Chapter 25
Federal Research and Development in Mississippi

- Approximately $322 million of federal R&D funds are spent each year in Mississippi.
- Mississippi ranks 30th among the 50 states, District of Columbia, and Puerto Rico in terms of the amount of federal R&D dollars received annually.
- Approximately 5 percent of all federal funds spent in Mississippi 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 25.1 – Sources of Federal R&D Dollars Spent in Mississippi
(Total Federal R&D ~$322 million)
BACKGROUND

In recent years, the federal government has spent in the neighborhood of $322 million annually in Mississippi on research and development (R&D) activities. On average, federal R&D dollars account for approximately 5 percent of all federal funds spent in Mississippi 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 Mississippi. Foremost among these agencies are the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and the Department of Agriculture (USDA), which account for 36, 26, and 20 percent of all federal R&D dollars spent in the state, respectively. The Departments of Commerce (DOC) and Health and Human Services (HHS) account for an additional 5 and 4 percent of all federal R&D dollars spent in Mississippi, respectively. The remaining federal R&D dollars come collectively from the National Science Foundation (NSF), the Department of Energy (DOE), and several other federal agencies.\(^\text{25}\)

All federal R&D dollars spent in Mississippi 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 Mississippi.

FEDERAL R&D UNITS IN MISSISSIPPI
Bay St. Louis, Mississippi, is home to NASA’s Stennis Space Center, DOD’s Naval Research Laboratory Research Site, and DOC’s Mississippi Laboratory.

- The John C. Stennis Space Center is a unit of NASA. It is directly involved in the static test firing of large rocket engines and

\(^\text{25}\) For a complete agency-by-agency breakdown of these R&D dollars, see Appendix C.
propulsion systems. The center also provides support for the Shuttle Test Program through operation and maintenance of facilities used for developmental testing of the Space Shuttle Main Engine and the Orbiter Main Propulsion Test Program. Additionally, it conducts research on terrestrial applications through the Earth Resources Laboratory, which develops research applications techniques, remote sensing systems, and Geographic Information Systems (GIS) for public and private applications. This federal facility annually receives a total of about $158 million, at least $61 million of which directly involves R&D efforts. The center has about 244 FTEs, only a portion of whom are involved in R&D activities. A substantial portion of its funds is spent on the maintenance and operation of R&D equipment and facilities. In a recent year, the center awarded over $11 million of R&D contracts, about $6 million of which were made to entities based in Mississippi.

- The Naval Research Laboratory Research Site is a unit of DOD. It is in the same complex as the Stennis Space Center and conducts R&D on a variety of oceanographic and atmospheric matters. The funding and staffing for this site are modest and are included in the figures presented for the main laboratory in the District of Columbia.

- The Mississippi Laboratory is a unit of the Southeast Fisheries Science Center inside DOC’s National Oceanic and Atmospheric Administration (NOAA). It conducts resource surveys of fish, endangered species, and marine mammals and performs research on fisheries gear. The laboratory also manages the Latent Resource Program and the Southeastern Area Monitoring and Assessment Program to collect, manage, and distribute fishery independent data. The laboratory is responsible for providing research vessels for NOAA research activities. It maintains two research vessels in Pascagoula for taking samples to estimate distribution, abundance, and trends of fishery resources. This federal unit annually receives approximately $3.5 million of federal R&D funds and has about 38 FTEs.
Jackson, Mississippi, is home to a Department of Veterans Affairs (DVA) R&D unit.

- While the principal focus of the Jackson 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 83 projects with total funding of approximately $700,000. These R&D activities focus on a wide range of topics, including neoplasms, sickle-cell anemia, anxiety disorders, and substance abuse.

Oxford, Mississippi, is home to USDA's National Sedimentation Laboratory and Natural Products Utilization Research Unit.

- The National Sedimentation Laboratory is a unit of USDA's Agricultural Research Service (ARS) located on the Oxford campus of Mississippi State University. It consists of three research divisions focusing on upland erosion processes, channel and watershed processes, and water quality and ecological processes. It conducts research on soil erosion and sediment delivery from upland areas, erosion and sedimentation in stream channels, the impact of sediment and other agricultural contaminants on the biological well-being of streams, and the loss of nutrients and agricultural chemicals from agricultural activities on the landscape. Specific research activities of this laboratory include transport and deposition of sediment; movement of chemicals on upland areas and in streams; the impact of agricultural practices, in-stream structures, and bank protection on these processes; water quality; and the ecological well-being of streams. This federal R&D unit annually receives approximately $7.8 million of federal R&D funds and has about 68 employees.

