic forestry for non-forestry majors. The course was also required in curricula such as Conservation and (later) Natural Resources and its largest enrollment now comes from those areas. For years Larry Jervis and Rich Braham alternated as instructors, and recently Dan Robison has taught the course.

As enrollment in Forestry curricula declined and pressure from the University to increase student contact hours grew, the Department considered the desirability of offering other courses in forestry for non-majors. Two courses, FOR 248 Forest History, Technology, and Society developed by Gary Blank and FOR 330 North Carolina Forests initiated by Doug Frederick. Enrollment in both courses was low in the beginning but has risen to the point where both courses are now well-received and have robust enrollments. FOR 248 is an elective taken by students in the College Humanities and Social Sciences and the College of Design to meet the University Science, Technology, and Society requirement and Agricultural Education and Extension students make up about one-third of the enrollment.
One other course, FOR 221 Conservation of Natural Resources, needs mention here. This course existed for years as Z0 221 and then FW 221 and was a required course in the Conservation and Natural Resource curricula. When the Wildlife Program transferred to Forestry it was renamed FOR 221 and cross-listed with Fisheries and Wildlife and Zoology. Enrollment in this course has always been high, and it is the only course offered by the Department during both the academic year and in summer school. It has always been available to other programs and regularly has a significant enrollment of students from other majors.

Involvement with Western Carolina University Forestry program

In addition to the futile negotiations with North Carolina A & T State University over development of a transfer forestry program, the Department was involved in much more intensive discussions with Western Carolina University concerning its efforts to develop an undergraduate forestry program as part of a natural resources management program. For years students from WCU who wished to study forestry took advantage of a 2 + 2 transfer program by transferring to NCSU after two years at Western.

All that changed when H. F. “Cotton” Robinson became Chancellor at WCU. Ironically, Robinson had been head of the Department of Genetics and of the Institute of Biological Sciences at NCSU and in that capacity had worked closely with all the people who were administering the forestry program at NCSU at the time. Consistent with a number of their other initiatives designed to make WCU better serve the needs of the people of western North Carolina, Robinson determined in the early 1980s that an undergraduate program with emphasis on forestry would fill a demand and be a service to their student body. WCU began to work toward this objective despite the fact that in 1974 Robinson had told Deans Ellwood and Saylor that he was not interested in establishing another forestry program but only sought more cooperation from NCSU.

Needless to say, when Dean Ellwood got wind of this venture, he immediately sensed that a forestry program at Western would not only siphon off students for which there was more than adequate room at NC State but also might become a viable competitor for the precious McIntire-Stennis research funds that were so critical to the finances of NCSU’s forestry research program. The situation was made more complicated by the fact that one of NCSU’s strong forestry supporters who was then a member of The University system Board of Governors was quoted in the Asheville paper as having proposed a forestry program at WCU, a statement which he later recanted with some embarrassment. In January of 1982 Robinson and his Dean of Arts and Sciences John McCrone invited Ellwood, Saylor, and Cooper to Cullowhee to discuss the matter. The meeting began with Robinson informing Ellwood that he did not “give a damn what we thought, that he had his mandate (based on Jordan’s remark), that we (WCU) are going to get it (the forestry program) and you can cooperate or not, and we will get it immediate-
ly.” Ellwood responded that NCSU would be happy to assist Western in developing its natural resources program but that forestry should be taught at NCSU. After extended, basically cordial, talks neither side had changed its position at all and Saylor and Cooper were instructed to work with McCrone to see what could be worked out.

Events, as they say, transpired, and WCU obtained permission to plan a natural resources program from The University System office. During the spring and summer of 1982 WCU developed proposals for the program, all of which contained “forest resources” as one of three concentrations. Several discussions of this proposal yielded no significant change in it and, in February 1984 WCU submitted a request to The University System office to establish a program in natural resources with forest resources as one of three concentration areas. Cooper prepared a lengthy analysis of the proposal, concluding that there were sufficient openings in forestry programs at other nearby universities, that the supply of 4-year forestry graduates had for a number of years exceeded demand, and that the proposed program was essentially a duplicate of existing programs at NCSU, Clemson, Tennessee, and VPI.

The result of deliberations at The University System level were essentially a foregone conclusion once the permission to plan was granted. As Robinson was retiring in May of 1984, it seemed appropriate, in light of his intense interest in the program, to award the program to WCU then. However, the approval of the program was accompanied by a memorandum summarizing agreements that Ellwood and the new Chancellor at WCU had come to in meetings subsequent to the approval of the degree. The important points for NCSU in this memorandum were: 1) that WCU had no interest in establishing an accredited forestry program; 2) WCU would continue its 2 + 2 program with NCSU and would explore development of a 3 + 2 program (note: neither of these agreements led anywhere); and 3) that NCSU and WCU would develop a cooperative approach to the WCU natural resources management program. Those agreements essentially ended the debate over the matter.

Western’s program now requires 25 semester hours in forestry courses taught by 2 of the 6 Natural Resources faculty, both of whom have education and backgrounds in forestry and are well-regarded professionally. All of the basic material required for a forestry degree appears to be included in these 25 hours. So far, no effort has been made to obtain accreditation for the degree from the Society of American Foresters and no effort has been made to obtain McIntire-Stennis funds. University System data do recognize WCU as having a natural resource management program and do not recognize forestry as a major. Those data also indicate that between 2001-02 and 2005-06 between 11 and 23 students graduated from WCU in Natural Resources Management and Policy; there is no indication how many were in the Forest Resources Concentration. Program enrollment data indicate trends similar to those at NCSU; total enrollment in Natural Resources declined from over 41 in 2002 to 23 in 2006 (again, there is no indication how many of these students were in the Forestry Concentration).
Conclusion

It is instructive to view the 25 years of change in the curricula offered in the Department of Forestry as these changes mirror, and respond to, changing University requirements and particularly to changing views of what constitutes an appropriate education for a forestry professional. One gets a sense that, in the national perspective, forestry education defined narrowly, is in a difficult position and that some major, as yet undefined, changes are likely to occur.
VI. UNDERGRADUATE PROGRAM AND EXTRA-CURRICULAR ACTIVITIES

Although extra-curricular activities have always played an important role in the Department’s undergraduate program, since 1980 they have increased in number, depth, and kind so that by any reasonable standard the program today is far richer than it ever has been. This is due in part to a broadening of the scope of the Department’s offerings but also because there is now more financial support for such activities than there was in the past.

In 1980 extra-curricular activities were focused on the Forestry Club, the Student SAF Chapter, and the local chapter of the forestry honorary society Xi Sigma Pi. Don Steensen and Tom Gemmer served as advisors for these groups. The Forestry Club had the larger membership and typically was involved in more activities. Activity in the SAF Chapter was limited. Typical activities for the Forestry Club were the fall Rolleo at the Hill Forest, regular participation in the Southern Forestry School Conclave where forestry skills were contested with the other Southern Forestry Schools, occasional participation in other woodsmanship competitions, and a spring social/dance, the Loggers Brawl. In addition, the Club regularly was involved in community service activities, such as Wake County’s Wood for Warmth. Much of the money to support Club activities came from jobs felling or clearing trees; largely because of potential liability problems, this activity was progressively curtailed. As student enrollment declined, membership in the Forestry Club and the Student SAF Chapter also declined and, in the mid-1980s, the two were combined for financial, membership, and program purposes. This combination was dissolved in 2001. In the early 1980s, Jim Gregory became the Forestry Club advisor, assisted by Larry Jervis, and Bill Smith became the advisor to the Student SAF Chapter. Joe Roise succeeded Gregory as Forestry Club advisor and Smith as SAF Chapter advisor in 1996, with Bronson Bullock taking over the Forestry Club in 2003.

The Rolleo and Conclave deserve special mention. Of all undergraduate activities these are as important in 2007 as they were in 1980. The Rolleo is always held at the Hill Forest in mid-autumn and involves an inter-class competition in technical and skill forestry events. As might be expected, the seniors usually win but upsets have

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1 Much information for this section was obtained from Pinetums, the yearbook of the College published each year. It is interesting that the changes between 1980 and 2007 in the character of the College, and Department, seen in so many areas, are reflected clearly in the Pinetum. In the early 1980s most coverage of forestry student activity was limited to the Rolleo, the Conclave, and the SAF. By the mid 00’s although those traditions were still covered, a far more diverse array of undergraduate activities was included, particularly in the wildlife program and the international arena.
occurred. The program starts early in the morning and always ends with a barbeque or pig-picking and night-time festivities. In 2002 a new tradition was begun when VPI was invited to participate. The Conclave involves all 14 Forestry programs in the southeast and its location rotates among the various schools. Competition is held in both technical and physical skill events. Preparation, practice, and participation are extremely time consuming and the trip itself, when it is in Texas or Arkansas, can be grueling, particularly for the faculty who accompany the group. NC State has hosted the Conclave twice since 1980, at Ellerbee in 1987 and again in 1999. Hosting the Conclave is a major responsibility and both times students took care of the majority of the planning. NC State’s team has usually been among the top 5 finishers in total score. Stephen F. Austin and Arkansas-Monticello, it seems, have had a lock on either first or second between 1980 and 2007.

In the fall of 1987 the Forestry Club, working with Larry Jervis, arranged an Alumni Symposium consisting of a dinner and round table discussion with recent graduates about their experiences and how their education did (or did not) prepare them for employment. In 1989 this program was held on the same weekend as the Rolleo which served as an enticement for alumni to attend. The program continued through 1991, was not held in 1992 when the National SAF meeting was in Richmond, and did not resume thereafter.

During the 1980s the student SAF Chapter, with Bill Smith playing an important role by urging the best students to join SAF and advising the group, became much more active. In the fall of 1984 a group of students traveled with Smith and Art Cooper to Washington, DC where they met with US Forest Service staff (even had lunch with the Chief!), and also visited the SAF National Office and offices of conservation and forest industry groups. This trip was repeated through 1988 and was generally agreed to be an important benefit to the students participating. Bill Smith insisted that the group always visit the Viet Nam memorial during the time in Washington. This experience always had a sobering effect on everyone.

Another activity begun by Smith was student attendance at SAF professional meetings. Although students had attended both the Appalachian and National meetings off and on in the past, Smith essentially made this an annual affair, aided by increased funding from the College. During the 1980s more students attended the APSAF meeting with the number attending the national meeting usually no more than 6. However, when Joe Roise took over as advisor to the SAF chapter after Smith’s departure to the US Forest Service, and as more money became available from the College, much larger groups attended the national meeting. Twenty or more students attended meetings in Memphis, Traverse City, Portland OR, Denver, and Pittsburg. Virtually the entire senior and junior classes attended, and worked at, the National meeting in Winston-Salem in 2002. Smaller numbers traveled to Washington, DC, Buffalo, Edmonton, and Ft. Worth. A particularly important feature that Roise added to these trips, and to which he devoted a great
amount of personal time and effort, was pre- or post-meeting field trips. A forest management-oriented trip was taken to the Olympic Peninsula after the 1999 Portland meeting, a wilderness trip to Rocky Mountain National Park before the 2001 Denver meeting, another wilderness trip to Mt. Robison Provincial Park near Edmonton, CA, in 2004, and a trip was taken to the Olympic Peninsula after the 2007 meeting in Portland, OR. The 2001 trip was especially memorable as the group was in the Rocky Mountain wilderness when the tragic events of September 11 occurred. Attendance at the January APSAF meeting, usually by a smaller group, has continued regularly up to the present. As Roise points out, these trips represent a sizable investment of time and resources in developing student professionalism.

The forestry honor society, the NC State chapter (Mu) of XI Sigma Pi, had been in existence 40 years in 1980. Don Steensen was serving as its advisor and did so until his death in 1989, with Rich Braham serving as co-advisor from 1987-89 and advisor from 1989 to present. In the 1980s, Xi regularly held a wine and chili dinner in the fall (with Steensen providing his trademark chili), a senior steak dinner, a spring picnic, and provided free tutoring services for the Department. During this time membership was opened to deserving students from other departments in the College. Now Xi’s activities are generally limited to its initiation banquet, at which an average of 35 students are accepted as members, and a spring picnic.

Growth of the Natural Resources and Environmental Technology curricula led to an interest in participation in professional affairs by those students. In 1995 a student chapter of the National Association of Environmental Professionals, open to students in the Colleges of Natural Resources and Agriculture and Life Sciences, was established with Gary Blank as advisor. In its early years the group held meetings with speakers, sometimes met with the local chapter of NCAEP, sent a few of its members to national meetings, and participated in local environmental improvement programs. Eventually students who wanted the organization to become an advocacy group rather than a professional affiliate severed ties with NCAEP and became the Student Organization for Sustainability. As of 2007 that group had died, sustainability in action appearing to have been the groups’ most immediate problem.

As minorities became a more visible presence in the College, a chapter of Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS) was established in 2000. This organization “promotes academic and professional advancement by empowering minorities in agriculture, natural resources, and related sciences.” Students in the Department are participating in this organization. Among its activities are a fall cookout to recruit new members, professional presentations, community service work, and a trip to the organization’s National Career Fair.

When the Fisheries and Wildlife Program joined the Department in 2003 it brought along its own set of extracurricular activities.
Chief among these is the Leopold Wildlife Club, which has had a long tradition of providing hands-on experiences as well as formal presentations and trips to students. The Wildlife students have their own Conclave featuring competition in technical and skill events.

In recent years the College has instituted service-learning programs that work in conjunction with a collaborative teaching and learning strategy housed in the Provost’s office. In Forestry and Environmental Resources this experience has been centered in George Hess’s Natural Resources Measurements course, where students have been working with Wake County’s Water Quality Committee to assist in developing standards for controlling runoff, and in Bronson Bullock’s forest measurements classes where students taught forest measurements to middle school classes and participated in year-long community service projects.

The most dramatic change in extra-curricular activities has been the large number of opportunities for international study now available to undergraduates. Beginning in the early 1990s trips abroad for forestry students, with some funding from the Department, were begun. Jan Laarman initially played a major role in developing and leading these trips; after his departure in the late 1990s Erin Sills took on this responsibility. The first seven trips (1992 to 1998) were club activities of the International Society of Tropical Foresters. Graduate students - and a few undergraduates - in ISTF helped raise funds and plan the trips, which generally took place over a couple weeks in the early summer. Beginning in 2000, faculty started organizing and offering study tours at different times of year, including many over spring break. These tours have attracted more undergraduate participation. Since 2000, there have been study tours to the Mexican Yucatan (2000), Paraguay (2001), Costa Rica (2002 and 2005), Chile (2003 and 2007), Ghana (2004), China (2006), and Turkey (2007). Faculty leaders have included Ted Shear, Lee Allen, Fred Cubbage, Jacek Siry, Dan Robison, Subhrendu Pattanayak, Carol Love, Bronson Bullock, Fikrit Isik, John Frampton, Barry Goldfarb, Sarah Warren, Bailian Li, Susan Moore, and Doug Frederick. In addition, wildlife students have for several years gone to Namibia, and a wildlife study tour to Nicaragua is planned for 2008. Funds from the Nicholson Trust have been used to support trips by Swedish students to NC State (in collaboration with Purdue) in even numbered years and by NC State students to Sweden in odd numbered years. Gary Blank has coordinated this activity, including study tours to the Mexican Yucatan and to northern and Central Europe with undergraduates from NC State, Purdue, and SLU. A small number of undergraduates have also spent semesters studying at universities in other countries (including Finland and South Korea) through NC State’s exchange programs, with scholarship support from the Department. Finally, some undergraduate are members of the International Society of Tropical Foresters. These new opportunities for international experience give today’s students an opportunity and outlook on forestry and natural resources to which students of the early 1980s never had access.
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 2007.1

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 tripled2. 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

1 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.

2 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
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 earmarked 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 un-filled 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 co-erced 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.
VIII. COLLEGE (SCHOOL) FORESTS

Ever since its inception in 1929 the forestry program at NC State has been actively involved in managing forest lands on a number of different properties, including the Hofmann, Hill, Goodwin, Hope Valley, Schenck, Hosley, Lee, Taylor, and Gates County Forests. The largest of these, the 81,000 acre Hofmann Forest in Onslow County, is owned by the Endowment Fund, Inc. of NC State and managed by the NC State Natural Resources Foundation, Inc.1 It will not be discussed as Bob Kellison is undertaking an update of the Hofmann Forest history completed by Ted Miller in 1970. Of the other properties, 3 (Hill, Hope Valley, Schenck) and 98 acres of another (Goodwin) are owned by the State of North Carolina and assigned by the Department of Administration to the College for management purposes. The bulk of the Goodwin (1,155 acres) and the Hosley (255 acres), Lee, (127 acres), Taylor (118 acres), and Gates County (3809 acres) are owned and managed by the NC State Natural Resources Foundation.

As these properties came a departmental responsibility, an incumbent faculty member, first George Slocum and then Ralph Bryant, filled the role of forest manager while carrying out their other duties. Since the late 1960s, however, the Department has had a faculty member whose primary duties were to serve as Forest Manager and to whom management of the College Forests was delegated. Larry Jervis filled this position from 1968-2001 and Joe Cox replaced Jervis in late 2001. From the late 1970s rotating resident caretakers, usually recently-graduated students, served as on-site caretakers at the Hill Forest. A permanent caretaker position was created in the mid-1990s. The position was filled for 2 years but was not refilled when the first incumbent left. In 2002 a position of liaison silviculturist was created and an additional liaison silviculturist position was created in 2003. These positions are funded partly from receipts from the Piedmont Forests and partly by funds from the NC Natural Resources Foundation. Jimmy Dodson filled the first liaison silviculturist and lives at Slocum Camp. James Rogers filled the second position and lives in Raleigh, and has an office in the new Jordan Hall. These two persons assist the Forest Manager in the management of the Hill, Hope Valley, and Schenck forests; the Department has no resident presence on the other 4 forests.

In 1979-80 a College Forest Advisory Committee was created to provide the Forest Manager with a sounding board for his ideas and to provide advice and recommend policies to the Forest Manager, the De-

1 The North Carolina Forestry Foundation, Incorporated changed its name to NC State Natural Resources Foundation, Inc. on July 1, 2008.
partment Head, and the Dean. Several faculty members, notably Doug Frederick as chair, Rich Braham, Bill Gardner, Dennis Hazel, Dick Lancia, and Joe Roise have served on the Committee for many years and have made invaluable input into management of the Forests. At present the Advisory Committee provides input only on management of the Hill, Hope Valley Forests.

The Forest Manager is responsible for all management activities, including timber sales, on the College-managed forests. Prior to 1990, all income from the State-owned forest lands was treated as appropriated funds (i.e. had to be spent in the year in which it was earned) and deposited in a College Forest account. Small amounts of unspent funds could be carried over into a new fiscal year but the majority of any unspent funds reverted to the State treasury. Income from the Foundations lands were, of course, never subject to the same constraints that pertained to revenues from the State-owned lands.

In 1990 the General Assembly passed legislation that allowed revenues from the state-owned College Forests to be retained in a Trust Fund and used for “forest-related research, teaching, and public service programs.” Passage of this legislation allowed for long-range fiscal planning and provided for much more realistic management of the State-owned College Forests. Currently, revenues are deposited into 4 different accounts: 1) a College Forests Trust Fund used for deposits of all revenues from the Schenck, Hill, Hope Valley, and State-owned portions of the Goodwin Forests and for payment of all expenses on those forests; 2) a Goodwin Forest Income Account where all revenues from the Forestry Foundation Goodwin Forest lands are deposited and from which all expenses and scholarship awards are made; 3) a Hosley Forest Income Account used as a depository for all revenues and for payment of all expenses for that Forest; and 4) a Schenck Forest Maintenance Fund which is an endowment, interest-earning account used for support of Schenck Forest.

Although the majority of the acreage occupied by the Hill, Hope Valley, and Schenck Forests had been reached by 1979, slight changes in acreage have taken place since. The Hill Forest, located in northern Durham County, was created in 1929 with a gift of 378 acres from George Watts Hill. Subsequent gifts and purchases, mostly during the 1970s, had increased its size in 1980 to 2200 acres. Since then 237 acres have been added by purchase and condemnation so that the Forest now comprises 2437 acres.

The Schenck Forest is located about 3 miles from campus in the northwest sector of Raleigh. Its name derives from the fact that Carl Alwyn Schenck’s ashes were sprinkled there after his death in 1953. It was obtained in 1936 via a transfer from the North Carolina Prison Department and was, in 1980, 245 acres in size. In 1999 33 acres were transferred from the Department of Corrections (DOC) to the College for inclusion in the Schenck, and in 2006 the DOC transferred another 20 acres to the College. The College currently has a Memorandum of Understanding with the Department of Transportation to manage the
property DOT acquired while planning construction of the Duraleigh Connector project. This property is approximately 42 acres in size and the College is pursuing having this property permanently allocated to it. The college is also pursuing purchasing an additional 2 acres north of the Duraleigh Connector that was donated by the City to the State for the Duraleigh Connector. If these last two properties are acquired, the size of the Schenck Forest would then be 342 acres.

The Goodwin Forest, located in Moore County, originated with a gift in 1967 of 1120 acres by James L. Goodwin. The land had been managed for timber for 36 years prior to Mr. Goodwin’s gift and, under the terms of his will, revenues derived from the Forest were to be used for “a scholarship fund in forestry.” Several purchases, the most recent in 1998-99, added 100 more acres to the Forest. In 2005, the North Carolina State Natural Resources Foundation purchased the last interior property, except for two residential properties. This purchase added 92 acres and was purchased using funds from the sale of a gas line right of way on the Hofmann Forest. The Goodwin property now totals 1347 acres in size.

The Hope Valley Forest was acquired in 1941 by the University through quit claim deed from the US Department of Agriculture. It was originally 1734 acres in size, but when the B. Everett Jordan Dam and Reservoir were proposed in the middle 1960s then Dean Richard Preston negotiated an agreement under which the Federal Government paid $1.179 million for 1412 acres that were included in reservoir lands. Not a bad deal, considering that the land was a gift from the Federal Government to begin with! This payment was deposited in a trust fund which the College, with approval of the NC Rural Rehabilitation Corporation, used to purchase land for inclusion in its other forests or for construction on those forests. Thus, in 1980 the Forest consisted of 345 acres. There has been no change in its size since but as of 2007 sale of the property to the NC Wildlife Resources Commission is being considered. Receipts from the sale would be used to build a new dining and kitchen facility on the Hill Forest, and the balance of the proceeds would be used to create a scholarship endowment fund to benefit students from rural NC wishing to attend the College.

It is important to note here that the majority of the acreage added to the Hill and Goodwin Forests since the mid-1970s has been bought with the money derived from sale of Hope Valley Forest lands back to the Federal Government. In addition, a significant part of the construction of new facilities and utilities at the Slocum Camp on Hill Forest was also supported by these funds. What at the time might have seemed to the College to be a serious loss of forest land has turned out to be a most serendipitous event.

An interesting sidelight to land acquisition at the Hill Forest involved the tobacco leases that were attached to some of the land purchased in the 1970s. Tobacco allotments at that time were a valuable commodity and could be bought and sold on the open market. Of course, inasmuch as the Department was not in the business of raising
tobacco, our allotments sat idle. Larry Jervis was approached off and on to see if we were interested in selling the allotments; our answer was always no. One night in the spring of 1983, Jervis called Cooper at night to let him know that he (Jervis) had just had a call informing him that we “had better put our allotments up for sale” or he (Jervis) might personally regret it. Jervis and Cooper met the next morning and decided that prudence should rule and the allotments were put up for sale by the University. The College Forests derived $34,588 for them.

The Hosley Forest, was a 255-acre gift from Mr. Wilfred Hosley in 1994. It is 46 miles northeast of Raleigh in Franklin County and consists of about 200 acres of even-age loblolly pine, now approaching 25 years in age, as well as a well-developed flood plain forest.

The 127 acre Lee Forest in Johnston County near Clayton was transferred to the Endowment Fund of NC State in 2007 upon the death of the donor. The original intent of the bequest was that the forest be used as a study area. However, because the timber was clearcut about two years before the gift, and because the area is almost entirely surrounded by houses, it is likely the land will be sold with the proceeds funding an endowment that will benefit the College.

The Taylor Forest, in Nash County, was a 118 acre gift from Mrs. Oma Taylor, a resident of Raleigh, in 2007. It consists of pine plantations, some of which have been cut and are ready for replanting, and open agricultural land. It is likely that this tract will remain in forest and agricultural uses as long as is possible.

The Gates County property is a 3809-acre tract of wetland forest that was transferred to the Foundation from the Nature Conservancy in the 1970s (the property was originally owned by Union Camp Corporation). The value of this property lies primarily in its fisheries and wildlife resources. The property is currently under lease to a hunt club; the lease is the only financial return from the property. Under agreement with the NC State Natural Resources Foundation, the wildlife leases are handled by the Fisheries and Wildlife Program with receipts to be retained by that program. The Gates property was extensively damaged by Hurricane Isabel in 2003.

In 2004, a Mrs. Carver willed a 106 acre tract in Person County to the NC State Endowment. This tract lies approximately 5 air miles from the Hill Forest. Mrs. Carver wanted the tract called the TIMACA property using the first two letters of her nieces and nephews. The Piedmont Forest staff and work crew cruised the property and had planned to carry out harvests when a great nephew contested the will using an unsigned note written in pencil as the basis for his case. At this point the nephew has lost all court proceedings. The last appeal to the State Supreme Court is in process. Pending a favorable outcome for the State in the Courts, this property will be managed by the NC State Natural Resources Foundation.
The Department manages one other tract, the Bull Neck Swamp Research Forest on the southern shore of Albemarle Sound in Washington County. This 6158 acre tract, with 7 miles of undisturbed shoreline, was acquired in 1996 through a series of grants from the Natural Heritage Trust Fund. Although the area had been logged extensively for Atlantic white cedar, it has recovered sufficiently for the Natural Heritage Trust Fund to place 2317 acres in preserve status that includes 1118 acres of shoreline and islands preserve, 237 acres of Pond pine preserve, and 185 acres of Atlantic white cedar preserve. Bull Neck Swamp contains 5 community types: nonriverine swamp forest, peatland Atlantic white cedar, mesic mixed hardwood forest, tidal cypress-gum swamp, and tidal freshwater marsh. The tract has large populations of many of the major wildlife species of eastern North Carolina wetland forests. The Forest now serves as a site for research by the Fisheries and Wildlife faculty and research by others is being sought. In addition, it generates income from hunting leases and timber sales with the revenue applied towards funding of graduate student research and an undergraduate Bull Neck Swamp scholarship.

Management of the Foundation-owned Forests, beginning in 2008 will be under plans approved by the Foundation. The management objective will be to maximize financial return to the College endowment, utilizing best management practices meeting all relevant social and environmental constraints. Management of the State-owned College Forests, on the other hand, has always been primarily for teaching, research, and demonstration and only secondarily for income. Since the first College-managed Forest lands were acquired, management philosophy can be summarized as:

- Provide sites for field instruction and research in forestry;
- Serve as examples of the multiple benefits to be derived from a balanced forest management program;
- Produce revenues sufficient to cover management costs and to support teaching and research on the forests.

During the last 25 years evolution of management on the Forests and the circumstances of their locations caused two other objectives to be added to this management philosophy:

- Preservation of habitats, both natural and cultural;
- Public recreation when and where it is compatible with other forest management objectives.

In the most recent (2004) version of the College-managed Forest Management Plan, the mission and goals of the Piedmont Forests are restated and expanded. The mission is “serving as outdoor laboratories for undergraduate and graduate teaching, for research, and as examples of biologically diverse and sustainable working forests.” This mission is realized through goals that can be paraphrased as:
• Encourage and facilitate teaching and research uses of the Forests;
• Actively engage undergraduate students in management activities on the Forests;
• Provide a high level of protection to soil, water, and air resources;
• Maintain representative examples of forest types and stand structures typical of the North Carolina Piedmont Region, including late successional hardwood types;
• Employ examples of a wide variety of silvicultural strategies and forest practices and maintain adequate acreages of specific forest types and stand conditions needed for future instructional and research needs;
• Increase public awareness of the multiple benefits of forests as demonstrated by the NCSU College-managed Forests;
• Produce sufficient revenues to offset the costs of routine management and facility maintenance, and to support scholarships and other teaching and research programs of the Department and College;
• Insure that timber harvests do not exceed sustainable levels.

