



FY 2020-21 Budget Request

Economic Development and Natural Resources Subcommittee
of the S.C. House Ways and Means Committee
January 22, 2020

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Clemson Public Service Activities (PSA) is part of a **national network** of 50 major land-grant universities—one in each state—that work in concert with the USDA National Institute of Food and Agriculture. Clemson PSA has state and federal mandates to conduct research, extension and regulatory programs that **support economic growth in South Carolina’s largest industry** – agriculture and forestry, or agribusiness. Clemson PSA is made up of four interrelated units: Experiment Station, Cooperative Extension Service, Livestock-Poultry Health, and Regulatory Services. The overall agency mission is to conduct research, extension (knowledge transfer) and regulatory programs that:

- Advance the competitiveness of South Carolina’s \$42 billion agriculture and forestry industry
- Enhance the economic potential of rural communities
- Safeguard the food supply
- Preserve natural resources
- Prepare young people for the workforce through 4-H

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CLEMSON®

PUBLIC SERVICE ACTIVITIES

As a land-grant university, Clemson is part of a national system created by the U.S. Congress to improve the quality of life for citizens in every state through teaching, research and outreach. The university's statewide **Public Service and Agriculture (PSA)** network conducts research, outreach and regulatory programs that improve and protect economic prosperity and well-being for all South Carolina citizens. Clemson PSA programs develop and deliver impartial science-based information in five areas that align with the national land-grant university system and touch the life for every South Carolinian. Those areas are: agribusiness productivity and profitability; economic and community development; environmental conservation: food safety and nutrition; and youth development and families.

Clemson PSA includes:

Experiment Station

Consisting of six (6) research and education centers (RECs), Experiment Station develops relevant, research-based knowledge for agriculture, forestry and natural resources to enhance economic development

Cooperative Extension Service

Transfers science-based information on agriculture, forestry and natural resources to commercial producers and land managers, and individuals. Programs include agriculture, natural resources, food safety and nutrition, economic and community development, and 4-H youth development.

Livestock-Poultry Health and State Veterinarian

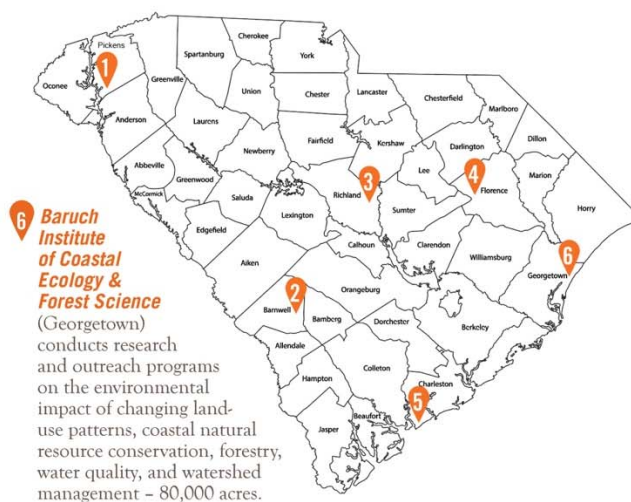
Serves as South Carolina's animal health authority, administers the state meat and poultry inspection program, and operates the state veterinary diagnostic center for livestock and companion animals.

Regulatory Services

Regulates the safe and legal use of pesticides, the quality of fertilizer and lime, the certification of seed purity and germination, the prevention and control of plant pests, and the certification of greenhouse and nursery plants as pest-free.

Research and Education Centers:

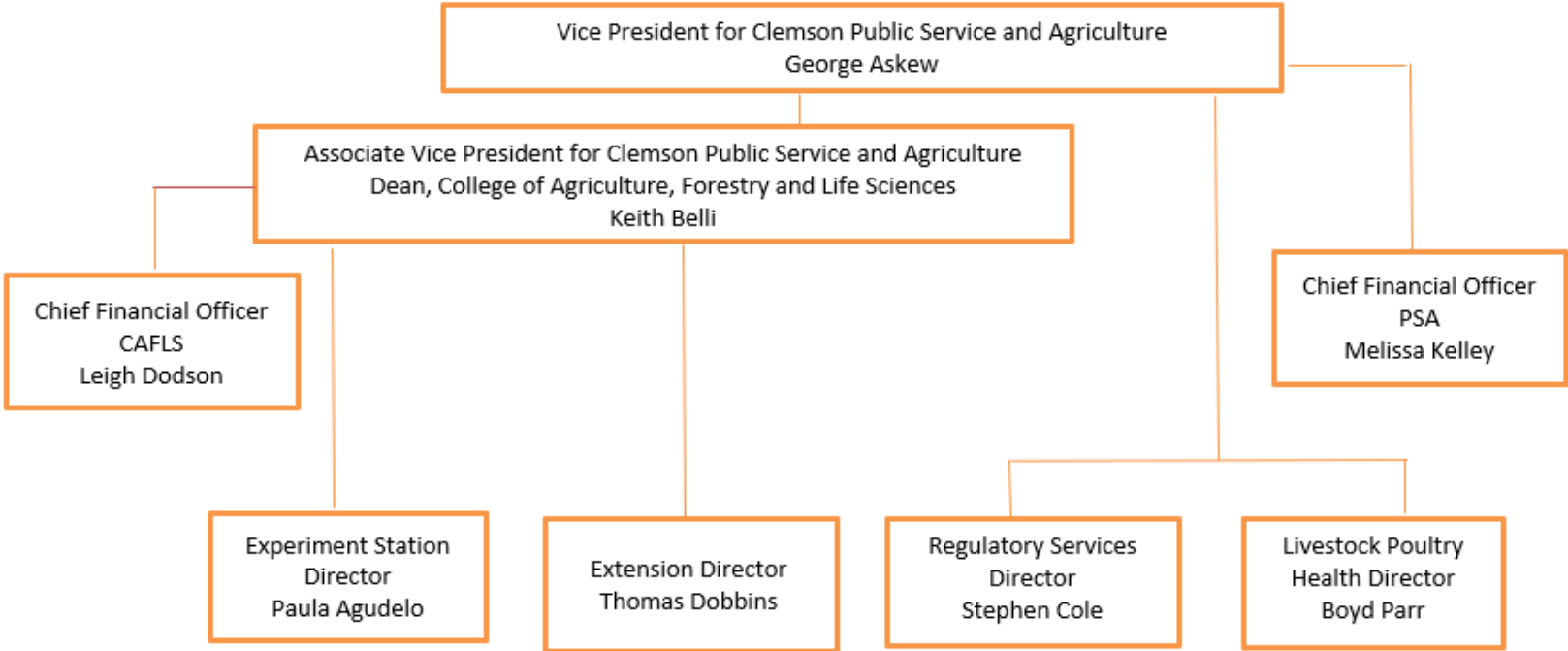
- 1 Simpson Research & Education Center** consists of all of the research farms located on and around Clemson University's main campus. The mission of the Simpson REC is to support agriculture research, teaching and public services of Clemson University.
- 2 Edisto Research & Education Center** (Blackville) conducts applied research and outreach programs on sustainable crop and livestock production systems, including cotton, soybeans, corn, peanuts, vegetables, small grains and beef cattle - 2,354 acres.
- 3 Sandhill Research & Education Center** (Columbia) conducts applied research and outreach programs on economic and community development, and environmental stewardship with an emphasis on building statewide collaborations to utilize resources more efficiently.
- 4 Pee Dee Research & Education Center** (Florence) conducts applied research and outreach programs on row crops to enhance yields through biotechnology and to reduce the environmental impact of crop production and golf course management - 2,300 acres.
- 5 Coastal Research & Education Center** (Charleston) conducts applied research and outreach programs for vegetables, strawberries and specialty crops in partnership with the USDA Vegetable Laboratory - 325 acres.



AGENCY NAME:	Clemson University PSA		
AGENCY CODE:	P200	SECTION:	45



PSA Organizational Chart



Clemson University - Public Service Activities FTE Summary

	State	Federal	Other	Total
Authorized	533.53	180.87	119.35	833.75
Vacant*	55.00	7.75	26.90	89.65
Filled*	478.53	173.12	92.45	744.10

* Clemson University PSA FTEs are combined with Clemson University E&G FTEs in the State HR system. The vacant and filled figures above are based on vacant positions within PSA, Extension and the College of Agriculture, Forestry and Life Sciences as of 9/30/19. This is reflective of approximately 14% of the university's total vacant positions. PSA Authorized FTES account for 19% of the university's total authorized FTEs.