- The Natural Products Utilization Research Unit is part of USDA's ARS located on the campus of Mississippi State University. It conducts research on natural products for use in agricultural pest management, with emphasis on pest management agents derived from plants. Specific research activities of
this unit are focused on products for agricultural sectors that the agrochemical industry has little interest in, such as horticultural crops and aquaculture, and the development of medicinal plants as alternative crops. The funding and staffing for this federal R&D unit is included in those presented above for the National Sedimentation Laboratory.

Pascagoula, Mississippi, is home to DOC’s Mississippi Laboratory Pascagoula Facility.

- The Pascagoula Facility is a facility of the Mississippi Laboratory inside DOC’s NOAA. The laboratory is headquartered in Bay St. Louis. The facility is the home of two NOAA vessels used for research—the Oregon II and the Gunter. The research at the facility focuses on resource surveys of fish, endangered species, and marine mammals. Currently, the Pascagoula Facility supports the following surveys internally: bottom trawling, plankton, trap/video, mammals, trawl/acoustics, and aerial surveys. It also participates in the following external surveys: South Atlantic SEAMAP (trawling), MARMAP (shallow reef fish), and Caribbean SEAMAP (shallow reef fish). The facility also conducts gear technology studies aimed at developing fishing devices to reduce bycatch of unwanted or protected species. Current gear studies center around utilizing gear experts, communication with the fishing industry, conducting dive trips, and taking videos to assimilate information surrounding types of gear and impact on the resources. The funding and staffing information for this facility are included in those presented for the Mississippi Laboratory.

Pearl, Mississippi, is home to the Department of Interior’s (DOI) Mississippi District Office of Water Resources.

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 $1.9 million in federal R&D funds.

Poplarville, Mississippi, is home to USDA’s U.S. Small Fruits Research Station.

- The U.S. Small Fruits Research Station is a unit of USDA’s ARS located on the Poplarville campus of Mississippi State University. It conducts research on new and improved cultural and management practices for small fruit. Specific research activities of this laboratory include the development of new and improved small fruit cultivars adapted to the Gulf Coast states. This federal R&D unit annually receives approximately $1.1 million of federal R&D funds and has about 15 FTEs.

Saucier, Mississippi, is home to USDA’s Southern Institute of Forest Genetics.

- The Southern Institute of Forest Genetics is a unit of the Southern Research Station inside USDA’s Forest Service. The institute is headquartered in Saucier, with facilities in Huntsville, Alabama; College Station, Texas; and Gainesville, Florida. Many of its activities focus on the Harrison Experimental Forest, 25 miles north of Gulfport, Mississippi. The institute conducts research on the principles of heredity that operate in southern
forests and demonstrates how these principles may be applied to sustain and enhance forest quality and productivity. Specific research activities of this unit include developing population management strategies for southern pine ecosystems that will maintain or enhance genetic diversity in the long term and provide the basis for genetic improvement in the short term. Other activities include elucidating the genetic principles and evolutionary forces that influence genetic variation within and among forest species, understanding the molecular genetic organization and function of forest species, and developing strategies for the management of forests at risk to disease. This federal R&D unit annually receives approximately $1.8 million of federal R&D funds and has about 11 employees.

Starkville, Mississippi, is home to USDA's Mississippi State Research Center and Starkville Forestry Sciences Laboratory and DOI's Mississippi Cooperative Fish and Wildlife Research Unit.

- The Mississippi State Research Center is a unit of USDA's ARS located on the campus of Mississippi State University. It consists of three research divisions focusing on biological control and mass rearing, poultry, and crop science. The center conducts research on the production and use of natural enemies for control of agricultural pests and the improvement of poultry production efficiency and product quality. Specific research activities of the center include the development of in vivo and in vitro mass rearing methods and technology, including technology for harvesting, packaging, storage, and distribution of quality-assured natural enemies. This federal R&D unit annually receives approximately $7.5 million of federal R&D funds and has about 88 FTEs.

