Chapter 42
Federal Research and Development in South Carolina

- Approximately $205 million of federal R&D funds are spent each year in South Carolina.
- South Carolina ranks 38th among the 50 states, District of Columbia, and Puerto Rico in terms of the amount of federal R&D dollars received annually.
- Approximately 2 percent of all federal funds spent in South 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 42.1 – Sources of Federal R&D Dollars Spent in South Carolina
(Total Federal R&D ~$205 million)
BACKGROUND

In recent years, the federal government has spent in the neighborhood of $205 million annually in South Carolina on research and development (R&D) activities. On average, federal R&D dollars account for approximately 2 percent of all federal funds spent in South 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 South Carolina. Foremost among these agencies are the Departments of Energy (DOE), Defense (DOD), Health and Human Services (HHS), and Commerce (DOC), which account for 25, 24, 19, and 10 percent of all federal R&D dollars spent in the state, respectively. The Department of Agriculture (USDA) and the National Science Foundation (NSF) account for an additional 8 and 6 percent of all federal R&D dollars spent in South Carolina, respectively. The remaining federal R&D dollars come collectively from National Aeronautics and Space Administration (NASA), the Department of Interior (DOI), and several other federal agencies.42

All federal R&D dollars spent in South 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 South Carolina.

FEDERAL R&D UNITS IN SOUTH CAROLINA

Aiken, South Carolina, is home to DOE’s Savannah River Technology Center.

- The Savannah River Technology Center is a federally funded research and development center (FFRDC) sponsored by DOE and operated by Westinghouse. The center is the applied R&D

42 For a complete agency-by-agency breakdown of these R&D dollars, see Appendix C.
laboratory for the Savannah River Site, which is also owned by
DOE and operated by Westinghouse Savannah River Company,
LLC, and produced tritium for nuclear weapons during the
Cold War. The center now focuses on developing, testing, and
demonstrating equipment and techniques for processing nu-
clear materials; cleaning up and protecting the environment;
processing and stabilizing hazardous and radioactive waste ma-
terials; decontamination and decommissioning; and minimizing
the danger globally from nuclear proliferation. Specific R&D
activities focus on such areas as instrumentation, data acquisi-
tion, remote handling, robotics, modeling, experimental ther-
mal-fluids analysis, and material packaging and transportation.
Together with the Savannah River Site, this federally owned and
contractor-operated center annually receives approximately
$1.3 billion of core funding and conducts an estimated $49
million of specific R&D projects. While the overall Savannah
River site has about 16,000 employees, the FFRDC has about
500 employees. A portion of the center’s funds is spent on the
maintenance and operation of R&D equipment and facilities.

Charleston, South Carolina, is home to DOD’s Space and Naval War-
fare Systems Center Charleston, USDA’s U.S. Vegetable Laboratory and
Center for Forested Wetlands, DOC’s Charleston Laboratory, and a
Department of Veterans Affairs (DVA) R&D unit.

- The Space and Naval Warfare Systems Center Charleston is a
unit of DOD. It is a part of SPAWAR Command, located in San
Diego, California, and also has a West Coast counterpart unit in
San Diego. This center conducts R&D in the areas of com-
mand, control, communications, intelligence, surveillance, re-
connaissance, and navigation. Specific R&D activities of this
unit focus on sensors, image processing, air traffic control and
environmental effects, navigation, computer security, briefing
systems, and multifaceted communication pipelines. This fed-
eral unit annually receives about $19.5 million of federal R&D
funds, approximately $8.5 million of which are for in-house ac-
tivities, and has about 1,442 civilian personnel, only a portion of
whom are directly involved in R&D activities. Virtually all of these R&D funds are provided to the center on a reimbursable basis to cover the costs of work being done for a variety of units located throughout DOD and are therefore already reflected in amounts contained elsewhere in this report.

• The U.S. Vegetable Laboratory is a unit of USDA's Agricultural Research Service (ARS) located on the campus of Clemson University. It conducts research to solve national problems in vegetable crop production and protection with emphasis on the southeastern United States. Specific research activities of this laboratory include studies to improve genetic populations of vegetable crops by combining resistance to diseases and pests (insects, nematodes, and weeds) with favored quality and new product characters, and studies on disease and pest biology that can be used as a basis for the development and implementation of new management systems that rely on host resistance rather than conventional pesticides. This federal R&D unit annually receives approximately $2.6 million of federal R&D dollars and has about 33 FTEs.