PSA Accountability Report Summary

Regulatory Services

- **Fertilizer and Nursery Programs (Department of Plant Industry):** The Fertilizer Program collected 2,911 fertilizer samples with 268 samples (10.86%) being deficient. The target deficiency rate was 20%. Fertilizer tonnage was reported at 442,643 tons; a decrease of approximately 150,000 tons from FY18. All 600 hundred nursery growers and 362 nursery dealers were inspected.
- **Pesticide Programs (Department of Pesticide Regulation):** Compliance inspectors have collected pesticide application records for over 885 schools since mid-2013 which are reviewed by the Reduced Risk Specialist and logged for future reference. In FY19, the Reduced Risk Specialist provided 12 trainings for school districts across the state, attended by 458 school district employees and applicators contracted to perform pest control activities in 12 districts in the following categories: Commercial Lawn Care Operators (14), Non-Commercial Lawn Care Operators (5) and Commercial Pest Control Operators (14) were inspected .
- **Regulatory Agriculture Services Laboratories:** In FY19 the ASL processed 59,171 samples. The Plant and Pest Diagnostic Clinic processed 4,253 samples in FY19.

Livestock-Poultry Health

- Animal Health Programs personnel conducted 914 inspections at livestock auction markets, after-hours markets, dealers, farms, and miscellaneous sales sites such as flea markets. These inspections are part of the requirement for **maintaining the state's "disease free"** status and are coordinated with USDA.
- **Virulent Newcastle Disease (VND)** was discovered in backyard poultry in Southern California in the Spring of 2018 and efforts continue to try to eradicate VND from California and restore U.S. VND free status. **African Swine Fever (ASF)** continues its spread in Asia and Europe with devastating effects in China, home to 49% of the world's pigs. LPH is actively promoting management practices that reduce the likelihood of introduction, assure early detection and prepare robust response should VND, ASF or any other foreign or emerging diseases threaten SC livestock and poultry. The state veterinarian signed 252 letters this year certifying South Carolina's status for poultry enabling import to certain countries.
- As lead agency for **Emergency Support Function 17 (ESF-17)**, LPH coordinates agricultural/animal issues under the SC Emergency Operations Plan with a heavy reliance on PSA partners Regulatory Services and Cooperative Extension. Between September 9 and 28, 2018, the SC Emergency Operations Center (SCEOC) ESF-17 desk operations for Hurricane Florence required 922 man-hours and 8,455 miles driven by PSA employees for largely 24/7 operations at the SCEOC during activation.

Clemson Experiment Station

- As a leading land-grant public research institution, Clemson University highlights its federal **grant activities** in this report. The number of externally funded research grants is one measure of Experiment Station scientists' success in competing for limited funding. These data go along with the high number of educational programs and published peer-reviewed journal articles. In FY19 there were 377 proposals submitted by the Experiment Station and 95 technical contributions related to research.
- Over the past year, there has been increased focus on integrating the Research and Education missions of the Experiment Station. We highlight the increase in **graduate students**, many of them advised or co-advised by

faculty located at the Research and Education Centers (RECs). In FY19 there were 154 graduate students recruited and retained.

- The **Hunnicut Creek** project enables the monitoring of water sensor nodes deployed along the entire length of the creek as it crosses the university campus. This project establishes a model for other streams intertwined with urban environments. We are conducting research to improve **flood models** of the lower PeeDee and Waccamaw Rivers. This includes high resolution re-creation of Hurricane Florence flooding using markers placed in the field by our staff during the event, and surveying markers put out by citizens responding to social media posts. Improved flood models in the tidal areas of these river basins will provide better information for county management and the public to predict levels of risk.
- We have completed installation of Carbon Flux towers in clear-cut and mature forests. Carbon footprint data analyzed with economic models will inform forest landowners on how to combine forest management practices with **carbon markets**, potentially diversifying their income or tax credits. Likewise, our research demonstrates that our tidal freshwater forested wetlands produce as much aquatic carbon as mangroves and other highly productive tropical systems. This carbon provides the foundation for the aquatic food web that supports many of our coastal fisheries.
- Research on grafting watermelons and vegetable transplants have **increased disease resistance** and reduced transplant costs for SC Growers and allow them to produce crops in disease infested fields that were not usable before. **Weed control** in both conventional and organic production systems using robotic technology will result in increased productivity and profitability for growers.
- Research to improve yield monitors, variable rate seeding and pesticide applications, planting and harvesting equipment continues to increase productivity and profitability of row crop producers in South Carolina. Technologies such as variable rate well pumps and sensor-based irrigation systems maintain yields while minimizing **water use** for irrigation. In non-irrigated areas, our research continues to examine the impact of drought stress on crop rooting patterns in order to develop drought-tolerant lines.