To these should be added the goal that public use and recreation will be encouraged and supported where it is warranted by a given Forest’s location and is consistent with the other goals under which the Forest operates.

Consideration of the old objectives suggests that the new goals contained in the 2004 Plan of Management are implicit within the old objectives. However, events that have taken place on the College-managed Forests since 1980 show clearly why it was necessary to state more explicit goals in the 2004 Plan. As new pressures, from a variety of sources, impacted the College-managed Forests it became necessary to clarify policy in dealing with these issues. The new objectives, therefore, are in a sense a “codification” of management experience over the life of the Forests, especially the last 25-30 years.

Because of their small size the College-managed Forests must be viewed collectively in assessing timber harvesting. When each came under Departmental management, the timber resource was in a far-from-desired condition. The Schenck, Hope Valley, and most of the Hill Forest consisted of a mixture of young, old-field or newly planted stands of pine (Loblolly pine on the Schenck and Hope and Virginia pine on the Hill), recently cut-over stands of young pine and hardwoods, with small amounts of older pine. The Goodwin was an exception to this generalization, as Mr. Goodwin had carried out management on the lands since he acquired them between 1928 and 1932. Thus, the first objective of management on all the forests became to bring them
into a “regulated” state where they were producing a sustainable flow of wood, income, and other benefits. As might be expected, this took longer on some forests than on others. Generalizing broadly, the Hill, Hope Valley, and Schenck (subject to constraints explained below) Forests, considered collectively, and the Goodwin considered as a separate management unit, came into a fully regulated condition during the last 25 years and all continue to be managed accordingly.

Records of timber harvests on the Hill, Hope Valley, and Schenck Forests, despite much missing data for the years from acquisition through 1960, give a sense of how timber harvesting took place in the early years of Department management. On the Hill, from 1932 to 1960, considerable harvesting of pine, particularly pulpwood, took place. Virtually no hardwood was harvested until the 1960s. Limited cutting took place on the Schenck Forest, whereas substantial cutting of pine and hardwood sawtimber occurred on the Hope Valley Forest. On the Goodwin, cutting of pine and hardwood sawtimber and pulpwood has taken place on a regular schedule ever since the Department took over management in 1968. Cutting on all 4 of the Piedmont forests since 1980 has been regular and consistent with the Department’s objective of sustained yield.

Since 1980, revenues derived from timber harvesting available for forest management, scholarships (in the case of the Goodwin), and other Departmental needs have increased significantly. Annual revenues from the Hill, Hope Valley, and Schenck rose from an average of about $17,000/year in the 1970s to slightly over $57,000/year in the 1980s and to nearly $70,000 in the 1990s. This substantial increase derived from an ability to carry out regular cutting on at least one of the forests each year, and from Larry Jervis’ astute assessment of local timber markets and wise application of a variety of management practices to each forest. Revenues, of course, could have been greater if income generation were the only objective of management. The necessity to retain timber types, examples of a variety of management practices and age classes, to accommodate research, and to allow students hands-on experience in management, combined to constrain somewhat revenue generation from timber harvesting.

During the last 25 years, revenues from the College Forests became a more and more integral part of the Department’s fiscal portfolio. With the exception of major capital construction at Slocum Camp, all regular maintenance, minor construction, and through 19883 utility-

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2 As a result of the sale of about 80% of the Hope Valley Forest to the Corps of Engineers in the late 1960s, the College liquidated the standing timber on the sold lands between the late 1960s and 1972. This large volume of timber, much of which would not otherwise have been sold until later, artificially increased the amount of timber sold from the Forests during the late 1960s and early 1970s.

3 In 1988 the costs of utilities, except for water and sewer, were assumed by the University. The reasons for this move were never clear, but needless to say it was gratefully accepted.
ties, were paid from College Forest funds. Work-study students, who provided a tremendous amount of labor, were also paid from these revenues. In addition, miscellaneous jobs such as painting offices when occupants changed, moving from Biltmore to Jordan in the late 1980s, and salaries for an equipment room clerk and for bus drivers for many classes, were paid by College Forest revenues. By the early 2000s, with the addition of a second liaison silviculturist, this annual subsidy had risen to $25,000.

Goodwin Forest revenues in excess of the costs of managing the Forest, are by the terms of the gift of the Forest to the University, designated for support of scholarships. The first scholarship of $1000 was awarded in 1981-82. Between 1994 and 1999, depending on the availability of funds and the number of qualified recipients, the value of undergraduate scholarships, graduate stipends, and work-study scholarships, ranged from $42,000 to $79,000! Mr. Goodwin would be proud of the results of Larry Jervis’ management of his gift to the College.

During the past 25 years, the pressures of urbanization on the College Forests have increased dramatically. In the 1970s small acreages of the Schenck Forest had been lost, with minimal effects on the Forest, to a sewer easement and to the Crabtree Creek floodplain protection plan. In 1984-85 the Forest was annexed into the City of Raleigh making it subject to city ordinances few of which, fortunately, had any direct impact on management. A serious threat occurred in the late 1980s and early 1990s when the State Department of Transportation proposed a 4-lane highway, the Duraleigh Connector, that would directly impact the western part of the Schenck and indirectly virtually the entire forest. After several years of serious discussion, and very strong negative citizen reaction to the project because of its impacts on the Schenck and Umstead Park, the proposal was finally killed in 1996. Doug Frederick and Larry Jervis took the lead in developing the Department’s objections to the proposed highway and deserve much credit for its demise. Completion of the RBC Center and the Edwards Mill Road Connector, relinquishment by the College of Agriculture and Life Sciences of most of its lands adjacent to the Schenck, and the proposed nearby construction of the Terry Sanford Center for the Performing Arts all combine to remind the Department that the Schenck Forest is now an urban forest. Because it is essentially indispensable to the Department’s teaching program, management has, for the last 20 years at least, been oriented toward making the Schenck an important open-space resource not only for the Department but for the City of Raleigh as well.

The situation at the Hill Forest is not much different. Until 1980 the Hill remained in a purely rural setting with the only external pressures being a continued low-level demand for hunting and riding access and a potentially-serious proposal for increasing the capacity of Durham’s Lake Michie Reservoir that would have resulted in a flooding of much of the forest near the Flat River. This proposal was first made in the early 1970s and was eventually shelved only to arise
new during the mid-1980s. After considerable negotiation with the City of Durham designed to minimize the impact of the project on the Forest, the City eventually turned to another alternative on the Little River which it has now completed. A more bizarre, but none-the-less serious proposal arose in 1986 when the State entered a bid to locate a superconducting supercollider facility on a site just to the north of the Hill. Construction of the supercollider would have had a significant physical effect on the forest which the Department went to considerable lengths to document for the environmental analyses done in support of the project. Eventually the facility was awarded to Texas and this threat, too, vanished.

What has not vanished, however, is the slow creep of urban development around the fringes of the Hill. In 1979-80 a golf course was constructed near the Forest and in 1984-85 the Treyburn residential development was announced. Since the mid-1980s residential development has continued unabated around the Hill driving up the cost of land to an extent that it is highly unlikely that any significant amount of new land can ever be added to the Forest. The Hill’s location dictates that it will continue on a path toward becoming what the Schenck now is, a working forest in an urban setting.

The Goodwin, Hope Valley, and Hosley Forests, because of their locations, are not now subject to the same urbanizing pressures as the Hill and Schenck. However, changes are taking place around the Goodwin as horse farms and “farmlets” increase, suggesting that the urbanized part of Moore County is beginning its inexorable creep toward the Goodwin.

Thus, it had become obvious by the early 1980s that continuing to manage the Forests for the teaching, research, and demonstration programs of the College alone was no longer a tenable policy. Much of the history of the College Forests during the last 25 years, therefore, has involved management taking into account their geographic and cultural context and developing ways in which the Department and College could continue to meet their needs while at the same time meeting some of the needs of their urban neighbors.

Wildlife management where and when appropriate has always been a part of the College Forest agenda. The Hill has always been open to hunting. A survey done in 1997-98 of hunting success on the Hill indicated that during the late 1970s deer hunter success remained low, about 1-2 animals per 100 hunting trips. However, during 1980s and early 90s success increased to 5-10 animals per 100 hunting trips, reflecting the increase in the deer herd in northern Durham County consistent with increases that have occurred elsewhere in North Carolina during the same period. Rabbit and quail hunting success decreased to essentially zero over the same period. A turkey restocking project undertaken by the North Carolina Wildlife Resources Commission in the early 1990s proved quite successful and wood duck boxes, blue bird houses, and food plots have also been a feature of Hill Forest management. From 1988 to 1998 the Goodwin Forest was a part of the State
gamelands program. However, it was removed as greater income could be obtained by leasing it to a private hunt club. For obvious reasons, hunting has not been permitted on the Schenck Forest since the late 1960s.

A special issue involving wildlife, fox hunting, has been a management problem for years at the Hill. A local fox-hunting group negotiated for use of the Forest in 1969 and has used it ever since. Over the years there have been conflicts between deer hunters and fox hunters. For the most part these have been minor in nature. In 2006, the College Forest Manager, Joe Cox, in a letter to previous hunting permit holders, announced a ban on recreational horse riding on the Forest during the gun season for deer and turkey. Within two weeks Cox found out how connected the equestrian community can be. Ex-UNC System President William Friday called Chancellor Oblinger to find out what was happening with the “horse ban on the Hill Forest.” After much consternation, a recreational permit process and non-hunter recreational use ban during the gun seasons was instituted. Also, new Dean, Robert Brown, mandated that the Department of Parks, Recreation, and Tourism Management work with the Piedmont Forest staff to analyze the recreational situation on the Forest. The College will analyze and recommend a course of action to address all of these issues. In summary, the recreational pressures continue to mount and to take a large amount of the Piedmont Forest staff time. The Piedmont Forest staff in conjunction with the PRTM staff, and the stakeholders continue to search for a workable sustainable solution to these problems.

In 1985 the Hope Valley Forest was thrust directly into the business of managing for endangered species habitat when a fresh seed tree cut was chosen as an overnight roosting site by 30-35 bald eagles that used the lake as their private fishing hole. Although the eagles use of the seed tree cut was entirely serendipitous, it none-the-less became clear that the Department had created an ideal site for their use. Up to 30 or more eagles continued to use the stand as their primary roosting site for several more years and, in 1990, began nest building activity. In 1993 two eaglets were successfully fledged on Corps of Engineers property immediately adjacent to the Hope Valley Forest. Numerous interagency consultations took place in the late 1980s, all intended to ensure that management practices on our property, as well as on adjacent Corps of Engineers lands, were designed to perpetuate use by the eagles. At least two other seed tree cuts were carried out on the Hope Valley Forest and at least one was done on Corps land. None of these sites proved as desirable from the eagle’s perspective as did our initial 1985 seed tree cut. In 1996-97 the Department of Cultural Resources received a Federal grant to restore the Mason House on property just south of the Hope Valley Forest. Although it was feared that the regular vehicle traffic that would be involved in restoration and eventual public use of the site would disturb the eagles this did not prove to be the case.

Eventually it became clear that the eagles’ use of the Hope Valley Forest would be a permanent phenomenon and management was shifted
from an emphasis on timber (particularly uneven-aged pine management) and early successional wildlife habitat to an emphasis on seed tree cutting and 50-year rotations in which consideration of the eagles was paramount. Although this meant forgoing significant revenues, the Department believed that use of the area as a real-life teaching experience and its value for public relations purposes exceeded what revenues and research opportunities it might have to forego. The work of the interagency team created to coordinate eagle management in the area quickly tended to blur the fact that the Department was originally responsible for attracting the bald eagle population to use of its now-permanent site. Larry Jervis and the School Forests Committee deserve much credit for insuring that the Department maintained a major role in decision-making about present and future management in the area.

Prior to 1980 public recreational use (other than hunting) of the Forests was low, and consisted primarily of hiking. In the late 1970s the trail network on the Schenck was improved and tied into the Raleigh Greenway Trail leading from the Meredith College area to Umstead Park. At about this same time a picnic shelter and pit toilets were built at the Schenck in the vicinity of the “Schenck memorial” oak. General use of the area was allowed, by reservation. Unfortunately, use became so great that soil compaction around the oak became a major concern. Consequently, use was limited to groups of no more than 150 from the University alone and a small use fee was charged. Later, it became necessary to restrict the use of alcohol. In honor of Frances Liles’ retirement in December 1982, the main interpretive trail was renamed the “Frances Liles Trail”. The picnic area at the Schenck remains the most heavily-used recreational site on the College Forests.

Increased general public use of the Schenck during the 1980s and 1990s led to the worst recreational conflict yet experienced on the College Forests. Although some problems were experienced with horse and motor bike riders on the Forest trails, the worst problems were encountered with dog owners who allowed their animals to run free. In order to protect other hikers and users of the Forest, the Department soon decided that all dog walking should involve dogs on leashes rather than running free. Unfortunately, many dog-walkers chose deliberately to ignore this rule, resulting in some nasty confrontations between dogs, their owners, and other users. At one point the NC State cross-country team had to cease using the Forest for practice when a dog attacked and injured one of the runners. In other episodes the Forest Manager and other faculty members were cursed and threatened when they reminded dog owners that their animal(s) should be on a leash. This issue dogged (no pun intended) Larry Jervis to the day he retired and quickly became a major problem for Joe Cox. Ultimately, with the support of the University Public Safety office, a full “no dogs” policy was adopted and that is where the issue stands today. This whole episode reminds one of the old adage that the only thing people are more irrational about than their children is their pets and is yet another example of the few ruining an opportunity for the many.
The rapid encroachment of urbanization on the Hill and Schenck meant that, inevitably, the management practices used on the Forests would be carried out in full public view. Wisely, Jervis and Cox have seized on this as an opportunity to educate the public about forest management. Whenever a cut or burn has been done in an area of public use, such as along Reedy Creek road adjacent to the Schenck, signs have been posted to explain the practice and its place in forest management. Such education was particularly important when much of the largest (78-acre) stand of 60+ year-old loblolly pine that surrounded the picnic shelter at the Schenck was cut in the early 2000s. Similar proactive educational efforts have been used at the Hill. Interestingly, there has been little negative reaction to timber harvesting on either the Hill or Schenck. This may be due to the fact that most stands harvested, or modified, are relatively small and that a large area of older stands still remain. For example, cuts in the 78 acre stand of loblolly pine planted in 1938 began in 1987-88 when two small shelterwood cuts were done along Reedy Creek road. Further cuts in this stand ultimately converted it into a mosaic of stands of different ages. Had all 78 acres been cut at once, not only would revenues have been greater but so would public outcry. In the case of the Schenck, at least, it seems that users largely understand who manages the area and accept that the Forest is a managed forest and that cutting of timber, or burning for undergrowth control, are to be expected.

The College Forests have continued to play an integral role in educational programs not only of the Department but also of other institutions. Availability of the Hill and its Slocum Camp enabled the Department to continue an outdoor teaching and living experience as an integral part of its forestry and fisheries and wildlife curricula. An analysis done in 1999 of educational use of the Schenck Forest showed that use by NCSU classes alone had risen from about 2000 contact hours in spring 1986-87 to nearly 7300 contact hours in just the spring of 1999. Nothing has happened to change the fact that, without access to the Schenck, the quality of a number of programs at NCSU would be seriously reduced.

Teaching programs of a number of other institutions in the Triangle area also began to make use of the Forests. Montgomery Community College forestry skills students first used the Goodwin Forest in 1988-89; this led to a formal cooperative agreement allowing them continued use of the Forest. Some examples of other educational uses of the Forests include: use by Boy Scout troops, visits by middle school students, training sessions for county sanitarians, cooperation with the North Carolina Museum of Natural History field programs, and use by 4-H groups, particularly during their annual June program in Raleigh. Many other examples could be cited but they would only emphasize the fact that the College Forests, and particularly the Hill and Schenck, constitute a rich outdoor educational resource in an area where such resources are becoming fewer and harder to get to.
Demonstration activities have always been an important use of the College Forests. They have generally been oriented toward owners of small tracts of land and have concentrated on practices that can be of value to this huge portion of North Carolina forest landowners. These have included extension field day programs and demonstrations of small scale logging practices. Obviously, such programs blend into the broader general education function of the Forests.

Research has always been one of the reasons the College Forests have existed. As a generalization, concentration of faculty use of the Forests for research was greatest when the College was young and now the Forests are, proportionately, the site of a smaller percentage of the Department’s total field research effort. This is due to a number of factors, perhaps the most important being the growth of the Research Cooperatives and the access that member companies have provided to a wealth of other lands for research and experimentation. Nonetheless, the College Forests have always constituted a valuable research site.

The most recent tabulation of research activity on the Forests done in 1992 showed that 64 masters and doctoral theses, 37 journal articles, and 31 miscellaneous reports had been produced between 1940 and 1992. As the report points out, there are many other ways in which the Forests have been of research value. For example, the Tree Improvement Cooperative has used the Schenck as a seed nursery for years and the Tree Improvement and Nutrition Cooperatives have both maintained long-term trial studies on the Hill, Hope Valley, and Schenck Forests. There have been several examples of long-term research projects that were located on one of the College Forests. The seed tree orchard at the Schenck is a prime example. Others include a study by Waldy Maki and Bill Hafley in the 1970s of water runoff at the Hill, an instrumented watershed weir at the Schenck, a water quality study comparing water quality from variously treated watersheds carried out by Jim Gregory in the early 1980s, and a long-term study on the Hill of southern pine beetle behavior by Fred Hain and his students.

Jervis and the College Forests Committee had always made it a practice to reserve from active management certain lands which, because of (1) their topography, (2) the nature of the forest community occupying them, or (3) the fact that they had been identified as containing plants or animals that were rare in the general area, warranted protection from active management. As development of the area surrounding the forests increased, these tracts became proportionately more valuable. These reserved lands were quickly recognized by the North Carolina Natural Heritage Program as having unique properties and the Forests entered into discussions that began the process of registering them as Natural Heritage sites. Eventually 4 areas on the Hill were given this designation including approximately 200 acres along the west side of the Flat River from the Hill’s southern boundary to near the camp entrance that were dedicated as the Flat River

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Nature Preserve. As a sidelight, 525 acres (21%) of the Hill Forest are now reserved from management.

The Hill Forest was officially registered as part of the American Tree Farm system in the early 1990s an action that predated ATF’s development of criteria for its program. Application for certification of all 5 Piedmont forests under the Sustainable Forestry Initiative (SFI) and Forest Stewardship Council (FSC) programs was made in 2000. This application was combined with ones from Duke University for the Duke Forest and the State Division of Forest Resources for its managed lands. Susan Moore, Larry Jervis, and later Joe Cox, coordinated this effort for NCSU. On-site audits took place in early 2001. SFI certification required correction of several non-conformances and a number of conditions had to be met before FSC certification was final. Fred Cubbage hired Jimmy Dodson on a temporary basis after summer camp to work through the specific non-conformances. Joe Cox was hired on 1 November and the auditors arrived on 12 December to conduct a remedy audit. Jimmy’s work in the woods, and Joe’s experience with SFI audits when he was with Champion International, combined to yield the evidence to get the NCSU properties certified with both programs in late 2001. In 2005, the original parties to the certification audit tried to work together to schedule a joint recertification audit to the SFI Standard. The details could not be worked out and each party had to pursue recertification on its own. The College awarded a bid to a company called SGS that handles both SFI and FSC certification audits. This resulted in a significant cost savings for continuing the certification of the Piedmont Forests to both standards. In late 2007, the Piedmont Forests were scheduled for the first recertification audit for the FSC standard.

The College Forests have been, and hopefully always will be an indispensable part of the Department’s teaching, research, and extension program. Their value to the Department and their equally important value to the communities in which they are located stand as testimony to the 30 plus years of wise management by Larry Jervis. There is every evidence that in Joe Cox the College Forests have found an equally able champion.
The Department’s research program is by far the most complex and difficult subject with which to deal adequately in this history. It would be nearly impossible to do justice to the work of the over 100 persons involved since 1980, each making his or her own particular contribution to the Department’s research portfolio. Some of these were made in the context of the Department’s several organized research programs. Others contributed as individuals through their own chosen research areas, some close to main stream forestry and others distant from it. The emphasis in this chapter is placed on the organized research programs, the cooperative research efforts involving Departmental faculty with industries and governmental agencies. The many other excellent research programs in the Department will be covered in the next chapter. Although cooperative research programs were not unique to NC State, it is fair to say that this research model reached its fullest development there during the 1980s and 1990s. This history of research in the Department during the past 25+ years will concentrate on the framework within which research was carried out and with the various directions taken by different research efforts. Specific research findings will be discussed only as they contributed to the overall direction of research and when they constituted major contributions to the science and practice of forestry.

The Department has never had an internal administrative structure for research. The persons closest to filling this role were Bill Johnson and Bob Kellison who served as coordinators of cooperative research programs during the late 1970s and 1980s respectively. In 1980 all administrative and accounting responsibility for research rested in the Dean’s Office. During the ensuing 25+ years significant accounting responsibility was gradually assumed by the Department but grant administration and coordination of project development still reside in the Office of the Associate Dean for Research and Extension.

Cooperative Research Programs and Industrial Partnerships

In 1980, the Department had 6 cooperative research programs (industrial and state partnerships). The NC State-Industry Cooperative Tree Improvement Program, established in 1956 through the efforts of Bruce Zobel and Dick Preston, was the first such program in the Department. It was followed in 1963 by the Hardwood Research Cooperative, in 1969 by the Forest Fertilization Cooperative, in 1976 by the Forest Equipment Cooperative, in 1979 by the Southern Forest Research Center, and in May 1980 by The Central America and Mexico Coniferous Resources Cooperative (CAMCORE). In 2007 there were 5 industrial partnerships. Of the 6 such units in 1980, the Tree Improvement Cooperative, Forest Nutrition (originally Forest
Fertilization) Cooperative, and CAMCORE remain, but the Hardwood Research Cooperative has become inactive, and the Forestry Equipment Cooperative and the Southern Forest Research Center have been dissolved. The Forest Biotechnology Research Consortium and the Southern Forest Resource Assessment Consortium have been created. During this same period the Loblolly and Slash Pine Rooted Cutting Cooperative, and the Fusiform Rust Research Cooperative have come and gone as well.

Before discussing each of the Department’s Industry-University Cooperative research programs one must recognize that the period from 1980-2000 when there was so much change in forest industry itself was also a period of major change in the nature of the relationship between the Department and its industrial cooperators. As previously pointed out, although the concept of the university-industry cooperative research program was not “invented” by NC State’s forestry program\(^1\), it had its greatest growth and development there. By the mid-1980s there were 5 such programs at NC State, and one out of every three industrial dollars spent on cooperative research was spent at NC State.

The original concept of a university-industry research cooperative when they were first formed in the 1950s was based on the facts that: 1) few industries had their own research staffs and that the greatest aggregation of forestry research expertise was located at universities, 2) that benefits of scale existed when a number of industries, their land bases, and the genetic resources of the trees they were growing were brought together to work toward a common objective, and 3) that applied forestry technology was so rudimentary that it was not considered a competitive risk for industries to cooperate with each other in this arena. Of necessity the first research done by the cooperatives was applied research in its finest sense, i.e., research directed toward resolving specific questions directly relevant to growing trees on a commercial scale. During the 1960s and 1970s NC State’s cooperatives and those located at other US universities were highly successful and their member industries utilized and benefited from the research results reported to them. Initially at NC State, the dues paid by industrial members of the cooperatives not only paid the expenses of doing research but they also paid a large part of the salaries of the university scientists involved. As pointed out elsewhere in this history, by the 1980s a significant part of the salaries of tenured faculty was paid from the “soft” money derived from cooperative membership dues.

One of the most important by-products of the research cooperatives was the opportunity they offered for training graduate students. Scores of graduate students obtained Masters and PhD degrees based on work done in, and supported by, one of the research cooperatives. Many of these students have gone on to important positions in academic and industrial research throughout the United States.

\(^1\) Bruce Zobel, however, is regarded as the originator of the industry-university cooperative concept when he started a tree improvement cooperative at Texas A. & M College in the early 1950s.
States and the world. For example, 215 PhD and Masters students have graduated with degree programs done in the Tree Improvement Program alone, with most of those occurring in its earlier years.

By the mid-1980s the climate in which the research cooperatives operated began to change. As dues went up year after year, reflecting the increased costs of doing business and raises for involved faculty, members began to question the financial structure of the cooperatives. Many industrial members began to pressure the Department to increase its financial contribution to the cooperatives. At the same time, increases in State funds provided to the Department were so small that they did not offer any real hope for increased financial support of the cooperatives. The matter of the Departmental contribution to the finances of each of the cooperatives was an issue raised at each annual meeting of the cooperative members. Furthermore, many industries had developed their own research staffs (often staffed by persons with advanced degrees from NC State). Consequently, the nature of the research conducted by the cooperatives became an issue with those industries having their own research staffs pushing the cooperatives to adjust their research programs to become more strongly oriented toward basic research; others with less research capability emphasized the need for continued applied research. In some cases this could be done easily as faculty themselves were eager to make this change, realizing that the future of their programs lay in a better understanding of the basic science underlying their management findings. In other cases this change could not be so easily accommodated, and the desire of some of the cooperative members for more basic research became a source of disagreement not only between faculty and certain industries but among industries themselves. In short, what had been a “trust me” relationship between member industries and the Cooperative staffs (“trust me” in the sense industries paid dues and the Coop staff provided an annual plan of work for the industry’s approval) showed signs of strain. Finally, the forest industry sector began undergoing major structural changes in the late 1980s and 1990s with companies merging and others selling off their land bases. These changes reduced the number of companies operating in the Southeast with a consequent reduction in the number of dues-paying members of the cooperatives. Membership in the Tree Improvement Cooperative from 1956 to 2008 illustrates the membership dynamics well (Figure 1). In the first 30 years, membership expanded as companies and state agencies recognized the benefits of intensive plantation management and tree improvement. Starting in the mid-1980s, company mergers were common, and in the 1990s, companies started to divest themselves of forest land. Today, there are 12 full members supporting the entire breeding effort for the region.
Figure 1. Cooperative membership in the Tree Improvement Program at NC State has changed dramatically from the beginning. See http://www.cnr.ncsu.edu/tip/files/reports/50thAnnualReport(2006).pdf for more details.

The net result of these changes caused some cooperatives at NC State (and elsewhere) to simply go out of business. In other cases, by changing its modus operandi and the thrust of its research, a cooperative was able to continue, but with a research program substantially different from that with which it began. The best example of this outcome is the Forest Nutrition Cooperative which now operates with more members than it has ever had and with a research program vastly different from that with which it started. In yet other cases, new programs, often with different operating ground rules, arose to provide research expertise in new areas of forest management and science.

**Tree Improvement Cooperative**

The Cooperative Tree Improvement program is the “granddaddy” of all organized research programs in the Department. It was organized in 1956 by Bruce Zobel and Dick Preston with 12 charter members, which agreed to support research on forest genetics, selection, breeding and testing, and technology transfer for an initial period of 5 years. In the 50 succeeding years, although members have come and gone (Figure 1), the focus of research has changed, and the Raleigh research staff has undergone a complete turnover, the Tree Improvement Program remains as one of the nation’s most successful industry-university cooperative programs. Bruce Zobel was the founding director, remaining in that position until 1979 when he “retired” (Zobel continues in 2008 as the Department’s oldest active
Bob Weir became Director in 1979 and served until 2000 when he retired and was replaced by Tim Mullin who served until 2005. Steve McKeand and Bailian Li were named co-directors in 2005 and served together until Li became Vice-Provost for International Affairs in 2006; McKeand now directs the program. Other scientists directly affiliated with the Program and integral to its success included Bob Kellison (1963-1977), J. B. Jett (1968-1994), Floyd Bridgwater (1978-1995), John Talbert (1978-1983), and Jerry Sprague and Alice Hatcher from 1970-2000. Throughout their tenures at NC State, US Forest Service employees Gene Namkoong and Jim Roberds worked independently with faculty members and graduate students in tree improvement, adding much to the theoretical basis of the work of the Cooperative.

