Chapter 34

Federal Research and Development in North Carolina

- Approximately $923 million of federal R&D funds are spent each year in North Carolina.
- North Carolina ranks 19th among the 50 states, District of Columbia, and Puerto Rico in terms of the amount of federal R&D dollars received annually.
- Approximately 7 percent of all federal funds spent in North Carolina each year on matters other than the direct support of individuals (i.e., such entitlements as retirement, disability, and housing assistance) is spent on R&D.

Figure 34.1 – Sources of Federal R&D Dollars Spent in North Carolina
(Total Federal R&D ~$923 million)
BACKGROUND

In recent years, the federal government has spent in the neighborhood of $923 million annually in North Carolina on research and development (R&D) activities. On average, federal R&D dollars account for approximately 7 percent of all federal funds spent in North Carolina each year on matters other than the direct support of individuals (i.e., such entitlements as retirement, disability, and housing assistance).

Most major federal agencies that currently support federal R&D efforts provide funding for R&D activities in North Carolina. Foremost among these agencies is the Department of Health and Human Services (HHS), which accounts for 52 percent of all federal R&D dollars spent in North Carolina each year. The Department of Defense (DOD), the Environmental Protection Agency (EPA), the National Science Foundation (NSF), and the Department of Agriculture (USDA) account for an additional 16, 14, 6, and 4 percent of all federal R&D dollars spent in North Carolina, respectively. The remainder of federal R&D dollars come from the Department of Commerce (DOC), the Department of Energy (DOE), the National Aeronautics and Space Administration (NASA), and several other agencies.34

All federal R&D dollars spent in North Carolina either cover the costs of operating federal R&D units in the state, including paying the salaries of federal R&D personnel working at these units, or are awarded as grants, contracts, or cooperative agreements to entities in the state. The following is an overview of what becomes of these federal R&D dollars once they arrive in North Carolina.

FEDERAL R&D UNITS IN NORTH CAROLINA

Asheville, North Carolina, is home to USDA’s Forest Service’s Southern Research Station Headquarters.

- The Station Headquarters of the Southern Research Station (SRS) is a unit inside USDA’s Forest Service that oversees re-

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34 For a complete agency-by-agency breakdown of these R&D dollars, see Appendix C.
search sites and experimental forests in 13 southern states. The Southern Forest Inventory, Monitoring, and Analysis Program is the SRS research site located at SRS headquarters. It conducts research to develop, analyze, and maintain forest resources information for southern states and conducts research to provide improved inventory and evaluation techniques. Specific research activities of this program include detailed databases from inventories, which are used extensively by forest industry, state agencies, consultants, and National Forests. While all portions of SRS annually receive around $34 million of federal R&D funds, the Station Headquarters annually receives approximately $4.3 million of these funds and has about 96 employees.

Beaufort, North Carolina, is home to the DOC’s Beaufort/Oxford Laboratory.

- The Beaufort/Oxford Laboratory is a unit of the Southeast Fisheries Science Center inside DOC's National Oceanic and Atmospheric Administration (NOAA). It conducts research on the biological productivity of estuaries and nearshore and ocean ecosystems, the dynamics of coastal and reef fishery resources, and the effects of man on resource productivity. The laboratory also manages NOAA's Coastal Change Analysis Project and the South Atlantic Bight Recruitment Experiment. This federal unit annually receives approximately $4.1 million of federal R&D funds and has about 75 FTEs, only a portion of whom are involved in R&D activities. A small portion of the laboratory’s activities take place in Oxford, Maryland.

Durham, North Carolina, is home to a Department of Veterans Affairs (DVA) R&D unit.

- While the principal focus of the Durham VA Medical Center is providing medical care to veterans, it is also the location of a number of research activities. In a recent year, this federally owned and operated facility was the site of 324 projects with total funding of approximately $7 million. These R&D activities focus on a wide range of topics, including mental health, gerontology, cardiovascular diseases, and infectious diseases.
Fort Bragg, North Carolina, is home to DOD’s Fort Bragg Scientific Research Office.