Cooperative Extension Service

- In FY19 Clemson Extension launched **Land-Grant Press** that provides science-based, peer-reviewed publications written by Extension personnel and university scientists for professional stakeholder audiences. Land-Grant Press features expert content from the array of Clemson Cooperative Extension's public outreach programs and fulfills several critical needs including a centralized online repository of Extension publications and a rigorous and structured peer-review process to ensure the output of scholarly products.
- The **Master Pond Manager (MPM)** program, initiated in 2015, provides participants with the tools needed to develop an integrated pond management plan. To date, more than 270 people have participated in the class offerings, with more than 80 professionals certified as Master Pond Managers. Field days have rotated throughout the state, resulting in the installation of a series demonstration sites that showcase pond best management practices. Next steps for this program include the development of a series of "Short Course" special topic trainings, including a dam inspection and maintenance training developed in partnership with the SC Department of Health and Environmental Control and Natural Resource Conservation Service.
- The Extension Agribusiness Team continues to develop **farm risk management workshops** and deliver core programs for South Carolina farmers. Agriculture is experiencing a down cycle with the combination of low prices and a string of disasters four out of the last five years. Four different statewide programs were offered to help farmers and industry professionals manage production, marketing and policy risk: 3rd Annual SC Ag Outlook Conference (51 attendees); 20th Annual Executive Marketing Seminar (24 attendees); In-Service Agent Training & 5 Regional Workshops on ARC/PLC Program (over 200 attendees).



Authorization and Expenditures

Clemson University - PSA (P200)				
Total Authorization and Expenditures Comparison				
FY19 – FY20 YTD (11/30/19)				
	FY18-19		FY19-20	
	Authorized	Expended	Authorized	Expended YTD
Recurring General	\$ 43,521,749	\$ 43,521,729	\$ 46,722,293	\$ 16,522,444
Non-Recurring General	\$ 12,800,000	\$ 1,830,890	\$ 2,164,802	\$ 955,269
Federal	\$ 17,275,000	\$ 14,605,692	\$ 17,275,000	\$ 6,788,593
Other	\$ 23,395,568	\$ 15,161,168	\$ 23,395,568	\$ 6,260,710
Total Funds	\$ 96,992,317	\$ 70,304,782	\$ 89,557,663	\$ 30,527,015

Other Funds Fund Balance 6/30/19 - \$15,754,596

FY 20-21 Prioritized Budget Request Summary												
P200 - Clemson University - Public Service Activities												
BUDGET REQUESTS			FUNDING						FTEs			
Priority	Request Title	Description	General - Recurring	General - NR	Capital	Other	Federal	Total	State	Other	Federal	Total
1	Statewide Comprehensive Extension Program Support	The requested funds will provide needed resident county agent support for Clemson Cooperative Extension youth development and critical agriculture programs including, food safety and nutrition, commercial horticulture, agribusiness and emerging crops, and forage-based livestock.	\$ 1,127,250					\$ 1,127,250	8.00			8.00
2	Critical Fruit and Vegetable Research	The requested funds will be used to hire scientists and research technicians with expertise to support research that addresses key challenges to maintaining and increasing competitiveness of SC fruit and vegetable growers.	\$ 1,448,400					\$ 1,448,400	12.00			12.00
3	Statewide Forestry and Wildlife Extension	The requested funds will be used to hire and support resident faculty members at Clemson Research and Education Centers, Extension Associates and a Shooting Sports Coordinator. The funds will also be used to provide these personnel with technical support.	\$ 767,800					\$ 767,800	7.00			7.00
4	Federal Authorization Increase	The increased Federal funding will be utilized by Clemson University PSA to support: Federal Research projects, as approved by the Clemson University Experiment Station and USDA, Extension service as authorized under the Smith-Lever Act, and grant funded work for Livestock-Poultry Health as approved by appropriate Federal Funding Agencies.					\$ 2,750,000	\$ 2,750,000			39.00	39.00
5	Research and Education Center Graduate Housing	If fully funded, the \$4M request will develop new housing and renovate and expand existing housing at each of the Research and Education Centers		\$ 4,000,000				\$ 4,000,000				
6	Pee Dee Research and Education Center Greenhouses	If fully funded, the \$2M request will construct three new greenhouse facilities at the Pee Dee Research and Education Center (REC).		\$ 2,000,000				\$ 2,000,000				