Initially, the Coop involved 12 members who agreed to fund a forest genetics program involving superior pine tree selection, breeding, testing, and technology transfer. The agreement was for an initial period of 5 years. The work, particularly on development of seed orchards based on superior tree selections, was so successful and its research quickly became such an integral part of southern pine forestry that the program became a permanent fixture. In 1980 the Coop had 27 members and its peak membership was in 1984-86 when it had 29 full members. With mergers and land divestitures in southern forestry companies, the membership has declined continuously so that in 2007 it was back to 12 full members, although not the original 12 (Figure 1). These changes have led to other, in the long run potentially more damaging, changes in tree improvement research in the Southeast. The lack of research expertise in tree improvement that existed in 1956, when the Cooperative was started, is true again today. Steve McKeand, Director of the NCSU cooperative, estimates that in tree improvement the forest industry sector in the Southeast has lost half of its tree breeders in the last 10 years. His liberal estimate is that there are 15 breeders among the Cooperative’s 12 members today, compared to 33 breeders among the 22 full members in 1998.

During the 1970s seed orchard management was improved so much that gains from using seed orchard seed far exceeded the initial expectations with 15% gains in yield from plantations originating from improved seedlings as opposed to that from unimproved seedlings. By 1980 the Tree Improvement Coop had completed a first generation of selection and breeding and was well into work on a second generation. By the early 2000s a third generation had been completed. When the Cooperative celebrated its 50th anniversary in 2006, over 94 million mass-control pollinated full-sib seedlings had been planted, over $95 million had been spent by members of the Cooperative on genetic improvement of loblolly pine, and more than 17 million acres in the south had been regenerated with genetically improved seedlings.

Over the last 25+ years the research program of the Cooperative has evolved from the initial mission of production of genetically-improved seedlings to an emphasis on forest genetics in the broadest sense. Studies were conducted on integrating tree improvement into
silvicultural systems, development of optimal selection strategies, understanding the genetic and environmental control of growth and wood properties, and understanding the genetic control of, and variation in, disease resistance. In cooperation with the Forest Nutrition program genetic material from the Tree Improvement program was used in studies of stand ecophysiology. One of the Cooperative’s most significant areas of cooperation in recent years has been with the biotechnology program that developed in the Department during the 1990s. The integration of biotechnology with breeding strategies and the Cooperative’s extensive loblolly pine genetic material contributed significantly toward making NC State’s forest biotechnology program one of the national leaders in this important new area of forest science.

Hardwood Research Cooperative

The Department’s second industrial cooperative program, the Hardwood Research Cooperative (HRC), came into existence on July 1, 1963 with Robert L. McElwee as its Director. The creation of the Hardwood Program was a result both of increasing interest in the management and use of hardwoods in the Southeast and of the impact of increased interest in hardwood tree improvement due to the emerging success of the loblolly pine improvement effort in the Tree Improvement Cooperative. The program’s initial objectives covered the full gamut of issues relating to hardwoods, including:

1) the management of hardwood stands to promote regeneration of desired species; 2) assessment of the wood properties and quality of key hardwoods; 3) determination of site requirements; 4) determination of patterns of variation in wood properties, growth and yield, and adaptability for principal species; 5) strengthen knowledge of reproduction from seed; and 6) develop studies of the genetics of key hardwoods to serve as the base for a genetic improvement program. Initially research was confined to the Coastal Plain and Piedmont with studies later carried out in the Mountains. Species of initial interest included Sweet gum, Willow oak, Southern red oak, Sycamore, and Tulip poplar. Its first major program was a region-wide Sweet gum improvement program.

McElwee, aided by Ed Jones in Extension and later by Bill Johnson, remained as Director of the Program until 1971. He was replaced by Bruce Zobel, who directed both the Tree Improvement and Hardwood Cooperatives from 1971-1977. Bob Kellison assumed the Directorship of the Hardwood program in 1977 serving until 1985 when the Directorship was turned over to Russ Lea. When Lea left to become the College’s Associate Dean for Research in 1991, Kellison returned as Director, remaining until he retired in late 1995. Mike Young was Interim Director until Dan Robison became Director in 1997. Robison served through termination of the Program in 2004. Bill Gardner served as liaison silviculturist with the Program from 1977-1981 when he left to join the Extension Forestry staff. Dennis Mengel and Mike Young among others were also important members of the Hardwood staff during the 1980s and 1990s.
The Hardwood Cooperative was a robust and well-supported program with as many as 20 members during the early 1980s. In addition to Kellison, Lea, and Gardner, Doug Frederick, who joined the faculty in the summer of 1977, developed an active program of research on hardwood silviculture. Frederick’s appointment, largely supported by teaching funds, was made primarily to broaden both teaching and research in silviculture in response to numerous criticisms from external constituencies that the Department’s programs had become almost entirely “pine oriented.” Kellison’s retirement in 1995 and Robison’s hiring, unfortunately, coincided with the period of major change and restructuring in forestry industry in the Southeast. Beginning in 1999 members began to drop out because of mergers, financial constraints, a desire to focus on pine management, and a perception that the program had dropped below a critical mass of members. Thus, the program became dormant in 2004 and it remains so today.

Nonetheless, the Hardwood Cooperative has a 40-year record of successful and significant research. When it began its work in 1963 numerous "Region-Wide" studies across 13 Southern states were installed on member lands. These studies were primarily oriented toward hardwood silviculture and tree improvement. This approach entailed the adoption of a uniform experimental methodology, which was then used by the members to install, maintain and measure studies on their own lands. Data from Region-Wide studies were sent back to the HRC staff for collective analysis and dissemination to HRC members and the broader scientific/forestry community. These studies were primarily directed toward regenerating and managing natural hardwood stands.

In the early 1980s the Cooperative’s research direction began to change. The first “national energy crisis” led to numerous sources of grants for the study of “wood for energy.” Frederick, and other faculty associated with the Hardwood Program, obtained several grants to study the production of biomass for energy by both natural and plantation stands of hardwoods. These studies continued throughout the early 1980s. Issues associated with harvesting and regenerating bottomland hardwoods led the Co-op staff to direct a major research effort to this complex situation. One important study of bottomland hardwood ecology and management was established on Scott Paper Company land in Alabama. This study involved Lea and Awatif Hassan, dealing with the impact of harvesting regimes on site properties. Another similar long-term study was developed with Georgia-Pacific on the Edisto River in South Carolina. Frederick developed several studies dealing with the use of young hardwood plantations as discharge sites for partially-treated municipal sewage. These studies, plus other similar ones, led to the Co-op staff assisting in development of wetland management practices designed to comply with Federal regulations. As a result of this work, Lea and Frederick were widely sought-out to provide guidance to both industry and regulators on bottomland hardwood management. Frederick’s interests in wetland
silviculture and restoration ecology, together with plantation culture of hardwoods for energy production, continue to the present.

Throughout its existence genetic improvement of hardwoods was an area of continued research. In the early 1980s a breeding program was adopted with emphasis on Sycamore and Sweet gum. These efforts were accompanied by attempts to introduce non-native hardwoods such as Eucalyptus spp., Alnus, and Paulownia to the Southeast. However, with industry interest focused almost entirely on management of natural hardwood stands, little opportunity existed for establishment of plantations and tree improvement research became a progressively less important part of the Co-ops’ research portfolio. This same effort was redeveloped in the mid-1990s, and unfortunately again met with declining industry interest due to the lack of adequate weed control techniques to ensure plantation success.

An interesting outgrowth of the Hardwood Cooperative’s work in wetlands was development, in the 1980s and early 1990s, of studies of the use of planted hardwoods in the restoration of degraded sites or as mitigation for destruction of bottomland hardwoods in other locations. Two early studies were located on the property of Texas Gulf Company near Aurora, NC, and at Coddle Creek near Concord, NC. These studies eventually led Ted Shear, who was hired on soft money to assist with research on mitigation, to develop his own research program in this area. Shear’s program will be discussed in Chapter 10. Since the late 1990s Robison and colleagues have worked extensively on the ecology and management of very young natural hardwoods stands, rooted cutting systems for sweetgum and oaks, and brought to conclusion the plantation and natural stand hardwood growth and yield efforts begun as early as the 1960s.

Despite the fact that the Hardwood Cooperative is now dormant it is still listed on the Department’s web page as an ongoing area of research with objectives essentially the same as those stated when it was started in 1963; Dan Robison continues an active research and graduate program in this area.

Forest Fertilization, now Forest Nutrition, Cooperative

The Forest Fertilization Cooperative, since 1986 the Forest Nutrition Cooperative, was organized in 1969 to bring together representatives of NC State, forest industry, and fertilizer manufacturers to “determine the economic feasibility of forest fertilization” for loblolly pine in the Piedmont and northern southeastern Coastal Plain. Field trials were begun in 1970-71. Wayne Haines, Bob Kellison, and Russ Ballard served as Directors during the 1970s, with able assistance from Mike Kane. Lee Allen has directed the program from 1981 to 2008 when he was retired and replaced by Jose Stape. Dan Kelting served as co-director from 2000-2003 and Tom Fox from VPI currently serves with Allen as co-director. Rafael Rubilar from the University of Concepcion in Chile became associate director for South American in 2006. The Nutrition
Cooperative is the only such program in the South ever to have its direction and programs determined by Directors from different institutions.

During its first 15 years the Cooperative concentrated on fertilizer trials in the Southeast. However, as its name change to Forest Nutrition Cooperative implies, the program altered its research effort to a wider emphasis on forest production, silviculture, and soils and to a wider geographic scope that now includes Argentina, Chile, and Columbia. Another significant change occurred in 2003 when NC State and VPI, and two years later the University of Concepcion, entered into a partnership to provide joint university leadership for its cooperative research work. Today there are 40 members in 3 classes (land owning/managing, contributing, corresponding) of the Cooperative who own and manage over 20,000,000 acres of pine plantations in the Southeastern US as well as 3 million acres of pine and eucalyptus plantations in South America.

The Nutrition Cooperative has not always had its current robust membership and research program. During the early 1990s as forest industries began to merge and change direction, membership in the Cooperative sank to below 10 members. A membership of this size provided barely enough membership funds for the program to operate and Cooper and Allen began discussions as to what would be done if the program “folded.” Due in no small part to Allen’s aggressive efforts to develop a forward-looking research program with emphasis on the physiological ecology of pine productivity the membership trend reversed and the program now rests on a solid foundation of membership and research, both basic and applied.

The field fertilization trials established by the Cooperative, as well as similar studies established by the Cooperative Research in Forest Fertilization Program at the University of Florida clearly showed that growth of most loblolly and slash pine plantations in the Southeastern U. S. was limited by the availability of both nitrogen and phosphorus. Mid-rotation fertilization with nitrogen and phosphorus increased growth by 25% in Loblolly pine on the majority of soil types with this response typically lasting for at least 6-10 years. These findings led to an increase in the number of acres of pine plantations receiving mid-rotation fertilization from 15,000 annually in 1988 to about 1.2-1.4 million acres per year since 2000. By the end of 2004 over 16 million acres of pine plantations in the Southeast had received mid-rotation fertilization. Recent studies have shown that deficiencies of other nutrients occur on certain soils and that growth increases after application of these nutrients. Results such as these have led to the solid membership base that the Nutrition Cooperative now enjoys. Much of the recent work of the Nutrition Cooperative involves demonstration of the role of fertilization as one component of an integrated system of plantation pine management that also includes tree improvement and planting, site preparation, and competition control.

The other major direction of the Nutrition Cooperative’s research has been toward understanding Loblolly pine plantations as
ecosystems. One major study, done in conjunction with the Phil Dougherty of the US Forest Service, involved the interaction of water stress and nutrition on Loblolly pine. Other research examined the effects of nutrition on leaf area production in an effort to determine how management practices such as fertilization actually affect the responses of trees that result in greater growth rates. Similar studies later involved different Loblolly pine genotypes developed by the Tree Improvement Cooperative in an attempt to elucidate why one genotype is more productive than another. Studies such as these, which go beyond simply determining what results various management practices achieve and seek to understand why certain responses occur have been one of the major factors in the dramatic success of the Nutrition Cooperative in the last 15 years. They reflect the understanding that Allen and his coworkers have of the criticisms of cooperative programs that members began to voice in the mid-1980s.

Forestry Equipment Cooperative (FECO)

FECO was established on January 1, 1976 with 9 member companies; 2 others joining later. Awatif Hassan, who had joined the faculty the previous August, was the first, and only, director of the Cooperative. Hassan’s hiring and creation of the Equipment Cooperative were driven by Dean Eric Ellwood’s desire that the School develop a program in forest engineering. Elwood sensed that there was a need for more application of engineering expertise to forest management problems and that there was a place for such a program at NC State. He was also, no doubt, motivated by the existence of a strong forest engineering program at VPI, with whom NC State competed while he and John Hosner were Deans at their respective institutions. FECO also had access to faculty members in Biological and Agricultural Engineering, Mechanical Engineering, Civil Engineering, Operations Research, and the Engineering Design Center.

The initial objective of FECO was to design and develop a planting machine capable of operating under various site conditions and to determine the machine’s role as a component of a total afforestation system. From the very beginning Hassan’s efforts toward this objective were hampered by limited support facilities and even more limited resources. The Department had no shop equipped with the necessary tools and it had no space in which one could be developed. To meet these needs a work space for Hassan was carved out of the Hodges Wood Products laboratory and limited equipment was acquired. Although Hassan became a member of the faculty in Biological and Agricultural Engineering, this contact produced little in the way of the equipment and work space she needed. Examination of FECO budgets show that in virtually every year of its existence the financial contribution of NC State exceeded that of the member industries together. In retrospect, it is clear that these shortages in fiscal and physical resources essentially doomed FECO from the very beginning.

Nonetheless, Hassan did what she and the Coop members set out to do—design and construct a tree planting machine that would operate...
under the conditions of Southeastern forest soils. The first prototype of the machine was completed in 1980 and tested during 1981-82. A new, more reliable planting head was constructed and field tested in 1982-83. After a successful demonstration of the machine in 1983 before 6 potential bidders, the rights to the machine were awarded to J. E. Love Company. In June 1984, the School, the Department, and the FECO members agreed to suspend the Cooperative, due to a “lack of funds”, on December 31, 1984.

Despite the demise of FECO Hassan continued research on various aspects of machine-soil interaction and on tire size-ground pressure relations in an all-terrain vehicle with a radar system for detection of tire pressure. Together with the Hardwood Cooperative she also engaged in research on the impact of different harvesting regimes on soil properties in bottomland hardwood forests. However, the efforts of the School and Department to develop a forest engineering program essentially died with the closure of FECO.

**Southern Forest Research Center**

This industry-funded research program began in 1978-79 with Ellis Cowling, who had become the College’s Associate Dean for Research in early 1978, serving as Director. The Center was organized under the auspices of the School rather than the Department and was envisioned as a program that would concentrate more on basic research (research with less immediate impact on management) than the research conducted by the Industrial Cooperatives.

At startup the Center supported studies in three areas, two in the Department and one in the Department of Botany. One project in Forestry involved studies of the impact of management practices such as site preparation and harvesting on forest site productivity. There were two separate projects initiated in this area. One, conducted by Chuck Davey and his students, dealt with biological fixation of nitrogen in forest soils. Objectives were to determine tolerance of N-fixing bacteria for the properties of forest soils and to isolate strains of bacteria particularly adapted to forest soils. The second in this area was initiated by Russ Ballard, Director of the Fertilization Cooperative. It involved two sites, one in the Piedmont and one in the Coastal Plain, on which were established studies of the impact of intensive forest management practices on site productivity. The other project in Forestry was carried out by Bill Hafley and Bill Smith and involved development of a bioeconomic model of growth of Loblolly pine as it is influenced by management practices prevalent in the South. The third project, located in the Department of Botany, involved pioneering efforts in the vegetative reproduction of Loblolly pine using tissue culture reproduction. Ralph Mott and Henry Amerson were the principal investigators.

Davey’s research on clover as a source of nitrogen in forest soils resulted in isolation of a strain of *Rhizobium* that would fix nitrogen under the conditions in forest soils. Field tests of this bacterium, alone and with fertilizer, were established. They showed
that use of clover as a source of nitrogen in forest plantations was feasible.

Upon Ballard’s departure in the winter of 1981 Lee Allen, the newly appointed director of the Fertilization Cooperative, took over management of the site productivity project. The study was expanded to a third site and Drs. Tom Wentworth of the NC State Department of Botany and Dr. Peter Vitousek of the Department of Botany at UNC-Chapel Hill came on board as research cooperators. Early research results showed that soil compaction in skid trails is severe, that nutrient displacement during windrowing was the most important drain on nitrogen and phosphorus reserves, and that herbicides and insecticides may stimulate nitrogen mineralization and thus nitrogen loss. Larry Morris joined the Fertilization Cooperative in 1982 taking responsibility for the Site Productivity Project. Morris left in 1985 for a position at the University of Georgia and Robert L. Sanford took over directorship of the Program. Sanford’s abrupt and unforeseen departure in the late fall of 1987 caused a serious management problem in this Project. Tim White became Project Director in early 1988, continuing through the summer of 1991. No publications ever appeared based on the Project’s work; ultimately, it was melded into the work program of the Nutrition Cooperative.

The model of Loblolly pine growth developed by Hafley and Smith was initially limited to unaltered stands. The unthinned model was then used to evaluate thinning responses and evaluation showed it conformed closely to data from thinned stands. Modifications were developed that incorporated fusiform rust impacts and allowed differentiation of stands into products. A technical report summarizing this study was released in 1982.

Within two years Ralph Mott and Henry Amerson, Botany faculty members who were the lead scientists in the Tissue Culture Project, had developed Loblolly pine plantlets through tissue culture techniques. Problems were encountered in root development and in field trials tissue culture plantlets did not perform as well as seedlings during the early years, largely due to problems with root development. Considerable research was directed to improvement of root development in plantlets and to development of in vitro techniques to screen Loblolly pine plantlets for resistance to fusiform rust and pitch canker. Research was also conducted on the development of rooted cuttings using material from 4-year old plants. By the late 1980s the Tissue Culture Program had essentially run out of new approaches to the issue of vegetative reproduction of plantlets and support of the Program was terminated by its industrial supporters. Although the loss of this program was a serious blow, in the long run it proved beneficial as the Department, with Bob Weir playing the lead role, developed a proposal for a Rooted Cutting project that was accepted and supported by a number of industries (see section on Rooted Cutting Program).

In the fall of 1986 the Department and School undertook a full examination of operation of the research cooperatives. One major recommendation of this study was that the Southern Forest Research
Center be phased out and replaced by a Forest Biology Research Program that would include the Site Productivity Project, the Tissue Culture Program, the newly-established Biotechnology Program, and a new forest physiology initiative. Bob Kellison was named director of this initiative. A total of $70,000 was made available from the Forestry Foundation to serve as seed money for new projects in basic forest biology. Unfortunately, and for a variety of reasons, the Forest Biology Research Program never fully realized the goals that were set for it and it never became a viable operation. Its constituent programs suffered various fates. The Tissue Culture Program, as indicated above, went out of existence, the Site Productivity Project became part of the Fertilization Cooperative’s field studies, the Biotechnology Program went its separate way and became enormously successful, and the forest physiology effort ultimately became a successful program, centered on the rooted cutting work of Barry Goldfarb.

Central America and Mexico Coniferous Resources Cooperative (CAMCORE)

In the late 1970s, Bruce Zobel and Carl Gallegos, one of his former students who was employed by International Paper Company, together with forest taxonomists Jesse Perry and Willy Mittak, specialist with the Food and Agriculture Organization stationed in Guatemala, agreed that there was a clear need for an international program directed at the conservation of certain tropical and subtropical trees in Central America and Mexico. Populations of these trees were in danger, through overcutting and expansion of agriculture, of becoming extinct or at the very least having their gene pools so severely depleted they would no longer be viable. The efforts of these visionary men, together with those of the administration of the School of Forestry, resulted in creation in 1980 of the Central America and Mexico Coniferous Resources Cooperative (CAMCORE) as a unit of the Department of Forestry. Initially there were 5 members in South and Central America and the United States. By 2008 membership had grown to 35 institutions spread across 4 continents. In August 1981 Bill Dvorak was named the Director of CAMCORE and he has remained in that position ever since (with the exception of 18 months in the early 1990s when Bob Kellison served as interim Director allowing Dvorak to finish his doctoral degree). Jeff Donohue assisted Dvorak during the program’s early years (1988-1996) as did international forestry consultant Bill Ladrach when he was still Director of Research for Smurfit Cartón de Colombia. Camcore increased its ability to do complex data assessment of genetic trials with the hiring of Gary Hodge in 1995.

In simple terms, CAMCORE began as a genetic rescue mission. During much of the 1980s Dvorak, with substantial on-site assistance, collected seed of a number of species of Central American and Mexican pines in order to save their genes. The seed were then planted on the lands of cooperators in trials designed to determine the productivity of these species under plantation conditions. CAMCORE’s strength was its ability to establish trials over a number of sites and use sophisticated data analyses to choose the best species,
populations and families. In 1984, CAMCORE began collections of tropical and subtropical broadleaf species in Central America and Mexico. In 1994 CAMCORE extended its scope to include collections of broadleaf species of Gmelina arborea and Eucalyptus urophylla in Southeast Asia. By 2008 the program was working with 40 different species, including pines and broad-leaved species. It has sampled over 11,000 trees in 500 locations and has more than 2500 acres of field trials and conservation banks. The tropical and subtropical pines included in these tests constitute the largest such data base of these species in the world. It has expanded its work to include assessment of wood quality, development of pine hybrids, and research on the evolutionary development of tropical pines and eucalypts.

From its modest beginnings in the early 1980s CAMCORE has grown into the “International Cooperative for Tree Conservation and Domestication” as it was renamed by its Advisory Board in 2001 (the program still retains its acronym CAMCORE). CAMCORE “works around the world with industry partners to identify threatened species and collect seeds from them for use in conservation and growth studies, assess genetic diversity to improve methods of conservation, evaluate the adaptability of trees to new locations and develop long-term improvement programs for ensuring the sustainability of resources.” The Program now offers stipends to enable international graduate students to study with the Program and the College of Natural Resources has named a Fellowship in Dvorak’s name to support international studies in forestry.

CAMCORE’s growth from a shoestring operation to a major player in world forestry is due both to the vision of its founders, particularly Bruce Zobel and Eric Ellwood, and to the dogged persistence and hard work of Bill Dvorak in obtaining funds and expanding the program’s scope throughout the world.

The NCSU Forest Biotechnology Research Consortium

To understand the background that led to founding of the Biotechnology Consortium it is necessary to understand the growth and development of forest biotechnology in the Department. In the mid-1980s Deans Ellwood and Cowling made a commitment to development of a forest biotechnology program. This commitment was made only after considerable discussion and with a clear understanding of the substantial personnel, space, and resources that would have to be committed for the program to succeed. In a sense, Ellwood and Cowling were gambling that the College and Department would be able to ride the rising tide of interest in biotechnology and develop such a program in forestry at NC State.

Obviously, establishment of a biotechnology program had to begin with scientists. Elwood and Cowling had been impressed with Ron Sederoff’s work in genetics and that of Anne Stomp in the Tissue Culture Program when he was in the Department of Genetics and she was getting her PhD with Ralph Mott in Botany. When Elwood approached Sederoff about returning to NC State he (Sederoff) was on a sabbatical at the University of California at Berkeley, employed by
the US Forest Service Southwestern Forest and Range Experiment Station. At the same time Stomp was working at the US Forest Service Laboratory at Placerville. Ellwood offered both the opportunity to return to Raleigh and both accepted, Stomp returning in 1986 and Sederoff a year later.

As the Department had no appropriate lab facilities at all, Stomp remodeled and outfitted the lab that Tom Perry had occupied on the second floor of Biltmore Hall. Sederoff, however, on his return in 1987, occupied lab facilities in Polk Hall courtesy of the Department of Biochemistry until the lab located on the 6th floor of Jordan Hall was completed in 1989.

The new forest biotechnology lab on the 6th floor of Jordan Hall quickly developed into a lab capable of cutting-edge biotechnology work and, as we will see, was the site of some highly significant research. However, within a few years it was clear that Sederoff’s program had outgrown its space. To resolve this difficulty, space was obtained on the second floor of the Partners II building on the Centennial Campus and the program was moved there in 1998. The University initially paid for this space but after two years the space was financed from overhead funds contained in grants. In 2007 the University resumed the costs of the facility. The Forest Biotechnology Program now operates entirely out of these facilities. The old forest biotech lab in Jordan was allocated to a campus-wide biotechnology teaching program that serves students in a number of biotech programs.

It is a major understatement to say that research in biotechnology is costly and complex and its needs far outstripped anything that the College or Department could provide. Fortunately, the research of Sederoff and his colleagues has been of such high caliber that a steady flow of grants from various sources has kept the Program functioning. This capability was greatly enhanced when Vincent Chiang joined the Department in 2002 and helped lead the program in new directions. Between Sederoff, Chiang, and Hou-Min Chang in the Wood and Paper Science Department, NC State’s forest biotechnology program is one of the strongest in the US if not in the world.

The research accomplishments of the Forest Biotech program writ large are substantial. One of its earliest findings, made by David Neale when he was Sederoff’s post doctoral at Berkeley, was to demonstrate the paternal inheritance of mtDNA in *Sequoia sempervirens*, a finding which became part of a dialogue on organelle inheritance in the journal Nature in March 1990. Work on transformation of Loblolly pine by *Agrobacterium tumefaciens*,

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2 Stomp’s work eventually took a very different direction from forest biotechnology. She developed a highly successful program in bioengineering of *Lemna* (Duckweed) as a source of therapeutic proteins such as insulin. Her work will be covered in more detail later in this history.
actually begun when Sederoff was in Genetics at NCSU and published in Bio/Technology in 1986, is regarded by Sederoff as the program’s first major contribution. His co-workers on this project involved not only Stomp, but also Scott Chilton and Larry Moore of the NCSU Department of Botany. Research on Loblolly pine continued with a study of the use of DNA markers. In 1992 Sederoff and his associates, using the RAPD technique, produced in 6 weeks a gene map of Loblolly pine which had been partially completed by others using more time-consuming methods. This eventually led several years later to the location of a gene that conveys resistance to fusiform rust disease. In the spring of 1992 the group, which now included Henry Amerson, David O’Malley, Ben Liu, and Ross Whetten, obtained three USDA competitive grants, showing the high regard in which peers held the NC State program. The RAPD method was used to map each parent in a full sib cross of Eucalyptus. The technique was also used as an integral part of research on fusiform rust, to study inheritance of quantitative traits in Loblolly pine, and to develop a genomic map of the species that will be of enormous importance to future breeding. Research was also initiated on the genetic basis for lignin formation in xylem. By the late 1990s the group had developed genomics of Pines and Eucalyptus using EST sequencing and microarrays enabling them to determine the effects of individual genes. This work involved an integration of molecular and quantitative genetics of the role of individual genes in traits controlled by a number of genes. In 1999 the group received an NSF grant of $3.7 million to study the genomics of Loblolly pine. Sederoff estimates that by 2004 the Forest Biotechnology Program had received about $18 million in support.