- The Fort Bragg Scientific Research Office is a unit inside DOD’s Army Research Institute for Behavioral and Social Sciences headquartered in Alexandria, Virginia. Additional sites are located in Fort Rucker, Alabama; Fort Benning, Georgia; Fort Knox, Kentucky; Fort Leavenworth, Kansas; Orlando, Florida; Fort Hood, Texas; Heidelberg, Germany; and Boise, Idaho. The unit conducts research on personnel training issues in support of Army Special Operations Command. Specific research activities of this unit include the selection and assessment of Special Operations Forces. In addition, research programs and technical advisory services are directed to special interest issues related to personnel selection and training. This federal unit annually receives approximately $148,000 in federal R&D funds and has one civilian employee directly involved in R&D activities.

Otto, North Carolina, is home to the USDA’s Coweeta Hydrological Laboratory.

- The Coweeta Hydrologic Laboratory is a unit of the Southern Research Station inside USDA’s Forest Service. It conducts research on watershed responses to the atmospheric environment and natural disturbances, forest management treatments (such as clearcutting, farming, logging, road building, insect infestations, chemical exposure, fire, and airborne nutrients and pollutants), and other human disturbances. Specific research activities of this lab include evaluating, explaining, and predicting how water, soil, and forest resources respond to such disturbances as well as identifying practices that mitigate such impacts. The laboratory is also a participant in international research programs and NSF’s Long-Term Ecological Research site, which conducts research on ecological phenomena that occur on time scales of decades or centuries. This federal R&D unit annually receives approximately $970,000 of federal R&D funds and has about 13 employees.
Raleigh, North Carolina, is home to a USDA Forest Service R&D Work Site and Agricultural Research Service (ARS) Research Facility at North Carolina State University and the Department of Interior’s (DOI’s) North Carolina Cooperative Fish and Wildlife Research Unit and North Carolina District Office of Water Resources.

- The R&D Work Site is a unit of the Southern Research Station inside USDA’s Forest Service located on the campus of North Carolina State University. It conducts research on forest ecosystem response to global change, including air pollution, current and potential future climate stress, and changing human resource demands. Specific research activities of this program include developing and evaluating science-based strategies to ensure sustained productivity and ecosystem health. Current research include the analysis of existing databases and collection of new regional databases; the establishment of research to increase scientific understanding of ecosystem processes; and the development of new, and use of existing, forest models to link research, monitoring, and forest inventories across time and space. This federal R&D unit annually receives approximately $1.4 million of federal R&D funds and has about four employees.

- The ARS Research Facility at North Carolina State University is a unit of USDA’s ARS. It consists of six research divisions focusing on air quality, plant growth, and development; food science; market quality and handling; plant science; and soybean and nitrogen fixation. Some of these divisions conduct research on the effects of the changing atmospheric environment on crop production and plant health to develop techniques for mitigating the problems and methods for the preservation of vegetables by fermentation or direct acidification that will result in improved processing efficiency. Other divisions conduct research to enhance the flavor and shelf-life of domestic and export peanuts and peanut products and to discover the genetic basis of yield and resistance to disease and environmental stresses in corn and small grains. Yet another division conducts research to im-
prove product quality, economic worth, nutritional value and reduced production costs or losses from soybeans. This federal R&D unit annually receives about $5.8 million of federal R&D funds and has about 57 FTEs.

- The North Carolina Cooperative Fish and Wildlife Research Unit is part of DOI’s U.S. Geological Survey (USGS). It is on the campus of North Carolina State University. It conducts research on the identification, assessment, interpretation, and alleviation of the effects of current or potential environmental changes or perturbations on fish and wildlife resources, with an emphasis on how the entire ecosystem is affected. Specific research activities of this unit include a GIS-based study of land use and terrestrial vertebrate distribution using NC GAP analysis, migration and spawning habitat requirements of anadromous fishes, natural mortality rates of reservoir striped bass, and factors affecting reproduction and migration of waterbirds. This federal R&D unit annually receives approximately $319,000 of federal R&D funds and has about four FTEs.