FY 20-21 Prioritized Budget Request Summary

P200 - Clemson University - Public Service Activities

BUDGET REQUESTS			FUNDING						FTEs			
Priority	Request Title	Description	General - Recurring	General - NR	Capital	Other	Federal	Total	State	Other	Federal	Total
7	Sandhill REC Research and Extension Building Repair	If fully funded, the \$990,000 request will fund the renovation of a two-story building at Sandhill REC that was built in the 1920s.		\$ 990,000				\$ 990,000				
8	Facility Renovation for Water Research	Clemson PSA is requesting \$2 million in funding to complete a renovation that will make possible overall building repairs and renovations, and feature new laboratory equipment for water quality analysis, water sensor development and remote sensor monitoring, and new computer equipment and monitors that will allow water researchers to conduct virtual meetings, on-site trainings, and webinars across the state and with southeast partnering universities.		\$ 2,000,000				\$ 2,000,000				
9												
10												
TOTAL BUDGET REQUESTS			\$ 3,343,450	\$ 8,990,000	\$ -	\$ -	\$ 2,750,000	\$ 15,083,450	27.00	0.00	39.00	66.00

Statewide Extension Program Support
Recurring request: \$1,127,250

The requested funds will provide needed resident county agent support for Clemson Cooperative Extension youth development and critical agriculture programs including, food safety and nutrition, commercial horticulture, agribusiness and emerging crops, and forage-based livestock.

Statewide Operating and Support Funds: \$540,000

Clemson Cooperative Extension offices in all 46 South Carolina counties are open to the public for meetings with county agents who provide research-based information on youth development; agribusiness; agriculture; food, nutrition and health; and natural resources management. Our agents also provide workshops, programming and on-farm assistance requiring supporting materials and extensive travel. The requested will allow Clemson Cooperative Extension programming to keep pace with a South Carolina population growth

Forage-based Livestock Extension Faculty (1): South Carolina’s \$2.5 billion animal agriculture industry is under competitive pressure from out-of-state and international producers. South Carolina has the land and infrastructure to support increased forage-based livestock production by focusing on efficient management practices optimized for success in the state’s unique climate and pastureland.

Sustainable Agriculture Extension Agents (3): The Emerging and Sustainable Agriculture Program will provide research-based training and education to farmers engaged in the production of emerging and specialty crops including vegetables, industrial hemp, small livestock, locally-grown foods, USDA certified organic operations and Controlled Environment Agriculture projects.

Controlled Environment Agriculture Extension Agents (3): The South Carolina Department of Agriculture anticipates Controlled Environment Agriculture will expand in South Carolina driven by the demand for fresh, local, organic and sustainable vegetables, fruits, and herbs and efforts to minimize the need for open land irrigation. This area of agricultural production is a critical link between traditional agriculture and the state’s steadily urbanizing population.

Student Organic Farm Manager (1): The Clemson Student Organic Farm is a fully operational 6-acre certified organic demonstration, research, and education facility on Clemson’s campus that has achieved USDA Good Agricultural Practices certification governing food safety in the production and handling of produce.

Forage Specialist (PhD) (1 FTE)	\$ 130,500
County Agents (6 FTE)	\$ 391,500
Farm Manager (1 FTE)	\$ 65,250
Operational Support	\$ 540,000
Total (8 FTE)	\$1,127,250

FY20-21 Recurring Priority #2

Critical Fruit and Vegetable Research

Recurring request: \$1,448,400

Scientists at Clemson’s six Research and Education Centers (RECs) are driven to keep South Carolina farmers competitive on a national and global scale through research critical to maintaining economically viable and efficient crop production. Advancing the state’s fruit and vegetable economy requires agricultural scientists committed to conducting innovative research to meet fluctuating market demands and constituent needs. Clemson agricultural scientists are also the foundation of successful applications for research grants and contracts with the USDA, state commodity boards, Environmental Protection Agency and other key groups.