The North Carolina State University Forest Biotechnology Industrial Research Consortium started in 1988 with 4 members. Largely due to the dramatic record of significant findings emerging from the Biotech laboratory, by 2004 it had grown to 12 cooperating companies from all over the world. Dr. Vincent Chiang, who joined the Department in 2002, was named the Director with coordination assistance from Ron Sederoff and Hou-min Chang. Twelve other researchers from the Departments of Forestry and Wood and Paper Science form the core of the consortium’s research expertise. The mission of the Consortium is “to integrate genome technology, metabolic engineering, traditional tree breeding and wood and paper science into a research organization directed to the creation of superior wood as a raw material and as a product.” The Consortium uses forest biotechnology to promote advances in forest, wood, and paper science by facilitating cooperation among industry participants throughout the world.

The Consortium operates in a manner different from that used by the Cooperative Programs. The members pay dues to the Consortium and the research to be supported is designated by the Consortium Advisory Committee. The Consortium does not rely on financial contributions from its members alone. Rather, the bulk of its research is supported by competitive grants from major national granting
agencies. Recent grants include two from the Department of Energy, one for $1.9 million dealing with improved wood properties through genetic manipulation and another for $1 million dealing with poplar genetics and carbon sequestration. The National Science Foundation Plant Genome program recently granted $2.7 million to conduct biotechnological studies on the Fagaceae, with particular emphasis on restoring American chestnut. Considering support from the Consortium and these recent grants, total program support now exceeds $30 million.

The history of the forest biotechnology program illustrates clearly the “genetic” relationship existing among a number of the Department’s industry-university programs. The success of the Tree Improvement Cooperative in genetically improving Loblolly pine led supporting industries and faculty researchers to realize the potential value of a means of vegetatively propagating superior genotypes, leading to creation of the Tissue Culture Program. The work of Mott and Amerson led to an understanding of the importance of research in vegetative reproduction and at the level of individual (and groups) genes, thus leading to creation of the Rooted Cutting Program and the Biotechnology Consortium. Realization that the approaches used in biotechnology might hold promise for isolating the gene (or genes) controlling fusiform rust resistance led to creation of the Fusiform Rust Cooperative. Henry Amerson played the lead role in this effort and it existed from 1995 to 2006 when Amerson retired. As pointed out previously, CAMCORE was created because of the realization that the techniques used in the Tree Improvement Cooperative could also be used to save endangered pine genotypes and, ultimately, to genetically improve them through breeding.

Another significant outgrowth of the work in forest biotechnology has been the establishment of companies created to utilize research findings on a commercial basis. The first such company on the NC State campus was Biolex, Inc. created to utilize Anne Stomp’s findings to create therapeutic proteins (more on this later). Two other companies have spun out of forest biotechnology research, BioInformatics stemming from Ben Liu’s quantitative approach, and ArrayXpress based on research on plant pathogens done by Leonard Van Zyl.

**Loblolly and Slash Pine Rooted Cutting Project**

As the Tissue Culture Program, supported through the Southern Forest Research Center, was ending, some of the industrial members expressed interest in the rooted cutting work that had been started by John Frampton and continued by Peter Somers. To capitalize on this interest, Bob Weir developed a proposal for continued rooted cutting research. Included was a College commitment for a faculty position. Simultaneously, a search was conducted for a lead scientist to direct the program’s research. Barry Goldfarb was chosen and began work in 1993; Bob Weir continued as director. Although this program effectively functioned as a cooperative it differed from the other Departmental cooperatives in that industry funding was committed for phases with each phase requiring the
The program succeeded in its primary mission of developing rooted cutting technology for Southern pines. The technology developed has not been widely adopted on a commercial level in the US, primarily because of economics and competition from private biotechnology companies offering vegetative propagation services with an alternative technique, somatic embryogenesis. However, the knowledge generated has been adopted overseas where labor costs are more favorable. In addition, the technique has been successfully applied in research settings, including enabling Department researchers to collaborate on a $6 million NSF Plant Genome grant with three other universities.

Despite the loss of industry support, research continues to be conducted on the process of root initiation and on development of a useful technology for producing rooted cuttings in southern pines. At present, Barry Goldfarb and John King, together with researchers from other departments, are involved. Research in the program is currently being conducted in five areas: 1) genetic selection for rooting is being evaluated for its potential to enhance efficiency in rooted cutting systems and for its effects on genetic gain for growth rate and rust resistance; 2) root initiation and maturation research is concentrating on understanding the molecular and cellular processes that occur during adventitious root initiation and which steps are blocked by maturation-caused loss of rooting ability; 3) stock plant management studies are determining the optimal mineral fertilization regimes for hedged stock plants as well as other management tools to maximize rooting success; 4) refining the rooting environment is being accomplished by studying the effect of environmental factors on physiological processes in the cuttings such as moisture stress, photosynthesis and respiration, and 5) the quality of rooted cuttings is being evaluated by testing the effects of plant hormones and other compounds on root system morphology and also measuring the performance of these cuttings in field tests.

Southern Forest Resources Assessment Consortium (SOFAC)

SOFAC was organized in 1994 at the USDA Forest Service by Fred Cubbage to enhance the analysis of the South’s forest resources. It is a cooperative effort involving Department faculty members, the US Forest Service, southern forest industry, timberland investment organizations, and state forestry agencies. The member organizations contribute funding and participate as voting members in the operation of the consortium. Shortly after, Cubbage came to NC State and became co-director, with financial administrative services still residing at the Forest Service. In 200y, SOFAC was migrated entirely to NC State, and as of 2008 has 18 members. Bob Abt and Cubbage now serve as co-directors.
The mission of SOFAC is to develop forest sector market models for application to forest resource assessments in the South, U. S., and the World. Its goals are:

- To integrate currently available forest resource data from the USDA Forest Service Inventory and Analysis program and economic theory to model timber supply and demand in the South by local area;
- SOFAC economic models will allow use of exogenous or endogenous inputs about supply, demand, land use change, and landowner behavior in the analysis of timber and forest land markets and management;
- SOFAC modelers and members will be able to use the SOFAC suite of models and research to simultaneously project timber inventory, supply, and prices for a variety of regions and a variety of timber products across the South, the U. S., and the World;
- SOFAC will foster discussion among modelers and members about the appropriate inputs and assumptions in forest projection models and employ these in building timber supply models and timber supply scenarios that represent likely conditions;
- SOFAC will continue cooperative university-industry-public agency cooperation in southern and national forest sector economic modeling;
- SOFAC will enhance graduate instruction in forest economics and modeling in the South.

SOFAC has sponsored several research projects addressing timber markets in the U.S. South. SOFAC has been developing core timber market models as well as their components and inputs, including summarizing the best available and developing new growth and yield information for projections, compiling data on annual removals, estimating timberland conversions, and improving pulpwood supply equations. These projects have produced several SOFAC's Working Papers as well as other publications.

SOFAC facilitates continual timber supply analyses for the South with models that are continually updated with most recent research developments. SOFAC's members are provided with annual southern forest resource assessments and timber supply forecasts that are based on most up to date information on timber markets and resource conditions. The timber supply model developed with SOFAC's support--Subregional Timber Supply (SRTS)--was used to assess the current timber supply situation and develop forecasts for the South as a part of the Southern Forest Resource Assessment carried out under the lead of the USDA Forest Service. It has been updated to analyze multiple products and markets and applied to many industrial and policy questions.

3 These statements are taken directly from SOFAC’s statement of mission and goals.
X. OTHER ORGANIZED RESEARCH PROGRAMS AND PERSONAL RESEARCH

The NCSU-Industry Research Cooperatives and research programs with formal ties to the forest industry sector constitute only a portion of the Department’s research effort. Whereas in 1980 the Research Cooperatives constituted the major part of the Department’s total research effort, today the Department’s other research programs, collectively, are equal in size, scope, and importance to the research programs with direct ties to forest industry. Some of these other research programs maintain close ties to forestry commodity or forest user groups and provide them invaluable research results and access to scientific expertise. Others have extended their purview and clients beyond traditional forestry research. Some of these programs are located in named, organized units. Others are simply groups of faculty members concentrating on areas of common interest while others represent the work of individual faculty members. An important point is that virtually none of these research programs or researchers was in the Department in 1980. They are a clear result of the Department’s conscious efforts to broaden its base from a research program built largely on the needs of forest managers to a research program contributing to a wider array of natural resource subjects.

The Center for Earth Observation

The Center for Earth Observation, which was established in 1983, evolved from Siamak Khorram’s role as Director of the Computer Graphics Center. This program had been located in Electrical Engineering, and Khorram took over its directorship through his joint appointment with Electrical Engineering. Due to space limitations the Earth Observation program grew slowly through the mid-1980s. However, the design of the first two wings of Jordan Hall allocated the fifth floor of one wing to remote sensing. More important, it allowed the Center for Earth Observation to be combined with research work in Geographic Information Systems being conducted by Dr. Hugh Devine of the Department of Recreation Resources Administration. Khorram serves as Director of the Center for Earth Observation and Devine is Associate Director in charge of the Geographic Information Research and Teaching Program. Faculty and graduate students from many disciplines use the facilities of the Center in their teaching and research programs. The Center for Earth Observation is also an Affiliated Campus of the International Space University in Strasbourg, France. Dr. Khorram served in many capacities at ISU including the Dean and Vice President for Academic Affairs, the Chair of the Affiliate Network, the Chair of the Academic Council, and currently as a member of the Board of Trustees.
The Center has amassed an impressive array of computer hardware and software facilities. The centerpiece of these is the teaching laboratory which has over 30 high-end Windows NT workstations and excellent multimedia instruction capabilities together with interactive, clustered teaching facilities. The Center also contained a research laboratory with one specialized UNIX workstation, several powerful NT workstations, a softcopy photogrammetry workstation, as well as a separate instructional technology development facility. All these systems are integrated into the University’s computer network. In addition, program facilities include digital cameras, film recorders, digitizers, large and small format plotters, color printers, scanners, air photo interpretation equipment, and GPS units.

In addition to Khorram and Devine, faculty members Heather Che-shire and Stacy Nelson carry out active research programs as a part of the Center’s work. In addition, over 30 faculty members from NCSU departments use the Center’s facilities. Projects conducted in-house described on the Center’s web site include:

- Remote Sensing and Image Processing research projects funded by a variety of federal and state governments and private industry. These research projects include water quality modeling in Sicily, Italy, accuracy assessment of satellite based land use/land cover inventories conducted in cooperation with the US Environmental Protection Agency for EPA Regions 4 and 5, and multi-processing research on remote sensing data as applied to natural resources, funded by Cray Research.
- GIS projects, such as technical support for the National Park Service, GIS for regional planning and natural resource management, and instructional technology for GIS and environmental education;
- Development of educational technologies that range across many disciplines and are based on multi-media applied to instruction in spatial analyses;
- Automated and intelligent remote sensing and image processing systems that span the entire remote imaging process from phenomenology through acquisition and data analysis, including automated systems for image classification and change detection, computer understanding of images, neural networks and artificial intelligence, environmental data visualization, and multi-source data fusion; and
- Database projects such as design and development of relational database for National Acid Precipitation Assessment Program investigators."

The breadth of the Center’s research program is illustrated by research currently underway or recently completed. This includes numerous projects supported by the National Oceanic and Atmospheric Administration, USDA, USGS, National Cray (supercomputing) Research, Na-
An interesting sidelight to the Department’s remote sensing research effort occurred in 1980-81 when discussions were initiated with Virginia Tech toward developing a joint VPI-NCSU aerial photography and remote sensing cooperative. After several meetings, which proved inconclusive, the effort was abandoned. In retrospect, neither institution really felt it was to its advantage to cooperate in this important area and, equally fatal, was an almost complete lack of interest among any potential industrial sponsors.

**Restoration Ecology**

The Department’s program in restoration ecology grew out of research in the Hardwood Cooperative by Russ Lea and Doug Frederick in the late 1980s dealing with forested wetland management and on use of hardwood wetlands as sites for treated municipal waste disposal. Initially this work concentrated on creation of forested wetlands and on the question of how soon such artificial wetlands begin to take on the properties of natural systems. Several studies were initiated with TVA and the US Army Corps of Engineers. These projects were managed for a short time by Tim White who had obtained his doctoral degree in the Hardwood Cooperative. White left shortly after taking over the projects and was replaced by Ted Shear in the summer of 1991.

Shear has managed and nurtured the restoration ecology effort into a strong program with a diversified research portfolio and a large number of graduate students. Shear’s initial appointments were entirely on external grants, and he was appointed with State salary support in 2000 when he became the first Director of the Environmental Technology Program, which he played a lead role in establishing. He continued work in restoration ecology as well, and now has returned to focus on restoration ecology and mitigation, which remain important subjects for research.

The Department’s restoration ecology program conducts research designed to help in the recovery of ecosystems that have been degraded, damaged or destroyed. Emphasis is placed on the actual craft of restoring natural ecosystems as well as the social and philosophical principles that mandate restoration. In many cases the research has been done cooperatively with other NC State departments, and State and Federal agencies. Graduate students have played a major role in execution of the research and Shear is justifiably proud of the success his students have had in obtaining jobs in the field of restoration ecology.

Much of the research has been conducted on forested wetlands and includes projects carried out on the North River in Carteret County, NC, along the Edisto River in South Carolina, at Core Point on PCS Phosphate lands, and on development of wetland forest on farmlands abandoned 50 years on TVA sites in Tennessee. Other wetland projects have led to development of guidelines for the NC Department of Trans-
portation for restoration of forested wetlands, to development of recommendations for minimizing the impacts on wetlands of road location, for analysis of impacts of highway construction on wetlands, and for determination of edge effects in modified wetlands. Shear and his students have also worked in upland sites, on individual species (Chamaecyperis thyoides and Astragalus michauxii), and in urban areas (Cary). The program has also carried its research efforts to locations elsewhere in the world including China, Costa Rica, and Tanzania.

Shear’s program in many ways resembles CAMCORE in that it has reached its current status through the hard work of a researcher in a field of growing importance to natural resource management.

Small Woodlot Program

In the late 1970s Lester Holley took a leave of absence from the Department to work in the State Division of Forest Resources. Holley’s work was devoted to studying the needs of individual owners of small forest tracts. One of the principal recommendations arising from his work was the proposal of a research program at NC State devoted to the needs of owners of small tracts of forest land. The 1979 General Assembly approved an appropriation of State funds to the College for this purpose. After considerable discussion within the College, and after weighing the advantages of several different “homes” for this program, Dean Ellwood decided that a Small Woodlot Research Program should be created in the Department. Ellwood himself took the lead in recruiting a director for this program and in December 1979 Carlyle Franklin was appointed to the position. Originally, the Program was administered through the Southern Forest Research Center. This affiliation never amounted to much and the Program became a free-standing program within the Department.

The decision to locate the Small Woodlot Program in the Department was not well received by the Forestry Extension Program. The Extension staff felt that objectives of the new program so closely related to their mission that another administrative unit in a different department was not needed. Nonetheless, Ellwood’s decision remained final.

Franklin moved quickly to develop policy direction and research priorities for the Program. He concentrated on action areas that would serve to increase the cash value of private land owner’s forest holdings. These included incentives such as tax impacts and alternatives and land valuation, technology especially adapted to small non-industrial ownerships, and technology transfer. By 1982 three such studies had been completed: 1) an analysis of North Carolina’s present use valuation law as applied to forest land and preparation of a report and recommendations on these findings for a legislative committee dealing with property taxes; 2) studies of management techniques adapted to small woodlot management, and 3) analysis of several industrial assistance programs aimed at small forest land owners. In addition, an Advisory Committee was formed.
During the early 1980s Franklin added several individuals to the Program's staff. Dennis Hazel was hired as a Research Assistant and Gary Kronrad came on board as an Assistant Professor in 1983. Kronrad left in 1986 but Hazel played a major role in the program, staying with it until he moved to the Extension Forestry staff in 2003.

Throughout the 1980s the program continued to carry out studies of issues relevant to small nonindustrial forest land owners. These included the effect of regeneration in enhancing the market value of land, problems of minority forest land owners, comparison of timber sale methods, and present use valuation of land for property tax purposes. In addition, Franklin undertook silvicultural studies directed toward the special problems on nonindustrial forest land owners. Special attention was paid to low cost silvicultural methods appropriate to owners of small tracts of forest land; a study of small scale forestry contractors who might be able to provide these services was also carried out. Considerable attention was devoted to developing a one-year curriculum to train forest technicians. Two fertilization studies were initiated and an evaluation of the usefulness of all terrain vehicles in forest management was conducted in 1986.

During the latter part of the 1980s the Program began to carry out active field studies directed toward management issues. One such study at the Creedmore Agricultural Research Station involved a determination of the usefulness of forests as sites for disposal of run-off from agricultural fields. This study showed that forested zones bordering agricultural fields can play an important role in dispersing runoff, increasing infiltration, and reducing nutrients leaving agricultural watersheds in storm flow. A staff member of the Woodlot Program was trained to use Global Positioning Systems and was authorized to offer training in this technology.

The Small Woodlot Program remained active until Franklin’s retirement in 2005. Its scope of work has been dispersed to other programs of the Department, particularly in the Extension group. The Program is no longer recognized as a named administrative unit.

Southern Center for Sustainable Forests

The Southern Center for Sustainable Forests is a cooperative organization comprised of the Department, Duke University’s Nicholas School of the Environment and Earth Sciences, and the NC Division of Forest Resources. It arose from a need identified in Governor Hunt’s 1996 Task Force on Forest Sustainability and was established in 1997 by a Memorandum of Understanding among North Carolina State University, Duke University, and the North Carolina Division of Forest Resources. Leadership for the Center is shared among the three co-directors, Fred Cubbage in the Department, Dan Richter at Duke, and Barry New for the State Division of Forest Resources.

The Center was established “to provide leadership for research, education, and extension to promote economically and ecologically sustainable management of forests in the South. The Center’s objec-
tives were distilled from 11 broad themes identified in group discussion among participants at the founding meeting in High Point, NC, in July 1997. These objectives are: 1) fostering research and applications on the productivity and sustainability of forest management practices on private forests and evaluating the effects of intensive and extensive forestry at the landscape scale; 2) improving state, regional, and interdisciplinary cooperation in technology transfer of existing and new research efforts to forestry professionals and private landowners; 3) promoting balanced discussion about and cooperation among interest groups in achieving sustainable forest management; and 4) assisting in development and use of appropriate guidelines for sustainable forest management that incorporate economic and ecological principles.”

The Center’s first effort was to sponsor a conference in November 1998 in Charlotte on “Perspectives on Sustainable Forestry for the South.” Shortly thereafter it undertook an important and highly controversial job by serving as the unifying organization for a study of “Economic and Ecologic Effects Associated with Wood Chip Production in North Carolina.” This study involved investigators from all 3 founding organizations and was a major examination of the expanding wood products harvesting and processing sector in the State and its effects on related economic sectors and the environment. This study was finished in July, 2000, and was instrumental in framing a more informed discussion about the issues associated with wood chip production, environmental protection, and forest management in the South.

In the winter of 2000 the Center sponsored a conference on Forest Certification and in 2001 agreed to coordinate a study of Forest Stewardship Council and Sustainable Forestry Initiative forest certification on its member organization lands. All of the College-managed Forests were certified in this study, as were Duke Forest and Division of Forest Resources lands at Bladen Lakes. Each member institution underwent a side-by-side comparison of SFI and FSC certification to assess their applicability. The project served as a means to examine the extension of certification to nonindustrial private forest lands. The study also involved a reverse certification component which examined the standards that certifying bodies used. In June 2002 a conference was held in Raleigh at which the results of the study were discussed. In 2004 the Center cooperated with governments and universities in 5 countries to develop a course in Temperate and Subtropical Sustainable Forest Management and Forest Certification. The course was offered in Argentina and jointly in 2005 at NC State and in Sweden via teleconferencing and web interactions. In March 2006 the Center co-sponsored a conference on Energy from Wood: Exploring the Issues and Impacts for North Carolina. Currently the Center is focusing its efforts on woody biomass and energy potentials in North Carolina.

Forest Resource Economics, Management, and Policy

No area better illustrates the growth and diversification of the Department’s research efforts since 1980 than the areas of economics,
management, and policy. Until the late 1970s the Department had only limited expertise, primarily in economics, in these areas. In fact, it seemed that there was almost an unwritten agreement between NC State and Duke that NC State’s strong industry-oriented programs in tree improvement and related areas would not be duplicated at Duke, and that Duke’s emphasis on the social dimensions of natural resources would not be duplicated at NC State. Lester Holley was the only active researcher in economics and policy. Holley’s major contributions were the study of the research needs of private, non-industrial landowners that led to the creation of the Small Woodlot Research Program, an intensive analysis of the impact of Southern Pine Beetle infestations on the southern forest economy and the economics of marketing beetle-killed timber, and development of a Timber Investment Diagnostic system.

However, circumstances changed when Dave Adams, Art Cooper, and Jan Laarman joined the faculty in the late 1970s. Adams carried out an active personal research program involving coastal resources, wildlife habitat analysis, and studies of issues related to implementation of Federal wetland legislation. Undoubtedly his greatest contribution was authoring a text, “Renewable Resource Policy”, that was published in 1993. Because it covered all renewable resources and approached the subject through an institutional context, it was not widely adopted in forestry programs. Nonetheless, Adams’ text was described by several policy experts as the “best text of its kind available” at the time. Although Cooper contributed little in the way of publishable research in forest policy, his deep involvement with the implementation of natural resource policy on the State and National level, particularly National Forest planning, inevitably led to a broadening of interest in the social science dimensions of forestry. Laarman’s initial interests in labor economics carried over from his doctoral work at UC-Berkeley. However, he quickly found that North Carolina was not a fertile ground for research in labor economics and shifted his interests to the economic dimensions of international forestry, particularly in Latin and Central America. His work in Costa Rica eventually led him to leave the Department for employment there in 1998. Laarman’s contributions ranged over a number of topics involving economic impacts of, among others, nature-based tourism, technical change in the Third World, policy planning in Latin America, and development assistance in forestry.

When Bob Abt, Fred Cubbage, Erin Sills, Toddi Steelman, and Sarah Warren joined the Department, economics and policy were represented by a breadth of active researchers whose programs established an expertise in the Department that had not existed before. Consequently, the Department now has a strong effort in economics and policy led by these four researchers that focuses on how the political and economic decisions we make individually and as a society affect our environment. There are now significant research efforts directed toward decision-making and the use, management, regulation, and protection of natural resources. Research is also devoted to the importance of accurate economic analysis in weighing management options, implementing oversight programs, evaluating the effectiveness of strategies, and motivating people to take action.
The research in economics and policy is proactive, in the sense that faculty and students often work together with public and private sector partners to address real-world problems. The scope of research covers a wide array of natural resources and an equally wide scope from local to international problems. Research often collaborates across disciplinary lines, involving other NCSU departments, Duke and UNC faculty, as well as federal, state, and non-profit organizations.

During the past decade, research has involved a number of areas involving policy. Examples include: public and community involvement in environmental and natural resource management, decision-making in communities dependent on natural resources, the economics of agroforestry and econometric applications in forestry, natural resource administration and policy, National Forest management and policy, Resources Planning Act policy and implementation, timber production and harvesting economics, as well as forest certification and the economics of sustainable forest management.

Steelman’s work has been a particularly important addition in the policy area. She has brought an interest in governance of environmental and natural resources with an emphasis on science, policy, and decision making interactions. Her current and past projects involve watershed remediation and management, land and open space protection, national forest planning and community forestry, and wildfire. Her current work focuses on reforming current wildfire policy in the United States and how communities interact with natural resource agencies. This sort of research, lying as it does on the interface between natural resource management and social science, represents a new and significant addition to the Department’s research capabilities.

Current research involves: development of regional timber supply models, nonmarket valuation, nontimber forest products, and international forestry, impacts of certification as a market policy tool and of government regulation and intervention, forest certification in the Americas, timber investment returns for plantations and native forests in 7 countries in Latin America, and silvopasture systems in Misiones, Argentina, with a parallel study at the Center for Environmental Farming Systems in North Carolina.

**Forest Ecosystem Health and Assessment Program**

The program is a long-term, national research and monitoring effort that helps resource managers and policy makers manage forest resources, allocate funds for research and development, and evaluate the effectiveness of environmental policies. It began as a program created and managed by Ellis Cowling and dealing primarily with the impact of atmospheric change, primarily acid rain, on forest ecosystems.

**NOTE: THIS SECTION REMAINS TO BE COMPLETED**

**International Forestry and Conservation**
It is difficult to argue that “international forestry” is a discrete area of research interest in the Department. Rather, it is a dimension that, except for Bruce Zobel’s work in tree improvement, hardly existed prior to 1980 and yet now permeates virtually every area of research that the Department carries out. All of the Coopertives have some of their research located in other countries and virtually every other faculty member has at one time or another been involved in an internationally-based research project. As the Department’s web site declares, “the Department maintains partnerships with organizations and universities around the world. These relationships increase our academic and study abroad offerings while enhancing the breadth and quality of our research capabilities.” Erin Sills, herself an active researcher with numerous international research projects underway, coordinates the Department’s international programs. These include overseas study opportunities for both undergraduates and graduates as well as research.

The Department maintains ties with several universities worldwide. Reciprocal arrangements provide students with opportunities to study abroad while also extending the Department’s international research capabilities. Probably the most important of these is with the Swedish University of Agricultural Sciences, a world-renowned institution whose research in forestry and natural resources has provided NC State with a rich source of knowledge over the years. This partnership exists because of the generosity of Gunnar Nicholson who created the Gunnar and Lillian Nicholson Faculty Exchange Fund which supports reciprocal visits between the two faculties as well as funds to support doctoral candidates. Other academic partnerships exist with the University of the Sunshine Coast in Queensland, Australia, the Universidad de Concepcion in Chile, five universities in China, and the University of Rome, Italy, for wildlife studies.

No less than 19 faculty, from virtually every disciplinary area in the Department, are listed as having active involvement in international research programs.

**Hydrology**

When Jim Gregory arrived in 1978 the Department had no faculty member whose primary interest was hydrology. Nonetheless, hydrologic research had been carried out during the 1950s-1970s by other faculty members and graduate students. Waldy Maki’s classic study of the very positive effects of drainage and fertilization on loblolly pine growth on very wet sites in the Hofmann Forest was instrumental in the development of the forest products industry in eastern NC. Waldy Maki and Bill Hafley studied the impact of land use on water quality in the watershed of Lake Michie (which includes Hill Forest), the principal water supply for the City of Durham. Maki and Hafley reported that unpaved county roads were the major culprit of sedimentation in Lake Michie followed by agricultural fields and they recommended maintenance of forested riparian buffers on streams and water bodies as a water quality management tool, the first NC scientists to do so. Maki led a large study of the impacts of stream channelization in eastern North
Several students worked with Maki, including Dennis Hazel who is now an extension faculty member. Another study, by graduate student Sharon Haines (nee Gibson, who became an influential industry researcher and who died unexpectedly in mid-2007), involved comparing runoff and water quality from the major Schenck Forest catchment to that from an adjacent agricultural catchment. However, none of these projects led to any coordinated effort to develop an hydrology research program.

Despite a major role in developing and managing the undergraduate forestry teaching program, Gregory also developed a personal program in watershed hydrology. Among his early studies were one on the impacts of upstream urbanization on streamflow and channel characteristics in Petersburg National Battlefield, one on the impacts of peat mining in eastern North Carolina on water quality and quantity, one in which he cooperated with the Small Woodlot Program in determining the sediment and nutrient removal functions of streamside buffer strips, a cooperative study with Weyerhaeuser Company and the Dept. of Biological and Agricultural Engineering of the hydrologic impacts of drainage control with flashboard risers in the pattern drainage systems of wetland loblolly pine plantations, and studies of water quality and water management in the Hofmann Forest. Gregory studied wetland hydrology in many different landscapes, including the ridge and swale topography of Hatteras Woods; mineral and organic flats of the Hofmann Forest, several different Weyerhaeuser Company sites, and the large military bombing ranges in Dare County; flood plains in two different states; and a large Carolina Bay. In recent years, Gregory’s research has also focused on headwaters streams including development of methods to define and identify stream types; studies of flow regimes, channel geomorphology and aquatic biology; and the development of new GIS-based methods for more accurate mapping of headwaters streams.