- The Starkville Forestry Sciences Laboratory is a unit of the Southern Research Station inside USDA's Forest Service. It conducts research on seed tree genetics, rural fires, and the role of termites in forest ecosystems. It is adjacent to Mississippi State University. Specific research activities of this unit include improving the protection of wood against damage; incorporating
remote sensing technology into the forest inventory process; screening and testing new and alternative compounds, materials, and treatment techniques for effective protection against damage caused by subterranean termites; and understanding the many risk factors that have allowed Formosan termites to survive standard termiticide treatments. This federal R&D unit annually receives approximately $4 million of federal R&D funds and has about 77 employees.

- The Mississippi Cooperative Fish and Wildlife Research Unit is part of DOI’s USGS. It is on the campus of Mississippi State University. It conducts research on forest and wildlife ecology. Specific research activities of this unit include studying how the neotropical landbird uses national forest lands; using gap analysis to study conservation and biodiversity in Mississippi; investigating the movement, spawning, and recruitment of Gulf coast strain walleye; and assessing tree frogs in Puerto Rico. This federal R&D unit annually receives approximately $245,000 of federal R&D funds and has about three FTEs.

Stoneville, Mississippi, is home to USDA’s Jamie Whitten Delta States Research Center and Southern Hardwoods Laboratory.

- The Jamie Whitten Delta States Research Center is a unit of USDA’s ARS located on the Stoneville campus of Mississippi State University. It consists of nine research divisions that focus on soybean production, southern insect management, cotton physiology and genetics, southern weeds, cotton ginning, catfish genetics, and application and production technology. Specific research activities include developing new equipment and technology to allow more precise application and placement of pesticides to specific sites without excessive drift; developing breeding strategies to genetically improve catfish for commercial production in the Mid-South; developing methods for augmenting parasite populations to manage insect pests of field crops; and developing sustainable integrated weed management systems for agronomic, horticultural, and aquatic crops. This federal R&D unit annually receives approximately $16.8 million of federal R&D funds and has about 172 FTEs.
The Southern Hardwoods Laboratory is a unit of the Southern Research Station inside USDA’s Forest Service. While it has long-term research sites Louisiana and elsewhere in Mississippi, its main facility, known as the Center for Bottomland Hardwoods, is at Stoneville. It conducts research on plant pathology, entomology, plant physiology, and dendrochronology. Specific research activities of this unit include research on the sustainable management of southern bottomland hardwood, wetland forests, and associated stream ecosystems; regeneration and reproductive biology; stand management, growth, and yield; ecology of aquatic and terrestrial fauna; and ecological processes and ecosystem restoration. Other activities focus on developing methods of collecting, conditioning, and storing eastern forest tree seeds that will generate and maintain high seed quality. This federal R&D unit annually receives approximately $3.2 million of federal R&D funds and has about 34 employees, 23 of whom are located in Stoneville.

Vicksburg, Mississippi, is home to DOD’s Waterways Experiment Station and DOI’s Vicksburg Field Station.

The Waterways Experiment Station is a unit of the Army Corps of Engineers inside DOD. It consists of the Coastal and Hydraulics Laboratory, the Environmental Laboratory, the Geotechnical Laboratory, the Information Technology Laboratory, and the Structures Laboratory and focuses on the civil engineering aspects of airfields and pavements, survivability and protective structures, and sustainment engineering. It conducts R&D on weapons effects; fighting positions; terrorist threat protection; structural hardening; fixed facility camouflage, concealment, and deception; bridge assessment and repair; vehicle/terrain interaction; military hydrology; lines of communications, construction, and repair; airfields and pavements; coastal engineering; coastal oceanography; littoral processes; hydraulic engineering; flood control and navigation; dynamic modeling and simulation; environmental impact; environmental restoration, aquatic plant control, zebra mussels, recreation, dredging,
and contaminated sediments; groundwater modeling; engineering geology; wetlands processes; environmental and geotechnical site characterization; ecosystem processes; reservoir, riverine, estuarine, and coastal water quality; mobility analyses; seismic response of structures; earthquake engineering; dredging and dredged material disposal; natural resources management; concrete technology; structural dynamics; and geotechnical engineering. This federal unit annually receives approximately $237 million of federal R&D dollars, about $146 million of which are spent on in-house activities, and has about 1,223 civilian personnel, only a portion of whom are involved in R&D activities. In 1999, the Waterways Experiment Station became part of the Engineer Research and Development Center, which also oversees laboratories in Hanover, New Hampshire; Champaign-Urbana, Illinois; and Alexandria, Virginia.