The requested funds will be used to hire scientists and research technicians with expertise to support research that addresses key challenges to maintaining and increasing competitiveness of SC fruit and vegetable growers.

Fruit and Vegetable production: Clemson scientists will strengthen the state’s specialty crop industry by improving yields through disease outbreak prevention and mitigation, and by developing improved cultural practices.

- Plant Disease Specialist: Address threats from crop diseases
- Vegetable Production Specialist: Improve production practices

Fruit and Vegetable safety and profitability: Clemson scientists will conduct research to protect food safety through each step in the food production and processing chain while developing marketing strategies and aiding in the development of crop policy.

- Post-harvest Specialist: Develop innovations in mechanization and post-harvest technologies
- Policy and Marketing Specialist: Improve profitability through crop policy and marketing

Fruit and Vegetable improvement and pest management: Strengthening scientific expertise in these areas will allow Clemson scientists to develop crop varieties optimized for South Carolina and Southeastern growing conditions and pest threats.

- Plant Breeder: Improve fruit and vegetable crop characteristics
- Plant Pest Specialist: Improve management of insect pests on fruits and vegetables

Six Technicians (one per researcher): Support research activities and increase research capacity.

Research Faculty (6 FTE)	\$ 783,000
Research Technicians (6 FTE)	\$ 365,400
Operational Support	\$ 300,000
Total (12 FTE)	\$1,448,400

FY20-21 Recurring Priority #3

Statewide Forestry and Wildlife Extension

Recurring request: \$767,800

According to a Clemson University study published in 2016, natural resource-based sectors contribute \$33.4 billion in economic activity annually to the South Carolina economy and are responsible for 218,719 jobs. Forests cover 13 million acres, including 7.2 million acres of private non-corporate forestland owned and managed by 207,000 family foresters.

South Carolina’s growing population and increased urbanization and the sustainable management of these natural resources requires robust research and an effective Extension programs designed to impart the latest science-based information to forestland owners across all regions of the state. Clemson PSA is seeking funding in the following specific focus areas:

Natural Resources Youth Program Director: Clemson Cooperative Extension’s 4-H Natural Resources and Environment Education Programs engage approximately 35,000 youth annually in methods for confronting some of the world’s most pressing problems, developing a love and respect for nature, becoming stewards of the environment and understanding the science behind the issues. The Natural Resources Youth Program Director will broaden the scope and strengthen the capacity of Clemson PSA’s natural resources youth programs.

Wildlife Management: Wildlife issues in the state have expanded beyond traditional hunting and fishing management to include human-wildlife interactions, invasive species, and economic development. Clemson PSA will expand its expertise to strengthen its ability to assist constituents in confronting wildlife problems, capitalizing on the economic impacts of hunting, fishing and tourism, and tackling challenges associated with the sustainable management of profitable recreational hunting game such as deer, turkeys and quail.

Specifically, funds will be used to hire and support resident faculty members at Clemson Research and Education Centers, Extension Associates and a Shooting Sports Coordinator. The funds will also be used to provide these personnel with technical support.

Director for Natural Resources Extension Programs (1 FTE)	\$130,500
Wildlife Expert (1 FTE)	\$130,500
Extension Associates – Statewide Program Coordinators (3 FTE)	\$261,000
Extension/Research Technical Support (2 FTE)	\$121,800
Extension Operation	\$124,000
Total (7 FTE)	\$767,800

Non-Recurring Priority #1



Research and Education Center Graduate Student Housing Request: \$4 million

Clemson PSA's six Research and Education Centers (RECs) are home to teams of scientists performing transformative research that helps build the South Carolina agribusiness economy, conserve the state's environment and natural resources, and improve the nutritional quality and safety of the food supply.

Clemson PSA has added 23 scientist positions over the last five years with the mission to help South Carolina farmers provide safe, affordable, and nutritious food for the state's citizens and stay competitive on a global scale.

In order to fulfill its research mission, Clemson PSA must add talented and accomplished graduate students, but housing for these graduate students is insufficient.