In the early 1980s began what are undoubtedly his most important contributions when he began assisting forest industry and the US Army Corps of Engineers in identifying acceptable forestry practices for use in federally-regulated wetlands. As time progressed, Gregory came to be regarded as a true expert in this ecologically, economically, and socially complex area of forestry. He was widely sought out for his expertise and his level-headed view of wetland management and regulation made him a source of guidance respected both by forest industry and government regulators. He assisted the State Division of Forest Resources in developing its Best Management Practices for Wetlands guidance and participated in every significant workshop held on this subject. At the same time, Gregory's research and technology transfer activities related to headwaters streams have made a significant contribution to protecting the ecological functions of these systems. As Co-Chair of the NC Stream Technical Advisory Committee, Gregory assisted in the development of the NC riparian buffer protection program and the development and testing of a field methodology for identification of the origins of intermittent and perennial streams that is the first of its kind in the country. That methodology has been adopted by several other states for stream protection programs and is being
adopted by the US Environmental Protection Agency and the US Army Corps of Engineers throughout the Southeast.

Despite his retirement, Gregory is still in heavy demand for continuing education programs on wetland management, wetland delineation, stream identification, and stream corridor management. Gregory’s heavy involvement in what was essentially extension work in wetland and stream management led the Department to make his appointment the first in its history that involved a split between teaching, research, and extension funds.

Fisheries and Wildlife

NOTE: THIS SECTION SUBJECT TO REVISION

Before discussing research in Fisheries and Wildlife in the Department it is useful to review the history of the Fisheries and Wildlife Program and of its relationships with the Department of Forestry. The Fisheries and Wildlife Program has a long and productive history at NC State. Prior to the late 1970s, all such work was located in the Department of Zoology in the College of Agriculture and Life Sciences. The Head of Zoology, Fred Barkalow, who also held an associate appointment in Forestry, was the principal wildlife researcher, with a particular interest in squirrels. Tom Quay in Ornithology and Bill Hassler in Fisheries also managed highly successful research programs with numerous graduate students in both areas. In 1976 the General Assembly appropriated earmarked funds to NC State to support a fisheries and wildlife program, specifying that some of the support was to go to the School of Forest Resources. After considerable negotiation between Agriculture and Forest Resources, sufficient funds were allocated to establish a position as Coordinator of the Fisheries and Wildlife Program with appointments in both Zoology and Forestry and to support a new position in forest wildlife management in the Department of Forestry. In 1978 Jay Hair assumed the position of Coordinator and Dick Lancia, who had recently completed his doctoral degree at the University of Massachusetts, became the first wildlife scientist appointed in the Department of Forestry. Lancia’s position carried a significant teaching commitment, most notably to a new 6-week summer field program in fisheries and wildlife management to be taught at the Hill Forest.

During the 1980s and 1990s Fisheries and Wildlife Management continued as a jointly administered program. In 1981 Hair left to become Executive Vice President of the Wildlife Society. In 1984 Rich Noble became Coordinator, holding the position until his retirement in 2003 when Lancia took over management of the program, holding it until his retirement in 2008. A number of other appointments in fisheries and wildlife management were made in Zoology, including Phil Doerr (1973), Roger Powell (1979), Peter Bromley ( ), Jaime Collazo ( ), and B. J. Copeland ( ); of these all save Copeland had, at one time or another, an appointment (either joint or associate) in Forestry. When
Fisheries and Wildlife moved to Forestry in 2003, Doerr also moved to Forestry; the others remained in Zoology.

In covering research in Fisheries and Wildlife that was conducted in the Department, only that of Lancia and of appointments made into Forestry (diPerno, Moorman, Peterson) will be covered in depth. The work of Barkalow, Quay, and Hassler, although significant, is beyond the scope of this history.

Lancia’s initial research can be broadly described as dealing with the habitat requirements of wildlife species, of which he studied a great number including bobcat, otter, and, (with one of his graduate students, on the impact of wild boar in the Great Smokies. Lancia and Dave Adams worked together on habitat description and prediction of the effects of development and management on fish and wildlife habitat, particularly in eastern North Carolina. Also in conjunction with Adams and research associate Steve Seagle, Lancia developed a new change-in-ratio method of estimating deer populations, and carried out studies involving range wide habitat use of Red-cockaded woodpeckers in the Southeast ultimately leading to a paper dealing with opportunity costs of management southern pine for red-cockaded woodpecker habitat. Lancia’s work supported that of Phil Doerr, who was a leader in studies of this endangered species, and who held a joint appointment in Zoology and Forestry. The research of both of these men made valuable contributions to the resolution of the dispute between red-cockaded woodpecker and timber managers.

During the 1990s Lancia, together with cooperators on the faculty, carried out studies and published on estimating the number of animals in wildlife populations, particularly the catch-per-unit-effort method. He also cooperated with one of his past graduate students on research on white tailed deer populations in a managed agricultural area on the eastern shore of Virginia. In the late 1990s Lancia was funded by WESTVACO to conduct research on the implications for wildlife populations of its management plans for its lands in South Carolina. This work led to publications dealing with impacts of management activities on breeding bird populations.

Three wildlife scientists have joined the Department in the last 8 years: Chris Moorman (1999) and Chris DePerno (2004) with primary commitments in wildlife extension and Nils Peterson (2007) on the teaching faculty. Moorman’s primary interests are in wildlife management, particularly of non-game species and in urban environments, and in environmental education with responsibility for the Department’s Project Learning Tree effort. DePerno specializes in population ecology, habitat use and management of big game species and predators, predator-prey relations and sexual segregation and resource partitioning in ungulates. He also works with reptile and amphibian habitat requirements, and as might be expected for an extension faculty member, with wildlife education. Nils Peterson, the newest member of the wildlife faculty, has diverse research interests, including policy analysis, environmental attitudes and behavior assessment, and assessing impacts of human behaviors on endangered wildlife populations.
Mensuration

By 1980 Bill Hafley had established himself as the Department’s mensurationist with 15 years of research in growth and yield and application of statistical measures to forestry problems. When Bill Smith joined the faculty in 1978 he quickly teamed up with Hafley to begin more than 10 years of joint research on growth and yield. Their principal project was the development of a bioeconomic model for growth and yield of Loblolly pine supported by the Southern Forest Research Center. Their collaboration initially produced a model simulating the performance of unaltered stands. The model was then adapted for use with thinned stands and to assess the impact of fusiform rust and of hardwood competition. Eventually it was used to permit differentiation of stands into products. They also developed a White pine plantation growth and yield model. In the mid-1980s Hafley carried out a reevaluation of US Forest Service survey data for the Southeast from which it had been inferred there had been a decrease in the rate of growth of pine in the last decade. Hafley identified artifacts in the data that contributed to the observed reduction in radial increment.

Much of Smith’s effort during the 1980s was devoted to completing his doctoral dissertation. After that, and before his departure for the US Forest Service in 1994, Smith worked with Joe Roise and Dave Adams to aid the US Forest Service planning effort for the Pisgah and Nantahala National Forests. His analysis of timber inventory and levels of cut proposed in earlier plans clearly showed that under such cutting regimes the Forests would have been over cut and levels which could not be sustained.

With Hafley’s retirement in 1990 and Smith’s departure in 1994 the Department was left without expertise in mensuration. This deficiency was remedied in 2002 when Bronson Bullock was hired. Bullock’s research focuses on quantitative issues relating to the growth and yield of forest stands with an emphasis on the spatial relationships between individual trees in a stand. He also works with more ‘traditional’ biometric topics, such as volume, taper, and weight equations derived for various species and regions in the Southern US.

Bullock’s research covers a broad range of forest biometrics theory and applications, including juvenile diameter distributions for loblolly pine, deriving the spatial autocorrelation for forested stands, evaluating the impacts of genetic background on individual and stand level growth characteristics, models for Christmas tree production, and using Bayesian multiple imputation techniques to fill in missing observations from large inventory datasets. He has performed applied research dealing with green weight and volume equations to any merchantable upper diameter or height limit with applicability to forestland managers and researchers alike.
Further, Bullock has led and helped to establish two long-term forestry research sites to evaluate the effects of genetics on tree and stand growth. These large study sites will provide a basis for ongoing research during the next thirty years.

A number of faculty members have made contributions to the Department’s research portfolio through their individual efforts. These include:

**Dave Adams**

Despite the fact that Dave Adams’ appointment was split 50-50 between the Department and the Division of University Studies, meaning he had heavy teaching and advising loads there, he was able to carry out several significant research projects during his tenure in the Department. His early work centered around habitat description and prediction of the effects of development and management on fish and wildlife habitat using computer models and describing the impacts of proposed dredging in Currituck Sound and the White Oak River. Another project involved three 20-year mining scenarios developed to assess environmental impacts of different intensities of peat mining and reclamation the Albemarle-Pamlico peninsula. Adams also completed an assessment of the implications for the State of North Carolina if it assumed responsibility for issuing Federal section 404 dredge and fill permits. He also re-surveyed a 20-acre plot established on Mt. Mitchell in the last 1950s before deterioration of spruce-fir forest in an effort to provide insights into the impacts of pollutants and other stresses on this high elevation forest. Adams also participated with other Department members in development of responses to public concerns with forest management practices described in land and resource management plans for the Pisgah and Nantahala National Forests; this work was designed to help the US Forest Service identify feasible, alternatives to clear cutting.

Unquestionably Adams’ greatest scholarly accomplishment during his tenure in the Department was completion of his renewable resource management text “Renewable Resource Policy: the Legal-Institutional Foundations.” Adams wrote this book during his last 5 years in the Department. After several abortive agreements with publishers, it was issued in 1993 by Island Press. The book was modeled after the outline of Adams’s course in Renewable Resource Management; ironically, because Adams retired at the end of 1993 he was never able to use it as the text for his course. Although the text was never widely adopted, policy researchers familiar with the book proclaim it to be one of the very best of its kind.

**Gary Blank**

When Gary Blank joined the Department, on a part-time appointment (the remainder of his time was allocated to Engineering) his efforts were wholly devoted to improvement of the writing skills of forestry undergraduates. His work in this area also involved working with individual faculty members to incorporate and evaluate writing assignments throughout the entire curriculum. He began work for his
PhD in 1981 and completed the degree in 1992. His thesis examined how professional foresters' communication behaviors were differentiated by workplace roles in federal, state, industrial or consulting organizations. During this period, his research concerning communications in natural resources resulted in a variety of proceedings papers and peer-reviewed publications.

During this time Blank's intellectual interests also shifted to include forestry-related problems, especially environmental impact assessment. Editing the Critical Assessment Review Papers on the Acidic Deposition Phenomenon and its Effects (1400+ pages with 66 authors) under direction of Drs. Ellis Cowling and Rick Lindhurst, Blank broadened his expertise in assessment science and policy. Consulting with engineering firms doing environmental assessment projects for the North Carolina Department of Transportation, Blank developed practical knowledge of assessment processes. From 1983 until 1998 he produced technical reports for more than 80 assessment projects across the state of North Carolina. In 1999, under contract with the Division of Forest Resources, he produced Conserving North Carolina's Forests: Assessment of Need for North Carolina to participate in the US Forest Service Forest Legacy program.

After completing his doctoral work Blank began to develop professional interests in the history of forestry, environmental history and historical ecology, in both North America and Europe. Largely these research interests evolved from experience in environmental impact assessment. They led to a project on the Harris Tract southwest of Raleigh that involved restoration of a Piedmont transitional longleaf pine site where longleaf had once been abundant. Several students completed Master's degrees under him using work done on the Harris Tract for their theses. Since then, he has continued to present papers and publish on the longleaf restoration project, principally in European venues. Blank's interests in the historical ecology have carried him to Europe several times for research in, among other areas, the Czech Republic and central Europe. Finally, Blank has also been examining environmental change from 1750 to the present in the central Appalachians' Allegany Plateau region, specifically focused on Garrett County, Maryland. A number of conference presentations and one paper have resulted from this project so far.

Richard Braham

Consistent with his devotion to excellence in teaching and advising Richard Braham has maintained an active involvement in research. Most of this work has stemmed directly from Braham's strong interests in the taxonomy and silvics of woody plant species.

In 1999 the Iowa State University Press gave Braham a contract to completely rewrite Dick Preston’s dendrology text North American Trees. This three-year project culminated in the publication of the new 5th edition of what is now Preston and Braham's North American Trees in December 2002. During its first year of publication, the text sold about 750 copies, a large number considering there are prob-
ably only about 1000 students who take dendrology in the United States. The text has also been adopted by 11 schools and colleges. Braham also obtained (with Alexander Krings of the Department of Plant Biology) a second contract to prepare a comprehensive manual to the tendrillate vines of Costa Rica and Central America. This work appeared in 2005.

Braham has also obtained support for graduate students to carry out studies on endangered plant species. Work on one of these, Michaux’s sumac (*Rhus michauxii*), involved transplantation of individuals from sites scheduled for disturbance. The work has resulted in successful movement of plants to protected sites and has also resulted in several publications. Braham is continuing his work with endangered species and forest types, particularly Longleaf pine on sites in the Piedmont at the western edge of its range.

Braham has regularly contributed articles on individual tree species to Forest Landowner News.

**George Hess**

When Hess joined the Department in 1996 he brought interests and abilities that filled a vacant niche in the Department’s research portfolio. He is another faculty member whose research and teaching are tightly integrated, much to his own benefit and to the benefit of the students in his classes.

Hess’s research is driven by a strong interest in the conservation of natural resources and biological diversity. Because of his background in biomathematics, he has concentrated on conservation issues amenable to modeling approaches and on examining wildlife conservation in managed landscapes generally, and suburbanizing landscapes in particular. Initially, his work focused on developing an approach to open space planning for wildlife in suburbanizing areas that could be applied by practitioners with readily available data, on understanding and quantifying suburban sprawl, and on the potential effects of increasing timber harvest rates on wildlife. Two important studies that benefited from Hess’s work were the 1999 North Carolina Chip Mill Study, in which he and his students quantified the effects of increased numbers of chip mills on wildlife populations, and the “State of Open Space 2000” report on the Triangle Region (he was the lead author) that played a role in igniting greater interest in open space protection in the Triangle.

More recently, Hess has studied urban greenways as habitat for breeding bird species, meso-mammals, bird nest predators, and salamanders, and their value as stopover habitat for migrating birds. The intent of this work is to develop guidelines for developing suburban greenways that maximize habitat for native flora and fauna. Graduate students working with Hess and Chris Moorman of the Extension faculty have examined the biodiversity values of greenways in Raleigh and

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1 Hess supplied materials from which this summary is drawn.
Cary. Hess and the students in his research special topics courses have also studied the potential effectiveness of various approaches to conservation planning, including surrogate species and indicator taxa. This work has been aided by a collaborative relationship with World Wildlife Fund.

Hess recently has added two new dimensions to his research. One is an effort, in conjunction with Toddi Steelman, to determine how to best incorporate scientific findings into local planning activities. The other involves, in collaboration with the Center for Excellence in Curricular Engagement, the scholarship of teaching and learning with respect to service-learning and curricular engagement.

Hess’s integration of teaching and research is shown by the evolution of his collaborative research courses taught at the graduate level. Since 2001 teams of graduate students in these courses have undertaken studies including: Measuring Urban Sprawl; Focal Species Planning; Surrogate Species Planning; Regional Biodiversity Patterns; Examining Biodiversity Patterns; Creating Open Space Plans that Work; and Where is Conservation in Local Planning. Scholarly presentations and published papers have resulted from a number of these team efforts.

Hess (Toddi Steelman and Ted Shear are others) is an excellent example of the new direction that the Department is taking in its research efforts. The work not only involves extension of ecological principles into the urban human-forest interface but also includes involvement of personal research in local resource management issues. The Department is clearly recognizing urban dwellers as important focal points for research and outreach related to the management of natural resources.

**John King**

King joined the faculty from Michigan Technological University in 2005 to continue the Rooted Cutting research program after Barry Goldfarb became Department Head. However, industry support for that program was terminated at virtually the same time King arrived, leaving him the latitude to pursue other directions in his personal research program.

The conceptual framework of King’s research lies in studying the flow of energy through terrestrial ecosystems by quantifying how net primary production is influenced by environmental drivers (CO2, ozone, temperature, nutrient, and water availability and by biotic factors such as genetics, community composition, and life history traits of the dominant plants. His studies range from the molecular to the ecosystem level and involve a variety of laboratory analytical techniques and field measurements.

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2 This section based on material kindly supplied by John King.
Currently, King has 6 distinct research projects underway. Four of these continue work that he began in the Lake States with co-investigators while he was at Michigan State and 2 represent new studies undertaken since his arrival at NC State. Three of the Lake States projects are located at the AspenFACE Project in Rhinelander Wisconsin where aggrading communities of Trembling aspen, Paper birch, and Sugar maple have been exposed to atmospheric CO$_2$ approximating those predicted to occur in 2050. The studies King has been involved in involve various aspects of ecosystem response changed atmospheric conditions. One involves the responses of fine root chemistry to changed atmospheric conditions, a second involves fluxes and rates of carbon and nutrients in leaf litter, and a third seeks to determine how forest ecophysiological responses will influence regional water responses. The other Lake States study King is involved in is a study of biomass production and partitioning in Red pine along a soil chronosequence in the upper Peninsula of Michigan. This study is a bit unique in that a full carbon accounting along the soil chronosequence has been made, including above and below-ground carbon. A tractor and mechanized soil screen was used to excavate and sieve the entire soil volume contained within the plots, thus recovering virtually all of the root biomass.

King has developed two separate projects since coming to NC State. One involves cooperative work with the Tree Improvement Program and involves studies of the effects of genetic improvement on tree physiology, stand-level productivity, and the cycling of carbon and nutrients. This project apparently will take advantage of the large pool of Loblolly pines of known genetic inheritance and known performance rates in the field and should provide physiological and ecological understanding as to why some improved trees perform better in nature. Small scale studies are being conducted in common garden experiments in Raleigh and the stand-level assessments are being conducted at the Hofmann Forest in Onslow County. The other North Carolina-based study deals with partitioning of ecosystem respiration in Lower Coastal Plain forests. This study is just getting underway and will complement two existing eddy covariance flux tower sites in 3- and 15-year old Loblolly pine plantations.

The work King has underway appears to provide the Department an opportunity to provide a physiological understanding for Loblolly pine behavior observed in the Tree Improvement and Nutrition Cooperative programs. No work of this sort has been possible before in the Department, partly due to the lack of a faculty member with appropriate interests and partly due to the lack of equipment and facilities needed for such work. It thus adds an important addition to the Department’s research portfolio.

Elizabeth Nichols

3 Nichols kindly provided a write-up on her research work that serves as the basis for this section.
When Nichols joined the Department in 2002 she brought with her research interests developed while she was on the faculty of the University of Tennessee-Chattanooga. In her six years in the Department she has built on those interests, developing a research program that focuses on chemical and biological mechanisms that control contaminant availability to interact with organisms in soils and sediments. She has worked closely with graduate students in the Department and with students working on related subjects in other departments, as well as with undergraduates. Nichols’ program, together with the bio-restoration work of Ted Shear, constitutes the Department’s research efforts in environmental technology. Given the growth of that program and the students it has attracted, it is easy to predict that it will be one of the emerging areas of research in the Department.

Currently, Nichols’ research centers around three subjects. The first involves studies of how plants impact petroleum hydrocarbon availability in soils and sediments. Working with members of the Departments of Marine, Earth, and Atmospheric Science and Environmental and Molecular Toxicology (where she is an associate faculty member), and with the assistance of Exxon-Mobil Corporation and the Environmental Protection Agency, she analyzed field sediments from a refinery waste pit that had naturally re-vegetated over several decades. Initial results showed that vegetated refinery waste had much less petroleum hydrocarbon contamination than barren refinery waste sediments. These results enabled her to obtain NSF funding to study plant carbon cycling in petroleum waste materials from sites in New Jersey and Indiana. She has also received funding from EPA and North Carolina’s Department of Environment and Natural Resources to establish a phytoremediation demonstration at the U.S. Coast Guard Training Facility at Elizabeth City, NC. The project goals are to present the discharge of gasoline-contaminated ground water into the Pasquotank River using trees to retard ground water flow via transpiration.

A second area of study involves using isotopic analyses to monitor water quality in watersheds. This work is a continuation of work she began at UT-Chattanooga in the Conasauga River Basin, GA, where freshwater mollusk populations were rapidly disappearing. After arriving at NC State she was contacted by the Nature Conservancy to carry out a study of contaminants in the Conasauga Basin using funds from the Woodruff Foundation and the USDA Forest Service. She used surrogate snail populations to evaluate if stable nitrogen isotope signatures changed with land use and passive membrane devices to collect integrated samples of water contaminants over time.

Nichols’ third area of interest built on work done on the Conasauga River and investigated the use of stable nitrogen isotope analyses of vegetation to monitor ground water contaminated with municipal or livestock waste water. Although snails and mussels are useful organisms for studying stable nitrogen isotopes in water because of their limited mobility, their usefulness is limited by their declining populations. Nichols began to investigate if stable nitrogen analyses of foliar and stem samples from trees would increase if trees were ex-
posed to groundwater contaminated with livestock or municipal waste water. A study was recently established at the Garner, NC, Waste Water Treatment Facility and determination of the usefulness of the approach are ongoing.

Graduate and undergraduate students have participated extensively in these studies and most publications emerging from them have either been authored or co-authored by students. Such collegial work clearly attracts students to the field of environmental technology, a critical factor in the early development of any successful program.

Joe Roise

With the hiring of Joe Roise, who began work in early 1985, into the position vacated by Tom Gemmer’s death, the Department acquired a new and important expertise in quantitative decision making. His research work has applied the methodologies of Management Science to integrate information and knowledge from a wide variety of disciplines for the purpose of improved forest resource decision making.4

His initial work concentrated on developing a new Nonlinear Programming methodology for estimating optimal combinations of stand-level management decisions, providing forest managers with a significantly improved ability to analyze stand-level management activities. Within 7 years Nonlinear Programming was applied commonly in North America and Scandinavia and are used world-wide today. These methods were extended to analyze multiple objective resource problems. One of the most interesting was development of tradeoff curves between Red Cockaded Woodpecker habitat and net present value of other forest resources. Roise took advantage of advances in computer technology, creating a formulation of the Four Color Theorem to analyze forest level problems. Roise used these techniques when he became involved, with Dave Adams and Bill Smith, in developing early versions of ecosystem management models for the planning efforts of the National Forests in North Carolina. Enhancements of FORPLAN, Spectrum, TerraVision, VDDT, and other mathematical models were used to analyze tradeoffs between policy, objectives, ecosystems, economics, inputs and outputs from the Pisgah, Nantahalah, Croatan, and Daniel Boone National Forests.

Another interest Roise pursued was development of computer software for use in forest product decision making, the most notable being CASP, a Computer Aided Sawing Pattern design program. This program has gone through several iterations and still in use in 2008. Other programs involved COW, a wood products costing program, and BYPS, a bottomland hardwood yield projections system.

As integrating information from a variety of sources ran into an informational roadblock, because key pieces of information were not available and simply making new assumptions was not adequate, Roise

4 The narrative on Roise’s research program draws extensively on material he kindly provided the author.
studied the use of Neural Networks in an effort to enhance the ability of experts to integrate information. Although theoretically interesting, application of these systems, while possible for limited purposes such as developing prescriptions for certain forest types, still has not been successful for large scale forest management problems. Roise concentrated on applying these systems to specific problems such as development of a pine straw yield model, optimal wetland mitigation and optimal location of roads through wetlands, weight loss equations due to evaporation, forest scheduling pipeline problems, and analysis of competitive timber markets in British Columbia.

In 2004 Roise’s research underwent a major changed in direction as an old forestry problem that had never been fully resolved became urgent. After 50 or more years of fire suppression in the Southeast hazardous fuel loads had become dangerously high and a method was needed to reduce them. Having been involved in harvesting research earlier, Roise sensed what was needed. When he looked for conventional methods to harvest small diameter woody biomass, he found that no machinery existed that could do the job economically. By mid-2004 when a national energy crisis again loomed, Roise realized that the small diameter woody undergrowth that had once been regarded as a public safety hazard was in reality a huge potential energy resource. He then focused his efforts on developing a machine system to harvest small diameter woody biomass and in 2006 developed a partnership with FECON Manufacturing, Craven Wood Energy, the USDA Forest Service, and the NCSU Forestry Foundation to develop the machinery. By fall 2007 the machine was ready and testing continued into 2008. Roise’s students have dubbed the machine “the Kraken” for the mythical Norse beast that eats everything in its path. A second generation machine is being developed in 2008/2009 the result of which will be a system that will harvest small diameter woody biomass thus reducing buildup of hazardous fuels.

Anne Stomp

When Stomp returned to NC State in 1986, and for several years thereafter, she worked with Ron Sederoff on forestry-related problems, making major contributions to the early work of the forest biotechnology program. Chief among these was her work on the use of Agrobacterium tumefaciens to transfer genes into Loblolly pine and a number of other species of pine.

By the early 1990s Stomp’s research interests had changed and she was concentrating on genetic engineering in Duckweed (Lemna). Initially, her interest in Duckweed was centered on its potential to grow and remove nutrients from swine waste disposal lagoons. The first studies involved growth of Duckweed in synthetic swine lagoon medium. Duckweed grew and removed significant levels of N and P from the medium. This work led to research on genetic improvement of Duckweed. The work successfully developed Agrobacterium-mediated gene transfer as well as ballistic bombardment gene transfer into Lemna gibba and L. minor. The research also involved Duckweed callus cul-
ture, yielding an alternative means for growing fronds for use in experiments with Agrobacterium.

The work with Duckweed shifted to an emphasis on the ability of genetically transformed plants to produce biologically active polypeptides, ultimately leading to development of methods for the production of therapeutic proteins such as insulin. Because of the large amount of protein Duckweed contains, and its ability to double in size every 24-48 hours, production of insulin this way is potentially less expensive, more productive and less risky than traditional techniques. Stomp has patented the processes she and her co-workers used to genetically engineer Duckweed and develop therapeutic proteins from it. Armed with this important new methodology, Stomp in 1997 launched Biolex, Inc., the first plant biotechnology company to grow out of NC State laboratories and, with a license for her patented technology, Biolex now has the support of significant venture capital funding. Currently, the company is working on an interferon treatment for chronic Hepatitis C. Stomp left Biolex in 2001 and returned full time to the Department.

Currently, she is working with the Department of Biomedical Engineering (a unique Department encompassing both NC State and UNC-Chapel Hill scientists) where she and Donald Bitzer are heading a multidisciplinary group that is applying signal processing principles to study and enhance protein translation. Stomp’s career has been marked by an uncommon willingness to strike out in new directions and to think well outside of traditional boxes. To say her work is unique in the Department would be a major understatement.
HISTORY OF THE DEPARTMENT OF FORESTRY AND ENVIRONMENTAL RESOURCES AT NORTH CAROLINA STATE UNIVERSITY, 1979-2008

APPENDIX 1

CHRONOLOGICAL LISTING OF FACULTY WHO SERVED 1979-2008

<table>
<thead>
<tr>
<th>Years</th>
<th>Name</th>
<th>Position and Responsibilities</th>
</tr>
</thead>
</table>
1960-2008 **Thomas O. Perry**

1961-1991 **Maurice H. Farrier**

1962- **Charles B. Davey**

1963- **Robert C. Kellison**

1962-1990 **Leroy C. Saylor**

1963-1993 **Gene Namkoong**


<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Positions and Titles</th>
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</table>


1977- Douglas J. Frederick  Assistant Professor 8/1977-6/1979; Associate Professor 7/1979-6/1985; Professor 7/1985-. Silviculture, forest management.