- The North Carolina District Office of Water Resources is a unit of DOI’s USGS. It oversees the R&D activities of USGS’s National Water-Quality Assessment (NAWQA), Ground-Water Resources Assessment, Toxic Substances Hydrology, and Federal State Cooperatives programs. The NAWQA program conducts research on the nation’s surface and groundwater resources to better understand the effect of pesticides, erosion, and bacterial contamination on water quality. The Ground-Water Resources Assessment program studies groundwater systems to develop models and simulations to better understand the workings of these systems. The Toxic Substances Hydrology program studies the behavior of toxic substances in hydrologic environments. These research activities investigate subsurface contamination at local releases and aquatic ecosystem contamination on a watershed and regional scale. The Federal State Cooperatives program studies the effects of agricultural chemicals, floods, droughts, and waste disposal on water supply and groundwater.
quality. This federal unit annually receives approximately $1.6 million in federal R&D funds.

Research Triangle Park, North Carolina, is home to HHS’s National Institute of Environmental Health Sciences, parts of the EPA’s National Center for Environmental Assessment, National Exposure Research Laboratory, National Health and Environmental Effects Research Laboratory, and Air Pollution Prevention and Control Division, and USDA’s Research Triangle Park Forestry Sciences Laboratory.

- The National Institute of Environmental Health Sciences is a unit of HHS’s National Institutes of Health (NIH), which is headquartered in Bethesda, Maryland. It conducts biomedical research on the interrelationships of the three elements of human disease—environmental factors, individual susceptibility, and age. Specific research activities of the institute include studying the effects of asbestos exposure, the developmental impairment of children exposed to lead, human fertility, birth defects and developmental defects, hazards specific to the poor, agricultural pollution, toxins that may play a role in Alzheimer’s disease and other neurologic disorders, and the health effects of urban pollution. The institute has played a key role in identifying the first breast cancer gene, BRCA1, and a gene that suppresses prostate cancer. It has also developed genetically altered mice to improve the screening of potential toxins and to help develop aspirin-like anti-inflammatory drugs with fewer side effects. This federal unit annually receives approximately $84.9 million of federal R&D funds and has about 677 employees.

- EPA’s National Center for Environmental Assessment, which is headquartered in Washington, D.C., maintains an office in Research Triangle Park, North Carolina. This office conducts research on major air pollutants, health and ecological assessments of air toxics, and fuel and fuels additives. Current research focuses on dose-response models and factors, exposure models and factors, probabilistic models, and community-based risk assessment. This federal R&D unit annually receives about $4.6 million of federal R&D funds and has about 33 FTEs.
• The National Exposure Research Laboratory is a unit of the EPA. While it is headquartered in Research Triangle Park, North Carolina, the laboratory has divisions in Cincinnati, Ohio; Athens, Georgia; and Las Vegas, Nevada, as well as Research Triangle Park. The laboratory provides scientific understanding, information, and assessment tools to reduce and quantify the uncertainty in the agency’s exposure and risk assessments for all environmental stressors. Stressors include chemicals, biologicals, radiation, and changes in climate and land and water use. The Atmospheric Sciences Modeling Division in Research Triangle Park conducts research on stressor sources; pollutant transport, transformations, and exposure; and source-to-receptor predictive exposure models applicable to the appropriate temporal scales and to site, watershed/regional, and global scales. It also conducts receptor and stressor analyses and evaluations of alternative mitigation, management, or restoration strategies from an exposure perspective. Together the headquarters and division annually receive about $61 million of federal R&D funds and have about 204 FTEs.

• The National Health and Environmental Effects Research Laboratory is a unit of the EPA. While it is headquartered in Research Triangle Park, it has divisions in Narragansett, Rhode Island; Gulf Breeze, Florida; Duluth, Minnesota; and Corvallis, Oregon, as well as four divisions and one program in Research Triangle Park. The Human Studies Division conducts clinical and epidemiological investigations to improve the understanding of human health risks associated with environmental pollution. It focuses on improving assessments of exposure, biologically relevant doses, and adverse biological or health effects, as well as investigating mechanisms linking these phenomena. The Experimental Toxicology Division conducts research on the health effects of inhaled, ingested, and dermally contacted environmental pollutants. The Neurotoxicology Division studies the effects of physical and/or chemical agents on the nervous system. It focuses on providing the scientific basis and technolog-
ical means to predict whether or not environmental agents will produce neurotoxicity in humans. The Reproductive Toxicology Division conducts biological research on the effects of environmental pollutants, singly or in combination, on all stages of the life cycle. The research seeks to assess the potential hazards to humans resulting from exposure to various environmental pollutants. The chemical agents under investigation include toxic substances, pesticides, air pollutants, drinking water contaminants, and hazardous wastes. The Environmental Monitoring and Assessment Program develops the tools to monitor and assess the status and trends of national ecological resources. It conducts research to advance the science of ecological monitoring and ecological risk assessment and to guide national monitoring of ecosystem integrity and dynamics. Together the headquarters unit and the five divisions/programs annually receive about $66.8 million of federal R&D funds and have about 367 FTEs.