• The Center for Forested Wetlands is a unit of the Southern Research Station inside USDA's Forest Service. It is on the Charleston campus of Clemson University. The center conducts research to develop, quantify, and synthesize ecological information needed to sustainably manage and restore the structure, functions, and productivity of forested wetland ecosystems through research and technology transfer in the areas of ecology, management, restoration, and landscape level modeling and assessments. Specific research activities of this center include ecological research, hydrology and water quality, landscape modeling and assessment, the Santee Experimental Forest, short rotation woody-crop production, silvicultural research, soil processes, wetland restoration, and wildlife habitat research. This federal R&D unit annually receives approximately $1.1 million of federal R&D funds and has about 25 employees.

• The Charleston Laboratory and the research ship Ferrel are units of DOC's National Oceanic and Atmospheric Adminis-
The laboratory includes the Center for Coastal Environmental Health and Biomolecular Research, which works closely with the portion of the Beaufort/Oxford Laboratory in Oxford, Maryland. The center conducts research on coastal ecosystems’ health, environmental quality, and related public health matters. In particular, it employs chemical, biomolecular, microbiological, and histological methods in both laboratory and field settings to describe, evaluate, and predict the controlling factors and outcomes of natural and anthropogenic influences in marine and estuarine habitats. The Ferrel collects coastal assessment data and monitors pollution to document the effects of human activities on the coastal and estuarine environments along the U.S. shoreline. Specific research activities of this unit focus on such matters as sampling water, conducting geologic surveys, taking bottom cores, surveying sediment quality, studying benthic macro invertebrates, conducting bathymetric surveys to study wave propagation, and conducting side scan sonar surveys to determine the biomass and bottom topography of several national marine sanctuaries. This federal unit annually receives approximately $5.5 million of federal R&D dollars and has about 65 FTEs.

- While the principal focus of the Ralph H. Johnson VA Medical Center in Charleston 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 168 projects with total funding of approximately $2 million. These R&D activities focus on a wide range of topics, including diabetes, lipid disorders, heart disease, hematology, fetal alcohol syndrome, kidney disease, and rheumatology.

Clemson, South Carolina, is home to the Department of Interior’s (DOI’s) South Carolina Cooperative Fish and Wildlife Research Unit and USDA’s Cotton Quality Research Station and Forest Service R&D Work Site.

- The South Carolina Cooperative Fish and Wildlife Research Unit is part of DOI’s U.S. Geological Survey (USGS). It was es-
established on the campus of Clemson University in 1998. It conducts research on management of natural resources. Specific research activities of this unit include developing quantitative techniques for the analysis of animal habitat selection, evaluating the effect of slow growth on the otolith size–fish size relationship in striped bass, and analyzing environmental assessment program data from the Carolinian provinces. Other research activities involve studying endangered species biology, examining avian biology, and conducting ecological analysis. This federal R&D unit annually receives approximately $203,000 of federal R&D funds and has about three FTEs.

• The Cotton Quality Research Station is a unit of USDA's ARS located on the campus of Clemson University. It conducts research on the different varieties and growths of cotton. Specific research activities of this station include the development of instruments for the objective measurement of the quality of cotton for marketing and utilization purposes, and measurement of the effects of cotton contaminants on the environmental safety and health of workers. This federal R&D unit annually receives approximately $1.8 million of federal R&D funds and has about 27 FTEs.

• The R&D Work Site at the Department of Forest Resources at Clemson University is a unit of the Southern Research Station inside USDA's Forest Service. It conducts research on habitat and population relationships of wildlife and plant species associated with fragmented and isolated forest communities. Specific research activities of this unit include determining how the red- cockaded woodpecker populations respond to habitat manipulation and the amount and distribution of habitat required to support a viable population and identifying the habitat requirements of Threatened and Endangered Species (TES). Other activities focus on determining how the longleaf pine–wiregrass communities respond to habitat perturbations, identifying the habitat requirements and responses to habitat alterations of neotropical migratory birds, developing models for projecting the viability of populations of TES species, and learning the
habitat requirements and life history characteristics of the en-
dangered northern flying squirrel in the southern Appalachians. This federal R&D unit annually receives approximately $780,000 of federal R&D funds and has about eight employees.

Columbia, South Carolina, is home to DOI's South Carolina District Office of Water Resources and a DVA R&D unit.

- The South 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 $1.7 million in federal R&D funds.

- While the principal focus of the William Jennings Bryan Dorn Veterans Hospital, the VA Medical Center in Columbia, 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 72 projects with total funding of approximately $700,000. These R&D activities focus on a wide range of topics, including hypertension, helicobacter pylori, congestive heart failure, and cerebrovascular disorders.