<table>
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<tr>
<th>Year</th>
<th>Name</th>
<th>Position Details</th>
</tr>
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</table>
1979-2007 Russell Lea

1979- Roger A. Powell
Assistant Professor of Zoology and Forestry 7/1979-6/1985; Associate Professor 7/1985-6/2000; Professor 7/2000-. Wildlife management.

1980-1987 Robert B. Hazel

1980- Siamak Khorram
Associate Professor of Forestry and Electrical Engineering 7/1980-6/1984; Professor 7/1984-. Director, Computer Graphics Center, now Center for Earth Observation 11/1982-. Remote Sensing, GIS, Image processing.

1980- Steven E. McKeand

1981- H. Lee Allen


1984-89,  L. John Frampton  Assistant Professor 4/1984-12/1989;  
1996-  Adjunct Assistant Professor 1/1990- 6/1996;  Associate Professor 7/1996- 6/2005;  Professor 7/2005-.  Forest  
genetics, Christmas tree improvement.

1984-1986 Vicente A. Molinos  Market Development Specialist/  

1984-1986 John Muench, Jr.  Forestry Enterprise Coordinator/  
Extension Specialist and Visiting Professor 11/1984-9/1986.  Inter-
national forestry investment.

1984-2003 Richard L. Noble  Professor of Zoology and Forestry  
7/1984-3/2003.  Director of the Fish-
eries and Wildlife Program 1984-2003.  Fish-
eries management.

1984- Joseph P. Roise  Assistant Professor 1/1985-6/1990;  
Associate Professor 7/1990-6/2001;  
Professor 7/2001-.  Director of Undergraduate Programs 2003-2007.  
Management science.

Forest ecology, site productivity.

1986- Anne Marie Stomp  Assistant Professor 5/1986-6/1992;  
Associate Professor 7/1992-.  Bio-
technology, bioremediation.

1987-1992 James N. Woodman  Associate Professor and Director of  
NCSU Atmospheric Impacts Program  
Atmospheric pollution.

1987- Ronald R. Sederoff  Professor 7/1987-;  Edwin F. Conger  
Professor of Forestry 7/1995-;  
National Academy of Sciences 1995;  
Distinguished University Professor of  

1987-1995 Leslie Tolley-Henry  Research Assistant Professor 11/1987-  

1988-90 Andrew R. Gillespie  Research Assistant Professor 5/1988-  
1988- Edwin L. Jones  

1988-2002 David M. O’Malley  

1988- Jill R. Sidebottom  

1989-2006 James A. Richmond  

1989-1990 Lauri Schainsky  

1989-1990 Paul J. Schulte  

1989- Larry W. Tombaugh  
Dean of the College and Professor of Forestry 2/1989-6/2001; Dean Emeritus 7/2001-. (Also had appointment in Recreation Resources Administration as USDA Forest Service employee, 1969-1971). Social dimensions of forestry.

1989- Ross W. Whetten  

1989-1991 Timothy A. White  

1990-2001 Susan McCord  

Extension Associate 10/2005-6/2007;
Extension Assistant Professor 7/2007- . Stewardship, environmental education.

Economics.

1991-  **Frederick W. Cubbage**  Adjunct Professor USDA 7/1991-7/1994;
Professor and Head of Department 8/1994-7/2004; Professor 8/2004- .
Forest economics and policy.

Adjunct Professor 9/2001- . Forest physiology, forest soils.


Research Assistant Professor 10/2000- . Forest health monitoring


1993-  **Barry Goldfarb**  Assistant Professor 1/1993-6/1998;
Associate Professor 7/1998-6/2004;

1995- Gary R. Hodge  Visiting Research Associate Professor 10/1995-12/1997; Research Associate Professor 12/1997-6/2008; Research Professor 7/2008-. CAMCORE, quantitative genetics.


1996- George R. Hess  Assistant Professor 7/1996-6/2002; Associate Professor 7/2002-. Biometry, modeling.


1996- Robert E. Bardon  Assistant Professor and Extension Specialist 12/1996; Associate Professor and Extension Specialist 7/2002-. Silviculture and forest management.


1997-  **Daniel J. Robison**  Assistant Professor 4/1997-6/2003; Associate Professor 7/2003-. Director of the Hardwood Research Cooperative 1997-. Interim Associate Dean for Research and Extension 2005-. Hardwood silviculture.


1997-  **Sarah T. Warren**  Assistant Professor (Multidisciplinary Studies) 8/1997-6/2003; Associate Professor 7/2003-6/2004; Associate Professor (Forestry) 7/2004-; Director of Graduate Programs 2007-. Social and environmental effects of resource management.


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<tr>
<th>Period</th>
<th>Name</th>
<th>Position and Roles</th>
<th>Research Areas</th>
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<tr>
<td>1999-</td>
<td>Steven G. McNulty</td>
<td>Assistant Professor (USDA) 2/1999-6/2004; Associate Professor USDA 7/2005-. Global change.</td>
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<tr>
<td>1999-</td>
<td>Christopher E. Moorman</td>
<td>Assistant Professor and Extension Specialist 5/1999-6/2005; Associate Professor 7/2005-. Coordinator of the Fisheries and Wildlife Program 2008-. Wildlife.</td>
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<tr>
<td>1999-</td>
<td>Ge Sun</td>
<td>Research Assistant Professor 1/1999-4/2006; Associate Professor USDA 5/2006-. Hydrology.</td>
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<tr>
<td>2000-</td>
<td>Susan E. Moore</td>
<td>Director, Forestry and Environmental Outreach Program and Visiting Assistant Professor 8/2000-7/2004; Extension Assistant Professor 8/2004-. Forestry Outreach Program.</td>
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<td>Year</td>
<td>Name</td>
<td>Title and Position</td>
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<td>(Jennifer B. Phelan)</td>
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<tr>
<td>2001-</td>
<td>Toddi A. Steelman</td>
<td>Assistant Professor 7/2001-6/2004; Associate Professor 7/2004- . Policy, social dimensions of forestry.</td>
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<tr>
<td>Year</td>
<td>Name</td>
<td>Position and Notes</td>
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<tr>
<td>2004-</td>
<td>Christopher S. DePerno</td>
<td>Assistant Professor and Wildlife Extension Specialist 4/2004-. Wildlife management.</td>
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<tr>
<td>2004-</td>
<td>Lisa E. Schabenberger</td>
<td>Program Coordinator 2004-.</td>
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<tr>
<td>2007-</td>
<td>Judy Jakobek</td>
<td>Laboratory Manager 2/2007-.</td>
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<tr>
<td>2007-</td>
<td>Shannon Shinault</td>
<td>Undergraduate Program Coordinator. 2/2007-.</td>
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<tr>
<td>2007-</td>
<td>Sarah Slover</td>
<td>Graduate Program Coordinator, 5/2007-.</td>
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<tr>
<td>2007-</td>
<td>Shanfa Lu</td>
<td>Research Assistant Professor 7/2007-. Forest biotechnology.</td>
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<tr>
<td>2007-</td>
<td>Kevin M. Potter</td>
<td>Research Assistant Professor 7/2007-. Forest Health Monitoring.</td>
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<td>2008-</td>
<td>Jean-Christophe Domec</td>
<td>Research Assistant Professor 4/2008-. Forest physiology.</td>
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<tr>
<td>Year</td>
<td>Name</td>
<td>Position and Focus</td>
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<tr>
<td>2008-</td>
<td>Jose Stape</td>
<td>Associate Professor and Director of the Forest Nutrition Cooperative. Forest soils, forest nutrition, silviculture.</td>
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<tr>
<td>2009-</td>
<td>Melissa McHale</td>
<td>Assistant Professor 1/2009-. Urban forestry</td>
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</table>
HISTORY OF THE DEPARTMENT OF FORESTRY AND ENVIRONMENTAL RESOURCES AT NORTH CAROLINA STATE UNIVERSITY, 1979-2008

APPENDIX 2

HONORS, AWARDS, AND FELLOWSHIPS WON BY DEPARTMENT OF FORESTRY FACULTY, 1980-2007

1979-80

Arthur W. Cooper: President, Ecological Society of America 1980-81
Arthur W. Cooper: finished service as Chairman of the Committee of Scientists for the National Forest Management Act
Douglas J. Frederick: New Zealand Forest Service Fellowship 1980-81
D. Lester Holley: On leave 1979-81 with North Carolina Forest Service working on small woodlot forestry
Richard A. Lancia: Chairman of the Wildlife Society’s Position Statement Committee

1980-81

Frederick S. Barkalow: 1980 Distinguished Service Award of the North Carolina Association of Soil and Water Conservation Districts
Richard R. Braham: Named Outstanding Teacher in the School of Forest Resources for 1980-81
Ellis B. Cowling: Received O. Max Gardner Award of The University of North Carolina for 1981
Thomas V. Gemmer: Named one of three NCSU Distinguished Alumni Professors for 1980-81
Robert C. Kellison: An Outstanding Extension Service Award for 1979-80
Siamak Khorram: President, World Space Center, Washington, DC
Bruce J. Zobel: Gamma Sigma Delta International Award for Distinguished Service to Agriculture

1981-82

Floyd E. Bridgewater: Certificate of Merit from the US Forest Service
Arthur W. Cooper: North Carolina Wildlife Federation Conservationist of the Year for 1982 and Sol Feinstone Environmental Award from...
the College of Environmental Science and Forestry at Syracuse, NY

Robert C. Kellison: Served as one of six representatives in Forest Genetics on a delegation to the Peoples Republic of China, 1981

1982-83

Charles B. Davey: Received the Barrington Moore Award for Biological Research from the Society of American Foresters

James D. Gregory: Elected Vice-President of the North Carolina Academy of Science for 1983-84

Awatif Hassan: Designated the 1982 Engineering Concept of the Year Award winner by the American Society of Agricultural Engineers

Bruce J. Zobel: Named Man of the Year in Forestry for 1982 by the North Carolina Forestry Association

1983-84

Arthur W. Cooper: Chairman, North Carolina Division of the Society of American Foresters

Charles B. Davey: Gamma Sigma Delta Award of Merit for 1983

William S. Dvorak: Elected to Board of Directors, International Society of Tropical Foresters

James D. Gregory: Chairman, Southern Forest Hydrology Group

Rick A. Hamilton: Governor’s Award as Forest Conservationist of the Year from the North Carolina Wildlife Federation

1984-85

Richard R. Braham: Named Outstanding Teacher for the School of Forest Resources

Arthur W. Cooper: Received the Distinguished Service Award of the Ecological Society of America for 1984 and named a Fellow of the Society of American Foresters

J. Edward deSteiguer: Received a Certificate of Merit from the US Forest Service

James D. Gregory: Received the 1984 Professional Achievement Award of the NC Chapter of the Soil Science Society of America

Rick A. Hamilton: Received the NCSU Outstanding Extension Service Award
Russell Lea: Was a Rotary Group Study Exchange Fellow to Finland

1985-86

Bruce J. Zobel: Received the Bernard E. Fernow Award of the American Forestry Association

1986-87

Arthur W. Cooper: Elected a Fellow of the Society of American Foresters

Douglas J. Frederick: Spent three months during the summer in Finland on a Fulbright Fellowship

D. Lester Holley: Received an Outstanding Service Award from the Southern Forest Economics Workers

Siamak Khorram: ASEE Fellow and Summer faculty, Stanford University

Richard A. Lancia: President of the North Carolina Chapter, The Wildlife Society

Joseph P. Roise: Elected Chairman of the Systems Analysis Working Group of the Society of American Foresters

1987-88

Richard R. Braham: Named an NCSU Alumni Distinguished Professor for 1988-91

James D. Gregory: Named an NCSU Administrative Fellow for 1988-89

Jan G. Laarman: Received a Fulbright Fellowship to spend 1989 in Costa Rica

Russell Lea: Chosen as Intern in the Office of the Vice-Chancellor For Research

Larry Jervis: Served as Chairman of the North Carolina Division of the Society of American Foresters

1988-89

David A. Adams: Recognized as the Outstanding Teacher in the School of Forestry

Arthur W. Cooper: Elected Chairman of the Appalachian Society of American Foresters

Richard A. Lancia: Appointed to a two-year term (19990-91) as Editor in Chief of the Journal of Wildlife Management
Richard L. Noble: Served as President-Elect of the Southern Division of the American Fisheries Society

Bruce J. Zobel: Received the Sir William Schlich Medal of the Society of American Foresters

1989-90

Gary B. Blank: Named the Outstanding Teacher in the College of Forest Resources for 1989-90

Charles B. Davey: Named one of three Distinguished University Graduate Professors

Siamak Khorram: Member of faculty, International Space University, Strasbourg, France (appointment continues to present)

1990-91

Arthur W. Cooper: Received the Eure-Gardner Award of the North Carolina Coastal Resources Commission

Gene Namkoong: Received the USDA-Forest Service Superior Science Award for 1990

Edwin J. Jones: Named President-elect of the North Carolina Wildlife Society

Richard A. Lancia: Elected President, NCSU Chapter, Sigma Xi, The Scientific Research Society

Larry W. Tombaugh: President, National Association of Professional Forestry Schools and Colleges.

Robert J. Weir: Named Outstanding Alumnus of the College of Forest Resources at the University of Maine

1991-92

Rick A. Hamilton: Received the Southern Extension Forester Program Excellence Award

William T. Huxster: Received the Outstanding Extension Award for 1991

Edwin J. Jones: Received an Outstanding Service Award from the Southeastern Section of the Wildlife Society

Richard A. Lancia: Elected Director, University Honors Council

Ronald R. Sederoff: Named a Senior Scientist by the USDA Forest Service
Larry W. Tombaugh: Official U.S. delegate to the Tenth World Forestry Congress, Paris, France

1992–93

Rick A. Hamilton: Received the North Carolina Forest Conservationist of the Year from the North Carolina Wildlife Federation and was elected Chair of the Southern Extension Foresters Group

Jackson B. Jett: Awarded the Outstanding Extension Service Award for the College of Forest Resources for 1992

Richard A. Lancia: Named Teacher of the Year in the College of Forest Resources and in the Department of Forestry for 1993

David M. O’Malley: Awarded a Junior Faculty Enhancement Grant by Oak Ridge Associated Universities

1993–94

H. Lee Allen: Named Outstanding Teacher in the Department of Forestry for 1993-94

William S. Dvorak: Named a member of the Steering Committee for the Center for International Forestry Research

William E. Gardner and Ronald Phillips: Award for Excellence from the Southern Forest Resources Extension Specialists for exceptional Programming in Atlantic White Cedar management

Rick A. Hamilton: Recognized as “Forester of the Year” by the North Carolina Society of Consulting Foresters

Steven E. McKeand: Elected Chairman of the North American Quantitative Forest Genetics Group

Joseph P. Roise: Was a keynote speaker in the IUFRO Symposium on Advancements in Forest Inventory and Forest Management Sciences in Seoul, Korea

1994–95

H. Lee Allen: Named Outstanding Alumnus of the College of Forest Resources at the University of Maine

Rick A. Hamilton: Selected as North Carolina Division of Forest Resources Stewardship Forester of the Year and as Forest Farmers Extension Forester of the Year

Leon Harkins: Alumni Association Outstanding Extension Award for 1995
Larry G. Jervis: Named Outstanding Teacher for 1994-95

Siamak Khorram: Sabbatical appointment as first Dean and Vice President, International Space University

Jan G. Laarman: NCSU Jackson Rigney International Service Award

Richard A. Lancia: Named an Alumni Distinguished Undergraduate Professor

Ronald R. Sederoff: Elected to the National Academy of Sciences

Larry W. Tombaugh: Received Outstanding Alumnus Award, Penn State College of Agricultural Sciences

1995-96

Richard R. Braham: College of Forest Resources Board of Governors Award for Excellence in Teaching

Gary B. Blank: NCSU Alumni Distinguished Undergraduate Professor

Arthur W. Cooper: Named Chairman of the Governor’s Task Force on Forest Sustainability and Service Award for Doctoral Student Advising, African-American Faculty and Staff Association

Frederick W. Cubbage: President-Elect, Southern NAPFSC; Deputy Leader, IUFRO Working Group S 6.15-00 Improving Education and Further Education in Forestry

Larry F. Grand: Received University Outstanding Teacher (Alumni Outstanding Teacher)

Fred P. Hain: Received the A. D. Hopkins Award from Southern Forest Insect Workers for “outstanding contributions to Southern forest entomology.

Rick A. Hamilton: Named to the North Carolina State Board of Registration for Foresters and ascended to Chair the Board

Edwin L. Jones: NCSU Outstanding Extension Service Award

Robert C. Kellison: Named Carl Alwin Schenck Professor of Forestry

Richard A. Lancia: Elected Chairman, NCSU Academy of Outstanding Teachers Executive Committee

Mark A. Megalos and Rick A. Hamilton: Regional Extension Publication Award, Southern Region Extension Workers
Joseph P. Roise: NCSU Outstanding Teacher 1995-96

Ronald R. Sederoff: Named Edwin F. Conger Professor of Forestry

Larry W. Tombaugh: 1995 Outstanding Alumnus, Pennsylvania State University College of Agricultural Sciences

1996–97

Edwin L. Jones: Wildlife Society Conservation Education Programming Award

Siamak Khorram: Principal Advisor to the President, International Space University

Mark A. Megalos: Forest Landowners Association Forestry Extension Award for Best Newsletter, Project Leaning Tree

Mark A. Megalos and David Drake—Forest Landowners Association Forestry Extension Award for Best Forestry Fact Sheet

Jill R. Sidebottom: Southern Extension Forest Resource Specialist Award for Christmas Tree Integrated Pest Management


1997–98

H. Lee Allen: Named Carl Alwin Schenck Distinguished Professor

Richard R. Braham: College of Forest Resources Board of Governors Award for Excellence in Teaching

Robert I. Bruck: The North Carolina Award (need more detail??????)

Larry F. Grand: Received the William H. Weston Award for Teaching Excellence from the Mycological Society of America

Rick A. Hamilton: Served as President of the national Association of Natural Resources Professionals

Robert C. Kellison: Society of American Foresters Barrington Moore Award

Siamak Khorram: Member and Chair (1998–99) of the Academic Council, International University (appointment continued to 2002); Member Of the Board of Directors of Peaceful Uses of Space for Humanity Foundation (appointment continued to present)

James R. McGraw: City of Raleigh Award for Service in Urban Forestry
Mark A. Megalos: North Carolina Forestry Association Educator of the Year Award

Mark A. Megalos: NCSU Cooperative Extension Service Charles M. Brickhouse Award

Richard L. Noble: Outstanding Achievement Award, Southern Division of the American Fisheries Society

Richard L. Noble: Elected a member of the Fisheries Management Section Hall of Excellence

Ronald R. Sederoff: Named NCSU Distinguished Professor of Forestry

**1998–99**

Gary B. Blank: Named NCSU Alumni Distinguished Undergraduate Professor

Robert I. Bruck: North Carolina Teachers Association Distinguished Service to Science Award

Arthur W. Cooper: Received NCSU’s Alexander Quarles Holladay Medal

Frederick W. Cubbage: Received Certificate of Appreciation for Chairing Forestry Incentives Work Group and for Invaluable Assistance in Developing Recommendations to Enhance Sustainable Forests in North Carolina from North Carolina Division of Forest Resources

Forestry Extension: Southern Extension Forest Resource Specialists Award for Excellence for “Forestry and Natural Resources Desktop Reference Library”

Barry Goldfarb: College of Forest Resources Award for Excellence in Teaching

Richard A. Lancia: College of Forest Resources Board of Governors Award for Excellence in Teaching and elected President, Southeastern Section, The Wildlife Society

**1999–2000**

Arthur W. Cooper: Received the Gifford Pinchot Medal from the Society of American Foresters

Arthur W. Cooper: CFR Nominee for Board of Governors Award for Excellence in Teaching

Frederic W. Cubbage: Chair, National Research Council Study on Forestry Research Capacity
Forestry Extension: North Carolina Association of Cooperative Extension Specialists Extension Education Award

James D. Gregory: CFR Nominee for NCSU Alumni Distinguished Professor Award

George R. Hess: Hewlett Initiative for Teaching (more detail????)

James R. McGraw: North Carolina Master Gardening Volunteer Association True Friend Award

Joseph P. Roise: Hewlett Initiative for Teaching (more detail????)

Ronald R. Sederoff: Member, National Research Council Study on Forest Research Capacity

Jill R. Sidebottom: North Carolina Christmas Tree Growers Pesticide Stewardship Certificate of Merit

Jill R. Sidebottom: North Carolina Department of Agriculture and Consumer Services nominee for 1999 EPA Region 4 Pesticide Stewardship Award

2000-01

H. Lee Allen: College of Natural Resources Outstanding Teacher Award

Robert Bardon: Southern Extension Foresters Award for Excellence

Richard R. Braham: College of Natural Resources nominee for the Board of Governors Award for Excellence in Teaching

Richard R. Braham: Appointed as a member of the North Carolina State Board of Registration for Foresters

Ellis B. Cowling: Society of American Foresters Barrington Moore Award

Barry Goldfarb: College of Natural Resources nominee for Alumni Distinguished Undergraduate Professor Award

Rick A. Hamilton: Served as Chair of the Appalachian Society of American Foresters for 2001; inducted into the NCSU Academy of Outstanding Faculty Involved in Extension; also elected as a Fellow, Society of American Foresters

Jackson B. Jett: Inducted into NCSU Academy of Outstanding Faculty Involved in Extension
James McGraw: Received The North Carolina Award from the North Carolina Urban Forest Council; charter member of the Academy of Outstanding Faculty Engaged in Extension

Steven McNulty: three USDA Extra Effort Awards

Christopher E. Moorman: Southern Extension Foresters Award for Excellence

Richard L. Noble: Received the Meritorious Service Award from the American Fisheries Society

Ronald R. Sederoff: Elected Fellow of the International Academy of Wood Science

Jill R. Sidebottom: College of Natural Resources Award for Outstanding Extension/Engagement Achievements

Larry W. Tombaugh: Received North Carolina Forestry Association Distinguished Service Award

2001-02

Robert Bardon: Southern Forest Extension Group Award for Excellence

Heather M. Cheshire: College of Natural Resources nominee for NCSU Excellence in Teaching Award

Ellis B. Cowling: Received NCSU’s Alexander Quarles Holladay Medal

Ellis B. Cowling: Recognized as Chapter Scholar by the NCSU Chapter Of Phi Kappa Phi

Frederick W. Cubbage: Chaired the National Research Council Study On Forestry Research Capacity

Rick A. Hamilton: Southern Extension Forestry Group Award for Excellence in Extension Publications

George R. Hess: College of Natural Resources Outstanding Undergraduate Advisor Award

Laurens G. Jervis: North Carolina Association of Consulting Foresters Forester of the Year Award

Siamak Khorram: Member and Chair, International Space University Affiliate Campuses Network (appointment continued to 2006)

Christopher E. Moorman: Received Southern Extension Forest Resource Specialists Award for Excellence for 2001
Jill R. Sidebottom: Inducted into NCSU Academy of Outstanding Faculty
Engaged in Extension

Ross W. Whetten: NCSU Libraries Faculty Award

2002-03

H. Lee Allen: Outstanding Extension Service Award, College of Natural Resources

Robert E. Bardon: Inducted into the Academy of Outstanding Faculty Engaged in Extension

Richard R. Braham: Board of Governor’s Award for Excellence in Teaching

Arthur W. Cooper: Received the Outstanding Service to Forestry from The North Carolina Forestry Association

Arthur W. Cooper and Robert C. Kellison: Co-General Chairs of the National Society of American Foresters meeting in Winston-Salem, NC, October 2002

Larry A. Grand: American Phytopathological Society’s Award for Excellence in Teaching

Rick A. Hamilton: Award for Excellence, Southern Region Extension Forest Resources Specialists Association

Awatif E. Hassan: College of Natural Resources Outstanding Undergraduate Advisor Award

George Hess: American Planning Association Award for Best Regional Planning Effort for the Triangle Green Print Open Space Resource Assessment

Richard A. Lancia: Elected Vice-President of the Wildlife Society (becomes President in 2004)

Richard L. Noble: North Carolina Chapter of the American Fisheries Society named its Best Student Paper Award the R. L. Noble Award


Renee Strnad: Appreciation Award from the Cradle of Forestry
2003-04

Robert Bardon: North Carolina Association of Cooperative Extension Specialists Award of Excellence

Barbara L. Conkling: USDA Certificate of Appreciation

Frederick W. Cubbage received a Fulbright Fellowship to study certification of forestry programs in Latin America

Steven McNulty: USDA Extra Effort Award and the Southern Research Station Stewardship Award

Ronald R. Sederoff: Elected a Fellow of the American Association for the Advancement of Science

Bruce J. Zobel: Received NCSU’s Alexander Quarles Holladay Medal

2004-05

Robert I. Bruck was named an Alumni Distinguished Undergraduate Professor

Barry Goldfarb was named an Alumni Distinguished Undergraduate Professor


Joseph P. Roise received a Fulbright Fellowship to study forest forest sustainability issues at the University of British Columbia

Larry W. Tombaugh: Member, Board of Directors of the Forest History Society (Chairman 2004-2006)

2005-06

Larry F. Grand: Named NCSU Alumni Distinguished Undergraduate Professor

The entire Extension and Outreach Program was awarded the 2005 Family Farm Education Award by the National Association of University Forest Resources Programs and the National Woodland Owners Association

Rick A. Hamilton: Received the Henry Hardtner Award from the Southern Group of State Foresters in recognition of “his outstanding education, extension, and technology transfer efforts promoting forest sustainability and providing forest management assistance
to landowners in North Carolina and across the South”

Bailian Li was named Interim Vice Provost for International Affairs

Susan E. Moore received the College of Natural Resources Outstanding Extension Service Award for 2005

Larry W. Tombaugh: Chairman of the Board, North Carolina Forestry Association

2006-07

H. Lee Allen received NCSU’s Alexander Quarles Holladay Medal

Vincent L. Chiang received the 2006 Alumni Outstanding Research Award and was elected a Fellow of the American Association for the Advancement of Science

Philip D. Doerr received the Wildlife Society 2006 Student Chapter Advisor of the Year award.

William S. Dvorak was asked to serve on the Food and Agriculture Organization of the United Nations Panel of Forest Genetics Resources

Awatif Hassan was named a Fellow of the American Society of Agricultural and Biological Engineering

Richard W. Lancia won the North Carolina Wildlife Federation Wildlife Conservationist of the Year for 2007

Siamak Khorram was named a Member of the International Space University Board of Trustees

Bailian Li was appointed Vice Provost for International Affairs

Steven E. McKeand was selected as the first recipient of the College of Natural Resources-College of Agriculture and Life Sciences Joint Award for Service to Society and the Environment

Susan E. Moore was inducted into the Academy of Outstanding Faculty Engaged in Extension and was awarded the 2006 Outstanding Extension Service Award

Todd A. Steelman was appointed by the Institute for Emerging Issues to its GlaxoSmithKline Faculty Fellowship Program

2007-08
APPENDIX 3

BOOKS PUBLISHED BY FACULTY, 1979-2008


1978-79

--Dr. John W. Johnson becomes Head of the Department of Forestry on January 1, 1979. Dr. Charles B. Davey steps down as Department Head and is named Carl Alwin Schenck Professor of Forestry.

--Dr. J. O. Lammi retires July 1, 1978. His air photo interpretation course is taught by Dr. Arthur L. Sullivan, appointed jointly between Forestry and Landscape Architecture, and Mr. Harold Nelson, retired from Weyerhaeuser Company.

--Course offerings in watershed management and hydrology resume with hiring of Dr. James D. Gregory.

--Wildlife summer camp, taught by Dr. Richard A. Lancia, is offered at Hill Forest Slocum Camp for the first time in the summer of 1979.