- The Air Pollution Prevention and Control Division is a unit of the EPA’s National Risk Management Research Lab headquartered at Research Triangle, North Carolina. It conducts R&D on air pollution prevention and control technologies for manufacturing and processing industries, power plants, incinerators, indoor environments, and sources of greenhouse gases. Research includes the characterization and assessment of all sources of air pollution and verification of the performance of innovative technologies. It participates in the Environmental Technology Verification program to verify the performance of innovative technical solutions to problems that threaten human health or the environment. This federal R&D unit annually receives about $14 million of federal R&D funds and has about 87 FTEs.

- The Research Triangle Park Forestry Sciences Laboratory is a unit of the Southern Research Station inside USDA’s Forest Service. It conducts research on aboveground and belowground processes governing forest productivity and sustainability; for-
est health to detect unexpected deviation from established baseline conditions or trends, identify causes, and define basic relationships sufficient to predict consequences; and economic status, trends, and opportunities for forest management in the southern United States. Specific research activities include studying the effects of silvicultural practices and soil/atmospheric properties on forest growth and productivity to develop sustainable management systems for southern forest resources. Other activities include analyzing the economic effect of public programs and regulations on private forest landowners; performing economic and impact assessments of forest insect, disease, and other forest health questions; and developing and implementing regional forest resource analysis models of inventory, multiple-use, and land area interactions. This federal R&D unit annually receives approximately $4.3 million of federal R&D funds and has about 29 employees.

Salisbury, North Carolina, is home to a DVA R&D unit.

- While the principal focus of the Salisbury–W. G. (Bill) Hefner VA Medical Center is providing medical care to veterans, it is also the location of a number of research activities. In a recent year, this federally owned and operated facility was the site of two projects with total funding of less than $50,000. These R&D activities focus on such topics as blindness and diabetes.

**Federal R&D Grants to North Carolina Entities**

Every major institution of higher education in North Carolina is the recipient of significant federal R&D dollars each year through grants made by federal agencies to faculty, graduate students, and research centers. The vast majority of the R&D grants are made by HHS, DOD, and NSF to individual faculty members and therefore ultimately inure to the benefit of such institutions as the University of North Carolina (U of NC), Duke University, Wake Forest University, North Carolina State University (NC State), North Carolina Agricultural and Technical State University (NCA&T), and East Carolina...
University (ECU). The table below shows the number of R&D grants active in FY 1998, highlighting those made by HHS, DOD, and NSF to parties at the various institutions and estimates of the total dollars transferred to them in FY 1998 pursuant to the terms of these grants. Among the grants in the “Other Agencies” category going to the University of North Carolina are ones from EPA ($9 million), DOC ($3 million), and DOE ($2 million). The comparable grants going to Duke include $6 million from DOE and $1 million each from NASA, EPA, and the Department of Education. The grants in this same category going to NC State come from USDA ($9 million) and DOE, DOC, NASA, and EPA ($2 million each). Those going to NCA&T come mainly from USDA ($3 million) and NASA ($1 million).