• The Vicksburg Field Station is a unit of the Patuxent Wildlife Research Center inside DOI’s USGS. It conducts research on migratory birds, waterfowl harvests, wildlife habitats, environmental contaminants, endangered species, and wildlife populations. Specific research activities of this unit include studying the status and trends of biological resources, the effects of ecological processes and human impacts on biological resources, the restoration and maintenance of sustainable ecological systems, and the management and transfer of natural resources information and technology. This federal R&D unit annually receives approximately $294,000 of federal R&D funds and has about three FTEs.

Federal R&D Grants to Mississippi Entities

Every major institution of higher education in Mississippi 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, USDA, and DOD to individual faculty members and therefore ulti-
mately inure to the benefit of such institutions as Mississippi State University (MSU), the University of Mississippi (U of Miss), Jackson State University (JSU), the University of Southern Mississippi (USM), and Alcorn State University. The table below shows the number of R&D grants active in FY 1998, highlighting those made by HHS, USDA, and DOD 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 MSU are ones from DOE ($4 million), NSF ($2 million), NASA ($1 million), and the Department of Education ($1 million). The comparable grants going to the University of Mississippi include $1 million each from EPA and NSF.

Table 25.1 – Sources of Federal R&D Grants to Higher Education in Mississippi

<table>
<thead>
<tr>
<th>Institution</th>
<th>HHS</th>
<th>USDA</th>
<th>DOD</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>
</tr>
<tr>
<td>MSU</td>
<td>&lt;$1M</td>
<td>8</td>
<td>$7M</td>
<td>196</td>
<td>$4M</td>
</tr>
<tr>
<td>U of Miss</td>
<td>$9M</td>
<td>66</td>
<td>&lt;$1M</td>
<td>1</td>
<td>$2M</td>
</tr>
<tr>
<td>JSU</td>
<td>$5M</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>&lt;$1M</td>
</tr>
<tr>
<td>USM</td>
<td>&lt;$1M</td>
<td>4</td>
<td>&lt;$1M</td>
<td>4</td>
<td>$3M</td>
</tr>
<tr>
<td>Alcorn</td>
<td>$1M</td>
<td>3</td>
<td>$1M</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>$1M</td>
<td>7</td>
<td>$1M</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>$16M</td>
<td>97</td>
<td>$9M</td>
<td>219</td>
<td>$9M</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 University of Mississippi Medical Center.

Several other nonacademic institutions in Mississippi also receive federal R&D grants each year. Foremost among the institutions that received R&D grants in FY 1998 are the Institute for Technology De-
velopment in Jackson ($3 million), the Mississippi/Alabama Sea Grant Consortium in Ocean Springs ($2 million), the Mississippi State Department of Health in Jackson ($1 million), and the Gulf Coast Research Laboratory in Ocean Springs ($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 extramural R&D of more than $100 million. In a recent year, small businesses in Mississippi received two SBIR awards totaling close to $125,000. These included a $70,000 award from NASA to Global Aircraft Corp. in Starkville for work on an innovative low-cost composite “spray-up toolings system” (STS) and a $55,000 award from USDA to TASKPRO, Inc., in Starkville to study the use of mechanical forces to control nonmicrobial enzymatic sapstain fungi.

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 Mississippi are ones valued at more than $5.9 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 Mississippi every year to foster research in water and water-related problems.

**Other Federal R&D Activities in Mississippi**

Several entities in Mississippi also receive notable sums in the form of contracts or cooperative agreements from federal agencies for specific R&D efforts. By far the majority of these funds go to the University of Mississippi, which in FY 1998 received close to $2.5 million, primarily in support of the Atherosclerosis Risk in Communities
(ARIC) program for HHS. In addition, Dimco, Inc. ($500,000), Sea Probe, Inc. ($300,000), and Seemann Composites, Inc. ($300,000), received significant R&D contracts from federal agencies in FY 1998. MSU ($2 million) and USM ($300,000) 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 these educational institutions receive from federal R&D grants.

A total of $14 million of federal R&D dollars was also received in FY 1998 by entities located in Mississippi in the form of cooperative agreements. The largest of these cooperative agreements ($3 million in FY 1998) went from NSF to MSU to operate the Engineering Research Center (ERC) for Computational Field Simulation. Other federal agencies awarding cooperative agreements to Mississippi-based entities include USDA and DOE.