--Southern Forest Research Center, organized under auspices of the School of Forest Resources but involving Department of Forestry faculty, begins research on biological fixation of nitrogen in forest stands (Dr. Davey) and on bioeconomic models of forest productivity (Dr. William L. Hafley). A special project being administered through the Center, dealing with tissue culture of loblolly pine, is headed by Drs. Ralph Mott and Henry Amerson of the Department of Botany.

--Efforts to improve writing skills in the undergraduate program are initiated under the direction of Mr. Gary B. Blank.

--Undergraduate forestry curriculum under revision.

--Governor’s Task Force on Small Woodlot Management, chaired by Dean Eric L. Ellwood with participation of Drs. D. Lester Holley and Gene Namkoong of the departmental faculty, concludes its work. Among other things, the report calls for establishment of a small woodlot research program in the Department of Forestry.
1979-80

--Together with the School of Forest Resources the Department of Forestry celebrates its 50th anniversary.

--Department Head John W. Johnson dies suddenly on November 23, 1979, and is replaced as Department Head by Dr. Arthur W. Cooper.

--Dr. Carlyle Franklin is hired to direct the program in small woodlot forestry research authorized by the 1979 General Assembly.

--The Department’s first course in environmental impact assessment is taught jointly with the University Studies Program by Dr. David A. Adams.

--The review of the undergraduate forestry curriculum is completed. Major changes involve: commitment to development of greater communications and mathematics skills, better integration of courses including summer camp throughout the 4 years of study, a new requirement for skills in computer science and remote sensing, a new junior-year sequence in forest ecology and silviculture, and smoother incorporation of transfer students into the junior year.

--The Central American Pine Cooperative (later to become CAMCORE—the Central America and Mexico Coniferous Resources Cooperative) is created. Dr. Bruce J. Zobel plays a major role in creating this program.

--Dr. Robert C. Kellison is named Coordinator of Cooperative Research Programs in addition to serving as Director of the Hardwood Research Cooperative.

--The Southern Forest Research Center becomes fully operational with Dr. Russell Ballard working on maintenance of site productivity and Mr. William D. Smith working with Dr. Hafley on bioeconomic modeling.

--With recent loss of six senior faculty to retirement or death, mean age of faculty declines by 15 years. Mix of faculty expertise begins to become more diversified.

--Dr. Arthur W. Cooper completes his chairmanship of the Committee of Scientists for the National Forest Management Act when the Committee’s report is issued in the fall of 1979.
1980-81

--Dr. Ellis B. Cowling shared the University of North Carolina’s prestigious O. Max Gardner Award for 1981.

--Dr. Siamak Khorram is hired as Associate Professor of Forestry and Electrical Engineering to teach and do research in aerial photography and remote sensing.

--William S. Dvorak begins his service as Director of the Central America and Mexico Coniferous Resources Cooperative. The Cooperative has 5 members with several other entities showing interest.

--Dr. Russ Ballard, Director of the Forest Fertilization Cooperative, resigns in mid-year to take a position in research administration with Weyerhaeuser Company. Ballard later returned to New Zealand and ultimately became the Director of the New Zealand Forest Service and later moved to a position in New Zealand’s national education ministry.

--Dr. Jay D. Hair, Director of the Fisheries and Wildlife Program and a joint appointment in Forestry left in May to become Executive Vice-President of the National Wildlife Federation.

--Dr. D. Lester Holley returned to the Department after a one-year assignment with the North Carolina Forest Service.

--Dr. Thomas V. Gemmer is named one of three University Alumni Distinguished Professors.

--Dr. Arthur W. Cooper served as President of the Ecological Society of America for 1980-81.

--Revision of Forestry undergraduate curriculum, with greater emphasis on communications and quantitation, approved by University Courses and Curriculum Committee. Administration of undergraduate program revised with two Committees, one on Courses and Curriculum and the other on Advising and Scholarships, established. Courses and Curriculum Committee proposes a process for evaluating and improving undergraduate courses. Advising and Scholarships Committee analyzed scholarship funds and allocated 8 merit and 8 work scholarships during the year.

--Discussions with VPI initiated toward development of a joint VPI-NCSU photography and remote sensing cooperative. Discussions eventually proved fruitless.

--Small Woodlot Research Program becomes fully operational.

--Tree Improvement Cooperative completes six-year project to broaden the genetic resource base of the program.
--In the Fertilization Cooperative several models predicting response of loblolly pine to fertilization were developed, recommendations were made as to source and timing of nitrogen fertilization, and analyses were made of response of fertilized stands to thinning.

--Studies of biomass related to wood-for-energy from planted and natural stands of hardwoods were made in the Hardwood Cooperative.

--The SESFOR "Symposium on Engineering Systems for Forest Regeneration" held at the McKimmon Center, sponsored by ASABE & the Department, internationally attended with its proceedings reprinted over 3 times.

--Graduate enrollment reaches 69 and the number of international graduate students begins to grow.

1981-82

--H. Lee Allen assumes Directorship of Forest Fertilization Cooperative. Dr. David A. Adams moved from a visiting appointment to Associate Professor of Forestry and University Studies. Dr. Lawrence A. Morris took over directorship of the Site Productivity Study and Dr. Gary Kronrad began a post-doctoral appointment in the Small Woodlot Program.

--Major turnover and diversification of faculty has occurred over the past 5 years. In 1976 14 of 26 full and adjunct faculty were full professors; in the fall of 1981 there were 40 full and adjunct members, only 13 of whom were full professors and 21 of whom were new since 1975-76. Mean age of faculty has declined from 48 to 40 years over the same period. New disciples represented include remote sensing, forest engineering, wildlife habitat management, biomass analysis, environmental impact assessment, and small woodlot management.

--New undergraduate curriculum fine-tuned. Junior year sequence of silvics and silviculture taught for the first time and senior year courses revised to assure continuity. Because many students were having difficulty with the quantitative subject matter in the freshman course in forestry, new mathematics requirements were instituted based on entering freshman predicted mathematics scores. After much debate faculty votes to require a grade of C or better (or a GPA of 2.0) for entrance into summer camp and in FOR 303, 304, 319, 405, 406, and ST 312. Continued emphasis is placed on writing improvement and, for the first time, the Department has a small number of scholarships to offer as an aid in recruiting. Concern with professionalism and ethics leads to new procedures for evaluating and emphasizing these qualities.
A special committee evaluates the entire summer camp program and recommends a number of changes in operations and physical plant. Construction of Phase I of the new dining hall at Hill Forest is authorized. Pre-camp course for transfers, FOR 111, taught for first time in May 1982.

Revisions of the Conservation curriculum effective in 1981-82 materially improve that program.

Applications for graduate study from international students continued to rise; the first application for graduate study from the People’s Republic of China was received (from Li Bailian who completed is doctoral degree at NCSU and later returned to a position in the Tree Improvement Cooperative and ultimately became the program’s Co-Director).

Comprehensive review of the graduate program, begun in 1980-81, are completed. Changes approved include: new procedure for screening applications, elimination of the foreign language requirement, revision of preliminary examination requirements particularly in the ground rules for preparation of propositions, increases in stipends, development of a research seminar to be required of all entering students, revisions of FOR 571, 572, and 614, and proposal of new courses in tree improvement techniques, environmental impact assessment, and advanced wildlife habitat management.

A study by The School Forests Committee shows that there has been a build-up of growing stock on the School Forests during the last 10 years and that an accelerated harvest of old-growth pine is desirable. Another study shows a need for new facilities at the Hill Forest Summer Camp, including a new kitchen and dining hall. Revenues from timber harvests on the School Forests will be adequate to finance the new construction and road repairs. Permission is sought and obtained for construction of a new kitchen. The study also identified several tracts of land on which development would damage Hill Forest. Approval is sought to acquire one such tract. A proposal is developed to justify carry-over authority in the School Forest budget. Such authority is deemed essential to sound fiscal management of the properties.

Despite difficult economic conditions in the forestry business, membership in the Department’s five industrial cooperatives continues to grow. CAMCORE makes significant strides in its first full year due to the work of Mr. Dvorak and Dr. Zobel often carried out under difficult and hazardous social and physical conditions in Central America. As a result of joint efforts with Duke and the US Forest Service the Southeastern Center for Forest Economics is established with Dr’s. Holley, Laarman, and deSteiguer participating.
1982-83

--Dr. Henry V. Amerson’s appointment was changed from a visiting appointment in Botany to Assistant Professor of Forestry.

--First mention made in Annual Reports of use of “contingent on continuing availability of funds” provision for hiring into tenure track positions. In 1983, 7 of 9 assistant professors were on that sort of appointment.

--Dr. Charles B. Davey receives Barrington Moore award for research from the Society of American Foresters.

--Dr. Bruce J. Zobel is named Man of the Year in Forestry for 1982 by the North Carolina Forestry Association.

--After study by faculty committees major changes made in departmental advising program and new procedures are developed in the job placement program.

--First computer laboratory established in the College. It is used by five forestry undergraduate courses.

--Changes approved in 1981-82 for the graduate program are implemented and a manual describing policies and procedures used in administering the graduate program is prepared.

--Plans for the new kitchen at the Hill Forest are approved and new equipment is ordered. A 100-acre tract near the entrance to the Hill Forest Camp was condemned and court proceedings are underway to determine its value. No action is taken on request for carry-over authority in the School Forest budget.

--Total research funding in the Department reaches $2.284 million with roughly one-third each coming from State and Federal appropriations, private industry, and grants and contracts.

--The Tree planter developed in the Forest Engineering Cooperative results in a patent ownership by NCSU.

--Camcore adds one new member each in Brazil, Columbia, and South Africa.
1983-84

--Dr. Thomas V. Gemmer dies of cancer in October 1983.

--Dr. James D. Gregory replaces Dr. Gemmer as departmental undergraduate placement coordinator.

--Mr. Jerry L. Bettis is hired to serve as a Lecturer for two years and becomes the first black faculty member in the College of Forest Resources. He is responsible for recruiting with special emphasis on minorities.

--Graduate program reaches a new peak of 76. Rapid growth of the graduate program in the early 1980’s is reflected by 15 students receiving their PhD degree at the May 1984 commencement.

--Graduate student Patrick B. Durst receives a Fulbright Grant to study reforestation in the Philippines becoming the Department’s first Fulbright Fellow.

--In the spring of 1984, the Department’s undergraduate forestry program undergoes a 10-year accreditation review by the Society of American Foresters and the Department undergoes its 5-year Cooperative State Research Service research review.

--Special analysis of the undergraduate Forestry curriculum carried out in March 1984 by faculty assisted by input from alumni and from persons currently hiring NCSU students. Review reveals a need to change the content of the introductory course and to add a course in policy. Other problems identified with humanities and social science electives, lack of a procurement course, and with concentration areas. As a consequence the content of the introductory course is strengthened and the course in policy is added as a requirement.

--New kitchen at summer camp completed and equipped prior to the 1984 summer camp.

--A long-term management plan is completed for the Goodwin Forest and plans are begun for the Hill, Schenck, and Hope Valley Forests.

--Research funding in the Department reaches $2.267 million.
---Economic conditions in the forestry industrial sector continue to be poor and are reflected at forestry schools by declining enrollment in undergraduate programs and increased competition for scarce industrial research dollars. Nationally, enrollment in forestry graduate programs increases.

---The curriculum in Forestry earns 10-year accreditation by the Society of American Foresters.

---The SAF accreditation review found our program to be “clearly one of the nation’s leading forestry schools” and the CSRS review was equally complimentary of the research program. Each review pointed out areas for improvement. The Department works during this year to respond to these issues.

---The Department implements the new fall orientation program, where incoming freshmen and transfers receive their orientation in late summer immediately before classes begin rather than earlier in the summer with other students.

---Joyce Hilliard-Clark is awarded her doctoral degree in May of 1985, becoming the first black female PhD in forestry in the nation.

---Alleviation of the department’s serious, long-running, space problems is offered by the proposal of a Natural Resources Research Center. Funding is sought for the building from the General Assembly.

---Research funding reaches $2.422 million not including funding for research in acid deposition which, if included, would bring the total to over $3 million.

---Despite declining enrollments the department does not lose State-funded faculty positions thus allowing a continued breadth of productive faculty that is cited by both the SAF and CSRS reviews as a major factor contributing to the excellence of the program.
1985-86

--Condition of the forest industry sector continues to be unsettled. Changes taking place appear to be long-term adjustments that will require changes in the forestry education sector if it is to remain competitive.

--General Assembly agrees to fund construction of a two-tower Natural Resources Research Center building that will, to a great extent, alleviate the serious space problems of the Department of Forestry. The building will combine space for Forestry and Marine, Earth, and Atmospheric Sciences and envisions a research program that will provide coordinated studies in a wide array of natural resource subjects.

--Dr. Awatif Hassan is on a sabbatical leave at the National Institute of Agricultural Engineering in England and Dr. Richard A. Lancia is on a one-semester teaching sabbatical at the University of California, Berkeley.

--Concentrated attention is given to recruiting with visits made to over 100 high schools and materials mailed to 396. Special attention is paid to minorities.

--Undergraduate enrollment continues to decline while graduate enrollment continues to increase reaching a high of 83.

--For the second year a group of undergraduate students and faculty travel to Washington for meetings at the SAF, the National Forest Products Association, the National Wildlife Federation, and the US Forest Service.

--The undergraduate curriculum is reviewed resulting in two new curricula, Forest Management and Forest Science, being proposed. In addition all required courses were reviewed to develop better coordination among them. FOR 110, Introduction to Forestry, undergoes major revision.

--Negotiations are carried out with North Carolina A & T State University toward development of a 3+2 transfer program.

--The graduate program is reviewed in March 1986 identifying a number of issues that will be reviewed by the faculty in 1986-87.

--Research support in the Department totals $2.55 million.

--Funds are obtained to purchase a plasma emission spectrophotometer for the Department’s soils analysis lab.

--A research program in Forest Biotechnology is established.
1986-87

--Major changes in the forestry sector continue to occur. These include mergers and takeovers among companies, a move toward divestment of forest land ownership, and a lessening of interest in research, including both money and personnel. These changes, particularly those involving research, lead to a proposal by the Department to restructure its organized research program. It is unclear how our industrial supporters will respond to the proposed change.

--Forestry becomes increasingly internationalized and our programs follow suit with particular opportunities in Central and South America and in Asia.

--Undergraduate enrollment continues to decline but graduate enrollment continues to be strong with quality being particularly good.

--The Department hosts the 30th Annual Conclave of southern forestry schools.

--An Alumni Symposium is held in the fall of 1986 with selected graduates of the Forestry program returning to have dinner with undergraduates and to discuss various aspects of employment.

--The proposal for an undergraduate Forestry degree with two concentrations, Forest Management and Forest Science, is approved and becomes effective in the fall of 1987.

--Review of the graduate program is, on the whole, complimentary. As a result of the review, a complete study of all graduate courses is conducted resulting in the elimination of several cross-listed courses, nine course revisions, and six proposals for new courses. In addition, a new process for evaluating applications is instituted, stipends are increased to $8,000 for master’s students and $9,000 for PhD’s, a recruiting trip to is made to six northeastern forestry schools, the Graduate Handbook is completely re-written, and a new recruiting brochure is prepared.

--Discussions are held with Western Carolina University concerning the forestry courses in its recently-approved Natural Resources program. No faculty member from NCSU indicates an interest in taking responsibility for those courses.

--Discussion with North Carolina A & T State University regarding approval of a 3+2 transfer program in forestry break down and the effort is abandoned.
There is a dramatic increase in interest in tropical forestry among graduate students and a course is developed which becomes popular. Many incoming graduate students indicate an interest in third-world or tropical forestry.

Intensive review of the Department’s cooperative research programs leads to, among other things, a recommendation for establishment of a Forest Biology Research Program that would replace the Southern Forest Research Center. It would include the Site Productivity Project, the Tissue Culture Program, the Biotechnology Program, and a new forest physiology initiative. The proposal is discussed by the various research cooperatives at their spring meetings.

Research in biotechnology begins with the addition of Dr. Anne Marie Stomp to the faculty. She remains working with the Forest Service biotechnology program in California while a laboratory is remodeled for her use.

A position in forest physiology is advertised in the winter of 1987.

A serious effort is made to develop a program of continuing education courses. A retired industry scientist is engaged to study the needs for such courses and develop those that seem appropriate. Three courses are developed. Two do not open due to low enrollment but the third does. The effort does not seem to be terribly successful.

For the first time every member of the Department has a personal computer. In addition, equipment is acquired and cables are laid to hard-wire the department’s computers so that they are all interconnected.

Champion International relinquishes its lease on the Hofmann Forest and management of the forest is turned over to the College of Forest Resources. Members of the forestry faculty work with the land management committee of the Forestry Foundation to develop a management plan and strategy for the Hofmann. The new situation at the Hofmann Forest represents a major opportunity to develop a source of support for school programs and for the Department and the Foundation to work together in a new, highly constructive, way.
1987-88

--Job situation for graduates stabilizes with more interviews held than in any recent year. Fully half the jobs for which our students interview describe some sort of general natural resources management knowledge is desirable.

--Continued discussions of departmental research program with industrial supporters indicate that there are areas of basic research in which we are not now involved and in which we should consider developing programs.

--Dr. Ronald R. Sederoff returns to NCSU taking a position in the department with a charge to play a lead role in developing a forest biotechnology program. Together with Dr. Anne Stomp the job of putting together laboratory facilities for the program begins together with writing research proposals to support the programs’ work.

--Dr. Leslie Tolley-Henry fills position in forest physiology

--Dr. Thomas O. Perry retires after 27 years on the faculty.

--Enrollment in undergraduate programs continues to decline as do undergraduate programs in all other major US forestry programs.

--The graduate program continues strong with many newly enrolled students having a strong interest, and in some cases background, in international forestry.

--In an effort to increase enrollment of blacks a group of 9 students from Tuskegee University was entertained. Although we continue to enroll more black students than any other forestry program in the US absolute numbers remain very low.

--Discussions aimed toward producing a better sequencing of courses in the Forestry major. They began with the courses in the junior and senior years.

--The course in Tropical Forestry is submitted to the Graduate Board for approval. It is anticipated that other courses in international forestry will follow.

--Two new undergraduate curricula, natural resource management and forest engineering, were developed. The natural resources curriculum is a revision and renaming of the existing Conservation curriculum. It is viewed as a very important part of the department’s continued efforts to serve students. Discussions continue with the College of Agriculture and Life Sciences to iron out differences between the Colleges. The forest engineering curriculum is a concentration within the Forestry major and has not yet been approved.
--An undergraduate minor in Forestry is developed which makes use of existing courses and includes the present course in forestry for non-majors (FOR 252) as well as a new course for non-foresters making a year-long sequence of such courses.

--There is still no progress on approval of the 3+2 transfer program with North Carolina A & T State University. We continue to be perplexed over this situation as there is no program in either natural resources or forestry, other than the two-year program at Tuskegee, at any of the 1890 universities.

--Research support increases slightly to more than $3.3 million.

--The Forest Biology Research Center is established and implemented with Dr. Robert C. Kellison as director. Its objectives are to increase the department’s basic research programs, to support the applied research of the cooperatives and other faculty, to provide an opportunity for industries to support specific research projects, and to provide greater emphasis on interactive research within and outside NCSU. A total of $70,000 in seed money is made available from the North Carolina Forestry Foundation.

--Continued discussions with industrial supporters indicates a need for a better coordinated program of research in tree improvement, tissue culture, and biotechnology. The existing 10 faculty in these areas represent the largest aggregation of such talent in the country and the department regards this as one of its most promising areas of research growth.

--The College of Forest Resources is ranked first in the country in amount of industrial funds raised for cooperative research; virtually all of these funds are raised within the Department of Forestry.

--Faculty members in the department participate extensively in the development of a management plan for the Hofmann Forest. Developments to this point indicate that within 10-15 years the Forest may become a major source of funding for the College.

--The department completes the first phase of its electronic communications capability with 70% of computers hardwired together and access to such capability is available for the remainder. This has allowed development of a full electronic mail capability that is used for routine communication within the department.

--Dr. Eric L. Ellwood retires after 17 years as Dean of the College. Larry W. Tombaugh is appointed as the new Dean.
1988-89

--The forestry sector prospered in 1988-89 with production in the pulp and paper sector reaching new highs and production of solid wood products also increased. However, the forestry enterprise has come under increased pressure from environmental interests and entering students are beginning to show this concern. It becomes clear that forestry education programs must stress sound environmental practices as essential features of forest management practices if they are to attract new students.

--Two faculty members take administrative intern appointments, Dr. James D. Gregory as the first NCSU administrative fellow working with the Dean of the College of Humanities and Social Sciences, and Dr. Russell Lea as a ¾ time intern in research administration.

--Dr. Bruce J. Zobel receives the Sir William Schlich Medal of the Society of American Foresters yet another recognition of his long and distinguished career in forestry.

--Dr. David A. Adams was named the Outstanding Teacher in the College of Forest Resources.

--Undergraduate enrollment underwent a small decline from the previous year and enrollment in the graduate program increased by 13. The proportion of international students remains high as does the number of students with interests and/or experience in international forestry.

--The Alumni Symposium in the fall of 1988 featured a variety of recent graduates discussing their earliest experiences on the job.

--Efforts to increase minority enrollment continue to splutter. In the fall of 1988, 5 blacks enroll but only two remain to continue into the sophomore year.

--The 3+2 transfer agreement with North Carolina A & T State University is approved in principle at A & T, is signed on the NCSU campus, and is returned to Greensboro for final approval. Dr. Lincoln Moore is assigned by the US Forest Service to A & T and it is hoped that he will be able to attract students to enter this program.

--Changes proposed in the Conservation curriculum, including the name change to Natural Resources, and approved by the College of Agriculture and Life Sciences and are readied for submission for approval in the fall of 1989.
Because entering students are now much more computer literate, the Department drops its previously-required sophomore course in computer use and replaces it with a first semester freshman course designed to acquaint students with computer facilities available in the College. In addition, there is a commitment by the faculty to include appropriate computer-based exercises where possible in all undergraduate courses.

Departmental faculty and graduate students, working with those in Soil Science and the Duke University School of Forestry, develop a successful proposal to the Pew Charitable Trust to assist in the planning of a major new program in sustainable agriculture and forestry and in conservation biology. A joint seminar held in conjunction with this effort attracts an average of over 50 per session.

When the College of Education and Psychology drops its course in college teaching, which was one way our graduate students could meet their requirement for experience in college teaching, Dr. Lester Holley developed and offered a 6-week seminar in college teaching as a substitute.

When contacts with prospective graduate students indicate that our current stipends may not be competitive, an examination of all stipends is begun.

Effective in the Spring of 1989 the Atmospheric Impacts Program is transferred to and now reports through the Department of Forestry.

Major attention is given during the year to preparation for a 5-year Cooperative State Research Service review.

Dr. Ronald R. Sederoff and Associate Dean Ellis B. Cowling serve as members of a National Research Council Committee on Forest Biology charged with making recommendations for the future of the nation’s forest biology research efforts.

Funds available to the Department from the Hofmann Forest are now $110,000 per year, up from just $30,000 two years ago. Drs. Robert C. Kellison and E. Carlyle Franklin play a lead role in planning for future management of the Hofmann.

The Department recognizes the need for an administrative infrastructure with assignments in specific areas of responsibility.
1989-90

--The department is saddened by the sudden death of Dr. Donald H. J. Steensen, who passed away of a heart attack shortly after administering his final exam at summer camp.

--The department continues to face the dilemma that faces the forestry profession, that traditional forestry is often perceived as creating environmental problems rather than resolving them. In the face of this perception the department aggressively continues to include environmental considerations in its course offerings to insure that its graduates will be well qualified to practice the kind of forestry that the future will require. In addition, new research programs relating to environmental considerations such as wetland management, restoration ecology, and bioremediation have been developed in response to environmental issues.

--The Extension Forestry program is moved into the Department of Forestry effective July 1, 1990.

--Dr. William L. Hafley retires on June 30, 1990. Together he and Steensen had over 50 years of service to our students and each will be sorely missed, Steensen for his dedicated service to students and Hafley for his teaching and research in biometrics.

--Jordan Hall is completed and during the summer of 1989 the Hardwood, Nutrition, Biotechnology, and Remote Sensing programs, plus a number of other faculty, move into new facilities. These moves allow renovation of certain facilities in Biltmore Hall for other research programs.

--Recognizing the need for a better-defined administrative infrastructure in the department, Dr. James D. Gregory is named administrator of undergraduate programs and Dr. D. Lester Holley is named administrator for graduate programs.

--Mr. Gary B. Blank is named College of Forest Resources Outstanding Teacher for 1989-90.

--By the end of the decade undergraduate enrollment has declined from 263 in 1980 to 143 in 1989. However, the decline appears to have stabilized at the end of the decade. This decline reflects similar declines in all US forestry education programs. Enrollment of women also declined from 18% in 1980 to 13% in 1989. Minority enrollment remained about 5% throughout the decade despite much effort devoted to recruiting.

--The job market for undergraduates improves reflecting general improvement in the forestry sector.
--Graduate student enrollment increased during the decade from 69 in 1980 to 76 in 1989 with the proportion of women constant at roughly 20%.

--The Alumni Symposium is held in conjunction with the annual Roleo in the fall. On this occasion the new dining hall is dedicated in the memory of Dr. Steensen.

--First courses relevant to 3+2 transfer program with North Carolina A & T taught in Greensboro.

--New, one-hour computer course for freshmen taught for the first time in coordination with introductory course in forestry for freshmen in which all writing assignments are required to be done on a word processor. In addition, forestry freshmen participate in one-year test of single English course for freshmen recommended by University report.

--As a result of Steensen’s death, Dr. James R. Gregory becomes summer camp director and College Forest Manager Larry G. Jervis becomes resident camp director.

--Implementation of Natural Resources curriculum delayed by extended discussions with Agriculture and Physical and Mathematical Sciences, largely related to the name for the curriculum. Regardless of what name is chosen, the department will begin next fall to make a major effort to advertise the opportunity that exists in the department to study natural resources.

--Research funding totals nearly $4 million for all programs. Pressure increases from industrial supporters for the department to increase its financial contributions to the cooperative research programs, this despite the fact that the department puts more of its own money into industrially-oriented research (over $1 million) than does any other university in the South.

--Interest in research on forested wetlands increases. A major study is established on the Hofmann Forest and studies of the impacts of forestry practices on wetland soils are implemented at a number of locations in the Southeast.

--During the spring of 1990 a 3-week short course in Tropical Forestry is offered under the auspices of CAMCORE and is attended by about 25 international foresters.

--The Forestry Foundation initiates a formal fund-raising effort on behalf of the College and Department. A small program in the previous year raised about $20,000.
--Uncertainties associated with both State and Federal funding draw attention to the vulnerability of the department salary structure. Fully one-fourth of the faculty FTEs are supported with soft money and the faculty so supported at vital to the department’s research and graduate programs.

--During 1990 the department is involved as a pilot department participating in the development of a process for measuring how well unit goals and objectives are met by current programs.

--Implementation of the Gunnar Nicholson bequest is begun when Dean Eric L. Ellwood visits Sweden in the fall of 1989 and six forestry faculty spend a week in Sweden in May 1990 in discussions with the faculty of forestry of the Swedish University of Agricultural Sciences. The program envisioned will support reciprocal exchanges of forestry faculty between the department and SUAS.

1990-91

--Opportunities for faculty and graduate student involvement with other countries continue to increase. Rapid internationalization of forestry significantly impacts departmental programs.

--Budget cuts begin to have a significant effect on departmental programs. One position vacated by retirement is lost, 3 faculty members leave because funds supporting them have been lost, and one research program is terminated for the same reason.

--Enrollment in undergraduate curricula increase slightly from 1989 with the greatest increase occurring in Conservation emphasizing an increasing interest in the broader field of natural resource management. Graduate enrollment remains stable.