Florence, South Carolina, is home to USDA's Coastal Plains Soil, Water, and Plant Research Center.
• The Coastal Plains Soil, Water, and Plant Research Center is a unit of USDA’s ARS located on the Florence campus of Clemson University. It conducts both basic and applied research on soil, water, and plant management. Specific research activities of this center include studies on soil erosion, strength and fertility, improving cotton germplasm, and increasing both sustainability and competitiveness of crop production. This federal R&D unit annually receives approximately $2.2 million of federal R&D funds and has about 26 FTEs.

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

Every major institution of higher education in South 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, NSF, and DOE to individual faculty members and therefore ultimately inure to the benefit of such institutions as the University of South Carolina (U of SC), the Medical University of South Carolina (MUSC), Clemson University, and South Carolina State University (SCSU). The table below shows the number of R&D grants active in FY 1998, highlighting those made by HHS, DOD, NSF, and DOE to parties at these institutions and estimates of the total dollars transferred.

<table>
<thead>
<tr>
<th>Institution</th>
<th>HHS</th>
<th>DOD</th>
<th>NSF</th>
<th>DOE</th>
<th>Other Agencies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>#</td>
<td>Amount</td>
<td>#</td>
<td>Amount</td>
<td>#</td>
</tr>
<tr>
<td>MUSC</td>
<td>$33M</td>
<td>163</td>
<td>$10M</td>
<td>5</td>
<td>$1M</td>
<td>11</td>
</tr>
<tr>
<td>U of SC</td>
<td>$10M</td>
<td>58</td>
<td>$3M</td>
<td>14</td>
<td>$7M</td>
<td>103</td>
</tr>
<tr>
<td>Clemson</td>
<td>$1M</td>
<td>7</td>
<td>$4M</td>
<td>16</td>
<td>$3M</td>
<td>62</td>
</tr>
<tr>
<td>SCSU</td>
<td>&lt;$1M</td>
<td>1</td>
<td>&lt;$1M</td>
<td>1</td>
<td>&lt;$1M</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>$1M</td>
<td>6</td>
<td>&lt;$1M</td>
<td>1</td>
<td>$1M</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>$45M</td>
<td>235</td>
<td>$17M</td>
<td>37</td>
<td>$13M</td>
<td>192</td>
</tr>
</tbody>
</table>

Table 42.1 – Sources of Federal R&D Grants to Higher Education in South Carolina
to them in FY 1998 pursuant to the terms of these grants. Among the grants in the “Other Agencies” category going to Clemson University include $4 million from USDA and $1 million each from NASA and EPA. Most of the comparable grants going to the University of South Carolina are from EPA.

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.

Several other nonacademic institutions in South Carolina also receive federal R&D grants each year. Foremost among the institutions that received R&D grants in FY 1998 are the South Carolina Sea Grant Consortium in Charleston ($3 million), the South Carolina State Department of Health and Environmental Control (DHEC) in Columbia ($2 million), Blue Cross of South Carolina in Columbia ($1 million), and the South Carolina Research Authority (SCRA) in Columbia ($1 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 extra-mural R&D of more than $100 million. In a recent year, small businesses in South Carolina received ten SBIR awards totaling close to $1 million. Examples include a $400,000 award from NSF to Poly-Med, Inc., in Anderson for work on surface-modified, ultrahigh-strength polyethylene fibers and a $200,000 award from USDA to Southland Fisheries Corp. in Hopkins to study the indoor production of hybrid striped bass fingerlings.

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 South Carolina are ones valued at more than $4.9 million from USDA’s Cooperative State Research, Education, and Extensi-
sion 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 South Carolina every year to foster research in water and water-related problems.

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

Several entities in South Carolina also receive notable sums in the form of contracts or cooperative agreements from federal agencies for specific R&D efforts. The majority of these funds go to SCRA, which in FY 1998 received close to $7 million from DOD to support such efforts as the Navy’s National Shipbuilding Research Program. In addition, Fuentez Systems Concepts, Inc. ($3 million), DHEC ($2 million), and Radiological Assessments Corp. ($1 million) received significant 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 SCRA and DHEC. The University of South Carolina ($3 million) and Clemson University ($2 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 $24 million of federal R&D dollars was also received in FY 1998 by entities located in South Carolina in the form of cooperative agreements. The largest of these cooperative agreements ($4 million in FY 1998) came from DOE to the South Carolina Institute for Energy Studies (SCIES) at Clemson University for work on the Advanced Gas Turbine Systems Research Program. Other federal agencies awarding cooperative agreements to South Carolina–based entities include DOC and NSF.