The ability to add graduate students to study and conduct research at off-campus RECs will expand the capability of our scientists to conduct research in all regions of the state and provide the state's agriculture and natural resource industry with Master's, Ph.D. and post-doctoral students trained to help address agricultural and natural resources problems facing South Carolina.

The requested funding will allow Clemson PSA to add new housing for students and visiting scientists and renovate and expand existing housing that is currently available at each of the RECs across South Carolina.

Construction of Additional Facilities	\$2 million
Repair and Renovate Existing Facilities	\$2 million
Total	\$4 million

Pee Dee REC Center Greenhouse Construction

Non-recurring request: \$2 million

Clemson's Pee Dee Research and Education Center (PDREC) is one of six RECs strategically located in each of South Carolina's unique climate and soil regions devoted to agricultural and natural resources research designed to support the state's agribusiness and forestry economies.

PDREC is home to Clemson's Advanced Plant Technology Program, which conducts high-tech research focused on creating new row crop cultivars with genetic traits optimized for South Carolina and Southeast growing conditions. These optimized plants are drought and pest tolerant and allow farmers to maximize crop yields while reducing inputs such as water, fertilizer and pesticides.

Research at Clemson's PDREC has resulted in a gluten-free wheat that will reduce sickness caused by gluten intolerance, a soybean cultivar that can be grown in extreme heat and drought, and other genetic advancements that will increase row crop yields and allow South Carolina farmers to sell their crops in new markets.

Existing greenhouse facilities at PDREC have been retrofitted but are still not suited for summer use, resulting in delayed research results in bringing optimized crops to the marketplace.

The requested funds will be used to build three research quality greenhouse facilities specifically designed to support Clemson's plant breeding programs and allow Clemson University scientists to continue making plant technology breakthroughs.

FY20-21 Non-recurring Priority #3

Sandhill REC Research and Extension Building Repairs Non-recurring request: \$990,000

Repair of 1920s Two-story Building for Research and Extension Offices

Sandhill Research in Education Center (REC) in Columbia, was established in 1926 to conduct agricultural research in the sandhill region of the state. Today, research efforts at the REC have evolved and expanded to continue to support the state’s \$41.7 billion agribusiness industry. Sandhill REC is also home to the growing Agribusiness Extension Program Team, focusing on farm risk management, commodity marketing, agriculture policy, local food systems development, small business planning and agritourism.

This request is to fund needed upgrades and repairs to one of the original 1920s buildings. As Clemson has achieved better integration of our research, Extension and regulatory activities at Sandhill REC, we are in need of additional office space. This historic building is strategically located and would be functional for many decades after this investment. Details and estimated costs of the required upgrades and repairs are listed below.

Elevator	\$ 180,000
HVAC	\$ 138,000
Exterior repairs	\$ 240,000
Main floor repairs	\$ 235,000
Lower level repairs	\$ 197,000
Total	\$ 990,000

Non-Recurring Priority #4



Facility Renovation for Water Research

Request: \$2 million

Clemson University's South Carolina Water Resources Center (SCWRC) is a multi-disciplinary, cross-college research organization focusing its research efforts on watershed study and management; water policy; remote water sensing, image analysis and technological innovation; water resources and population growth; and emerging water problems. Through its work, the SCWRC provides state agencies with information they need to make unbiased, research-based decisions about South Carolina water resources policy.

In FY18, Clemson PSA invested approximately \$330,000 to begin converting a near-campus building that formerly housed environmental toxicology research into a solid programmatic home for the SCWRC. The building includes laboratory and meeting space and features an ideal near-campus location for research, monitoring, analysis, and technical instruction. Renovations included replacing air conditioning units and adding meeting space and video conferencing technology.

In FY2018-19,, Clemson PSA requested \$7 million in one-time state funding and was allocated \$3 million. Clemson PSA is requesting \$2 million in funding to complete a renovation that will make possible overall building repairs and renovations, and feature new laboratory equipment for water quality analysis, water sensor development and remote sensor monitoring, and new computer equipment and monitors that will allow water researchers to conduct virtual meetings, on-site trainings, and webinars across the state and with southeast partnering universities.

Once renovated, the expanding team of water resources experts will be based in this building to conduct analytical water-related research, and provide research-based natural resources management outreach, instruction, and demonstration. The building's proximity to campus and research space will unify staff and create capacity for more collaborative research supported by grants and private funding.