--The last two freshmen classes seem to be of a quality higher than those of the mid-80s with academic performance better, interest in the subject matter of forestry higher, and more remaining in forestry. Perhaps the newly-initiated scholarship program accounts for this.

--Agreement is reached among all parties on the structure of the new Natural Resources curriculum. Two concentrations, Natural Resource Policy and Natural Resource Management, will be offered in Forestry with others offered in Agriculture and Life Sciences and Marine, Earth, and Atmospheric Sciences. Since University approval has not yet been obtained students are registered into the Conservation curriculum and will be transferred to Natural Resources.

--Work continues on closer integration of upper-level forestry courses with considerable emphasis placed on incorporation of quantitative and computer skills.
--New courses in Tropical Silviculture and Conservation and Sustainable Development (taught jointly with Soil Science and Duke faculty) are offered and are heavily enrolled.

--The department serves as one of 5 departments on campus developing a program of outcomes assessment. Included in forestry are evaluation of undergraduates after completion of summer camp, use of external reviewers in evaluation of senior projects in FOR 406, and exit interviews.

--Research activity totals $3.604 million.

--Research work in biotechnology expands. The Tree Improvement and Biotechnology faculties begin development of a series of pioneering experiments dealing with the use of DNA markers in loblolly pine. Extension, Biotechnology, and Tree Improvement faculty obtain a grant for vegetative reproduction and DNA transfer in Fraser fir.

--Drs. Frederick W. Cubbage and Philip M. Doherty move from the University of Georgia to the US Forest Service Lab in the Research Triangle and begin active collaboration with our faculty.

--Using Nicholson funds, a group of Swedish scientists visit Raleigh in October and begin development of working relationships with several of our research programs.

--The Tissue Culture Program is terminated by its industrial supporters effective December 31, 1991. While closing down the tissue culture research efforts begin to develop a new program dealing with rooted cuttings which we believe will be supported by a number of industries.

--Full integration of the Extension Forest Resources group into the Department is accomplished and Dr. Edwin Jones is named Specialist in Charge effective July 1, 1990.

--As a result of management of the Hofmann Forest nearly $400,000 is available to the College and Department for program support during 1990-91. These funds were critical in allowing the department to deal with cuts in appropriated funds. Chesapeake Corporation and Canal Wood Company establish endowed scholarships in forestry, further increasing scholarship funds available to our students.

--The classroom building at the Hill Forest is, at long last, air conditioned.

--The department holds a retreat during the fall of 1990. A number of areas of concern were identified. One tangible step taken immediately is the establishment of an executive committee which undertakes as its first mission preparation of a revision of the department’s criteria and procedures for promotion and tenure. Problems remain, largely relating to the soft-money salaried positions in the department.
1991-92

--Change toward traditional forestry practices will continue to change during the 90s. In addition, today's natural resource manager is in competition for the "mind of urban America" meaning that all natural resource programs must be developed that are specifically aimed at urban populations.

--"Forestry Research: a Mandate for Change" a report issued by the National Academy of Sciences (and to which Drs. Cowling and Sederoff contributed as committee members) calls for a greater emphasis on basic, as opposed to applied, research in forestry. Four of five areas identified directly related to departmental programs: biology of forest organisms, ecosystem function and management, human-forest interactions, and international trade, competition, and cooperation. The department appears well situated to make important contributions in these areas.

--The department adopts a new policy and procedure statement on promotion and tenure. It also spells out a mentoring system which is available to new faculty and a system for storing data about faculty activities that parallels the criteria for promotion and tenure.

--Dr. Jan G. Laarman is appointed Coordinator of International Programs for the College and department.

--Mr. William T. Huxster wins the Outstanding Extension award for the College for 1991.

--Enrollment in undergraduate programs increases to 199 with the greatest increase again coming in the Conservation major. Much of this enrollment increase appears related to student interest in the new Natural Resources program.

--The department offers almost $60,000 in scholarships and this appears to be one factor leading to improvement in the quality of forestry undergraduates.

--As yet no students have transferred from the 3+2 program at North Carolina A & T.

--The Natural Resources curriculum, three years in the planning, was approved by the University Courses and Curriculum Committee and is now awaiting approval of The UNC system office.

--Teaching assignments in the upper level undergraduate courses are changed so that students are exposed to a wider array of faculty. Course offerings in the first several weeks of summer camp are adjusted to allow for greater integration of forestry and wildlife students.
--The department continues use of measures developed to assist in outcomes evaluation, such as use of external examiners in the capstone senior course that will be required by the University as part of preparation for its decennial accreditation review in 1994.

--Research expenditures total $4.24 million, up over half a million dollars from the previous year.

--A research accomplishment of major proportions is achieved when work in Dr. Ronald R. Sederoff’s biotechnology lab results in a gene map of Loblolly pine. The map, which had been partially completed by others, was accomplished in 6 weeks.

--Department researchers obtain three competitive grants in biotechnology, further emphasizing the departmental capability in this important emerging area of research.

--A new vegetative reproduction program, developed by Dr. Robert J. Weir and his co-workers, with seven industrial members begins work on January 1, 1992.

--Dr. Theodore H. Shear and Dr. Douglas J. Frederick develop several research projects in restoration ecology, concentrating primarily on creation of forested wetlands and on the rate at which such artificially-created systems assume the properties of natural wetlands.

--Under the leadership of Dr. E. Carlyle Franklin, faculty members participate in gathering data necessary for revision of the current management plan for the Hofmann Forest.

--Tuition remission funds become a problem as graduate student enrollments jump dramatically. Through the continued generosity of the Graduate School the departmental graduate program remains solvent.

--Increased bookkeeping demands associated with newly-implemented fiscal flexibility guidelines and with movement of accounting responsibilities from the office of the Dean for Research to the Department make it clear that a departmental bookkeeper is required. Inasmuch as no funds are available for such a position, released faculty salaries will be used.

--The success and consequent growth of the biotechnology program lead to serious space problems for that program. As has been the case ever since the department moved into Biltmore Hall in 1970 the space allocated to undergraduate teaching is wholly inadequate.
1992-93

--Undergraduate enrollment continues to increase, from 199 to 238, with the largest increase being in what is now the Natural Resources curriculum. This trend underscores the dilemma most forestry programs now face. On the one hand they must offer education in natural resources management that has the same rigor as the forestry degree while continuing a strong program in forestry that places emphasis on resource integration.

--Dr. Charles B. Davey retires in July 1992 and William T. Huxster retires in January 1993. Davey was department head in the 1970s and is recognized as one of the department’s most accomplished scholars and teachers while Huxster was a major figure in the rise of the Christmas tree industry in North Carolina.

--Enrollment trends suggest that the department will soon have as many students in Natural Resources as in Forestry. Such a situation requires that the department make a re-evaluation of its course offerings.

--Aided by receipts from several timber sales on the School Forests scholarship aid increases to $77,000 in offers to students for the 1993-94 school year.

--Graduate enrollment, at 101, tops 100 for the first time. Given current faculty and facilities, the faculty believes that a maximum enrollment of 100-110 should be set on the graduate program.

--As a result of a number of factors, particularly the University System’s requirement that hours-for-graduation in all curricula should not exceed 128, the faculty spend considerable time reviewing the forestry curriculum. Specific changes will be proposed next year at the time of the decennial SAF accreditation review. Graduate courses are also reviewed and a number of changes are sent to the Graduate Board. The Graduate Committee continues to consider whether or not the department should have a graduate core curriculum.

--The department continues to implement elements of its outcomes assessment plan. External examiners are used in the field exams in the senior capstone course. Group interviews are used with graduating seniors but they do not prove as satisfactory as the individual interviews done last year.

--Total research expenditures are $4.27 million. For each dollar in State and Federal appropriated funds, the department research faculty generate $2.12 in additional funds.
--Extension sponsored workshops on “Conservation and Confiscation: who really owns your land?” that attracted nearly 900 participants. The theme proved highly controversial, with the department receiving criticisms from a number of sources for sponsoring such controversial programs. A less controversial, but equally important, workshop on Longleaf pine involved numerous parties interested in the Longleaf pine ecosystem and its components.

--In order to handle the increasing flow of work at the departmental level resulting from changes in the managerial structure of the College, the department hired an accountant in late 1992.

--Work continued on a new master plan for the Hofmann Forest. A recent doctoral graduate is hired to do the actual drafting of the new plan.

--Lack of laboratory space continues to hamper research in biotechnology and tree improvement. In addition, the only purchases of equipment during the last several years have been computers.

1993–94

--Increased enrollments in both undergraduate and graduate programs lead to some of the overcrowding problems experienced in the mid-1970s.

--Dr. Richard A. Lancia is named the outstanding teacher in the College and Dr. H. L. Allen won recognition as the Outstanding Teacher in the department.

--Dr. David A. Adams who taught courses in renewable resource policy and environmental assessment, retired effective December 31, 1993.


--Undergraduate enrollment showed a major increase for the third year in a row, totaling 286, with the greatest increase again being in Natural Resources. Graduate enrollment declined slightly to 92.
--The undergraduate Forestry curriculum is thoroughly reviewed during 1993-94 in conjunction with preparation for the Self-Study required by SAF accreditation. The major change involved reduction in total hours from 141 to 128 including summer camp. Although the curriculum still retains its essential elements virtually all electives and other sources of flexibility have been removed. The faculty is not entirely comfortable with this result and will re-visit the issue next year. Results of the Outcomes Assessment program play an important part in curriculum decisions.

--The Department Graduate Committee develops a new Master of Forestry program which is approved by the full Department. This is a course work only degree program that will provide an opportunity to obtain a degree in as little as 12 months. Formal approval by the Graduate School will be sought next year.

--Research funding reaches $4.377 million; for each dollar of appropriated money the forestry faculty generates $2.28 in additional research funds.

--Researchers in biotechnology locate a gene that conveys resistance to fusiform rust disease, a significant finding stemming from the genetic map of loblolly pine developed earlier.

--Five new members join the Forest Nutrition Cooperative putting that program back on a solid financial basis after several years of severe fiscal difficulty. A major research effort involves installation and measurement of a large experiment designed to quantify interactions between water and nutrient availability.

--The new management plan for the Hofmann Forest is essentially completed.

--Two new tracts of land are added to the department’s holdings. One is a tract of 250 acres of primarily loblolly pine forest in Franklin County and the other is a large tract of wetland forest on the south shore of Albemarle Sound at Bull’s Bay. Drs. E. Carlyle Franklin and Douglas J. Frederick carried the brunt of the work associated with this acquisition with funds coming from the North Carolina Heritage Trust program.

--The department obtains one more endowed scholarship and other funds for scholarships continue to rise.

--The College completes its internal computer network providing an essential tool for teaching, research, and managerial tasks. In addition computers in the College computer room are upgraded.
--Renovation of facilities at the Hill Forest is planned using fund from the Rural Rehabilitation Corporation. The water and septic field facilities will be rebuilt together with a new dining room and two new cabins. A tract of about 100 acres, the number one acquisition target for addition to the Hill Forest, is purchased also with RRC funds.

--Five straight years of budget cuts have reduced Academic and Station budgets to the point where they support little more than salaries with operating funds coming almost entirely from released faculty salaries.

--After a year-long search, Dr. Frederick W. Cubbage is chosen as the new head of the department replacing Dr. Arthur W. Cooper who has served since late 1979.

1994–95

--Dr. Frederick W. Cubbage takes over as department head on August 1, 1994.

--Dr. Ronald R. Sederoff is elected to membership in the National Academy of Science becoming the second member of the departmental faculty to be so honored.

--Dr. Gene Namkoong, who left NC State in 1993 to become Head of the Forestry Department at the University of British Columbia, wins the Marcus Wallenberg Prize.

--Undergraduate curriculum in environmental sciences/watershed hydrology finalized, approved by the University, and offered as an option.

--Charge of racial harassment is lodged against the department by a former student. As a result, undergraduate program manual is rewritten to state that the department endorses personal ethics and respect for all persons. The Department Head emphasizes this statement in his remarks at the opening of summer camp and all teachers will follow through with similar statements to their classes.

--Revised course-work Master of Forestry is approved and offered to incoming students. A similar Master of Natural Resources program also developed, approved, and offered. The program has 5 concentrations: Forest Policy and Management, Outdoor Recreation, Spatial Information Systems, Hydrology, and Soil Science (in the Department of Soil Science).

--Department receives SAF five-year re-accreditation. Review team raises issue concerning lack of public speaking experience in the program and steps are taken to respond to this issue. A report from an ad-hoc committee appointed to review the status of speaking and writing coursework and other instructional materials in the undergraduate curriculum is received and is under review.
Because of concerns over content of the forestry undergraduate curriculum arising from the reduction in hours made in 1994, the faculty begins another review designed to improve content of the program.

Dr. Craig McKinley is hired and assumes responsibility for Christmas tree extension. State appropriations are obtained for a Christmas tree genetic improvement program.

Dr. Richard A Lancia becomes Director of Undergraduate Programs, taking over from Dr. James D. Gregory who becomes Director of undergraduate Natural Resources and Environmental Sciences programs.

Continued budget cuts jeopardize department’s ability to provide excellent service in several critical areas.

The College and the Department begin a substantial strategic planning effort that will identify important external issues that affect the department’s mission and important internal issues that impede enhancing our efforts.

1995–96

Department undertakes a review of most graduate courses.

A course in wood procurement was developed and taught by Professor Larry Jervis.

Department assumes co-advising responsibilities (and enrollment credit) for incoming Fisheries and Wildlife Science program majors.

Research grants totaled $5.6 million with the industrial cooperatives generating an additional $1.7 million.

Department assumes leadership for Christmas Tree extension. Dr. John Frampton is hired to lead the Christmas Tree Genetics program building on previous Fraser fir efforts by the Cooperative Tree Improvement Program.

Extension faculty continued to coordinate external input and advice to the US Department of Interior Fish and Wildlife Service and the Environmental Defense Fund on development of a "safe harbor" program for use by landowners in development of Red Cockaded Woodpecker Habitat Conservation plans.

Dr. Richard A. Lancia is appointed as interim Director of the NCSU Center for Teaching Excellence.
1996–97

--Undergraduate Forestry curriculum is revised. The second semester of Physics is dropped, a one-credit change in the required Calculus course, and addition of 2 credit hours permit 7 hours of electives in Forestry.

--A web-based experimental course in clearcutting is developed and taught.

--NR 300, Natural Resources measurements, is completely revised and updated.

--A proposal for a course-only Master of Forest Resources (MFR) was completed and approved by the Graduate School. All required courses were taught during the academic year.

--The old core and concentration curricula for the Master of Natural Resources Administration were reviewed and revised and the name of the degree changed to Master of Natural Resources (MNR). This action was approved by the University and instituted in 1997.

--A two-year strategic planning effort is completed including a summary of implementation recommendations and action items.

--Total research grants in force total $4.5 million with another $1.85 million coming from cooperative research funds.

--An inter-institutional proposal for a Center for Sustainable Forestry, involving NCSU, Duke, the Universities of Florida and Kentucky and Southern Forestry Extension, was submitted to the USDA Competitive Grants program.

--After Hurricane Fran hits in September 1996 forestry students apply their skills to help many local residents clean up. Their work brings recognition from the Raleigh Council in February 1997.

--The University’s newly implemented Faculty Workload Reporting System indicated that all faculty in the Department are meeting the minimum university standard for overall instructional/research contributions when “release time” for research appointments, graduate student advising, and undergraduate advising was considered.

1997–98

--Undergraduate Natural Resources curriculum is reviewed as a part of the Department’s strategic planning effort. Recommendations are made for revisions in core courses and for development of a concentrated short summer session.
--Research grants in force total $2.9 million with an additional $1.9 million generated by the research cooperatives.

--The Southern Center for Sustainable Forests is established in cooperation with Duke University and the North Carolina Division of Forest Resources.

--A new forest landowner Education Council is formed by Extension Forest Resources.

--The first year of the Forestry Educational Outreach Program was successfully completed under the direction of Ms. Kelley Duffield.

--Dr. Awatif E. Hassan is appointed as Director of Forestry Undergraduate Programs.

--Dr. Richard A. Lancia completes his term as Interim Director of the Center for Teaching Excellence.

--Brochures describing Departmental programs and curricula are revised.

--A new high-quality plastic greenhouse is rebuilt at Method Road, in cooperation with Horticulture, to provide space for the Rooted Cutting and Christmas tree programs.

--Availability of funds from the University Technology and Lab Fee enable major upgrades of forestry field equipment, including Global Positioning System data loggers, increment borers, bark gauges, compasses, and diameter tapes. Summer camp computer equipment is also upgraded, providing GIS capability.

1998–99

--The Department hosts the annual Southern Forestry Schools Conclave at Ellerbee.

--Twenty-eight students attend the national Society of American Foresters meeting in Traverse City, MI, the largest such contingent from any forestry program in the nation.

--The five-year accreditation review document required by the Society of American Foresters is prepared.

--Research grants in force total almost $3 million with another $2.169 contributed to the industrial cooperatives.

--A Strategic Research Initiative to develop an integrated proposal for forestry and wood products across the Departments of Forestry and Wood and Paper Science is prepared.
--The Forest Landowner Education Council began work coordinating activities for professional education of foresters within the State.

--A task force on Nonindustrial Private Forest landowners met to consider means to improve programs for NIPF and to develop recommendations.

--The Forestry Educational Outreach Program continued its successful work but with its third director in three years.

--Dr. Arthur W. Cooper receives NCSU’s Holladay Medal.

1999-2000

--A Bachelor of Science curriculum in Environmental Technology is developed and submitted for approval.

--Forestry Extension faculty play a leading role in developing Distance Learning and Computer aided instruction.

--The Department develops and submits a proposed articulation agreement with North Carolina A. & T. State University for their Natural Resources students and our B. S degree in Forest Management.

--The Society of American Foresters continues accreditation for the Bachelor of Science degree in Forest Management.

--External funding for research grants totals $7.2 million with another $2.28 million generated by the research cooperatives.

--Biotechnology faculty received $4.45 million 3-year research grant for a project entitled “Genomics of Wood Formation in Loblolly Pine.”

--Mr. Rick A. Hamilton is designated as Acting Department Extension Leader after Dr. Craig McKinley leaves to become Department Head at Oklahoma A. & M.

--Work is begun on a new initiative in forest certification and stewardship including development of a proposal for assessing certification on the College forests.

--Dr. Arthur W. Cooper receives the Gifford Pinchot medal from the Society of American Foresters.

--Dr. Frederick W. Cubbage is named to chair a National Research Council Committee on Forestry Research Capacity.
--About 30 students attend the annual Society of American Foresters in Portland, OR, again the largest group from any forestry program in the country. The students also went their own tour of West Coast forestry in Oregon and Washington. The tour was organized by Dr. Joseph P. Roise.

--Dr. Robert J. Weir, Ms. Alice Hatcher, and Mr. Jerry Sprague all retire from the Tree Improvement Cooperative. Weir is replaced as Director by Dr. Timothy J. Mullin.

--Dr. D. Lester Holley retires effective December 31, 1999.

2000-01

--The Environmental Technology program proposed as a separate curriculum, all but two course action forms are approved and authorization to plan has been granted by the Dean’s Council. Several new faculty will be required to meet the demands of this curriculum.

--The Natural Resources curriculum has also been revised and all required documents are ready to submit to the College curriculum committee in the fall of 2001.

--Research grants total $$6.59 million and contributions to the Cooperatives total $1.98 million.

--Opportunities for international experience are for the first time provided by the Department with students in international forestry and natural resources, together with those in a world forestry course, travel to Paraguay in the spring of 2001.

--The Forestry Educational Outreach Program has a successful year under new Director Dr. Susan E. Moore, the Program’s fourth director in as many years.

--The Southern Center for Sustainable Forestry sponsors a certification effort on the College’s Piedmont forests, as well as on the Duke Forest and on the State Division of Forest Resources Bladen Lakes forest.

--About 20 students attend the annual Society of American Foresters meeting in Washington, DC. This number again leads all forestry programs.

--Dr. Arthur W. Cooper retires on February 1.

--William E. Gardner and Larry Jervis retire on June 30.
2001-02

--First instructors in Environmental Technology, Ms. Theresa Litzenberger and Dr. Elizabeth Nichols, are hired.

--Mr. Joseph Cox joins the Department as its second College Forest Manager.

--Environmental Technology program is proposed as a separate curriculum and all planning documents clear NCSU and are sent to UNC General Administration for approval.

--External research grants total $6.74 million, with another $1.75 million derived from the industrial cooperatives.

--Extension faculty delivered an intensive Christmas tree program in western North Carolina, including site selection, shearing research, business management principles, integrated pest management, and groundwater management.

--Dr. Ellis B. Cowling receives NCSU’s Holladay Medal.

--The National Research Council Committee on Forestry Research Capability, chaired by Dr. Frederick W. Cubbage, completes its report.

--A number of undergraduates travel with Dr. Joseph P. Roise to the Society of American Foresters meeting in Denver, CO. Prior to the meeting, the students participate in a wilderness camping experience to gain familiarity with wilderness management. During that trip, the tragic events of September 11, 2001 occurred.

--The College’s Piedmont Forests complete the forest certification process, meeting both the Sustainable Forestry Initiative and the Forest Stewardship Council requirements. This effort was led by Susan Moore and Larry Jervis. SFI certification required correction of several non-conformances and a number of conditions had to be met before FSC certification was final. This certification was carried out in conjunction with certification of Duke Forest lands and lands managed by the State Division of Forest Resources.

2002-03

--Five initiatives are proposed as a part of the Department’s Compact Plan: 1) Managing Green Infrastructure in a Developing World; 2) Natural Resources Distance Learning and Outreach; 3) Sustainable Forests to Meet World Fiber Needs; 4) Focused Marketing and Recruitment for the Department; and 5) Forest Management Curriculum Revisions.
Final approval is received from General Administration for the Environmental Technology undergraduate degree. The first class graduates at the May 2003 commencement.

An external review meeting is held in August with invited forestry professionals and faculty to discuss revision of the Forest Management curriculum. A revised curriculum allowing for five explicit concentrations and providing more focus throughout the four years on professional skills of critical thinking, communications, ethics, and leadership. This revision is approved and becomes effective for students entering in the fall of 2003.

Students take two international trips, one to Costa Rica in August 2002 and the other to Chile in March 2003. In addition a group traveled to Washington DC in January to visit various government organizations and NGOs involved in international forestry issues reviving an experience begun in the 1980s.

Research grant funding is $3.93 million. The industrial research cooperatives bring in another $1.63 million.

The 2002 National meeting of the Society of American Foresters is held for the first time in North Carolina in Winston-Salem with Drs. Robert C. Kellison and Arthur W. Cooper serving as co-general chairs. NCSU students, together with Duke students, host the student activities at the convention.

For the first time students from Virginia Tech were invited to participate in the Rolleo held at Hill Forest November 8-9.

2003-04

On February 1, 2003, the Department assumes leadership of the Fisheries and Wildlife Program with Richard A. Lancia serving as Director and the Department assuming administrative oversight.

The first full year for the Environmental Technology Program attracts 50 students.

The new Forest Management curriculum is implemented. There is greater emphasis on the professional skills of critical thinking, communications, ethics, and leadership as well as more opportunity for selection from concentration areas in International Forestry, Forest Business, Forest Biology, and Forest Management (with a concentration in Urban Forestry being developed).

Major revisions to the Natural Resources—Ecosystem Management and Natural Resources—Policy and Administration curricula are approved.

Dr. Bruce J. Zobel receives the Holladay Medal.
--Students travel to Sweden in the summer of 2003.

--A number of undergraduate students attend the National SAF meeting in Buffalo, NY

--Forestry Club members assist the North Carolina Forestry Association with the fall Loggin’ Demo.

2004-05

--The College of Natural Resources and the forestry program at NCSU celebrate their 75th anniversary.

--The Tree Improvement Program celebrated its 50th anniversary and the CAMCORE and Forest Nutrition Programs celebrated their 25th anniversaries.

--The new name of the Department, Forestry and Environmental Resources, combining the array of new programs with historical strength in forestry, became effective.

--Dr. Frederick W. Cubbage steps down as Department Head in the summer of 2004 and is replaced by Dr. Barry Goldfarb.

--The four new professional development courses required in the new Forestry curriculum, critical thinking, communications skills, ethics, and leadership, are offered for the first time.

--The undergraduate Forestry Curriculum was reviewed by SAF in the spring of 2005.

--During the summer program in natural resources, students traveled to Yucatan during the summer of 2004 and northern and central Europe during the summer of 2005 and the World Forestry course visited Ghana in 2004

--In the summer of 2005 Fisheries and Wildlife students travel to Namibia with Dr. Werner Dorgeloh.

--The Biotechnology faculty originated the Forest Biotechnology Industrial Research Consortium involving numerous faculty members and industries around the globe.

--The Forestry Issues forum is now broadcast by TV conferencing throughout North Carolina and even into South Carolina.
2005-06

--The undergraduate forestry curriculum is re-accredited by SAF with praise for student performance, breadth and dedication of faculty, and quality of facilities and infrastructure.

--A new course in Urban Forestry is offered and a concentration in Urban Forestry is submitted to the University for approval.

--The summer program in Natural Resources hosted students from Sweden and Purdue University on a tour of North and South Carolina.

--Twelve students visit China in the spring of 2006.


--Fisheries and Wildlife students again visit Namibia in the summer of 2006.

--The Piedmont forests are re-certified by the Forest Stewardship Council and the Sustainable Forestry Initiative.

--Progress Energy donates funds for Internships in Water Quality that allow Environmental Technology and Natural Resources students to learn first-hand about measuring water quality and analyzing data while saving money toward their tuition.

--Undergraduate Fisheries and Wildlife student Ben Noffsinger and his partners from the Multidisciplinary Senior Design Center won first place in the Computer Society International Design Competition 2005 World finals, the first United States team to win in the 6 years of the competition. Their project combined GPS technology with wireless sensor networks to track animal movements in the wild.

--Susan Moore received the College Outstanding Extension Award for 2005.

--The entire Extension and Outreach Program is awarded the 2005 Family Farm Education Award by the National Association of Forest Resources Programs and the National Woodland Owners Association.


--Ellis B. Cowling, E. Carlyle Franklin, James D. Gregory, and Awatif E. Hassan retire.

--Bailian Li is named Interim Vice Provost for International Affairs.
2006-07

--As part of its recruiting effort, the Department hosts a highly successful 5-day Summer Exploration Camp for 35 rising high school juniors and seniors.

--The Department develops an exchange program with the University of Conception in Chile.

--Study abroad programs take place dealing with Exploring Forestry and Natural Resource Management in Turkey in June 2007 and in northern Sweden dealing with Climate Change in July 2007.

--Doctoral program in Fisheries and Wildlife approved January 2007.

--Henry V. Amerson, Philip D. Doerr, and Rick A. Hamilton retire.

--Dr. H. Lee Allen receives the Holladay Medal and also is named CNR Alumni Distinguished Graduate Professor.

--Philip D. Doerr is named Wildlife Society Student Chapter Advisor of the Year for 2006.

--Bailian Li is named Vice Provost for International Affairs.

--Rick A. Hamilton receives the Henry Hardtner Award from the Southern Group of State Foresters.

--Steven E. McKeand was selected as the first recipient of the College of Natural Resources-College of Agriculture and Life Sciences Joint Award for Service to Society and the Environment.

--Susan E. Moore was inducted into the Academy of Outstanding Faculty Engaged in Extension and was awarded the 2006 Outstanding Extension Service Award.

--Toddi A. Steelman was appointed by the Institute for Emerging Issues to its GlaxoSmithKline Faculty Fellowship Program.

--Extension faculty and their partners continue the Working Forest Summit series which has proven to be of value to non-industrial forest landowners.

--The Department’s Alumni gathering was declared the best at the winter Appalachian Society of American Foresters meeting.