Table 34.1 – Sources of Federal R&D Grants to Higher Education in North Carolina

<table>
<thead>
<tr>
<th>Institution</th>
<th>HHS</th>
<th>DOD</th>
<th>NSF</th>
<th>Other Agencies</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>U of NC</td>
<td>$151M</td>
<td>684</td>
<td>$11M</td>
<td>49</td>
<td>$12M</td>
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<tr>
<td>Duke</td>
<td>$158M</td>
<td>636</td>
<td>$16M</td>
<td>55</td>
<td>$14M</td>
</tr>
<tr>
<td>Wake Forest</td>
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<td>208</td>
<td>$1M</td>
<td>3</td>
<td>$1M</td>
</tr>
<tr>
<td>NC State</td>
<td>$8M</td>
<td>63</td>
<td>$11M</td>
<td>69</td>
<td>$10M</td>
</tr>
<tr>
<td>NCA&amp;T</td>
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<td>3</td>
<td>$1M</td>
<td>8</td>
<td>$1M</td>
</tr>
<tr>
<td>ECU</td>
<td>$3M</td>
<td>26</td>
<td>$1M</td>
<td>2</td>
<td>&lt;$1M</td>
</tr>
<tr>
<td>Other</td>
<td>$6M</td>
<td>69</td>
<td>$1M</td>
<td>8</td>
<td>$1M</td>
</tr>
<tr>
<td>Total</td>
<td>$383M</td>
<td>1,689</td>
<td>$41M</td>
<td>196</td>
<td>$39M</td>
</tr>
</tbody>
</table>

These activities are particularly significant because they fund much of the “basic research” so critical to expanding our knowledge and understanding of fundamental scientific phenomena. In addition, these funds account for a substantial portion of the dollars available each year to various academic departments within these institutions, such as the School of Medicine at Duke University.

Several other nonacademic institutions in North Carolina also receive a significant amount of federal R&D grants each year. Foremost among the institutions that received R&D grants in FY 1998 are Re-
search Triangle Institute in Durham ($36 million), the International Fertility Research Program in Durham ($15 million), and Technology Planning & Management Corp. in Durham ($3 million).

Scattered among these grants, as well as among the contracts discussed in the section below, are small business innovative research (SBIR) awards. These are special awards made by the SBIR programs supported by the 10 federal agencies with annual budgets for extramural R&D of more than $100 million. In a recent year, small businesses in North Carolina received 57 SBIR awards totaling $14 million. Examples include a $750,000 award from HHS to Andcare, Inc., in Durham for work on DNA probes for detection of gene disorders and a $750,000 award from DOE to Geophex, Ltd., in Raleigh to study passive and active low-frequency electromagnetic spectroscopy for airborne detection of underground facilities.

Also included among these grants are formula grants from federal agencies. Formula grants differ from the much more common project grants in that the money transmitted through formula grants is allocated to a state or one of its subdivisions in accordance with a distribution formula prescribed by law or regulation. Among the formula grants benefiting North Carolina are ones valued at more than $9 million from USDA’s Cooperative State Research, Education, and Extension Service (CSREES) to State Agricultural Experiment Stations, forestry schools, and veterinary colleges for the support of research in agriculture, forestry, and animal health and disease. Similarly, a modest formula grant goes from DOI’s USGS to the Water Resources Research Institute in North Carolina every year to foster research in water and water-related problems.

**Other Federal R&D Activities in North Carolina**

Several entities in North Carolina also receive notable sums in the form of contracts or cooperative agreements from federal agencies for specific R&D efforts. The majority of the funds go to Research Triangle Institute, which in FY 1998 received close to $48 million in R&D contracts for work on such efforts as assisting NASA laboratories in the development of nonaerospace uses for its technology, and
chemistry support for NIH/NIEHS National Toxicology Program environmental studies. In addition, Family Health International ($23 million), NSI Technology Services Corp. ($10 million), Digital Optics Corp. ($9 million), and MCNC ($7 million) received large R&D contracts from federal agencies in FY 1998. Note that these amounts are in addition to the federal R&D grants also received by Research Triangle Institute. The University of North Carolina ($39 million), Duke University ($20 million), NC State University ($3 million), and Wake Forest University ($3 million) also received contracts from various federal agencies to conduct R&D for the federal government. Although these amounts are notable, they do not come close to eclipsing the funds that these institutions receive from federal R&D grants.

A total of $16 million of federal R&D dollars was also received in FY 1998 by entities located in North Carolina in the form of cooperative agreements. By far the largest of these cooperative agreements ($5 million in FY 1998) came from the DOC Advanced Technology Program to IBM and the CIIMPLEX consortium to develop systems for the management of supply-chain enterprise coalitions. Other federal agencies awarding cooperative agreements to North Carolina–based entities include USDA and DOD.